

USER'S MANUAL

BCO-500-ADL

Semi-Rugged Fanless Mini Compute



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Prefaces

Revision

| Revision | Description | Date |
|----------|-----------------|------------|
| 1.0 | Manual Released | 2025/01/07 |

Disclaimer

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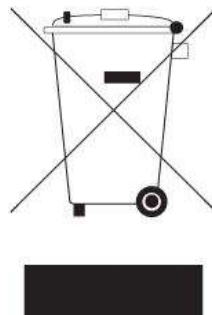
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Environmental Protection Announcement

Do not dispose this electronic device into the trash while discarding. Please recycle to minimize pollution and ensure environment protection.



Safety Precautions

Before installing and using the equipment, please read the following precautions:

- Put this equipment on a reliable surface during installation. Dropping it or letting it fall could cause damage.
- The power outlet shall be installed near the equipment and shall be easily accessible.
- Turn off the system power and disconnect the power cord from its source before making any installation. Be sure both the system and the external devices are turned OFF. Sudden surge of power could ruin sensitive components. Make sure the equipment is properly grounded.
- When the power is connected, never open the equipment. The equipment should be opened only by qualified service personnel.
- Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
- Disconnect this equipment from the power before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
- Avoid the dusty, humidity and temperature extremes.
- Do not place heavy objects on the equipment.
- If the equipment is not used for long time, disconnect it from the power to avoid being damaged by transient over-voltage.
- The storage temperature shall be above -30°C and below 85°C .
- The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
- If one of the following situation arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well or it cannot work according the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.

Technical Support and Assistance

1. Visit the Premio Inc website at www.premioinc.com where you can find the latest information about the product.
2. Contact your distributor, our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:
 - Model name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Conventions Used in this Manual

**WARNING**

This indication alerts operators to an operation that, if not strictly observed, may result in severe injury.

**CAUTION**

This indication alerts operators to an operation that, if not strictly observed, may result in safety hazards to personnel or damage to equipment.

**NOTE**

This indication provides additional information to complete a task easily.

Package Contents

Before installation, please ensure all the items listed in the following table are included in the package.

| Item | Description | Q'ty |
|------|-----------------------------------|------|
| 1 | BCO-500-ADL Fanless Mini Computer | 1 |
| 2 | Accessory Kit | 1 |

Ordering Information

| Model No. | Product Description |
|---------------------|--|
| BCO-500-ADL-2L-N97 | Semi-Rugged Fanless Mini Computer with Intel® Alder lake N97, QC, 12W Processor, 1x DP, 1x HDMI, 4x USB, 2x LAN |
| BCO-500-ADL-2L-N305 | Semi-Rugged Fanless Mini Computer with Intel® Alder lake N305, QC, 15W Processor, 1x DP, 1x HDMI, 4x USB, 2x LAN |

Optional Accessories

| Model No. | Product Description |
|---------------|--|
| 1-E09A06008 | Adapter AC/DC 12V 5A 60W with 3pin Terminal Block Plug 5.0mm Pitch |
| 1-TPCD00005 | Power Cord, 3-pin US Type, 180cm |
| 1-TPCD00002 | Power Cord, European Type, 180cm |
| 1-TPCD00001 | Power Cord, 3-pin UK Type, 180cm |
| 3-BC5AD110S10 | Din Rail Mounting Kit |

Chapter 1

Product Introductions

1.1 Overview

Premio Basic Fanless Embedded Systems are designed for entry-level applications and basic needs. The BCO series can oversee connected devices and manage the collection, storage, and transmission of sensor data, and is capable of distilling unexplored value in data. It is not only robust and can withstand dust, shock, and vibration, but also can suitable for industrial automation, industrial control, kiosk & retail, and digital signage (without high demand in graphics).



Key Features

- Support Intel® G Alder Lake N97 / N305 Processor
- 1x 262-Pin DDR5 4800MT/s SO-DIMM. Max. up to 16GB
- Dual Independent Display by 1x Display Port, 1x HDMI
- 2x Intel® I225-V 2.5GbE LAN
- 1x M.2 B-Key, 1x M.2 E-Key
- 2x COM, 4x USB 3.2 Gen 2, 1x Line-out
- 12 to 36VDC Wide Range Power Input Supporting AT/ATX Mode
- Wide Operating Temperature -10°C to 50°C
- TPM 2.0 Supported
- CE, FCC Class A, UL

1.2 Hardware Specification

System

Processor

- 12th Gen Intel® IoTG Alder Lake-N Processor N97, QC, 12W
- 12th Gen Intel® IoTG Alder Lake-N Processor N305, QC, 15W

| | |
|----------------|---|
| System Chipset | SoC integrated |
| LAN Chipset | 2 x Intel® I225-V 2.5GbE LAN |
| Audio Codec | Realtek ALC897 |
| System Memory | 1x 262-Pin DDR5, 4800MHz SO-DIMM, Max. up to 16GB (Non-ECC) |
| BIOS | AMI UEFI BIOS |
| Watchdog | Software Programmable Supports 1~255 sec. System Reset |
| TPM | TPM 2.0 |

I/O

| | |
|-------------|---|
| DisplayPort | 1x DisplayPort |
| HDMI | 1 x HDMI |
| COM | 2x DB9 COM1: RS232/422/485 COM2: RS232 |
| LAN | 2x RJ45 2.5GbE LAN Ports Connectors |
| USB | 4x USB 3.2 Gen 2 |
| Audio | 1x Line-out |
| Others | 6x Antenna Holes (optional) 1x Power button 1x DC in Power Jack |

Display

| | |
|------------------|---|
| DisplayPort | 1x DisplayPort 1.4a Max Resolution 4096 x 2304 @60Hz |
| HDMI | 1x HDMI 1.4b Max Resolution 3840 x 2160 @30Hz |
| Multiple Display | 2x Independent Displays |

Storage

| | |
|-----|---|
| M.2 | 1 x M.2 B Key (SATA/PCIe x1), 2242/3042 for NVMe/SATA support |
|-----|---|

Expansion

| | |
|-----|---|
| M.2 | • 1 x M.2 E Key (PCIe x1, USB 2.0), 2230 for Wifi/Bluetooth |
|-----|---|

Power

| | |
|----------------------|-----------------------|
| Power Adapter | Optional Adapter 60W |
| Power Mode | AT, ATX (Default ATX) |
| Power Supply Voltage | 12~36VDC |
| Power Connector | DC in Power Jack |

Operating System

| | |
|---------|---------------|
| Windows | Windows 10/11 |
| Linux | Linux kernel |

Environment

| | |
|-------------------|---|
| Operating Temp. | -10°C to 50°C (12W/15W CPU) |
| Storage Temp. | -30°C to 85°C |
| Relative Humidity | 10% to 95% (non-condensing) |
| Certification | CE, FCC Class A, UL |
| Vibration | IEC60068-2-64:2008 With SSD: 5 Grms (5 - 500 Hz, 0.5 hr/axis) Designed to comply with MIL-STD-810G Method 514.7 Procedure I |
| Shock | IEC60068-2-27:2008 With SSD: 50G half-sin 11ms Designed to comply with MIL-STD-810G Method 516.7 Procedure I |

Physical

| | |
|--------------|---|
| Construction | Extruded Aluminum with Heavy Duty Metal |
| Dimension | 225 (W) x 130 (H) x 41 (D) mm |
| Weights | 3KG |
| Mounting | Wall Mounting |

*All specifications and photos are subject to change without notice.

1.3 System I/O

BCO-500-ADL

Front Panel

USB 3.2 Gen 2 port (10 Gbps)

Used to connect USB 3.2 device

DisplayPort

Used to connect a DisplayPort monitor

HDMI port

Used to connect a HDMI monitor or connect optional split cable for dual display mode

DC IN

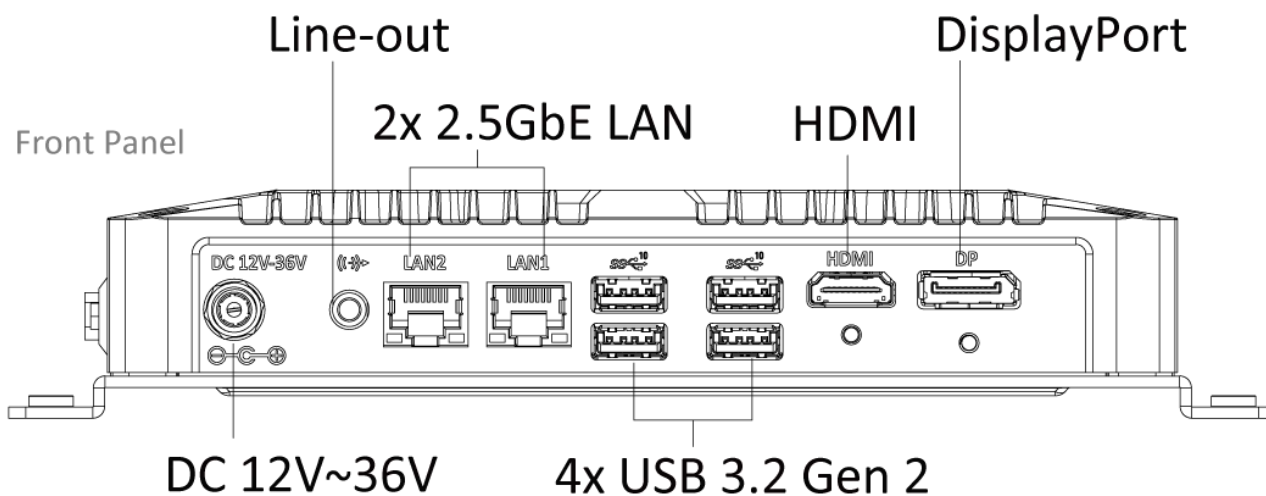
Used to plug a DC power input with terminal Block

LAN port

Used to connect the system to a local area network

Line-out

Used to connect a speaker

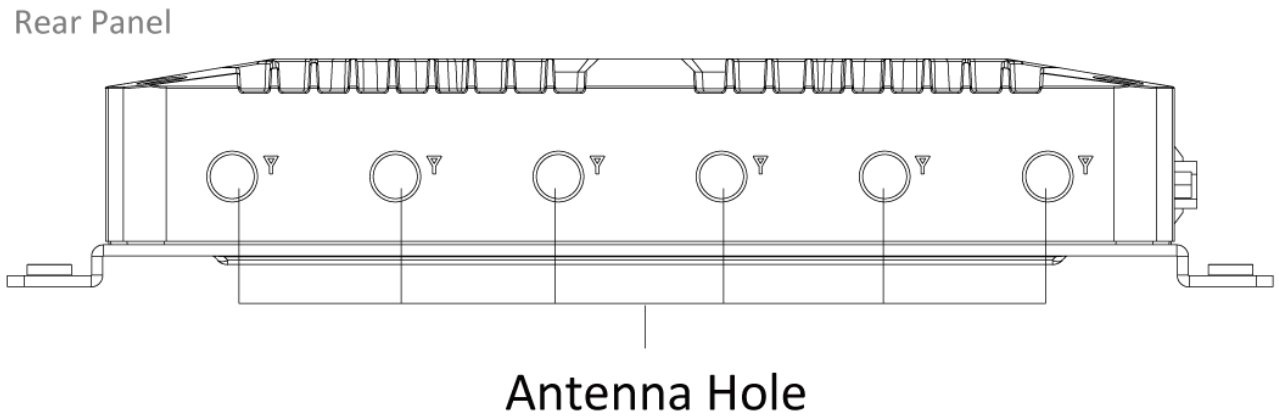


BCO-500-ADL

Rear Panel

Antenna hole

Used to connect an antenna for optional Mini-PCIe WiFi module



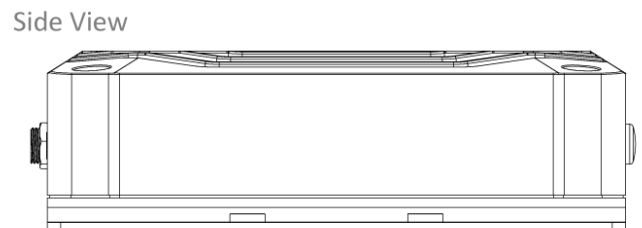
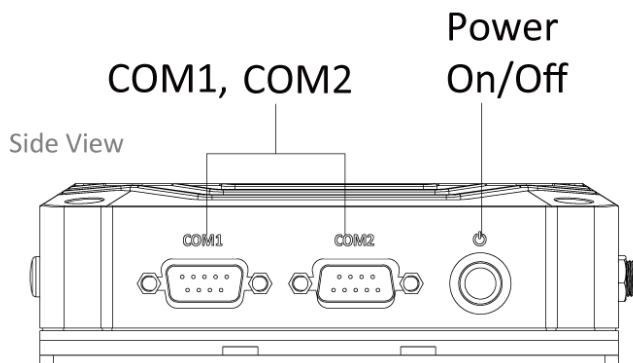
Side View

COM port

COM1 ~ COM2 support RS232/422/485 serial device

Power On/Off

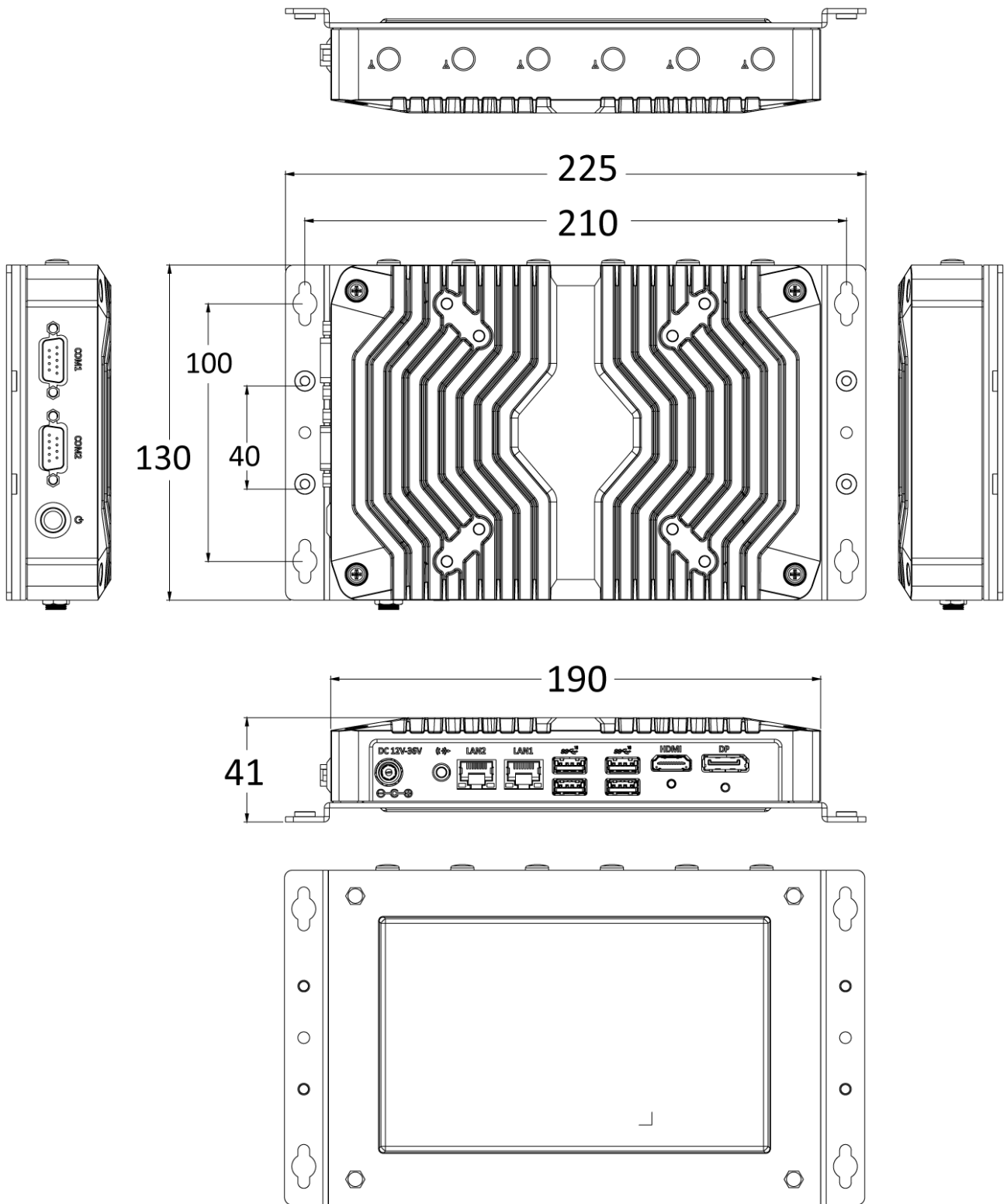
Press to power-on or power-off the system



1.4 Mechanical Dimensions

BCO-500-ADL

Unit: mm

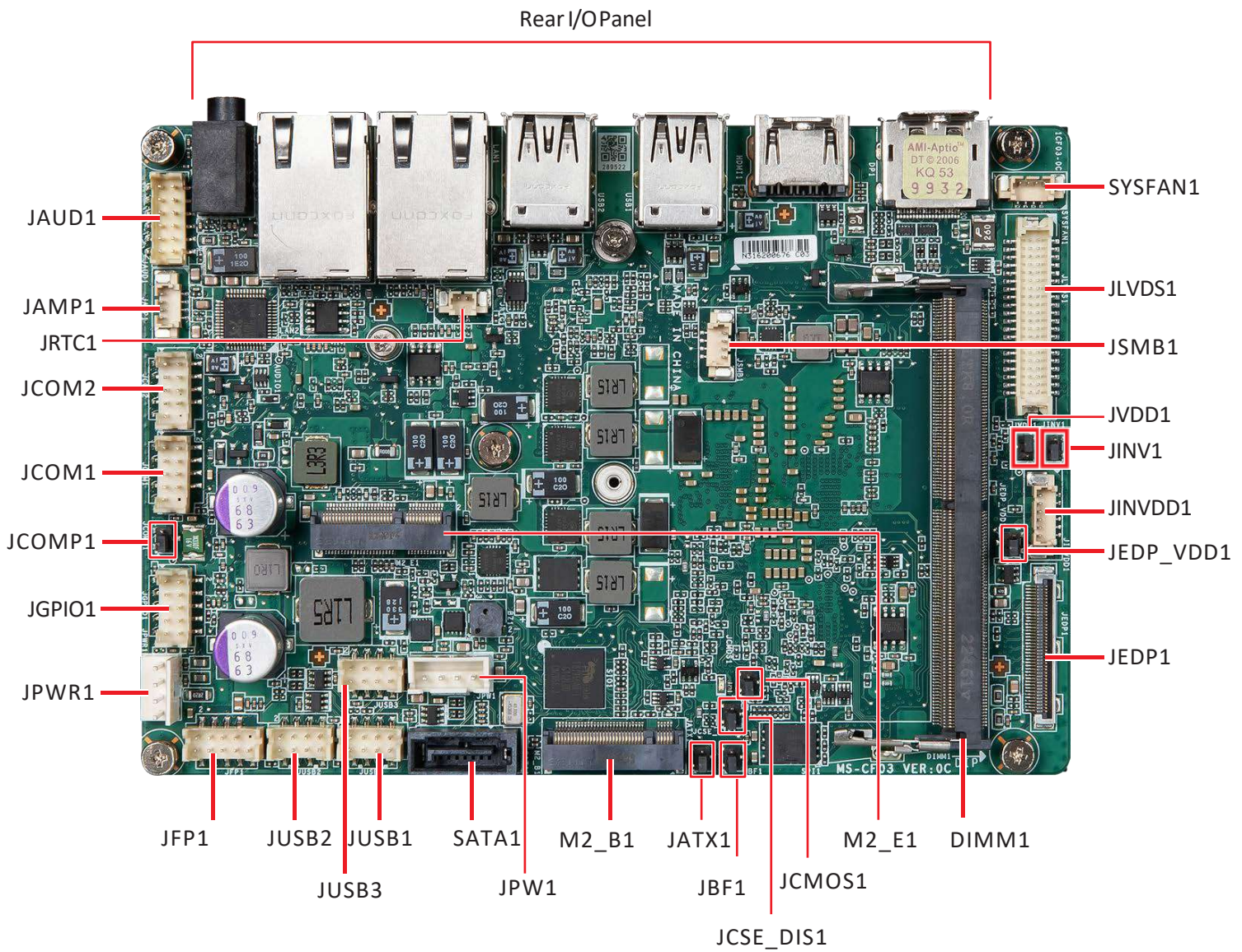


Chapter 2

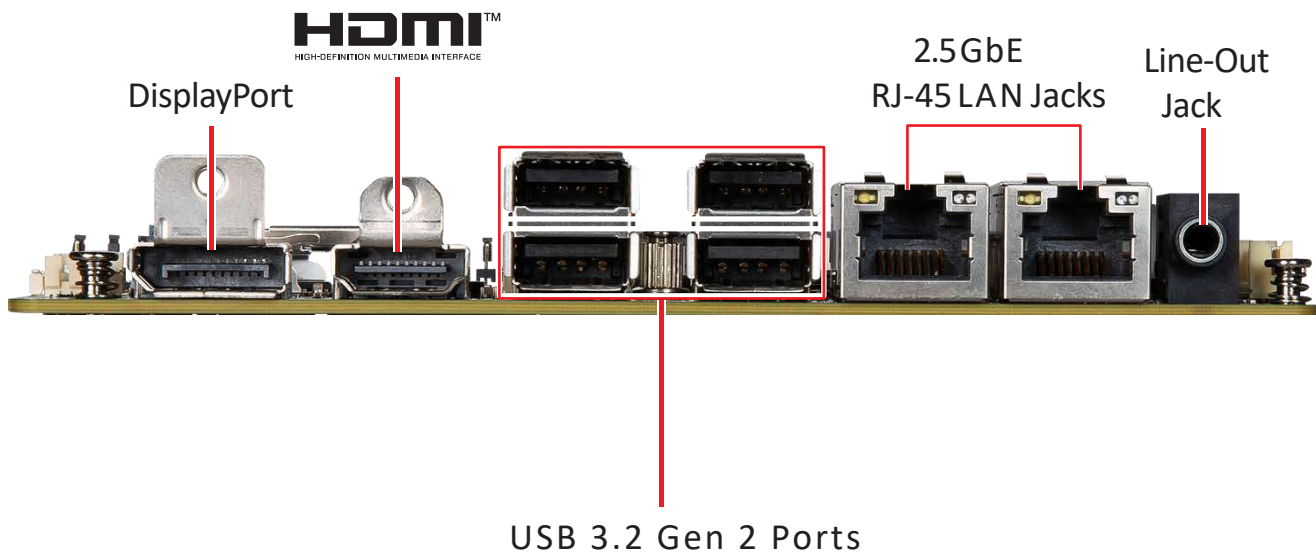
Mechanical Specifications

2.1 Switch and Connector Locations

2.1.1 TopView



2.1.2 Rear I/O Panel



DisplayPort

DisplayPort is a digital display interface standard. This connector is used to connect a monitor with DisplayPort inputs.

HDMI™ Connector

The High-Definition Multimedia Interface (HDMI™) is an all-digital audio/video interface capable of transmitting uncompressed streams. HDMI™ supports all TV format, including standard, enhanced, or high-definition video, plus multi-channel digital audio on a single cable.


USB 3.2 Gen 2 Port

USB 3.2 Gen 2, the **SuperSpeed USB 10Gbps**, delivers high-speed data transfer for various devices, such as storage devices, hard drives, video cameras, etc.

2.1.3 2.5 GbE RJ-45 LAN Jack

2.5 GbE RJ-45 LAN Jack

The standard single RJ45 LAN jack is provided for connection to the Local Area Network (LAN). You can connect a network cable to it.

| Link/ Activity LED | |  | Speed LED | |
|--------------------------------|---------------|---|------------|-------------|
| Status | Description | | Status | Description |
| <input type="radio"/> Off | No link | <input type="radio"/> Off | 10/100Mbps | |
| <input type="radio"/> Yellow | Linked | <input type="radio"/> Green | 1000 Mbps | |
| <input type="radio"/> Blinking | Data activity | <input type="radio"/> Orange | 2.5Gbps | |

⚠ Important

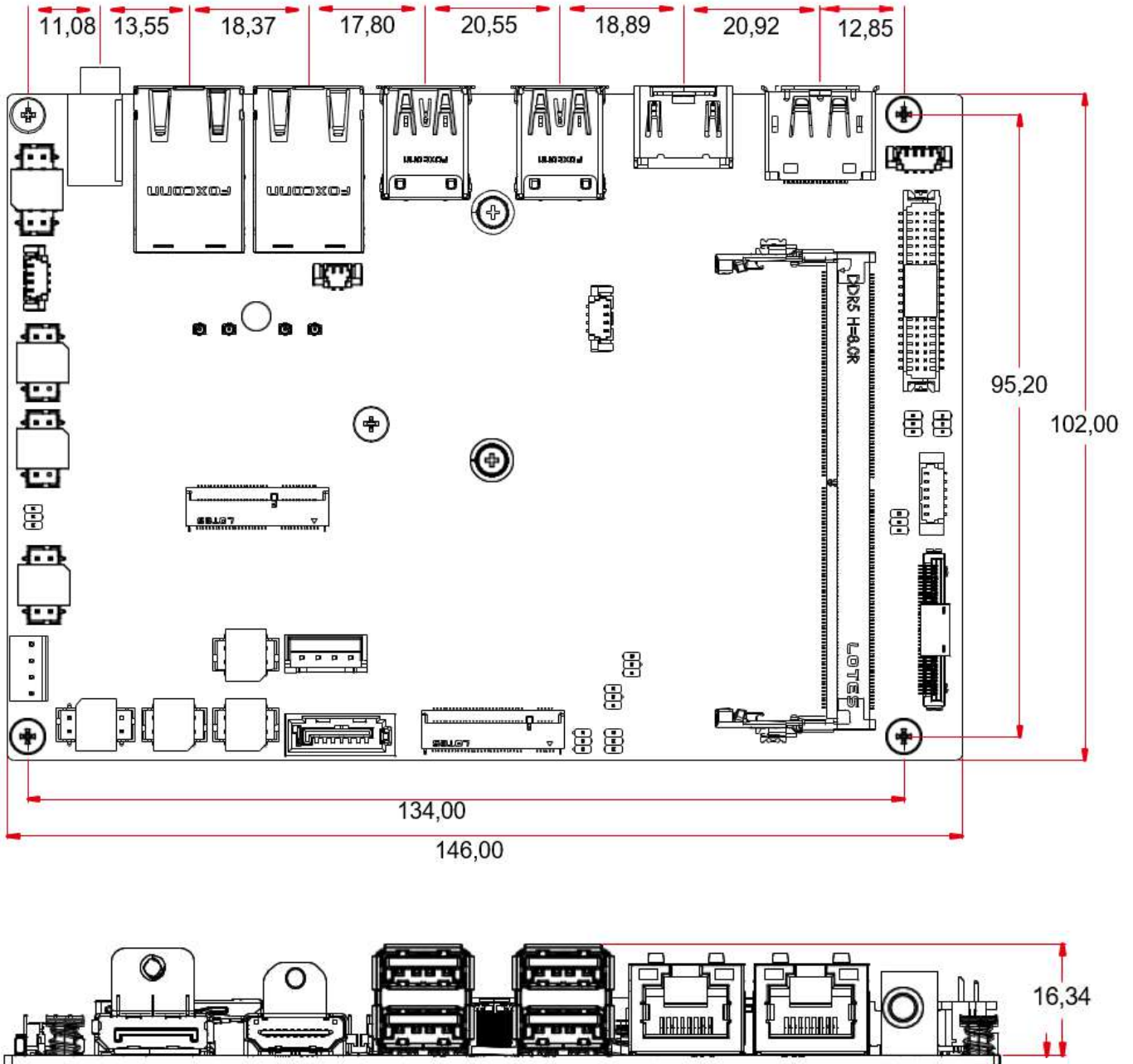
High-speed devices are recommended for USB 3.2 ports whereas low-speed devices, such as mouse or keyboard, are suggested to be plugged into the USB 2.0 ports.

Line-Out Jack

This connector is provided for headphones or speakers.

2.1.4 Board Dimension

Unit: mm



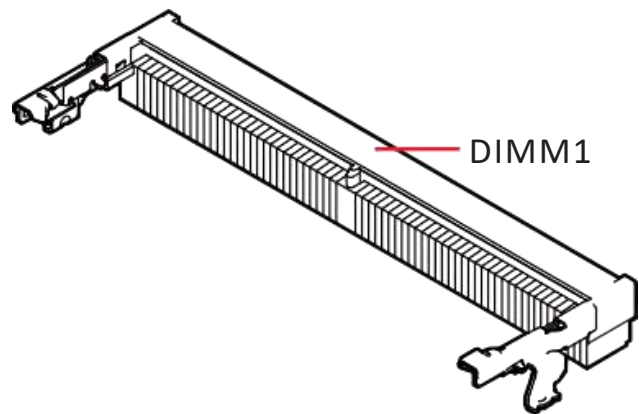
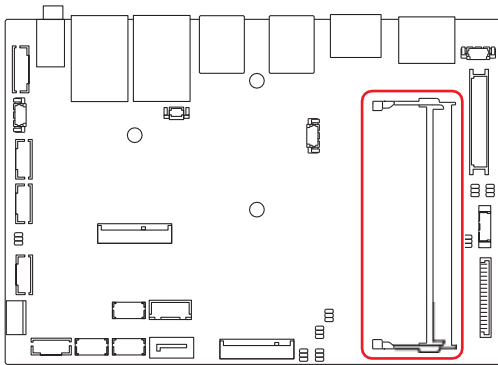
2.2 Component Contents

| Component | Component |
|---|--------------------------------------|
| Memory | JLVDS1: LVDS Wafer Connector |
| DIMM1: DDR5 SO DIMM Slot | JINVDD1: LVDS Inverter Box Header |
| Storage | JEDP1: eDP Connector |
| M2_B1: M.2 Slot (B Key, 2242, 3042, 2280) | Other Connectors |
| Expansion Slots | SYSFAN1: P W M System Fan Box Header |
| M2_B1: M.2 Slot (B Key, 2242, 3042, 2280) | JFP1: Front Panel Connector |
| M2_E1: M.2 Slot (E Key, 2230) | JCOM1, JCOM2: COM Port Box Headers |
| Connectors | JGPIO1: GPIO (DIO) Box Header |
| Power Connectors | JUSB1~3: USB 2.0 Box Headers |
| JPWR1: 4-Pin DC-In Main Power Connector | JSMB1: SMBus Box Header |
| JPW1: 4-Pin SATA Power Connector | JRTC1: CMOS Battery Header |
| Audio Connectors | Replacing CMOS battery |
| JAUD1: Front Audio Header | Jumpers |
| JAMP1: Audio Amplifier Header | |
| Graphics Connectors | |

Memory

DIMM1 : DDR5 SO DIMM Slot

The SO-DIMM slot is intended for memory modules.



Installing DDR5 Memory

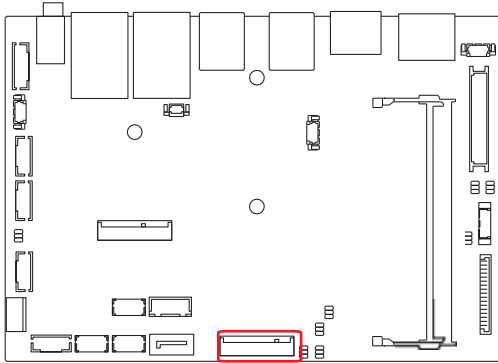
1. Locate the SO-DIMM slot. Align the notch on the DIMM with the key on the slot and insert the DIMM into the slot.
2. Push the DIMM gently downwards until the slot levers click and lock the DIMM in place.
3. To uninstall the DIMM, flip the slot levers outwards and the DIMM will be released instantly.

Important

- You can barely see the golden finger if the DIMM is properly inserted in the DIMM slot.
- To ensure system stability for Dual channel mode, memory modules must be of the same type, number and density.

M2_B1 : M.2 Slot (B Key, 2242, 3042, 2280)

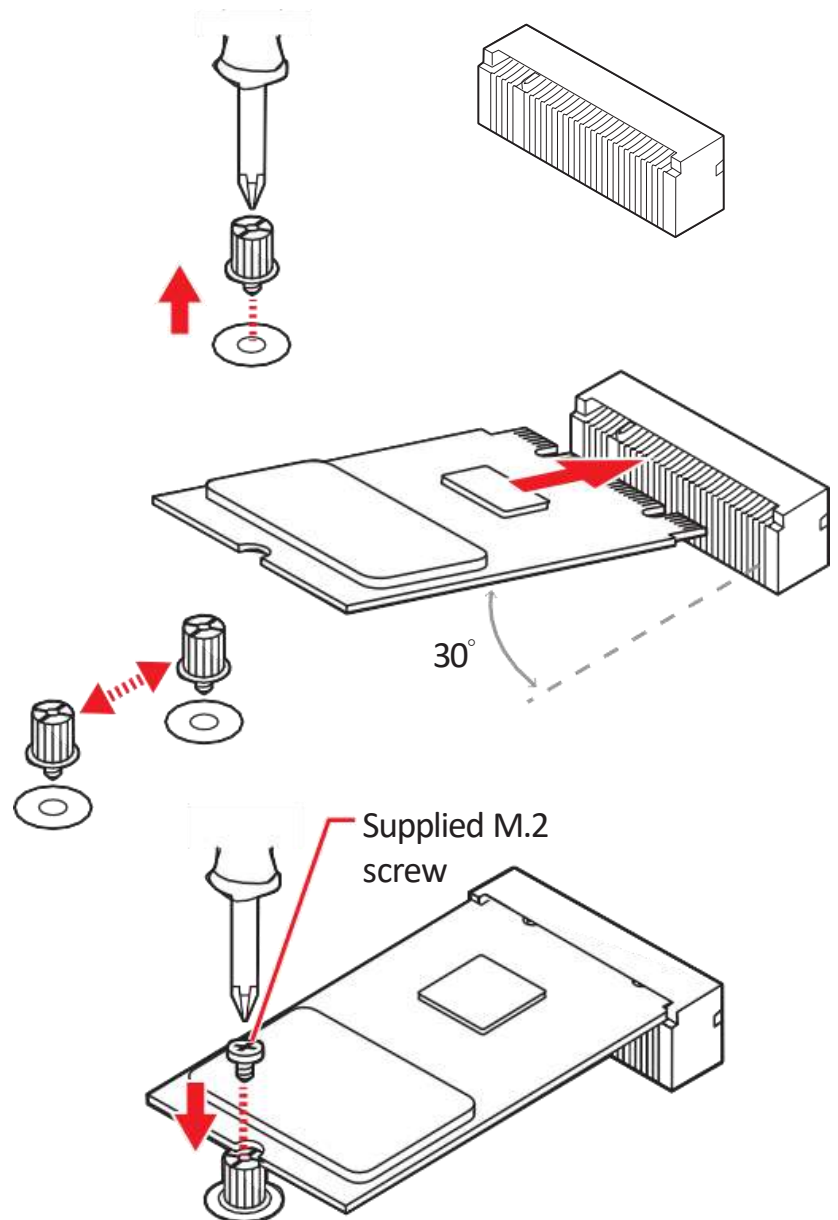
Please install the solid-state drive (SSD) into the M.2 slot as shown below.

**Feature**

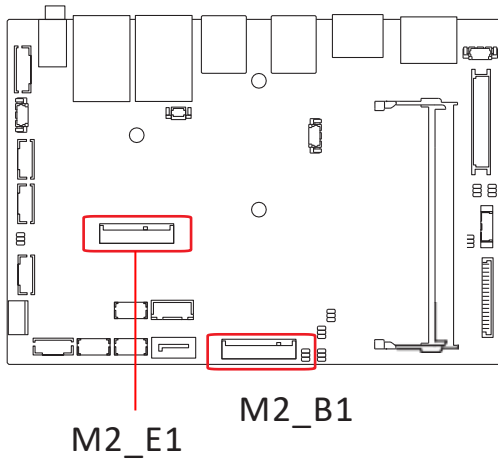
- Supports SATA 3.0 signal.
- Supports B+M Key SATA 3.0 SSD.

Installing M.2 SSD

1. Loosen the M.2 riser screw from the motherboard.
2. Set the M.2 riser screw at the appropriate location based on the length of your M.2 SSD.
3. Insert your M.2 SSD into the M.2 slot at a 30-degree angle.
4. Secure the M.2 SSD in place with the supplied M.2 screw.



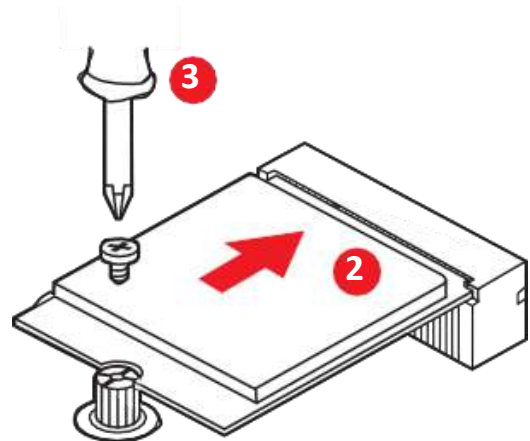
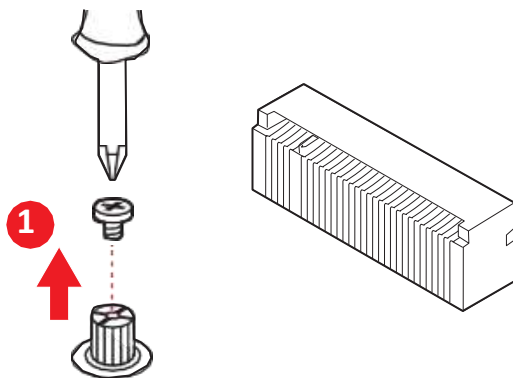
Expansion Slots



Expansion Slots

M2_B1: M.2 Slot (B Key, 2242, 3042, 2280)

Please install the module card into the M.2 slot as shown below.

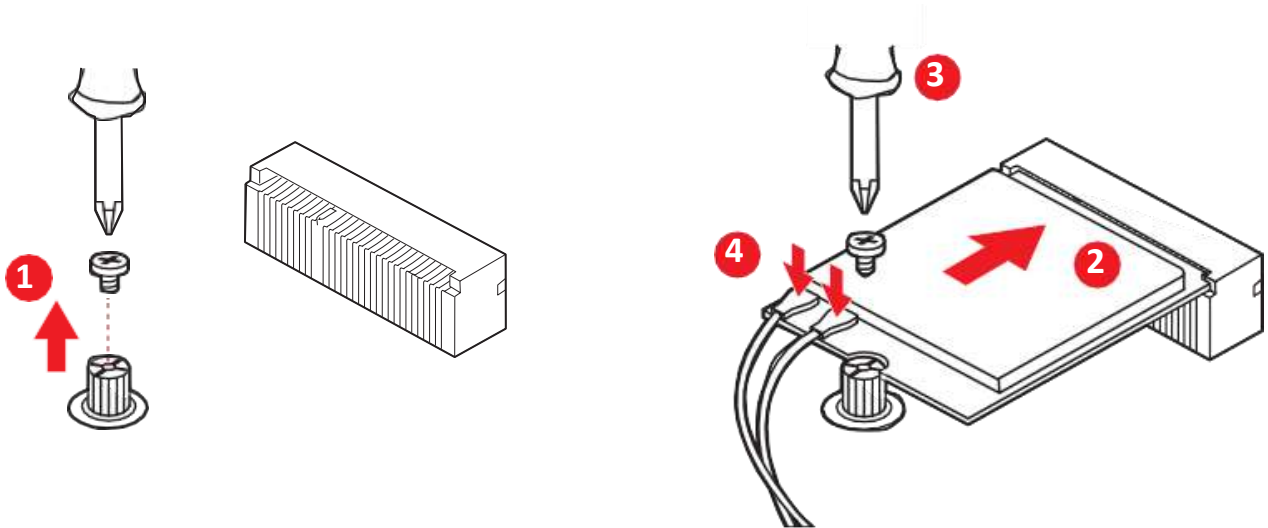


Feature

- Supports PCIe x1 signal.
- Supports B+M key PCIe x1 module.

M2_E1: M.2 Slot (E Key, 2230)

Please install the Wi-Fi/ Bluetooth card into the M.2 slot as shown below.

**Feature**

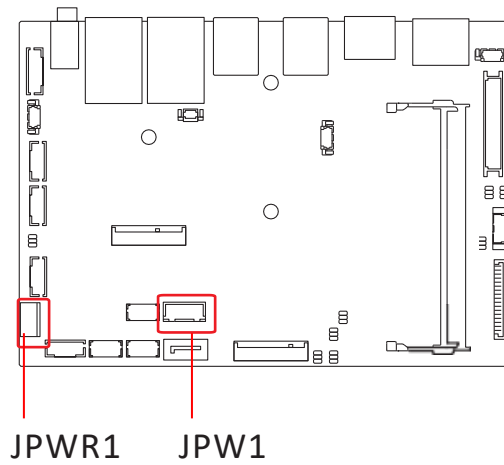
- Supports PCIe x1 & USB 2.0 signal.
- Supports Intel® Wi-Fi 6E AX210 + BT 5.2 wireless card.

⚠ Important

When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

Connectors

Power Connectors



JPWR1: 4-Pin DC-In Main Power Connector

This connector allows you to connect an power supply.

| | | | | |
|--|---|-------|---|-------|
| | 1 | DC-IN | 2 | DC-IN |
| | 3 | GND | 4 | GND |

JPW1: 4-Pin SATA Power Connector

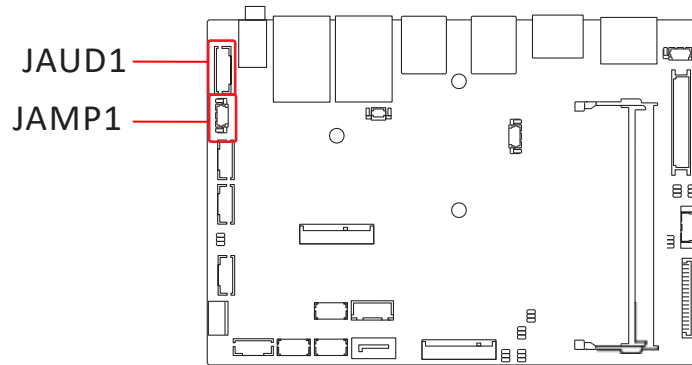
This connector is used to provide power to SATA devices.

| | | | | |
|--|---|-----|---|-----|
| | 1 | 5V | 2 | GND |
| | 3 | GND | 4 | 12V |

Important

Make sure that all the power cables are securely connected to a proper power supply to ensure stable operation of the system.

Audio Connectors



JAUD1: Front Audio Header

This connector allows you to connect front panel audio.

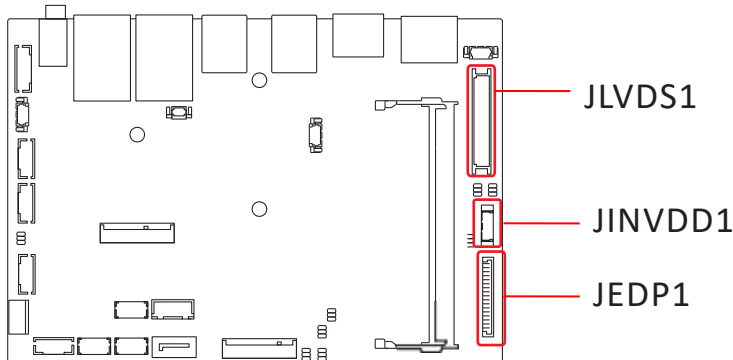
| | | | | |
|--|----|------------|----|------------|
| | 1 | LINE_IN_RA | 2 | MIC1_RA |
| | 3 | LINE_IN_LA | 4 | MIC1_LA |
| | 5 | LOUT_RA | 6 | MIC1_JD |
| | 7 | LOUT_LA | 8 | LINE_IN_JD |
| | 9 | FRONT_JD | 10 | GND |
| | 11 | GND | 12 | GND |

JAMP1: Audio Amplifier Header

The connector is used to connect audio amplifiers to enhance audio performance..

| | | | | |
|--|---|--------|---|--------|
| | 1 | AMP_L- | 2 | AMP_L+ |
| | 3 | AMP_R- | 4 | AMP_R+ |

Graphics Connectors



JLVDS1: LVDS Wafer Connector

This connector is designed for use with LVDS interface flat panels. When connecting your flat panel to this connector, be sure to check the panel datasheet to ensure that you set the LVDS power select jumper (JVDD1) to the appropriate power voltage.


| | | | | |
|--|----|--------------|----|----------------|
| | 1 | 12V | 2 | 12V |
| | 3 | LCD_VDD | 4 | 12V |
| | 5 | LCD_VDD | 6 | LCD_VDD |
| | 7 | DDC_CLK | 8 | DDC_DATA |
| | 9 | L_BKLT_CTRL# | 10 | LCDEN |
| | 11 | INV_ON | 12 | LVDS_DETECT#_C |
| | 13 | LVDSA_DATA1 | 14 | LVDSA_DATA0 |
| | 15 | LVDSA_DATA#1 | 16 | LVDSA_DATA#0 |
| | 17 | GND | 18 | GND |
| | 19 | LVDSA_DATA3 | 20 | LVDSA_DATA2 |
| | 21 | LVDSA_DATA#3 | 22 | LVDSA_DATA#2 |
| | 23 | GND | 24 | GND |
| | 25 | LVDSB_DATA1 | 26 | LVDSB_DATA0 |
| | 27 | LVDSB_DATA#1 | 28 | LVDSB_DATA#0 |
| | 29 | GND | 30 | GND |
| | 31 | LVDSB_DATA3 | 32 | LVDSB_DATA2 |
| | 33 | LVDSB_DATA#3 | 34 | LVDSB_DATA#2 |
| | 35 | GND | 36 | GND |
| | 37 | LVDSB_CLK | 38 | LVDSA_CLK |
| | 39 | LVDSB_CLK# | 40 | LVDSA_CLK# |

⚠ Important

Pin 12 is a detect pin. When using a customized LVDS cable, pin 12 should be a signal ground with a low impedance. Otherwise, LVDS will not function.

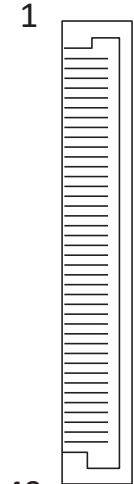
JINVDD1: LVDS Inverter Box Header

The connector is provided for LCD backlight options, be sure to check the panel datasheet to ensure that you set the LVDS Inverter Power Select Jumper (JINV1) to the appropriate power voltage (5V/12V).

| | | | | |
|--|---|---------|---|-----------|
|  JINVDD1 | 1 | 5V/12V | 2 | 5V/12V |
| | 3 | BKLT_EN | 4 | BKLT_CTRL |
| | 5 | GND | 6 | GND |

JEDP1: eDP Connector

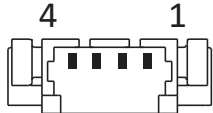
This connector is designed for use with eDP interface flat panels. When connecting your flat panel to this connector, be sure to check the panel datasheet to ensure that you set the eDP power select jumper (JEDP_VDD1) to the appropriate power voltage.

| | | | | |
|--|----|---------------|----|---------------|
|  JEDP1 | 1 | LCD_VDD1 | 2 | LCD_VDD1 |
| | 3 | LCD_VDD1 | 4 | LCD_VDD1 |
| | 5 | LCD_VDD1 | 6 | VCC3 |
| | 7 | SMB_CLK | 8 | SMB_DATA |
| | 9 | GND | 10 | HPD |
| | 11 | N/C | 12 | N/C |
| | 13 | GND | 14 | DPC_LINE3_DN |
| | 15 | DPC_LINE3_DP | 16 | GND |
| | 17 | DPC_LINE2_DN | 18 | DPC_LINE2_DP |
| | 19 | GND | 20 | DPC_LINE1_DN |
| | 21 | DPC_LINE1_DP | 22 | GND |
| | 23 | DPC_LINE0_DN | 24 | DPC_LINE0_DP |
| | 25 | GND | 26 | DSP_DDPC_AUXP |
| | 27 | DSP_DDPC_AUXN | 28 | GND |
| | 29 | VCC3 | 30 | GND |
| | 31 | +12V | 32 | GND |
| | 33 | GND | 34 | VCC5 |
| | 35 | GND | 36 | BKLTCTL |
| | 37 | BKLT_EN | 38 | +12V |
| | 39 | VCC3 | 40 | GND |

Other Connectors

SYSFAN1: PWM System Fan Box Header

The fan power connector supports system cooling fans with +12V. When connecting the wire to the connectors, always note that the red wire is the positive and should be connected to the +12V; the black wire is Ground and should be connected to GND.

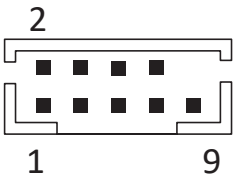
| | | | | |
|---|---|----------|---|-----------|
| SYSFAN1  | 1 | GND | 2 | FAN POWER |
| | 3 | FANSENSE | 4 | FAN_PWM |

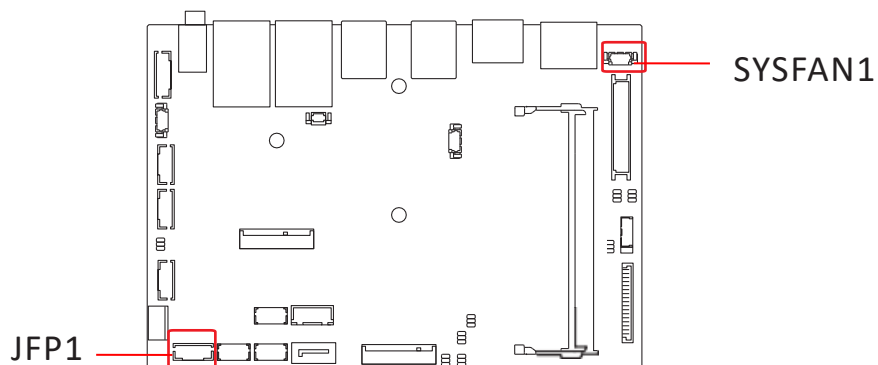
⚠ Important

Please refer to the recommended CPU fans at processor's official website or consult the vendors for proper CPU cooling fan.

JFP1: Front Panel Connector

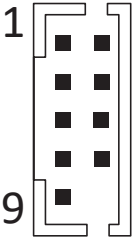
This front-panel connector is provided for electrical connection to the front panel switches & LEDs and is compliant with Intel Front Panel I/O Connectivity Design Guide.

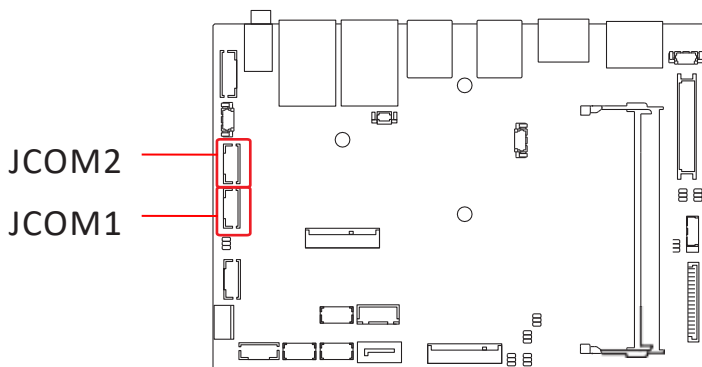
| | | | | |
|--|---|---------------|----|---------------|
| JFP1  | 1 | HDD LED+ | 2 | POWER LED |
| | 3 | HDD LED- | 4 | SUS LED |
| | 5 | GND | 6 | POWER SWITCH+ |
| | 7 | RESET SWITCH+ | 8 | POWER SWITCH- |
| | 9 | NC | 10 | No pin |



JCOM1, JCOM2: COM Port Box Headers

This connector is a 16550A high speed communications port that sends/ receives 16 bytes FIFOs. You can attach a serial device to it.

| | | | | | |
|----------------|---|---|-----------------------------|----|--------|
| JCOM1 JCOM2 |  | 1 | DCD# | 2 | SIN |
| | | 3 | SOUT | 4 | DTR |
| | | 5 | GND | 6 | DSR# |
| | | 7 | RTS | 8 | CTS# |
| | | 9 | VCC_COM(JCOM1) NC(JCOM2) | 10 | No pin |



- **JCOM1**
 - Supports RS-232/422/485
 - With 0V/5V/12V
- **JCOM2**
 - Supports RS-232

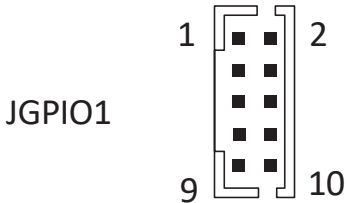
| RS232 | | |
|-------|----------------|-----------------------|
| PIN | SIGNAL | DESCRIPTION |
| 1 | NDCD | Data Carrier Detect |
| 2 | NSIN | Signal In |
| 3 | NSOUT | Signal Out |
| 4 | NDTR | Data Terminal Ready |
| 5 | GND | Signal Ground |
| 6 | NDSR | Data Set Ready |
| 7 | NRTS | Request To Send |
| 8 | NCTS | Clear To Send |
| 9 | VCC_COM/ NC | VCC_COM/No Connection |
| 10 | No Pin | No Pin |

| RS422 | | |
|-------|----------|-------------------------|
| PIN | SIGNAL | DESCRIPTION |
| 1 | 422 TXD- | Transmit Data, Negative |
| 2 | 422 TXD+ | Receive Data, Positive |
| 3 | 422 RXD+ | Transmit Data, Positive |
| 4 | 422 RXD- | Receive Data, Negative |
| 5 | GND | Signal Ground |
| 6 | NC | No Connection |
| 7 | NC | No Connection |
| 8 | NC | No Connection |
| 9 | NC | No Connection |
| 10 | NC | No Connection |

| RS485 | | |
|-------|--------|-------------------------|
| PIN | SIGNAL | DESCRIPTION |
| 1 | TXD- | Transmit Data, Negative |
| 2 | TXD+ | Transmit Data, Positive |
| 3 | NC | No Connection |
| 4 | NC | No Connection |
| 5 | GND | Signal Ground |
| 6 | NC | No Connection |
| 7 | NC | No Connection |
| 8 | NC | No Connection |
| 9 | NC | No Connection |
| 10 | NC | No Connection |

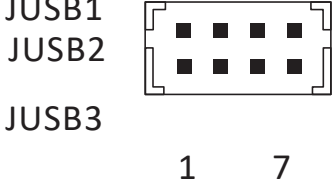
JGPIO1: GPIO (DIO) Box Header

This connector is provided for the General-Purpose Input/Output (GPIO) peripheral module.

| | | | | |
|---|---|------|----|------|
|  | 1 | GND | 2 | VCC5 |
| | 3 | GPO0 | 4 | GPI0 |
| | 5 | GPO1 | 6 | GPI1 |
| | 7 | GPO2 | 8 | GPI2 |
| | 9 | GPO3 | 10 | GPI3 |

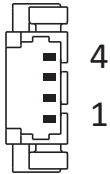
JUSB1~3: USB 2.0 Box Headers

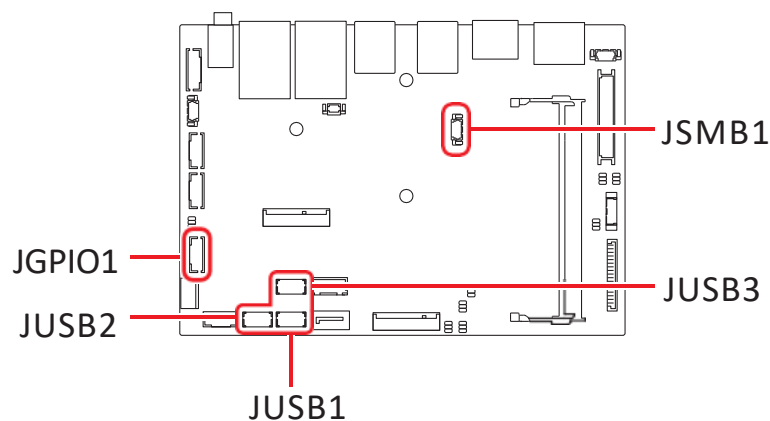
These connectors are ideal for connecting USB devices such as keyboard, mouse, or other USB-compatible devices.

| | | | | |
|---|---|--------|---|--------|
|  | 1 | 5V | 2 | GND |
| | 3 | USB_0- | 4 | USB_1+ |
| | 5 | USB_0+ | 6 | USB_1- |
| | 7 | GND | 8 | 5V |

JSMB1: SMBus Box Header

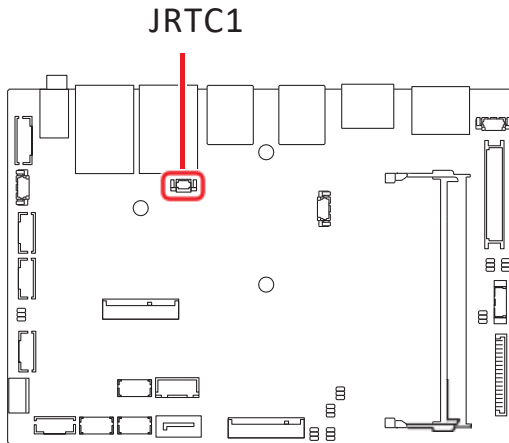
This connector, known as I2C, is for users to connect System Management Bus (SMBus) interface.

| | | | | |
|---|---|---------|---|--------|
|  | 1 | 5VSB | 2 | SMBCLK |
| | 3 | SMBDATA | 4 | GND |



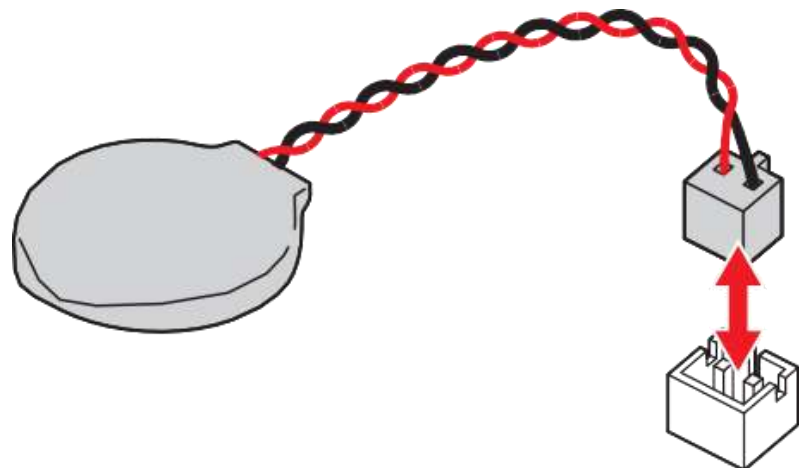
JRTC1: CMOS Battery Header

If the CMOS battery is out of charge, the time in the BIOS will be reset and the data of system configuration will be lost. In this case, you need to replace the CMOS battery.



Replacing CMOS battery

- Unplug the battery wire from the JRTC1 connector and remove the battery.
- Connect the new CR2032 battery with wire to the JRTC1 connector.



WARNING

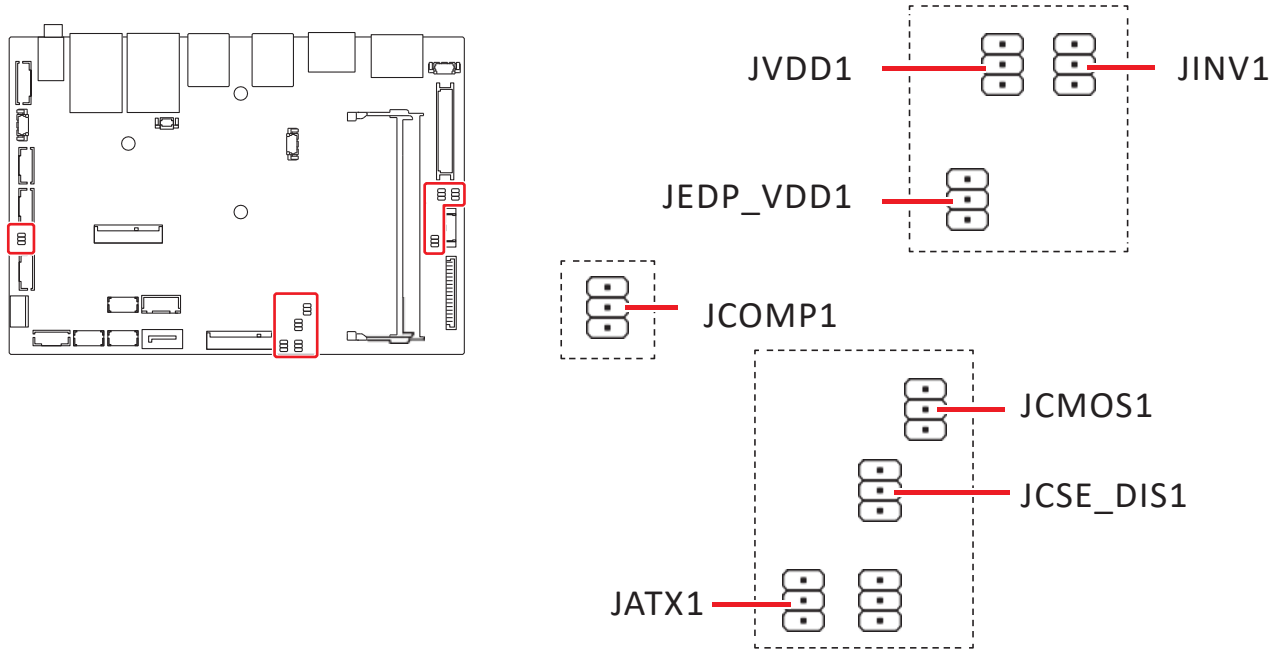
KEEP OUT OF REACH OF CHILDREN

- Swallowing can lead to chemical burns, perforation of soft tissue, can death.
- Severe burns can occur within 2 hours of ingestion.
- If you think batteries might have been swallowed or placed inside any part of the body, seek immediate medical attention.



Jumpers

⚠ Important

Avoid adjusting jumpers when the system is on; it will damage the motherboard.



| Jumper Name | Default Setting | Description |
|-------------|-----------------|---|
| JCOMP1 | 1 | COM Power Select Jumper |
| | | 1-2:5V Power (Default) 2-3:12V Power |
| JCMOS1 | 1 | Clear CMOS Jumper |
| | | 1-2: Normal (Default) 2-3:Clear CMOS |
| JCSE_DIS1 | 1 | CSE Jumper |
| | | 1-2: Normal (Default) 2-3:ME disable |
| JATX1 | 1 | AT/ ATX Mode Select Jumper |
| | | 1-2:ATX (Default) 2-3:AT |
| JVDD1 | 1 | LVDS Power Select Jumper |
| | | 1-2:3V (Default) 2-3:5V |

| Jumper Name | Default Setting | Description |
|-------------|---|--|
| JINV1 | 1  | LVDS Inverter Power Select Jumper |
| | | 1-2: 5V (Default) 2-3: 12V |
| JEDP_VDD1 | 1  | eDP Power Select Jumper |
| | | 1-2: 5V 2-3: 3V (Default) |

Chapter 3

System Setup

Set torque force to 3.5 kgf-cm to execute all the screwing and unscrewing.

3.1 Removing the chassis bottom cover



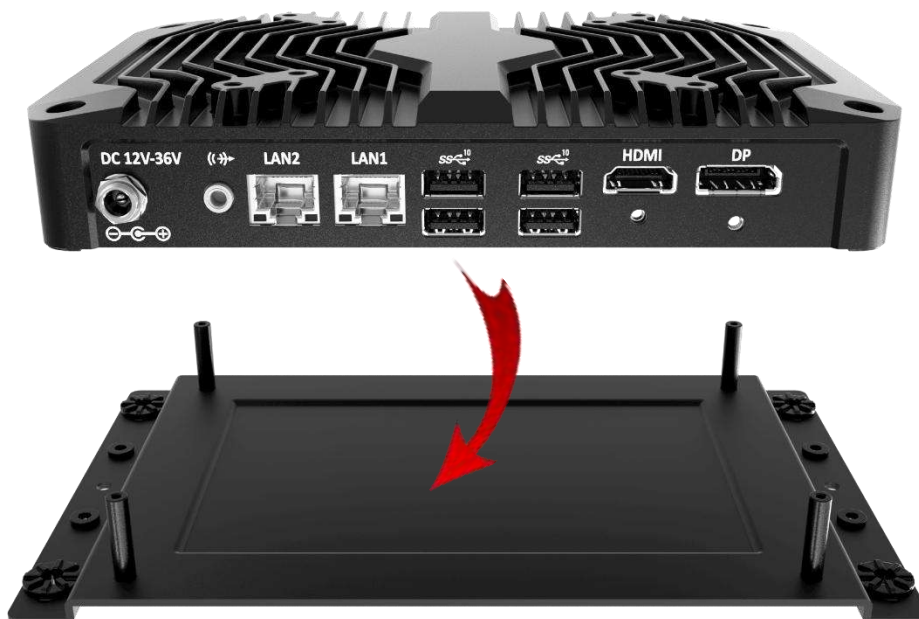
WARNING

In order to prevent electric shock or system damage, before removing the chassis cover, must turn off power and disconnect the unit from power source.

1. Use a screwdriver to remove the four screws securing the top cover.

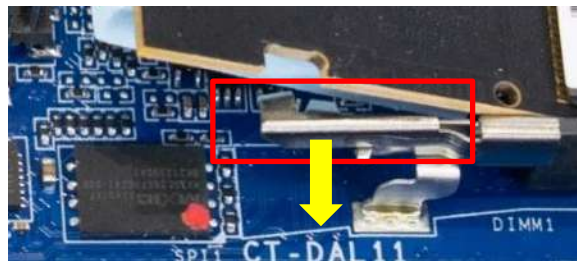
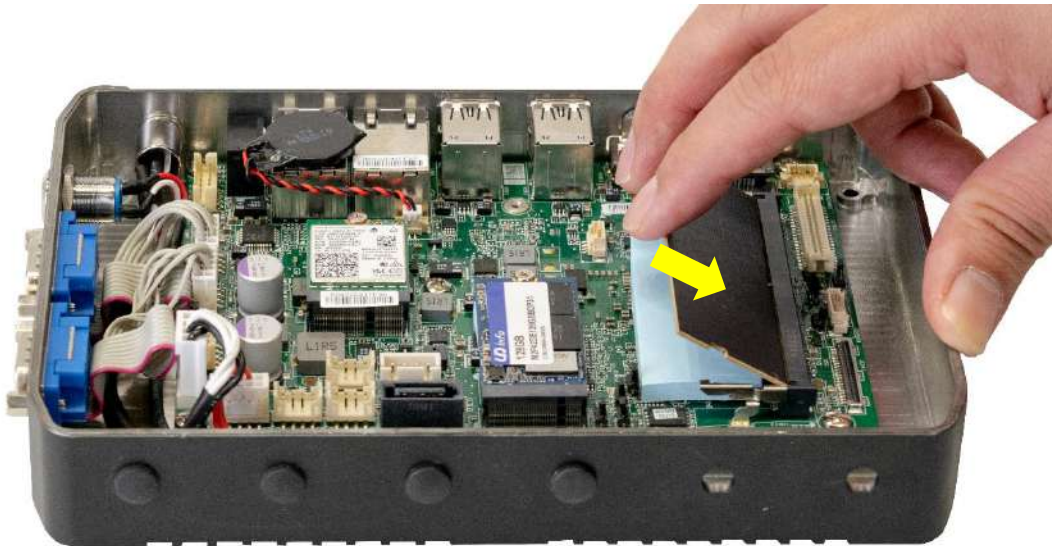


2. After removing the screws, detach the main unit from the bottom chassis.



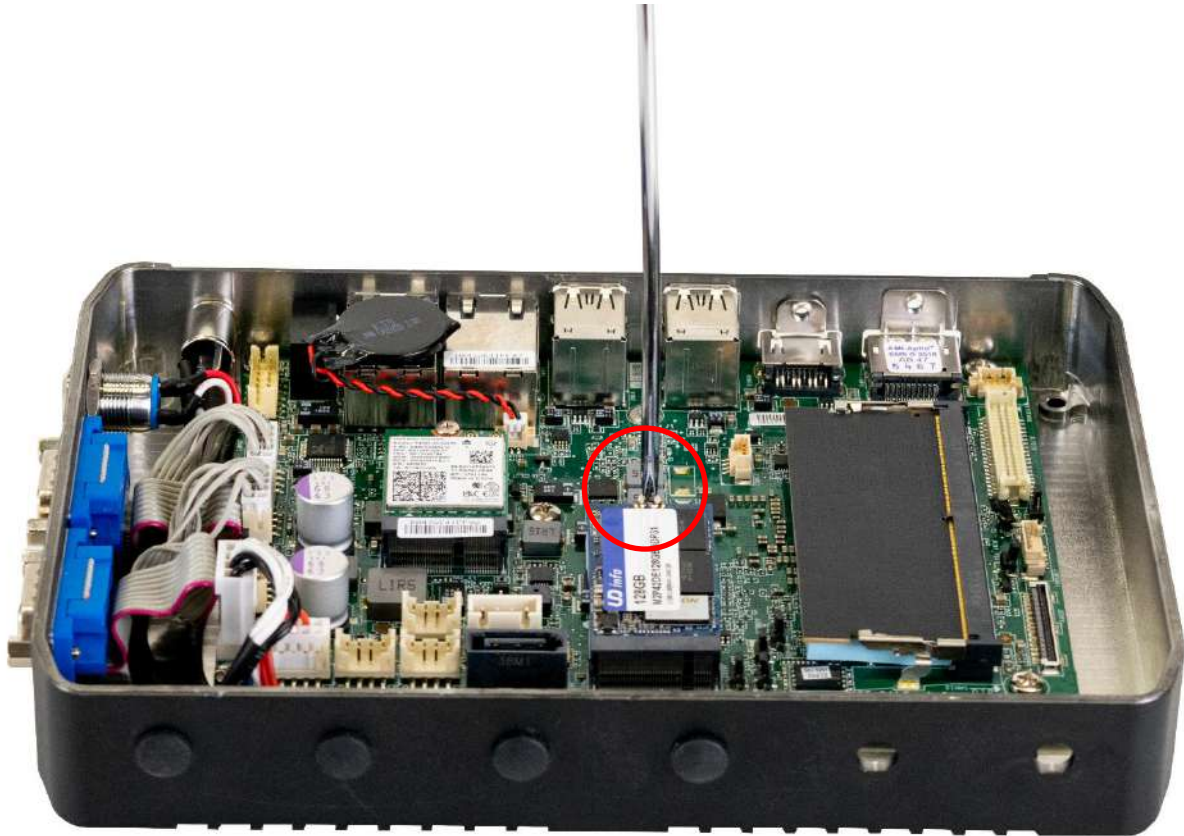
3.2 Installing SODIMM

1. Insert memory module from 45 degree direction.



3.3 Installing M.2 Storage Module

1. Insert SSD module from 45 degree direction and lock it with one screw.

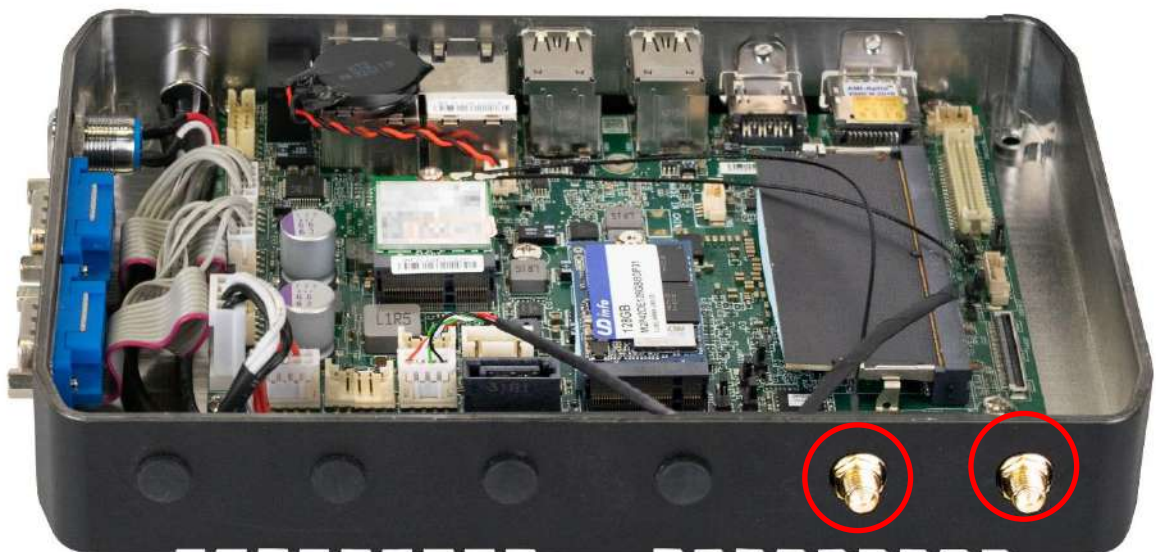


3.4 Install wireless network card and antenna

1. Install the network card in the designated red frame and secure it with screws.



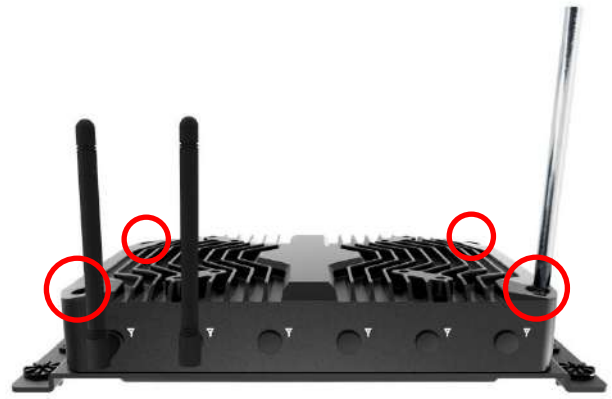
2. Ensure the internal antenna is securely connected to the network card, and the antenna interface is properly installed in the designated opening on the chassis cover.



3. Place the bottom cover according to the below direction and make sure the rail is facing inside the system.



4. Secure the bottom cover with four screws.

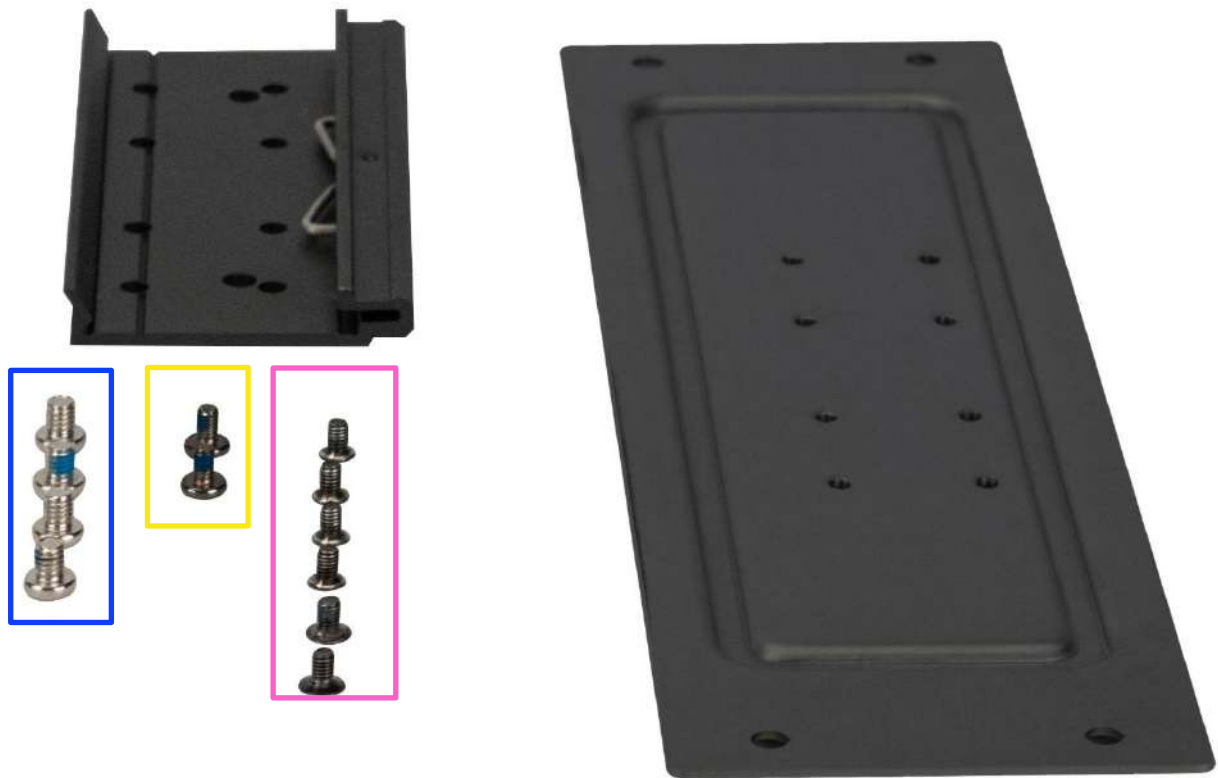


5. Connect the external antenna to the internal antenna, reattach the main unit to the screen following the original steps, and secure it with the four screws.

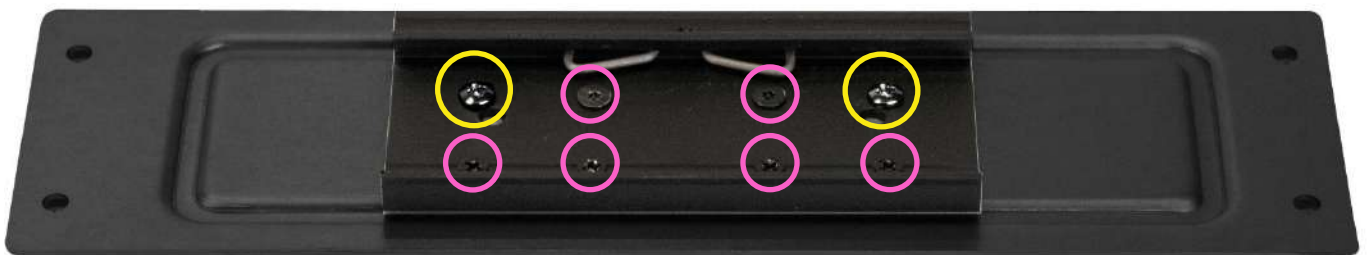


3.5 Installing DIN rail holder

1. Din rail holder is available for BCO-500-ADL series as optional accessories.



2. Place the din rail mount on the black chassis bar. Lock the din rail mount with 8 screws.



3. Place the black chassis bar on the back cover and lock it with 4 screws.



Chapter 4

BIOS Setup

4.1 BIOS Setup

This chapter provides information on the BIOS Setup program and allows users to configure the system for optimal use.

Users may need to run the Setup program when:

- An error message appears on the screen at system startup and requests users to run SETUP.
- Users want to change the default settings for customized features.

Important

- Please note that BIOS update assumes technician-level experience.
- As the system BIOS is under continuous update for better system performance, the illustrations in this chapter should be held for reference only.

Entering Setup

Power on the computer and the system will start POST (Power On Self Test) process. When the message below appears on the screen, press or <F2> key to enter Setup, <F11> key to Boot Menu, <F12> key to PXE Boot.

Press or <F2> to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system by turning it **OFF** and **On** or pressing the **RESET** button. You may also restart the system by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

Important

The items under each BIOS category described in this chapter are under continuous update for better system performance. Therefore, the description may be slightly different from the latest BIOS and should be held for reference only.

BIOS Introduction

Control Keys

| | |
|------------------|----------------------------|
| ? ? | Select Screen |
| ↑ ↓ | Select Item |
| Enter | Select |
| + - | Change Value |
| Esc | Exit |
| F1 | General Help |
| F7 | Previous Values |
| F9 | Optimized Defaults |
| F10 | Save & Reset* |
| F12 | Screenshot capture |
| <K> | Scroll help area upwards |
| <M> | Scroll help area downwards |

* When you press **<F10>**, a confirmation window appears and it provides the modification information. Select between **Yes** or **No** to confirm your choice.

Getting Help

Upon entering setup, you will see the Main Menu.

Main Menu

The main menu lists the setup functions you can make changes to. You can use the **arrow keys (↑ ↓)** to select the item. The on-line description of the highlighted setup function is displayed at the bottom of the screen.

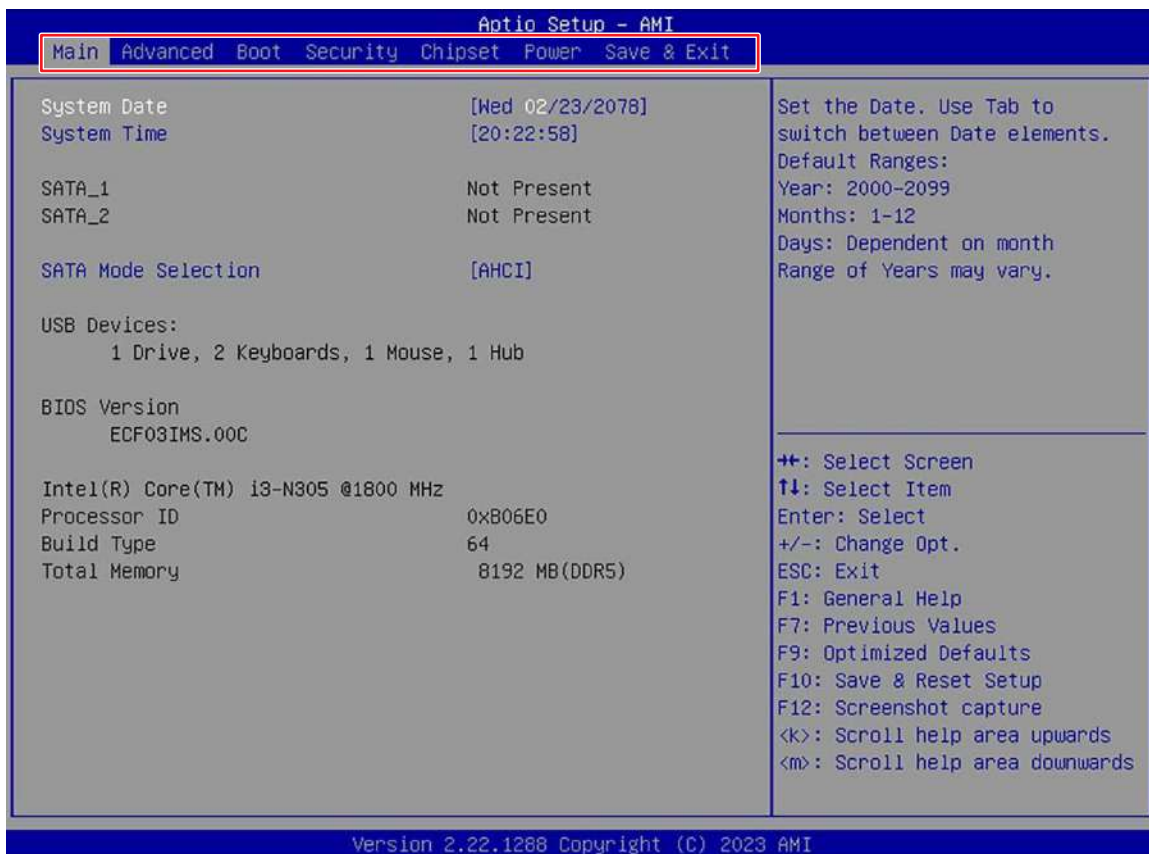
Sub-Menu

If you find a right pointer symbol appears to the left of certain fields that means a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. You can use **arrow keys (↑ ↓)** to highlight the field and press **<Enter>** to call up the sub-menu. Then you can use the **control keys** to enter values and move from field to field within a sub-menu. If you want to return to the main menu, just press the **<Esc>**.

General Help <F1>

The BIOS setup program provides a General Help screen. You can call up this screen from any menu by simply pressing **<F1>**. The Help screen lists the appropriate keys to use and the possible selections for the highlighted item. Press **<Esc>** to exit the Help screen.

4.2 The Menu Bar



► Main

Use this menu for basic system configurations, such as time, date, etc.

► Advanced

Use this menu to set up the items of special enhanced features.

► Boot

Use this menu to specify the priority of boot devices.

► Security

Use this menu to set supervisor and user passwords.

► Chipset

This menu controls the advanced features of the on-board chipsets.

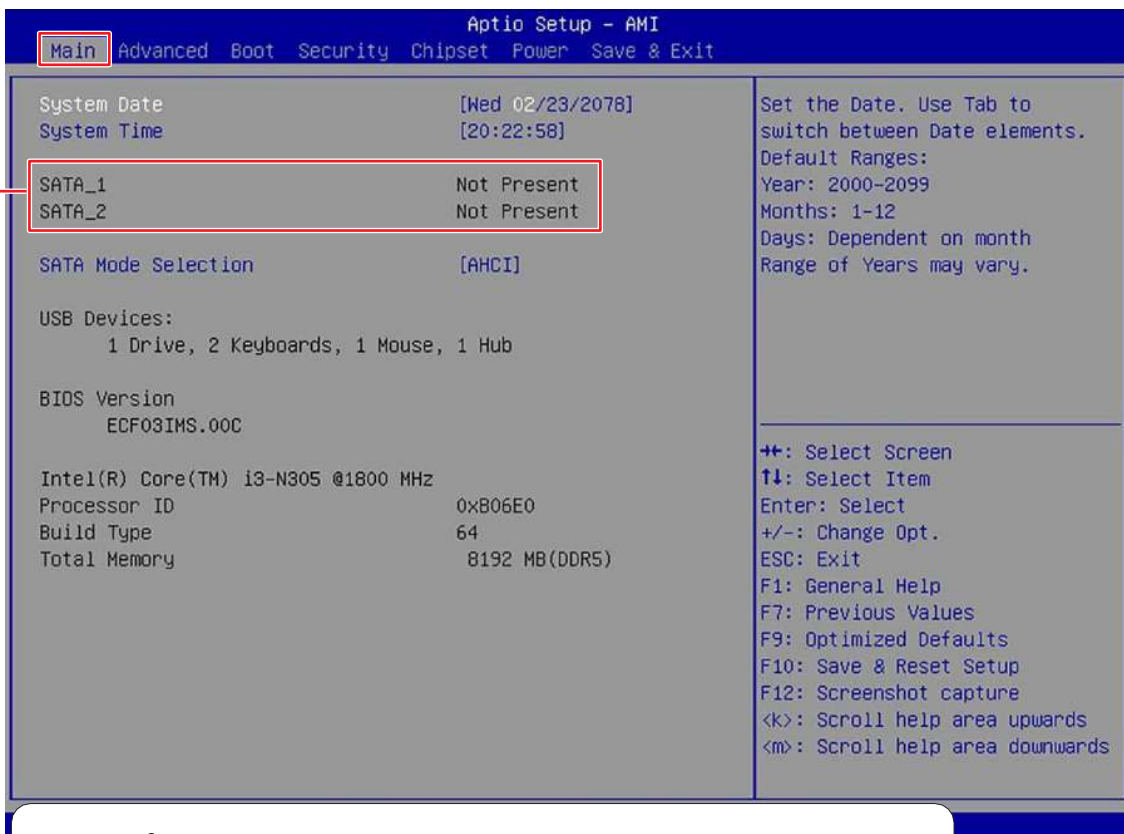
► Power

Use this menu to specify your settings for power management.

► Save & Exit

This menu allows you to load the BIOS default values or factory default settings into the BIOS and exit the BIOS setup utility with or without changes.

4.2.1 Menu



HDD Information

- RAID (VMD) Disabled: Display HDD information as plugging in status.
- RAID (VMD) Enabled: Display "Empty" only.
*SATA_2 is for M.2 B key (SATA signal)

► System Date

This setting allows you to set the system date. Use <Tab> key to switch between date elements.

Format: <Day> <Month> <Date> <Year>.

► System Time

This setting allows you to set the system time. Use <Tab> key to switch between time elements.

Format: <Hour> <Minute> <Second>.

► SATA Mode Selection

This setting specifies SATA controller mode.

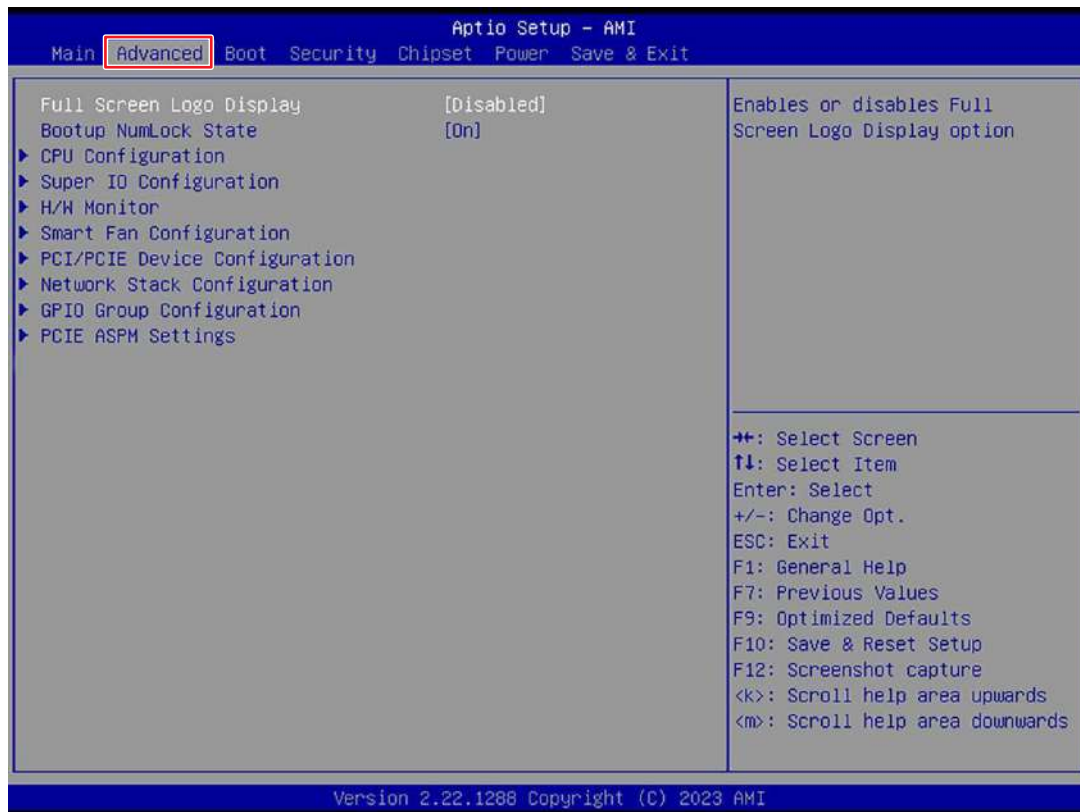
[AHCI]

AHCI (Advanced Host Controller Interface), is a technical standard for an interface that allows the software to communicate with Serial ATA (SATA) devices. It offers advanced SATA features such as Native Command Queuing (NCQ) and hot-plugging.

[RAID]

RAID (Redundant Array of Independent Disks) is a virtual disk storage technology that combines multiple physical disks into one unit for data redundancy, performance improvement, or both.

4.2.2 Advanced



► Full Screen Logo Display

This BIOS feature determines if the BIOS should hide the normal POST messages with the motherboard or system manufacturer's full-screen logo.

[Enabled] BIOS will display the full-screen logo during the boot-up sequence, hiding normal POST messages.

[Disabled] BIOS will display the normal POST messages, instead of the full-screen logo.

Please note that enabling this BIOS feature often adds 2-3 seconds to the booting sequence. This delay ensures that the logo is displayed for a sufficient amount of time. Therefore, it is recommended to disable this BIOS feature for faster boot-up.

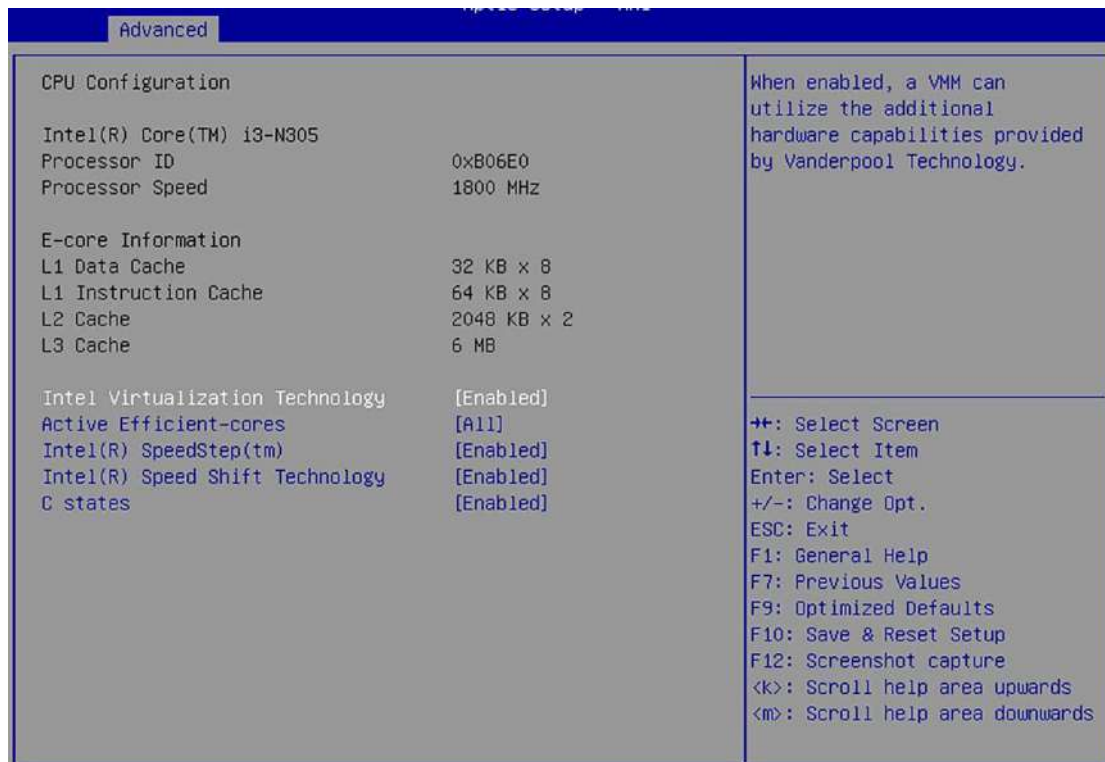
Bootup NumLock State

This setting is to set the state of the Num Lock key on the keyboard when the system is powered on.

[On] Turn on the Num Lock key when the system is powered on.

[Off] Allow users to use the arrow keys on the numeric keypad.

CPU Configuration



► Intel Virtualization Technology

Enables or disables Intel Virtualization technology.

- [Enabled] Enables Intel Virtualization technology and allows a platform to run multiple operating systems in independent partitions. The system can function as multiple systems virtually.
- [Disabled] Disables this function.

► Active Efficient-cores

Select the number of active Efficient-cores (E-cores).

► Intel(R) SpeedStep(TM)

Enhanced Intel SpeedStep® Technology enables the OS to control and activate performance states (P-States) of the processor.

- [Enabled] When enabled, Intel SpeedStep® technology is activated. This technology allows the processor to manage its power consumption via performance state (P-State) transitions.
- [Disabled] Disables this function.

► Intel(R) Speed Shift Technology

Intel® Speed Shift Technology is an energy-efficient method that allows frequency control by hardware rather than the OS.

[Enabled] When enabled, Intel® Speed Shift Technology is activated. The technology enables the management of processor power consumption via hardware performance state (P-State) transitions.

[Disabled] Disable this function.

► C States

This setting controls the C-States (CPU Power states).

[Enabled] Detects the idle state of system and reduce CPU power consumption accordingly.

[Disabled] Disable this function.

Super IO Configuration



► Serial Port 1/ 2

This setting enables or disables the specified serial port.

» Change Settings

This setting is used to change the address & IRQ settings of the specified serial port.

» Mode Select

Select an operation mode for Serial Port 1/2.

► FIFO Mode

This setting controls the FIFO (First In First Out) data transfer mode.

► Shared IRQ Mode

This setting provides the system with the ability to share interrupts among its serial ports.

► Watch Dog Timer

You can enable the system watchdog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watchdog polls it.

H/W Monitor (PC Health Status)

These items display the current status of all monitored hardware devices/ components such as voltages, temperatures and all fans' speeds.



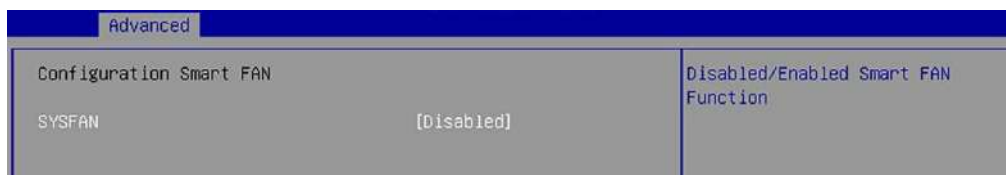
► Thermal Shutdown

This setting determines the behavior of the system when the CPU temperature reaches a predefined threshold.

[Enabled] Initiate an automatic shutdown of the system to protect from potential damage due to overheating.

[Disabled] Disable this function.

► Smart Fan Configuration



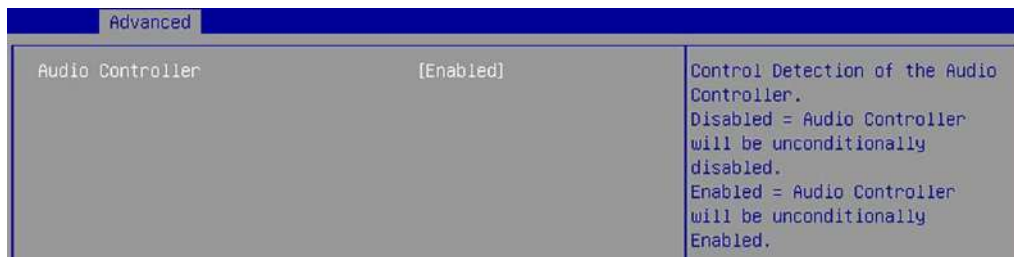
► SYSFAN

This setting enables or disables the Smart Fan function. Smart Fan is an excellent feature which will adjust the system fan speed automatically depending on the current system temperature, avoiding the overheating to damage your system. The following items will display when **SYSFAN** is enabled.

» Min. Speed (%)

The beginning speed of the System fan.

► PCI/PCIE Device Configuration

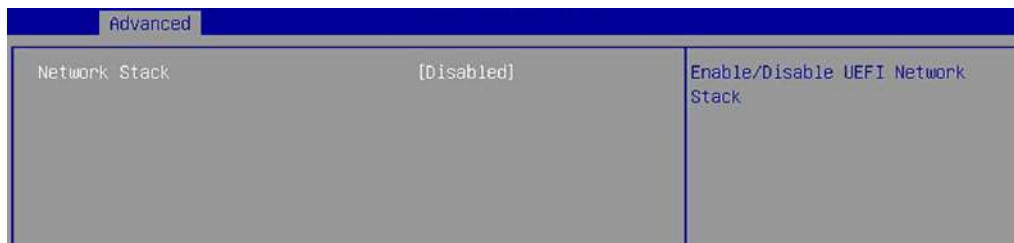


► Audio Controller

This setting enables or disables the detection of the onboard audio controller.

► Network Stack Configuration

This menu provides Network Stack settings for users to enable network boot (PXE) from BIOS.



► Network Stack

This menu provides Network Stack settings for users to enable network boot (PXE) from BIOS. The following items will display when **Network Stack** is enabled.

» IPV4 PXE Support

Enables or disables IPv4 PXE boot support.

» IPV4 HTTP Support

Enables or disables Ipv4 HTTP Support.

» IPV6 PXE Support

Enables or disables Ipv6 PXE Support.

» IPV6 HTTP Support

Enables or disables Ipv6 HTTP Support.

» PXE boot wait time

Use this option to specify the wait time to press the ESC key to abort the PXE boot. Press “4” or “/” on your keyboard to change the value. The default setting is 0.

» Media detect count

Use this option to specify the number of times media will be checked. Press “4” or “/” on your keyboard to change the value. The default setting is 1.

► GPIO Group Configuration

| Advanced | | |
|----------|-------|-----------------------------|
| GP00 | [Low] | Set GP00 to output High/Low |
| GP01 | [Low] | |
| GP02 | [Low] | |
| GP03 | [Low] | |

► GPO0 ~ GPO3

These settings control the operation mode of the specified GPIO.

► PCIE ASPM settings

This menu provide settings for PCIe ASPM (Active State Power Management) level for different installed devices.

| Advanced | | |
|----------|------------|--|
| M2_B1 | [Disabled] | Set the ASPM Level: Force L0s - Force all links to L0s State AUTO - BIOS auto configure DISABLE - Disables ASPM |
| M2_E1 | [Disabled] | |

► M2_B1/ M2_E1

Sets PCI Express ASPM (Active State Power Management) state for power saving.

| | |
|------------|---|
| [L0s] | Initiate an automatic shutdown of the system to protect from potential damage due to overheating. |
| [L1] | Higher latency, lower power “standby” state (optional) . |
| [L0sL1] | Activate both L0s and L1 support. |
| [Disabled] | Disable this function. |

4.3 Boot



► Boot Option #1-2

This setting allows users to set the sequence of boot devices where BIOS attempts to load the disk operating system.

4.4 Security



► Administrator Password

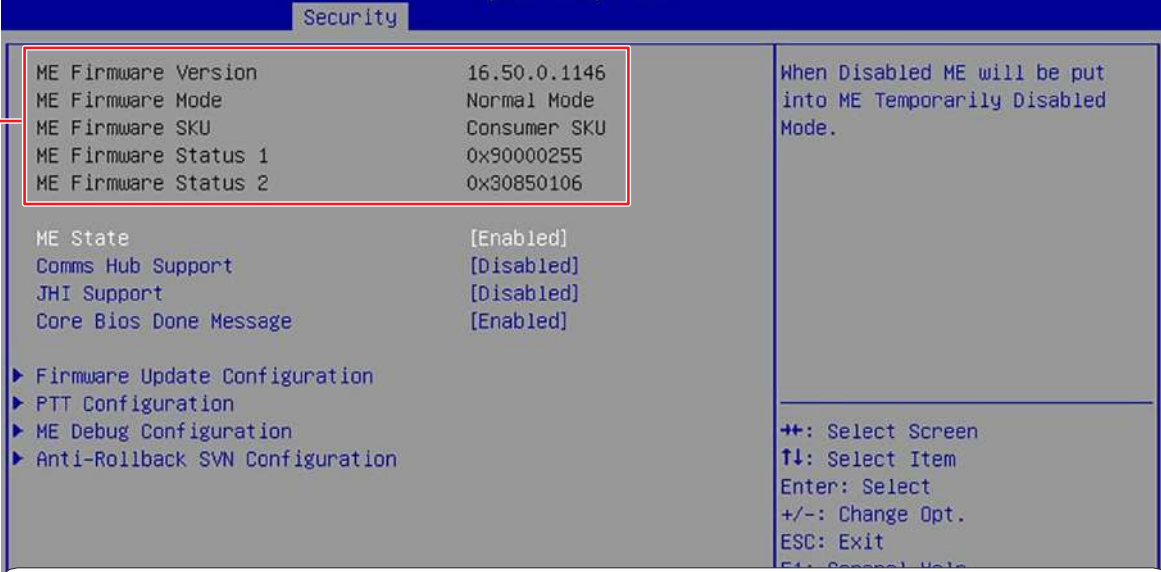
Administrator Password controls access to the BIOS Setup utility.

► User Password

User Password controls access to the system at boot and to the BIOS Setup utility.

► PCH-FW Configuration

This menu allows you to configure settings related to the PCH firmware.



The screenshot shows the BIOS Security menu with the following settings:

| Setting | Value | Description |
|---|--------------|---|
| ME Firmware Version | 16.50.0.1146 | When Disabled ME will be put into ME Temporarily Disabled Mode. |
| ME Firmware Mode | Normal Mode | |
| ME Firmware SKU | Consumer SKU | |
| ME Firmware Status 1 | 0x90000255 | |
| ME Firmware Status 2 | 0x30850106 | |
| ME State | [Enabled] | |
| Comms Hub Support | [Disabled] | |
| JHI Support | [Disabled] | |
| Core Bios Done Message | [Enabled] | |
| ► Firmware Update Configuration ► PTT Configuration ► ME Debug Configuration ► Anti-Rollback SVN Configuration | | |

Navigation keys: ++: Select Screen, ↑↓: Select Item, Enter: Select, +/-: Change Opt., ESC: Exit, F1: Screen Help

Firmware Information

| Setting | Value | Description |
|---------------------|---------------------------|---|
| ME Firmware Version | ME System Integrity Value | These settings show the firmware information of the Intel ME (Management Engine). |
| Firmware Mode | ME Firmware Status 1-2 | |
| Firmware SKU | | |

► ME State

This menu controls the Intel® Management Engine State (ME state) parameters, which provides various management and security capabilities. The following items will display when **ME State** is enabled.

► Comms Hub Support

Enables or disables the communications hub support.

► JHI Support

Enables or disables JHI Support. JHI stands for Intel® Dynamic Application Loader Host Interface Service (Intel® DAL HIS) and is the engineering name for this feature. Enabling JHI Support in the BIOS settings allows the system to utilize this interface for communication between trusted applications and host-based applications.

► Core BIOS Done Message

Enables or disables Core BIOS Done Message sent to ME.

► Firmware Update Configuration

This menu will display when **ME State** is enabled.

| Security | | |
|----------------------|------------|---|
| Me FW Image Re-Flash | [Disabled] | Enable/Disable Me FW Image Re-Flash function. |
| Local FW Update | [Enabled] | |

» ME FW Image Re-Flash

Enables or disables the M E Firmware Image Re-flashing.

» Local FW Update

Enables or disables the capability to perform a firmware update of the M E locally.

► PTT Configuration

Intel® Platform Trust Technology (PTT) is a platform functionality for credential storage and key management used by Microsoft Windows. This menu will display when **ME State** is enabled.

| Security | | |
|------------------------|--------|---|
| PTT Capability / State | 1 / 0 | Selects TPM device: PTT or dTPM. PTT - Enables PTT in SkuMgr. dTPM 1.2 - Disables PTT in SkuMgr. Warning ! PTT/dTPM will be disabled and all data saved on it will be lost. |
| TPM Device Selection | [dTPM] | |

» TPM Device Selection

Select T P M (Trusted Platform Module) devices from PTT or d T P M (Discrete TPM).

- [PTT] Enables PTT in SkuMgr.
- [dTPM] Disables PTT in SkuMgr. **Warning! PTT/ dTPM will be disabled and all data saved on it will be lost.**

► ME Debug Configuration

This menu allows you to configure debug-related options for the Intel® Management Engine (ME). This menu will display when **ME State** is enabled.

| Security | | |
|-------------------------------|---------------|--|
| HECI Timeouts | [Enabled] | Enable/Disable HECI Send/Receive Timeouts. |
| Force ME DID Init Status | [Disabled] | |
| CPU Replaced Polling Disable | [Disabled] | |
| HECI Message check Disable | [Disabled] | |
| MHP HOB Skip | [Disabled] | |
| HECI2 Interface Communication | [Disabled] | |
| KT Device | [Enabled] | |
| End Of Post Message | [Send in DXE] | |
| DOI3 Setting for HECI Disable | [Disabled] | |
| MCTP Broadcast Cycle | [Disabled] | |

» HECI Timeouts

This setting enables/ disables the HECI (Host Embedded Controller Interface) send/ receive timeouts.

» Force ME DID Init Status

Forces the M E Device ID (DID) initialization status value.

» **CPU Replaced Polling Disable**

Setting this option disables the CPU replacement polling loop.

» **HECI Message Check Disable**

This setting disables message check for BIOS boot path when sending messages.

» **MBP HOB Skip**

Setting this option will skip ME's Memory-Based Protection (MBP) HOB region.

» **HECI2 Interface Communication**

This setting Adds/ Removes HECI2 device from PCI space.

» **KT Device**

Enables or disables Key Transfer (KT) Device.

» **End of Post Message**

Enables or disables End of Post Message sent to ME.

» **DOI3 Setting for HECI Disable**

Setting this option disables setting DOI3 bit for all HECI devices.

» **MCTP Broadcast Cycle**

Enables or disables Management Component Transport Protocol (MCTP) Broadcast Cycle.

► **Anti-Rollback SVN Configuration**

| Security | | |
|---|------------|---|
| Minimal Allowed Anti-Rollback SVN | 0 | When enabled, hardware-enforced Anti-Rollback mechanism is automatically activated: once ME FW was successfully run on a platform, FW with lower ARB-SVN will be blocked from execution |
| Executing Anti-Rollback SVN | 1 | |
| Automatic HW-Enforced Anti-Rollback SVN | [Disabled] | |
| Set HW-Enforced Anti-Rollback for Current SVN | [Disabled] | |
| | | |

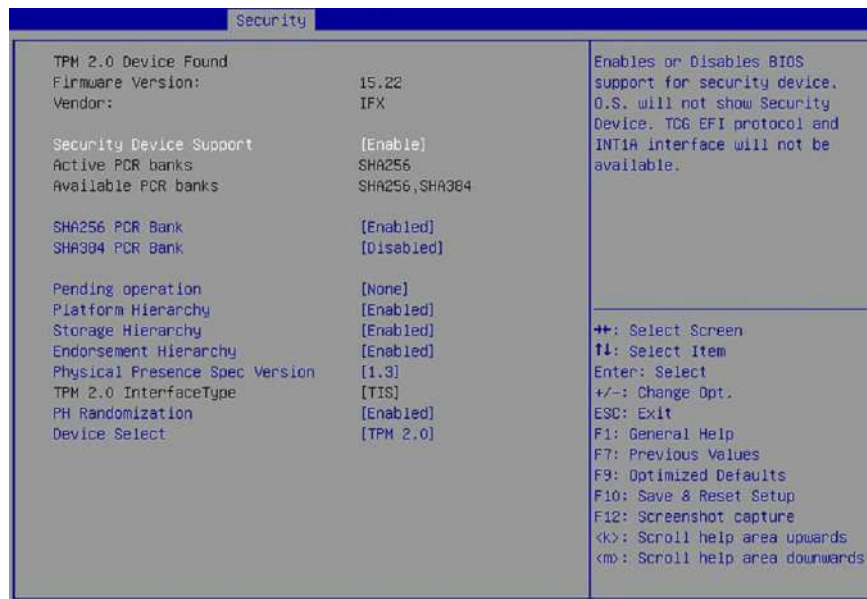
» **Automatic HW-Enforced Anti-Rollback SVN**

Setting this item enables will automatically activate the hardware-enforced anti-rollback protection based on the Secure Version Number (SVN). Once enabled, the hardware will enforce that only firmware updates with an SVN equal to or higher than the current SVN can be installed.

» **Set HW-Enforced Anti-Rollback for Current SVN**

Enable H W ERB mechanism for current ARB SVN value. FW with lower ARB-SVN will be blocked from execution. The value will be restored to disable after the command is sent. This item will display when **Automatic HW-Enforced Anti-Rollback SVN** is enabled.

► Trusted Computing



► Security Device Support

This item enables or disables BIOS support for security device. When set to [Disable], the OS will not show security device.

► SHA256/ SHA384 PCR Bank

These settings enables or disables the SHA256 PCR Bank and SHA384 PCR Bank.

► Pending Operation

When **Security Device Support** is set to [Enable], **Pending Operation** will appear. It is advised that users should routinely back up their TPM secured data.

[TPM Clear] Clear all data secured by TPM.

[None] Discard the selection.

► Platform Hierarchy, Storage Hierarchy, Endorsement Hierarchy

These settings enables or disables the Platform Hierarchy, Storage Hierarchy and Endorsement Hierarchy.

► Physical Presence Spec Version

This settings show the Physical Presence Spec Version.

► TPM 2.0 Interface Type

This setting shows the TPM 2.0 Interface Type.

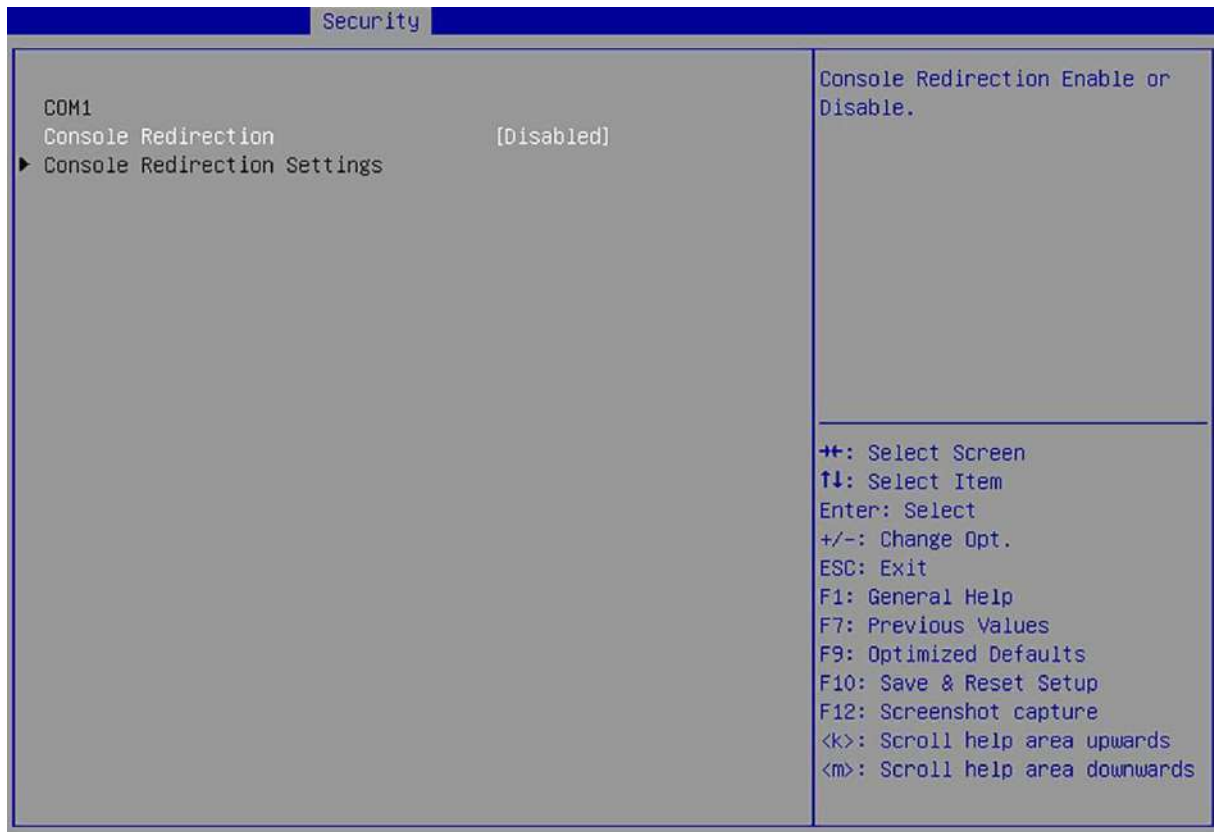
► PH Randomization

Enables or disables Platform Hierarchy (PH) Randomization.

► Device Select

Select your TPM device through this setting.

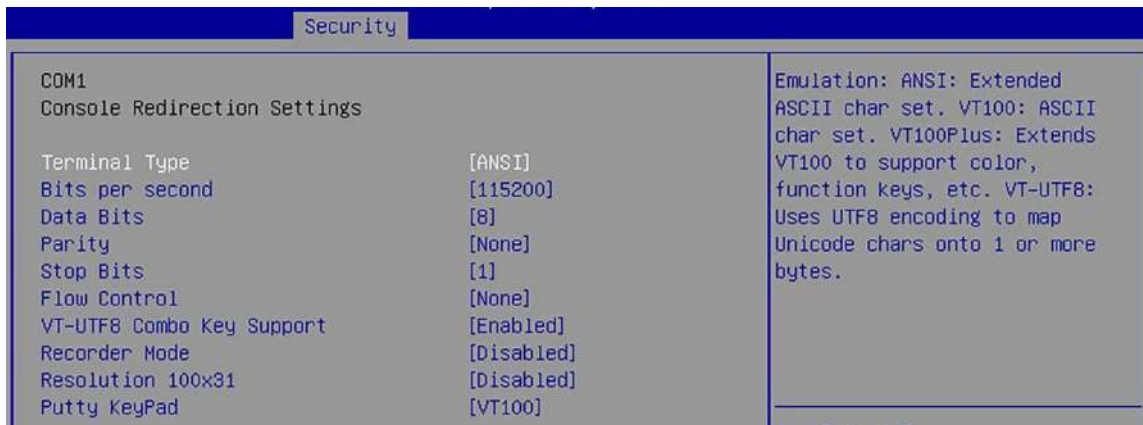
► Serial Port Console Redirection



► Console Redirection

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables or disables the operation of console redirection. When set to [Enabled], BIOS redirects and sends all contents that should be displayed on the screen to the serial COM port for display on the terminal screen. Besides, all data received from the serial port is interpreted as keystrokes from a local keyboard.

► Console Redirection Settings (COM1)



» Terminal Type

To operate the system's console redirection, you need a terminal supporting ANSI terminal protocol and a RS-232 null modem cable connected between the host system and terminal(s). You can select emulation for the terminal from this setting.

| | |
|-------------|--|
| [ANSI] | Extended ASCII character set. |
| [VT100] | ASCII character set. |
| [VT100Plus] | Extends VT100 to support color, function keys, etc. |
| [VT-UTF8] | Uses UTF8 encoding to map Unicode characters onto one or more bytes. |

» Bits per second, Data Bits, Parity, Stop Bits

These settings specify the transfer rate (bits per second, data bits, parity, stop bits) of Console Redirection.

» Flow Control

Flow control is the process of managing the rate of data transmission between two nodes. It is the process of adjusting the flow of data from one device to another to ensure that the receiving device can handle all of the incoming data. This is particularly important where the sending device is capable of sending data much faster than the receiving device can receive it.

» VT-UTF8 Combo Key Support

This setting enables or disables the VT-UTF8 combination key support for ANSI/VT100 terminals.

» Recorder Mode, Resolution 100x31

These settings enable or disable the recorder mode and the resolution 100x31.

» Putty KeyPad

Putty is a terminal emulator for Windows. This setting controls the numeric keypad for use in Putty.

► Secure Boot



► Secure Boot

Secure Boot function can be enabled only when the **Platform Key (PK)** is enrolled and running accordingly.

► Secure Boot Mode

Selects the secure boot mode. This item appears when **Secure Boot** is enabled.

- [Standard] The system will automatically load the secure keys from BIOS.
- [Custom] Allows user to configure the secure boot settings and manually load the secure keys.

► Restore Factory Keys

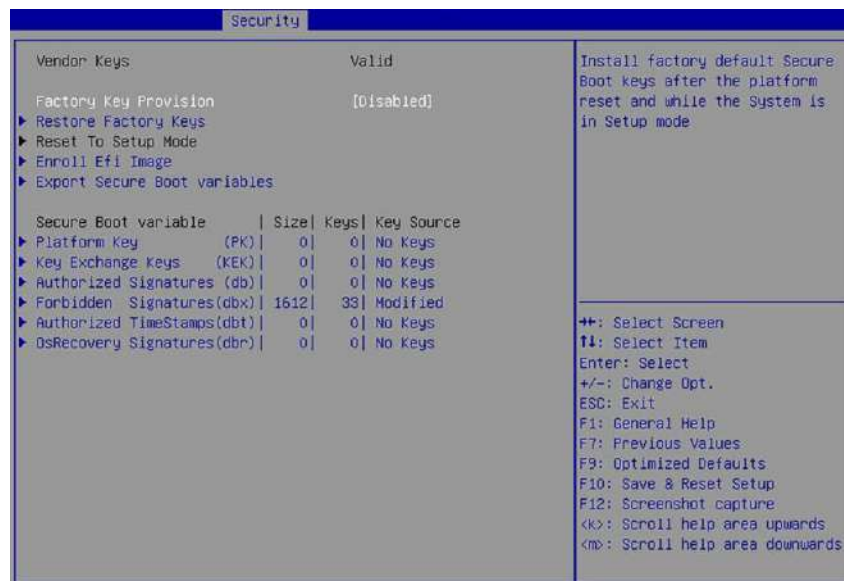
Allows you to restore all factory default keys. The settings will be applied after reboot or at the next reboot. This item appears when "**Secure Boot Mode**" sets to **[Custom]**.

► Reset to setup Mode

Allows you to delete all the Secure Boot keys (PK, KEK, db, dbt, dbx). The settings will be applied after reboot or at the next reboot. This item appears when "**Secure Boot Mode**" sets to **[Custom]**.

► Key Management

Press **Enter** key to enter the sub-menu. Manage the secure boot keys. This item appears when “**Secure Boot Mode**” sets to **[Custom]**.



» Platform Key (PK):

The Platform Key (PK) can protect the firmware from any un-authenticated changes. The system will verify the PK before your system enters the OS. Platform Key (PK) is used for updating KEK.

» Set New Key

Sets a new PK to your system.

» Delete Key

Deletes the PK from your system.

» Key Exchange Keys (KEK):

Key Exchange Key (KEK) is used for updating DB or DBX.

» Set New Key

Sets a new KEK to your system.

» Append Key

Loads an additional KEK from storage devices to your system.

» Delete Key

Deletes the KEK from your system.

» Authorized Signatures (db) :

Authorized Signatures (db) lists the signatures that can be loaded.

» Set New Key

Sets a new db to your system.

» Append Key

Loads an additional db from storage devices to your system.

» Delete Key

Deletes the db from your system.

» Forbidden Signatures (dbx):

Forbidden Signatures (dbx) lists the forbidden signatures that are not trusted and cannot be loaded.

» Set New Key

Sets a new dbx to your system.

» Append Key

Loads an additional dbx from storage devices to your system.

» Delete Key

Deletes the dbx from your system.

» Authorized TimeStamps (dbt):

Authorized TimeStamps (dbt) lists the authentication signatures with authorization time stamps.

» Set New Key

Sets a new DBT to your system.

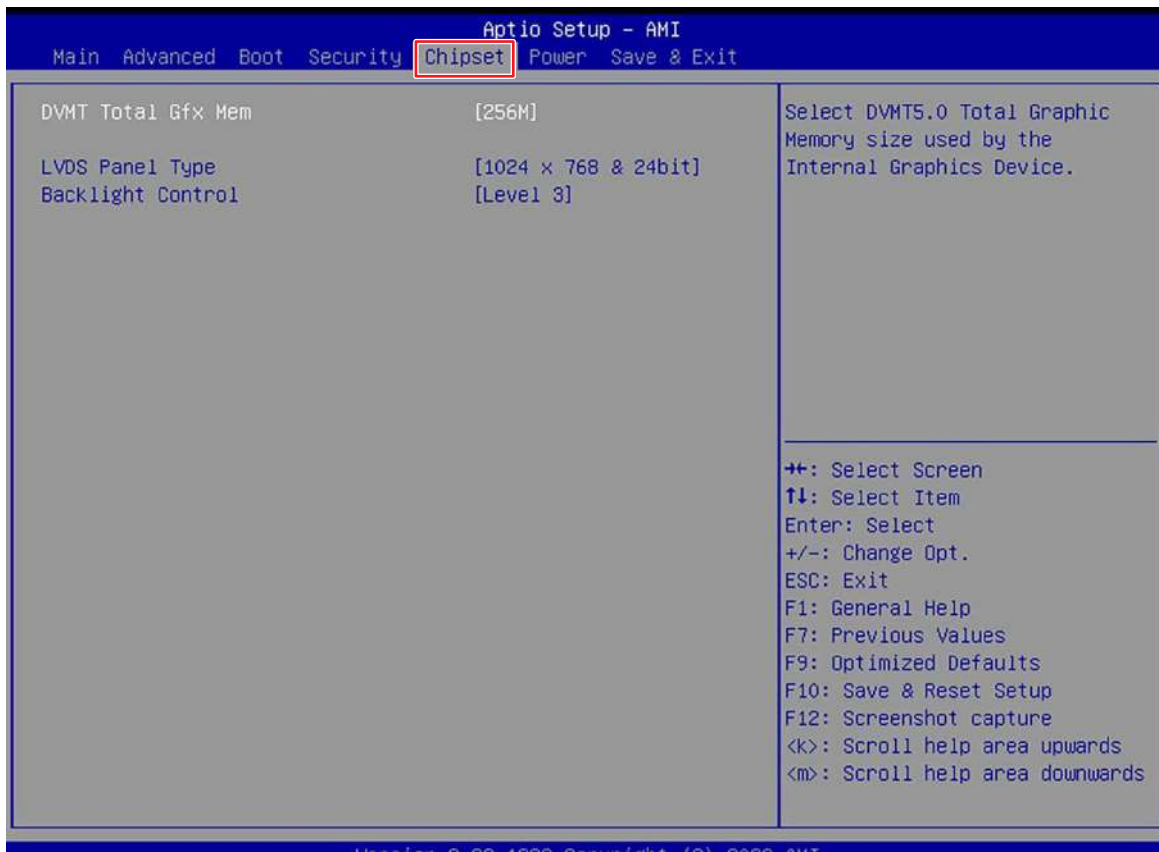
» Append Key

Loads an additional DBT from storage devices to your system.

» OsRecovery Signatures (dbr):

Lists the available signatures for OS recovery.

4.5 Chipset



► DVMT Total Gfx Mem

This setting specifies the total graphics memory size for Dynamic Video Memory Technology (DVMT).

► LVDS Panel Type

This setting specifies the LVDS Panel's resolution and distribution formats.

► Backlight Control

This setting controls the intensity of the LED's backlight output. When lighting conditions are brighter, set it high for a clearer image and low when it's darker.

| LED's backlight output | |
|------------------------|------|
| [Level 1] | 20% |
| [Level 2] | 40% |
| [Level 3] | 60% |
| [Level 4] | 80% |
| [Level 5] | 100% |

4.6 Power



► Restore AC Power Loss

This setting specifies whether your system will reboot after a power failure or interrupt occurs. Available settings are:

[Power Off] Leaves the computer in the power off state. Leaves the

[Power On] computer in the power on state.

[Last State] Restores the system to the previous status before power failure or interrupt occurred.

► Deep Sleep Mode

The setting enables or disables the Deep S5 power saving mode. S5 is almost the same as G3 Mechanical Off, except that the PSU still supplies power, at a minimum, to the power button to allow return to S0. A full reboot is required. No previous content is retained. Other components may remain powered so the computer can “wake” on input from the keyboard, clock, modem, LAN, or USB device.

► OnChip USB

The item allows the activity of the OnChip USB device to wake up the system from S4/S5 sleep state.

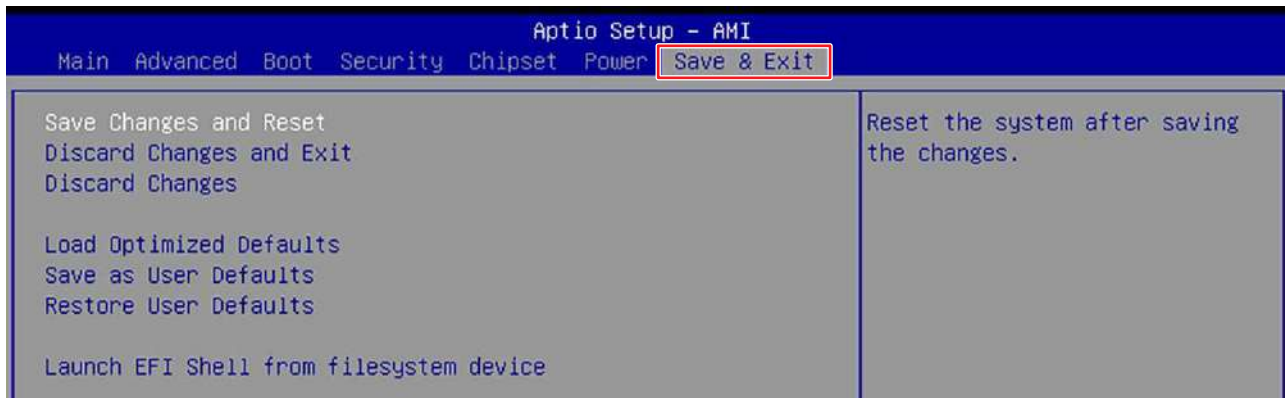
► LAN/ PCIE PME

Enables or disables the system to be awakened from the power saving modes when activity or input signal of Intel LAN device and onboard PCIE PME is detected.

► RTC

When [Enabled], you can set the date and time at which the RTC (real-time clock) alarm awakens the system from suspend mode.

4.7 Save & Exit



► Save Changes and Reset

Save changes to CMOS and reset the system.

► Discard Changes and Exit

Abandon all changes and exit the Setup Utility.

► Discard Changes

Abandon all changes.

► Load Optimized Defaults

Use this menu to load the default values set by the motherboard manufacturer specifically for optimal performance of the motherboard.

► Save as User Defaults

Save changes as the user's default profile.

► Restore User Defaults

Restore the user's default profile.

► Launch EFI Shell from filesystem device

This setting helps to launch the EFI Shell application from one of the available file system devices.

Appendix

GPIO WDT BKL SMBus Access Programming

GPIO WDT BKL SMBus Access Programming

This chapter provides GPIO (General Purpose Input/Output), WDT (Watch Dog Timer), LVDS Backlight and SMBus Access programming guide.

Abstract

In this section, code examples based on C programming language provided for customer interest. **Inportb**, **Outportb**, **Inportl** and **Outportl** are basic functions used for access IO ports and defined as following.

Inportb: Read a single 8-bit I/O port. **Outportb**: Write a single byte

to an 8-bit port. **Inportl**: Reads a single 32-bit I/O port.

Outportl: Write a single long to a 32-bit port.

1. General Purposed IO – GPIO/DIO

The GPIO port configuration addresses are listed in the following table:

| Name | IO Port | IO address | Name | IO Port | IO address |
|----------------|---------|------------|---------------|---------|------------|
| N_GPIO0 | 0xA10 | Bit 0 | N_GPO0 | 0xA10 | Bit 4 |
| N_GPIO1 | 0xA10 | Bit 1 | N_GPO1 | 0xA10 | Bit 5 |
| N_GPIO2 | 0xA10 | Bit 2 | N_GPO2 | 0xA10 | Bit 6 |
| N_GPIO3 | 0xA10 | Bit 3 | N_GPO3 | 0xA10 | Bit 7 |

1.1 Set output value of GPO

1. Read the value from GPO port.
2. Set the value of GPO address.
3. Write the value back to GPO port.

Example: Set **N_GPO0** output “high”

```
val = Inportb (0xA10);           // Read value from N_GPO0 port.
val = val | (1<<4);             // Set N_GPO0 address (bit 4) to 1 (output “high”).
Outportb (0xA10, val);         // Write back to N_GPO0 port.
```

Example: Set **N_GPO1** output “low”

```
val = Inportb (0xA10);           // Read value from N_GPO1 port.
val = val & ~(1<<5);           // Set N_GPO1 address (bit 5) to 0 (output “low”).
Outportb (0xA10, val);         // Write back to N_GPO1 port.
```

1.2 Read input value from GPI

1. Read the value from GPI port.
2. Get the value of GPI address.

Example: Get **N_GPI2** input value.

```
val = Inportb (0xA10);           // Read value from N_GPI2 port.
val = val & (1<<2);             // Read N_GPI2 address (bit 2).

if (val)printf (“Input of N_GPI2 is High”); printf
else (“Input of N_GPI2 is Low”);
```

2. Watchdog Timer – WDT

The base address (WDT_BASE) of WDT configuration registers is [0xA10](#).

2.1 Set WDT Time Unit

```
val = Inportb (WDT_BASE + 0x05); // Read current WDT setting
val = val | 0x08; // minute mode. val = val & 0xF7 if second mode
Outportb (WDT_BASE + 0x05, val); // Write back WDT setting
```

2.2 Set WDT Time

```
Outportb (WDT_BASE + 0x06, Time); // Write WDT time, value 1 to 255.
```

2.3 Enable WDT

```
val = Inportb (WDT_BASE + 0x0A); // Read current WDT_PME setting
val = val | 0x01; // Enable WDT OUT: WDOUT_EN (bit 0) set to 1.
Outportb (WDT_BASE + 0x0A, val); // Write back WDT setting.
val = Inportb (WDT_BASE + 0x05); // Read current WDT setting
val = val | 0x20; // Enable WDT by set WD_EN (bit 5) to 1.
Outportb (WDT_BASE + 0x05, val); // Write back WDT setting.
```

2.4 Disable WDT

```
val = Inportb (WDT_BASE + 0x05); // Read current WDT setting
val = val & 0xDF; // Disable WDT by set WD_EN (bit 5) to 0.
Outportb (WDT_BASE + 0x05, val); // Write back WDT setting.
```


2.5 Check WDT Reset Flag

If the system has been reset by WDT function, this flag will set to 1.

```
val = Inportb (WDT_BASE + 0x05);    // Read current WDT setting.
val = val & 0x40;                   // Check WDTMOUT_STS (bit 6).

if (val)    printf ("timeout event occurred");
else printf ("timeout event not occurred");
```

2.6 Clear WDT Reset Flag

```
val = Inportb (WDT_BASE + 0x05);    // Read current WDT setting
val = val | 0x40;                   // Set 1 to WDTMOUT_STS (bit 6);
Outportb (WDT_BASE + 0x05, val);    // Write back WDT setting
```

3. LVDS Backlight Control – BKL

The controller support **LVDS** backlight level control from 0(0%) to 255(100%), the default backlight level is 100%. It must be controlled by SMBus access. The details of SMBus access (SMBus_ReadByte, SMBus_WriteByte) are provided in this document.

3.1 Set the Level of LVDS Backlight

1. Write **0x0D** into address **0x00** on SMBus device **0x42**.
2. Write desired backlight level from 0(0%) to 255(100%) into address **0x35** on SMBus device **0x42**.

Example 3: Set **LVDS backlight level** to “100%”

```
SMBus_WriteByte (0x42, 0x00, 0x0D) SMBus_WriteByte  
(0x42, 0x35, 0xFF)
```

3.2 Read the Level of LVDS Backlight

4. Write **0x0D** into address **0x00** on SMBus device **0x42**.
5. Read current backlight level from address **0x35** on SMBus device **0x42**.

Example 4: Get **LVDS backlight level** `SMBus_WriteByte(0x42, 0x00, 0x0D); BKL_Value = SMBus_ReadByte(0x42, 0x35);`

4. SMBus Access

The base address of SMBus must know before access. The relevant bus and device information are as following.

```
#define IO_SC                0xCF8
#define IO_DA                0xCFC
#define PCIBASEADDRESS      0x80000000
#define PCI_BUS_NUM         0
#define PCI_DEV_NUM         31
#define PCI_FUN_NUM         4
```

4.1 Get SMBus Base Address

```
int SMBUS_BASE;
int DATA_ADDR = PCIBASEADDRESS + (PCI_BUS_NUM<<16) +
                (PCI_DEV_NUM<<11) + (PCI_FUN_NUM<<8);
```

```
Outportl (DATA_ADDR + 0x20, IO_SC);
SMBUS_BASE = Inportl (IO_DA) & 0xffffffff;
```

4.2 SMBus_ReadByte (char DEVID, char offset)

Read the value of OFFSET from SMBus device DEVID.

```
Outportb (LOWORD (SMBUS_BASE), 0xFE);
Outportb (LOWORD (SMBUS_BASE) + 0x04, DEVID + 1); //out Base + 04, (DEVID + 1)
Outportb (LOWORD (SMBUS_BASE) + 0x03, OFFSET); //out Base + 03, OFFSET

Outportb (LOWORD (SMBUS_BASE) + 0x02, 0x48); //out Base + 02, 48H
mdelay (20); //delay 20ms to let data ready
while ((Inportl (SMBUS_BASE) & 0x01) != 0); //wait SMBus ready

SMB_DATA = Inportb (LOWORD (SMBUS_BASE) + 0x05); //input Base + 05
```

4.3 SMBus_WriteByte (char DEVID, char offset, char DATA)

Write DATA to OFFSET on SMBus device DEVID.

```
Outportb (LOWORD (SMBUS_BASE), 0xFE);  
Outportb (LOWORD (SMBUS_BASE) + 0x04, DEVID); //out Base + 04, (DEVID)  
Outportb (LOWORD (SMBUS_BASE) + 0x03, OFFSET); //out Base + 03, OFFSET  
Outportb (LOWORD (SMBUS_BASE) + 0x05, DATA); //out Base + 05, DATA  
Outportb (LOWORD (SMBUS_BASE) + 0x02, 0x48); //out Base + 02, 48H  
mdelay (20); //wait 20ms
```

