ECM-ADLN

Intel® Processor N97 3.5” SBC

User’s Manual

Edition 1.0 – Jul, 2024

FCC Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) this device may not cause harmful interference, and
2) this device must accept any interference received, including interference that may cause undesired operation.

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 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 measures listed below:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and 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/television technician for help.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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Trademark Acknowledgement

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1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into body, or (b) support or sustain life and whose failure to perform, when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

A Message to the Customer

BCM Customer Services

Each and every BCM product is built to the most exacting specifications to ensure reliable performance in the harsh and demanding conditions typical of industrial environments. Whether your new BCM device is destined for the laboratory or the factory floor, you can be assured that your product will provide the reliability and ease of operation for which the name BCM has come to be known.

Your satisfaction is our primary concern. Here is a guide to BCM customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone. So please consult the user's manual first.

To receive the latest version of the user's manual; please visit our Web site at:
http://www.bcmcom.com.

If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your BCM products. In fact, most problems reported are minor and are able to be easily solved over the phone.
In addition, free technical support is available from BCM engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products. Please do not hesitate to call or e-mail us.

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Product Warranty

BCM warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship during warranty period.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by BCM, or which have been subject to misuse, abuse, accident or improper installation. BCM assumes no liability under the terms of this warranty as a consequence of such events. Because of BCM high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If any of BCM products is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details. If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU type and speed, BCM products model name, hardware & BIOS revision number, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information available.
3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Manual Objectives

This manual describes in detail the BCM ECM-ADLN Main board.

We strongly recommend that you study this manual carefully before attempting to interface with ECM-ADLN or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

Safety Precautions

Warning!

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!

Always ground yourself to remove any static charge before touching the mainboard. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

Document Amendment History

Revision	Date	Comment
1.0	Jul, 2024	Initial

Contents

Mainboard Specifications

System	
CPU	Intel® Alder Lake-N Platform Intel® Processor N97, 6M Cache, up to 3.60 GHz, up to 12W TDP
System Memory	1 x SODIMM socket supports DDR5 4800 MT/s up to 16GB
BIOS	256Mb SPI BIOS
Expansion Slots & Storage	1 x M.2 E-Key 2230, CNVi Support (PCIe x 1 + USB 2.0) 1 x M.2 B-Key 2242/3042 with Nano SIM Card Socket (PCIe x1 or SATAIII, & USB 2.0) 1 x 64GB eMMC Onboard
TPM	TPM 2.0
OS Support	Win 10 Win 11 Linux Ubuntu
Display	
Chipset	Intel® UHD Graphics
Interface	2 x DisplayPort 1.4b 4K@60Hz 1 x LVDS/eDP (eDP option by SKU)
Multi-Display	Support 3 Independent Displays
Audio	
Audio Codec	Realtek HD Audio
Amplifier	3W Per Channel
Ethernet	
LAN Chipset	2 x Intel® Ethernet Controller I226-V (2.5GbE)
LAN Port	2 x RJ45
External I/O	
Display	2 x DisplayPort
USB	3 x USB 3.2 Gen2 Type-A (Red)
	USB Type-C OTG
LAN	2 x RJ45
Audio	Combo Audio Jack- Line-out and Mic-in
Display	2 x DisplayPort
Internal I/O	
Display	1 x LVDS Header

	1 x eDP Header (Optional)
USB	**2 x USB 2.0 Headers (4 Ports)**
COM	**2 x RS232** **2 x RS232/422/485**
SATA	**1 x SATAIII, 1 x SATA Power Connector**
GPIO	**1 x 8-bits GPIO Header**
DC-in	**1 x 4-pin DC-in Connector**
Mechanical and Environment	
Power Requirement	**12V-24V Wide Range DC-In**
Operating Temperature	**0°C ~ 60°C (32°F ~ 140°F)**
Storage Temperature	**-20° C ~ 80° C (-4°F ~ 176°F)**
Operating Humidity	**5% to 90% non-condensing**
Cooling Design	**Heatsink (Optional fan)**
Form Factor	**3.5" Single Board Computer (SBC)**
Certification Information	**CE, FCC Class B, RoHS Compliant**
Dimensions	**5.7" x 4" (146mm x 102mm)**
Weight	**0.44lbs (0.2kg)**

Chapter 1: System Setup

This chapter describes the mainboard features and the new technologies it supports

1.1 Introduction

The mainboard delivers a host of new features and latest technologies, making it another line of BCM long life mainboards! Before you start installing the mainboard, and hardware devices on it, check the items in your package with the list below.
If any of the items listed below is damaged of missing, please contact with your vendor.

1.2 Packing Contents

- **Mainboard**
  - **1 x ECM-ADLN with Heatsink**

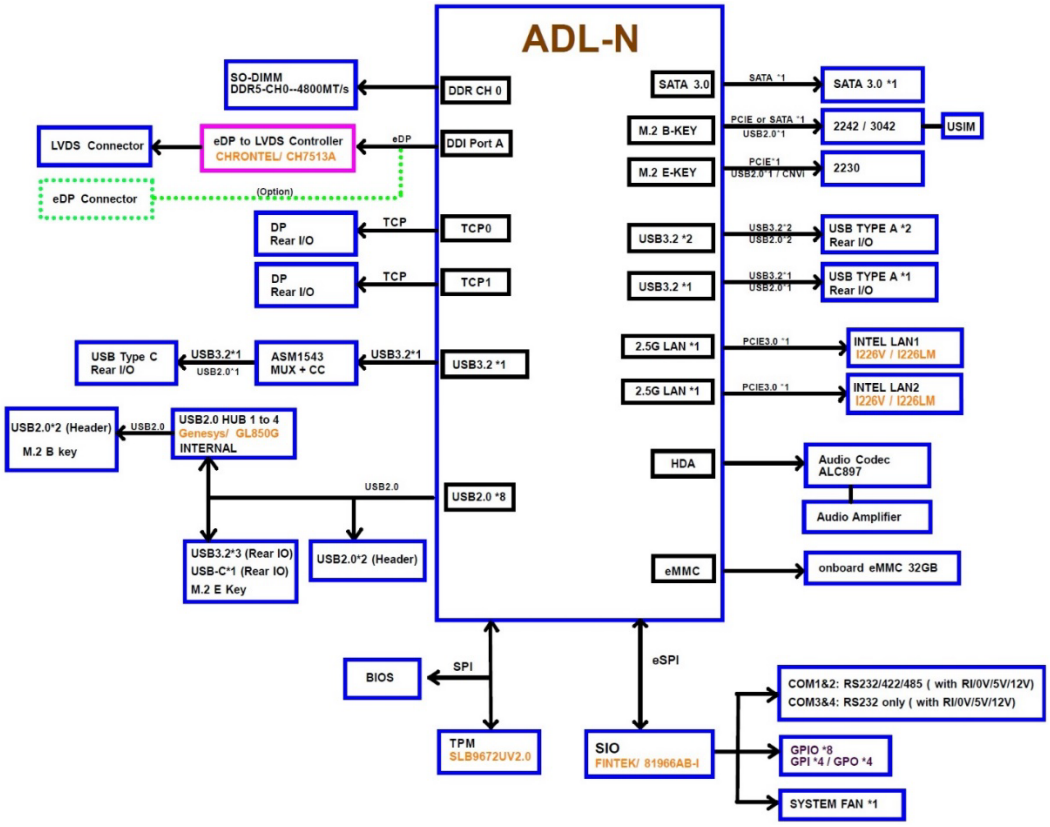
- **Accessories**
  - **1 x SATA Power Cable**
  - **1 x Dual COM Port Cable**

- **Drivers**
  - **Drivers is available for download at BCM website at WWW.BCMCOM.COM**

- **Documentation**
  - **Quick Installation Guide and Manual are available for download at BCM website at WWW.BCMCOM.COM**

1.3 Features

ECM-ADLN block Diagram



1.4 Before you proceed

Take note of the following precautions before you install mainboard components or change any mainboard settings.

- **Unplug the power cord from the wall socket before touching any component inside the system.**
- **Use a grounded wrist strap or touch a safely grounded object or to a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.**
- **Hold components by the edges to avoid touching the ICs on them.**
- **Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.**
- **Before you install or remove any component, ensure that the ATX power supply is switched**

off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the mainboard, peripherals, and/or component

1.5 Mainboard Overview

Before you install the mainboard, study the configuration of your chassis to ensure that the mainboard fits into it.

Make sure to unplug the power cord before installing or removing the mainboard. Failure to do so can cause you physical injury and damage mainboard components.

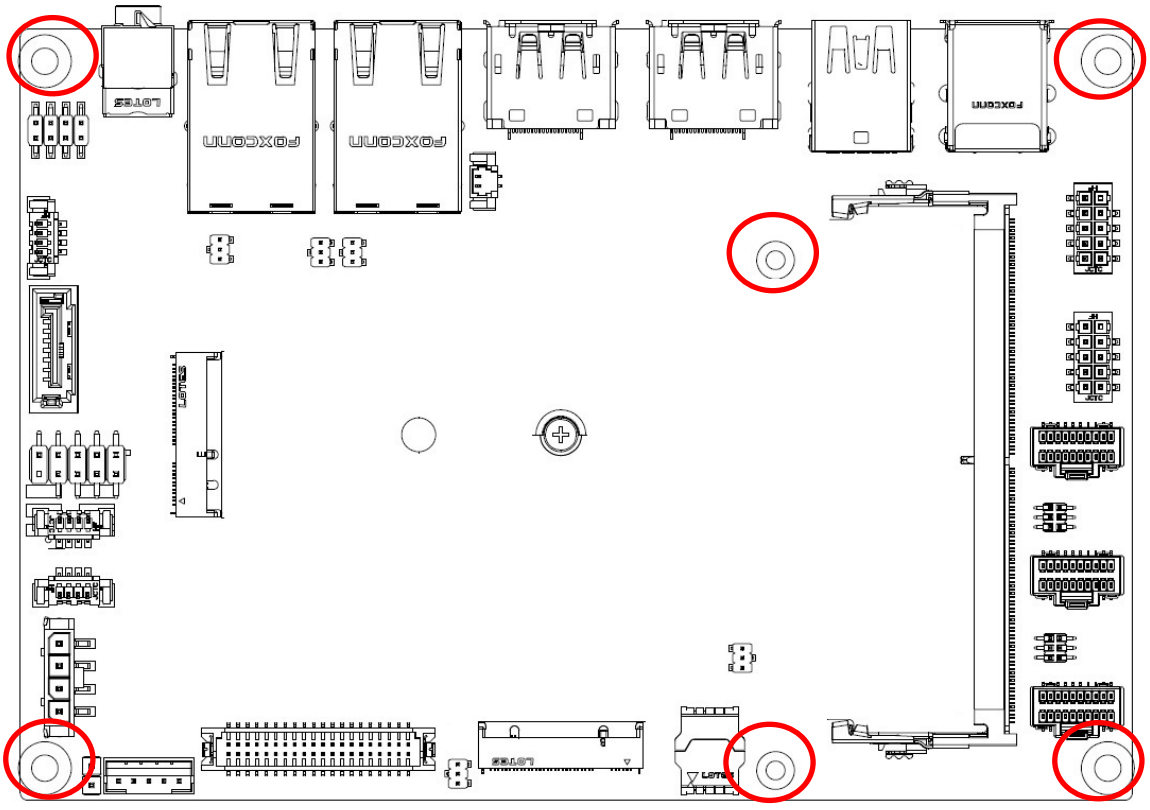
1.5.1 Placement Direction

When installing the mainboard, make sure that you place it into the chassis in the correct orientation. The edge with external port goes to the rear part of the chassis as indicated in the image below.

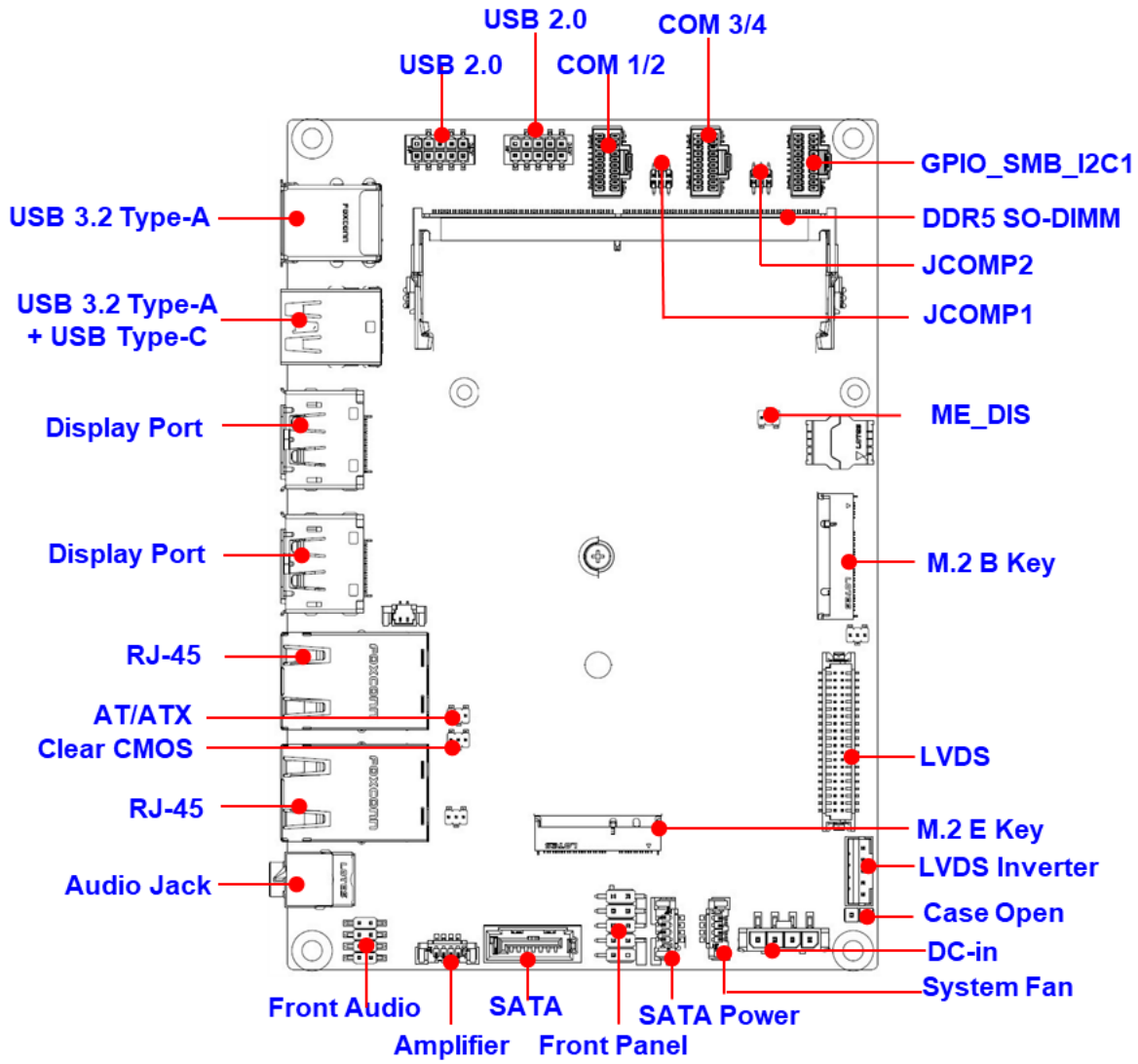
1.5.2 Mounting Holes

Place the screws into the mounting holes indicated by red squares to secure the mainboard to the chassis.

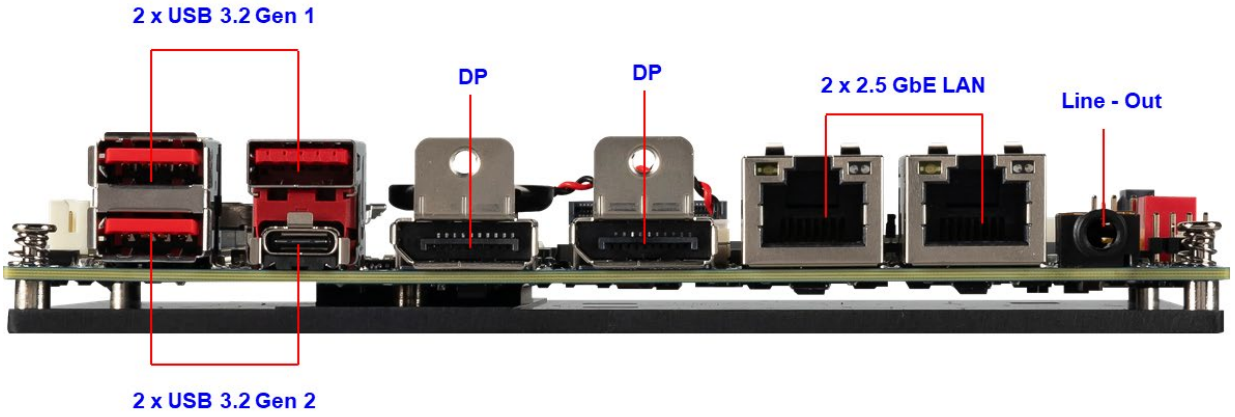
Do not over-tighten the screws! Doing so may damage the mainboard.



1.5.3 Mainboard Layout



• **Back Panel:**



1.5.4 Layout Content List

1.5.4.1 Slots

Label	Function	Note	Page
DIMM1	262-pin DIMM slot 1		19
M2_E1	2230 M.2 slot E Key		36
M2_B1	2242 M.2 Slot B Key		35

1.5.4.2 Internal Jumpers

Label	Function	Note	Page
JCMOS1	Clear CMOS	1 x 3 header, pitch 1.25mm	30
JME_DIS1	Enable/disable the Intel ME F/W	1 x 3 header, pitch 1.25mm	32
JATX1	AT/ATX Power Select	1 x 3 header, pitch 1.25mm	30
JEDPLVOL1	eDP Backlight Power 3V/5V Select	1 x 3 header, pitch 1.25mm	32
JCOMP1	COM1&COM2 RI/+5V/+12V Select	2 x 3 header, pitch 1.25mm	31
JCOMP2	COM3&COM4 RI/+5V/+12V Select	2 x 3 header, pitch 1.25mm	31

1.5.4.3 Internal Headers

Label	Function	Note	Page
JPWR1	DC-in Power Connectors	1 x 4 Micro fit, pitch 3mm	24
JSATA1	Serial ATA Connectors	7-pin	21
JPW1	SATA Power Connector	1 x 4 wafer, pitch 1.25mm	21
SYSFAN1	System Fan Connector	1 x 4 wafer, pitch 1.25mm	23
JGPIO_SMB_I2C1	I2C&SMBus&GPIO Connector	2 x 10 wafer, pitch 1.0mm	26
JFP1	System Panel Connector	2 x 5 header, pitch 2.54mm	23
JCOM1&2 JCOM3&4	Serial Port Connector 1~4	2 x 10 wafer, pitch 1.0mm	25 26
JCASE1	Chassis Intrusion Connector	1 x 2 header, pitch 2.54mm	33
JUSB1 JUSB2	USB 2.0 Connector	2 x 5 wafer, pitch 2.0mm	24

JAMP1	Amplifier Connector	1 x 4 wafer, pitch 1.25mm	22
JAUD2	Front Panel Audio Connector	2 x 4 header, pitch 2.0mm	22
JINV1	LVDS Inverter Connector	1 x 5 header, pitch 2.0mm	27
JLVDS1	LVDS Connector	2 x 20 header, pitch 1.25mm	27
EDP1	eDP Connector	1 x 40 header, pitch 0.5mm	28
USIM1	Nano SIM Holder		29

1.5.4.4 Back Panel Connectors

Label	Function	Note	Page
USB1	1 x Dual USB 3.2 Stacked Connector		20
USB2	1 x USB 3.2 Gen1 Connector		20
USB_C1	1 x USB 3.2 Type-C Gen2 Connector		20
DP1	1 x DP Connector		20
DP2	1 x DP Connector		20
LAN1	1 x 2.5GbE RJ45		20
LAN2	1 x 2.5GbE RJ45		20
AUDIO1	1 x Audio Combo Jack		20

1.5.4.5 Mating Connectors list

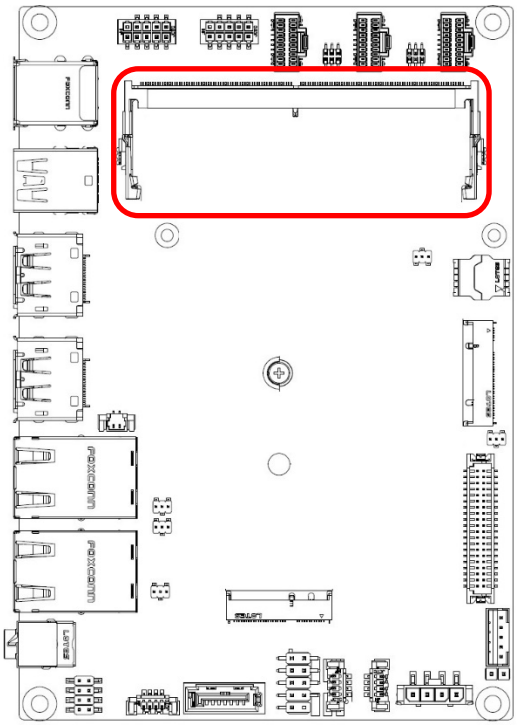
Connector/Header	Location	Mating P/N	Connector/Header P/N
Amplified Speakers	JAMP1	Molex 510210400 or equivalent	HORNG TONG WF04HA-8EJA069
Backlight	JINV1	JST PHR-5 or equivalent	HORNG TONG WF05N22WJQ006
SATA Power	JPW1	Molex 510210400 or equivalent	HORNG TONG WF04HA-8EJA069
COM Port	JCOM1; JCOM2	Aces S-51347-020xx	Aces 51347-02044-001
eDP	EDP1	I-PEX 20453-040T-11	HIROSE KN38A-40S-0.5H(800)

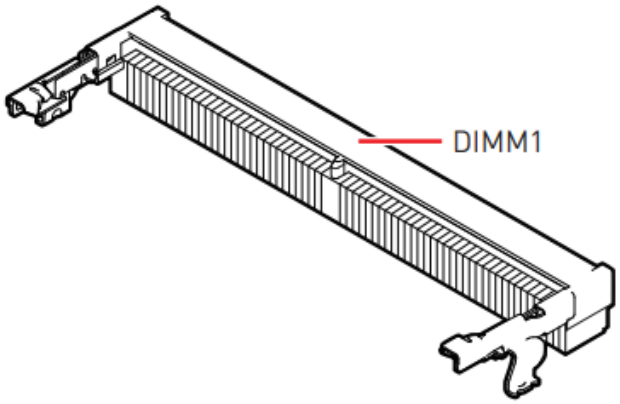
Fan	SYSFAN1	Molex 510210400 or equivalent	HORNG TONG WF04HA-8EJA069
Front Audio	JAUD1	Molex 511100850 or equivalent	LOTES AJAK0050-P001A
Front Panel	JFP1	Molex 22-55-2101 or equivalent	HORNG TONG PH10R63YAAB18
GPIO	JGPIO_SMB_I2C1	Aces S-51347-020xx	Aces 51347-02044-001
I2C			
SMB			
USB 2.0	JUSB1; JUSB2	Molex 22-55-2101 or equivalent	HORNG TONG PH10R93BAAC09
LVDS	JLVDS1	Hirose DF13-40DS-1.25C(10) or equivalent	HORNG TONG WF40H6-7BAA178
DC-in connector	JPWR1	Aces 57958-xxxHxxx-xxx	Aces 52996-0044N-001

1.6 Installing DIMM

DIMM1: DDR5 SO DIMM Slot

The SO-DIMM slots is intended for memory modules.





Installing DDR5 Memory

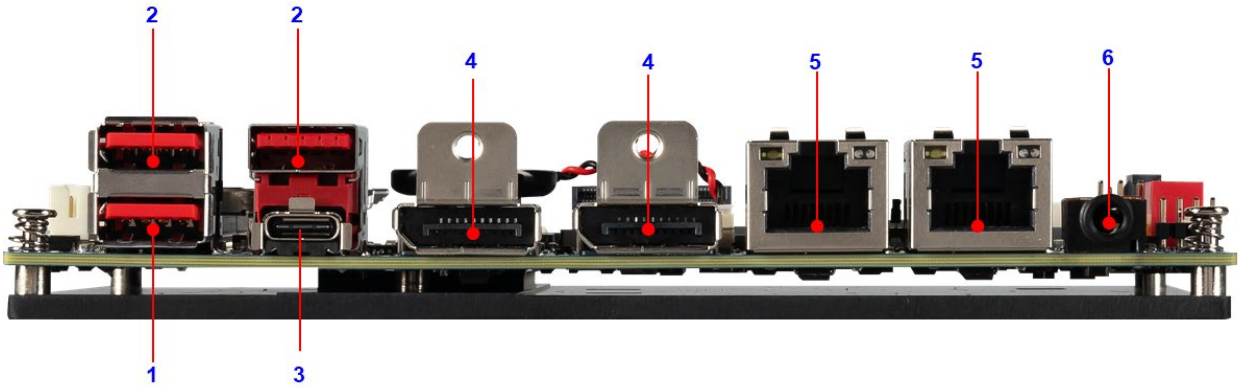
1. Locate the SO-DIMM slot. Align the notch on the DIMM with the key on the slot and insert the DIMM into the slot.
2. Push the DIMM gently downwards until the slot levers click and lock the DIMM in place.
3. To uninstall the DIMM, flip the slot levers outwards and the DIMM will be released instantly.

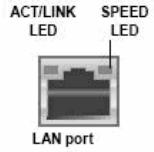
Important

- 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

1.7 Back Panel

1.7.1 Back Panel Connectors



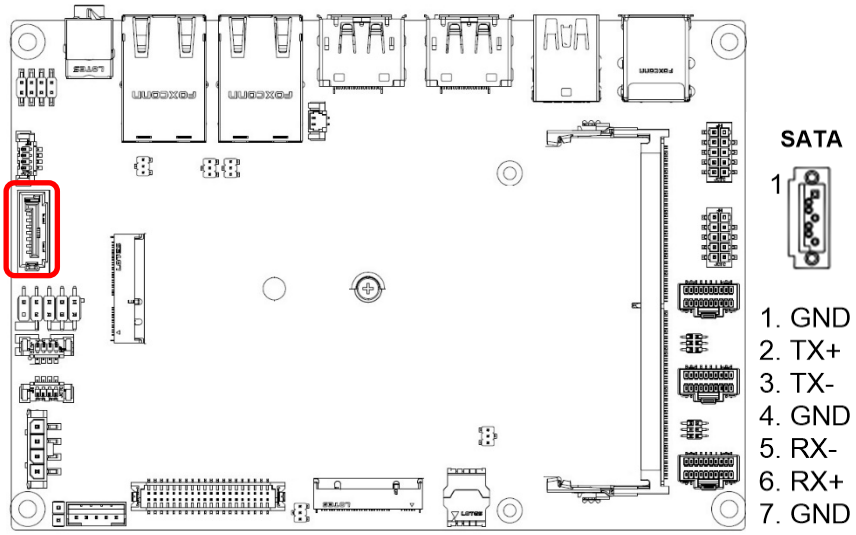
Item	Name	Function	Description
1	USB3.2 Type A	USB 3.2 Connector (Type-A)	These is a Universal Serial Bus (USB) port is available for connecting USB 3.2 Gen 2 device.
2	USB3.2 Type A	USB 3.2 Connectors (Type-A)	These two Universal Serial Bus (USB) ports are available for connecting USB 3.2 Gen 1 devices.
3	USB3.2 Type C	USB 3.2 Connector (Type-C)	These Universal Serial Bus (USB) port is available for connecting USB 3.2 Gen 2 type C device.
4	DP	Display Port	The display port Connector
5	RJ45	2.5G LAN (RJ-45) Connectors 	This port allows 2.5G connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.
6	AUDIO	Combo Jack (Black)	This port connects a headphone or a speaker.

ACT/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10/100Mbps connection
Orange	Linked	Orange	1Gbps connection
Blinking	Data activity	Green	2.5Gbps connection

1.10 Connectors/ Headers

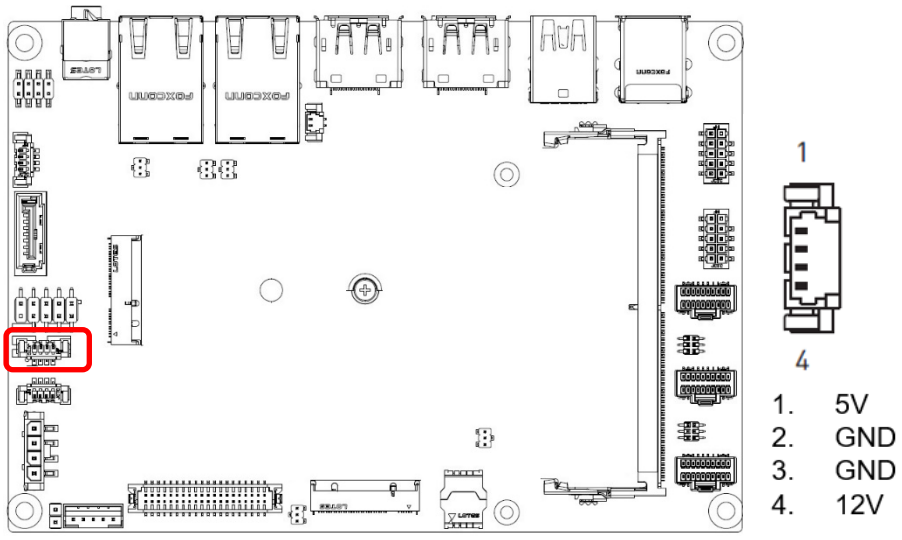
1.10.1 Serial ATA Connectors: JSATA1

This connector is a high-speed Serial ATA interface port. Each connector can connect to one Serial ATA device. SATA3.0 standard, which is backward compatible with SATA2.0



Important **Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during data transmission.**

1.10.2 4-Pin SATA Power Connector: JPW1

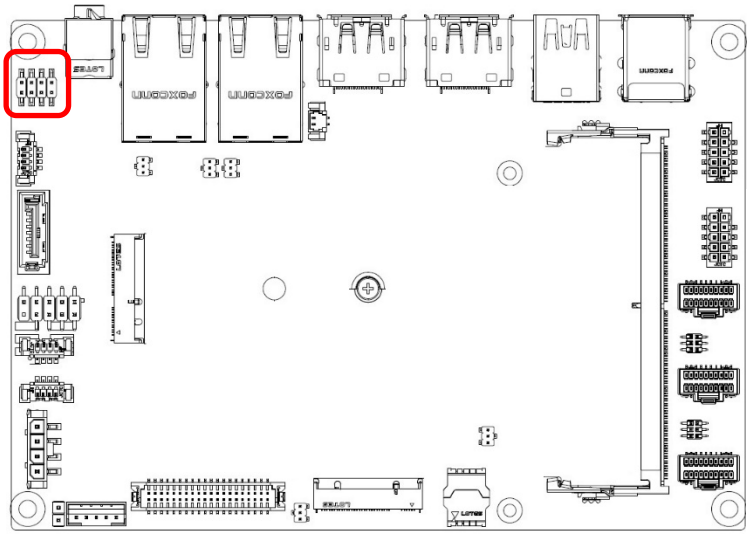


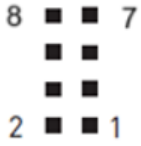
Important

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

1.10.3 Front Panel Audio Connector: JAUD2

This connector allows you to connect the front panel audio and is compliant with Intel® Front Panel I/O Connectivity Design Guide.

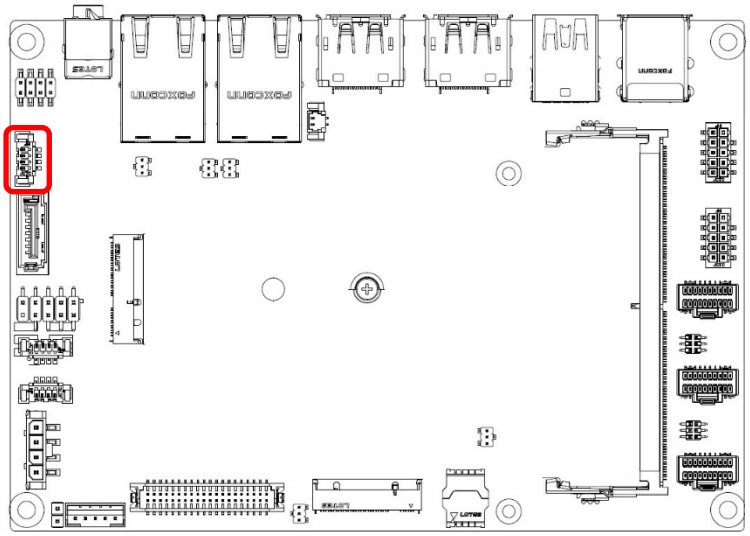


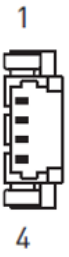


1. MIC2L	2. MIC2_JD
3. MIC2R	4. SENSE
5. LINE2R	6. LINE2_JD
7. LINE2L	8. GND

1.10.4 Amplifier Connector: JAMP1

This header provided amplified audio signals to external speakers (2-channels).

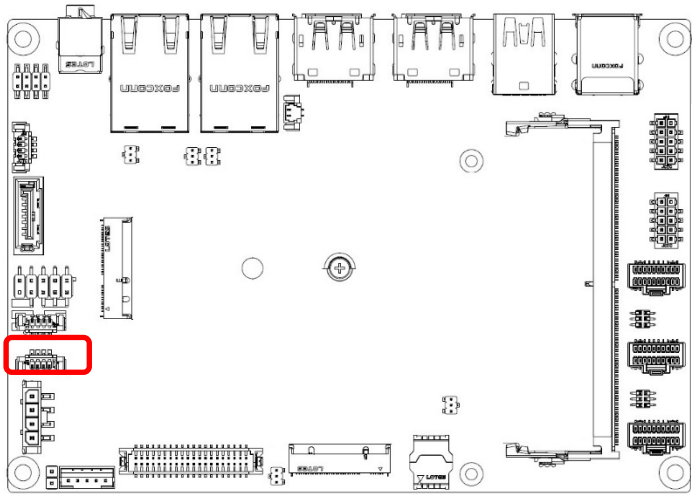




1. AMP_R-
2. AMP_R+
3. AMP_L-
4. AMP_L+

1.10.5 Fan Power Connectors: SYSFAN1

The fan power connectors support system cooling fan with +12V. When connecting the wire to these fan connectors, please note that the red wire is designated as “Power” and should be connected to “+12V” pin; the black wire is designated as “Ground” and should be connected to “GND”. In order to take the advantage of System Hardware Monitor, be sure to use the fan which is specifically designed with speed sensor.



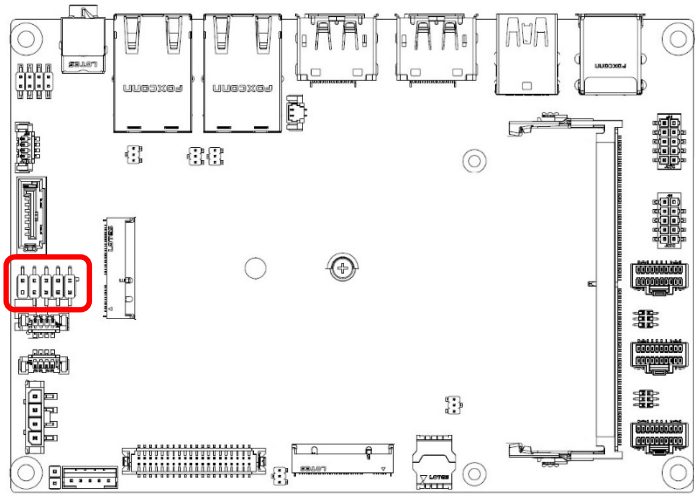
1. GND
2. FAN POWER
3. FAN SENSE
4. FAN_PWM

Important

Please refer to the recommended CPU fans at processor’s official website or consult with the vendor for proper CPU cooling fan.

1.10.6 Front Panel Connectors: JFP1

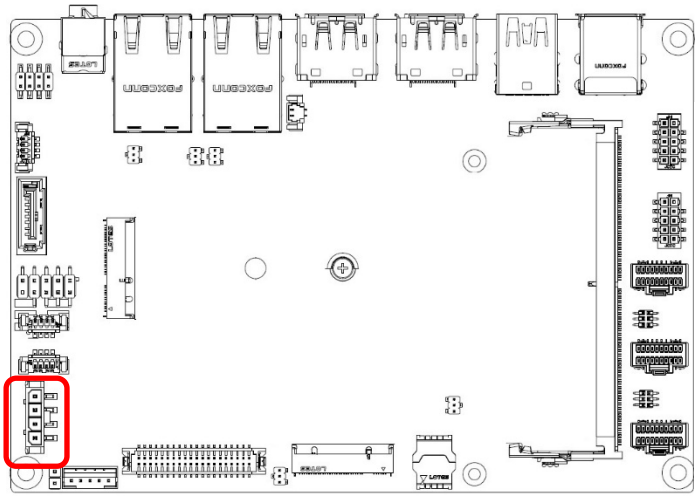
This front panel connector is provided for electrical connection to the front panel switches & LEDs and is compliant with Intel Front Panel I/O Connectivity Design Guide.



1. HDD LED+	2. PWR LED
3. HDD LED#	4. SLED
5. GND	6. PWRBT#
7. RST	8. GND
9. NC	10. NC

1.10.7 4-Pin DC-In Main Power Connector: JPWR1

This connector allows you to connect an power supply.



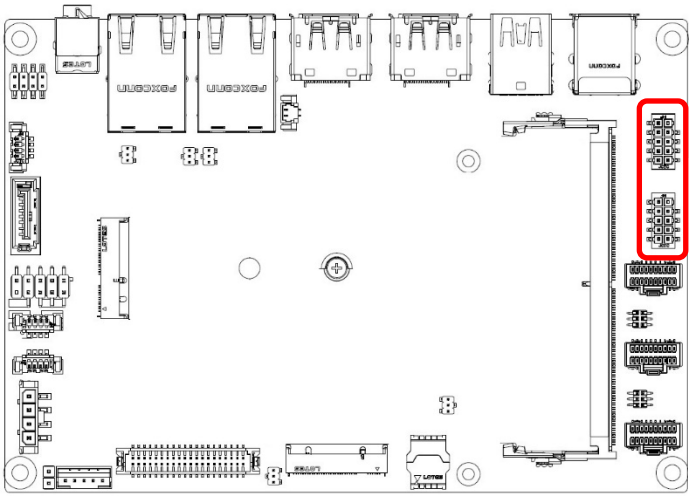
1. GND
2. Power
3. Power
4. GND

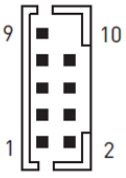
Important

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

1.10.8 Front USB2.0 Headers: JUSB1&JUSB2

This connector is compliant with Intel® I/O Connectivity Design Guide, which is ideal for connecting high-speed USB peripherals such as USB HDD, USB digital cameras, USB MP3 players, USB printers, etc.





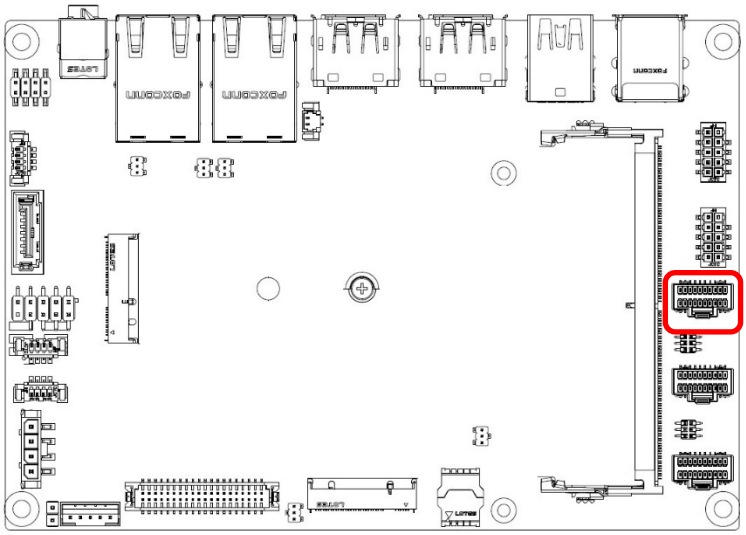
1. USB 5V	2. USB 5V
3. USB-	4. USB-
5. USB+	6. USB+
7. GND	8. GND
9. NC	10. NC

Important

Be sure the pins of VCC and GND is connected to the connector correctly. Otherwise, it may cause damage to the USB port and/or the connected USB device.

1.10.9 Serial Port Connectors: JCOM1&JCOM2

This connector provides tow serial connections with serial port COM1&2 support RS232/RS422/RS485 or Ring-in.



1. DCD
2. RX
3. TX
4. DTR#
5. GND
6. DSR#
7. RTS#
8. CTS#
9. RI
10. NC
11. DCD
12. RX
13. TX
14. DTR#
15. GND
16. DSR#
17. RTS#
18. CTS#
19. RI
20. NC

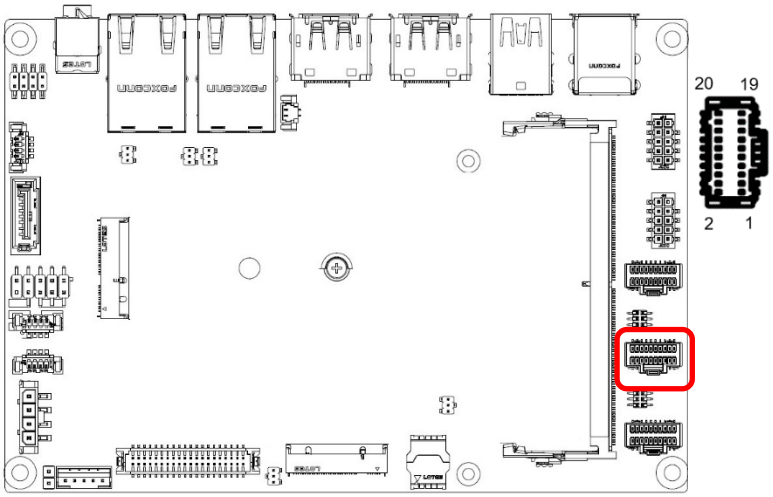
RS232		
PIN	**SIGNAL**	**DESCRIPTION**
1	NDCD	Data Carrier Detect
2	NSIN	Signal In
3	NSOUT	Signal Out
4	NDTR	Data Terminal Ready
5	GND	Signal Ground
6	NDSR	Data Set Ready
7	NRTS	Request To Send
8	NCTS	Clear To Send
9	VCC_COM/ NC	VCC_COM/ No Connection
10	No Pin	No Pin

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

1.10.10 Serial Port Connectors: JCOM3&JCOM4

This connector provides tow serial connections with serial port COM3~4 support RS232 or Ring-in.

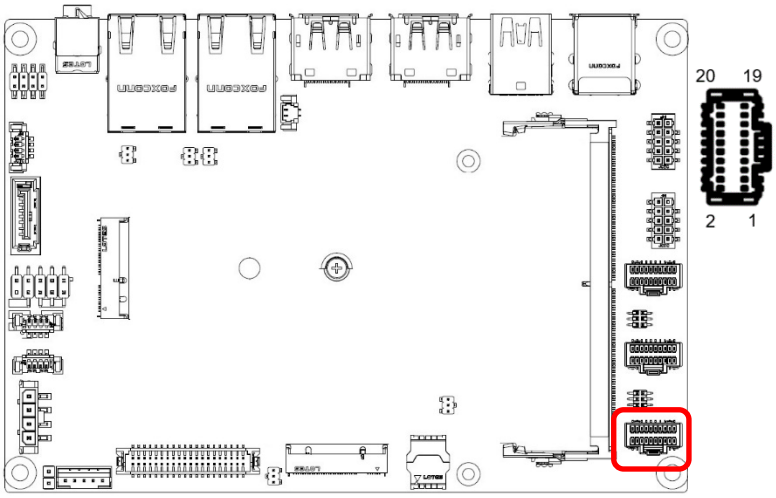


1. DCD
2. RX
3. TX
4. DTR#
5. GND
6. DSR#
7. RTS#
8. CTS#
9. RI
10. NC
11. DCD
12. RX
13. TX
14. DTR#
15. GND
16. DSR#
17. RTS#
18. CTS#
19. RI
20. NC

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

1.10.11 Digital I/O & SMBus & I2C Connector: JGPIO_SMB_I2C

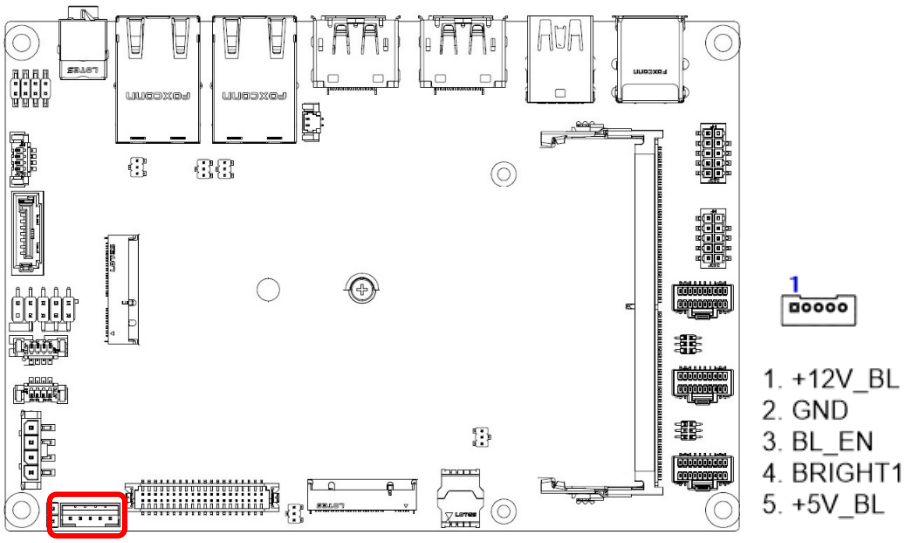
This connector is combo function provided for the General-Purpose Input/Output (GPIO) peripheral module; SMBus & I2C, is for users to connect System Management Bus (SMBus) interface.



1. VCC3
2. VCC3
3. GPI0
4. GPO0
5. GPI1
6. GPO1
7. GPI2
8. GPO2
9. GPI3
10. GPO3
11. GND
12. GND
13. 3VSB
14. 3VSB
15. PCH_I2C0_SCL
16. SMBCLK
17. PCH_I2C0_SDA
18. SMBDATA
19. GND
20. GND

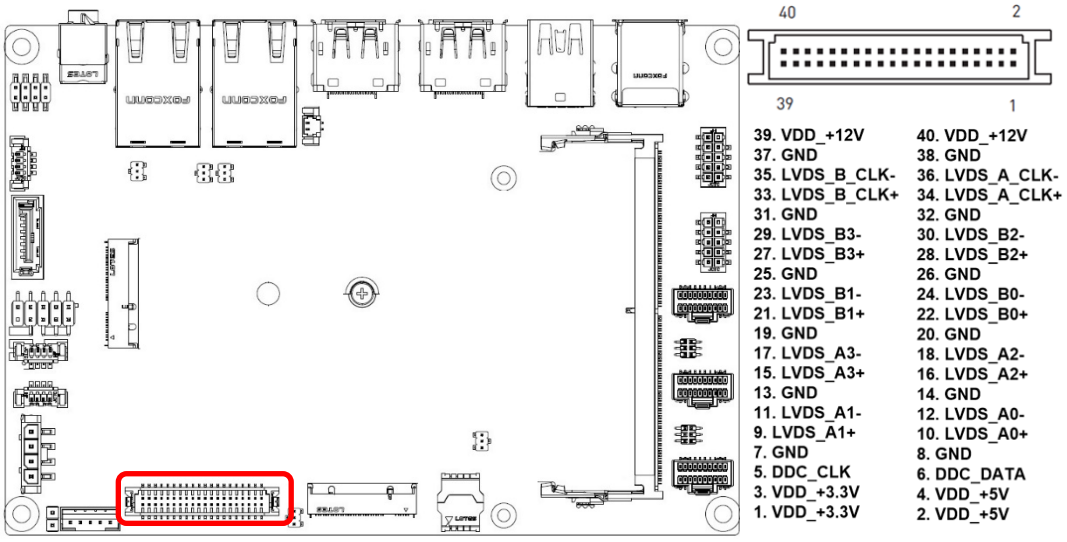
1.10.12 LVDS Inverter Connector: JINV1

The connector is provided for LCD backlight options.



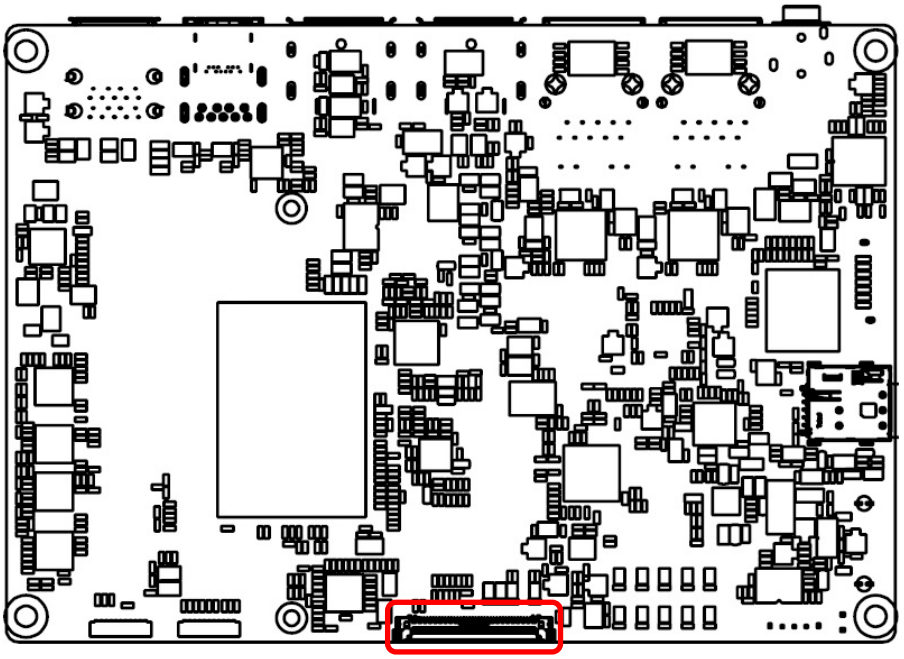
1.10.13 LVDS Connector: JLVDS1

The LVDS (Low Voltage Differential Signal) connector provides a digital interface typically used with flat panels. After connecting an LVDS interface flat panel to the JLVDS1, be sure to check the panel datasheet and set the LVDS jumper to proper power voltage.



1.10.14 eDP Connector: EDP1

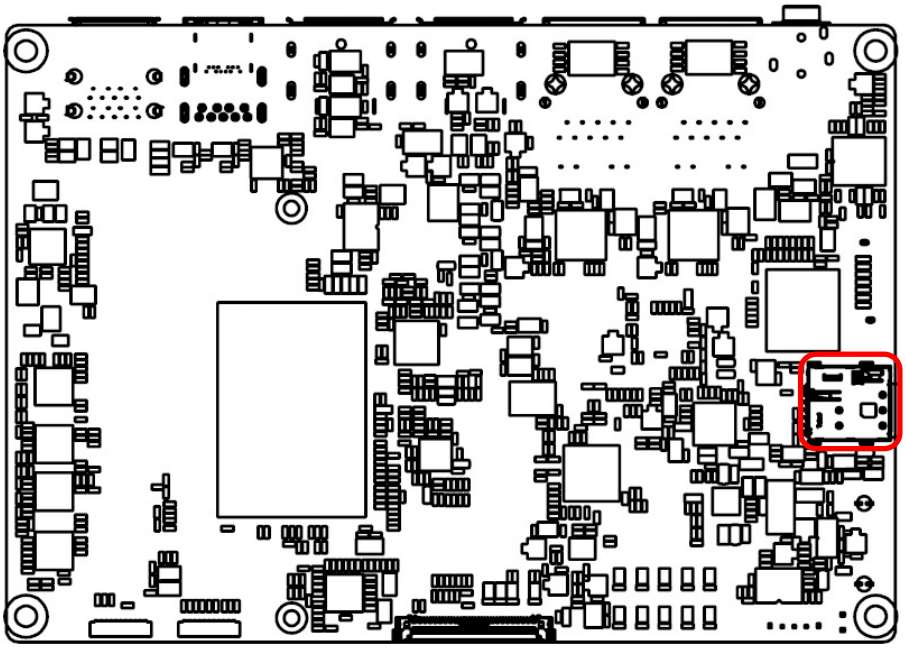
This connector is for connecting the flat EDP cable.



1.	NC	21.	3.3V/5V (EDP_PWR)
2.	GND	22.	NC
3.	EDP_DATA#3_C	23.	GND
4.	EDP_DATA3_C	24.	GND
5.	GND	25.	GND
6.	EDP_DATA#2_C	26.	GND
7.	EDP_DATA2_C	27.	EDP_HPD
8.	GND	28.	GND
9.	EDP_DATA#1_C	29.	GND
10.	EDP_DATA1_C	30.	GND
11.	GND	31.	GND
12.	EDP_DATA#0_C	32.	EDP_BKLTEN
13.	EDP_DATA0_C	33.	EDP_BKLCTL
14.	GND	34.	NC
15.	EDP_AUX_P	35.	NC
16.	EDP_AUX_N	36.	12V
17.	GND	37.	12V
18.	3.3V/5V (EDP_PWR)	38.	12V
19.	3.3V/5V (EDP_PWR)	39.	12V
20.	3.3V/5V (EDP_PWR)	40.	NC

1.10.14 Nano SIM: USIM1

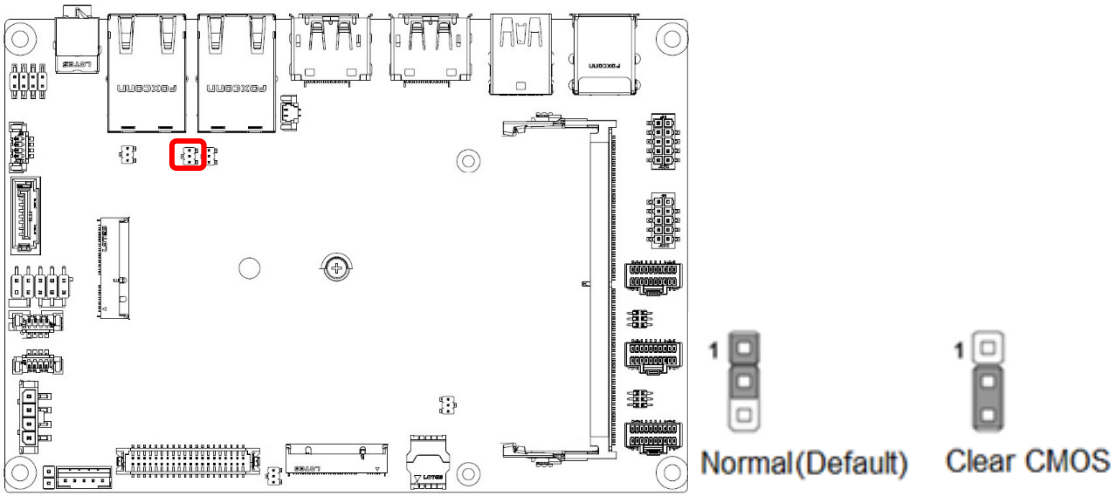
This slot provides connection to Nano SIM card..



1.11 Jumpers

1.11.1 Clear CMOS Jumper: JCMOS1

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration.

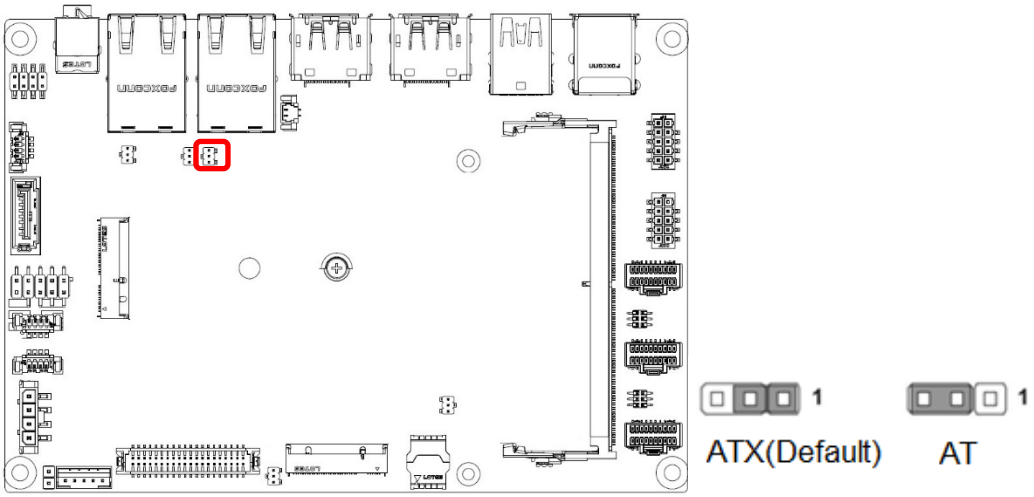


Important

1. **You can clear CMOS by shorting pin 2-3 for at least 30 seconds (while the system is OFF), then place the jumper back to pin 1-2 for normal operation.**
2. **Avoid clearing the CMOS while the system is ON; this will damage the mainboard.**

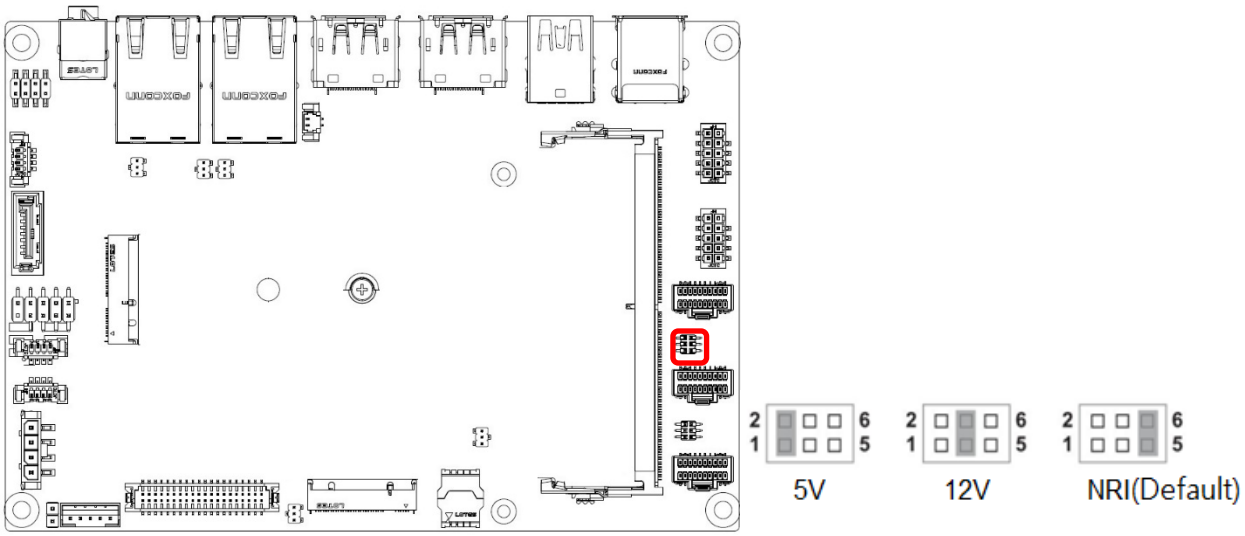
1.11.2 ATX/AT Mode Selection: JATX1

This header provides the option to boot the system in the form of ATX mode (default) or AT mode. When the system is set in AT mode, the system power on/off will be controlled directly by the power switch on power supply. And some of the power saving modes will not function as ATX mode provided.



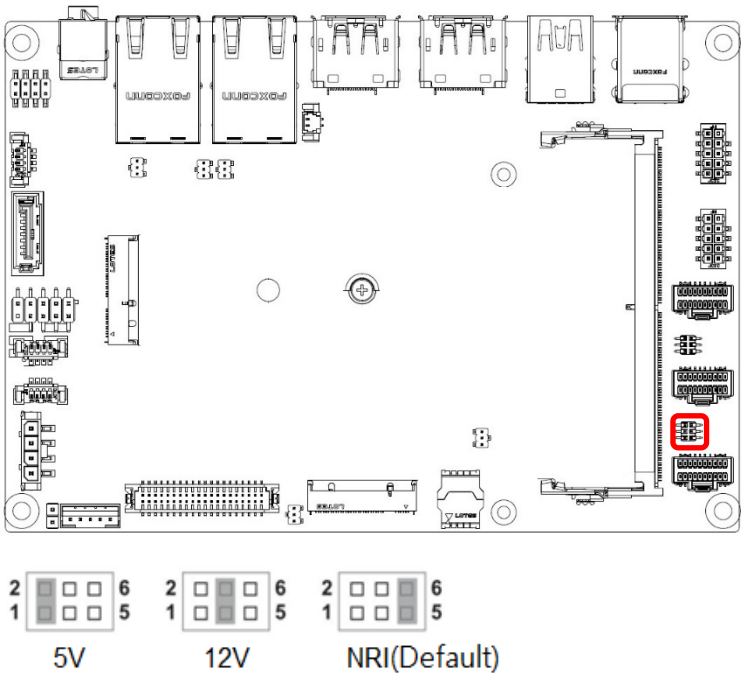
1.11.3 COM1, COM2, Ring-in/ +12V/ +5V Power Select: JCOMP1

This header provides ring-in, or 5V, or 12V on the two COM ports.



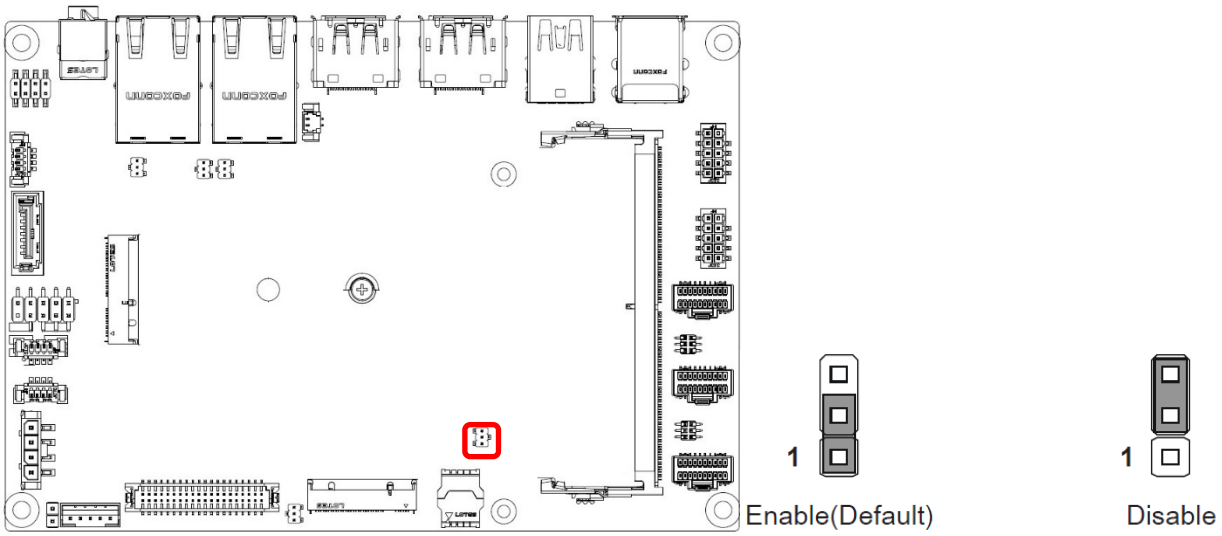
1.11.4 COM3, COM4, Ring-in/ +12V/ +5V Power Select: JCOMP2

This header provides ring-in, or 5V, or 12V on the two COM ports.



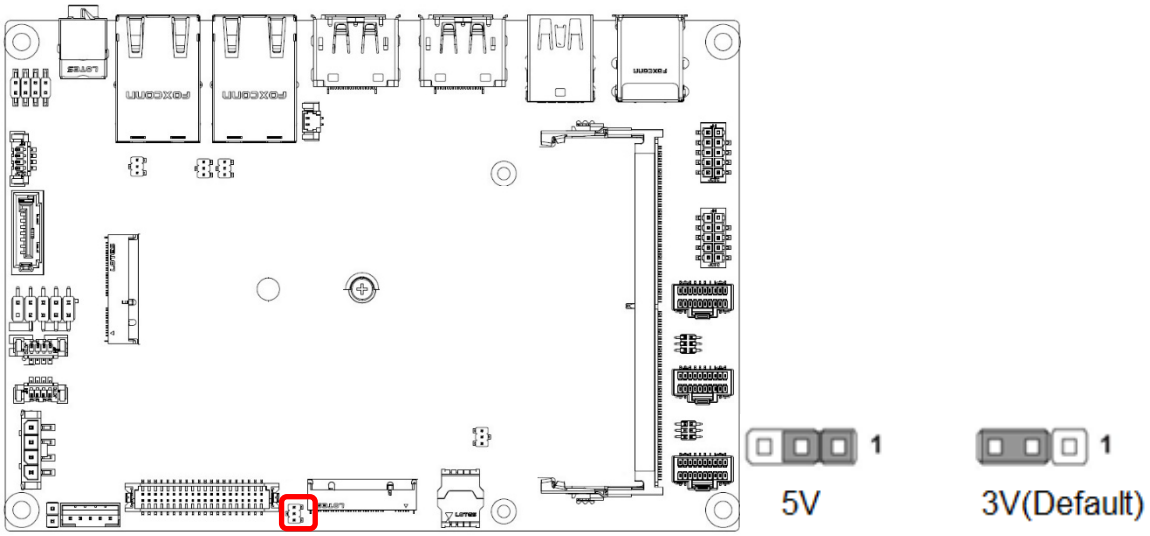
1.11.4 ME F/W Jumper: JME_DIS1

This jumper is used to enable/disable the Intel ME function.



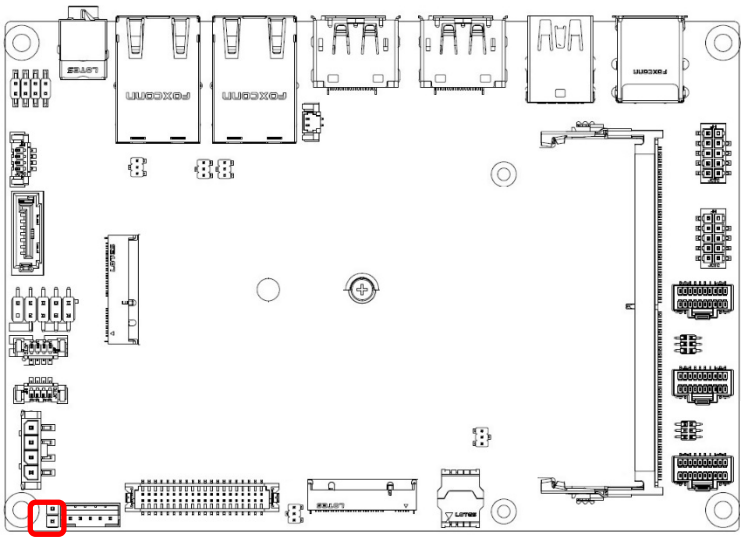
1.11.5 eDP Backlight Control Jumper: JEDPVOL1

Use this jumper to specify the operation voltage of the eDP display.



1.11.6 Chassis Intrusion Jumper: JCASE1

This 2-pins header provides chassis intrusion warning connection.



1 ■
2 ■

1. Signal
2. GND

1.12 The Expansion Slots

In the future, you may need to install expansion cards. The following sub-sections describe the expansion slots and the expansion cards that they support.

Make sure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage mainboard components.

1.12.1 Installation of Expansion Card

To install an expansion Card:

1. Before install the expansion card, read the documentation that came with it and make the necessary hardware setting for the card.
2. Remove the chassis cover (if the mainboard is installed in a chassis).
3. Remove the expansion slot bracket from the chassis on the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press it firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw that have been removed earlier (in step 3).
6. Place the chassis cover back on.

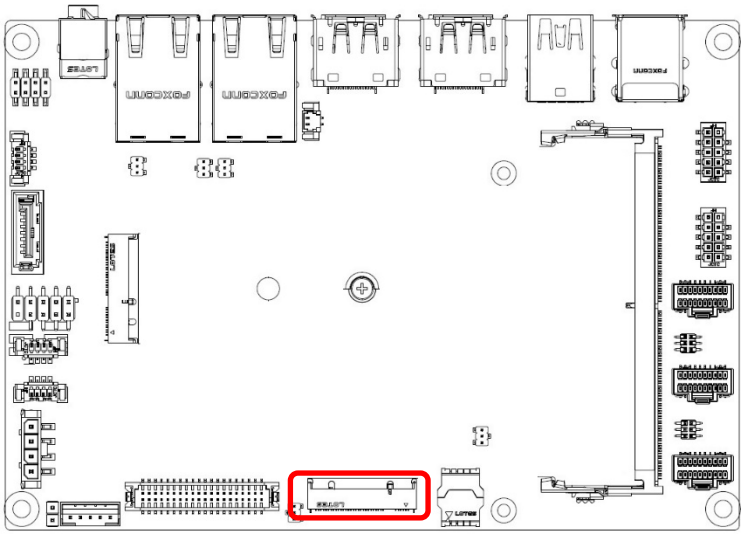
1.12.2 M.2 Slot (Key B, 2242): M2_B1

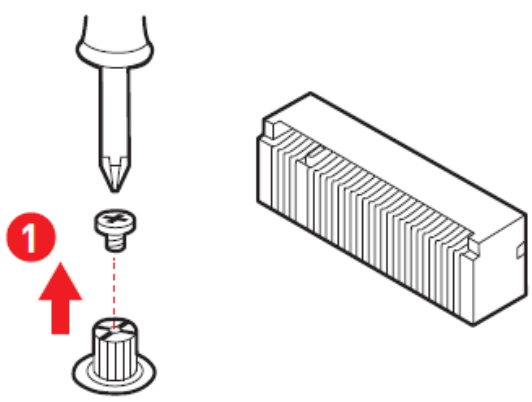
Please install the M.2 solid-state drive (SSD) or module card into the M.2 slot as shown below.

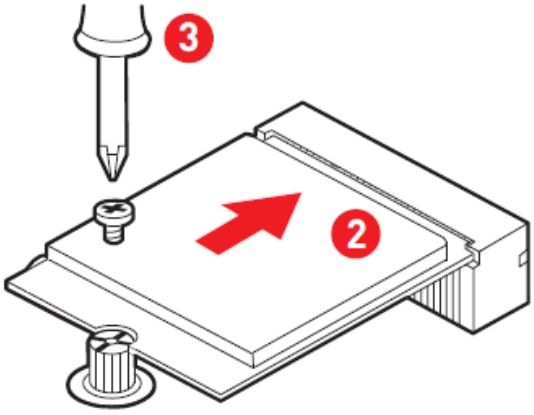
For fanless operation, use extended temp SSD.

Feature

- **Supports SATA-3.0 or PCIe x1 signal.**
- **Supports B+M Key SATA 3.0 SSD**
- **Supports B+M key PCIe x1 module.**







Important

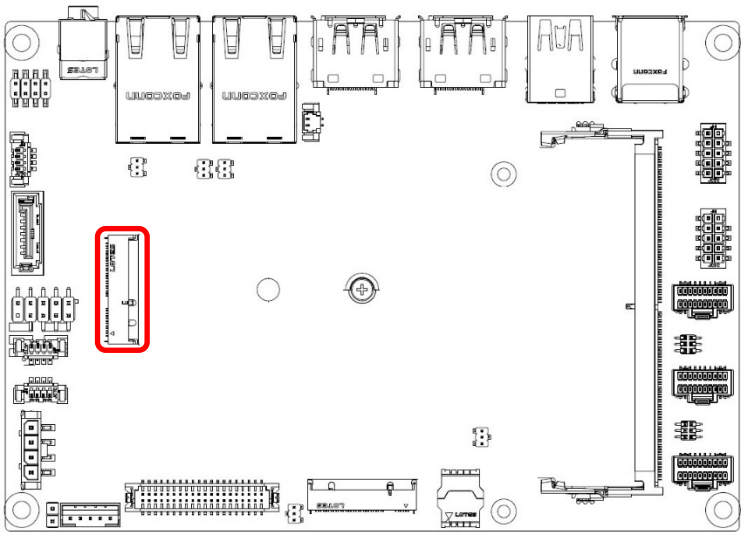
When adding or removing expansion cards, make sure that you unplug the power supply first. Meanwhile, read the documentation for the expansion card to configure any necessary hardware or software settings for the expansion card, such as jumpers, switches or BIOS configuration.

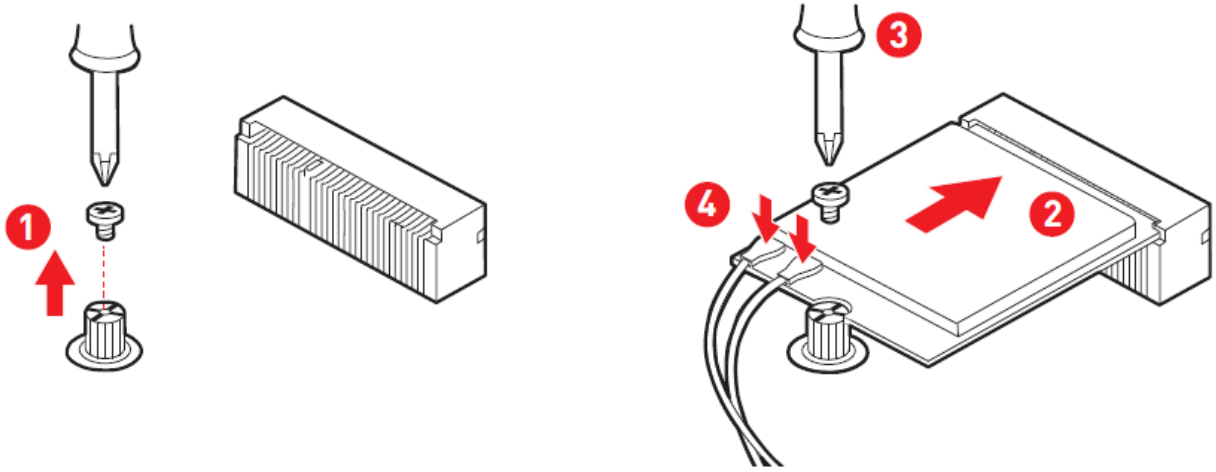
1.12.3 M.2 Slot (Key E, 2230): M2_E1

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

Feature

- **Supports PCIe x1 & USB 2.0 signals.**
- **Supports Intel CNVi WiFi Module**





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.

Chapter 2: Starting Up the System

2.1 Starting Up Your System

1. After all connections are made, close your computer case cover.
2. Connect the power supply cord into the power supply located on the back of your system case according to your system user's manual.
3. Turn on your peripheral in following order:
   a. Your monitor.
   b. Other external peripheral (Printer, Scanner, External Modem etc…)
   c. Your system power. For ATX power supplies, you need to turn on the power supply and press the ATX power switch on the front side of the case.
4. The power LED on the front panel of the system case will light. The LED on the monitor may light up or switch between orange and green after the system is on. If it complies with green standards or if it is has a power standby feature. The system will then run power-on test. While the test are running, the BIOS will alarm beeps or additional message will appear on the screen.

   If you do not see any thing within 30 seconds from the time you turn on the power. The system may have failed on power-on test. Recheck your jumper settings and connections or call your retailer for assistance.

Beep	**Meaning**
One short beep when displaying logo	No error during POST
Long beeps in an endless loop	No DRAM install or detected
One long beep followed by three short beeps	Video card not found or video card memory bad
High frequency beeps when system is working	CPU overheated System running at a lower frequency

5. During power-on, press <Del> key to enter BIOS setup. Follow the instructions in BIOS SETUP.
6. If you wish to boot from a different bootable device other than the default arrangement under the BIOS, you may press <F11> key during the system power-on (post); a menu with all detected bootable devices which are attached to the system will be displayed. Then you may select the desired first bootable device from this menu.

7. **Power off your computer:** You must first exit or shut down your operating system before switch off the power switch. For ATX power supply, you can press ATX power switching after exiting or shutting down your operating system. If you use Windows Operating Systems, click **"Start"** button, click **"Shut down"** and then click **"Shut down the computer"** The power supply should turn off after windows shut down.

Chapter 3: 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:

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

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 <DEL> or <F2> key 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 <De- lete> keys.

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.

Control Keys

← →	Select Screen
↑ ↓	Select Item
Enter	Select
+ -	Change Option
F1	General Help
F7	Previous Values
F9	Optimized Defaults
F10	Save & Reset
Esc	Exit

Getting Help

After entering the Setup menu, the first menu you will see is 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.

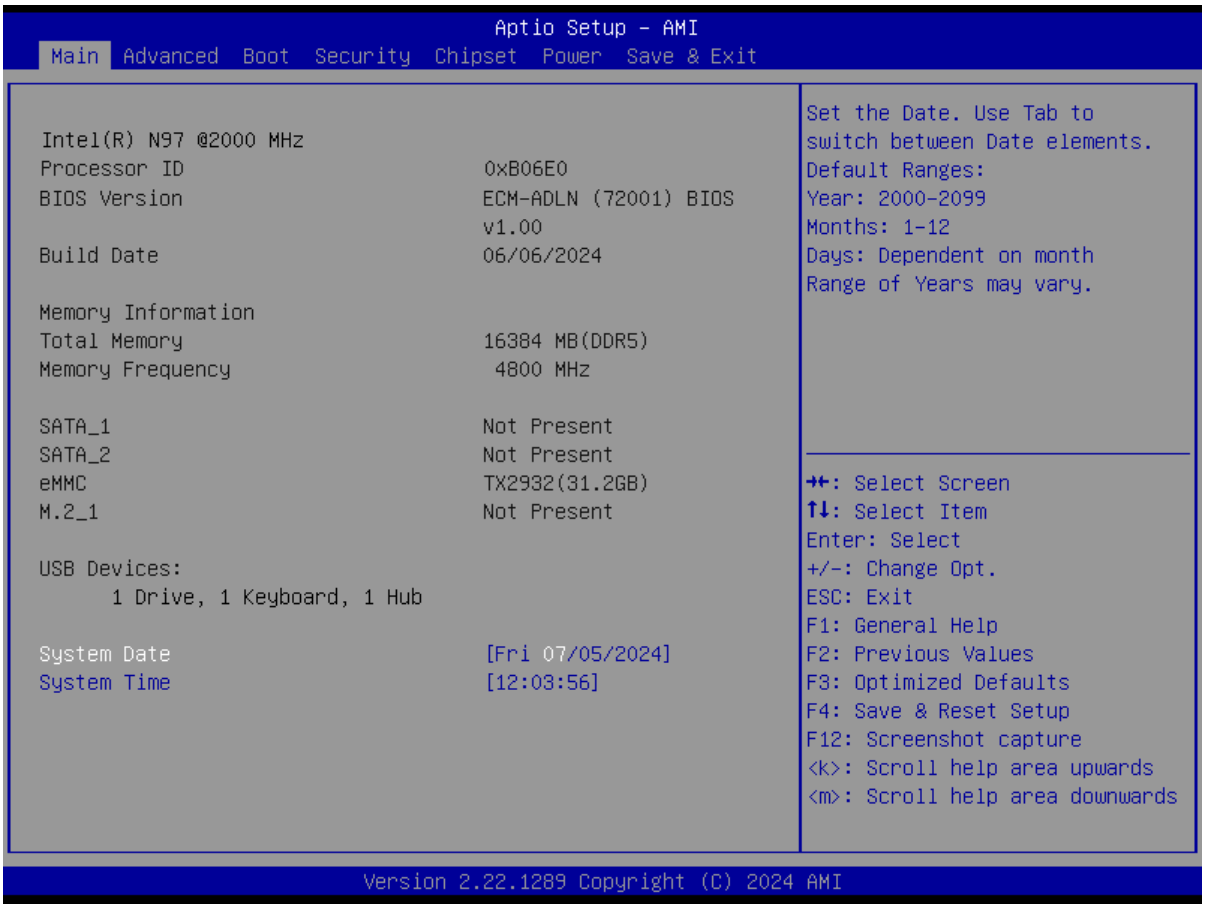
Sub-Menu

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.

3.1 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.

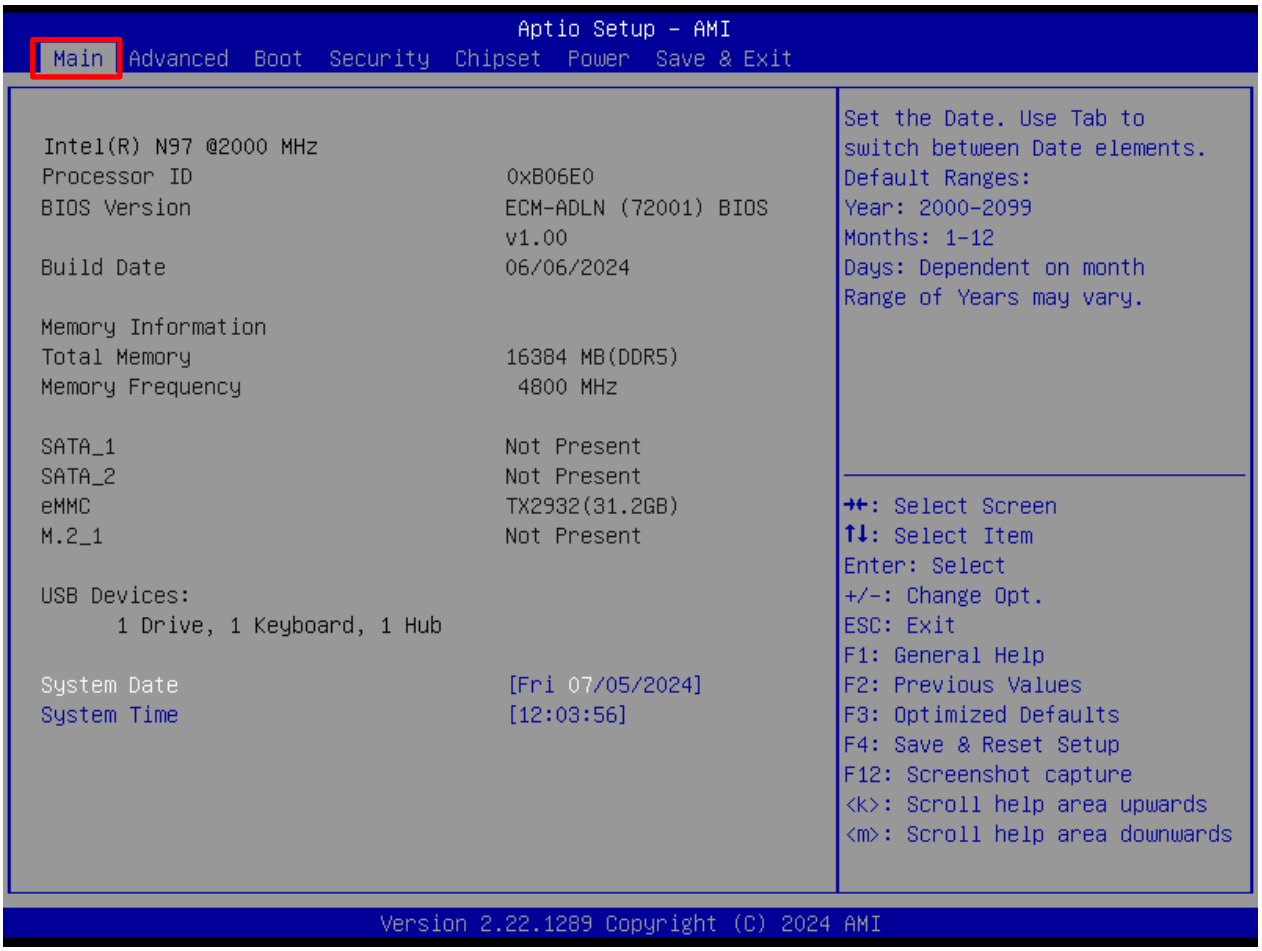
▶ Power

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.

3.1.1 Main



▶ System Date

This setting allows you to set the system date.

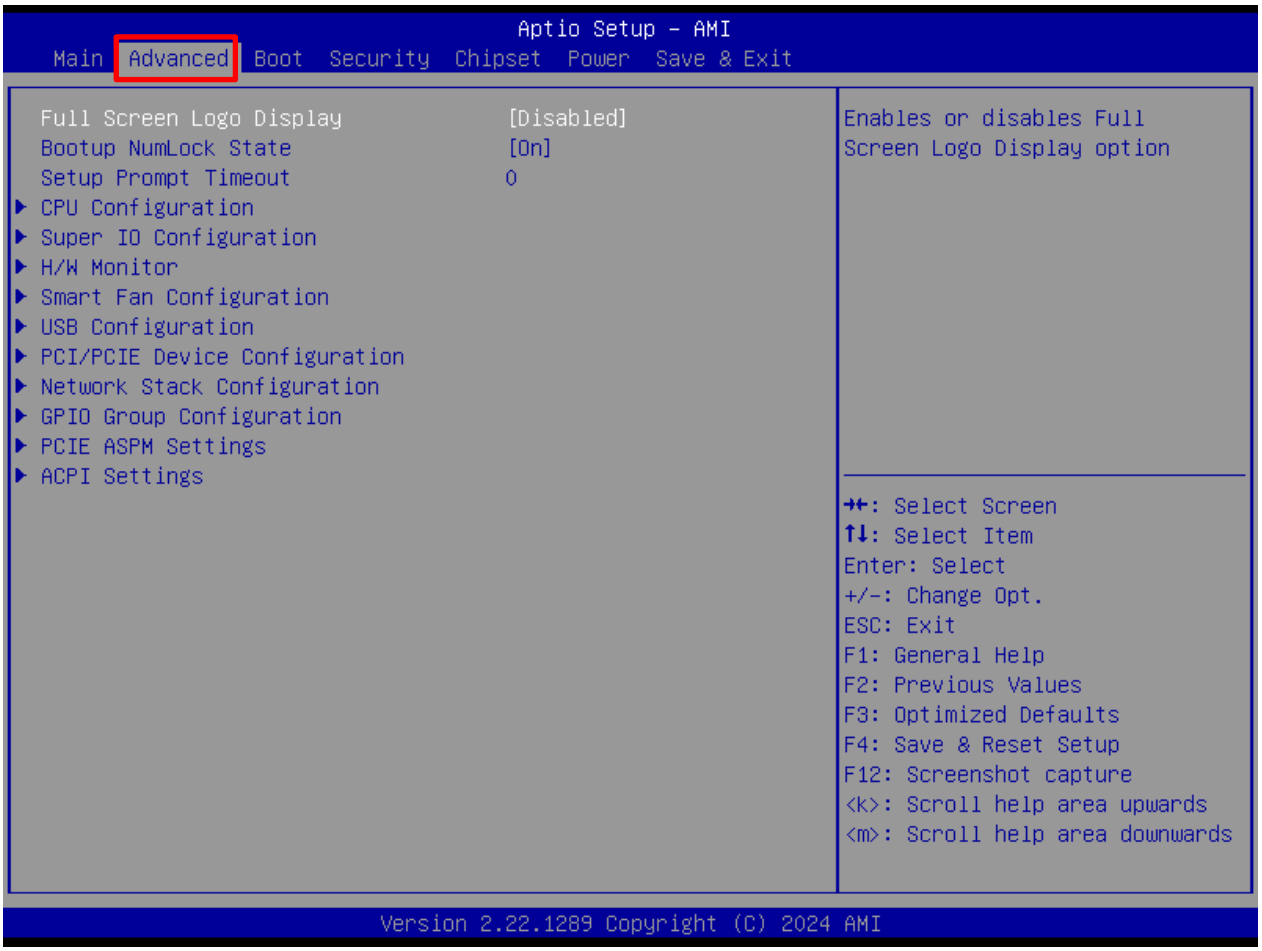
Format: <Day> <Month> <Date> <Year>.

▶ System Time

This setting allows you to set the system time.

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

3.2 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 fullscreen logo.

▶ Bootup NumLock State

This setting is to set the Num Lock status when the system is powered on.

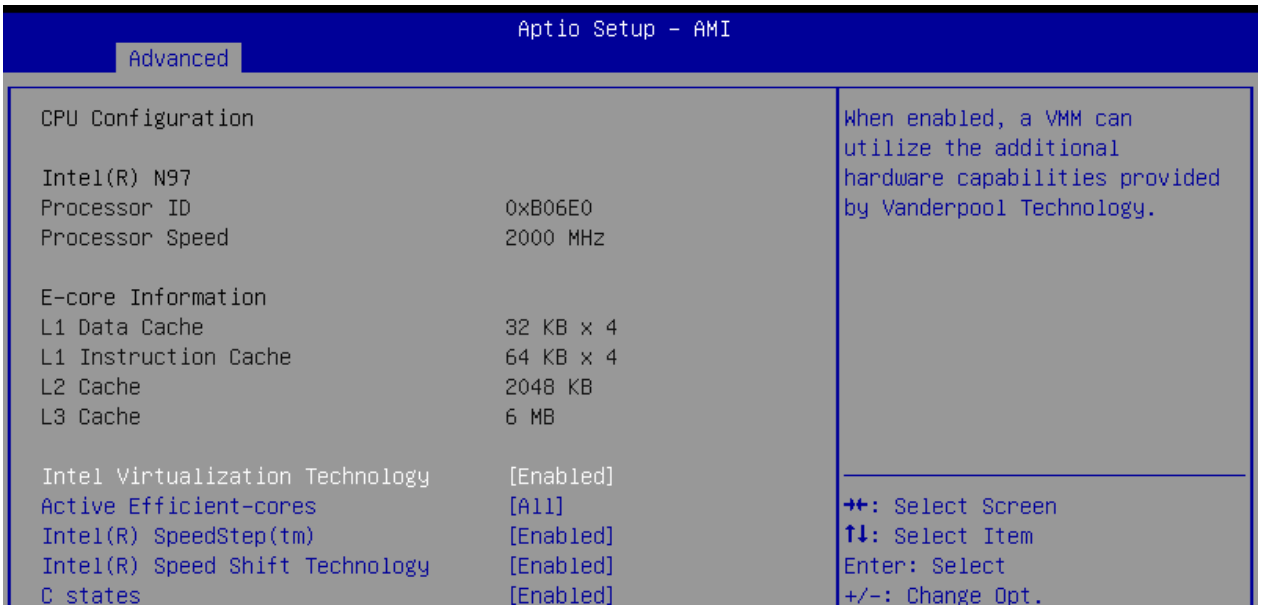
[On] Turn on the Num Lock key when the system is powered on.

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

▶ Setup Prompt Timeout

Number of second to wait for setup activation key.

3.2.1 CPU Configuration



▶ Intel Virtualization Technology

Virtualization enhanced by Intel Virtualization Technology will allow a platform to run multiple operating systems and applications in independent partitions. With Virtualization, one computer system can function as multiple “virtual” systems.

▶ Active Efficient-cores

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

▶ Intel(R) SpeedStep(TM)

EIST (Enhanced Intel SpeedStep Technology) allows the system to dynamically adjust processor voltage and core frequency, which can result in decreased average power consumption and decreased average heat production. When disabled, the processor will return the actual maximum CPUID (CPU Identification) input value of the processor when queried.

▶ Intel(R) Speed Shift Technology

It 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.

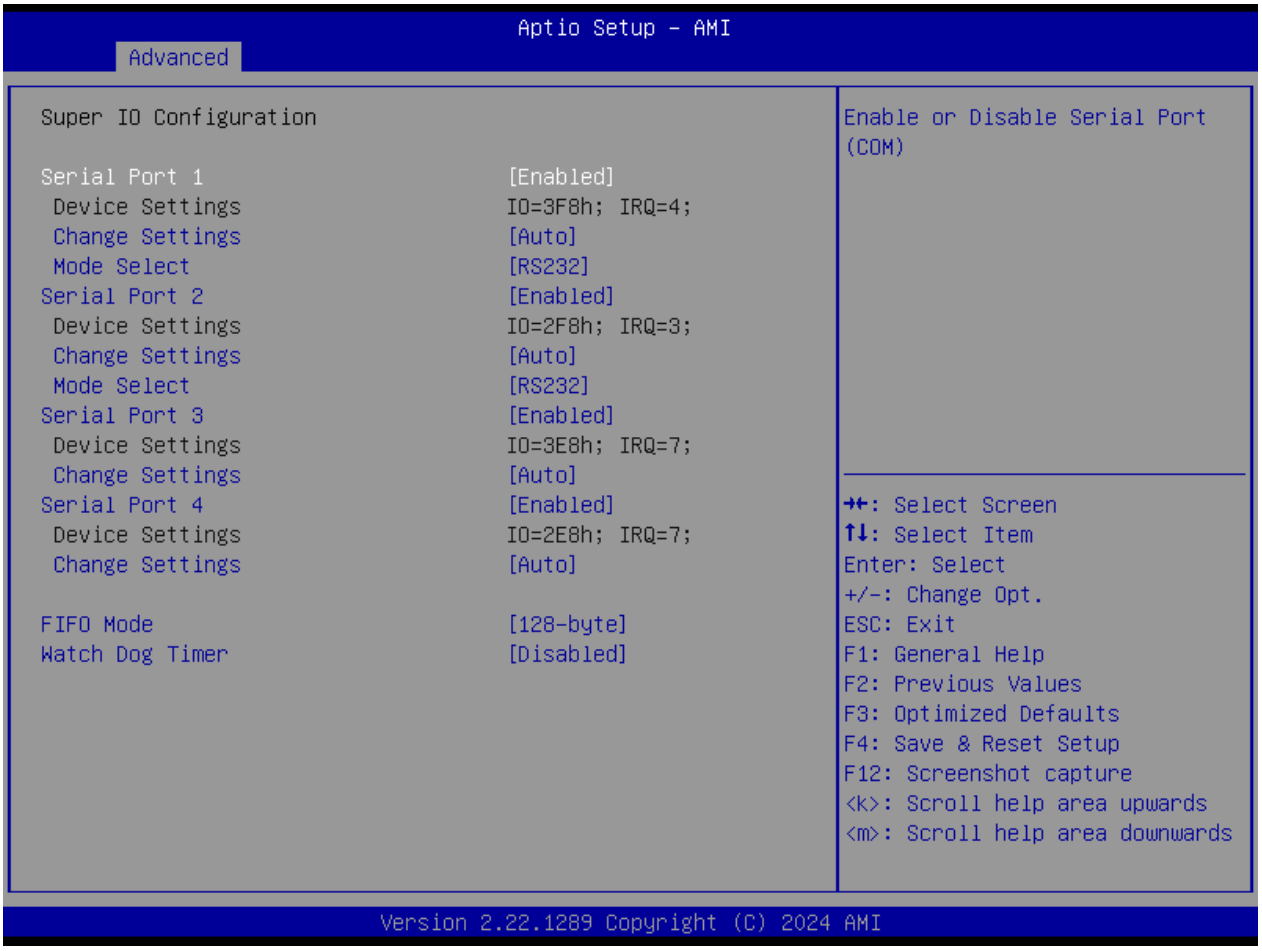
▶ C States

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.

3.2.2 Super IO Configuration



▶ Serial Port 1/ 2/ 3/ 4

This setting enables/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/ 3/ 4.

▶ FIFO Mode

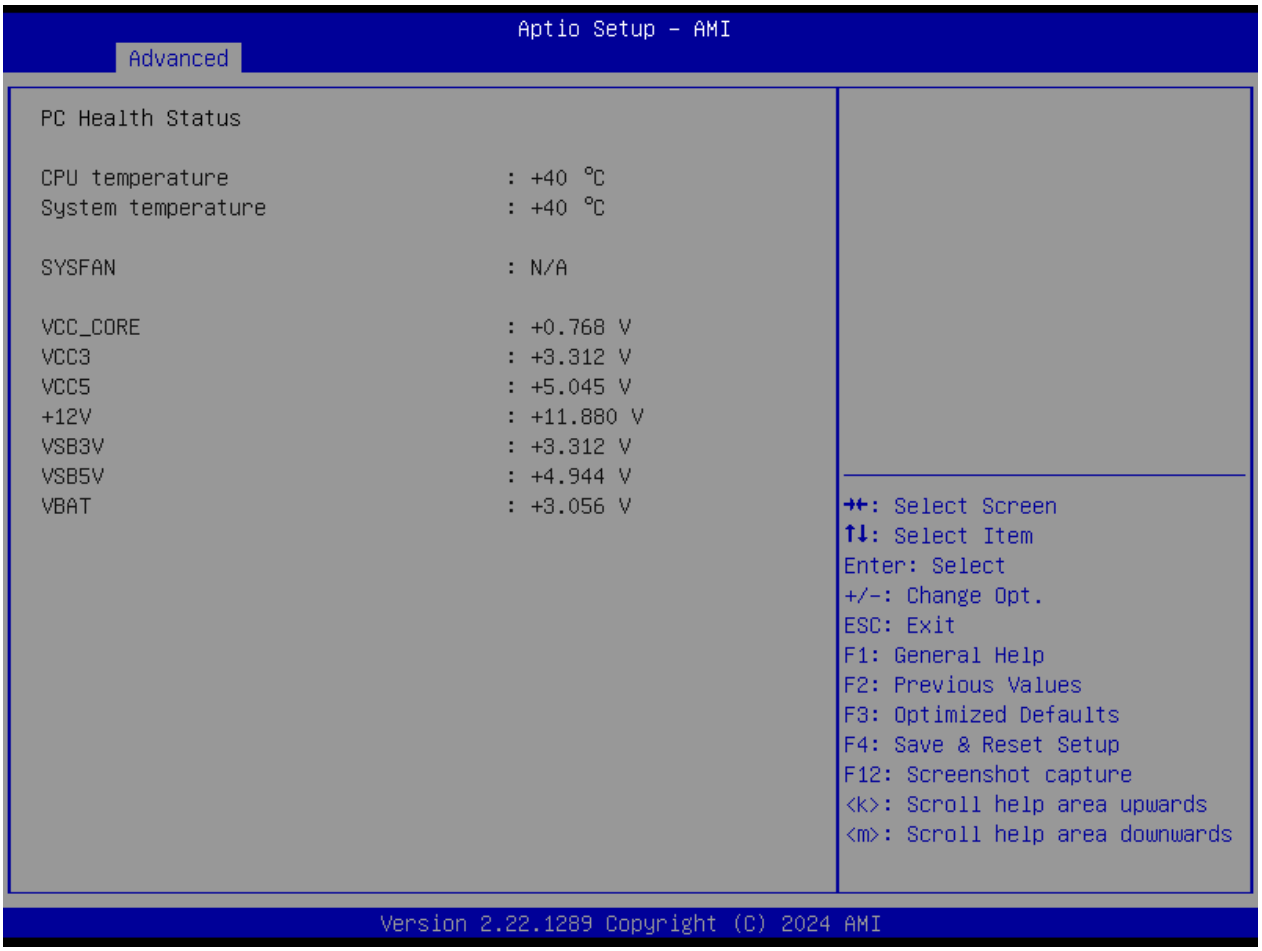
This setting controls the FIFO (First In First Out) data transfer mode.

▶ Watch Dog Timer

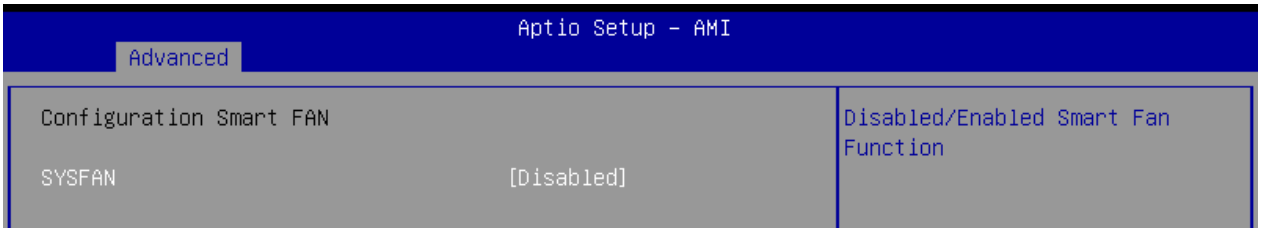
You can enable the system watchdog timer, a hardware timer that generates a reset when the software that it monitors does not respond as expected each time the watchdog polls it.

3.2.3 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.



3.2.4 Smart Fan Configuration

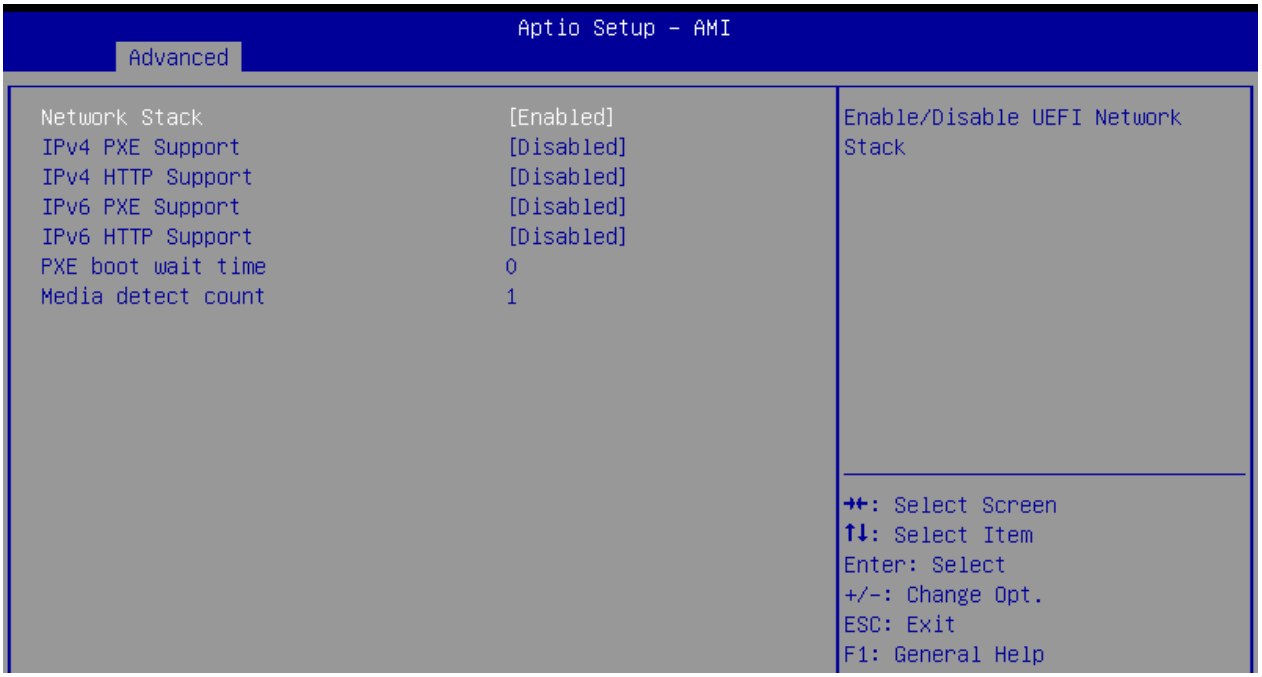


▶ Smart CPUFAN/ SYSFAN Target

This setting enables/ 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.

3.2.5 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 Stak** is enabled.

» IPV4 PXE Support

Enables or disable IPv4 PXE boot support.

» IPV4 HTTP Support

Enables or disable Ipv4 HTTP Support.

» IPV6 PXE Support

Enables or disable Ipv6 PXE Support.

» IPV6 HTTP Support

Enables or disable Ipv6 HTTP Support.

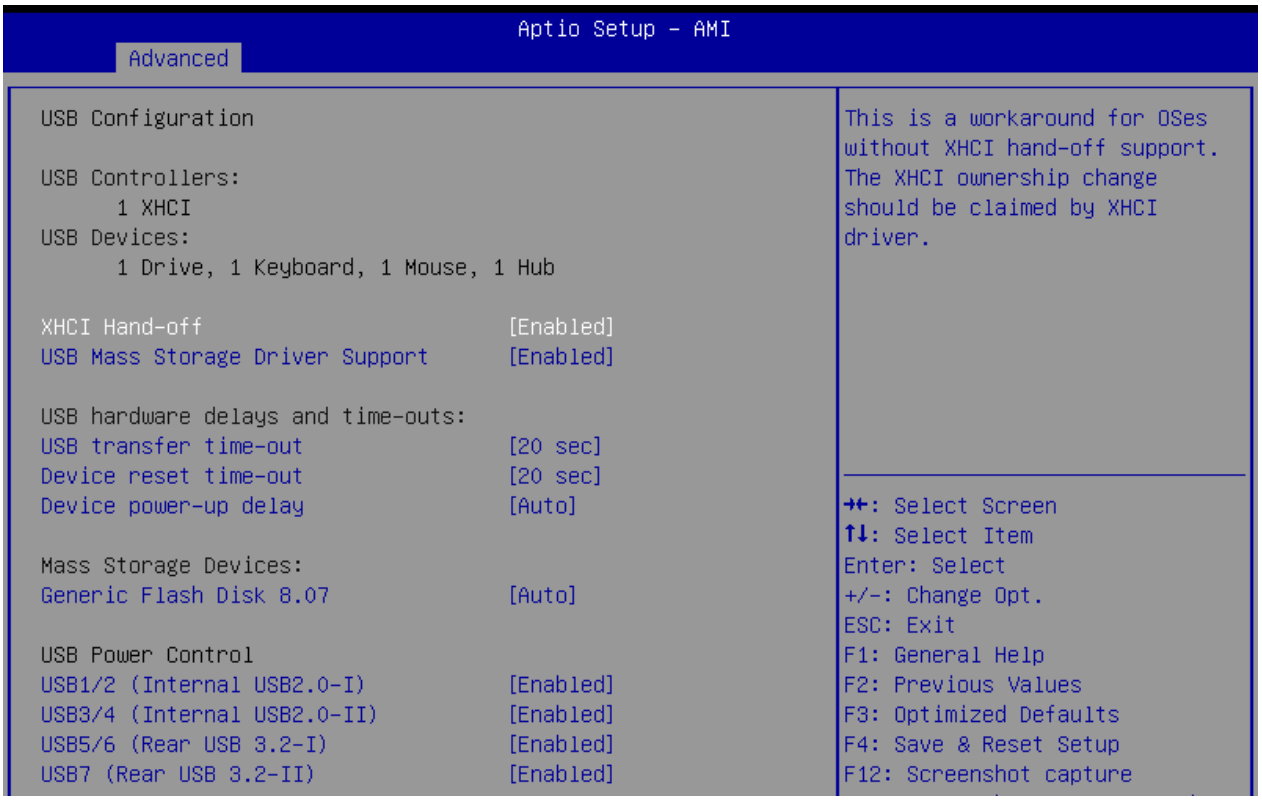
» PXE boot wait time

Use this option to specify the wait time to press the ESC key to abort the PXE boot. Press “+” 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 “+” or “-” on your keyboard to change the value. The default setting is 1.

3.2.6 USB Configuration



▶ XHCI Hand-off

This setting controls the XHCI (eXtensible Host Controller Interface) Hand-off.

[Enabled] On-board USB 3.2 port functions like a regular 3.2 port.

[Disabled] On-board USB 3.2 por functions like a 2.0 port.

▶ USB Mass Storage Driver Support

A USB mass storage driver setting enables/disables the ability to communicate with external drives and other removable devices connected through the USB port, such as external HDDs/SSDs and flash drives.

▶ USB transfer time-out

Set the USB core's wait time for Control, Bulk, and Interrupt transfers.

▶ Device reset time-out

Set the amount of time that the POST(Power-On Self-Test) will wait for the USB mass storage device to be used after start unit command.

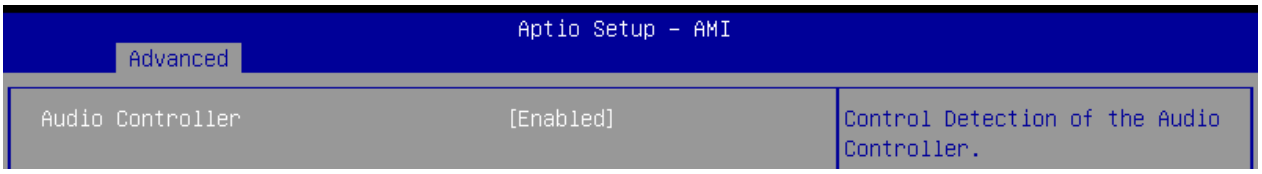
▶ Device power-up delay

Set the maximum time that a USB device will wait before reporting itself to the host controller.

▶ USB Power Control

This setting enables/disables USB Ports.

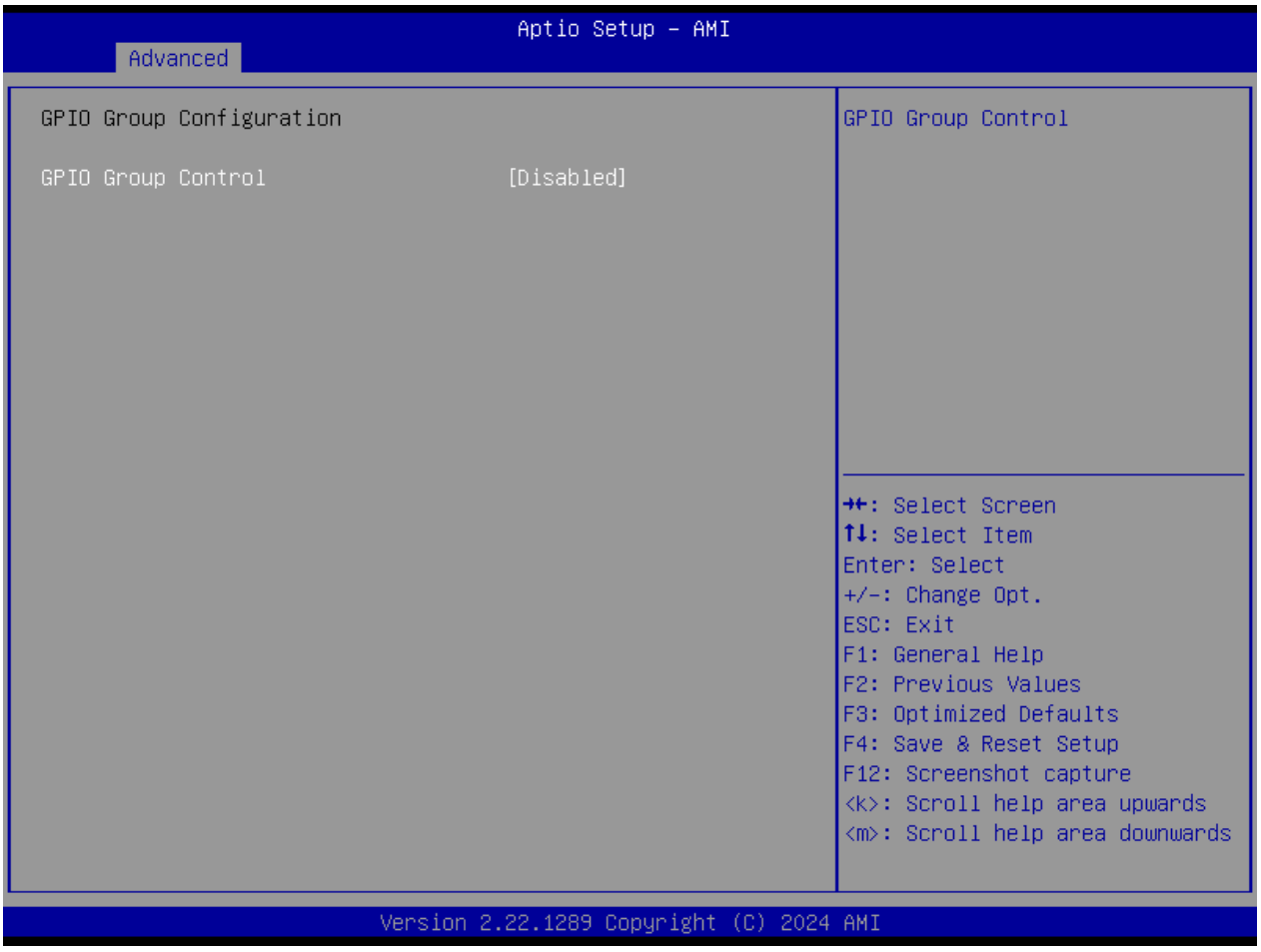
3.2.7 PCI/ PCIE Device Configuration



▶ Audio Controller

This setting enables/disables the onboard audio controller.

3.2.8 GPIO Group Configuration

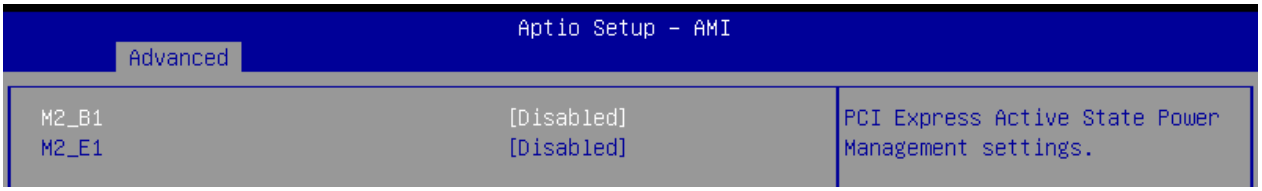


▶ GPIO Group Control

These settings control the operation mode of the specified GPIO.

3.2.9 PCIE ASPM Settings

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



▶ M2_B1/ M2_E1

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

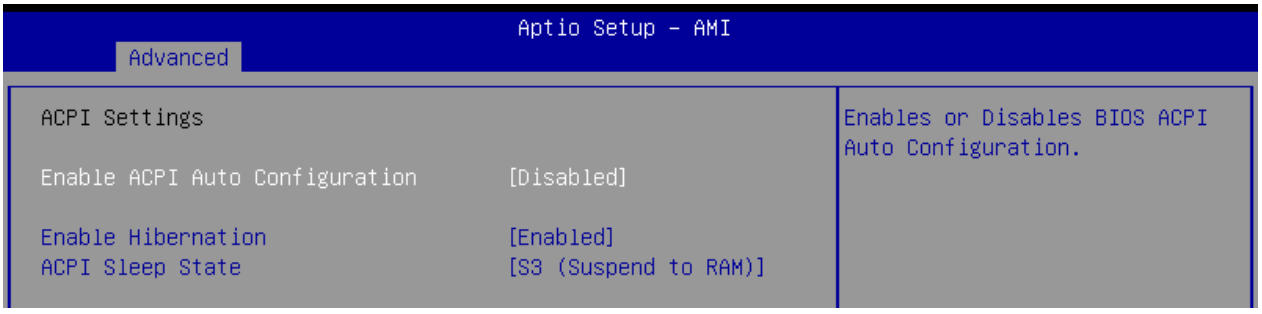
[L0s] Initiate an automatic shutdown of the system to protect from potential damage due to overheating.

[L1] Higher latency, lower power "standby" state (optional).

[L0sL1] Activate both L0s and L1 support.

[Disabled] Disable this function.

3.2.10 ACPI Settings

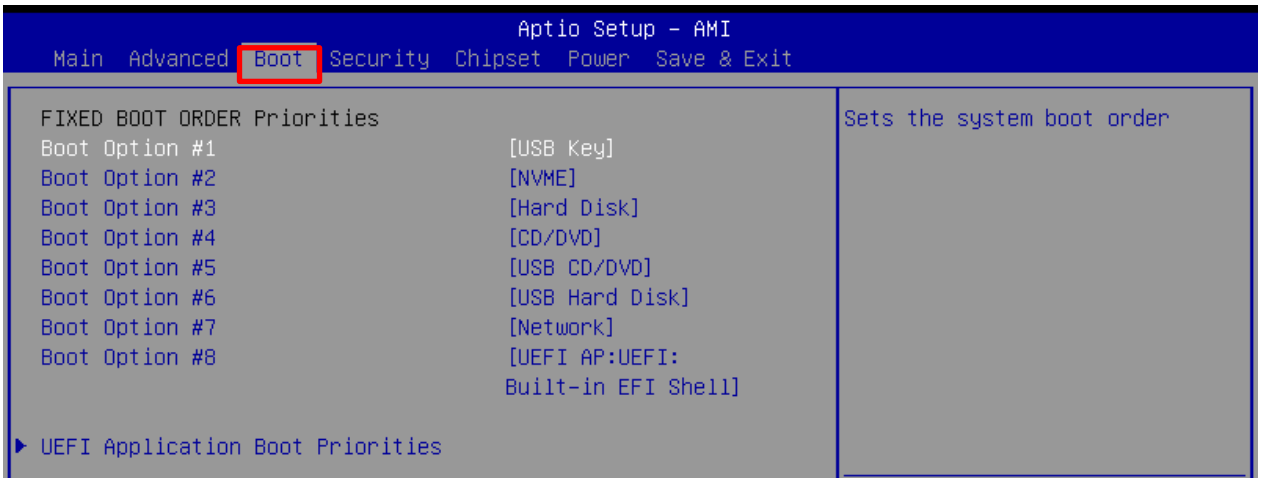


▶ Enable ACPI Auto Configuration

▶ Enable Hibernation

▶ ACPI Sleep State

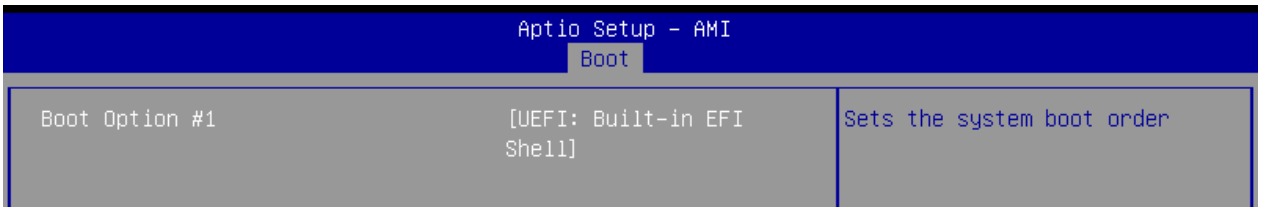
3.3 Boot



▶ Boot Option #1-8

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

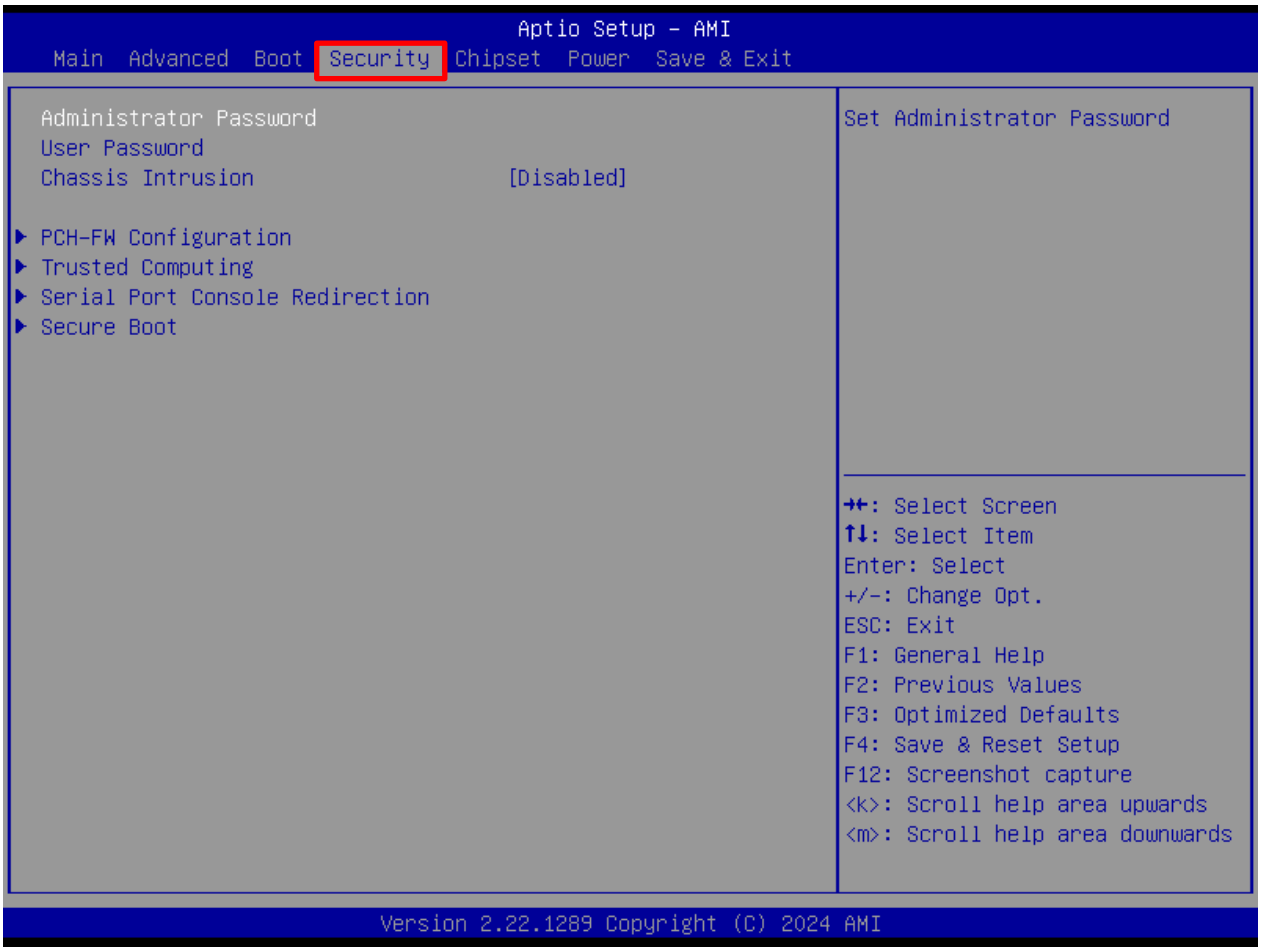
3.3.1 UEFI Application Boot Priorties



▶ Boot Option #1

This setting allows users to set the system boot order.

3.4 Security



▶ Administrator Password

Administrator Password controls access to the BIOS Setup utility.

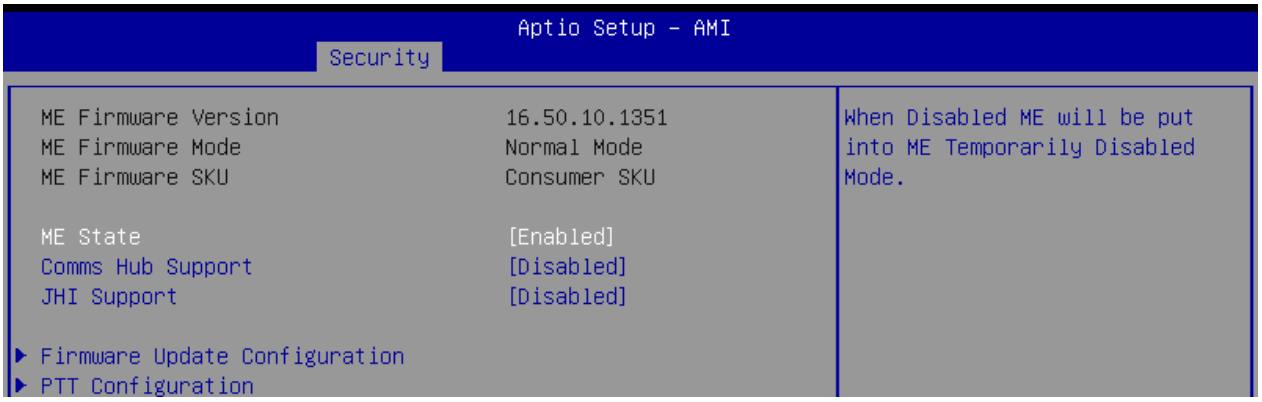
▶ User Password

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

▶ Chassis Intrusion

Select chassis intrusion enabled to Disabled Configuration options: [Disabled] [Enabled]

3.4.1 PCH-FW Configuration



▶ 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.

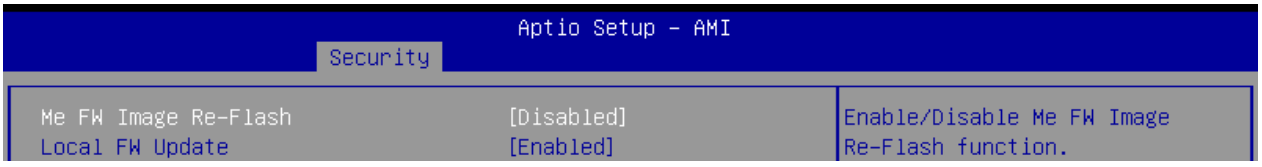
▶ Comms Hub Support

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 hostbased applications.

3.4.1.1 Firmware Update Configuration



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

▶ ME FW Image Re-Flash

Enables or disables the ME Firmware Image Re-flashing.

▶ Local FW Update

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

3.4.1.2 PTT Configuration

Intel Platform Trust Technology (PTT) is a platform functionality for credential storage and key management used by Microsoft Windows.

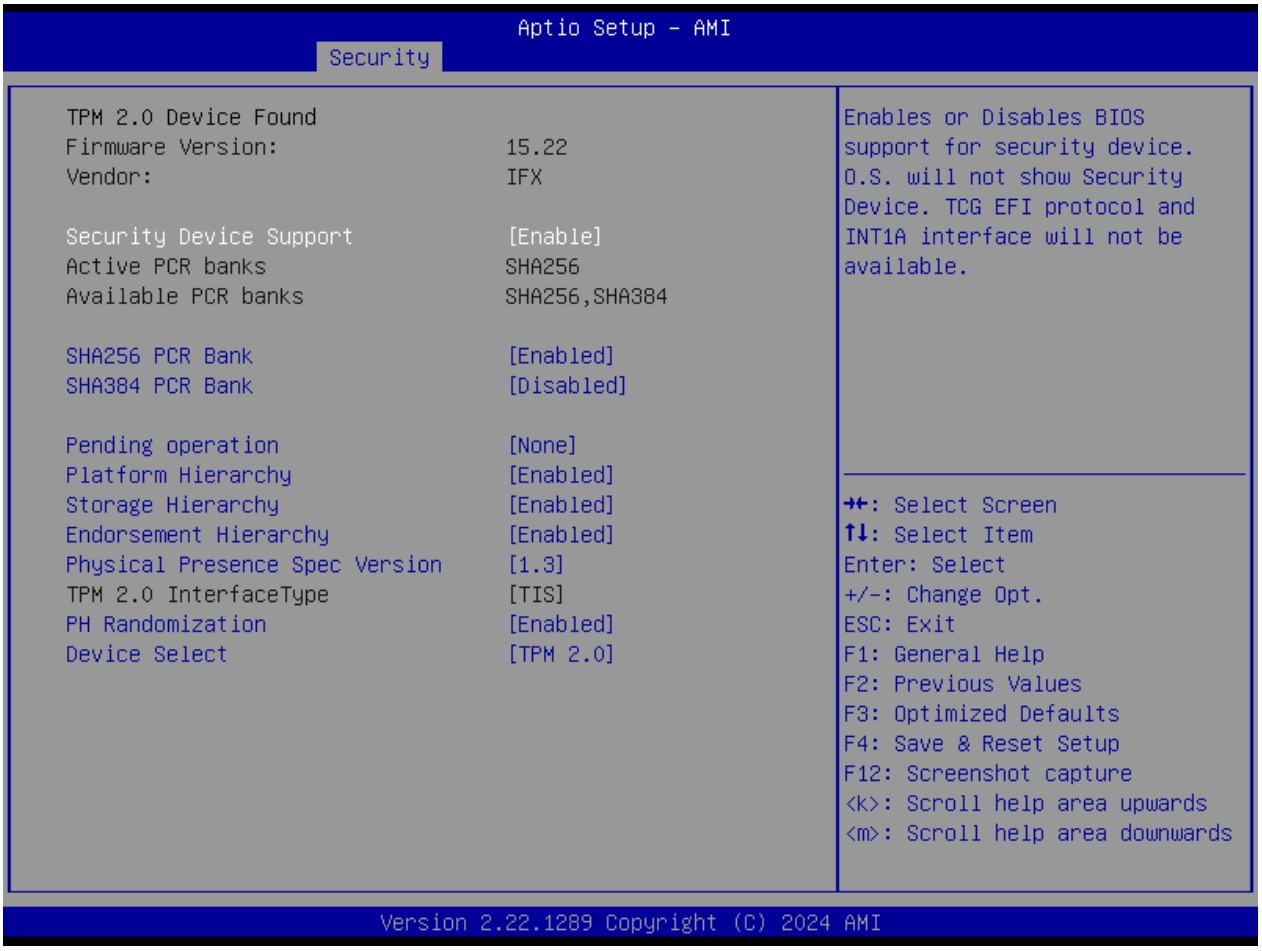
» **TPM Device Selection**

Select TPM (Trusted Platform Module) devices from PTT or dTPM (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.**

3.4.2 Trusted Computing



▶ **Security Device Support**

This setting enables/disables BIOS support for security device. When set to [Disable], the OS will not show security device. TCG EFI protocol and INT1A interface will not be available.

▶ **SHA256 / SHA384 PCR Bank**

These settings enable/disable the SHA-1 PCR Bank and SHA256 & SHA384 PCR Bank.

▶ **Pending Operation**

When **Security Device Support** is set to [Enable], **Pending Operation** will appear.

Set this item to [TPM Clear] to clear all data secured by TPM or [None] to discard the selection.

It is advised that users should routinely back up their TPM secured data.

▶ **Platform Hierarchy, Storage Hierarchy, Endorsement Hierarchy**

These settings enable/disable the Platform Hierarchy, Storage Hierarchy and Endorsement Hierarchy.

▶ **Physical Presence Spec Version**

This setting show the Physical Presence Spec Version.

▶ **TPM 2.0 Interface Type**

This setting shows the TPM 2.0 Interface Type.

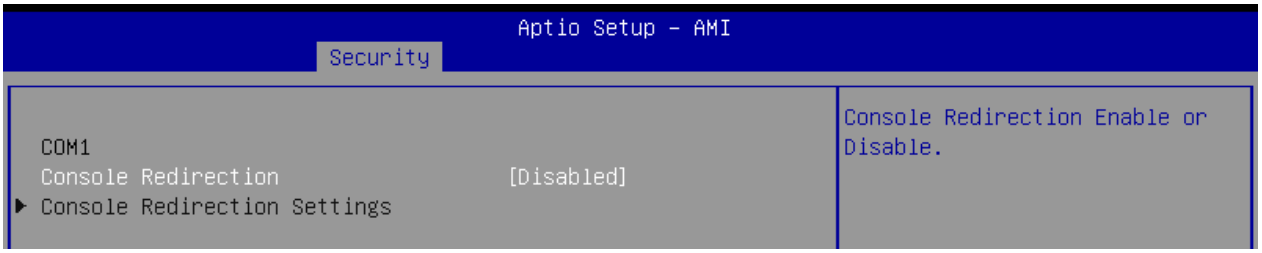
▶ **PH Randomization**

Enables or disables Platform Hierarchy (PH) Randomization.

▶ **Device Select**

Select your TPM device through this setting.

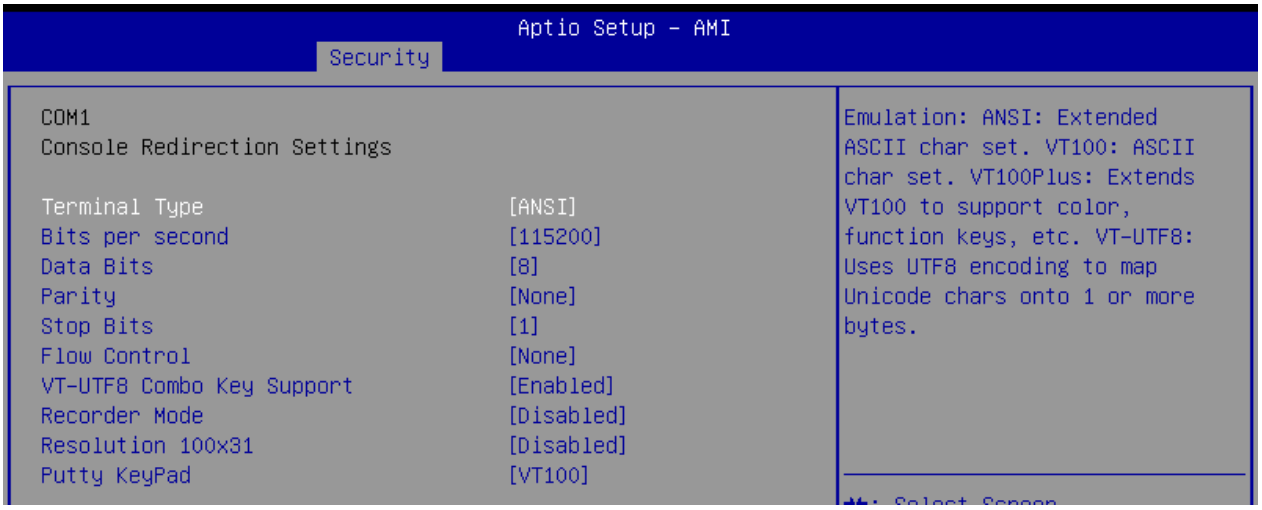
3.4.3 Serial Port Console Redirection



▶ **Console Redirection**

Console Redirection operates in host systems that do not have a monitor and keyboard attached. This setting enables/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.

3.4.3.1 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 setting specifies 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's 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/disables the VT-UTF8 combination key support for ANSI/VT100 terminals.

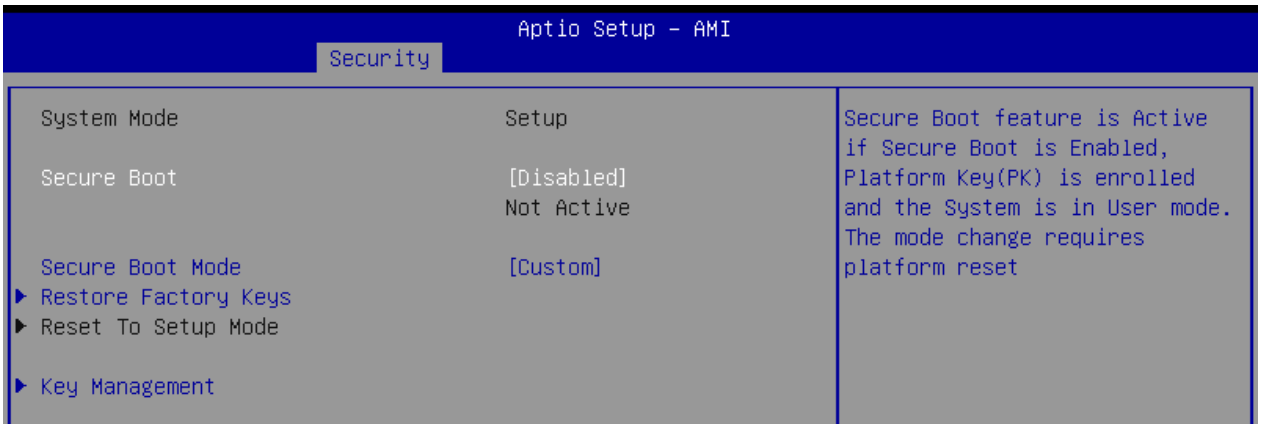
▶ Recorder Mode, Resolution 100x31

These settings enable/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.

3.4.4 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.

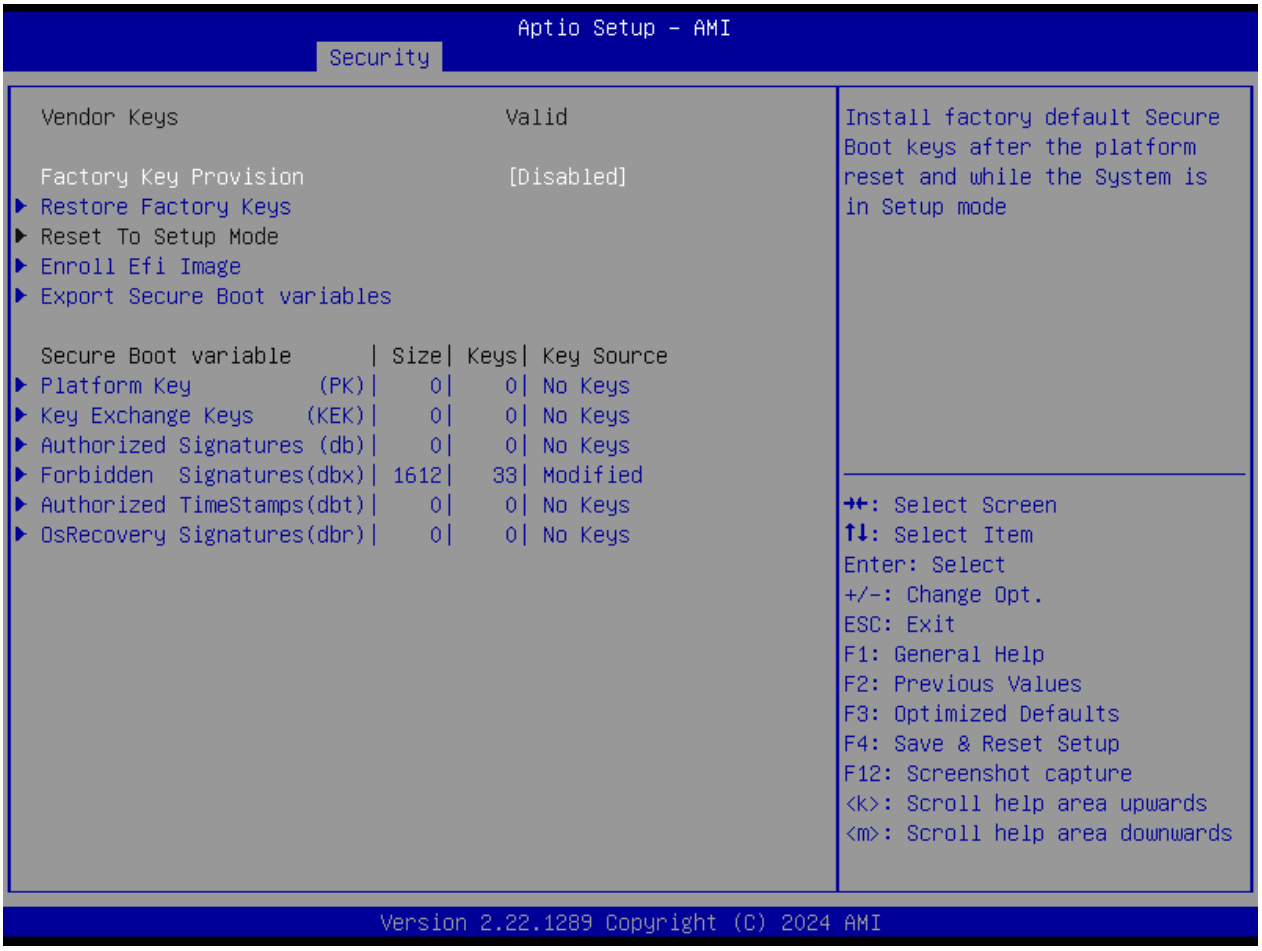
▶ Restore Factory Keys

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]**.

3.4.4.1 Key Management



▶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.

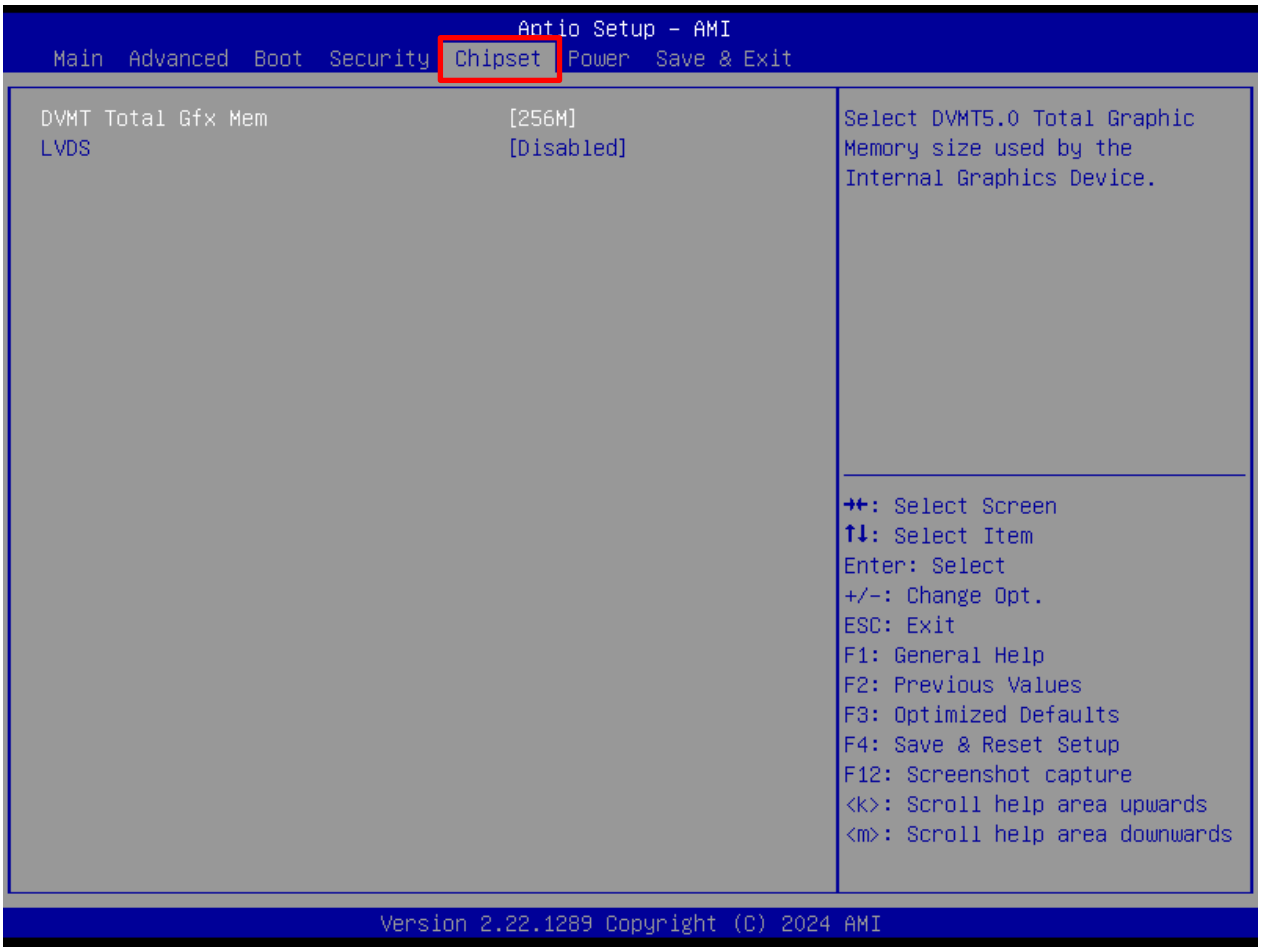
▶ **Append Key**

Loads an additional DBT from storage devices to your system.

▶ **OsRecovery Singnatures (dbr):**

Lists the available signatures for OS recovery.

3.5 Chipset



▶ DVMT Total Gfx Mem

This setting specifies the total graphics memory size for DVMT.

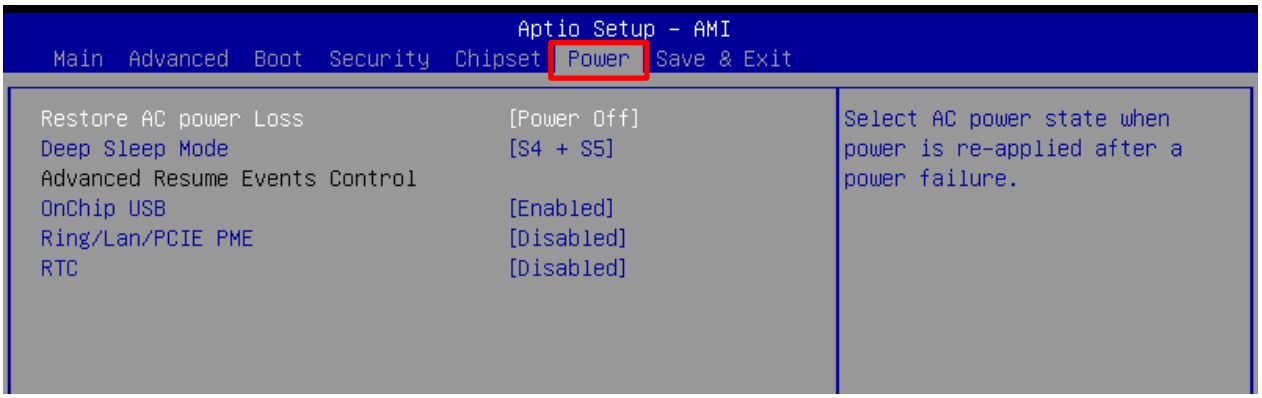
▶ LVDS

This setting enables/disables LVDS.

▶ LCD Panel Type

This setting specifies the LCD Panel's resolution and distribution formats. The item **will display when LVDS is enabled**.

3.6 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.

[Power On] Leaves the 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/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 S3/S4 sleep state.

▶ Ring /LAN /PCIE PME

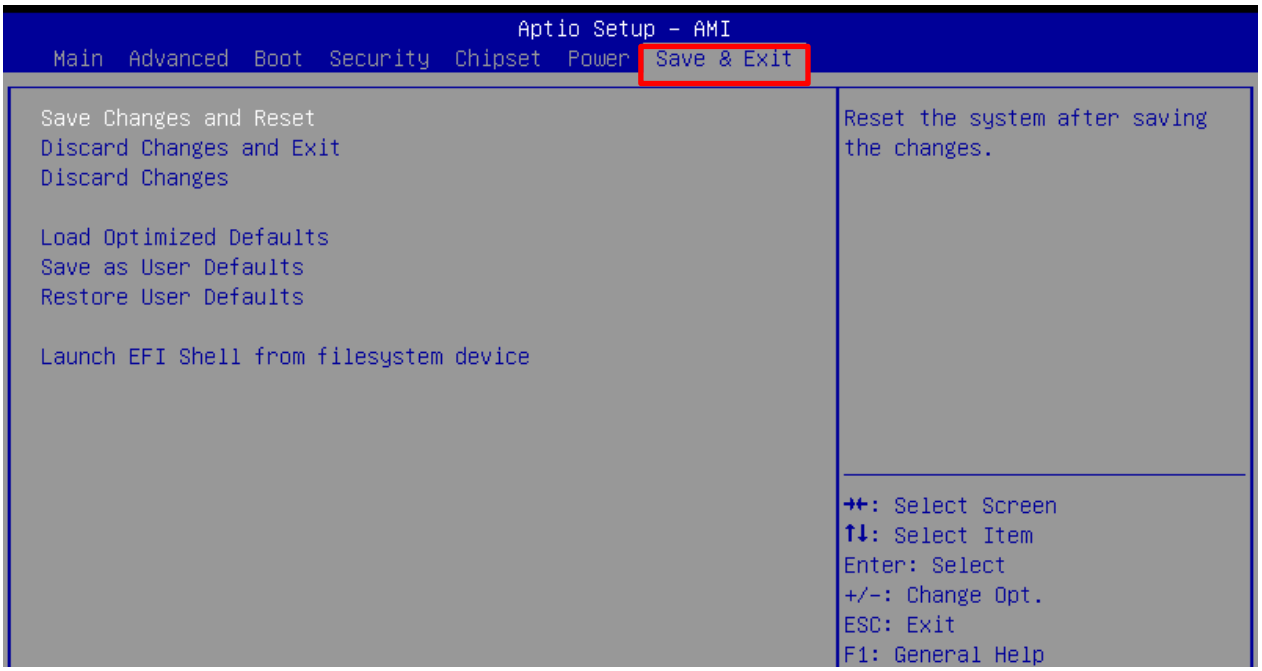
Enables or disables the system to be awakened from power saving modes when activity or input signal of onboard PCIE PME/Ring is detected.

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

▶ RTC

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

3.7 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.

Chapter 4: GPIO

In this chapter , 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.

4.1 General Purposed IO – GPIO/DIO

The GPIO port configuration addresses listed in the following table:

Name	IO Port	IO address	Name	IO Port	IO address
N_GPI0	0xA02	Bit 0	N_GPO0	0xA02	Bit 4
N_GPI1	0xA02	Bit 1	N_GPO1	0xA02	Bit 5
N_GPI2	0xA02	Bit 2	N_GPO2	0xA02	Bit 6
N_GPI3	0xA02	Bit 3	N_GPO3	0xA02	Bit 7

4.1.1 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 (0xA02); // Read value from N_GPO0 port.

val = val | (1<<4); // Set N_GPO0 address (bit 4) to 1 (output "high").
```

```
Outportb (0xA02, val); // Write back to N_GPO0 port.
```

Example: Set N_GPO1 output “low”

```
val = Inportb (0xA02); // Read value from N_GPO1 port.

val = val & (~(1<<5)); // Set N_GPO1 address (bit 5) to 0 (output “low”).

Outportb (0xA02, val); // Write back to N_GPO1 port.
```

4.1.2 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 (0xA02); // 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” );

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