ESM-RPLC

COM Express Rev. 3.1 Intel®13th Generation Core™ Embedded Mobile Processor Type6 COMe Compact Module

User's Manual

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Document Amendment History

Revision	Date	By	Comment
1st	April 2024	Avalue	Initial Release

Declaration of Conformity

This device complies with part 15 FCC rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference.

(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 "a" digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. 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.

Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

CE statement

The product(s) described in this manual complies with all application European Union (CE) directives if it has a CE marking. For computer systems to remain CE compliant, only CE-compliant parts may be used. Maintaining CE compliance also requires proper cable and cabling techniques.

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.

Copyright Notice

Acknowledgements

Intel and Pentium are trademarks of Intel Corporation.

Microsoft Windows is registered trademark of Microsoft Corp.

All other product names or trademarks are properties of their respective owners.

Disclaimer

This manual is intended to be used as a practical and informative guide only and is subject to change without notice. It does not represent a commitment on the part of Avalue. This

product might include unintentional technical or typographical errors. Changes are periodically made to the information herein to correct such errors, and these changes are incorporated into new editions of the publication.

A Message to the Customer

Avalue Customer Services

Each and every Avalue's 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 Avalue 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 Avalue has come to be known.

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

Technical Support and Assistance

1. Visit the Avalue website at https://www.avalue.com/ where you can find the latest information about the product.
2. Contact your distributor or our technical support team or sales representative for technical support if you need additional assistance. Please have following information ready before you call:

- Product 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

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

Product Warranty (Returns & Warranties policy)

1. Purpose

Avalue establishes the following maintenance specifications and operation procedures for providing the best quality of service and shortened repair time to our customers.

2. Warranty

2.1 Warranty Period

Avalue endeavors to offer customers the most comprehensive post-sales services and protection; besides offering a 2-year warranty for standard Avalue products, an extended warranty service can also be provided based on additional request from the customer. Within the warranty period, customers are entitled to receive comprehensive and prompt repair and warranty.

Standard products manufactured by Avalue are offered a 2-year warranty, from the date of delivery from Avalue. For ODM/OEM products manufactured by Avalue or PCBA with conformal coating, will follow up the define warranty of the agreement, otherwise will be offered 1-year warranty for ODM/OEM products but non-warranty for PCBA with conformal coating. For outsourcing parts kit by Avalue (ex: Motherboard, LCD touch panel, CPU, RAM, HDD) are offered a 6-month warranty, and Mobile/Tablet PC battery are offered a warranty of the half year, from the date of delivery by Avalue. Products before the mass production stage, i.e. engineering samples are not applied in this warranty or service policy. For extended warranty and cross-territory services, product defects resulting from design, production process or material are covered by the pre-set warranty period after the date of delivery from Avalue. For non-Avalue products, the product warranty and repair time shall be based on the service standards provided by the original manufacturer; in principle Avalue will provide these products a warranty service for no more than one year.

2.2 Maintenance services within the warranty period

In the case of Avalue product DOA (Defect-on-Arrival) when the customer finds any defect within 1 month after the delivery, Avalue will replace it with a new product in a soonest way. Except for custom products, once the customer is approved of a Cross-Shipment Agreement, which allows for delivery a new product to the customer before receiving the defective one, Avalue will immediately proceed with new product replacement for the said DOA case. On validation of the confirmed defect, Avalue is entitled to reserve the right whether to provide a new product for replacement. For the returned defective new product, it is necessary to verify that there shall be no bruise, alteration, scratch or marking to the appearance, and that none of the delivered accessories missing; otherwise, the customer will be requested to pay a processing fee. On the other hand, if the new product defect is resulting from incorrect configuration or erroneous use by the user instead of any problem of the hardware itself, the customer will also be requested to pay for relevant handling fees.

As for other conditions, Avalue will handle defects by way of repair. The customer will be requested to send the defective product to an Avalue authorized service center, and Avalue will return the repaired product back to the customer as soon as possible.

2.3 Ruling of an out-of-warranty defect

The following situations are not included in the warranty:

- The warranty period has expired.
- Product has been altered or its label of the serial number has been torn off.
- Product functionality issues resulting from improper use by the user, unauthorized dismantle or alteration, unfit operation environment, improper maintenance, accident or other causes. Avalue reserves the right for the ruling of the aforementioned situations.
- Product damage resulting from lightning, flood, earthquake or other calamities.
- The warranty rules of non-Avalue products and accessories shall be in accordance with standards set up by the original manufacturer. These products and accessories include RAM, HDD, FDD, CD-ROM, CPU, FAN, etc.
- Product upgrade request or test request submitted by the customer after expiration of the warranty.
- PCBA with conformal coating.
- Avalue semi-product and outsourced products without Avalue serial number.
- Products before the mass production stage, i.e. engineering samples.

3. Procedure for sending for repair

3.1 Attain a RMA number

A customer's rejected product returned for repair shall have a RMA (Return Merchandise Authorization) number. Without a RMA number, Avalue will not provide any repair service for the rejected product, and the product will be returned to the customer at customer's cost. Avalue will not issue any notice for the return of the product.

Each returned product for repair shall have a RMA number, which is simply the authorization of the return for repair; it is not a guarantee that the returned goods can be repaired or replaced. For applying for a RMA number, the customer may enter the eRMA webpage of Avalue https://www.avalue.com/en/member and log-in with an account number and a password authorized by Avalue. The system will then automatically issue a RMA number.

When applying for the RMA number, it is essential to fill in basic information of the customer and the product, together with detailed description of the problem encountered. If possible, avoid using ambiguous words such as "does not work" or "problematic". Without a substantial description of the problem, it is hard to start the repair and will cause prolonged repair time. Lacking detailed statement of fault steps also makes the problem hard to be identified, sometimes resulting in second-time repairs.

In case the customer can't define the cause of problem, please contact Avalue application engineers. Sometimes when the problem can be resolved even before the customer sends back the product.

On the other hand, if the customer only returns the key parts to Avalue for repair, it is necessary that the serial number of the entire unit is given in the "Problem Description" field, so that warranty period can be ruled accordingly; or Avalue will handle the case as an Out-of- warranty case.

3.2 Return of faulty product for repair

It is recommended that the customer not to return the accessories (manual, connection cables, etc.) with the products for repair, devices such as CPU, DRAM, CF memory card, etc., shall also be removed from the faulty goods before return for repair. If these devices are relevant to described repair problems and necessary to be returned with the goods; please clearly indicate the items included in the eRMA application form. Avalue shall not be responsible for any item that is not itemized. Moreover, make sure the problem(s) are detailed in the "Problem Description" field.

In the list of delivery, the customer may fill-in a value which is lower than the actual value, to prevent customs levying a higher tax over the excessive value of the return goods. The customer shall be held responsible for extra fees caused by this. We strongly recommend that "Invoice for customs purpose only with no commercial value" be indicated on the delivery note. Also for the purpose of expedited handling, please printout the RMA number and put it in the carton, also indicate the number outside of the carton, with the recipient addressing to Avalue RMA Department.

When returning the defective product, please use an anti-static bag or ESD material to pack it properly. In case of improper packing resulting in damages in the transportation process, Avalue reserves the right to reject the un-repaired faulty good at the customer's costs. Furthermore, it is suggested that the faulty goods shall be sent via a door-to-door courier service. The customer shall be held responsible for any customs clearance fee or extra expenses if Air-Cargo is used for the delivery.

In case of a DOA situation of a new product, Avalue will be responsible for the product and the freight. If the faulty goods are within the warranty period, the sender will take responsibility for the freight. For an out-of-warranty case, the customer shall be responsible for the freight of both trips.

3.3 Maintenance Charge

Avalue will charge a moderate repair fee for the following conditions:

- The warranty period has expired.
- Product has been altered or its label of the serial number has been torn off.
- Product functionality issues resulting from improper use by the user, unauthorized dismantle or alteration, unfit operation environment, improper maintenance, accident

or other causes. Avalue reserves the right for the ruling of the aforementioned situations.

- Product damage resulting from lightning, flood, earthquake or other calamities.
- The warranty rules for non-Avalue products and accessories shall be in accordance with standards set up by the original supplier. These products and accessories include RAM, HDD, FDD, CD-ROM, CPU, FAN, etc.
- Product upgrade request or test request submitted by the customer after expiry of the warranty.
- PCBA with conformal coating.
- Avalue semi-product and outsourced products without Avalue serial number
- Products before the mass production stage, i.e. engineering samples.
- In case the products received are examined as NPF (No Problem Found) within the warranty period, the customer shall be responsible for the freight of both trips.
- Please contact your local distributor to examine in advance to prevent unnecessary freight cost.

For system failure of out-of-warranty products, Avalue will provide a quotation prior to repair service. When the customer applies for the cost, please refer to the Quotation number. In case the customer does not return the DOA product that has already been replaced by a new one, or the customer does not sign back the quotation of the out-of-warranty maintenance, Avalue reserves the right of whether or not to provide the repair service. In case the customer does not reply in 3 months, Avalue shall directly scrap or return the product back to customer at customer's cost without further notice to the customer.

3.4 Maintenance service of phased-out products

For servicing phased-out products, Avalue provides an extended period, starting the date of phase-out, as a guaranteed maintenance period of such products, for continuance of the maintenance service to meet customer's requirements. In case of unexpected factors causing Avalue to be unable to repair/replace a warranted but phased-out product, Avalue will, depending on the availability, upgrade the product (free of charge with continued warranty period as of the original product), or, give partial refund (based on the length of the remaining warranty period) to solve this kind of problem.

3.5 Maintenance Report

On completion of repair of a defective product, a Maintenance Report indicating the maintenance result and part(s) replaced (if any) will be sent to the customer together with the product. If the customer demands an additional maintenance analysis report, a service fee of various level will be charged depending on the warranty status. In case the analysis result shows that the defect attributes to Avalue's faulty design or process, the analysis fee will be exempted.

4. Service Products

Avalue provides service products to manage with different customer needs. Should you have any need, please consult to Avalue Sales Department.

Defect Analysis Report (DAR)

Avalue provides DAR (Defect Analysis Report) services aiming to elevating customer satisfaction. A DAR includes defect cause identification/verification/suggestion and improvement precautions, with instructions on correct usage for the avoidance of any reoccurrence.

Upgrade Service

Avalue is capable to provide system upgrade service for customization requirements. This upgrade service is applicable for main parts, such as CPU, memory, HDD, SSD, storage devices; also replacements motherboards of systems. Please contact Avalue sales for details to evaluate the possibility of system upgrade service and obtain information of lead time and price.

Safety Instructions

Safety Precautions

Before installing and using this device, please note the following precautions.

1. Read these safety instructions carefully.
2. Keep this User's Manual for future reference.
3. Disconnected this equipment from any AC outlet before cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
8. Use a power cord that has been approved for using with the product and that it matches the voltage and current marked on the product's electrical range label. The voltage and current rating of the cord must be greater than the voltage and current rating marked on the product.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to

avoid damage by transient overvoltage.

12. Never pour any liquid into an opening. This may cause fire or electrical shock.

13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel. If one of the following situations 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 you cannot get it work according to the user's manual.
- The equipment has been dropped and damaged.
- The equipment has obvious signs of breakage.

14. CAUTION: Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.

15. Equipment intended only for use in a RESTRICTED ACCESS AREA.

Explanation of Graphical Symbols

	Warning	A WARNING statement provides important information about a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Caution	A CAUTION statement provides important information about a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to the user or patient or in damage to the equipment or other property.
	Note	A NOTE provides additional information intended to avoid inconveniences during operation.
		Direct current.
		Alternating current
		Stand-by, Power on
		FCC Certification
		CE Certification
		Follow the national requirements for disposal of equipment.
		Stacking layer limit
		This side up

		Fragile Packaging
		Beware of water damage, moisture-proof
		Carton recyclable
		Handle with care
		Follow operating instructions of consult instructions for use.

Disposing of your old product

WARNING:
There is danger of explosion if the battery is mishandled or incorretly replaced. Replace only with the same type of battery. Do not disassemble it or attempt to recharge it outside the system. Do not crush, puncture, dispose of in fire, short the external contacts, or expose to water or ther liquids. Dispose of the battery in accordance with local regulations and instructions from your service provider.

CAUTION:
- Lithium Battery Caution: Danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type. Dispose batteries according to manufacturer's instructions.
- Disposal of a BATTERY into fire or a hot oven, or mechanically crushing or cutting of a BATTERY, that can result in an EXPLOSION
- Leaving a BATTERY in an extremely high temperature surrounding environment that can result in an EXPLOSION or the leakage of flammable liquid or gas.
- A BATTERY subjected to extremely low air pressure that may result in an EXPLOSION or the leakage of flammable liquid or gas.

Mise en garde!
AVERTISSEMENT : Il existe un risque d'explosion si la batterie est mal manipulée ou remplacée de manière incorrecte. Remplacez uniquement par le même type de batterie. Ne le démontez pas et ne tentez pas de le recharger en dehors du système. Ne pas écraser, percer, jeter au feu, court-circuiter les contacts externes ou exposer à l'eau ou à d'autres liquides. Jetez la batterie conformément aux réglementations locales et aux instructions de votre fournisseur de services.

MISE EN GARDE:
- Pile au lithium Attention : Danger d'explosion si la pile n'est pas remplacée correctement. Remplacer uniquement par un type identique ou équivalent. Jetez les piles conformément aux instructions du fabricant.
- L'élimination d'une BATTERIE dans le feu ou dans un four chaud, ou l'écrasement ou le découpage mécanique d'une BATTERIE, pouvant entraîner une EXPLOSION
- Laisser une BATTERIE dans un environnement à température extrêmement élevée pouvant entraîner une EXPLOSION ou une fuite de liquide ou de gaz inflammable.
- UNE BATTERIE soumise à une pression d'air extrêmement basse pouvant entraîner une EXPLOSION ou une fuite de liquide ou de gaz inflammable.

Content

1. Getting Started

1.1 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 CPU card. 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.

1.2 Packing List

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

Item	Description	Q'ty
1	ESM-RPLC COMe Module	1
2	Desiccant (5g)	1
3	Screws	2

If any of the above items is damaged or missing, contact your retailer.

1.3 Manual Objectives

This manual describes in details Avalue Technology ESM-RPLC Single Board.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of this board.

We strongly recommend that you study this manual carefully before attempting to set up ESM-RPLC 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 regarding this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

1.4 System Specifications

System	
CPU	13th Gen. Intel® P-Series Embedded / Industrial (28W) U-Series Embedded / Industrial (15W)
BIOS	AMI uEFI BIOS, 256 Mbit SPI Flash ROM
System Chipset	Raptor lake SoC integrated
I/O Chip	EC iTE IT5782
Memory	1 x 262-Pin DDR5 5200 MT/s SO-DIMM Up to 32GB
Watchdog Timer	H/W Reset, 1Sec. ~ 65535Sec. and 1Sec./Step
H/W Status Monitor	Monitoring System Temperature Voltage and FAN Status with Auto Throttling Control
VMD (RAID)	Yes Intel® Volume Management Device (VMD)
TPM	Onboard nuvoTon_NPCT754AADYX TPM 2.0
iAMT	Support iAMT
Expansion	
Expansion	2 x PCIe x4 (Gen4), Only for SSD, (From CPU) Default: 5 x PCIe x1, 2 Lanes Shares with SATA (From PCH)
I/O Interface (SOM)	
USB	2 x USB 4 by TCP Ports (Optional by BIOS) 4 x USB3.2 Gen2 8 x USB2.0
COM Port	2 x UART (RX/TX Only)
SATA	2 x SATA III
DIO	1 x 8-bit GPIO
MIO	1 x SMBus 1 x LPC (Via ESPI-to-LPC Bridge IC) 1 x I2C (User) 1 x GP_SPI (TBC) 1 x SPI
Display	
Graphic Chipset	Intel® Iris® Xe Graphics on i7/i5 Processor Intel® UHD Graphics on i3/Celeron® Processor Intel® Gfx Up to 96 EU
Spec. & Resolution	3 x DDI, VGA, eDP/LVDS (BOM Optional) VGA Supported by Build Option Via DP-to-VGA IC, Max. Resolution 1920x1200@60Hz LVDS Single/Dual Channel 18/24-bit LVDS from eDP-to-LVDS IC, Max.

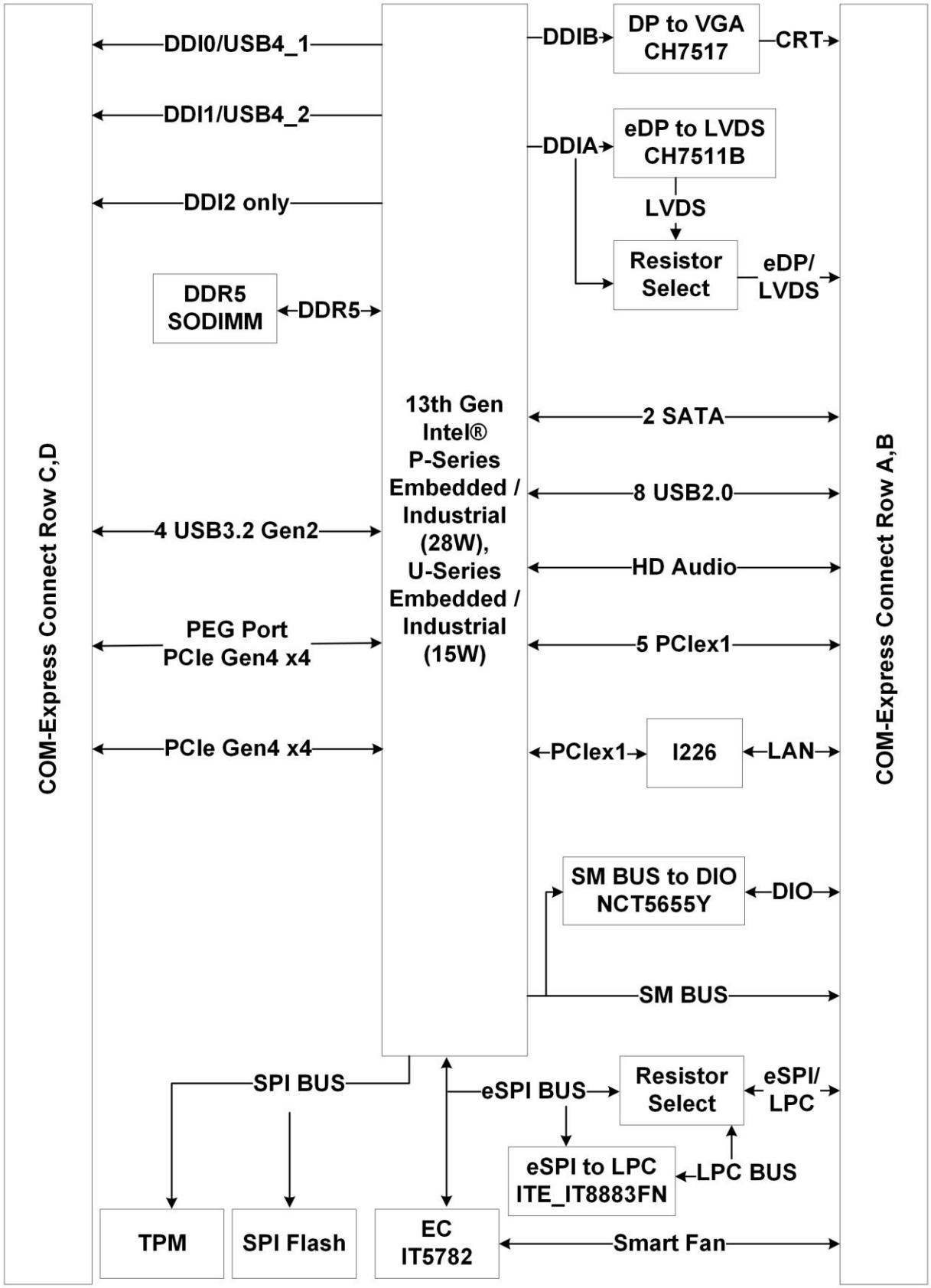
	Resolution 1920x1200@60Hz in Dual Mode or eDP Build Option in Place of LVDS, 4 lanes, eDP 1.4b (by BOM) USB4 Max. 2 x USB4 in Place of DDI 1/2, Supports DP 1.4a by DP Alternative Mode DDI3 for Avalue EX-EX26 Carrier HDMI 2.1 or DP 1.4a Select by BIOS, Support Feature Depend on Carrier Board.
Multiple Display	Four Display Support, Up to 4K (3DDI+eDP)
LVDS	CH7511B (eDP to LVDS)
Digital Display Interface (SOM)	3 x DDI, VGA, eDP/LVDS (BOM Optional) HDMI/DP(Default)
Audio	
Audio Interface	Intel® HD Audio Integrated on CPU
Ethernet	
LAN Chipset	1 x Intel® I226LM
Ethernet Interface	10/100/1000/2500 Base-Tx GbE Compatible
Mechanical & Environmental	
Power Requirement	DC IN +9V ~ +19V
ACPI	Single power ATX Support S0, S3, S4, S5 ACPI 5.0a Compliant
Power Mode	AT/ATX
Operating Temp.	Standard 0°C ~ 60°C (32°F ~ 140°F)
Storage Temp.	-40°C ~ 85°C (-40°F ~ 185°F)
Operating Humidity	40°C 95% Relative Humidity, Non-condensing
Size (L x W) (Please consult product engineers for the production feasibility if the size is larger than 410x360mm or smaller than 80x70mm)	3.74" x 3.74" (95 x 95 mm)
Weight	0.44lbs(0.2kg)
Vibration Test	Fill with testing condition & standard Example: Random Vibration Operation Reference IEC60068-2-64 Testing procedures Reference ISTA 2A, Method : IEC-60068-2-32 Test:EdSine Vibration test (Non-operation) 1 Test PSD : 0.00454G²/Hz , 1.5 Grms 2 Test frequency : 5~500 Hz

	3 Test axis : X,Y and Z axis 4 Test time : 30 min. each axis 5 System condition : Operation mode 6 Test program OS+ PassMark Burn in test 10.16 Test program OS+ PassMark Burn in test Random Vibration Non Operation Reference IEC60068-2-64 Testing procedures Reference ISTA 2A, Method : IEC-60068-2-32 Test:Ed 1 Test PSD : 0.01818G²/Hz 3 Grms 2 Test frequency : 5~500 Hz 3 Test axis : X,Y and Z axis 4 Test time : 30 min. each axis 5 System condition : Non-Operation mode Packing Vibration Reference IEC60068-2-64 Testing procedures Reference ISTA 2A, Method : IEC-60068-2-32 Test:Ed 1 Test PSD : 0.026G²/Hz , 2.16 Grms 2 Test frequency : 5~500 Hz 3 Test axis : X,Y and Z axis 4 Test time : 30 minutes each axis 5 Test curve
Drop Test	Fill with testing condition & standard Example: Package drop test Reference ISTA 2A, Method : IEC-60068-2-32 Test:Ed Test Ea : Drop Test 1 Test phase : One corner, three edges, six faces 2 Test high : 96.5 cm 3 Package weight : 0.2 kg 4 Test drawing
OS Information	Windows 10 IoT Enterprise 2021 LTSC, Ubuntu 22.04 (Kernel 5.15) above

Note: Specifications are subject to change without notice.

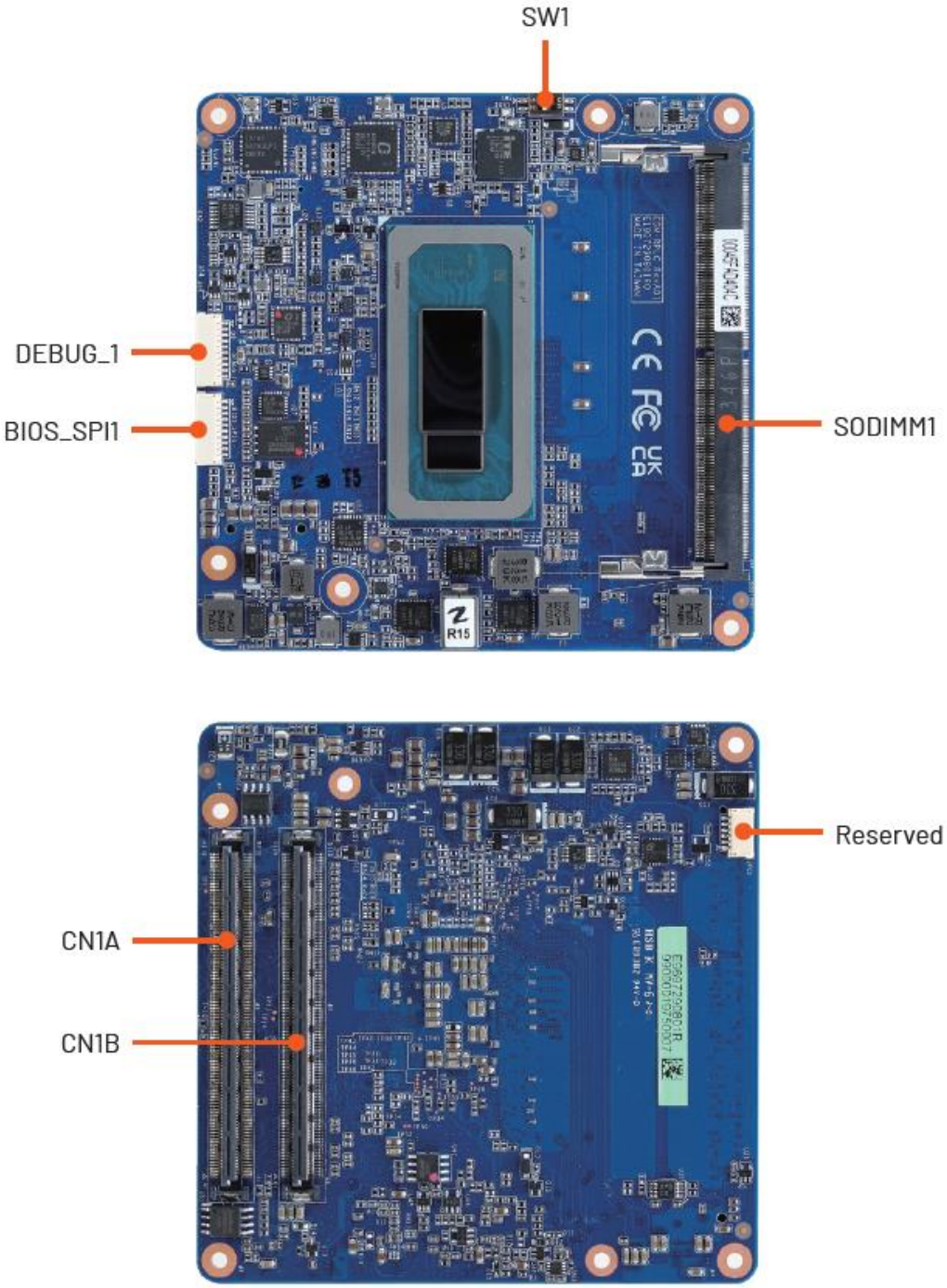
1.5 Architecture Overview—Block Diagram

The following block diagram shows the architecture and main components of ESM-RPLC.



2. Hardware Configuration

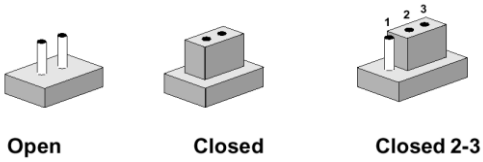
2.1 Product Overview



2.2 Jumper and Connector List

You can configure your board to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch.

It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip. To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2, and 3. In this case, you would connect either two pins.



The jumper settings are schematically depicted in this manual as follows:

A pair of needle-nose pliers may be helpful when working with jumpers.

Connectors on the board are linked to external devices such as hard disk drives, a keyboard, or floppy drives. In addition, the board has a number of jumpers that allow you to configure your system to suit your application.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes.

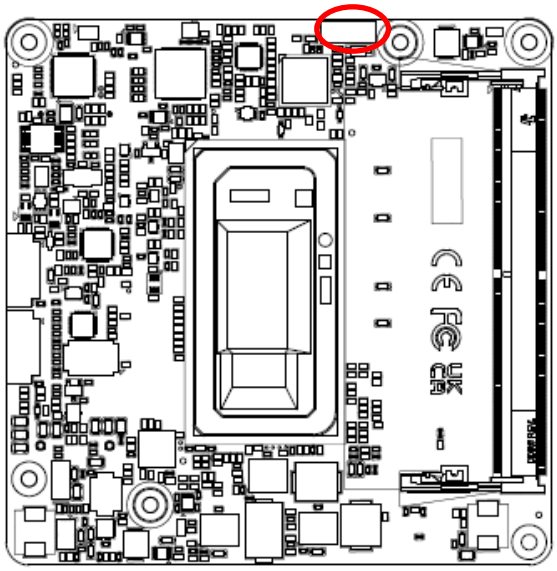
The following tables list the function of each of the board's jumpers and connectors.

Connectors

Label	Function	Note
BIOS_SPI1	BIOS SPI programming connector	10 x 1 wafer, pitch 1.00mm
DEBUG_1	Debug connector	10 x 1 wafer, pitch 1.00mm
CN1A	COM Express connector 1	
CN1B	COM Express connector 2	
SODIMM1	262-pin DDR5 SDRAM DIMM socket	
SW1	AT/ATX mode selector	

2.3 Setting Jumpers & Connectors

2.3.1 AT/ATX mode selector (SW1)



AT/ATX mode

AT mode

OFF	1		⇨	ON
	2			

ATX mode*

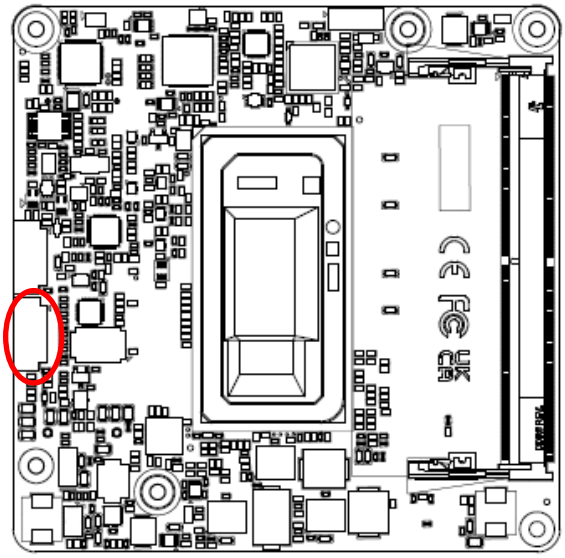
OFF	1	⇦		ON
	2			

***Default**

2.3.1.1 Signal Description –AT/ATX mode selection

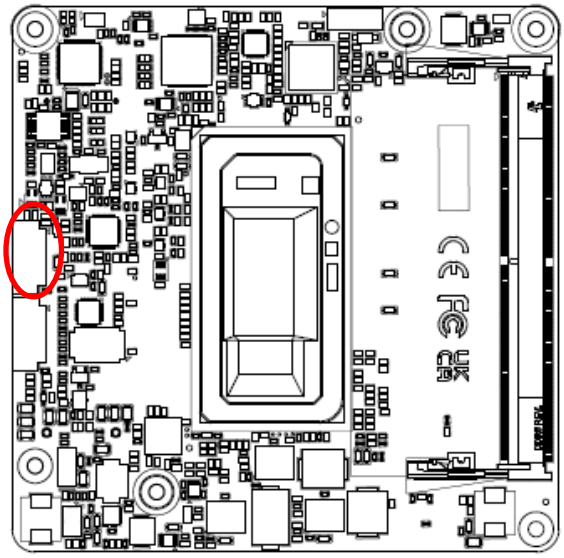
AT/ATX mode	Description
AT mode 	Auto power on, no need to press Power button to enable power on/off
ATX mode 	Press the ATX power button to enable power on/off

2.3.2 BIOS SPI programming connector (BIOS_SPI1)



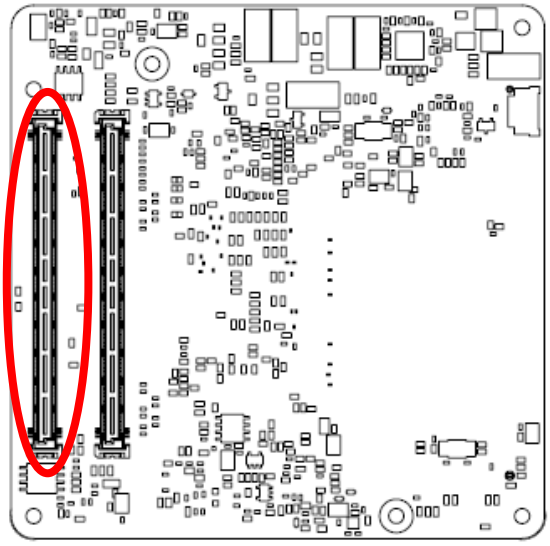
Signal	PIN
EC_SMDAT_DBG	1
EC_SMCLK_DBG	2
BIOS_WP#	3
BIOS_HOLD#	4
SPI0_BIOS_MOSI	5
SPI0_BIOS_MISO	6
SPI0_BIOS_CLK	7
SPI0_CS0#	8
GND	9
+3.3VSB	10

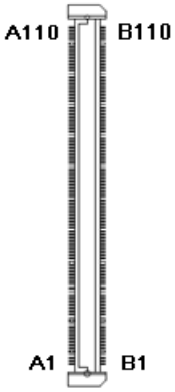
2.3.3 Debug connector (DEBUG_1)



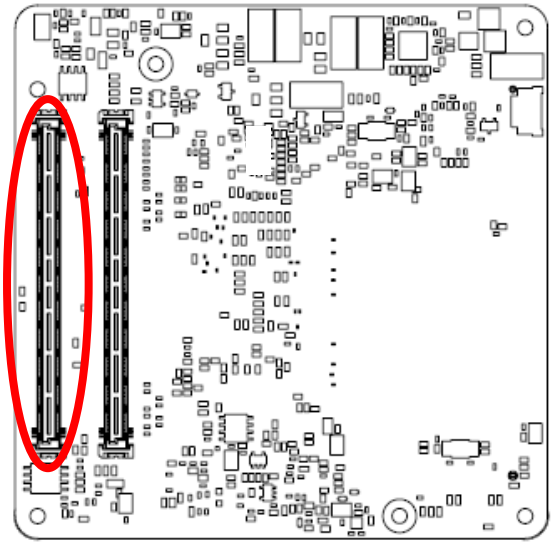
Signal	PIN
ESPI_IO0_COM	1
ESPI_IO1_COM	2
ESPI_IO2_COM	3
ESPI_IO3_COM	4
ESPI_RST#	5
ESPI_CLK_COM	6
ESPI_CS0#	7
PLT_BUF_RST#	8
GND	9
+3.3VSB	10

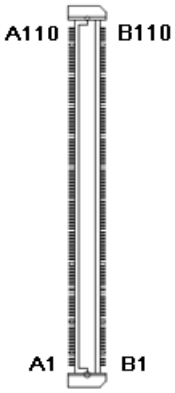
2.3.4 COM Express Connector 1 (CN1A)



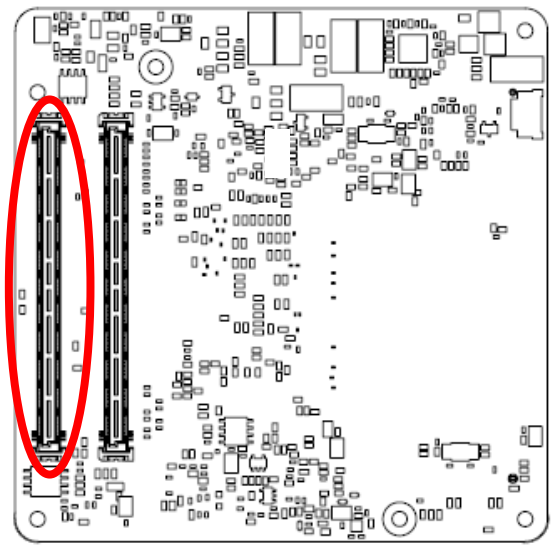


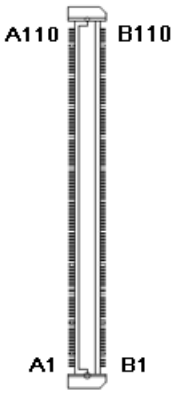
Signal	PIN	PIN	Signal
GND	A110	B110	GND
VCC_12V	A109	B109	VCC_12V
VCC_12V	A108	B108	VCC_12V
VCC_12V	A107	B107	VCC_12V
VCC_12V	A106	B106	VCC_12V
VCC_12V	A105	B105	VCC_12V
VCC_12V	A104	B104	VCC_12V
LID#	A103	B103	SLEEP#
SER1_RX	A102	B102	FAN_TACHIN
SER1_TX	A101	B101	FAN_PWMOUT
GND	A100	B100	GND
SER0_RX	A99	B99	GSPI1_CLK
SER0_TX	A98	B98	GSPI1_MISO
TYPE10#	A97	B97	NC
TPM_PP	A96	B96	VGA_I2C_DAT
NC	A95	B95	VGA_I2C_CK
NC	A94	B94	VGA_VSYNC
GPO0	A93	B93	VGA_HSYNC
NC	A92	B92	VGA_BLU
NC	A91	B91	VGA_GRN
GND	A90	B90	GND
PCIE_CLK_REF-	A89	B89	VGA_RED
PCIE_CLK_REF+	A88	B88	NC
CB_EDP_HDP	A87	B87	+ATX5VSB
GSPI1_MOSI	A86	B86	+ATX5VSB
GPI3	A85	B85	+ATX5VSB
LVDS_I2C_DAT/EDP_AUX-	A84	B84	+ATX5VSB
LVDS_I2C_CK/EDP_AUX+	A83	B83	LVDS_BKLT_CTRL/ EDP_BKLT_CTRL
LVDS_A_CK-/EDP_TX3-	A82	B82	LVDS_B_CK-
LVDS_A_CK+/EDP_TX3+	A81	B81	LVDS_B_CK+



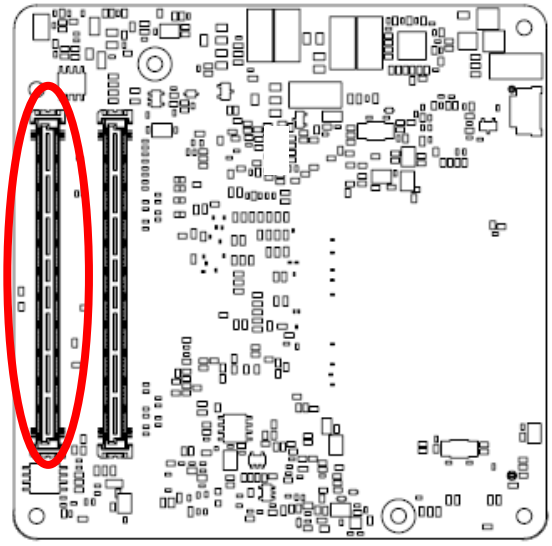


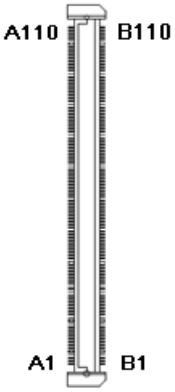
Signal	PIN	PIN	Signal
GND	A80	B80	GND
LVDS_A3-	A79	B79	LVDS_BKLT_EN/ EDP_BKLT_EN
LVDS_A3+	A78	B78	LVDS_B3-
LVDS_VDD_EN/EDP_VDD_EN	A77	B77	LVDS_B3+
LVDS_A2-/EDP_TX0-	A76	B76	LVDS_B2-
LVDS_A2+/EDP_TX0+	A75	B75	LVDS_B2+
LVDS_A1-/EDP_TX1-	A74	B74	LVDS_B1-
LVDS_A1+/EDP_TX1+	A73	B73	LVDS_B1+
LVDS_A0-/EDP_TX2-	A72	B72	LVDS_B0-
LVDS_A0+/EDP_TX2+	A71	B71	LVDS_B0+
GND	A70	B70	GND
PCIE_TX0-	A69	B69	PCIE_RX0-
PCIE_TX0+	A68	B68	PCIE_RX0+
GPI2	A67	B67	WAKE1#
GND	A66	B66	WAKE0#
PCIE_TX1-	A65	B65	PCIE_RX1-
PCIE_TX1+	A64	B64	PCIE_RX1+
GPI1	A63	B63	GPO3
PCIE_TX2-	A62	B62	PCIE_RX2-
PCIE_TX2+	A61	B61	PCIE_RX2+
GND	A60	B60	GND
PCIE_TX3-	A59	B59	PCIE_RX3-
PCIE_TX3+	A58	B58	PCIE_RX3+
GND	A57	B57	GPO2
PCIE_TX4-	A56	B56	PCIE_RX4-
PCIE_TX4+	A55	B55	PCIE_RX4+
GPI0	A54	B54	GPO1
PCIE_TX5-	A53	B53	PCIE_RX5-
PCIE_TX5+	A52	B52	PCIE_RX5+
GND	A51	B51	GND





Signal	PIN	PIN	Signal
LPC_SERIRQ/ ESPI_CS1#	A50	B50	CB_RESET#
GBE0_SDP	A49	B49	SYS_RESET#
RSMRST_OUT#	A48	B48	USB0_HOST_PRSNT
+3.3V_RTC	A47	B47	NC
USB0+	A46	B46	USB1+
USB0-	A45	B45	USB1-
USB_2_3_OC#	A44	B44	USB_0_1_OC#
USB2+	A43	B43	USB3+
USB2-	A42	B42	USB3-
GND	A41	B41	GND
USB4+	A40	B40	USB5+
USB4-	A39	B39	USB5-
USB_6_7_OC#	A38	B38	USB_4_5_OC#
USB6+	A37	B37	USB7+
USB6-	A36	B36	USB7-
THRMTRIP#	A35	B35	THRM#
NC	A34	B34	I2C_DATA
HDA_SDOUT	A33	B33	I2C_CLK
HDA_BITCLK	A32	B32	SPKR
GND	A31	B31	GND
HDA_RST#	A30	B30	HDA_SDIN0
HDA_SYNC	A29	B29	HDA_SDIN1
(S)ATA_ACT#	A28	B28	NC
BATLOW#	A27	B27	WDT
NC	A26	B26	NC
NC	A25	B25	NC
SUS_S5#	A24	B24	PWR_OK
NC	A23	B23	NC
NC	A22	B22	NC
GND	A21	B21	GND





Signal	PIN	PIN	Signal
SATA0_RX-	A20	B20	SATA1_RX-
SATA0_RX+	A19	B19	SATA1_RX+
SUS_S4#	A18	B18	ESPI_RST#
SATA0_TX-	A17	B17	SATA1_TX-
SATA0_TX+	A16	B16	SATA1_TX+
SUS_S3#	A15	B15	SMB_ALERT#
GBE0_CTREF	A14	B14	SMB_SDA_S5
GBE0_MDI0+	A13	B13	SMB_SCL_S5
GBE0_MDI0-	A12	B12	PWRBTN#
GND	A11	B11	GND
GBE0_MDI1+	A10	B10	LPC_CLK/ ESPI_CK
GBE0_MDI1-	A9	B9	NC
GBE0_LINK#	A8	B8	LPC_DRQ0#/ ESPI_ALERT0#
GBE0_MDI2+	A7	B7	LPC_AD3/ ESPI_IO_3
GBE0_MDI2-	A6	B6	LPC_AD2/ ESPI_IO_2
GBE0_LINK2500#	A5	B5	LPC_AD1/ ESPI_IO_1
GBE0_LINK1000#	A4	B4	LPC_AD0/ ESPI_IO_0
GBE0_MDI3+	A3	B3	LPC_FRAME#/ ESPI_CS0#
GBE0_MDI3-	A2	B2	GBE0_ACT#
GND	A1	B1	GND

2.3.4.1 Signal Description – COM Express Connector 1 (CN1A)

2.3.4.1.1 Audio Signals

Signal	Signal Description
HDA_SYNC	HD Audio Sync
HDA_RST#	HD Audio Reset

2.3.4.1.2 Gigabit Ethernet Signals

Signal	Signal Description
GBE0_MD[0:3] +/-	Gigabit Ethernet Controller 0: Media Dependent Interface Differential Pairs 0,1,2,3. The MDI can operate in 2500, 1000, 100 and 10 Mbit / sec modes. Some pairs are unused in some modes, per the following:
GBE0_ACT#	Gigabit Ethernet Controller 0 activity indicator, active low.
GBE0_LINK#	Gigabit Ethernet Controller 0 link indicator, active low.
GBE0_LINK100_1000#	Gigabit Ethernet Controller 100 1000 Mbit / sec link indicator, active low.
GBE0_LINK2500#	Gigabit Ethernet Controller 2500 Mbit / sec link indicator, active low.

	2500B-T/1000B-T	100B-T	10B-T
MDI[0]+/-	B1_DA+/	TX+/-	TX+/-
MDI[1]+/	B1_DB+/	RX+/-	RX+/-
MDI[2]+/	B1_DC+/	X	X
MDI[3]+/	B1_DD+/	X	X

2.3.4.1.3 PCI Express Signals

Signal	Signal Description
PCIE_TX[0:5] +/-	PCI Express Differential Transmit Pair 0-5
PCIE_RX[0:5] +/-	PCI Express Differential Receive Pair 0-5

2.3.4.1.4 Flat Panel LVDS Signals

Signal	Signal Description
LVDS_BKLT_CTRL	Controls panel digital power.
LVDS_I2C_CK	I2C clock output for LVDS display use.
LVDS_I2C_DAT	I2C data line for LVDS display use.
LVDS_VDD_EN	LVDS panel power enables.

2.3.4.1.5 LPC/eSPI Signals

Signal	Signal Description
LPC_FRAME#/ ESPI_CS0#	LPC frame indicates the start of an LPC cycle
	ESPI Mode: eSPI Master Chip Select Outputs Driving Chip Select0#. A low selects a particular eSPI slave for the transaction. Each of the eSPI slaves is connected to a dedicated Chip Selectn# pin
LPC_AD[0:3]/ ESPI_IO_[0:3]	LPC multiplexed address, command and data bus
	ESPI Mode: eSPI Master Data Input / Outputs These are bi-directional input/output pins used to transfer data between master and slaves. Multiplexed with LPC_AD[0:3]
LPC_CLK/ ESPI_CK	LPC clock output - 33MHz nominal
	ESPI Mode: eSPI Master Clock Output This pin provides the reference timing for all the serial input and output operations
LPC_SERIRQ/ ESPI_CS1#	LPC serial interrupt
	ESPI Mode: eSPI Master Chip Select Outputs Driving Chip Select# A low selects a particular eSPI slave for the transaction. Each of the eSPI slaves is connected to a dedicated Chip Selectn# pin
LPC_DRQ0#/ ESPI_ALERT0#	LPC serial DMA request.
	ESPI Mode: eSPI pins used by eSPI slave to request service from the eSPI master.
LPC_DRQ1#/ ESPI_ALERT1#	LPC serial DMA request.
	ESPI Mode: eSPI pins used by eSPI slave to request service from the eSPI master.

2.3.4.1.6 GPIO Signals

Signal	Signal Description
GPI[0:4]	General purpose input pins.
GPO[0:4]	General purpose output pins.

2.3.4.1.7 Power & System Management Signals

Signal	Signal Description
SUS_S3#	Indicates system is in Suspend to RAM state. Active low output.
BATLOW#	Indicates that external battery is low
PWRBTN#	Power button to bring system out of S5 (soft off), active on rising edge.

SMB_SCL_S5	System Management Bus bidirectional clock line.
SMB_SDA_S5	System Management Bus bidirectional data line.
SMB_ALERT#	System Management Bus Alert - input can be used to generate an SMI# (System Management Interrupt) or to wake the system.
ESPI_RST#	ESPI Mode: eSPI Reset Reset the eSPI interface for both master and slaves. eSPI Reset# is typically driven from eSPI master to eSPI slaves
PWR_OK	Power OK from main power supply
SYS_RESET#	Reset button input. Active low input.
WAKE0#	PCI Express wake up signal.
WAKE1#	General purpose wake up signal.

2.3.4.1.8 SATA Signals

Signal	Signal Description
SATA[0:1]_TX +/-	Serial ATA Channel 0-1 transmit differential pair.
SATA[0:1]_RX +/-	Serial ATA Channel 0-1 receive differential pair.
ATA_ACT#	ATA (parallel and serial) activity indicator, active low.

2.3.4.1.9 USB Signals

Signal	Signal Description
USB[0:7] +/-	USB differential pairs, channels 0 through 7
USB_0_1_OC#	USB over-current sense, USB channels 0 and 1
USB_2_3_OC#	USB over-current sense, USB channels 2 and 3
USB_4_5_OC#	USB over-current sense, USB channels 4 and 5
USB_6_7_OC#	USB over-current sense, USB channels 6 and 7

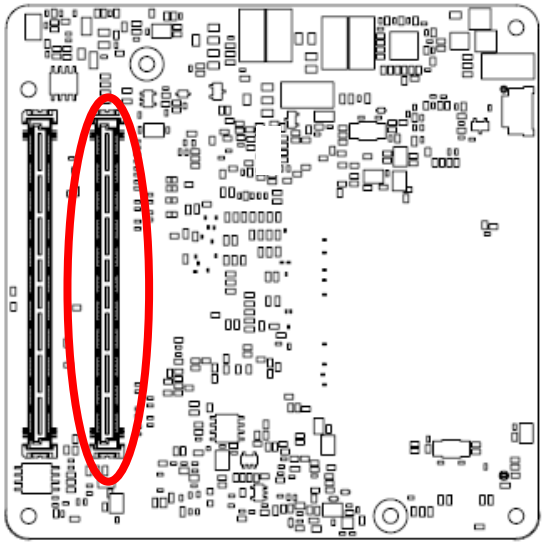
2.3.4.1.10 I2C Signals

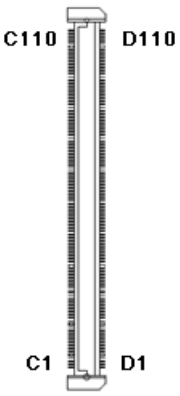
Signal	Signal Description
I2C_CLK	General purpose I2C port clock output.
I2C_DATA	General purpose I2C port data I/O line.

2.3.4.1.11 USB3.0 Signals

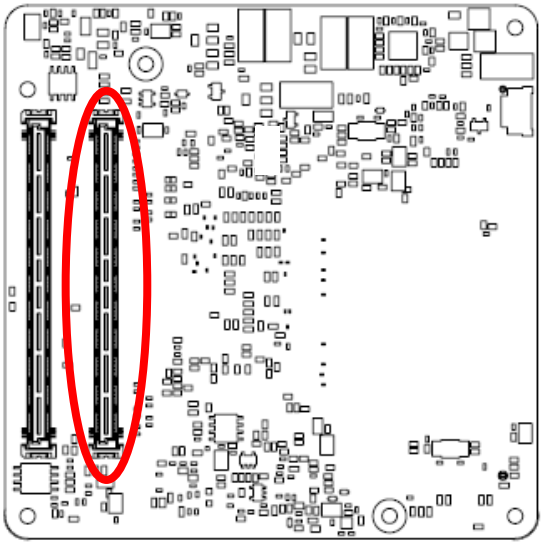
Signal	Signal Description
USB_SSTX[0:1]+ USB_SSTX[0:1]-	Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSRX[0:1]+ USB_SSRX[0:1]-	Additional receive signal differential pairs for the SuperSpeed USB data path.

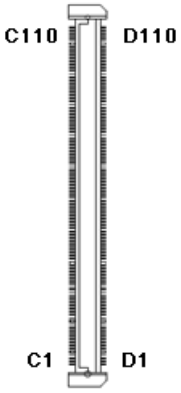
2.3.5 COM Express Connector 2 (CN1B)



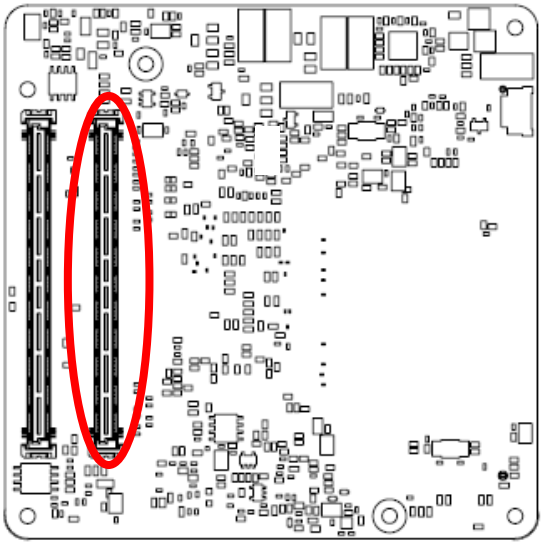


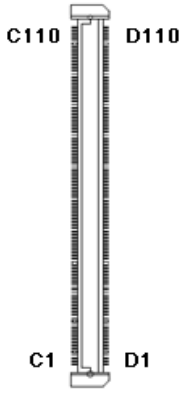
Signal	PIN	PIN	Signal
GND	C110	D110	GND
VCC_12V	C109	D109	VCC_12V
VCC_12V	C108	D108	VCC_12V
VCC_12V	C107	D107	VCC_12V
VCC_12V	C106	D106	VCC_12V
VCC_12V	C105	D105	VCC_12V
VCC_12V	C104	D104	VCC_12V
GND	C103	D103	GND
PCIEX4_B_RX3-	C102	D102	PCIEX4_B_TX3-
PCIEX4_B_RX3+	C101	D101	PCIEX4_B_TX3+
GND	C100	D100	GND
PCIEX4_B_RX2-	C99	D99	PCIEX4_B_TX2-
PCIEX4_B_RX2+	C98	D98	PCIEX4_B_TX2+
GND	C97	D97	GND
GND	C96	D96	GND
PCIEX4_B_RX1-	C95	D95	PCIEX4_B_TX1-
PCIEX4_B_RX1+	C94	D94	PCIEX4_B_TX1+
GND	C93	D93	GND
PCIEX4_B_RX0-	C92	D92	PCIEX4_B_TX0-
PCIEX4_B_RX0+	C91	D91	PCIEX4_B_TX0+
GND	C90	D90	GND
PCIEX4_A_RX3-	C89	D89	PCIEX4_A_TX3-
PCIEX4_A_RX3+	C88	D88	PCIEX4_A_TX3+
GND	C87	D87	GND
PCIEX4_A_RX2-	C86	D86	PCIEX4_A_TX2-
PCIEX4_A_RX2+	C85	D85	PCIEX4_A_TX2+
GND	C84	D84	GND
GND	C83	D83	GND
PCIEX4_A_RX1-	C82	D82	PCIEX4_A_TX1-
PCIEX4_A_RX1+	C81	D81	PCIEX4_A_TX1+



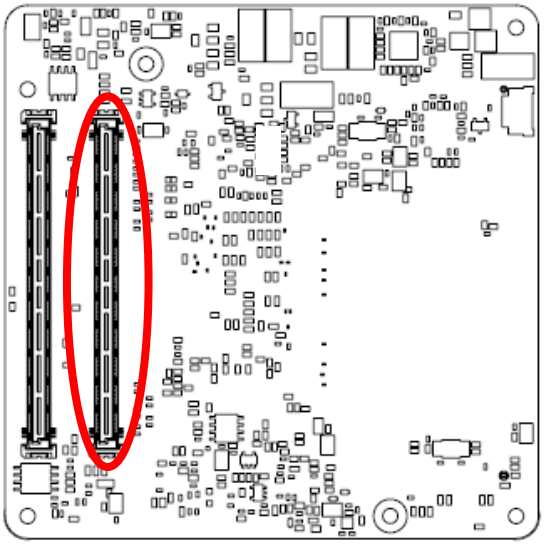


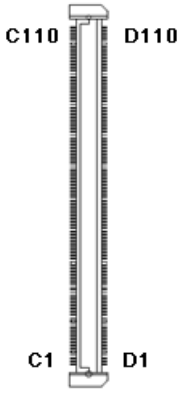
Signal	PIN	PIN	Signal
GND	C80	D80	GND
PCIEX4_A_RX0-	C79	D79	PCIEX4_A_TX0-
PCIEX4_A_RX0+	C78	D78	PCIEX4_A_TX0+
GND	C77	D77	GND
GND	C76	D76	GND
NC	C75	D75	NC
NC	C74	D74	NC
GND	C73	D73	GND
NC	C72	D72	NC
NC	C71	D71	NC
GND	C70	D70	GND
NC	C69	D69	NC
NC	C68	D68	NC
RAPID_SHUTDOWN	C67	D67	GND
NC	C66	D66	NC
NC	C65	D65	NC
GND	C64	D64	GND
GND	C63	D63	GND
NC	C62	D62	NC
NC	C61	D61	NC
GND	C60	D60	GND
NC	C59	D59	NC
NC	C58	D58	NC
TYPE1#	C57	D57	TYPE2#
NC	C56	D56	NC
NC	C55	D55	NC
TYPE0#	C54	D54	PEG_LAN_RV#
NC	C53	D53	NC
NC	C52	D52	NC
GND	C51	D51	GND





Signal	PIN	PIN	Signal
DDI3_PAIR3-	C50	D50	DDI2_PAIR3-/USB4_2_SSRX1-
DDI3_PAIR3+	C49	D49	DDI2_PAIR3+/USB4_2_SSRX1+
PEG_SLOT_RESTE#	C48	D48	GND
DDI3_PAIR2-	C47	D47	DDI2_PAIR2-/USB4_2_SSRX1-
DDI3_PAIR2+	C46	D46	DDI2_PAIR2+/USB4_2_SSRX1+
GSPI1_CS0#	C45	D45	GND
DDI3_HPD	C44	D44	DDI2_HPD_CB
DDI3_PAIR1-	C43	D43	DDI2_PAIR1-/USB4_2_SSRX0-
DDI3_PAIR1+	C42	D42	DDI2_PAIR1+/USB4_2_SSRX0+
GND	C41	D41	GND
DDI3_PAIR0-	C40	D40	DDI2_PAIR0-/USB4_2_SSTX0-
DDI3_PAIR0+	C39	D39	DDI2_PAIR0+/USB4_2_SSTX0+
DDI3_DDC_AUX_SEL	C38	D38	GND
DDI3_CTRLDATA_AUX-	C37	D37	DDI1_PAIR3-/USB4_1_SSRX1-
DDI3_CTRLCLK_AUX+	C36	D36	DDI1_PAIR3+/USB4_1_SSRX1+
USB4_2_LSTX	C35	D35	LSX1_RXD
DDI2_DDC_AUX_SEL	C34	D34	DDI1_DDC_AUX_SEL
DDI2_CTRLDATA_AUX-	C33	D33	DDI1_PAIR2-/USB4_1_SSTX1-
DDI2_CTRLCLK_AUX+	C32	D32	DDI1_PAIR2+/USB4_1_SSTX1+
GND	C31	D31	GND
USB4_PD_I2C_DAT	C30	D30	DDI1_PAIR1-/USB4_1_SSRX0-
USB4_PD_I2C_CLK	C29	D29	DDI1_PAIR1+/USB4_1_SSRX0+
SML1_DAT	C28	D28	GND
SML1_CLK	C27	D27	DDI1_PAIR0-/USB4_1_SSTX0-
SML0_DAT	C26	D26	DDI1_PAIR0+/USB4_1_SSTX0+
SML0_CLK	C25	D25	GND
DDI1_HPD_CB	C24	D24	GND
NC	C23	D23	NC
NC	C22	D22	NC
GND	C21	D21	GND





Signal	PIN	PIN	Signal
PCIE_RX6-	C20	D20	PCIE_TX6-
PCIE_RX6+	C19	D19	PCIE_TX6+
GND	C18	D18	PMCALERT#
USB4_RT_ENA	C17	D17	EC_I2C_IRQ#
USB4_1_LSRX	C16	D16	DDI1_CTRLDATA_AUX-
USB4_1_LSTX	C15	D15	DDI1_CTRLCLK_AUX+
GND	C14	D14	GND
USB_SSRX3+	C13	D13	USB_SSTX3+
USB_SSRX3-	C12	D12	USB_SSTX3-
GND	C11	D11	GND
USB_SSRX2+	C10	D10	USB_SSTX2+
USB_SSRX2-	C9	D9	USB_SSTX2-
GND	C8	D8	GND
USB_SSRX1+	C7	D7	USB_SSTX1+
USB_SSRX1-	C6	D6	USB_SSTX1-
GND	C5	D5	GND
USB_SSRX0+	C4	D4	USB_SSTX0+
USB_SSRX0-	C3	D3	USB_SSTX0-
GND	C2	D2	GND
GND	C1	D1	GND

2.3.5.1 Signal Description – COM Express Connector 2 (CN1B)

2.3.5.1.1 USB3.0 Signals

Signal	Signal Description
USB_SSTX[0:3]+ USB_SSTX[0:3]-	Additional transmit signal differential pairs for the SuperSpeed USB data path.
USB_SSRX[0:3]+ USB_SSRX[0:3]-	Additional receive signal differential pairs for the SuperSpeed USB data path.

2.3.5.1.2 USB4.0 Signals

Signal	Signal Description
USB4_1_SSTX[0:1]+ USB4_1_SSTX[0:1]-	High speed USB4 data transmit pairs, pin shared with DDI[1:2].
USB4_1_SSRX[0:1]+ USB4_1_SSRX[0:1]-	High speed USB4 data receive pairs, pin shared with DDI[1:2].
USB4_2_SSTX[0:1]+ USB4_2_SSTX[0:1]-	High speed USB4 data transmit pairs, pin shared with DDI[1:2].
USB4_2_SSRX[0:1]+ USB4_2_SSRX[0:1]-	High speed USB4 data receive pairs, pin shared with DDI[1:2].
USB4_RT_ENA	Power Enable for Carrier based USB Retimers. Sourced from chipset GPO. "USB Retimer Enable".
USB4_1_LSRX	Side-band RX interface for USB4 Alternate modes. "Low Speed" asynchronous serial RX line
USB4_1_LSTX	Side-band TX interface for USB4 Alternate modes. "Low Speed" asynchronous serial TX line

2.3.5.1.3 DDI Signals

Signal	Signal Description
DDI[1:3]_PAIR[0:3]+ DDI[1:3]_PAIR[0:3]-	Digital Display Interface 1 to 3Pair[0:3] differential pairs
DDI[1:3]_DDC_AUX_SEL	Selects the function of DDI[1:3]_CTRLCLK_AUX+ and DDI[1:3]_CTRLDATA_AUX-. If this input is floating the AUX pair is used for the DP AUX+/- signals. If pulled-high the AUX pair contains the CRTLCLK and CTRLDATA signals.
DDI[1:3]_CTRLCLK_AUX+	DP AUX+function if DDI[1:3]_DDC_AUX_SEL is no connect HDMI/DVI 12C CTRLCLK if DDI[1:3]_DDC_AUX_SEL is pulled high
DDI[1:3]_CTRLDATA_AUX-	DP AUX-function if DDI[1:3]_DDC_AUX_SEL is no connect HDMI/DVI 12C CTRLDATA if DDI[1:3]_DDC_AUX_SEL is pulled high
DDI[1:3]_HPD	Digital Display Interface Hot-Plug Detect

2.3.5.1.4 PCI Express Signals

Signal	Signal Description
PCIE_TX6 +/-	PCI Express Differential Transmit Pair 6
PCIE_RX6 +/-	PCI Express Differential Receive Pair 6

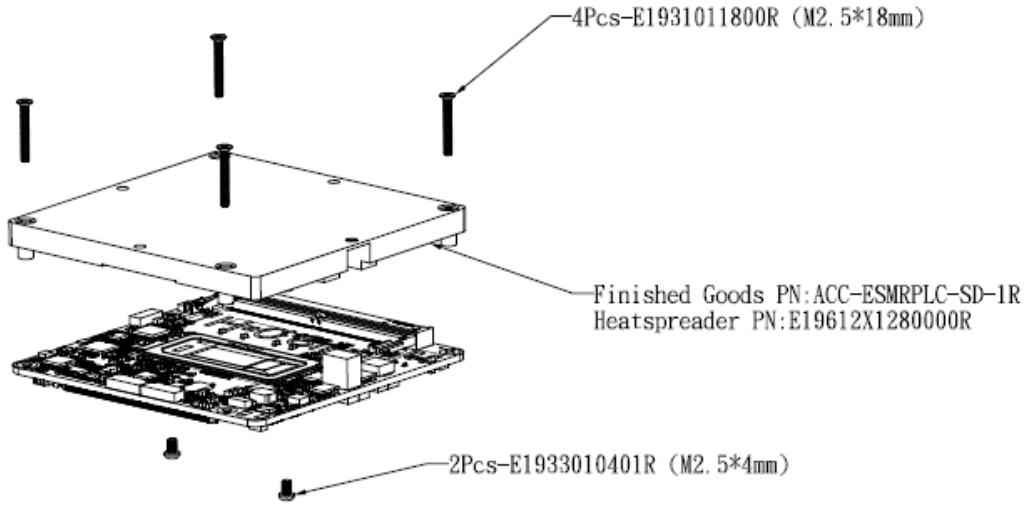
2.3.5.1.5 PEG PCI Express Lanes Signals

Signal	Signal Description
PEG_TX[0:15]+ PEG_TX[0:15]-	PCI Express Graphics transmit differential paris.
PEG_RX[0:15]+ PEG_RX[0:15]-	PCI Express Graphics recevie differential paris.

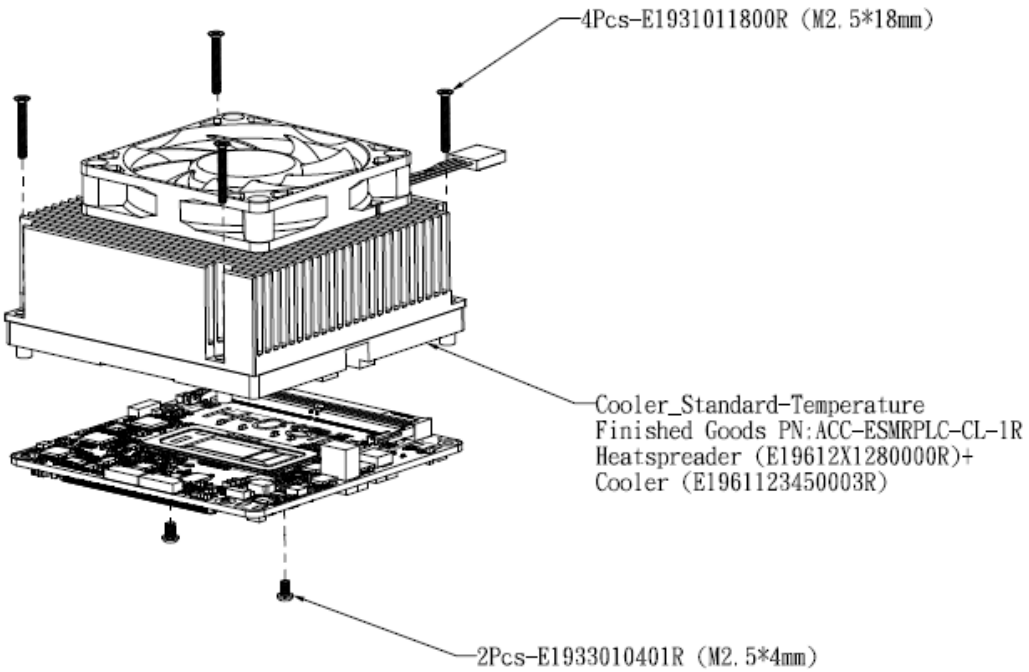
2.4 Installing Heatsink / Cooler

Standard Temperature

Heat spreader



Cooler (ACC-ESMRPLC-CL-1R) for the SKUs of ESM-RPLC with 13th Gen. Intel® P-Series (28 W) and U-Series (15W).



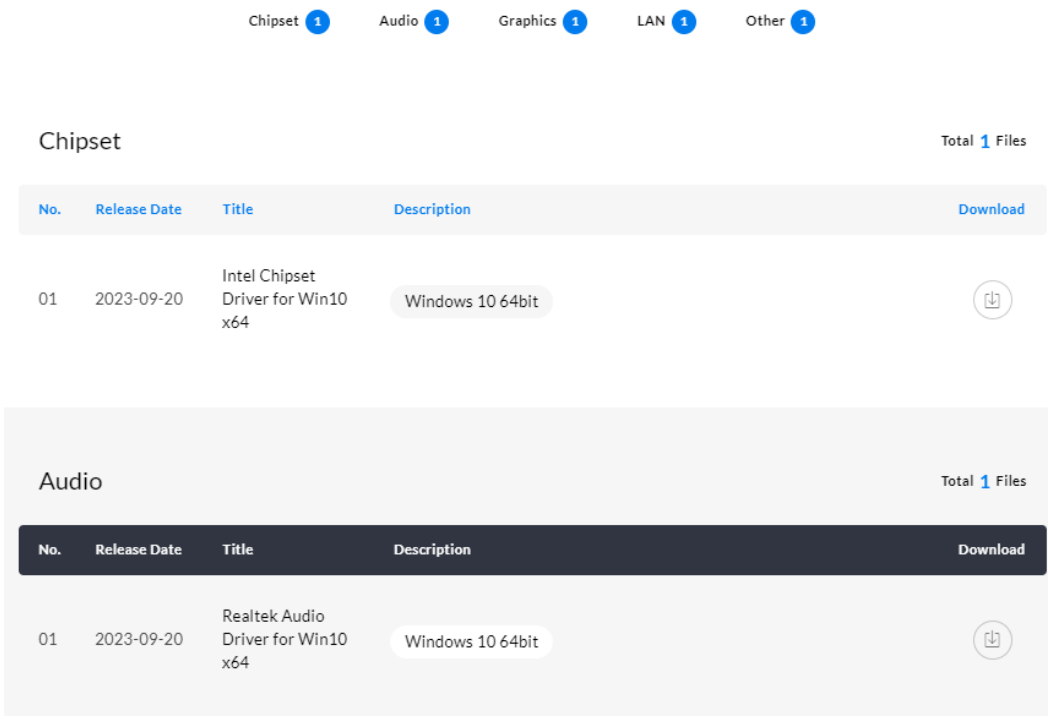
Step1. Using 4 screws (M2.5-18L) to lock the heat spreader and Cooler through PCB screw holes from top to bottom.

Note:

Screw Size/Q'TY - M2.5-18L Ni*4pcs

3. Drivers Installation

All the drivers are available on Avalue Downloads Area (**https://www.avaluetech.com/en/support/download**). Type the model name and press Enter to find all the relevant software, utilities, and documentation.



Note: Installation procedures and screen shots in this section are for your reference and may not be exactly the same as shown on your screen.

3.1 Install Chipset Driver

All drivers can be found on the Avalue Official Website:

www.avalue.com.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.

Step 3. Click **Install**.

Step1. Click **Next**.

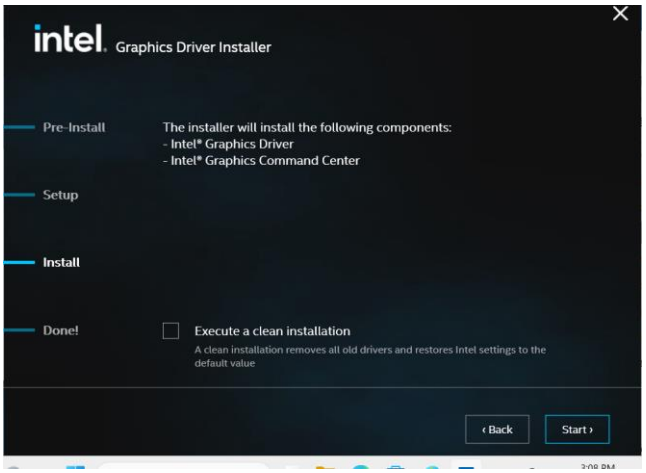
Step 4. Click Finish to complete setup.

Step 2. Click **Accept**.

3.2 Install VGA Driver

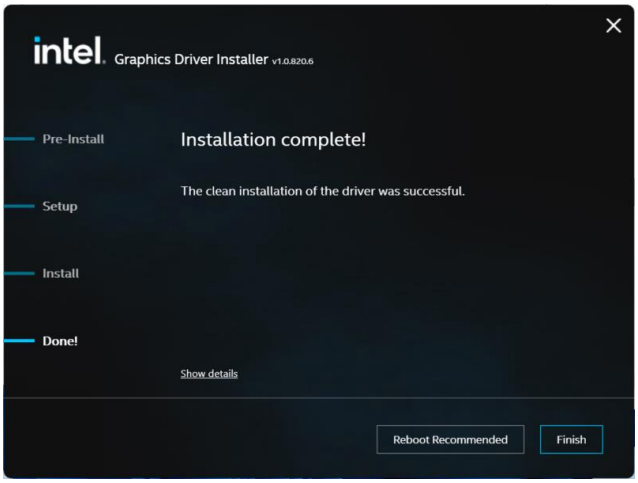
All drivers can be found on the Avalue Official Website:
www.avalue.com.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.

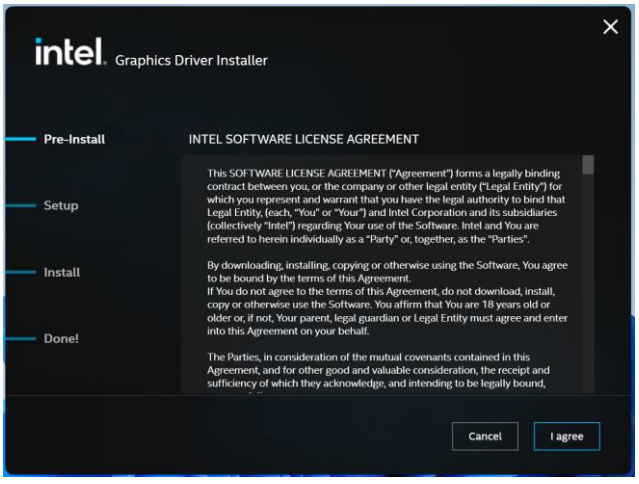


Step 3. Click **Start.**

Step 1. Click **Begin installation**.



Step 4. Click **Finish** to complete setup.



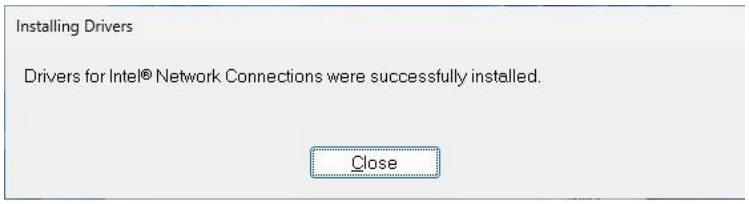
Step 2. Click **I agree**.

3.3 Install Ethernet Driver

All drivers can be found on the Avalue Official Website:
www.avalue.com.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.

Step 1. Click **OK** to continue installation.

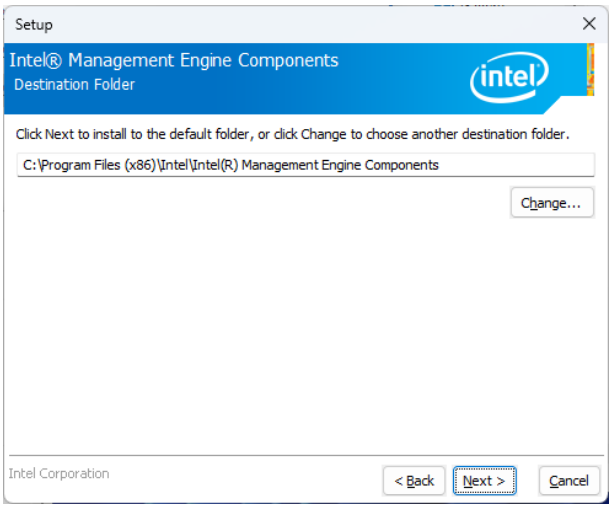


Step 2. Setup completed.

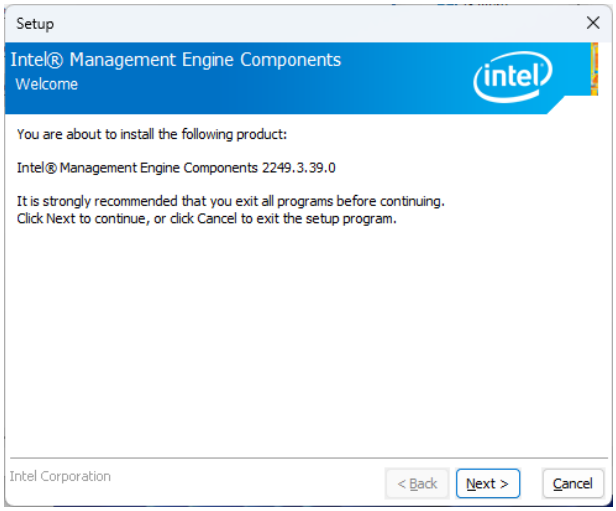
3.4 Install ME Driver

All drivers can be found on the Avalue Official Website:
www.avalue.com.

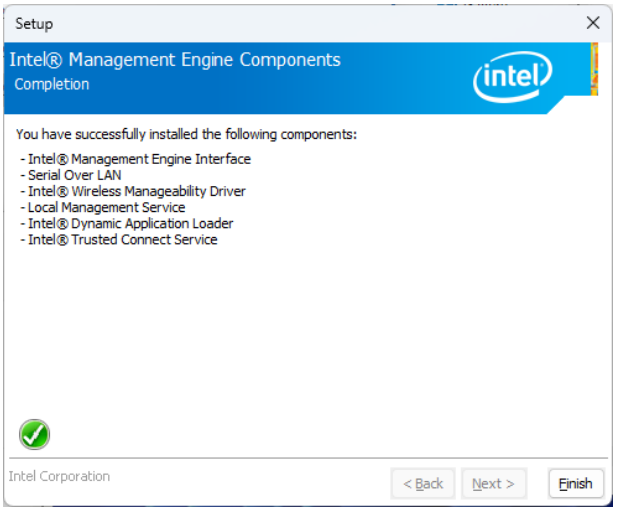
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



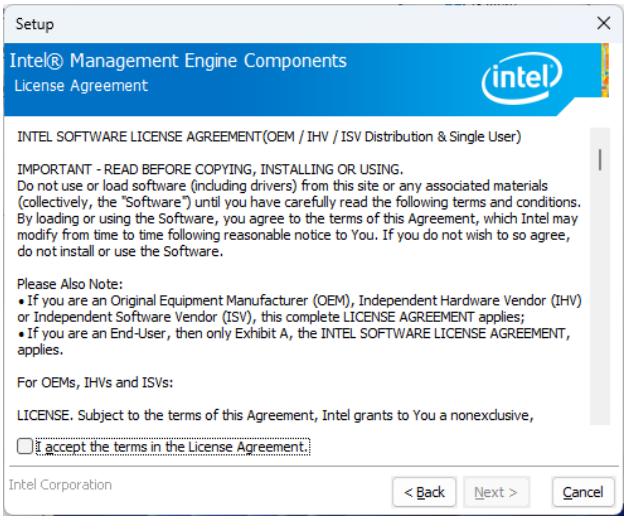
Step 3. Click **Next**.



Step 1. Click **Next** to continue installation.



Step 4. Click **Finish** to complete setup.



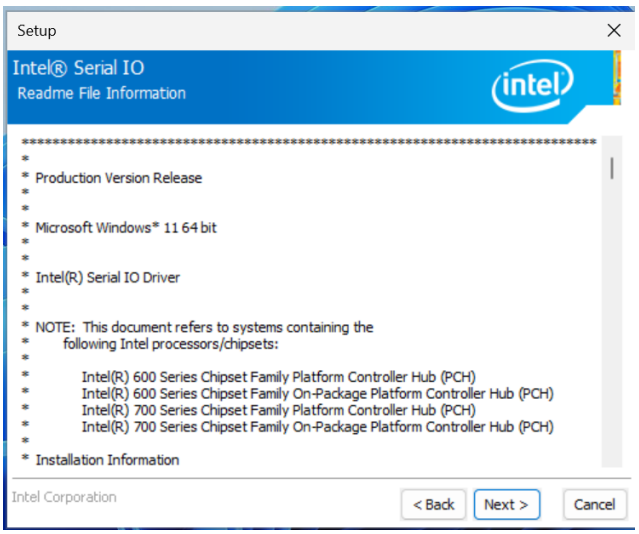
Step 2. Click **Next**.

3.5 Install Serial IO Driver

All drivers can be found on the Avalue Official Website:

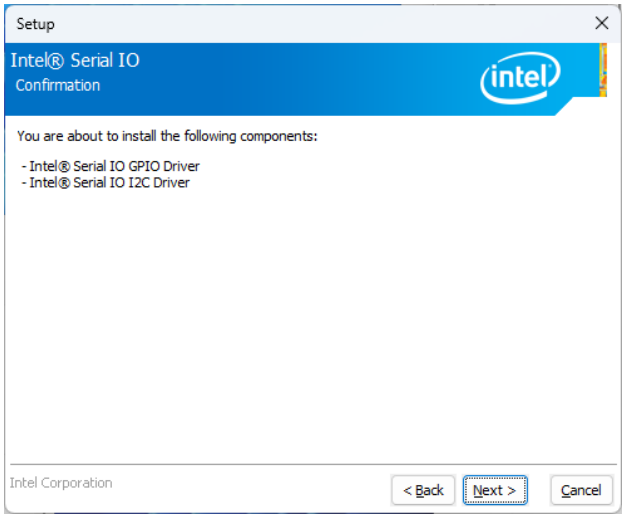
www.avalue.com.

Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.

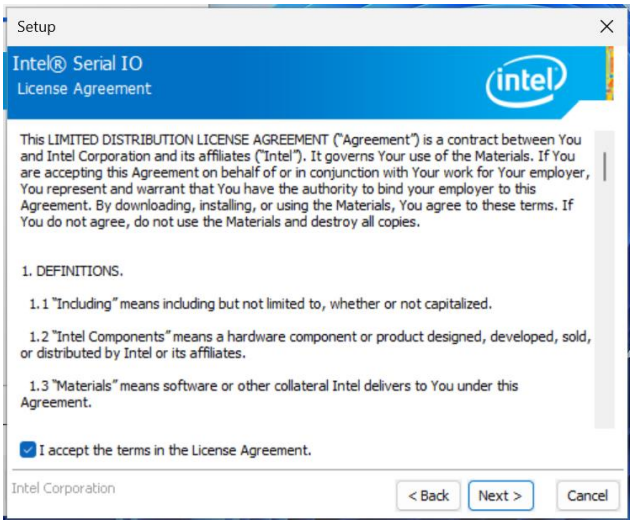


Step 3. Click **Next**.

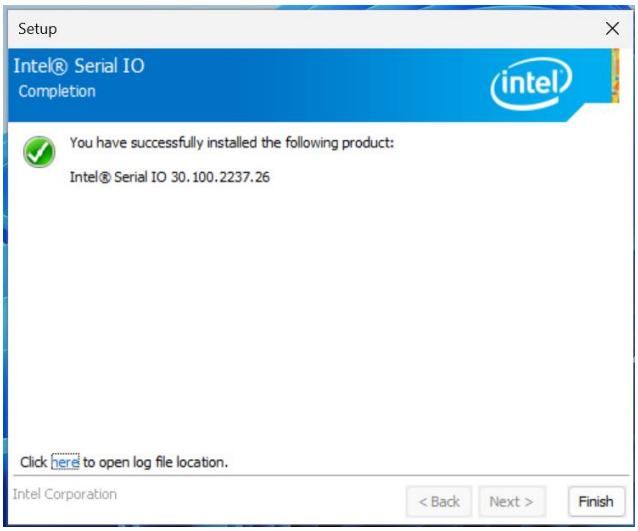
Step 1. Click **Next** to continue installation.



Step 4. Click **Next**.



Step 2. Click **Next**.

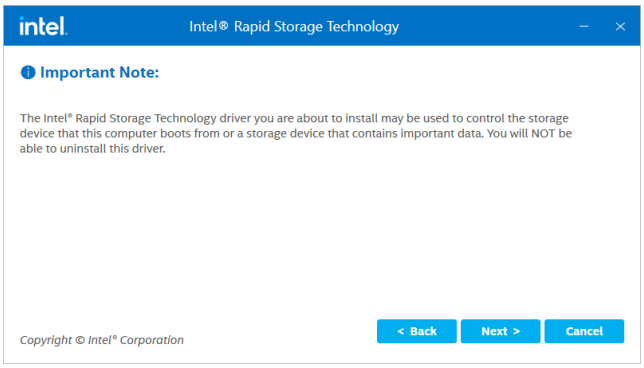


Step 5. Click **Finish** to complete setup.

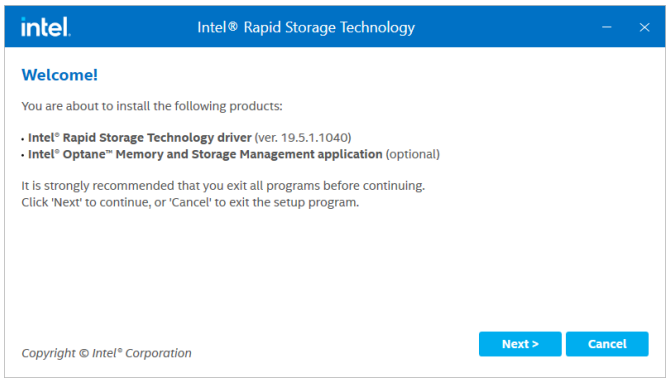
3.6 Install VMD RST Driver

All drivers can be found on the Avalue Official Website:
www.avalue.com.

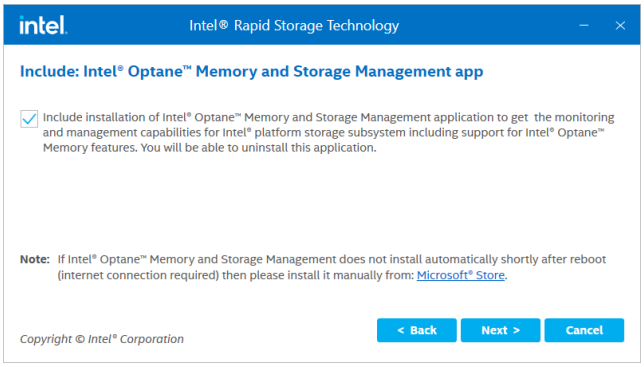
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



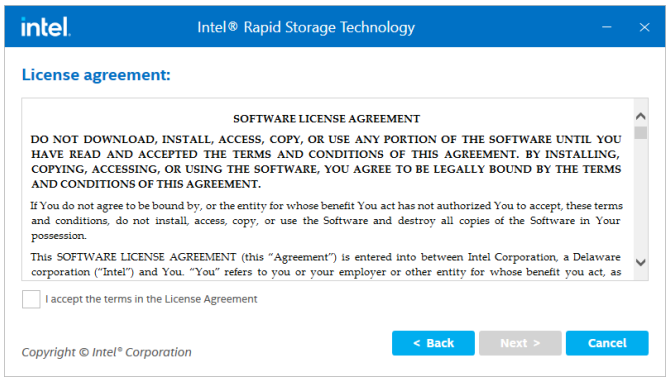
Step 3. Click **Next**.



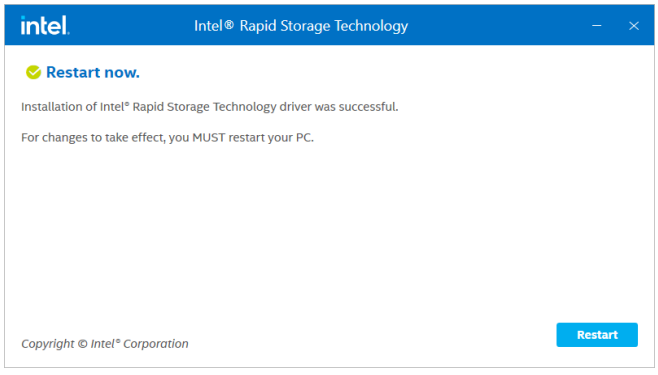
Step 1. Click **Next** to continue installation.



Step 4. Click **Next**.



Step 2. Click **Next**.



Step 5. Setup completed.

4.BIOS Setup

4.1 Introduction

The BIOS setup program allows users to modify the basic system configuration. In this following chapter will describe how to access the BIOS setup program and the configuration options that may be changed.

4.2 Starting Setup

AMI BIOS™ is immediately activated when you first power on the computer. The BIOS reads the system information contained in the NVRAM and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:
By pressing <ESC> or <Del> immediately after switching the system on, or
By pressing the < ESC> or <Del> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <ESC> or <Del> to enter SETUP

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys.

4.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Button	Description
↑	Move to previous item
↓	Move to next item
←	Move to the item in the left hand
→	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into NVRAM Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 key	Previous Values
F3 key	Optimized defaults
F4 key	Save & Exit Setup

- **Navigating Through The Menu Bar**

  Use the left and right arrow keys to choose the menu you want to be in.

Note: Some of the navigation keys differ from one screen to another.

- **To Display a Sub Menu**

  Use the arrow keys to move the cursor to the sub menu you want. Then press <Enter>. A "➢" pointer marks all sub menus.

4.4 Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the <Enter> key again.

4.5 In Case of Problems

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the AMI BIOS supports an override to the NVRAM settings which resets your system to its defaults.

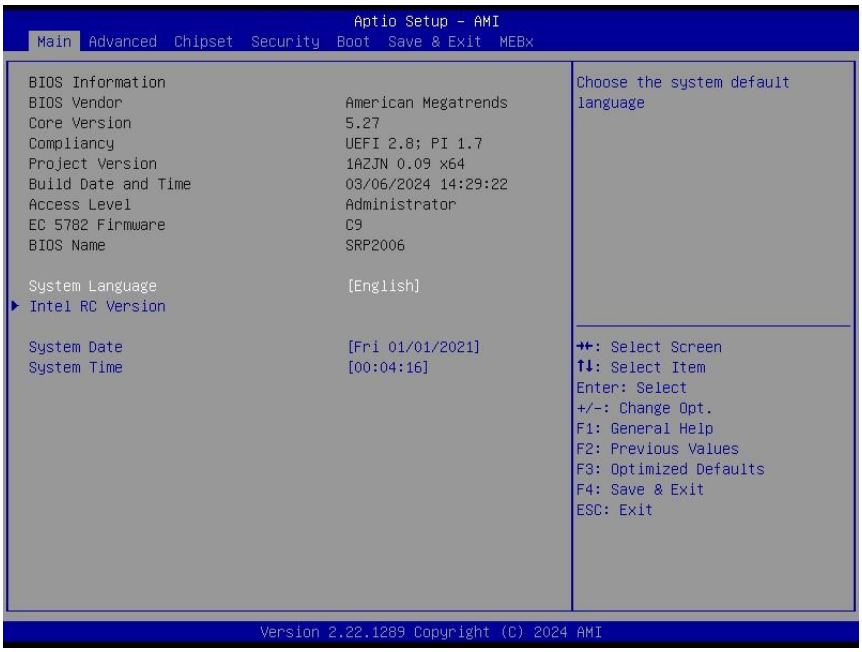
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to the chipset setup has the potential for causing you to use the override.

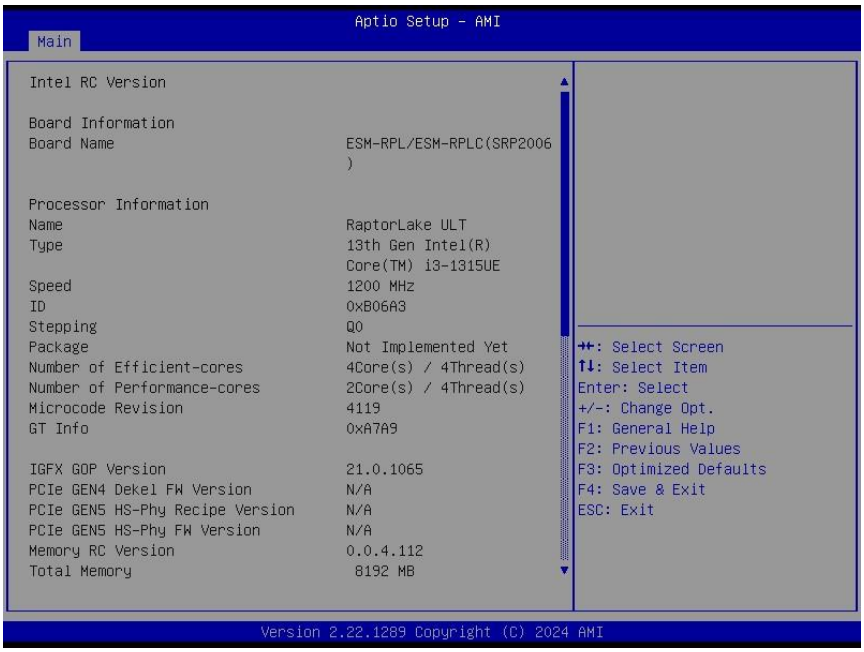
4.6 BIOS setup

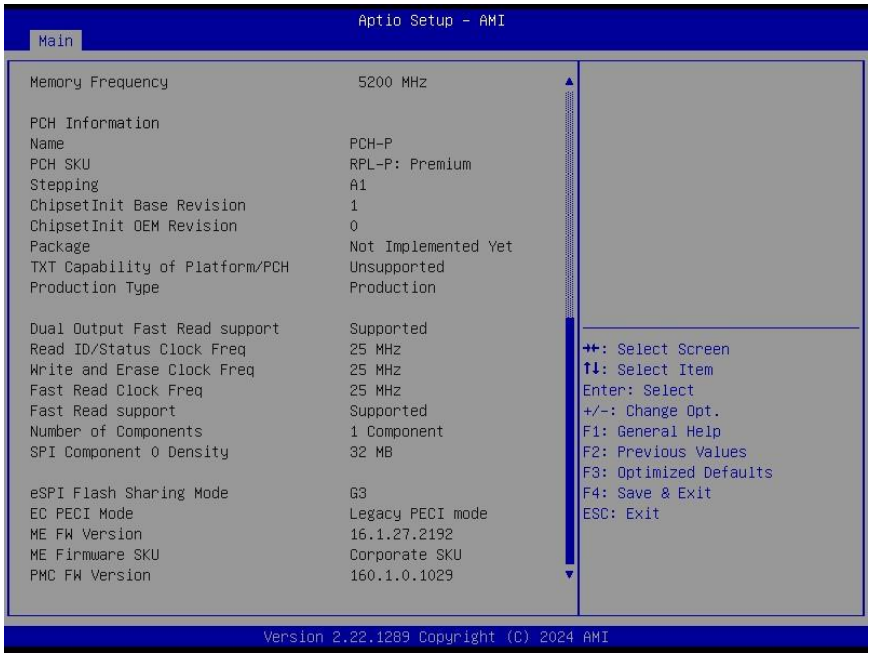
Once you enter the Aptio Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.

4.6.1 Main Menu

This section allows you to record some basic hardware configurations in your computer and set the system clock.







4.6.1.1 System Language

This option allows choosing the system default language.

4.6.1.2 System Date

Use the system date option to set the system date. Manually enter the Month, day and year.

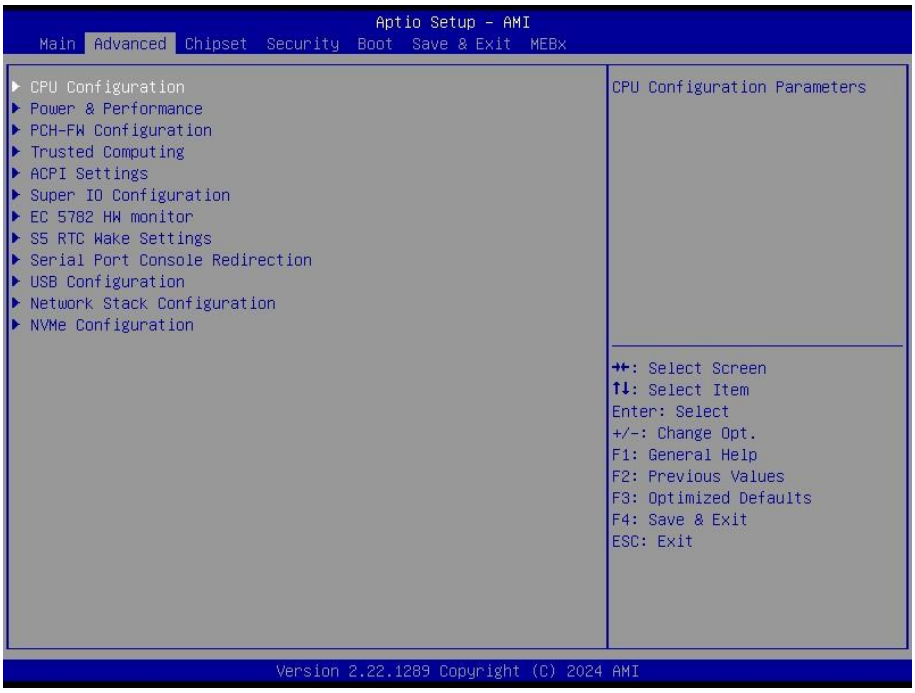
4.6.1.3 System Time

Use the system time option to set the system time. Manually enter the hours, minutes and seconds.

Note: The BIOS setup screens shown in this chapter are for reference purposes only, and may not exactly match what you see on your screen.
Visit the Avalue website (www.avalue.com) to download the latest product and BIOS information.

4.6.2 Advanced Menu

This section allows you to configure your CPU and other system devices for basic operation through the following sub-menus.



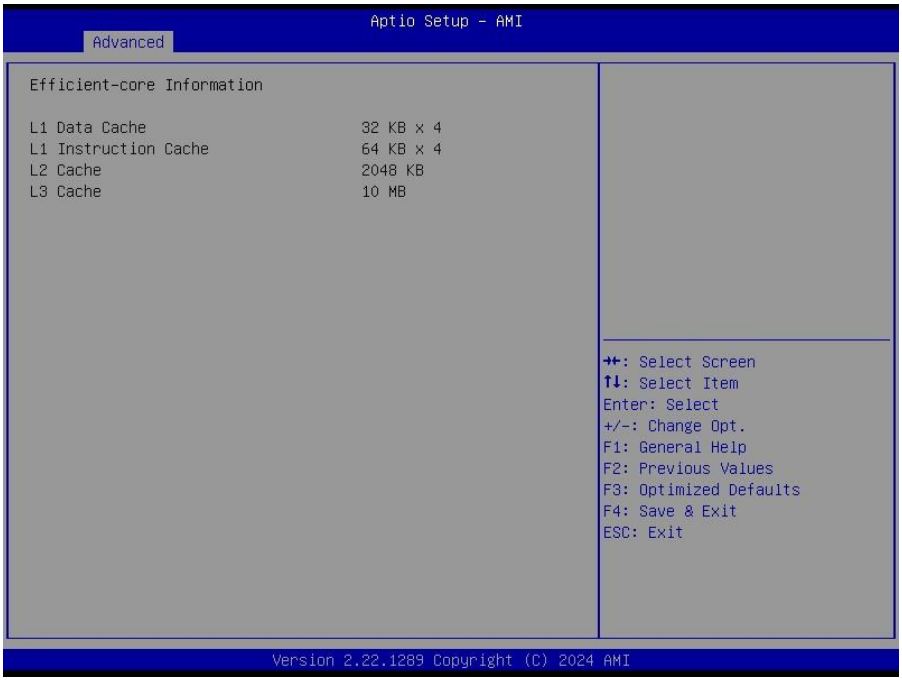
4.6.2.1 CPU Configuration

Use the CPU configuration menu to view detailed CPU specification and configure the CPU.

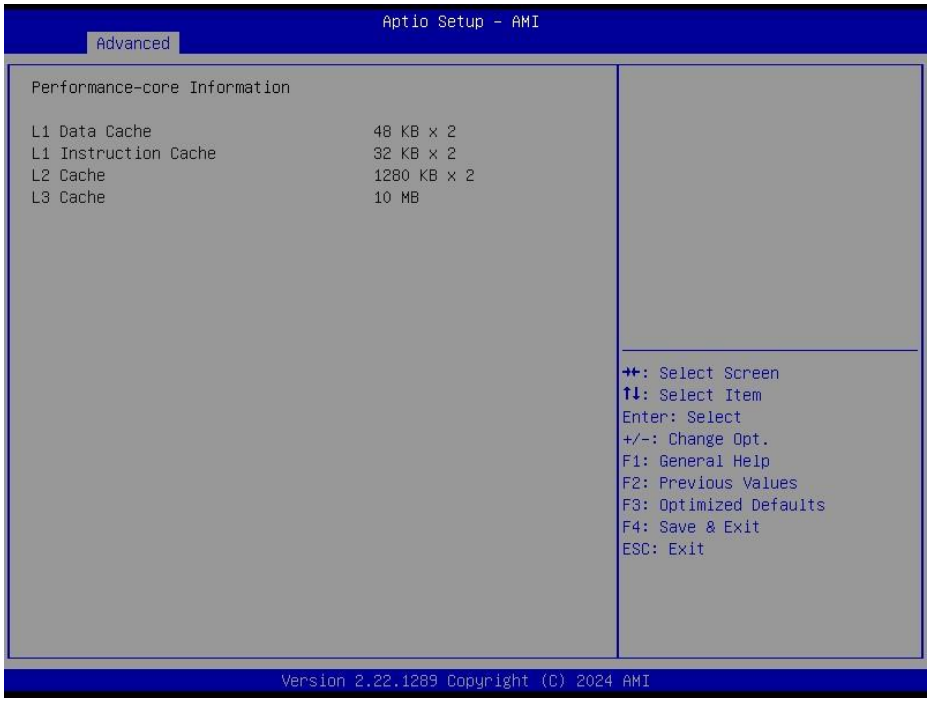
Item	Options	Description
Intel (VMX) Virtualization Technology	Disabled Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool

		Technology.
Active Performance-cores	All**[Default]** 7 6 5 4 3 2 1	Number of P-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.
Active Efficient-cores	All[Default] 15 14 13 12 11 10 9 8	Number of E-cores to enable in each processor package. Note: Number of Cores and E-cores are looked at together. When both are {0,0}, Pcode will enable all cores.

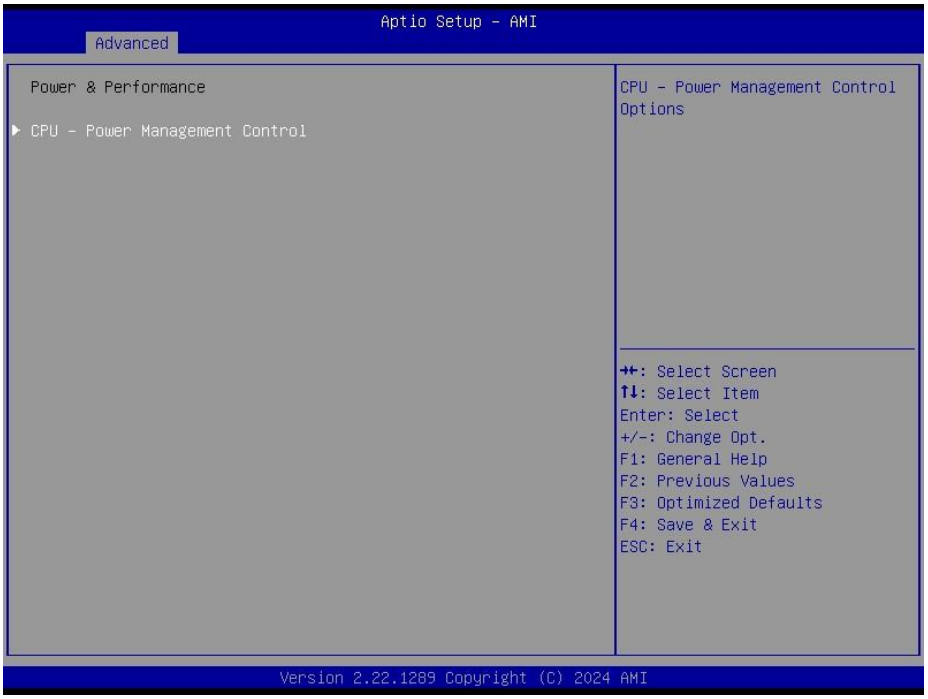
4.6.2.1.1 Efficient-core Information



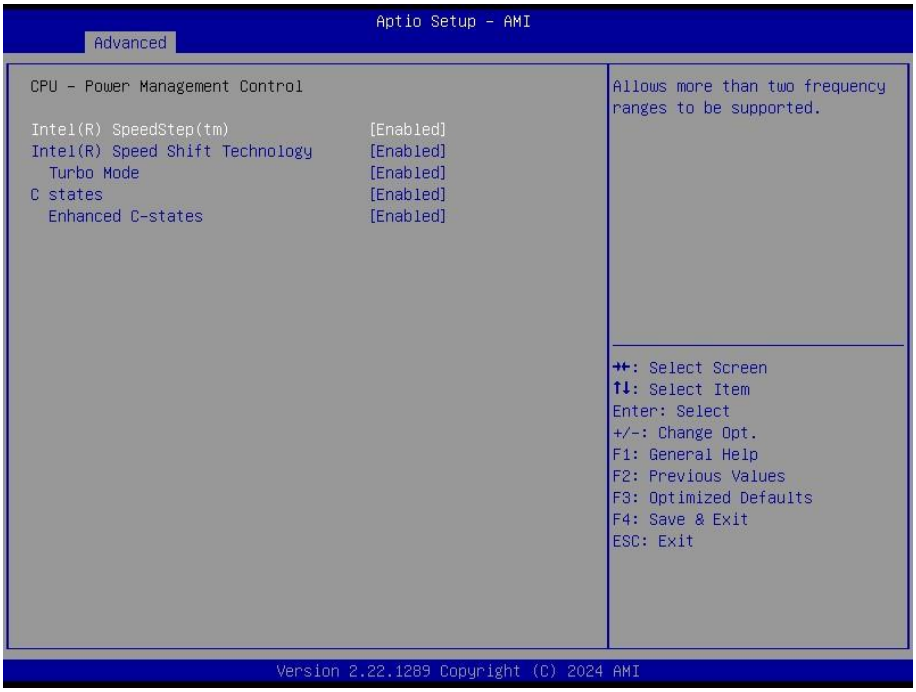
4.6.2.1.2 Performance-core Information



4.6.2.2 Power & Performance

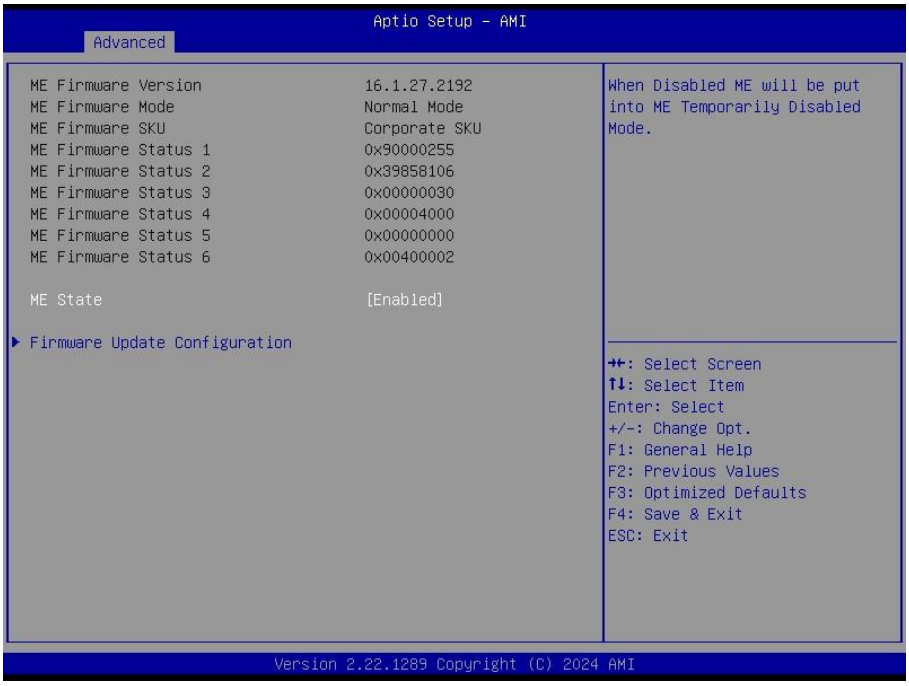


4.6.2.2.1 CPU – Power Management Control



Item	Option	Description
Intel® SpeedStep™	Enabled**[Default]**, Disabled	Allows more than two frequency ranges to be supported.
Intel® Speed Shift Technology	Enabled**[Default]**, Disabled	Eanble/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.
Turbo Mode	Enabled**[Default]**, Disabled	Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled).
C States	Enabled**[Default]**, Disabled	Enable/Disable CPU Power Management.
Enhanced C-States	Enabled**[Default]**, Disabled	Enable/Disable C1E. When enabled, CPU will switch to minimum speed when all cores enter C-State.

4.6.2.3 PCH-FW Configuration

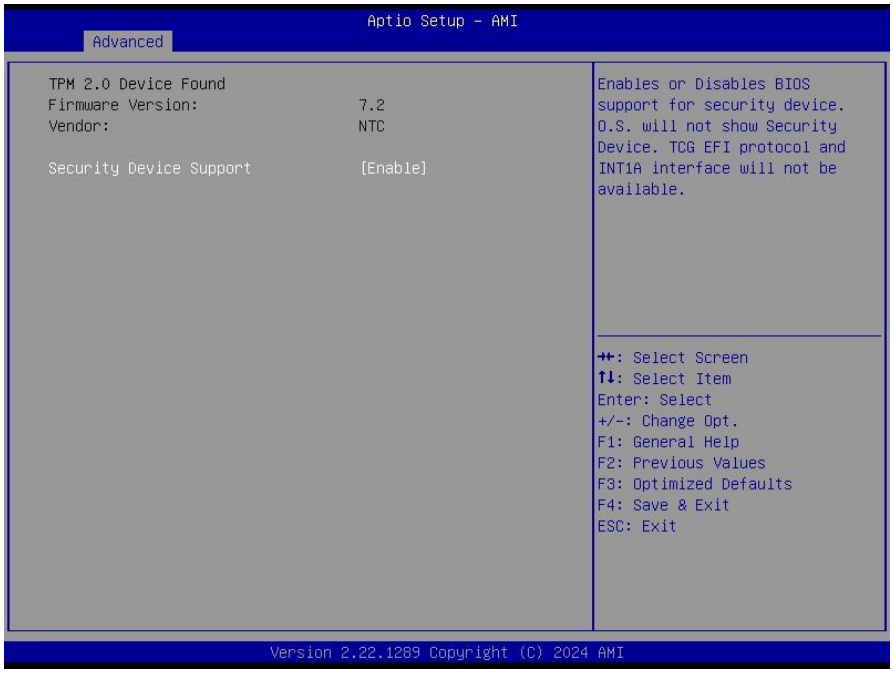


Item	Option	Description
ME State	Disabled Enabled**[Default]**,	When Disabled ME will be put into ME Temporarily Disabled Mode.

4.6.2.3.1 Firmware Update Configuration

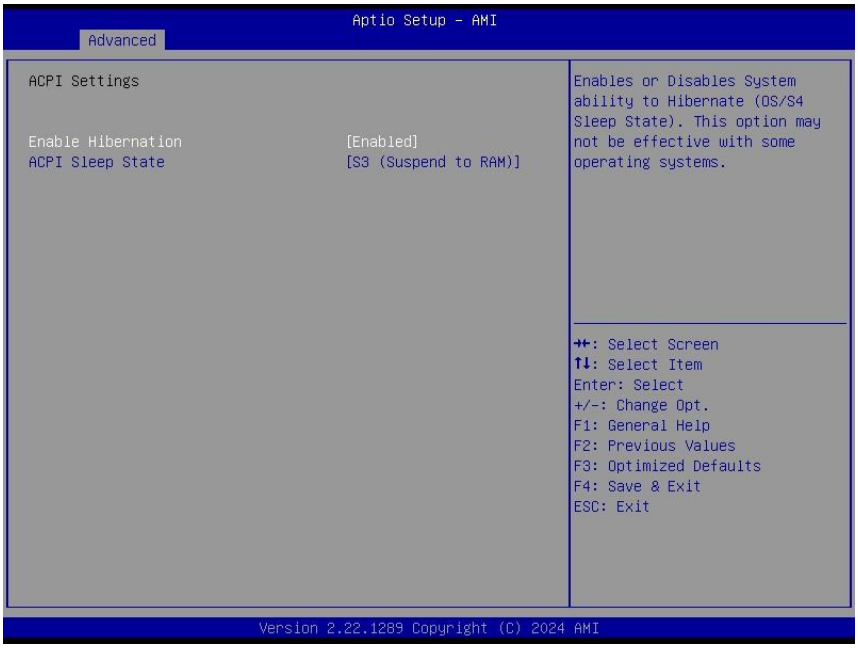
Item	Option	Description
ME FW Image Re-Flash	Disabled**[Default]**, Enabled	Enable/Disable Me FW Image Re-Flash function.

4.6.2.4 Trusted Computing



Item	Options	Description
Security Device Support	Disable, Enable**[Default]**	Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available.

4.6.2.5 APCI Settings

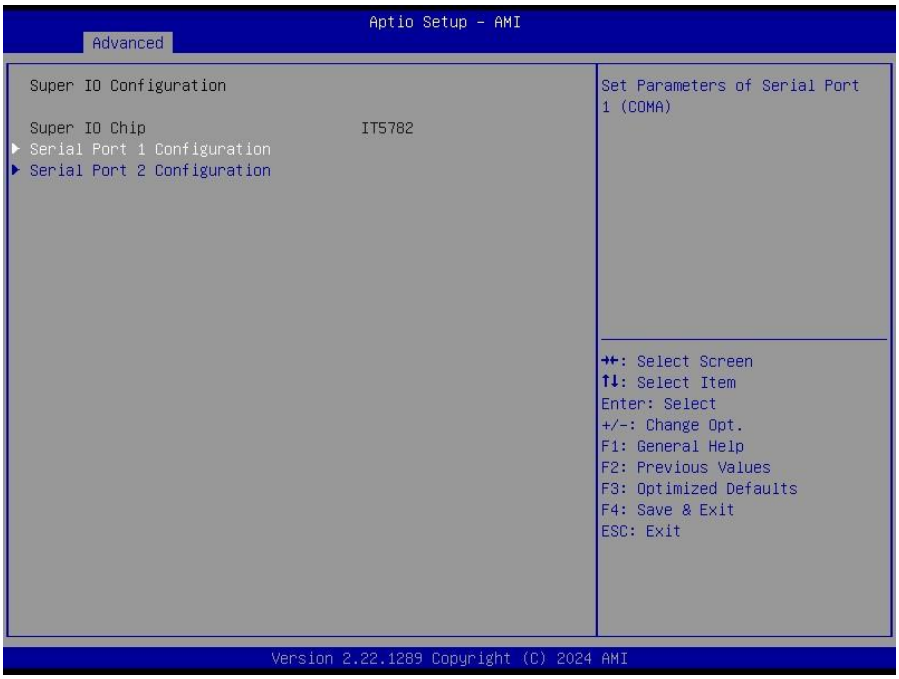


Item	Options	Description
Enable Hibernation	Disabled Enabled**[Default]**,	Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may not be effective with some OS.

ACPI Sleep State	Suspend Disabled, S3 (Suspend to RAM)**[Default]**	Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

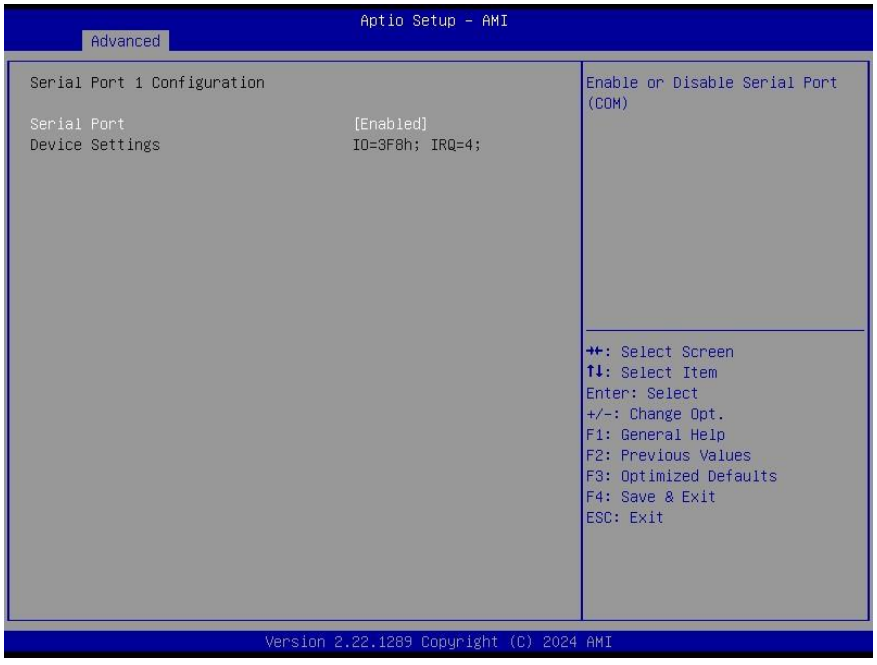
4.6.2.6 Super IO Configuration

You can use this item to set up or change the Super IO configuration for serial ports. Please refer to 4.6.2.6.1 ~ 4.6.2.6.2 for more information.



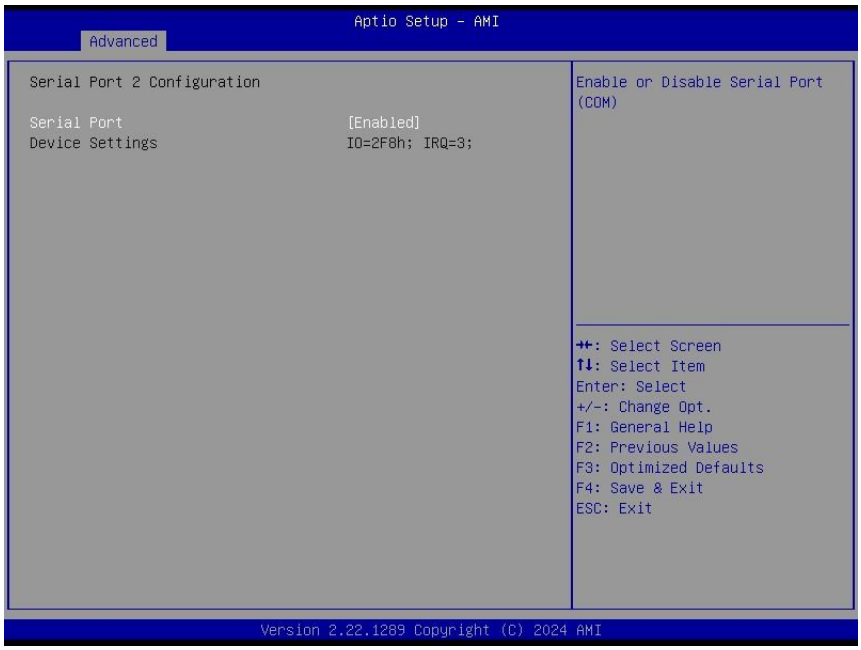
Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).

4.6.2.6.1 Serial Port 1 Configuration



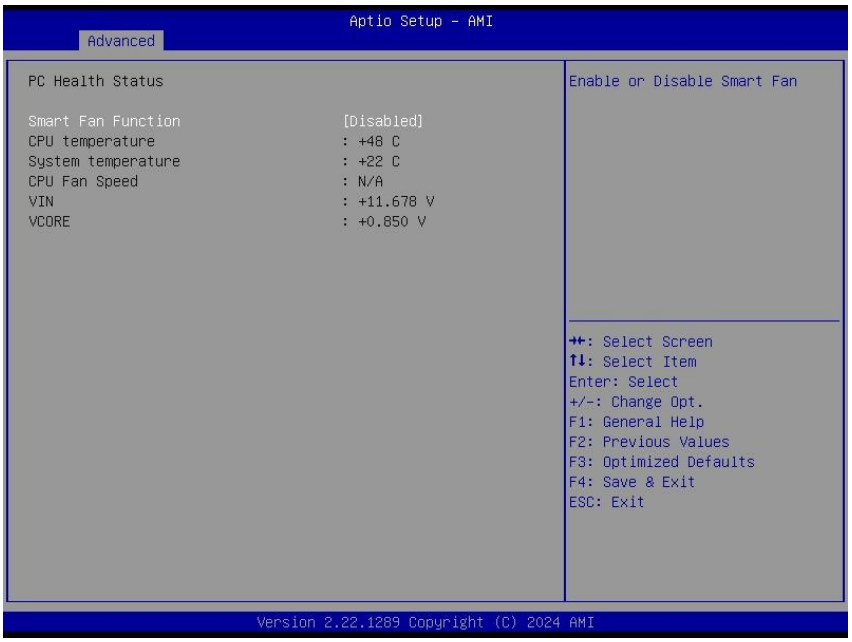
Item	Option	Description
Serial Port	Enabled**[Default]**, Disabled	Enable or Disable Serial Port (COM).

4.6.2.6.2 Serial Port 2 Configuration



Item	Option	Description
Serial Port	Enabled**[Default]**, Disabled	Enable or Disable Serial Port (COM).

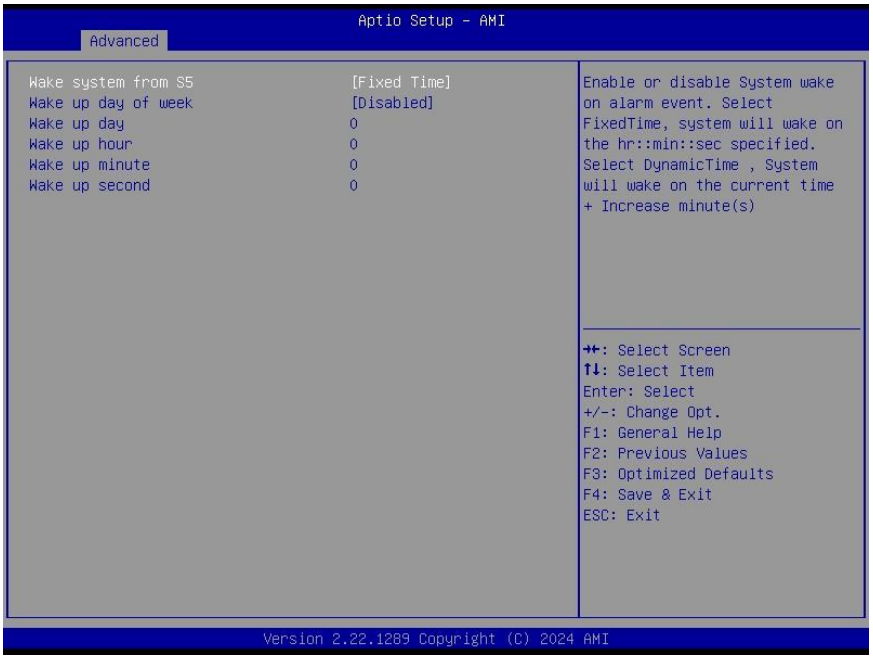
4.6.2.7 EC 5782 HW Monitor



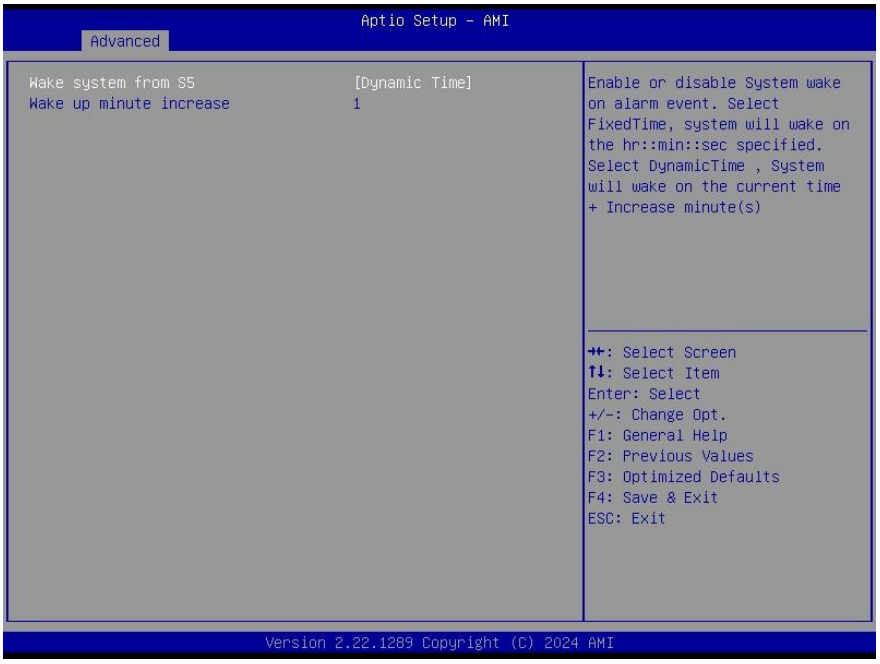
Item	Options	Description
Smart Fan Function	Enabled, Disabled**[Default]**	Enables or Disables Smart Fan.

4.6.2.8 S5 RTC Wake Settings

Item	Options	Description
Wake system from S5	Disabled**[Default]**, Fixed Time Dynamic Time	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Time, System will wake on the current time + Increase minute(s).

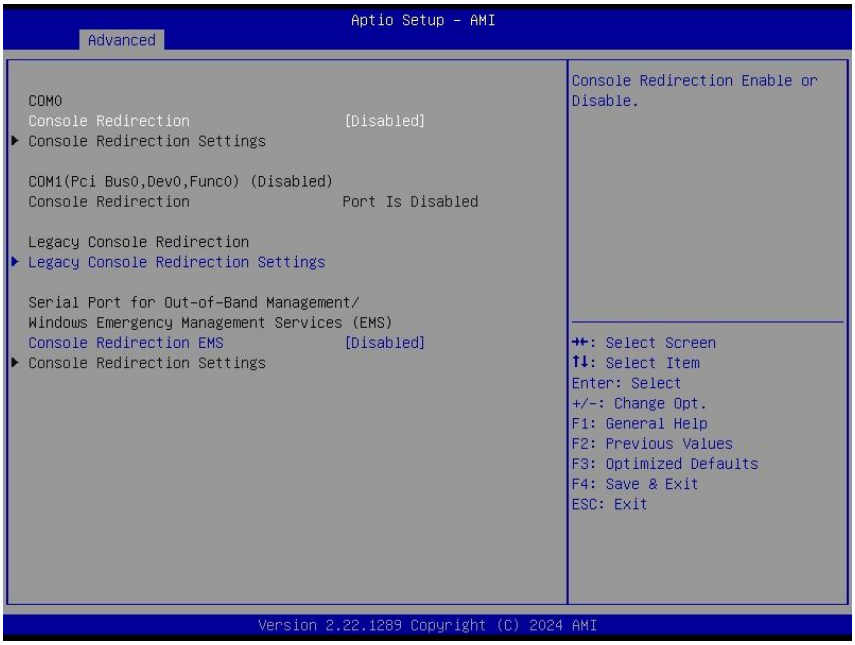


Item	Options	Description
Wake system from S5	Disabled, Fixed Time**[Default]** Dynamic Time	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Times, System will wake on the current time + Increase minute(s).
Wake up day of week	Disabled**[Default]**, Monday-Friday Monday-Saturday	Wake up day of week. (Monday-Friday) or (Monday-Saturday).
Wake up day	1-31	Select 0 For daily system wake up 1-31 for which day of the month that you would like the system to wake up.
Wake up hour	0-23	Select 0-23 For example enter 3 for 3am and 15 for 3pm.
Wake up minute	0-23	Select 0-23 For example enter 3 for 3am and 15 for 3pm.
Wake up second	0-23	Select 0-23 For example enter 3 for 3am and 15 for 3pm.



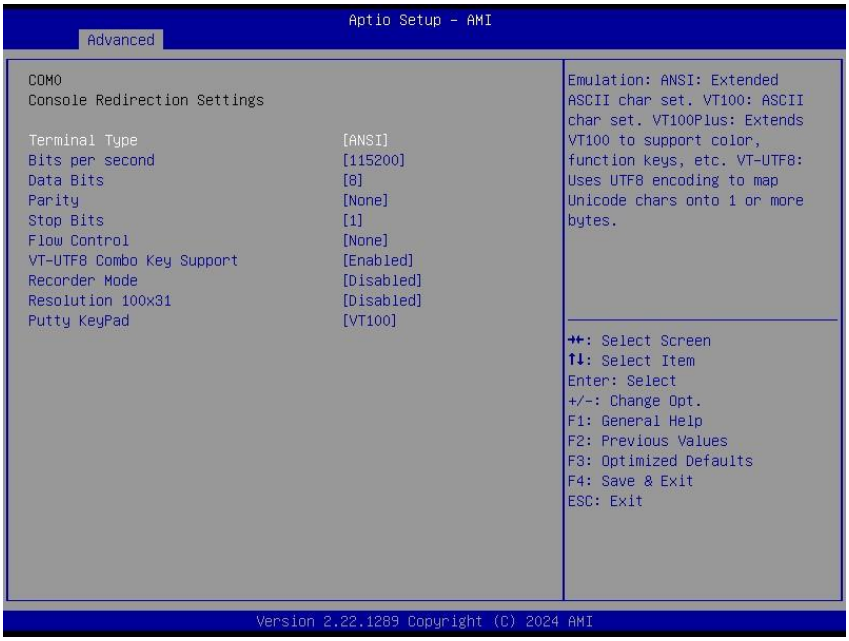
Item	Options	Description
Wake system from S5	Disabled, Fixed Time Dynamic Time**[Default]**	Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr::min::sec specified. Select Dynamic Times, System will wake on the current time + Increase minute(s).
Wake up minute increase	1-5	1-5.

4.6.2.9 Serial Port Console Redirection



Item	Options	Description
Console Redirection	Disabled**[Default]**, Enabled	Console Redirection Enable or Disable.
Console Redirection EMS	Disabled**[Default]**, Enabled	Console Redirection Enable or Disable.

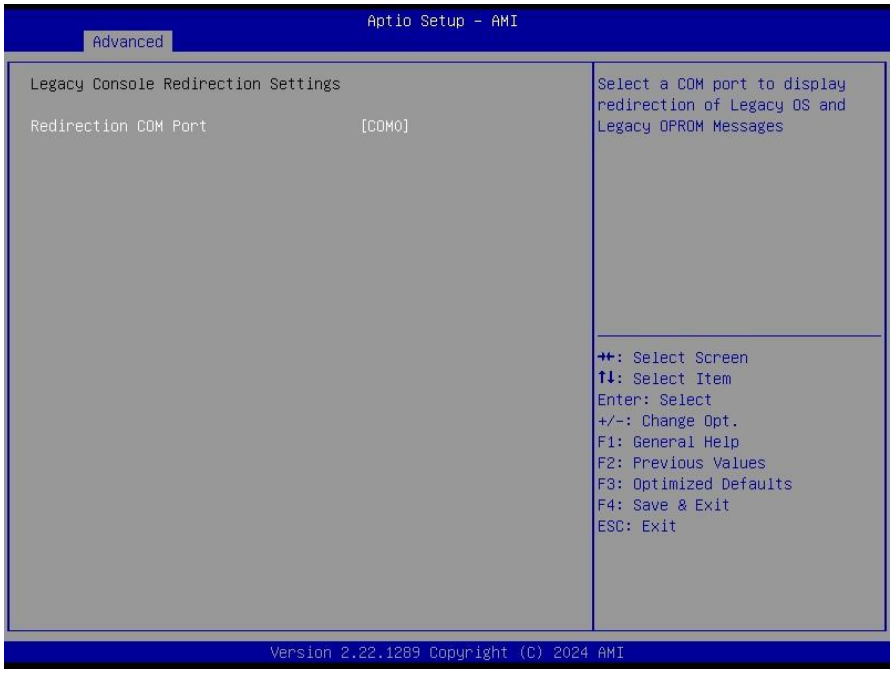
4.6.2.9.1 COM0



Item	Option	Description
Terminal Type	VT100 VT100+ VT-UTF8	Emulation: ANSI: Extender ASCII char set. VT100: ASCII char set. VT100+:Extends VT100 to support color, function keys, etc.

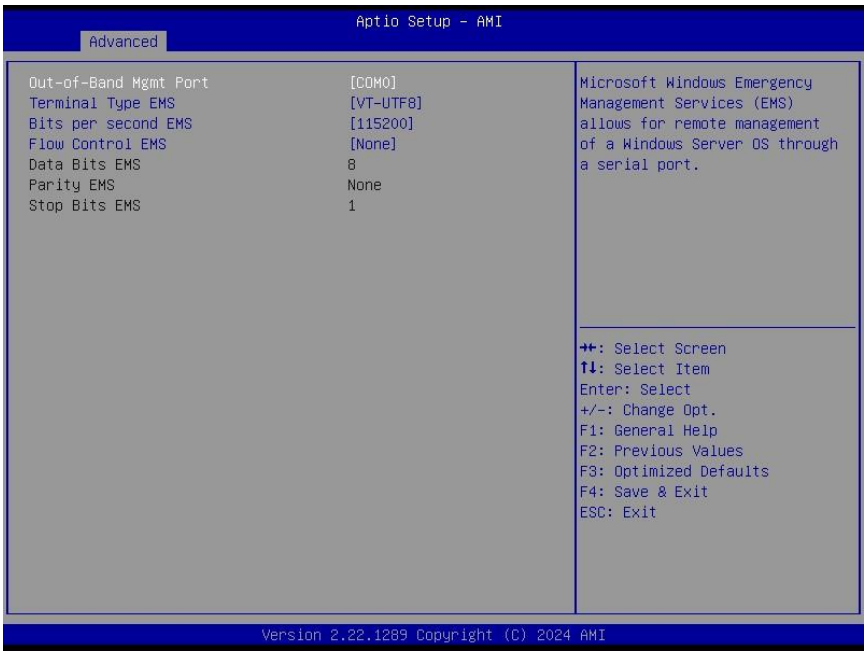
	ANSI**[Default]**, VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.	
Bits per second	9600 19200 38400 57600 115200**[Default]**	Select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Data Bits	7 8**[Default]**	Data Bits.
Parity	None**[Default]** Even Odd Mark Space	A parity bit can be sent with the data bits to detect some transmission errors. Even: parity bit is 0 if the num of 1's in the data bits is even. Odd: parity bit is 0 if num of 1's in the data bits is odd. Mark: parity bit is always 1. Space: Parity bit is always 0. Mark and Space Parity do not allow for error detection. They can be used as an additional data bit.
Stop Bits	1**[Default]** 2	Stop bits indicate the end of a serial data packet. (A start bit indicates the beginning). The standard setting is 1 stop bit. Communication with slow devices may require more than 1 stop bit.
Flow Control	None**[Default]** Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.
VT-UTF8 Combo Key Support	Disabled Enabled**[Default]**	Enable VT-UTF8 Combination Key Support for ANSI/VT100 terminals.
Recorder Mode	Disabled**[Default]** Enabled	With this mode enabled only text will be sent. This is to capture Terminal data.
Resolution 100x31	Disabled**[Default]** Enabled	Enables or disables extended terminal resolution.
Putty KeyPad	VT100**[Default]** Intel Linux XTERMR6 SCO ESCN VT400	Select FunctionKey and KeyPad on Putty.

4.6.2.9.2 Legacy Console Redirection Settings



Item	Option	Description
Redirection COM Port	COM0**[Default]**	Select a COM port to display redirection of Legacy OS and Legacy OPROM Messages.

4.6.2.9.3 Console Redirection EMS

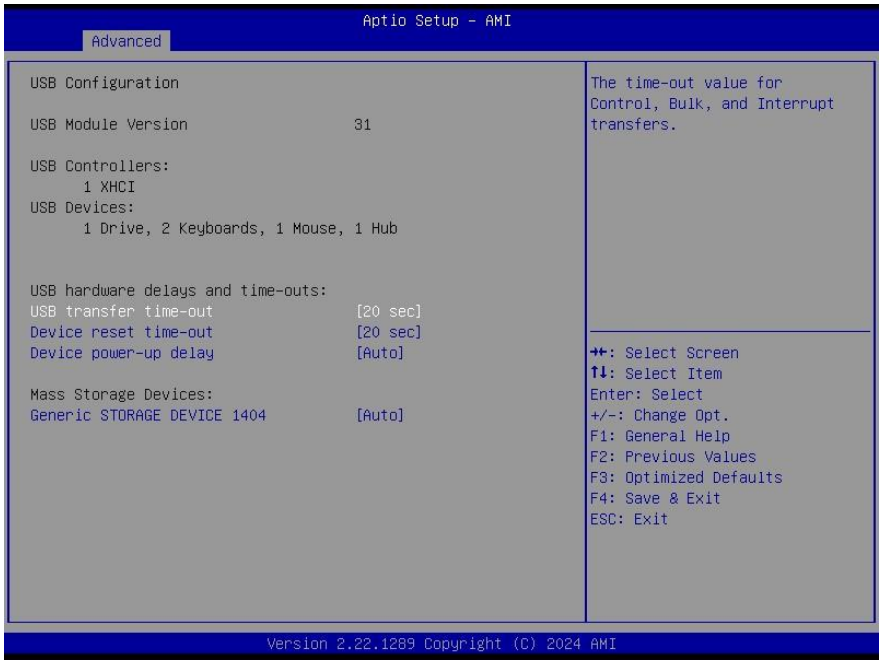


Item	Option	Description
Out-of-Band Mgmt Port	COM0**[Default]**,	Microsoft Windows Emergency Management Services (EMS) allows for remote management of a Windows Server OS through a serial port.

Terminal Type	VT100 VT100+ VT-UTF8**[Default]** ANSI,	Emulation: ANSI: Extender ASCII char set. VT100: ASCII char set. VT100+:Extends VT100 to support color, function keys, etc. VT-UTF8: Uses UTF8 encoding to map Unicode chars onto 1 or more bytes.
Bits per second EMS	9600 19200 38400 57600 115200**[Default]**	Select serial port transmission speed. The speed must be matched on the other side. Long or noisy lines may require lower speeds.
Flow Control EMS	None**[Default]** Hardware RTS/CTS	Flow control can prevent data loss from buffer overflow. When sending data, if the receiving buffers are full, a 'stop' signal can be sent to stop the data flow. Once the buffers are empty, a 'start' signal can be sent to re-start the flow. Hardware flow control uses two wires to send start/stop signals.

4.6.2.10 USB Configuration

The USB Configuration menu helps read USB information and configures USB settings.

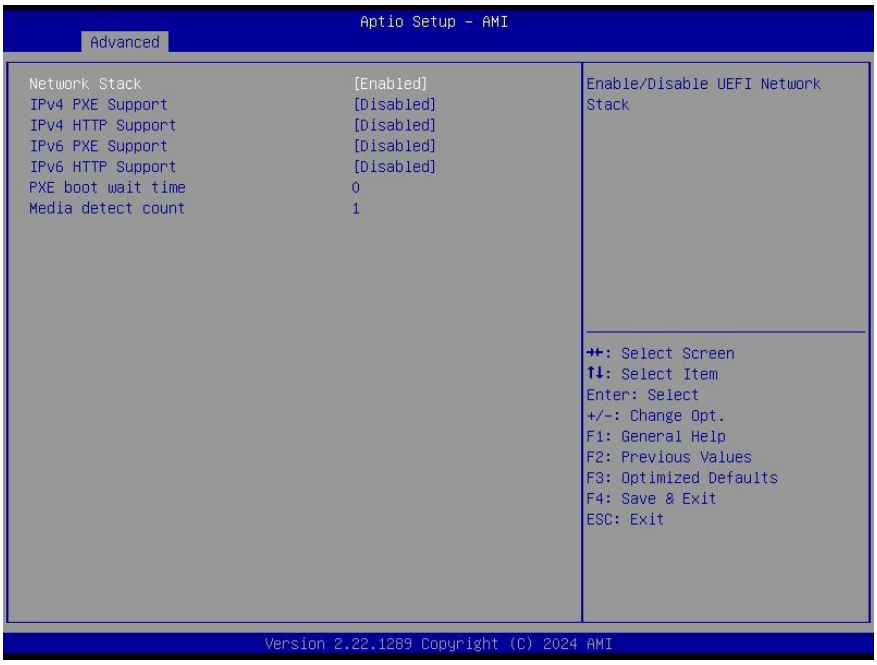


Item	Options	Description
USB transfer time-out	1 sec 5 sec 10 sec 20 sec**[Default]**	The time-out value for Control, Bulk, and Interrupt transfers.
Device reset time-out	10 sec 20 sec**[Default]** 30 sec 40 sec	USB mass storage device Start Unit command time-out.
Device power-up delay	Auto**[Default]** Manual	Maximum time the device will take before it properly reports itself to the Host Controller.

		'Auto' uses default value: for a Root port it is 100ms, for a Hub port the delay is taken form Hub descriptor.
Mass Storage Devices	Auto**[Default]** Floppy Forced FDD Hard Disk CD-ROM	Mass storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.

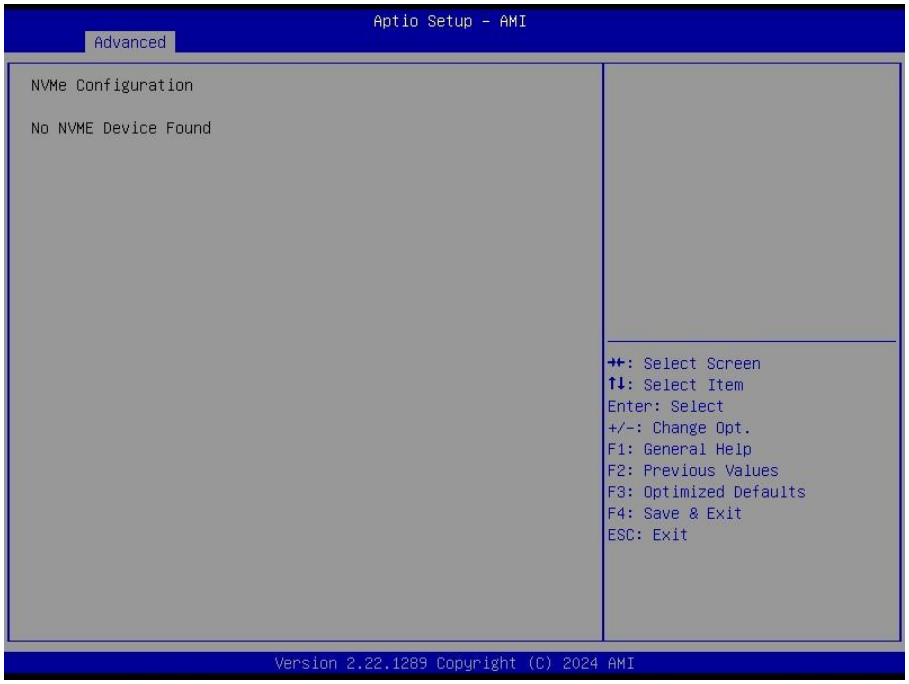
4.6.2.11 Network Stack Configuration

Item	Options	Description
Network Stack	Enabled Disabled**[Default]**	Enable/Disable UEFI Network Stack.

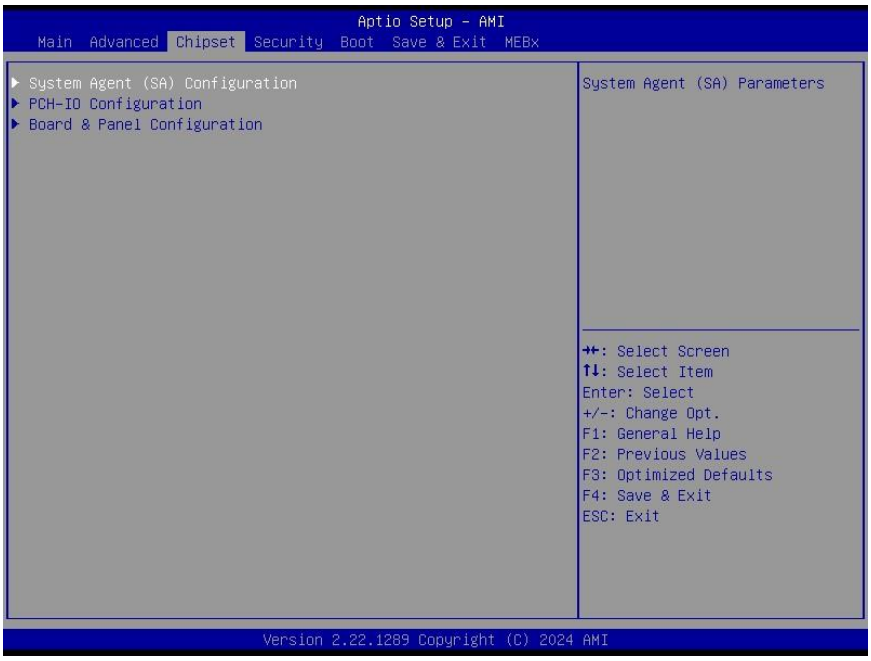


Item	Options	Description
Network Stack	Enabled**[Default]** Disabled	Enable/Disable UEFI Network Stack.
Ipv4 PXE Support	Enabled Disabled**[Default]**	Enable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created.
Ipv4 HTTP Support	Enabled Disabled**[Default]**	Enable Ipv4 HTTP Boot Support. If disabled IPV4 HTTP boot option will not be created.
Ipv6 PXE Support	Enabled Disabled**[Default]**	Enable Ipv6 PXE Boot Support. If disabled IPV6 PXE boot option will not be created.
Ipv6 HTTP Support	Enabled Disabled**[Default]**	Enable Ipv6 HTTP Boot Support. If disabled IPV4 HTTP boot option will not be created.
PXE boot wait time	0	Wait time to press ESC key to abort the PXE boot.
Media detect count	1	Number of times presence of media will be checked.

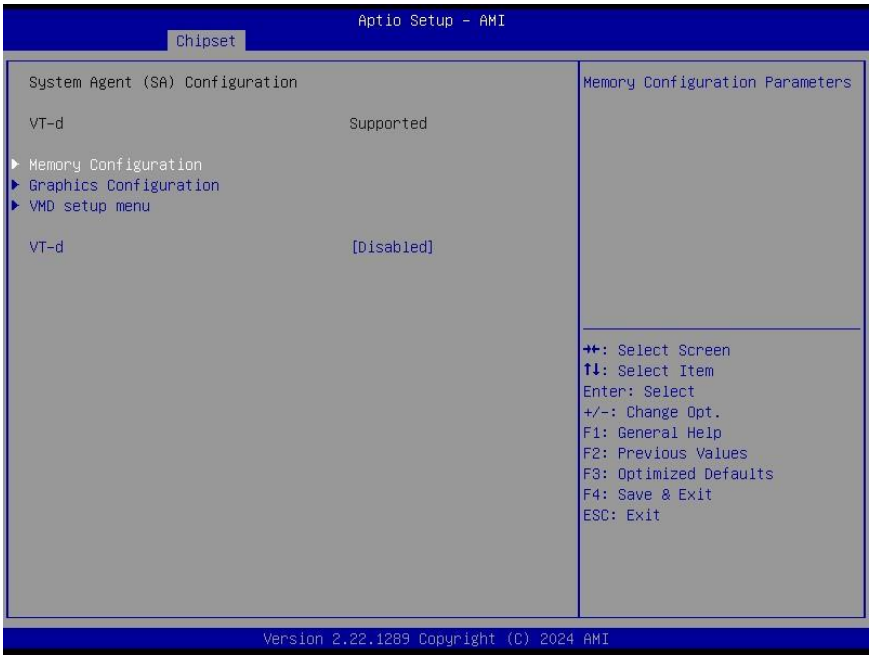
4.6.2.12 NVMe Configuration



4.6.3 Chipset

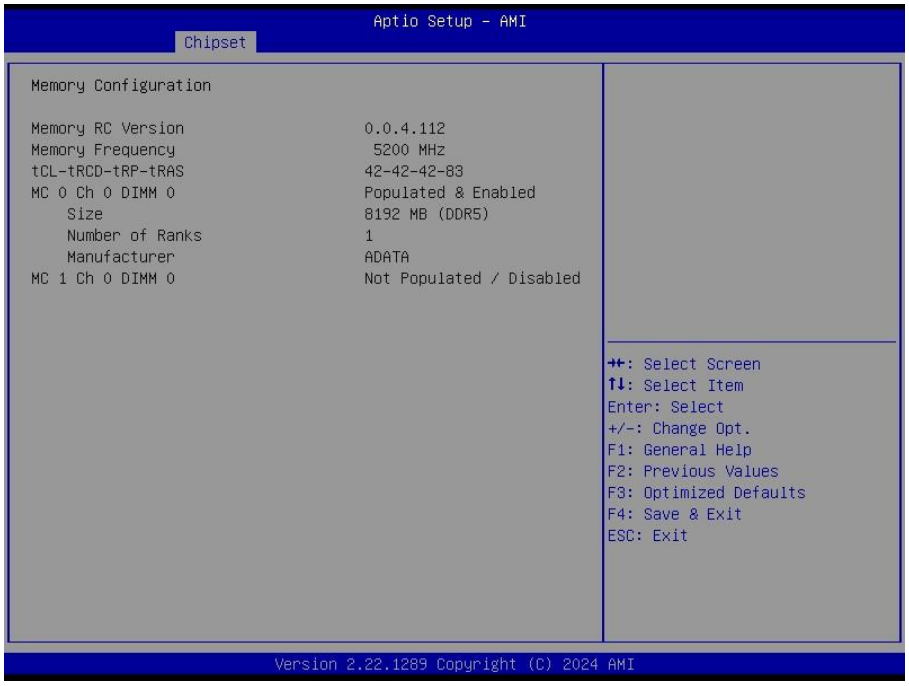


4.6.3.1 System Agent (SA) Configuration



Item	Option	Description
VT-d	Enabled Disabled**[Default]**	VT-d capability.

4.6.3.1.1 Memory Configuration



4.6.3.1.2 Graphics Configuration

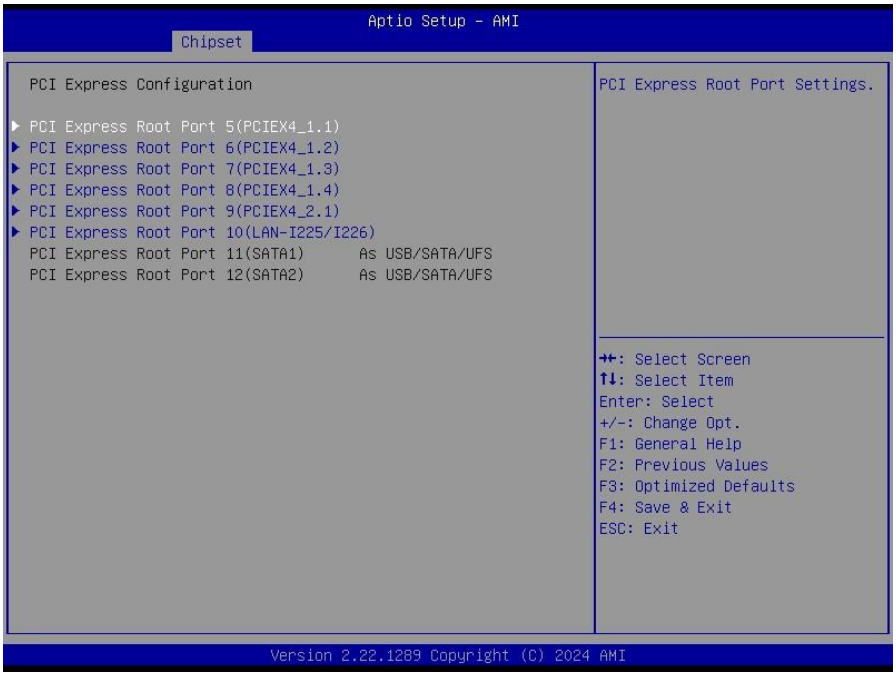
Item	Option	Description
Primary Display	Auto**[Default]** IGFX	Select IGFX Graphic device should be Primary Display.

4.6.3.1.3 VMD setup menu

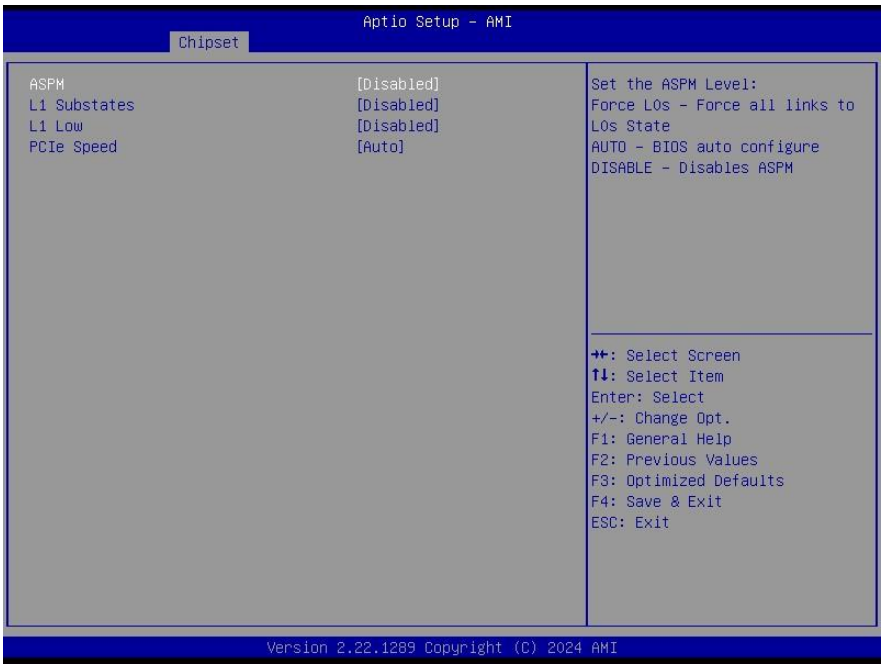
Item	Option	Description
Enable VMD controller	Enabled Disabled**[Default]**	Enable/Disable VMD controller.

4.6.3.2 PCH-IO Configuration

4.6.3.2.1 PCI Express Configuration



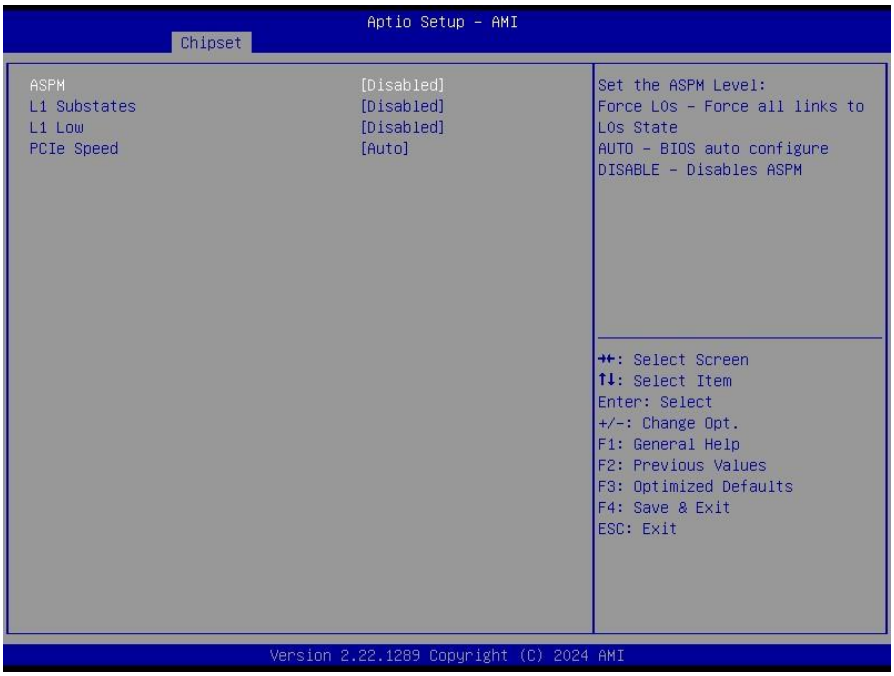
4.6.3.2.1.1 PCI Express Root Port 5(PCIEX4_1.1)



Item	Option	Description
ASPM	Disabled**[Default]**, L1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
L1 Low	Disabled**[Default]**, Enabled	PCI Express L1 Low Substates Enable/Disable.

PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed.

4.6.3.2.1.2 PCI Express Root Port 6(PCIEX4_1.2)

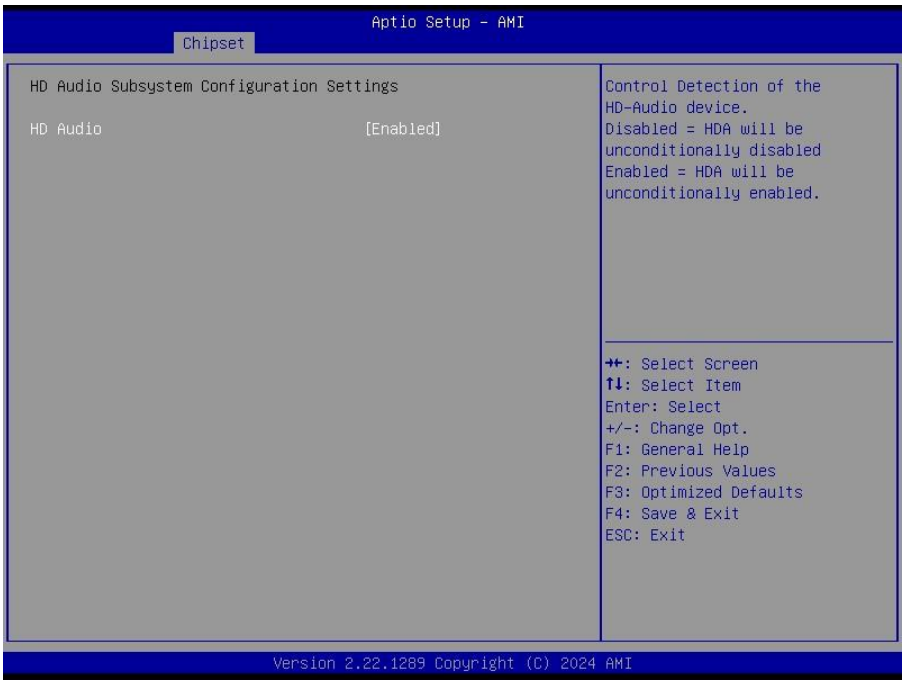


Item	Option	Description
ASPM	Disabled**[Default]**, L1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]** L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
L1 Low	Disabled**[Default]**, Enabled	PCI Express L1 Low Substates Enable/Disable.
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe Speed.

4.6.3.2.2 SATA Configuration

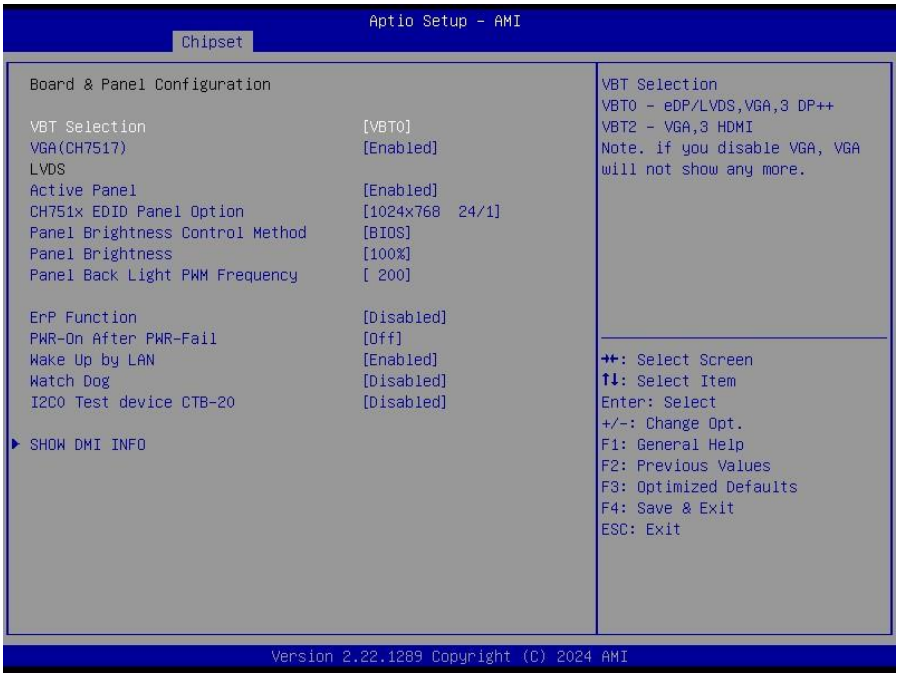
Item	Options	Description
SATA Controller(s)	Enabled**[Default]** Disabled,	Enable/Disable SATA Device.
SATA Speed Limitation	AUTO**[Default]** Gen1 1.5 Gb/s Gen2 3.0 Gb/s Gen3 6.0 Gb/s	Set the maximum speed of SATA.
Port 0	Enabled**[Default]** Disabled	Enable or Disable SATA Port.
SATA Device Type	Hard Disk Drive Solid State Drive**[Default]**	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.
Port 1	Enabled**[Default]** Disabled	Enable or Disable SATA Port.
SATA Device Type	Hard Disk Drive Solid State Drive**[Default]**	Identify the SATA port is connected to Solid State Drive or Hard Disk Drive.

4.6.3.2.3 HD Audio Configuration



Item	Option	Description
HD Audio	Disabled Enabled**[Default]**	Control Detection of the HD-Audio device. Disable = HDA will be unconditionally disabled Enabled = HDA will be unconditionally enabled.

4.6.3.3 Board & Panel Configuration

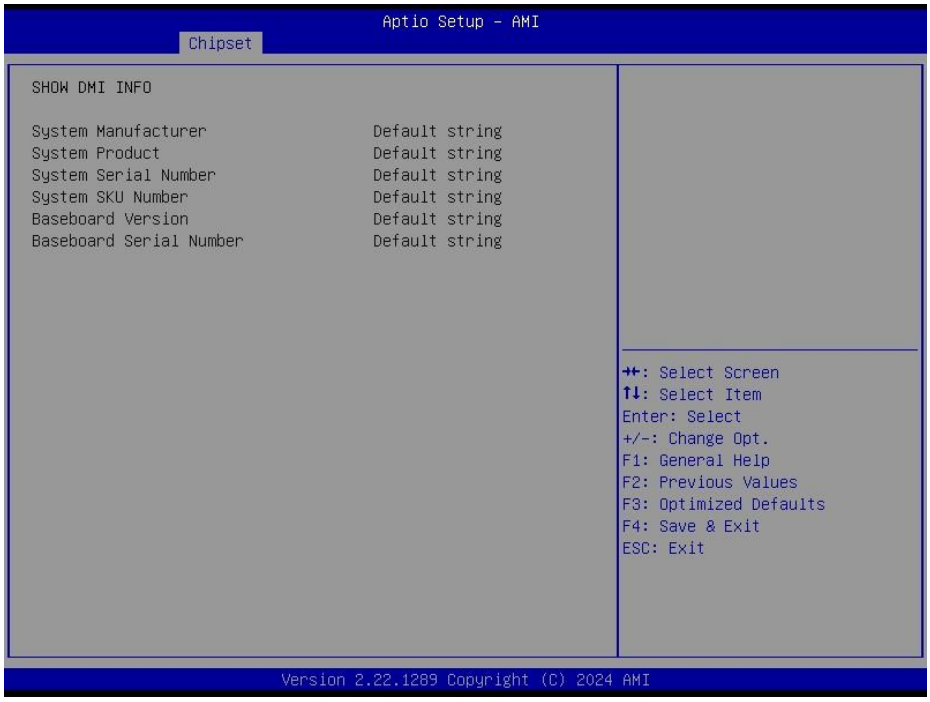


Item	Option	Description
VBT Selection	VBT0**[Default]** VBT2	VBT Selection VBT0 – eDP/LVDS, VGA, 3 DP++ VBT2 – VGA, 3 HDMI Note. If you disable VGA, VGA will not show any more.

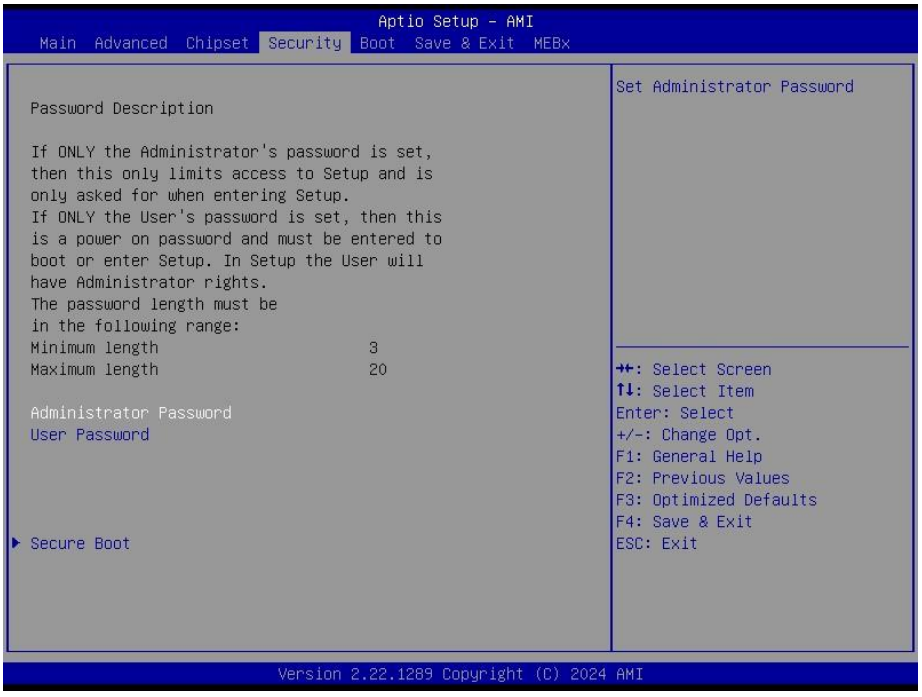
VGA(CH7517)	Disabled Enabled**[Default]**	Active VGA(DP->Ch7511-to-VGA1).
Active Panel	Disabled Enabled**[Default]**	Active Internal LVDS(eDP->Ch7511-to-LVDS).
CH751x EDID Panel Option	1024x768 24/1**[Default]** 800x600 18/1 1024x768 18/1 1366x768 18/1 1024x600 18/1 1280x800 18/1 1920x1200 24/2 1920x1080 18/2 1280x1024 24/2 1440x900 18/2 1600x1200 24/2 1366x768 24/1 1920x1080 24/2 1680x1050 24/2	Port-EDP to LVDS(Chrotel 7511) Panel EDID Option.
Panel Brightness Control Method	BIOS**[Default]** BR Button VR OS driver	Panel Brightness Control Method. 1.BIOS 2.Brightness Button 3.Variable Resistor 4.OS Driver.
Panel Brightness	00% 25% 50% 75% 100%**[Default]**	Select Panel back light PWM duty.
Panel Back Light PWM Frequency	200**[Default]** 300 400 500 700 1k 2k 3k 5k 10k 20k	Select Panel back light PWM Frequency.
ErP Function	Disabled**[Default]** Enabled	ErP Function (Deep S5).
PWR-On After PWR-Fail	Off**[Default]** On Last state	AC loss resume.
Wake Up by LAN	Disabled Enabled**[Default]**	Wake Up by LAN from S3/S4/S5.
Watch Dog	Disabled**[Default]** 30 sec 40 sec 50 sec 1 min 2 min	Select WatchDog.

	10 min 30 min	
I2C0 Test device CTB-20	Disabled**[Default]** Enabled	7-bit address of SPB1002 Disabled(No Device) Enabled(NCT5655, 0*20)

4.6.3.3.1 SHOW DMI INFO



4.6.4 Security



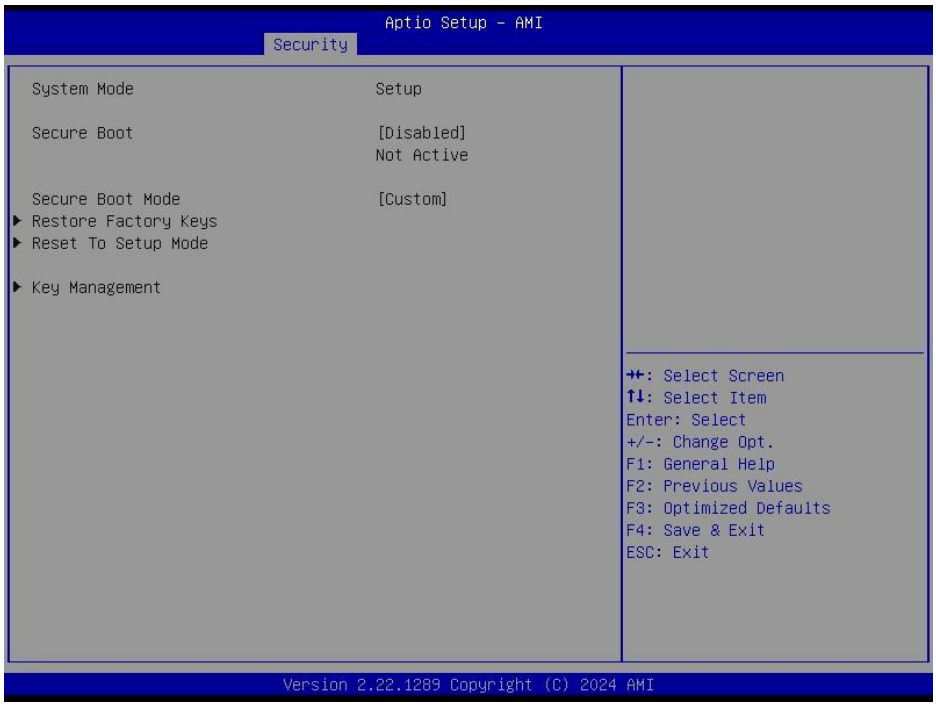
- **Administrator Password**

Set setup Administrator Password

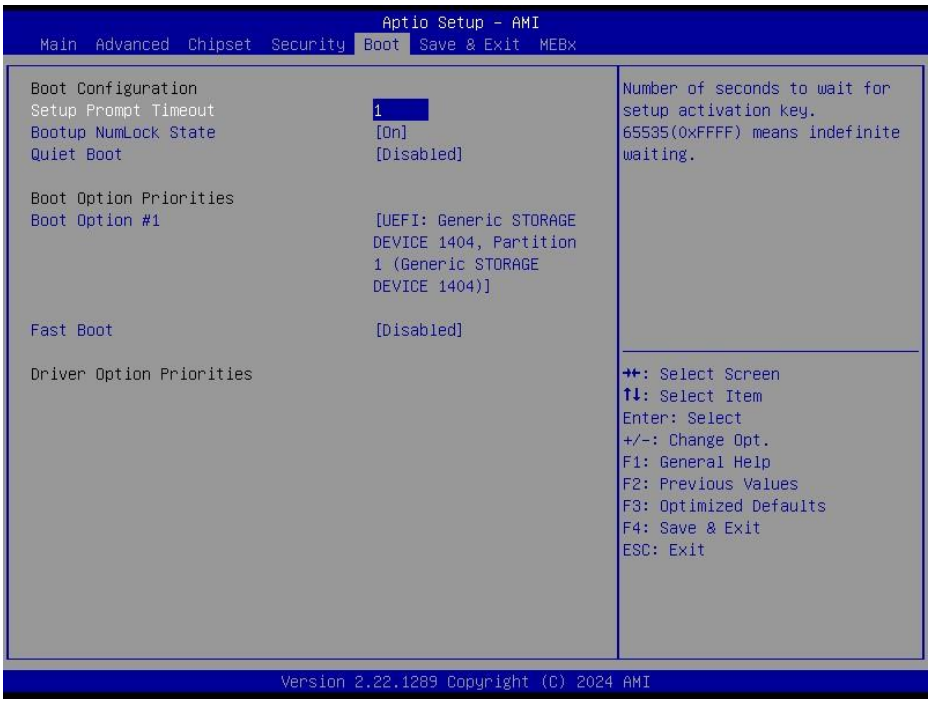
- **User Password**

Set User Password

4.6.4.1 Secure Boot

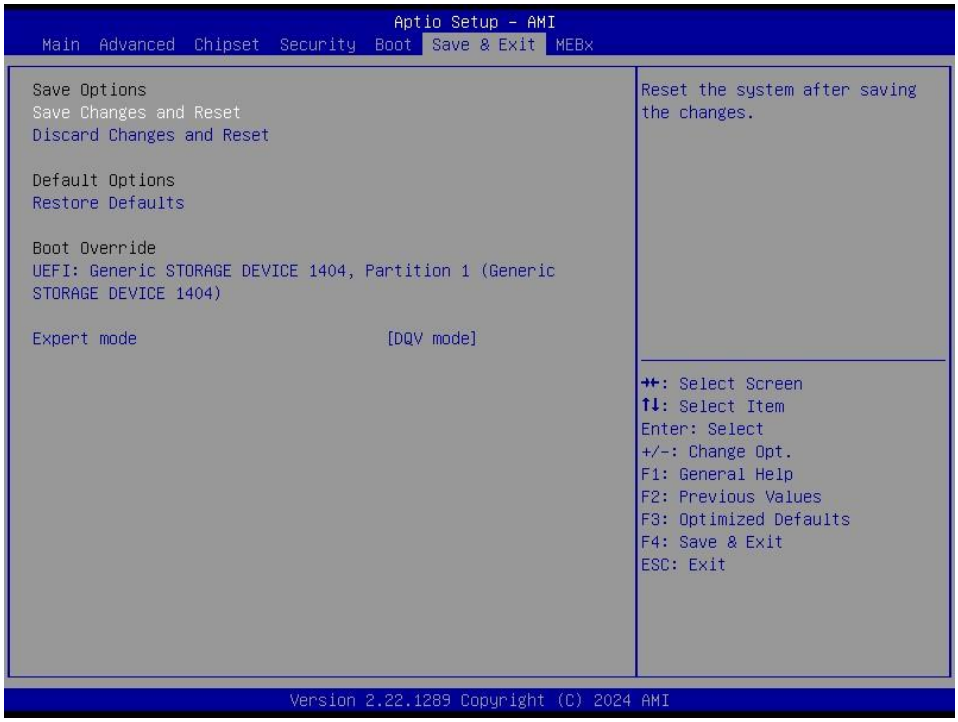


4.6.5 Boot



Item	Option	Description
Setup Prompt Timeout	1~ 65535	Number of seconds to wait for setup activation key. 65535(0xFFFF) means indefinite waiting.
Bootup NumLock State	On**[Default]** Off	Select the keyboard NumLock state
Fast Boot	Disabled**[Default]** Enabled	Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot optios.
Quiet Boot	Disabled**[Default]** Enabled	Enables or disables Quiet Boot option
Boot Option #1/2	Set the system boot order.	

4.6.6 Save and Exit



4.6.6.1 Save Changes and Reset

Reset the system after saving the changes.

4.6.6.2 Discard Changes and Reset

Any changes made to BIOS settings during this session of the BIOS setup program are discarded. The setup program then exits and reboots the controller.

4.6.6.3 Restore Defaults

This option restores all BIOS settings to the factory default. This option is useful if the controller exhibits unpredictable behavior due to an incorrect or inappropriate BIOS setting.

4.6.6.4 Launch EFI Shell from filesystem device

Attempts to Launch EFI Shell application (Shellx64.efi) from one of the available filesystem devices.

4.6.6.5 Expert mode [DQV mode]

Switch Expert mode or DQV mode.

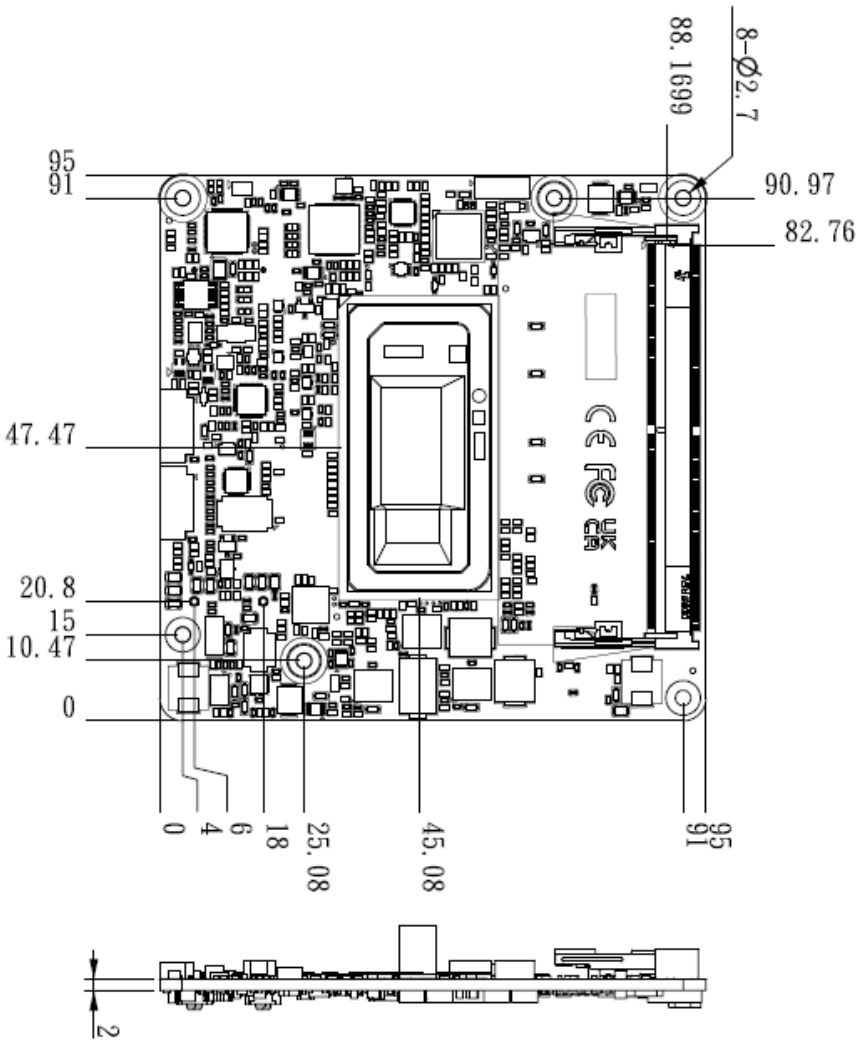
Configuration options: [DQV mode] [Expert mode]

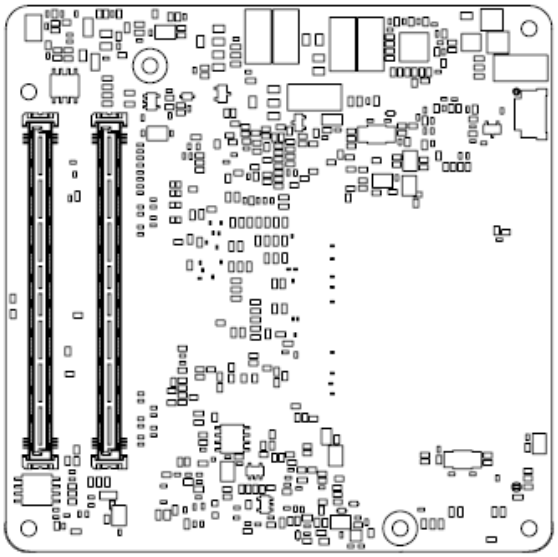
4.6.7 MEBx

- **Intel® ME Password**

MEBx Login.

5. Mechanical Drawing


88.1699
8-Ø2.7
95
91
90.97
82.76
47.47
20.8
15
10.47
0
0
4
6
18
25.08
45.08
95
91
2



Unit: mm