EMS-EHL

Intel® Atom™ / Celeron Elkhart Lake Fanless Embedded Moduler System

Quick Reference Guide

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Part No. E2017AAQ0A1R

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.

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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.
		**WARNING** • **INGESTION HAZARD**: This product contains a button cell or coin battery. • **DEATH** or serious injury can occur if ingested. • A swallowed button cell or coin battery can cause **Internal Chemical Burns** in as little as **2 hours**. • **KEEP** new and used batteries **OUT OF REACH of CHILDREN**. • **Seek immediate medical attention** if a battery is suspected to be swallowed or inserted inside any part of the body.

Disposing of your old product

WARNING:
There is danger of explosion if the battery is mishandled or incorrectly 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 other 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.

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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

- 1 x EMS-EHL Intel® Celeron®/ Atom® SoC Processor J6413/x6425E Fanless Rugged Embedded System
- 1 x Terminal block to lockable DC Jack cable
- 1 x DP to VGA Converter
- 1 x Screw driver for chassis
- 1 x Wire tie for HDMI
- 1 x 60W/120W adapter (optional)
- 1 x Power cord (optional)



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

1.3 System Specifications

System	
Board	● EBM-EHLS (EMS-EHL) **With IET Extension Board** ● EBM-EHLS +AUX-M01 (EMS-EHL-6 COM) ● EBM-EHLS +IET-BYPASS (EMS-EHL-6 LAN Bypass) ● EBM-EHLS +IET-Normal LAN (EMS-EHL-6 LAN Normal) ● EBM-EHLS +IET-PSEBF (EMS-EHL-PSEBF), support 4 port IEEE 802.af ● EBM-EHLS +IET-PSEBT (EMS-EHL-PSEBT), support 2 port IEEE 802.at ● EBM-EHLS +AUX-M07 (EMS-EHL-4 COM Isolation) ● EBM-EHLS +EBM-BYTS DB-A (EMS-EHL-HDMI) ● EBM-EHLS +EBM-CDVS DB-A (EMS- EHL -DVI) ● EBM-EHLS +EBM-BYTS DB-E (EMS-EHL-USB)
CPU	● Intel® Celeron® Processor J6413 (1.5M Cache, up to 3.00Ghz), ST, Tj=105°C ● Intel® ATOM® Processor X6425E(1.5M Cache, up to 3.00Ghz), WT, Tj=-40°C ~105°C
SBC	● 5.25” SBC
BIOS	● AMI uEFI BIOS 256 Mbit SPI Flash ROM
System Chipset	● SoC
I/O Chip	● EC ITE IT5571
System Memory	● 1 x 260-pin SODIMM socket Max. Up to 32GB DDR4 3200 MT/s
Watchdog Timer	● H/W Reset, 1sec. ~ 65535sec.
Battery	● Cable type ● Supports wide operating temperature (adjusting according to test result) ● Supports no RTC battery mode
H/W Status Monitor	● CPU & system temperature monitoring and Voltages monitoring
TPM	● TPM 2.0, NuvoTon NPCT754AADYX, PN: E14S4075401H, co-lay SLB9670VQ2.0: E14S4967000H
Expansion	
Expansion	● 1 x M.2 Key-B 2242/3042/3052 support SATA3/ PCIe III/ USB3.2 Gen.1 and SIM slot1 (internal), default support 3.3V, jumper setting to adjust 3.3V/ 3.8V ● 1 x M.2 Key-E 2230 for Wi-Fi & BT Module (USB2.0/ PCIe III) ● 1 x IET interface (1 x DDI, 4x PCIeIII x1, 3 x USB2.0, 1 x Line-Out(R/L), 1 x SMBus, LPC)
Storage	

Combination	● 1 x M.2 Key-B 2242/2280, support SATA ● 1 x M.2 Key-B 2242, support SATA (share with expansion slot)
Front Edge I/O	
Button	● 1 x Push Button for Power on/off ● 1 x Push Button for Reset ● 1 x 2-Pin Terminal Block for wire-control power on/off
LED	● 1 x Power LED (Blue) ● 1 x Storage LED (Yellow)- M.2 B-key SATA ● 1 x LTE LED (Green)- M.2 B-key PCIe ● 1 x Wifi LED (Green)- M.2 E key
Serial Port	● 2 x COM RS232/422/485 (select via BIOS, auto flow control via HW)
GPIO	● 1 x 8-bit GPIO (DB9)
Antenna	● 2 x Antennas
Rear Edge I/O	
USB Port	EMS-EHL ● 2 x USB 3.1 Gen.2 (10Gbp/s) ● 2 x USB 3.1 Gen.1 (5Gbp/s), via USB Hub EMS-EHL-HDMI, EMS-EHL-DVI, EMS-EHL-6COM, EMS-EHL-4COM isolation, EMS-EHL-PSEBF, EMS-EHL-PSEBT, EMS-EHL-6 LAN Bypass, EMS-EHL 6 LAN Normal ● 2 x USB 3.1 Gen.2 (10Gbp/s) ● 2 x USB 3.1 Gen.1 (5Gbp/s) via Hub ● 2 x USB 2.0 EMS-EHL-USB ● 2 x USB 3.1 Gen.2 (10Gbp/s) ● 6 x USB 3.1 Gen.1 (5Gbp/s) via Hub ● 3 x USB 2.0
LAN	EMS-EHL, EMS-EHL-DVI, EMS-EHL-6COM, EMS-EHL-4 COM isolation, EMS-EHL-USB ● 2 x RJ45 EMS-EHL-HDMI ● 4 x RJ45 EMS-EHL-PSEBT ● 4 x RJ45, 2 port Powered LAN support IEEE802.at EMS-EHL-PSEBF

	● 6 x RJ45, 4 port Powered LAN support IEEE802.af EMS-EHL-6 LAN Bypass, EMS-EHL 6 LAN Normal ● 6 x RJ45
Serial Port	EMS-EHL-HDMI ● 2 x COM RS232/422/485 (select via BIOS, auto flow control via HW) EMS-EHL-6COM ● 4 x COM RS232/422/485 (select via BIOS, auto flow control via HW) EMS-EHL-4COM isolation ● 4 x COM RS232/422/485 (select via BIOS, auto flow control via HW), supported 2.5kv Isolation.
Audio	● 1 x Mic-In, 1 x Line-Out
Display	EMS-EHL, EMS-EHL-6COM, EMS-EHL-4COM isolation, EMS-EHL-PSEBF, EMS-EHL-PSEBT, EMS-EHL-6 LAN Bypass, EMS-EHL 6 LAN Normal, EMS-EHL-USB ● 1x DP++ 1.4 (DP to VGA converter is the standard accessory, and optional DP to DVI, DP to HDMI converters) ● 1x HDMI 2.0b EMS-EHL-DVI ● 1 x DP++ 1.4 (DP to VGA converter is the standard accessory, and optional DP to DVI, DP to HDMI converters) ● 1 x HDMI 2.0b ● 1 x DVI-D EMS-EHL-HDMI ● 1 x DP++ 1.4 (DP to VGA converter is the standard accessory, and optional DP to DVI, DP to HDMI converters) ● 2 x HDMI 2.0b
Power connector	● 1 x 3-pin Phoenix connector
Antenna	● 2 x Antennas
Side IO	
Antenna	● 4 x Antennas
Internal IO	
SIM slot	● 1 x internal SIM slot

<table>
<tr><td>DC out</td><td>● 1 x 6 pin DC out (12V/6A)</td></tr>
<tr><td>IET connector</td><td>● 1 x 80 pin IET connector</td></tr>
<tr><td>USB pin header</td><td>● 1 x USB 2.0</td></tr>
<tr><td colspan="2">Display</td></tr>
<tr><td>Chipset</td><td>● Intel® UHD Graphics for 10th Gen Intel® Processors</td></tr>
<tr><td>Resolution</td><td>● DP++ 1.4: 4096x2304 @ 60Hz
● HDMI 2.0b : Max. resolution 4096x2304 @ 60Hz
* DP to HDMI cable cannot support 4K @ 60Hz, Max up to 1920x1080 (60Hz)
● DVI-D (Dual Link): 2560×1600 @ 60Hz</td></tr>
<tr><td>Multiple Display</td><td>● 2 displays
● 3 displays (EMS-EHL-DVI, EMS-EHL-HDMI)</td></tr>
<tr><td colspan="2">Ethernet</td></tr>
<tr><td>Chipset</td><td>Standard Sku:
● 2 x Intel I226-IT</td></tr>
<tr><td>Ethernet Interface</td><td>Standard Sku:
● 2x 10/100/1000/2.5G Base-Tx GbE compatible</td></tr>
<tr><td>LED Signal</td><td>2.5G LAN Port (i226-IT)
<table>
<tr><th colspan="2">ACT/LINK</th><th colspan="2">SPEED</th></tr>
<tr><th>LED</th><th>Definition</th><th>LED</th><th>Definition</th></tr>
<tr><td>Light Off</td><td>No Link</td><td>Solid Orange</td><td>2.5G</td></tr>
<tr><td>Solid Yellow</td><td>Connection</td><td>Solid Green</td><td>1G/100M</td></tr>
<tr><td>Flashing</td><td>Activity</td><td>Light Off</td><td>10M</td></tr>
</table></td></tr>
<tr><td colspan="2">Audio</td></tr>
<tr><td>Chipset</td><td>● Realtek ALC888S (co-lay with ALC897) HD codec</td></tr>
<tr><td>Audio Interface</td><td>● Mic-In, Line-Out</td></tr>
<tr><td colspan="2">Mechanical & Environmental</td></tr>
<tr><td>Power Connector</td><td>● 3-Pin Terminal Block (V+. V-, GND)</td></tr>
<tr><td>Power Requirement</td><td>● DC in typical 12/24V (+9V ~ +32V), wide voltage single power input
● TVS component for surge protection
● Reverse current/voltage protection(Max. Currency: 13A)</td></tr>
<tr><td>Power Type</td><td>● AT/ATX (ATX is default setting)</td></tr>
<tr><td>ACPI</td><td>● Single power ATX Support S0,S3, S4, S5
● ACPI 5.0 Compliant</td></tr>
<tr><td>Dimension (W x L x H)</td><td>● 240mm x 150mm x 43 mm (Standard)
● 240mm x 150mm x 64 mm (w/ IET module)</td></tr>
<tr><td>Weight</td><td>● 1910 g</td></tr>
<tr><td>Color</td><td>● Avalue Box PC family design</td></tr>
</table>

Mounting Kit	● Wall mount kit (standard) ● DIN RAIL (optional)
Reliability	
Vibration Test (operation)	1. PSD: 0.0505G²/Hz , 5 Grms 2. Operation mode 3. Test Frequency : 5-500Hz 4. Test Axis : X,Y and Z axis 5. 30 minutes per each axis 6. IEC 60068-2-64 Test:Fh 7. Storage : SSD
Vibration Test (non-operation)	1. Test Acceleration : 2G 2. Test frequency : 5~500 Hz 3. Sweep：1 Oct/ per one minute. (logarithmic) 4. Test Axis : X,Y and Z axisTest time :30 min. each axis 5. System condition : Non-Operating mode 6. Reference IEC 60068-2-6 Testing procedures
Package vibration test	1. PSD: 0.026G²/Hz , 2.16 Grms 2. Non-operation mode 3. Test Frequency : 5-500Hz 4. Test Axis : X,Y and Z axis 5. 30 min. per each axis 6. IEC 60068-2-64 Test:Fh
Shock	1. Wave form：Half Sine wave 2. Acceleration Rate：55g for operation mode 3. Duration Time：11ms 4. No. of Shock：+/- XYZ axis 18 times 5. Operation mode 6. Reference IEC 60068-2-27 Testing procedures Test Eb : Shock Test
Package Drop Test	1. One corner , three edges, six faces 2. ISTA 2A, IEC-60068-2-32 Test:Ed
IP	● IP 50
Operating Temperature	● -40°C ~ 70°C (w/SSD) ambient w/ 0.5 air flow, WT sku, X6425E ● -40°C ~ 60°C (w/SSD) ambient w/ 0.2 air flow, WT sku, X6425E ● 0°C ~ 65°C (w/SSD) ambient w/ 0.5 air flow, ST sku, J6413 ● 0°C ~ 55°C (w/SSD) ambient w/ 0.2 air flow, ST sku, J6413
Operating Humidity	● 40°C @ 95% Relative Humidity, Non-condensing
Storage Temperature	● -30°C ~ 70°C (-22°F ~ 158°F)
Certification	● CE, FCC Class B, LVD 62368-1
OS Supported	● Win 10 64bit / Win 11 64 bit/ Linux

Compliant with following Flexible IET Expansion Modules (Optional)	
IET-6 LAN BYPASSB	● 4 x LAN support 2-Pair LAN bypass + 2 x USB 2.0
IET-6 LAN Normal	● 4 x normal LAN + 2 x USB 2.0
IET-PSEBF (4 port at)	● 4 x LAN support PoE 802.3af + 2 x USB 2.0
IET-PSEBT (2 port at)	● 2 x LAN support PoE 802.3at + 2 x USB 2.0
EBM-CDVS DB-A	● 1 x DVI-D + 2 x USB 2.0
EBM-BYTS DB-E	● 4 x USB 3.0 + 3 x USB 2.0
EBM-BYTS DB-A	● 1 x HDMI, 2 x RJ45, 2 x RS-232/422/485 (BIOS), 2 x USB 2.0
AUX-M01	● 4 x RS-232/422/485(BIOS), 2 x USB 2.0
AUX-M07	● 4 x RS-232/422/485(BIOS) w/ 2.5KV isolation, 2 x USB 2.0

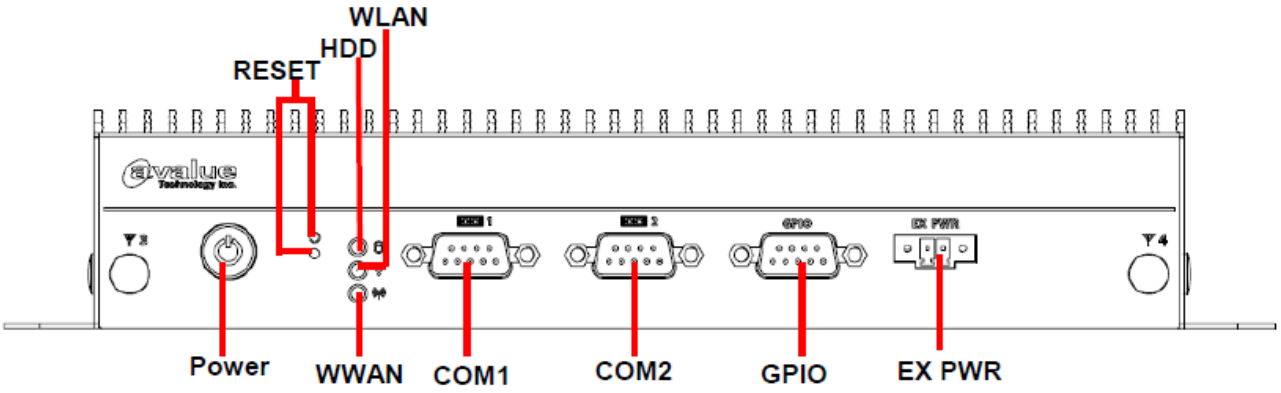


Note: Specifications are subject to change without notice.

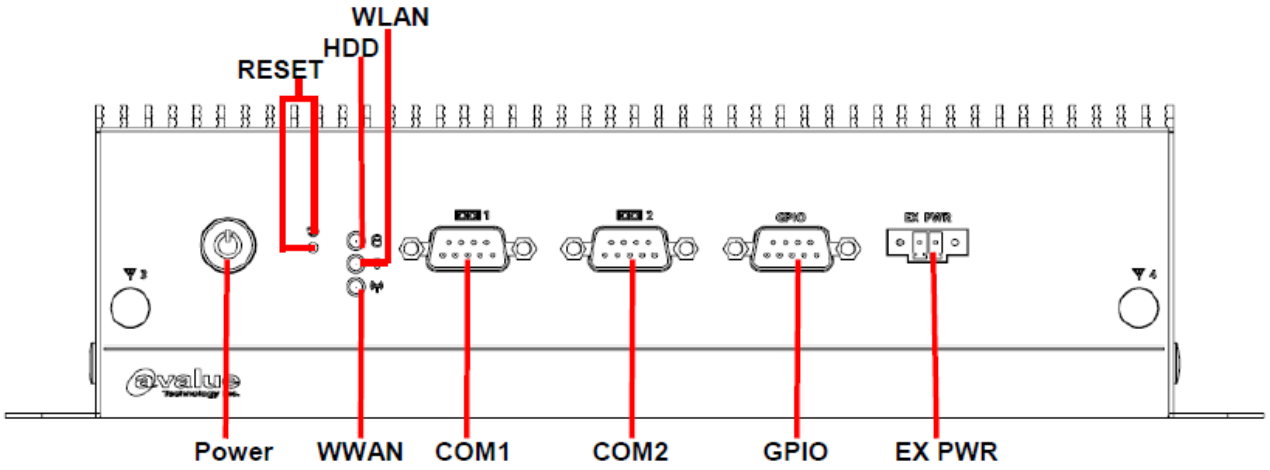
1.4 System Overview

1.4.1 Front View

EMS-EHL

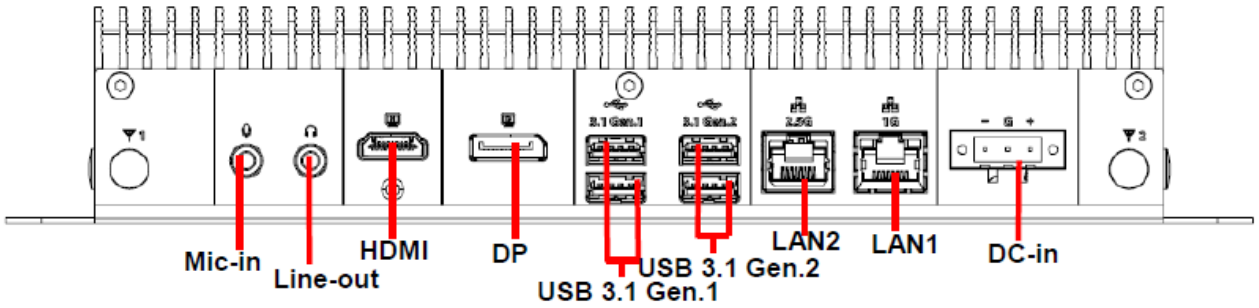


EMS-EHL-6 COM/EMS-EHL-6 LAN Bypass/EMS-EHL-6 LAN Normal /EMS-EHL-PSEBF/EMS-EHL-PSEBT/EMS-EHL-4 COM Isolation /EMS-EHL-HDMI/EMS-EHL-DVI/EMS-EHL-USB

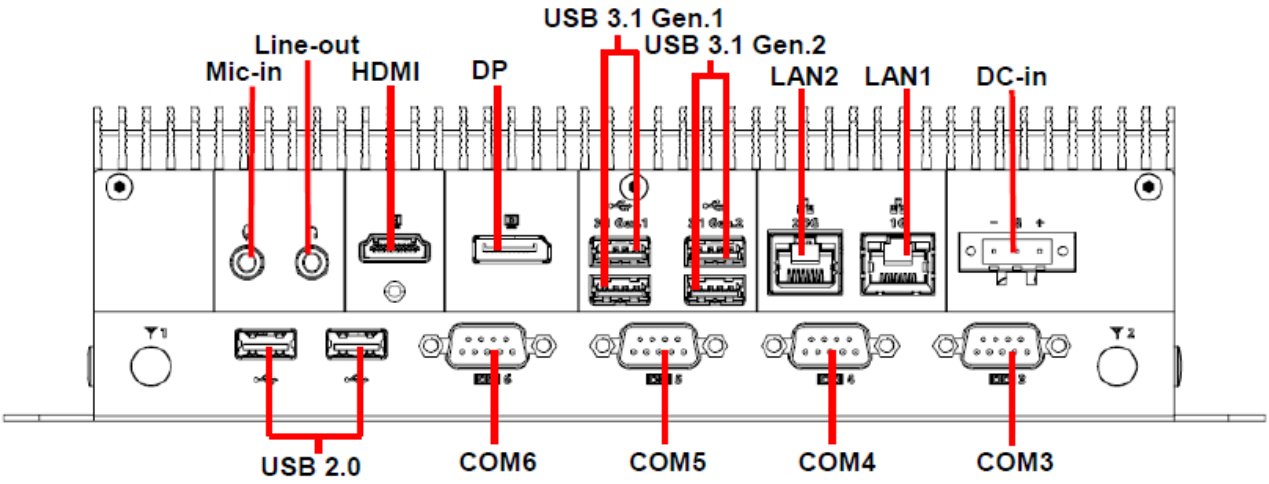


1.4.2 Rear View

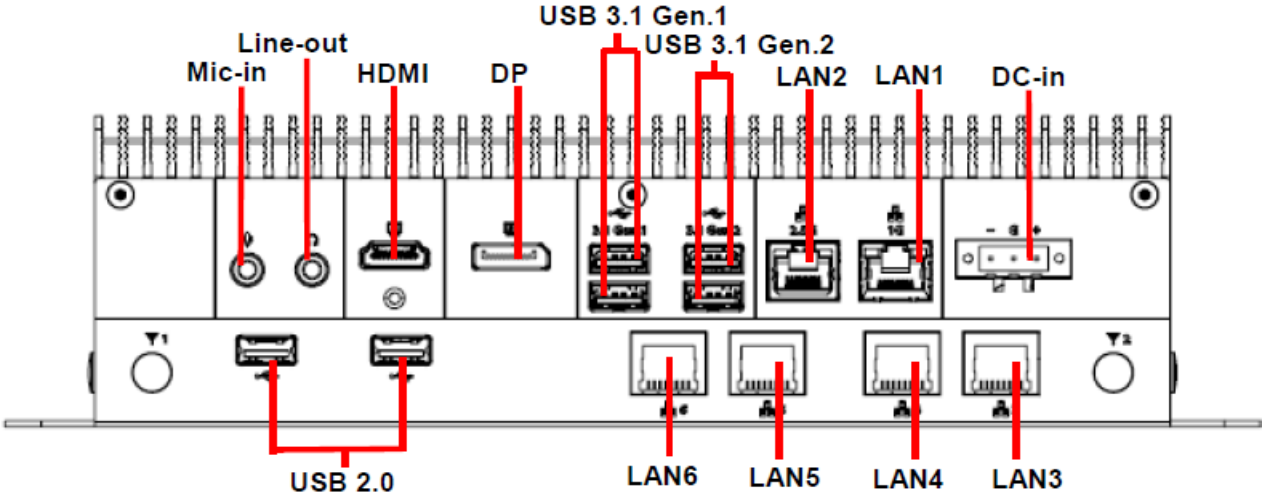
EMS-EHL



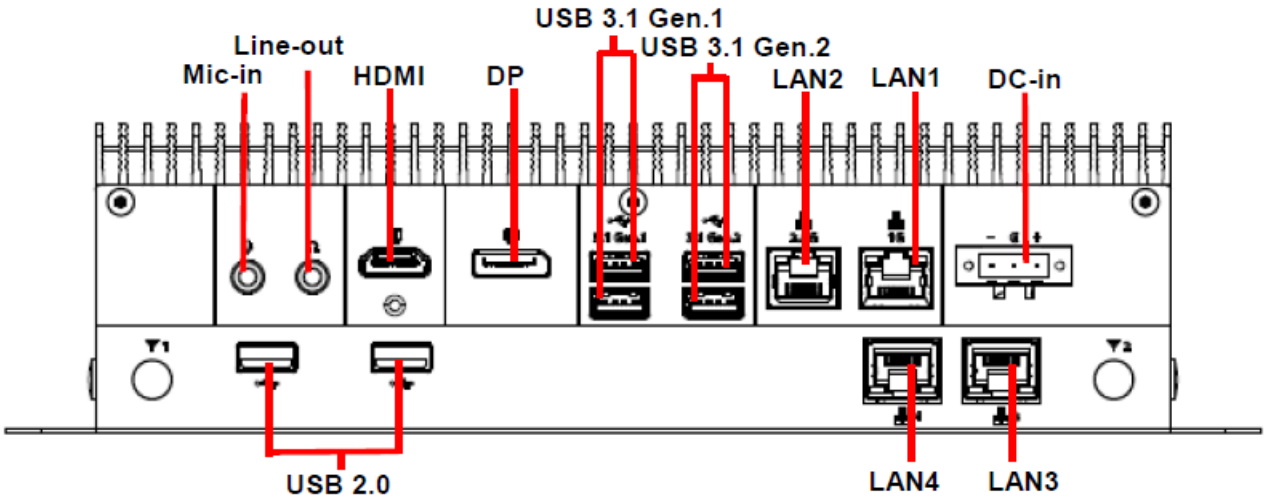
EMS-EHL-6 COM/EMS-EHL-4 COM Isolation



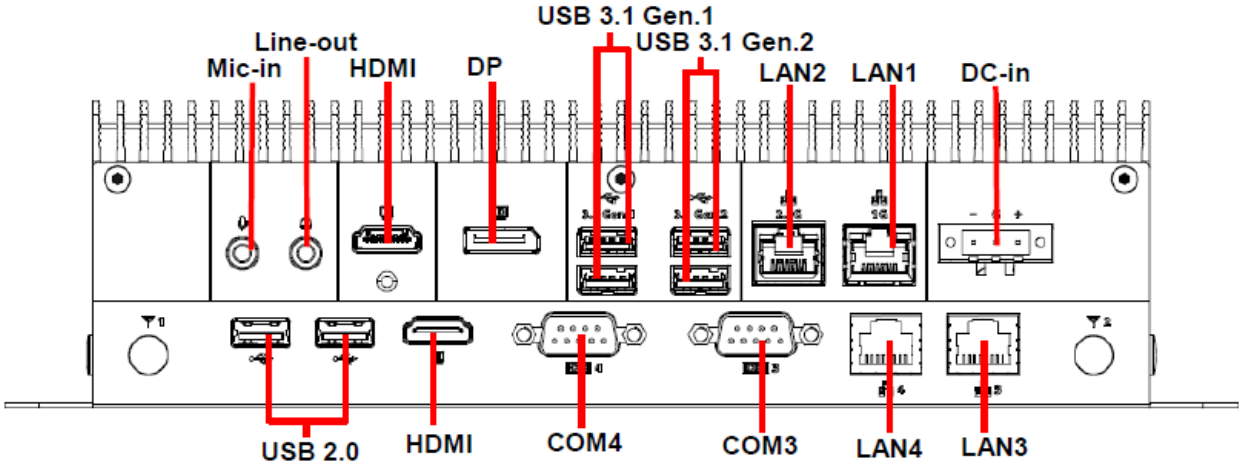
EMS-EHL-6 LAN Bypass/EMS-EHL-6 LAN Normal/EMS-EHL-PSEBF



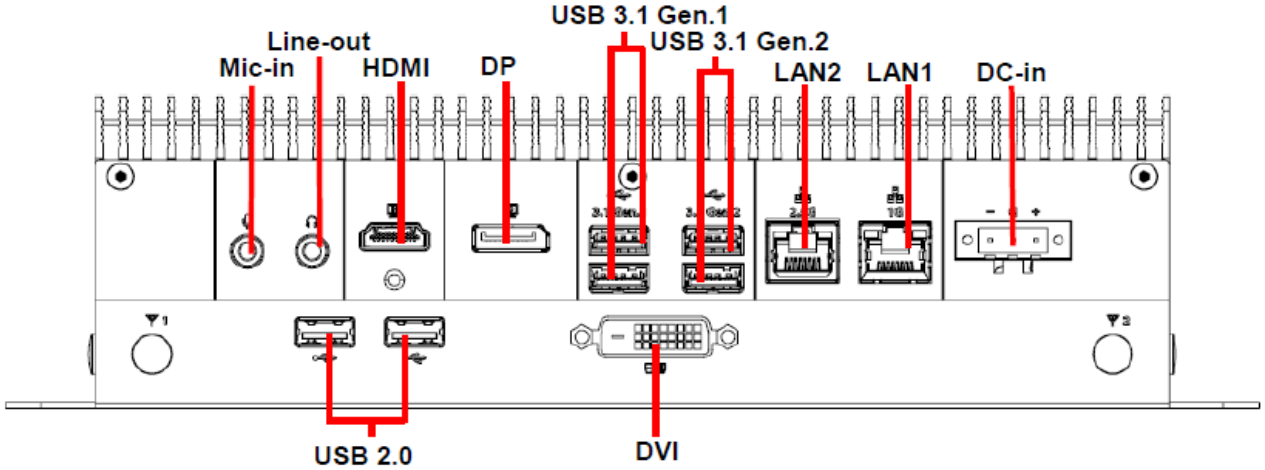
EMS-EHL-PSEBT



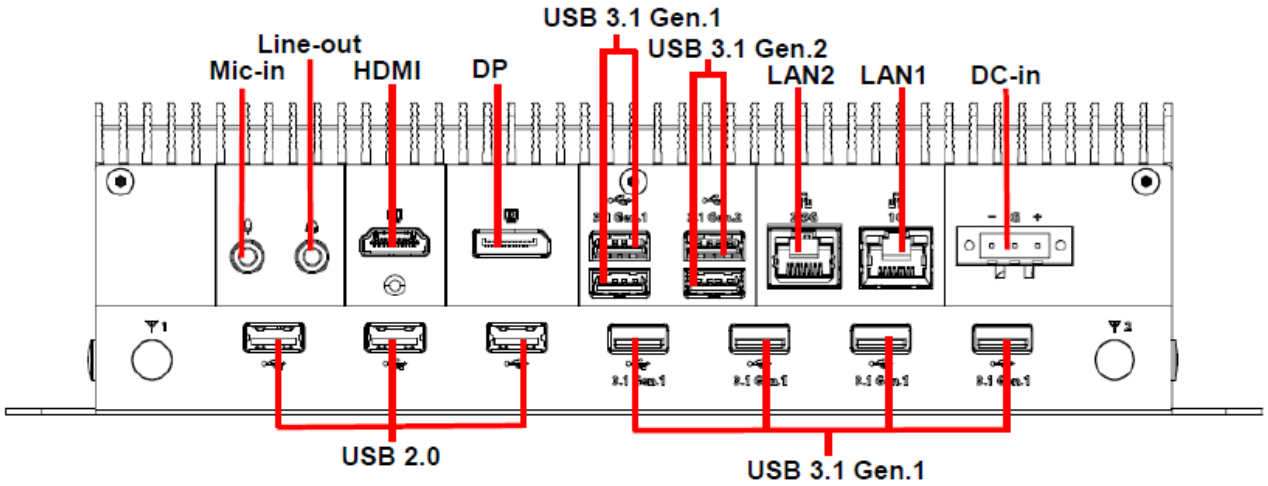
EMS-EHL-HDMI



EMS-EHL-DVI



EMS-EHL-USB



EMS-EHL

Connectors

Label	Function	Note
Power	System power indicator	
Reset	Reset button	
HDD	HDD indicator	
WWAN	WWAN Indicator	
WLAN	WLAN Indicator	
COM1/2	Serial port connector 1/2	
GPIO	General purpose I/O connector	
EX PWR	Power on button	
Mic-in	Mic-in audio jack	
Line-out	Line-out jack	
HDMI	HDMI connector	
DP	DP connector	
USB 3.1 Gen.1	2 x USB 3.1 Gen.1 connector	
USB 3.1 Gen.2	2 x USB 3.1 Gen.2 connector	
LAN1/2	RJ-45 Ethernet 1/2	
DC-in	DC power-in connector	

EMS-EHL-6 COM/EMS-EHL-4 COM Isolation

Connectors

Label	Function	Note
Power	System power indicator	
Reset	Reset button	
HDD	HDD indicator	
WWAN	WWAN Indicator	
WLAN	WLAN Indicator	
COM1/2/3/4/5/6	Serial port connector 1/2/3/4/5/6	
GPIO	General purpose I/O connector	
EX PWR	Power on button	
Mic-in	Mic-in audio jack	
Line-out	Line-out jack	
HDMI	HDMI connector	
DP	DP connector	
USB 3.1 Gen.1	2 x USB 3.1 Gen.1 connector	

USB 3.1 Gen.2	2 x USB 3.1 Gen.2 connector
USB 2.0	2 x USB 2.0 connector
LAN1/2	RJ-45 Ethernet 1/2
DC-in	DC power-in connector

EMS-EHL-6 LAN Bypass/EMS-EHL-6 LAN Normal/EMS-EHL-PSEBF

Connectors

Label	Function	Note
Power	System power indicator	
Reset	Reset button	
HDD	HDD indicator	
WWAN	WWAN Indicator	
WLAN	WLAN Indicator	
COM1/2	Serial port connector 1/2	
GPIO	General purpose I/O connector	
EX PWR	Power on button	
Mic-in	Mic-in audio jack	
Line-out	Line-out jack	
HDMI	HDMI connector	
DP	DP connector	
USB 3.1 Gen.1	2 x USB 3.1 Gen.1 connector	
USB 3.1 Gen.2	2 x USB 3.1 Gen.2 connector	
USB 2.0	2 x USB 2.0 connector	
LAN1/2/3/4/5/6	RJ-45 Ethernet 1/2/3/4/5/6	
DC-in	DC power-in connector	

EMS-EHL-PSEBT

Connectors

Label	Function	Note
Power	System power indicator	
Reset	Reset button	
HDD	HDD indicator	
WWAN	WWAN Indicator	
WLAN	WLAN Indicator	
COM1/2	Serial port connector 1/2	
GPIO	General purpose I/O connector	

EMS-EHL

EX PWR	Power on button
Mic-in	Mic-in audio jack
Line-out	Line-out jack
HDMI	HDMI connector
DP	DP connector
USB 3.1 Gen.1	2 x USB 3.1 Gen.1 connector
USB 3.1 Gen.2	2 x USB 3.1 Gen.2 connector
USB 2.0	2 x USB 2.0 connector
LAN1/2/3/4	RJ-45 Ethernet 1/2/3/4
DC-in	DC power-in connector

EMS-EHL-HDMI

Connectors

Label	Function	Note
Power	System power indicator	
Reset	Reset button	
HDD	HDD indicator	
WWAN	WWAN Indicator	
WLAN	WLAN Indicator	
COM1/2/3/4	Serial port connector 1/2/3/4	
GPIO	General purpose I/O connector	
EX PWR	Power on button	
Mic-in	Mic-in audio jack	
Line-out	Line-out jack	
HDMI	2 x HDMI connector	
DP	DP connector	
USB 3.1 Gen.1	2 x USB 3.1 Gen.1 connector	
USB 3.1 Gen.2	2 x USB 3.1 Gen.2 connector	
USB 2.0	2 x USB 2.0 connector	
LAN1/2/3/4	RJ-45 Ethernet 1/2/3/4	
DC-in	DC power-in connector	

EMS-EHL-DVI

Connectors

Label	Function	Note
Power	System power indicator	

Reset	Reset button
HDD	HDD indicator
WWAN	WWAN Indicator
WLAN	WLAN Indicator
COM1/2	Serial port connector 1/2
GPIO	General purpose I/O connector
EX PWR	Power on button
Mic-in	Mic-in audio jack
Line-out	Line-out jack
HDMI	HDMI connector
DP	DP connector
DVI	DVI connector
USB 3.1 Gen.1	2 x USB 3.1 Gen.1 connector
USB 3.1 Gen.2	2 x USB 3.1 Gen.2 connector
USB 2.0	2 x USB 2.0 connector
LAN1/2	RJ-45 Ethernet 1/2
DC-in	DC power-in connector

EMS-EHL-USB

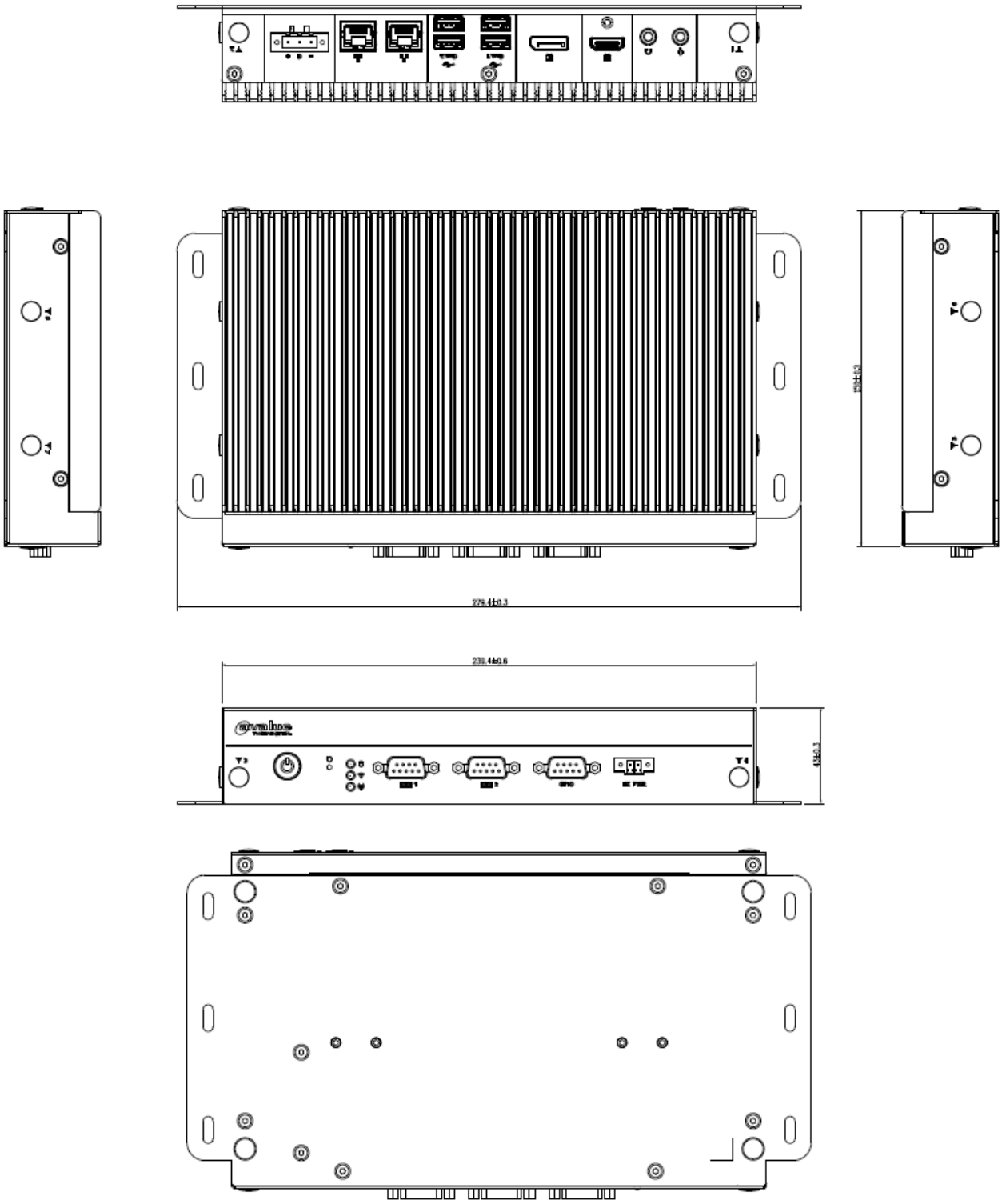
Connectors

Label	Function	Note
Power	System power indicator	
Reset	Reset button	
HDD	HDD indicator	
WWAN	WWAN Indicator	
WLAN	WLAN Indicator	
COM1/2	Serial port connector 1/2	
GPIO	General purpose I/O connector	
EX PWR	Power on button	
Mic-in	Mic-in audio jack	
Line-out	Line-out jack	
HDMI	HDMI connector	
DP	DP connector	
USB 3.1 Gen.1	6 x USB 3.1 Gen.1 connector	
USB 3.1 Gen.2	2 x USB 3.1 Gen.2 connector	
USB 2.0	3 x USB 2.0 connector	

LAN1/2	RJ-45 Ethernet 1/2
DC-in	DC power-in connector

1.5 System Dimensions

1.5.1 Front & Top View



(Unit: mm)

2. Hardware Configuration

Jumper and Connector Setting, Driver and BIOS Installing

For advanced information, please refer to:

1- EBM-EHLS included in this manual.

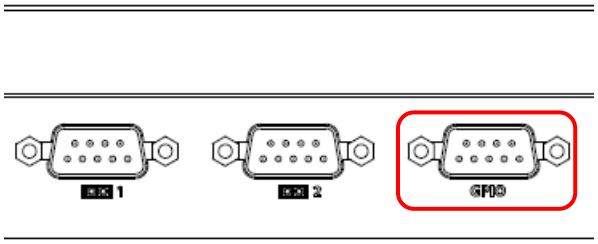


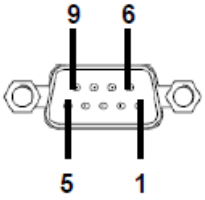
Note: If you need more information, please visit our website:

www.avalue.com

2.1 EMS-EHL connector mapping

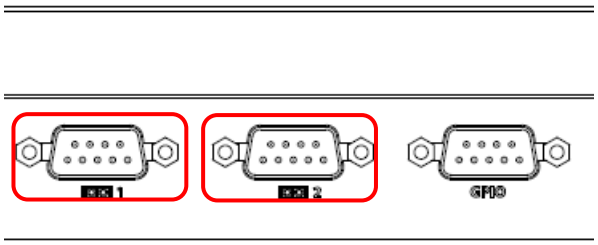
2.1.1 General purpose I/O connector (GPIO)

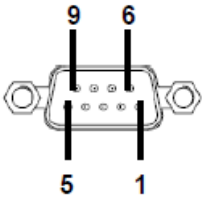




Signal	PIN	PIN	Signal
DIO_GP20	1	6	DIO_GP10
DIO_GP21	2	7	DIO_GP11
DIO_GP22	3	8	DIO_GP12
DIO_GP23	4	9	DIO_GP13
GND	5		

2.1.2 Serial Port 1/2 connector (COM1/2)





In RS-232 Mode

Signal	PIN	PIN	Signal
NDCD#	1	6	NDSR#
NRXD	2	7	NRTS#
NTXD	3	8	NCTS#
NDTR#	4	9	NRI#
GND	5		

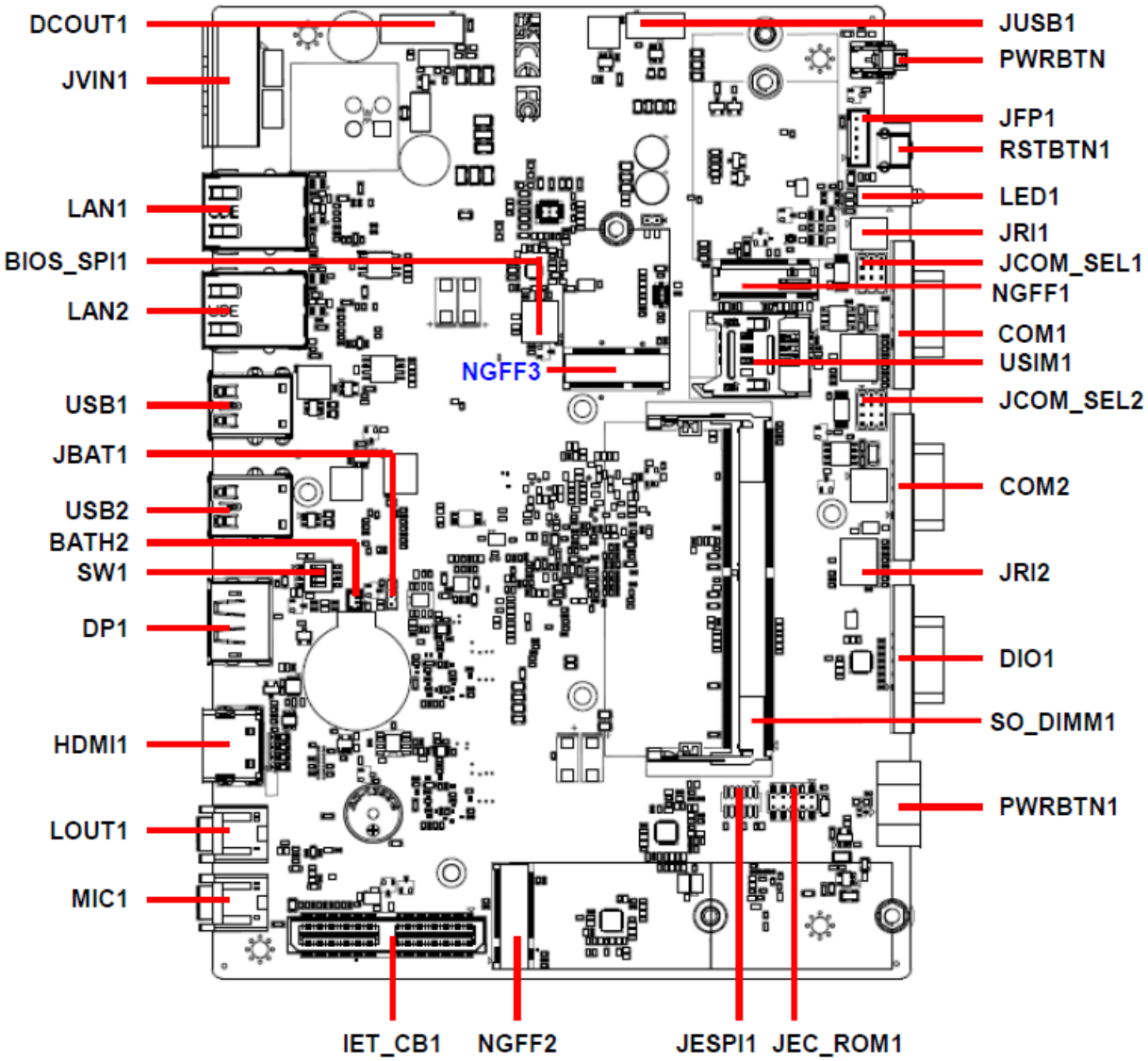
In RS-422 Mode

Signal	PIN	PIN	Signal
TxD1-	1	6	NC
TxD1+	2	7	NC
RxD1+	3	8	NC
RxD1-	4	9	NC
GND	5		

In RS-485 Mode

Signal	PIN	PIN	Signal
DATA1-	1	6	NC
DATA1+	2	7	NC
NC	3	8	NC
NC	4	9	NC
GND	5		

2.2 EBM-EHLS Overviews



2.3 EBM-EHLS Jumper & Connector list

Jumpers

Label	Function	Note
JBAT1	Clear CMOS	3 x 1 header, pitch 2.00 mm
JRI1/2	Serial port 1/2 pin 9 signal select	3 x 2 header, pitch 2.00 mm
JCOM_SEL1/2	Serial port 1/2 – RS232/422/485 mode select	4 x 3 header, pitch 2.00 mm
SW1	Multi-function select	DIP switch 4pin

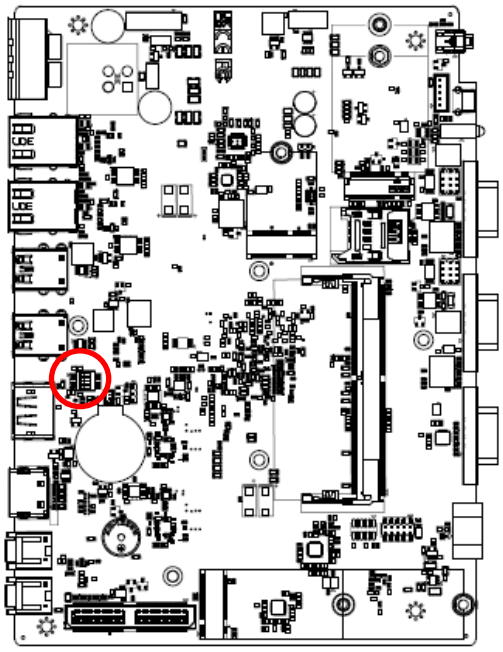
Connectors

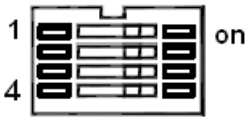
Label	Function	Note
USB1	2 x USB3.1 Gen.2 connector	
USB2	2 x USB3.1 Gen.1 connector	
JUSB1	On-board header for USB2.0	5 x 2 wafer, pitch 2.00 mm
DIO1	General purpose I/O connector	
LAN1/2	RJ-45 Ethernet 1/2	
LOUT1	Audio line-out connector	
MIC1	Audio mic-in connector	
COM1/2	Serial port connector 1/2	
USIM1	SIM card slot	
JFP1	Front Panel connector	5 x 1 wafer, pitch 2.00 mm
PWRBTN1	Power on/off connector	1 x 2 terminal block, pitch 3.50 mm
PWRBTN	Power on/off button	
RSTBTN1	Reset button	
LED1	WWAN、WIFI & Storage	
HDMI1	HDMI connector	
SO_DIMM1	DDR4 SODIMM connector	
IET_CB1	IET connector	40 x 2 wafer, pitch 0.80mm
BIOS_SPI1	BIOS SPI connector	4 x 2 header, pitch 2.00 mm
JESPI1	eSPI connector	6 x 2 header, pitch 1.27 mm
DP1	DP connector	
NGFF1	M.2 Key-B 2242/3042/3052 connector	
NGFF2	M.2 KEY-B 2242/2280 connector	

NGFF3	M.2 KEY-E 2230 connector	
DCOUT1	DC Output connector	6 x 1 wafer, pitch 2.50 mm
JVIN1	DC Input connector	1 x 3 terminal block, pitch 5.08 mm
JEC_ROM1	EC Debug connector	5 x 2 header, pitch 2.00 mm
BATH2	Battery connector	2 x 1 wafer, pitch 1.25 mm

2.4 EBM-EHLS Jumpers & Connectors settings

2.4.1 Multi-function select (SW1)





Power mode

	AT	ATX*
1	ON	OFF

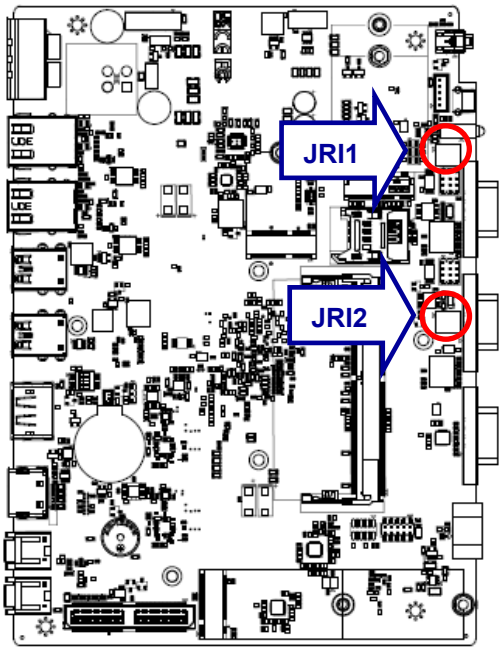
DDI2 mode(DP+)

	DisplayPort*	HDMI	Cable select
2	OFF	OFF	ON
3	ON	OFF	OFF

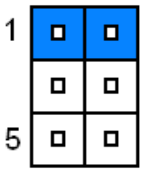
N.C.

	WWAN	SSD
4	ON	OFF

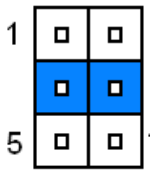
2.4.2 Serial port 1/2 pin 9 signal select (JRI1/2)



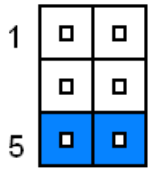
Ring*



+5V

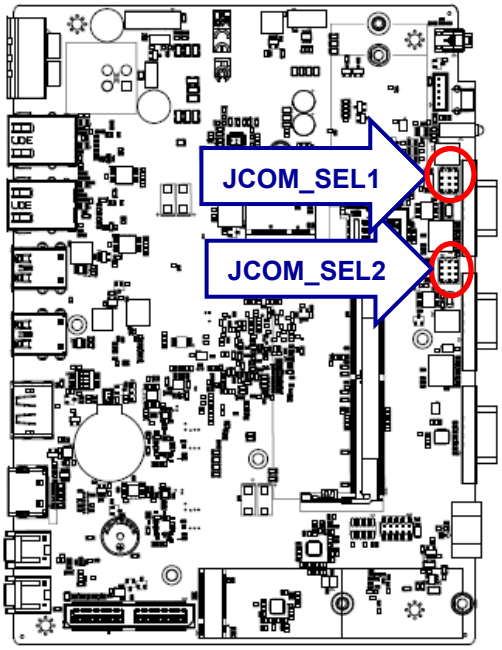


+12V

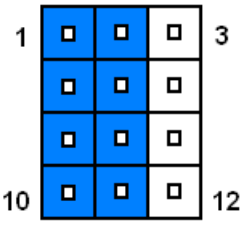


*** Default**

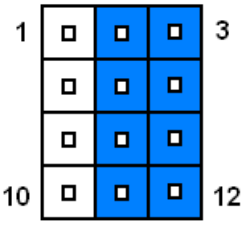
2.4.3 Serial port 1/2 RS-232/422/485 mode select (JCOM_SEL1/2)



RS-232*

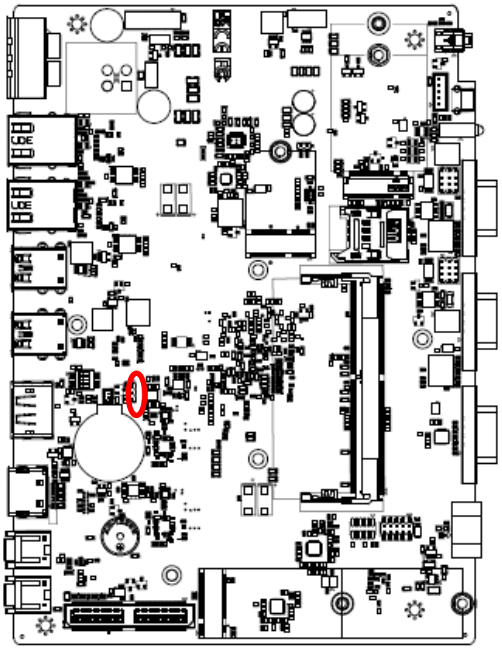


RS-422/ 485

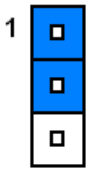


***Default**

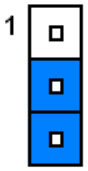
2.4.4 Clear CMOS (JBAT1)



Protect *

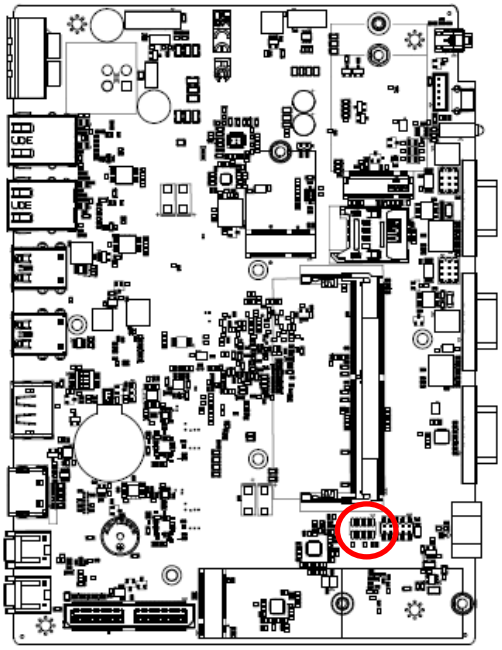


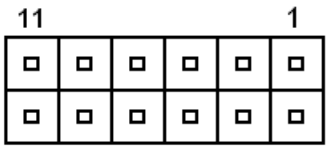
Clear CMOS



***Default**

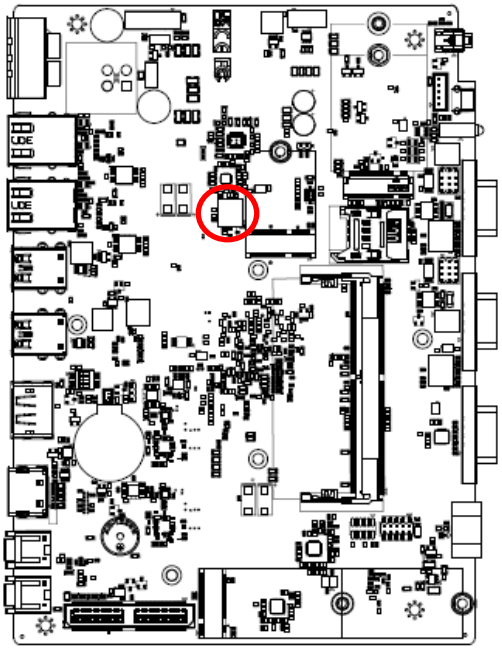
2.4.5 eSPI connector (JESPI1)

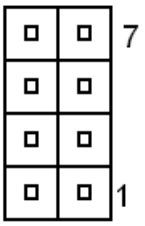




Signal	PIN	PIN	Signal
CN_ESPI_IO0	1	2	+3.3V
CN_ESPI_IO1	3	4	PLT_RST1#
CN_ESPI_IO2	5	6	ESPI_CS#0
CN_ESPI_IO3	7	8	CN_ESPI_CLK
NC	9	10	GND
ESPI_RST	11	12	ESPI_ALERT#2

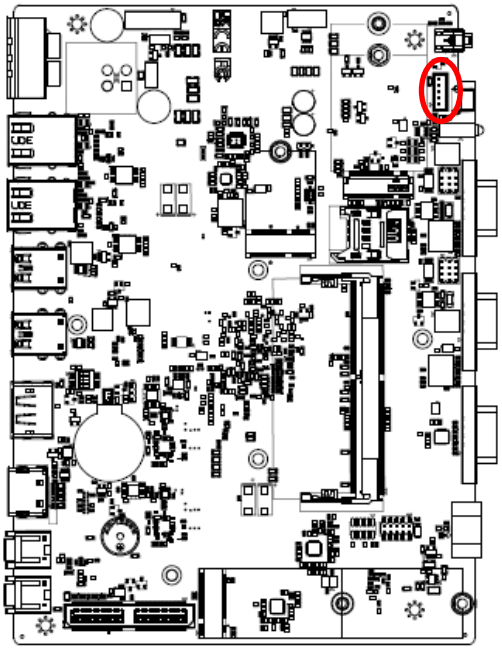
2.4.6 BIOS SPI connector (BIOS_SPI)





Signal	PIN	PIN	Signal
SPI_WP#	8	7	SPI_HOLD#
SPI_MOSI	6	5	SPI_MISO
SPI0 _CLK	4	3	SPI_CS0#
GND	2	1	+3.3VSB

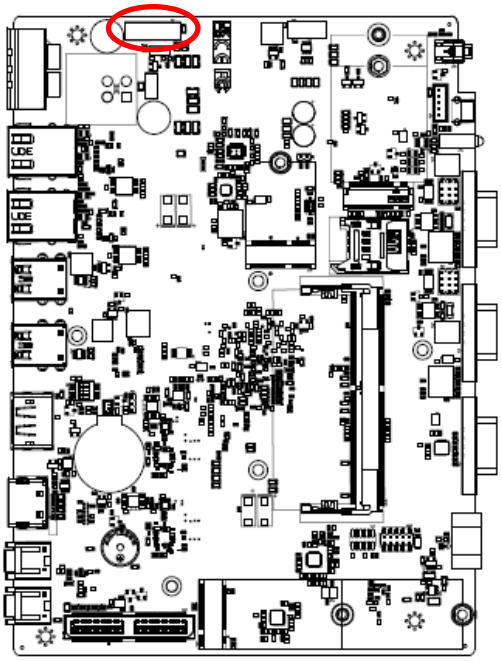
2.4.7 Front Panel connector (JFP1)

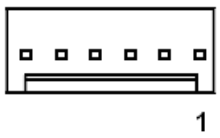




Signal	PIN
PWR_LED-	5
+5VSB	4
GND	3
PMC_RSTBTN#	2
PWR_BTN_IN_EC#	1

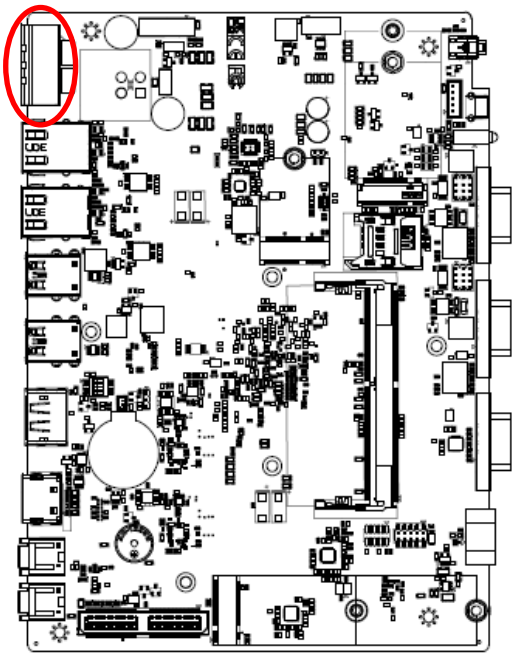
2.4.8 DC Output connector (DCOUT1)





Signal	PIN
+V36_VIN	1
+V36_VIN	2
+V36_VIN	3
GND	4
GND	5
GND	6

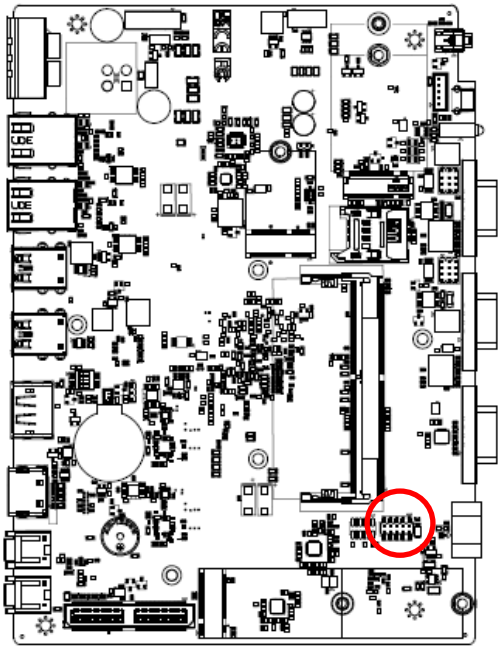
2.4.9 DC Input connector (JVIN1)

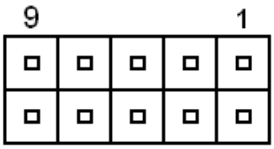




Signal	PIN
+DC_IN	1
CHASSIS_GND	2
GND	3

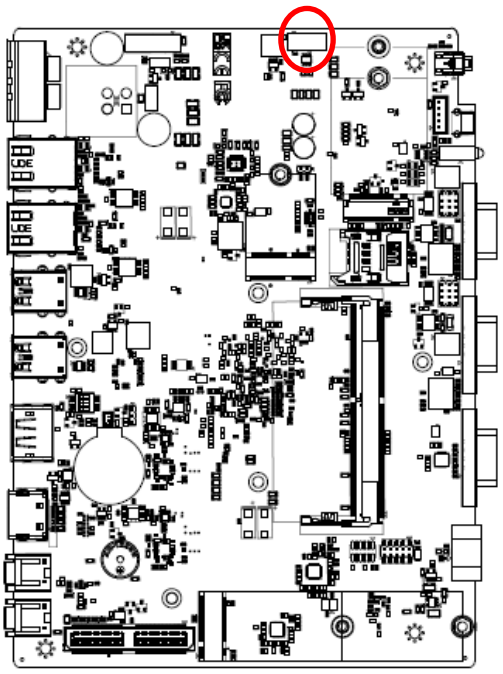
2.4.10 EC Debug connector (JEC_ROM1)

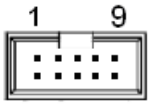




Signal	PIN	PIN	Signal
+VSPI_EC	1	2	GND
EC_FSCE#	3	4	EC_FSCK
EC_FMISO	5	6	EC_FMOSI
EC_HOLD#	7	8	NC
EC_SMCLK_DBG	9	10	EC_SMDAT_DBG

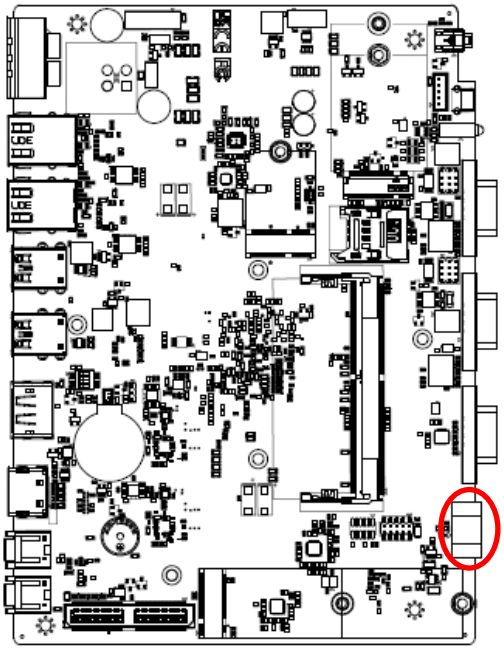
2.4.11 On-board header for USB2.0 (JUSB1)

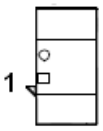




Signal	PIN	PIN	Signal
+5VSB	1	2	+5VSB
USB_R_DN3	3	4	USB_R_DN4
USB_R_DP3	5	6	USB_R_DP4
GND	7	8	GND
GND	9	10	GND

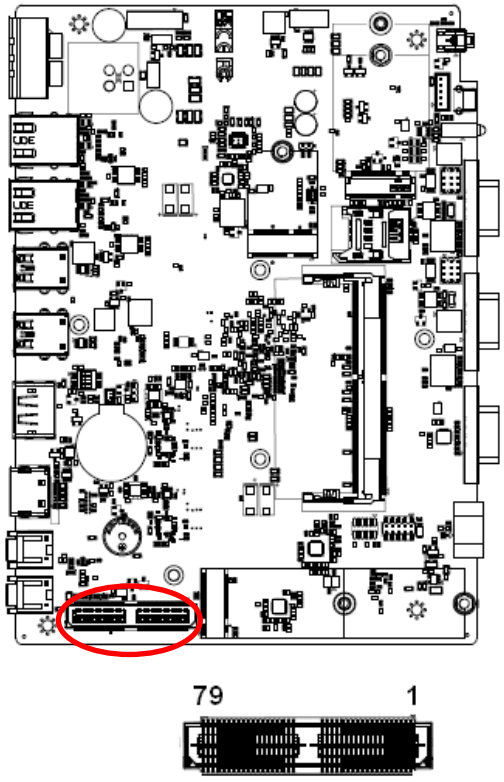
2.4.12 Power on/off connector (PWRBTN1)





Signal	PIN
GND	2
PWRBTN#_R	1

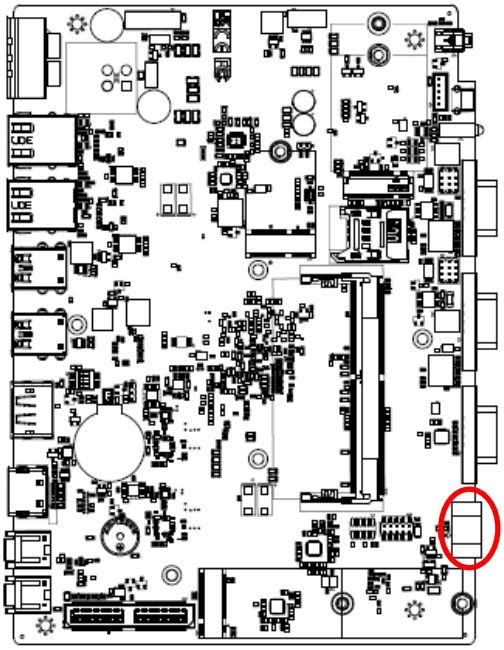
2.4.13 IET connector (IET_CB1)

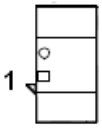


Signal	PIN	PIN	Signal
GND	1	2	GND
PCIE_SW1_RXP_1	3	4	PCIE_SW1_TXP_1
PCIE_SW1_RXN_1	5	6	PCIE_SW1_TXN_1
GND	7	8	GND
PCIE_SW1_RXP_2	9	10	PCIE_SW1_TXP_2
PCIE_SW1_RXN_2	11	12	PCIE_SW1_TXN_2
GND	13	14	GND
PCIE_SW2_RXP_1	15	16	PCIE_SW2_TXP_1
PCIE_SW2_RXN_1	17	18	PCIE_SW2_TXN_1
GND	19	20	GND

Signal	PIN	PIN	Signal
PCIE_SW2_RXP_2	21	22	PCIE_SW2_TXP_2
PCIE_SW2_RXN_2	23	24	PCIE_SW2_TXN_2
GND	25	26	GND
CLK_PCIE_P4	27	28	SIDEOUT_L
CLK_PCIE_N4	29	30	SIDEOUT_R
GND	31	32	GND
SMB_SCL_S5	33	34	NC
SMB_SDA_S5	35	36	DDI0_SEL
IET_WAKE#	37	38	IET_DB_TYPE0
PLT_RST_IET#	39	40	IET_DB_TYPE1
IET_PWRON	41	42	CLK_24M_BUF
NC	43	44	LPC_AD0
DDI0_HPD	45	46	LPC_AD1
GND	47	48	LPC_AD2
DDI0_AUXP_CLK	49	50	LPC_AD3
DDI0_AUXP_DAT	51	52	LPC_LDRQ#
GND	53	54	LPC_SERIRQ
DDI0_C_TXP0	55	56	LPC_LFRAME#
DDI0_C_TXN0	57	58	GND
GND	59	60	USB_DP_7
DDI0_C_TXP1	61	62	USB_DN_7
DDI0_C_TXN1	63	64	GND
GND	65	66	USB_DP_8
DDI0_C_TXP2	67	68	USB_DN_8
DDI0_C_TXN2	69	70	GND
GND	71	72	USB_DP_9
DDI0_C_TXP3	73	74	USB_DN_9
DDI0_C_TXN3	75	76	GND
GND	77	78	USB2_OC3#
+12VSB	79	80	+12VSB

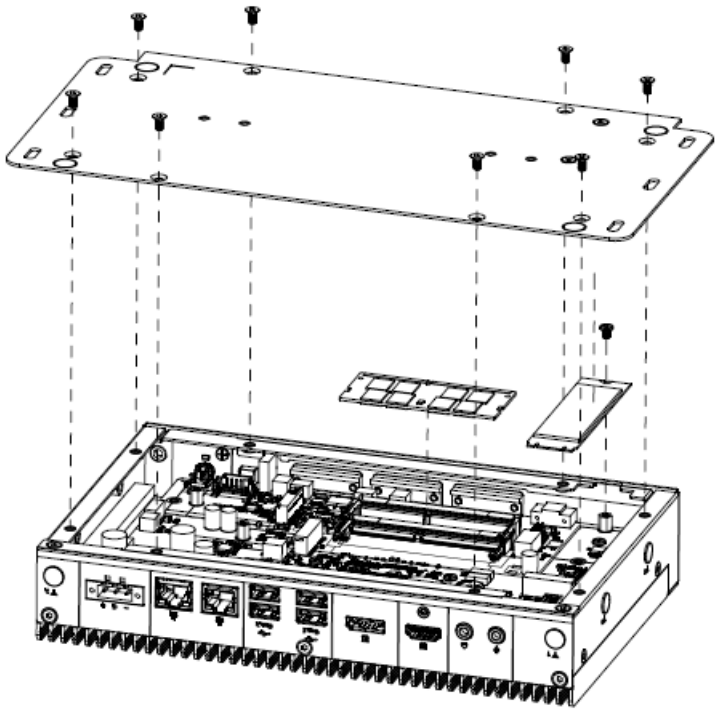
2.4.14 Battery connector (BATH2)





Signal	PIN
GND	2
PWRBTN#_R	1

2.5 Installing Hard Disk & Memory (EMS-EHL)



Step 1. Remove 8 screws from the bottom of your system and take it off.

Step 2. Slide the DDR4 SODIMM into the memory socket and press it down until properly seated.

Step 3. Insert M.2 Key-B card into designated locations, between M.2 and thermal solution please paste with thermal pad, and fasten with screws to complete installation.

3.BIOS Setup

3.1 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.

3.2 Starting Setup

The 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 <Del> or <F2> immediately after switching the system on, or
By pressing the <Del> or <F2> key when the following message appears briefly at the left-top of the screen during the POST (Power On Self Test).

Press <Del> or <F2> 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. If you do not press the keys at the correct time and the system does not boot, an error message will be displayed and you will again be asked to.

Press F1 to Continue, DEL to enter SETUP

3.3 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.

3.4 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 F1 key again.

3.5 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.

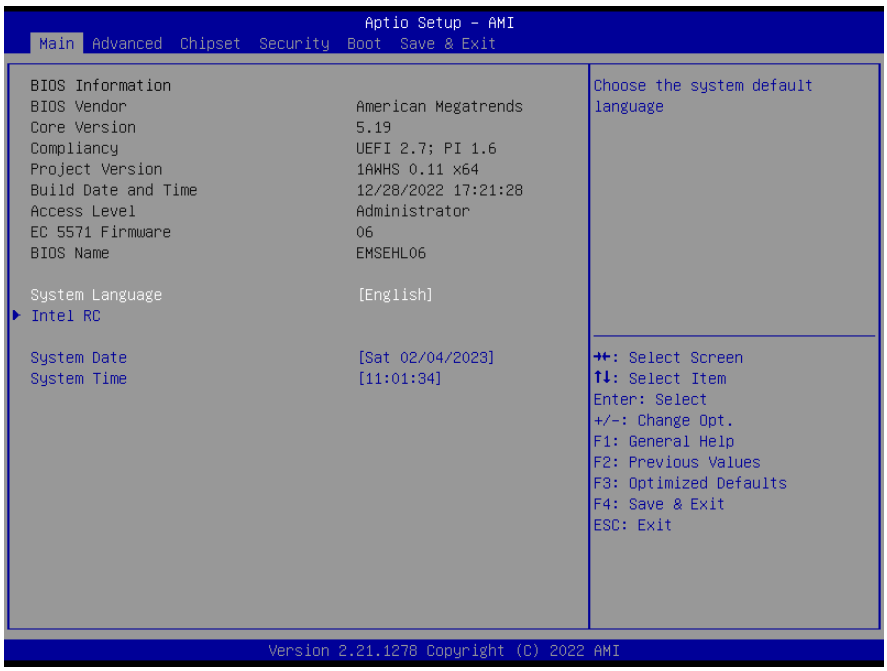
The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both BIOS Vendor and your systems manufacturer to provide the absolute maximum performance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

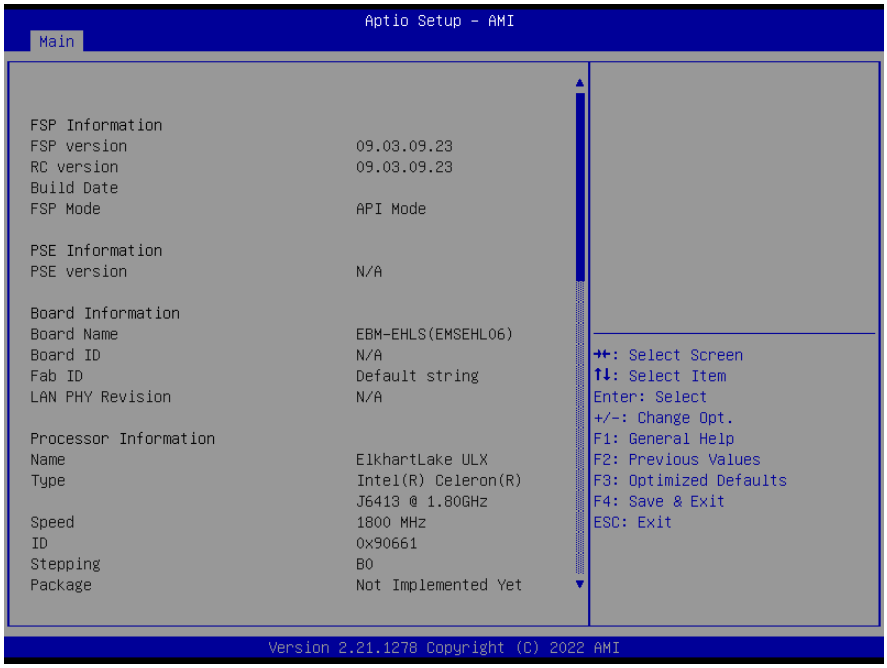
3.6 BIOS setup

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.

3.6.1 Main Menu

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





3.6.1.1 System Language

This option allows choosing the system default language.

3.6.1.2 System Date

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

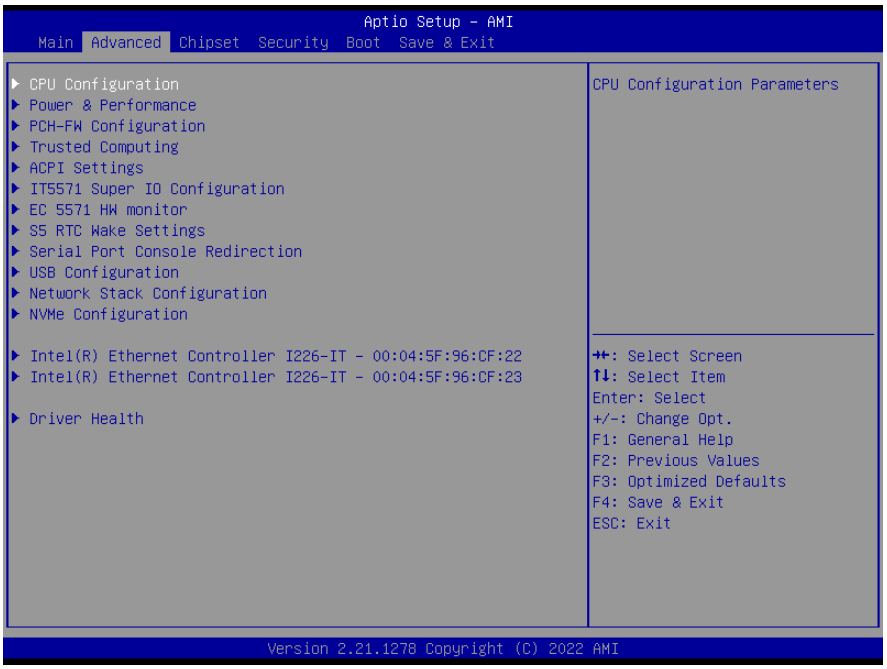
3.6.1.3 System Time

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.

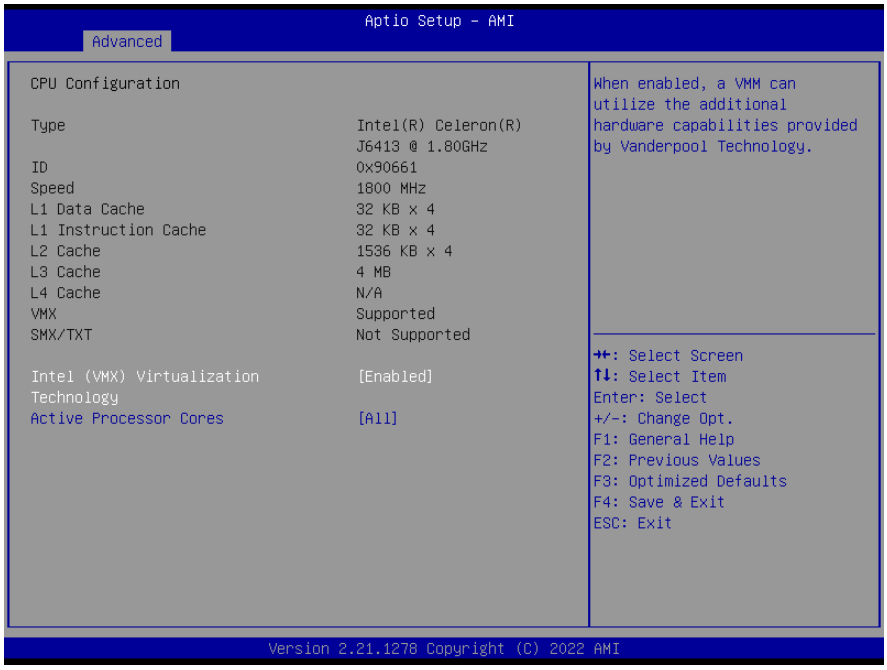
3.6.2 Advanced Menu

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



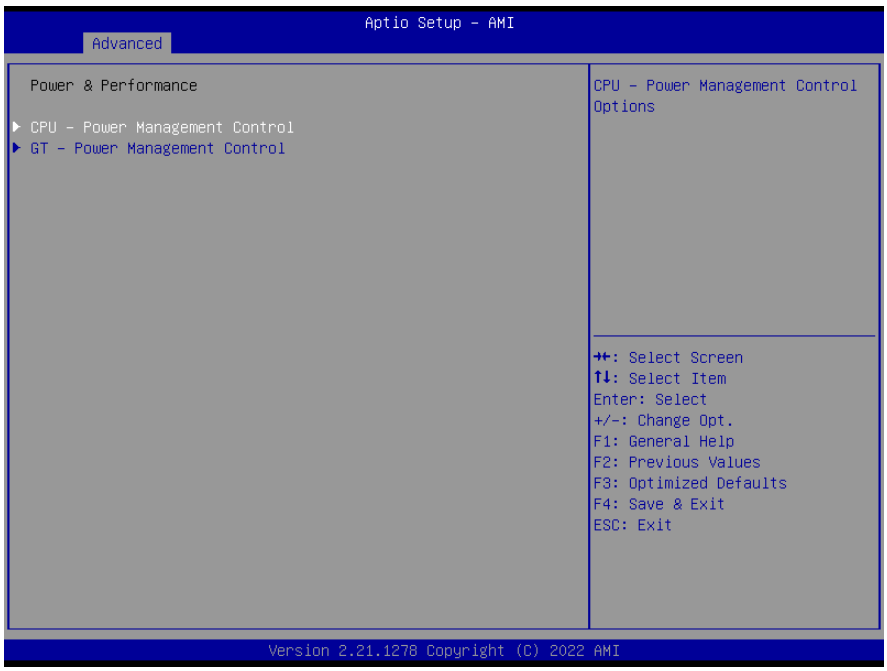
3.6.2.1 CPU Configuration

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

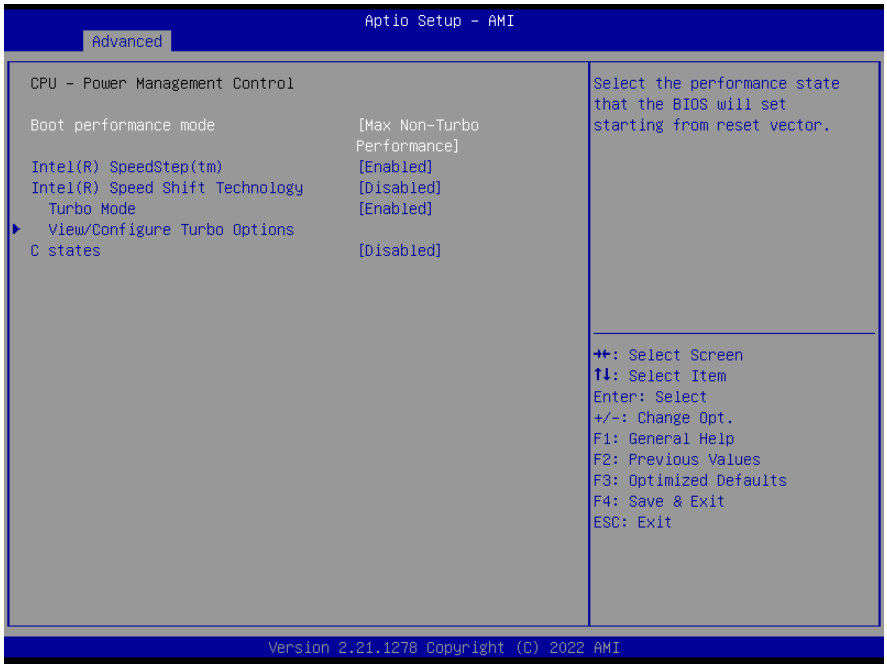


Item	Options	Description
Intel(VMX) Virtualization Technology	Disabled Enabled**[Default]**	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
Active Processor Cores	All**[Default]** 1 2 3	Number of cores to enable in each processor package.

3.6.2.2 Power & Performance



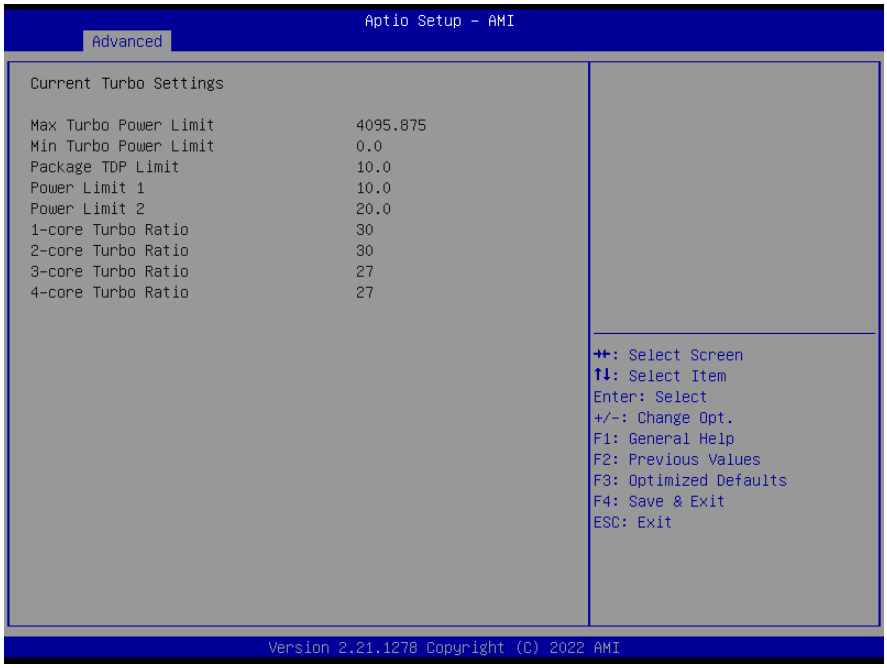
3.6.2.2.1 CPU - Power Management Control



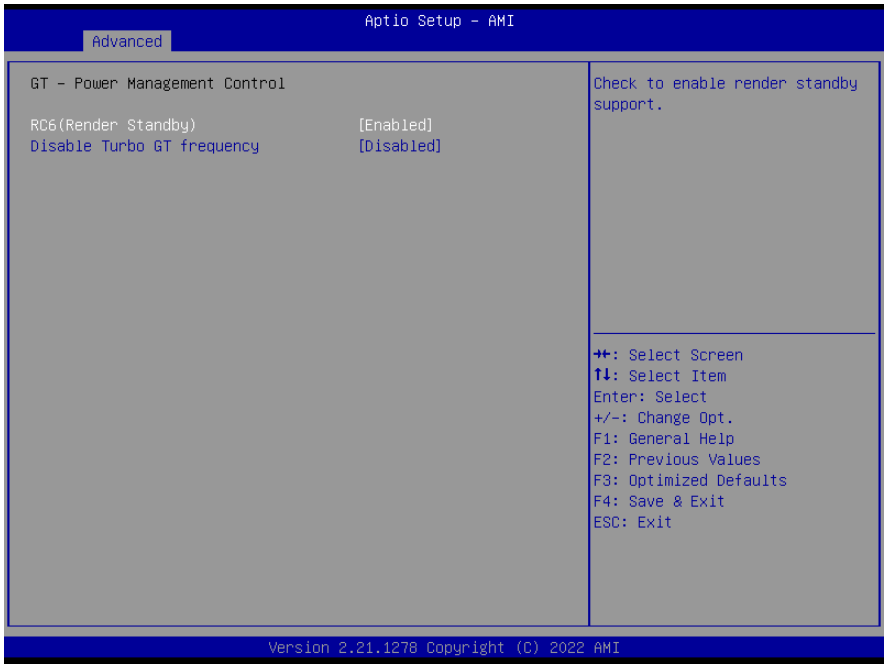
Item	Option	Description
Boot performance mode	Max Non Turbo Performance**[Default]**, Turbo Performance	Select the performance state that the BIOS will set starting from reset vector.
Intel® SpeedSted™	Disabled Enabled**[Default]**,	Allows more than two frequency ranges to be supported.
Intel® Speed Shift Technology	Disabled**[Default]**, Enabled	Enable/Disable Intel® Speed Shift Technology support. Enabling will expose the CPPC v2 interface to allow for hardware controlled P-states.

Turbo Mode	Disabled Enabled**[Default]**,	Enable/Disable processor Turbo Mode (requires EMTTM enabled too). AUTO means enabled.
C states	Disabled**[Default]**, Enabled	Enable/Disable CPU Power Management. Allows CPU to go to C states when it's not 100% utilized.

3.6.2.2.1.1 View/Configure Turbo Options



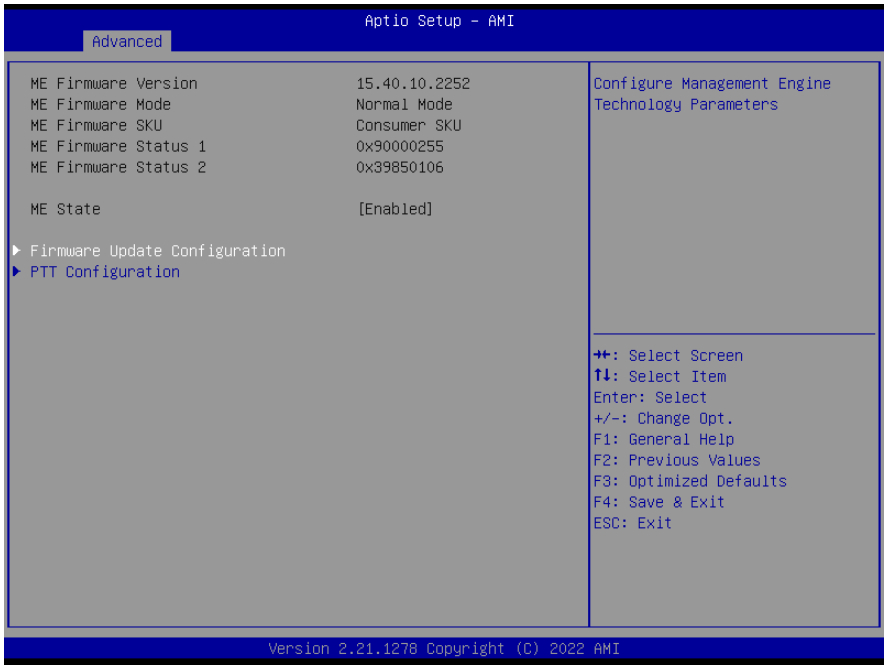
3.6.2.2.2 GT - Power Management Control



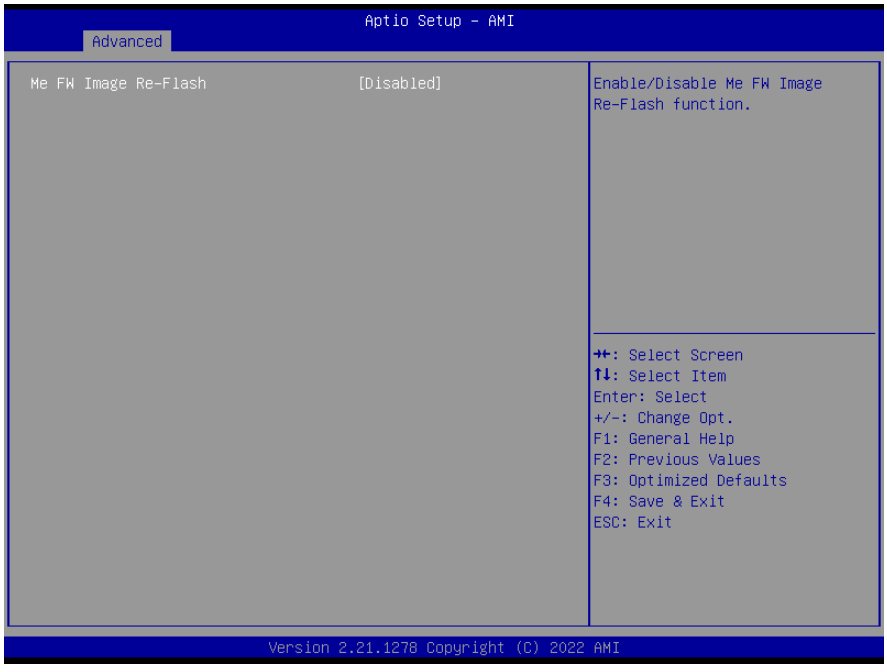
Item	Option	Description
RC6(Render Standby)	Disabled Enabled**[Default]**,	Check to enable render standby support.

Disable Turbo GT frequency	Disabled**[Default]**, Enabled	Enabled: Disables Turbo GT frequency. Disabled: GT frequency is not limited

3.6.2.3 PCH-FW Configuration

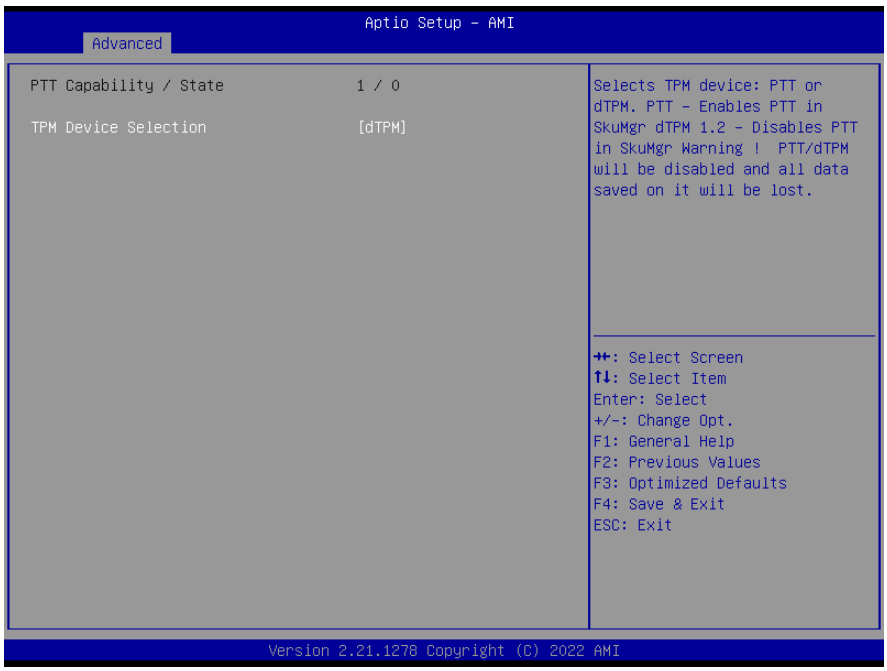


3.6.2.3.1 Firmware Update Configuration



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

3.6.2.3.2 PTT Configuration



Item	Option	Description
TPM Device Selection	dTPM**[Default]**, PTT	Selects TPM device: PTT or dTPM. PTT - Enables PTT in SkuMgr dTPM 1.2 - Disables PTT in SkuMgr Warning ! PTT/dTPM will be disabled and all data saved on it will be lost.

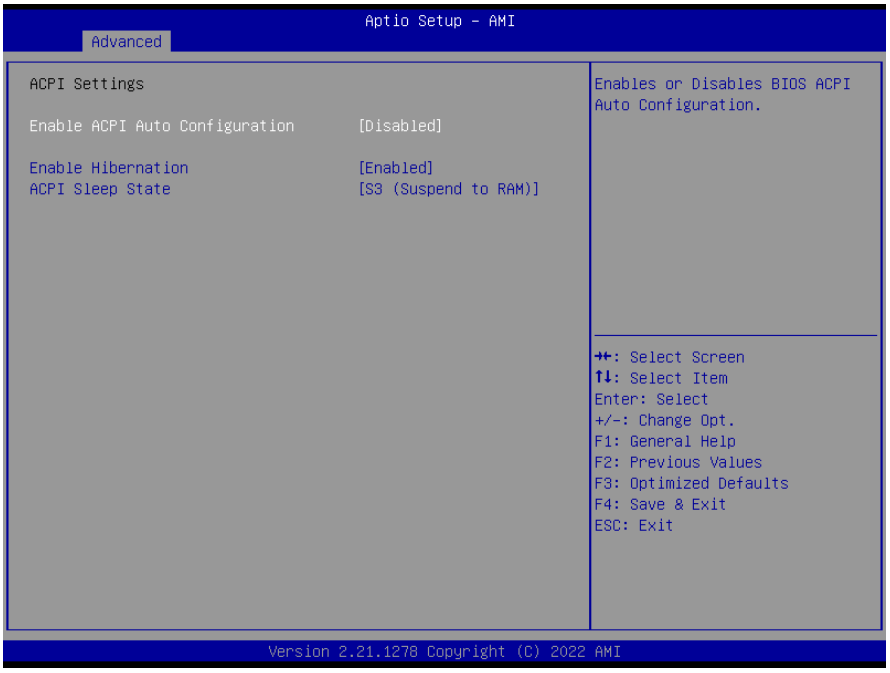
3.6.2.4 Trusted Computing



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.

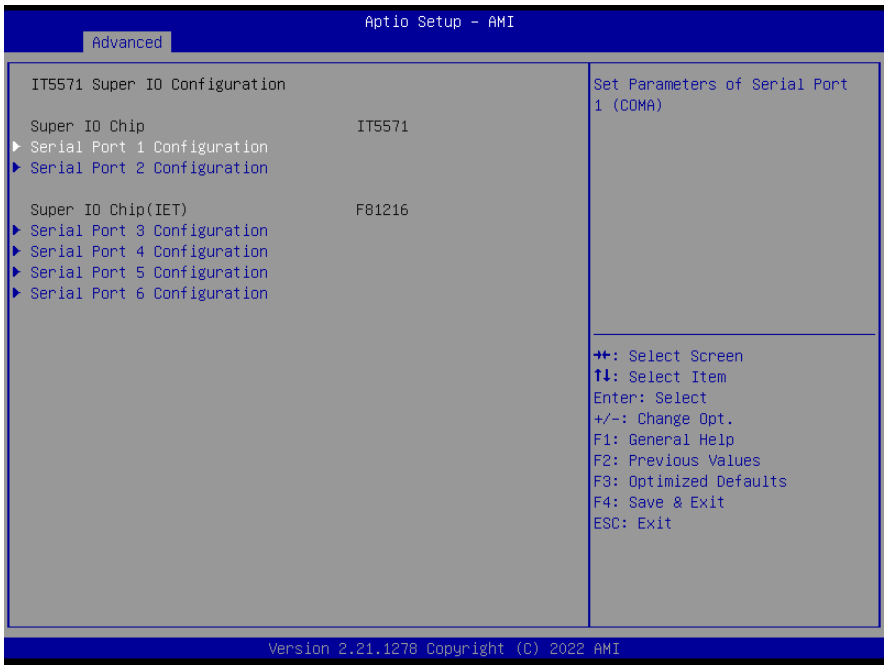
3.6.2.5 ACPI Settings



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

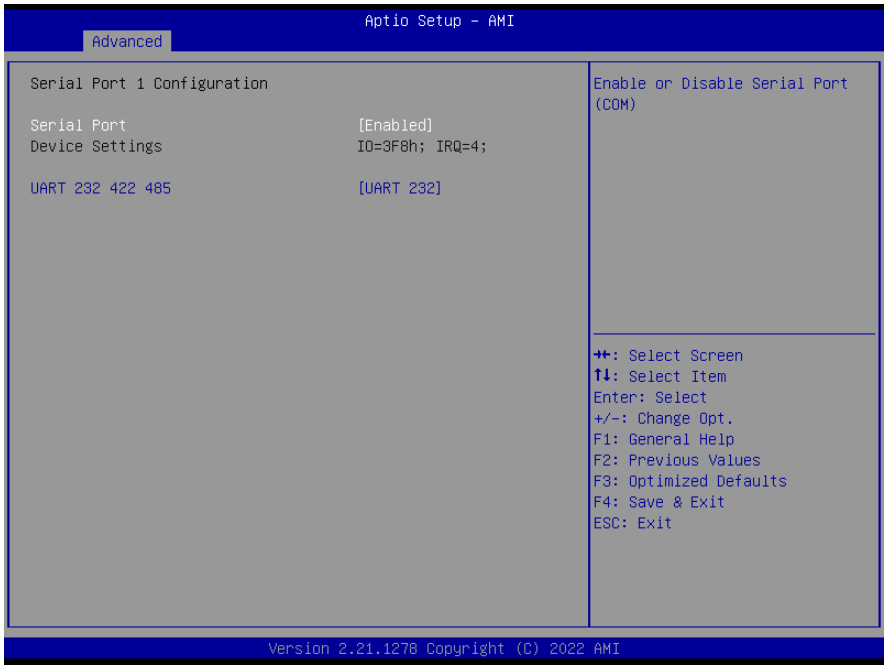
3.6.2.6 IT5571 Super IO Configuration

You can use this item to set up or change the IT8528 Super IO configuration for serial ports. Please refer to 3.6.2.6.1~ 3.6.2.6.6 for more information.



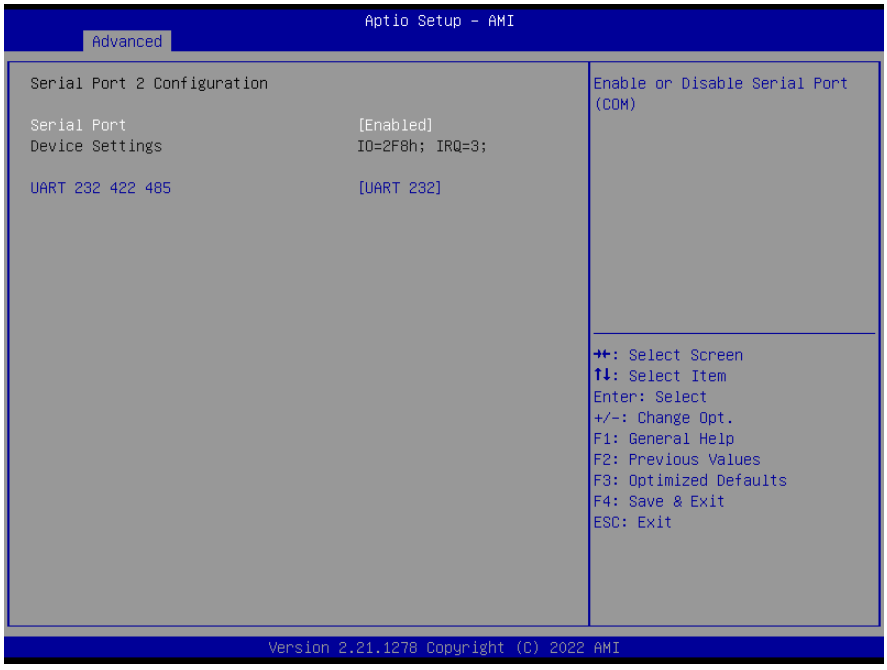
Item	Description
Serial Port 1 Configuration	Set Parameters of Serial Port 1 (COMA).
Serial Port 2 Configuration	Set Parameters of Serial Port 2 (COMB).
Serial Port 3 Configuration	Set Parameters of Serial Port 3 (COMC).
Serial Port 4 Configuration	Set Parameters of Serial Port 4 (COMD).
Serial Port 5 Configuration	Set Parameters of Serial Port 5 (COME).
Serial Port 6 Configuration	Set Parameters of Serial Port 5 (COMF).

3.6.2.6.1 Serial Port 1 Configuration



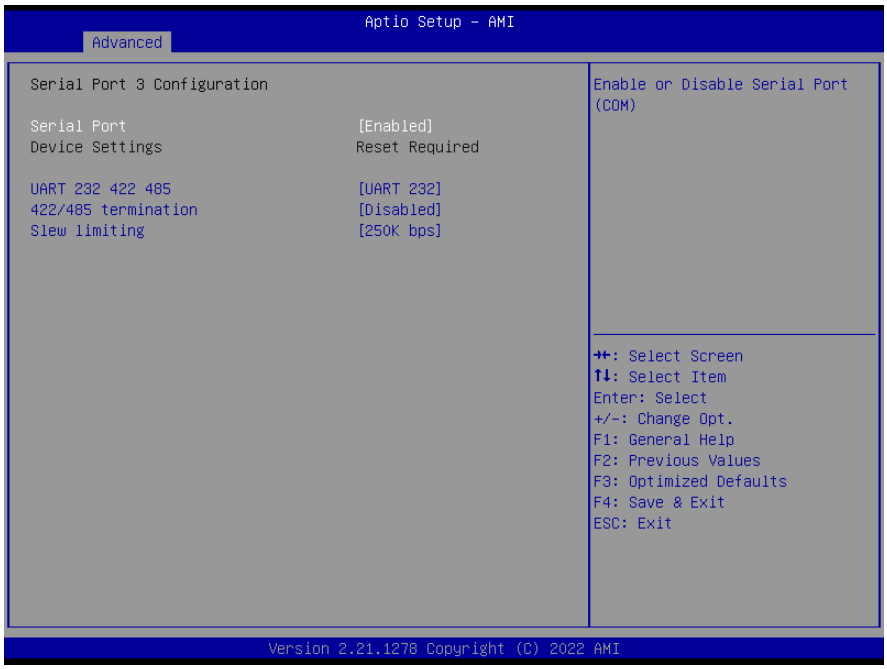
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.

3.6.2.6.2 Serial Port 2 Configuration



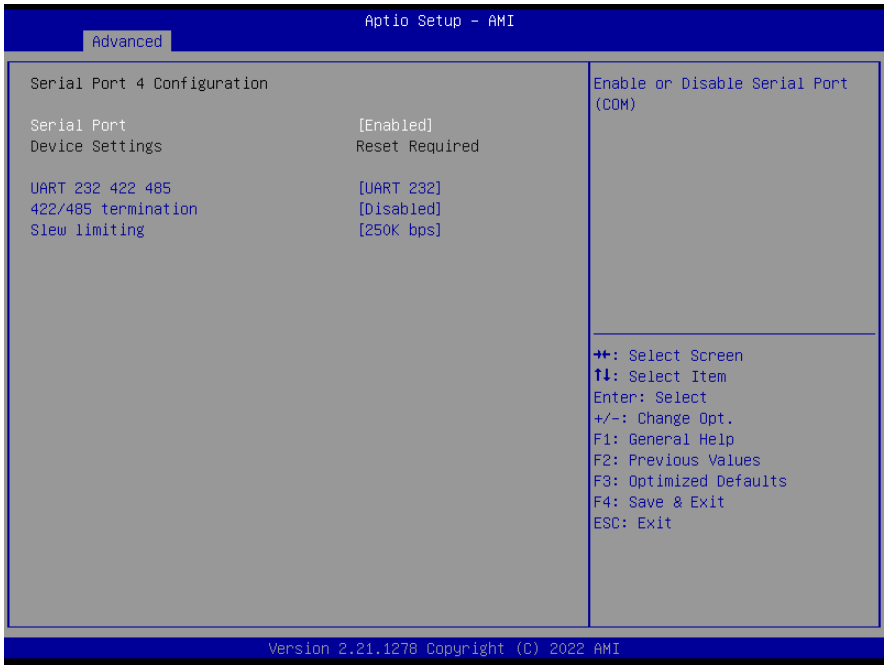
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.

3.6.2.6.3 Serial Port 3 Configuration



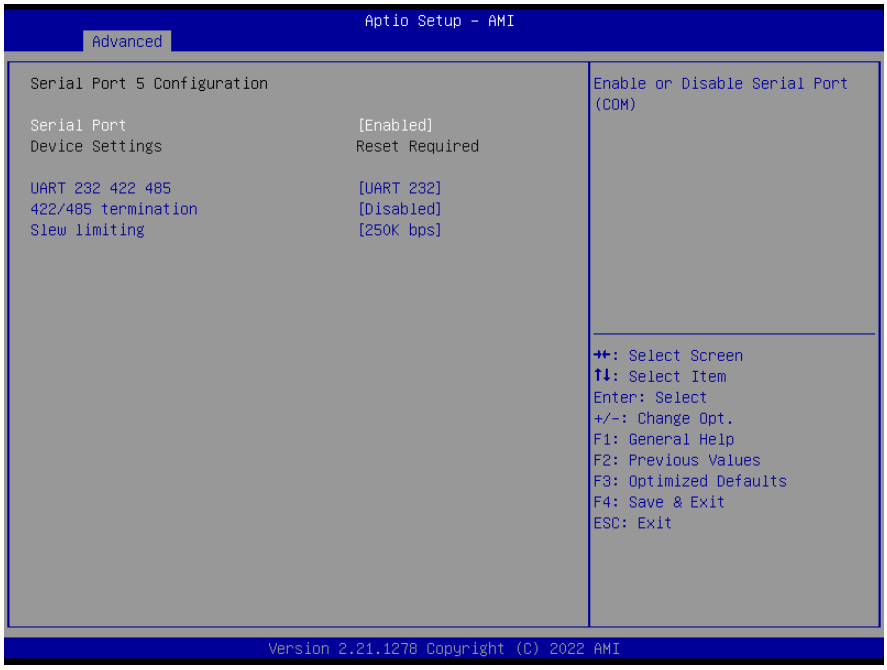
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Disabled**[Default]**, Enabled	Adjust the Serial Port with internal or external termination resistors
Slew limiting	10M bps 250k bps**[Default]**	SLEW from GPIO.

3.6.2.6.4 Serial Port 4 Configuration



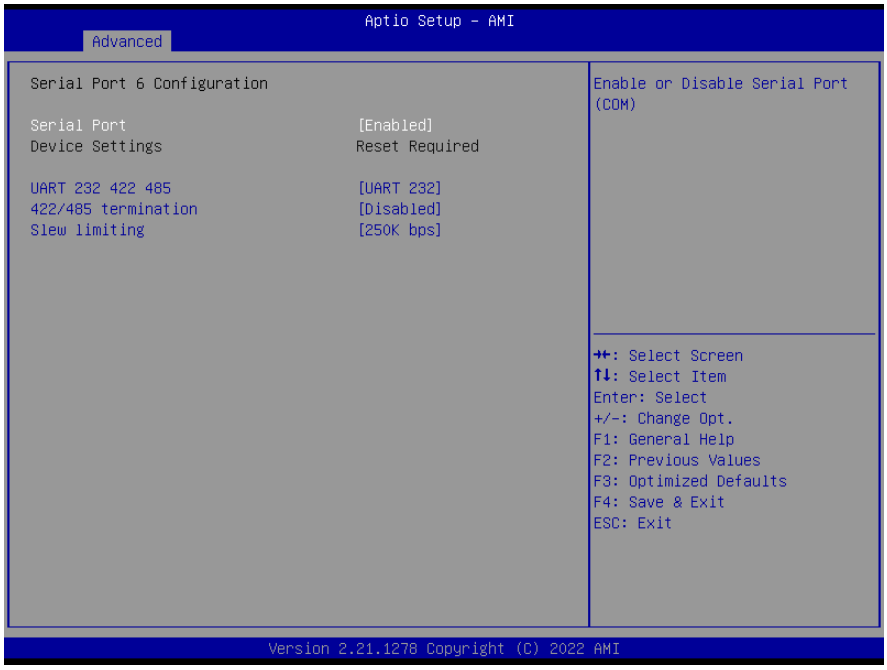
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Disabled**[Default]**, Enabled	Adjust the Serial Port with internal or external termination resistors
Slew limiting	10M bps 250k bps**[Default]**	SLEW from GPIO.

3.6.2.6.5 Serial Port 5 Configuration



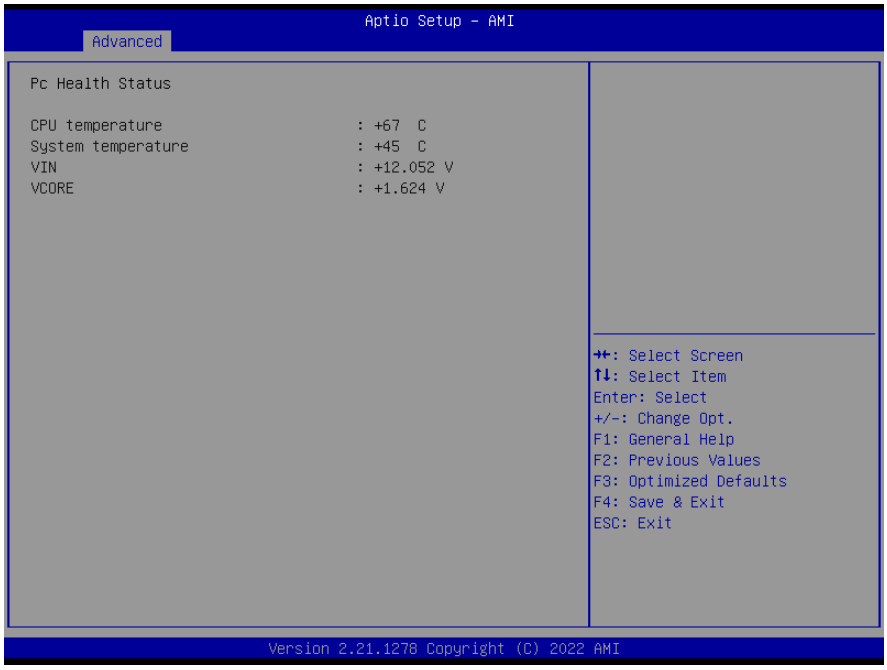
Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Disabled**[Default]**, Enabled	Adjust the Serial Port with internal or external termination resistors
Slew limiting	10M bps 250k bps**[Default]**	SLEW from GPIO.

3.6.2.6.6 Serial Port 6 Configuration



Item	Option	Description
Serial Port	Disabled Enabled**[Default]**,	Enable or Disable Serial Port (COM).
UART 232 422 485	UART 232(LOOPBACK) UART 232**[Default]** UART 422 UART 485	Change the Serial Port as RS232/422/485.
422/485 termination	Disabled**[Default]**, Enabled	Adjust the Serial Port with internal or external termination resistors
Slew limiting	10M bps 250k bps**[Default]**	SLEW from GPIO.

3.6.2.7 H/W Monitor

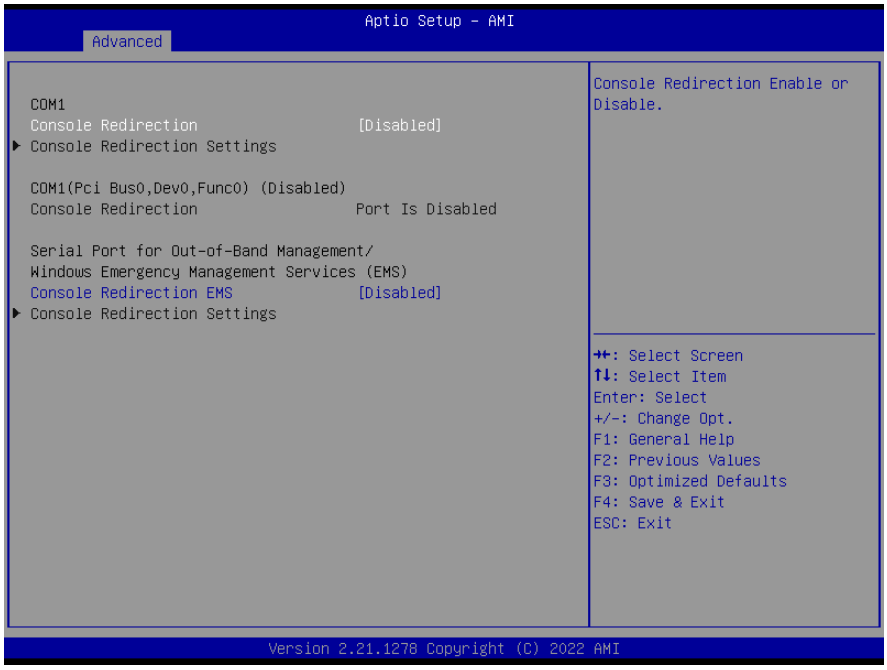


3.6.2.8 S5 RTC Wake Settings



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).

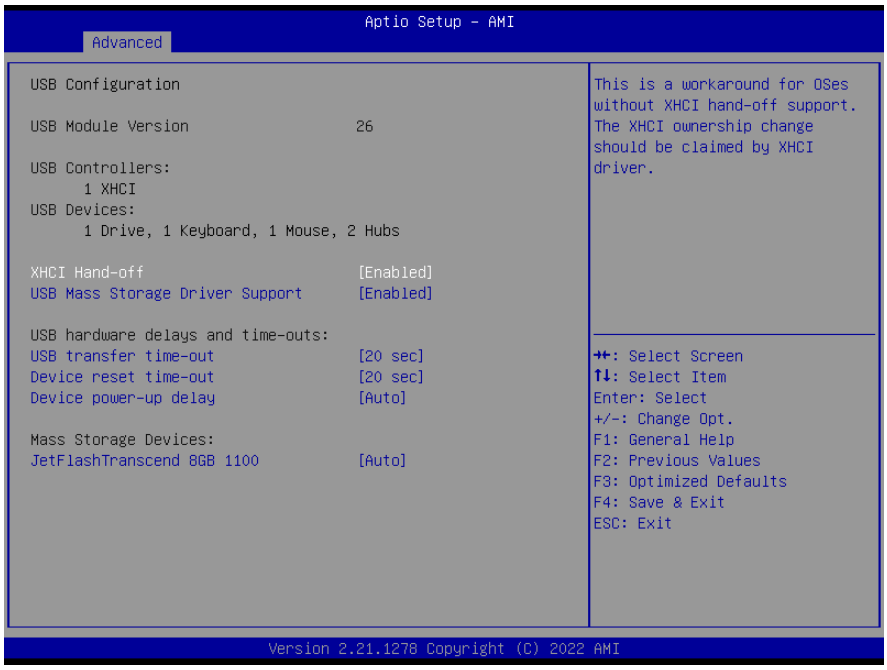
3.6.2.9 Serial Port Console Redirection



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

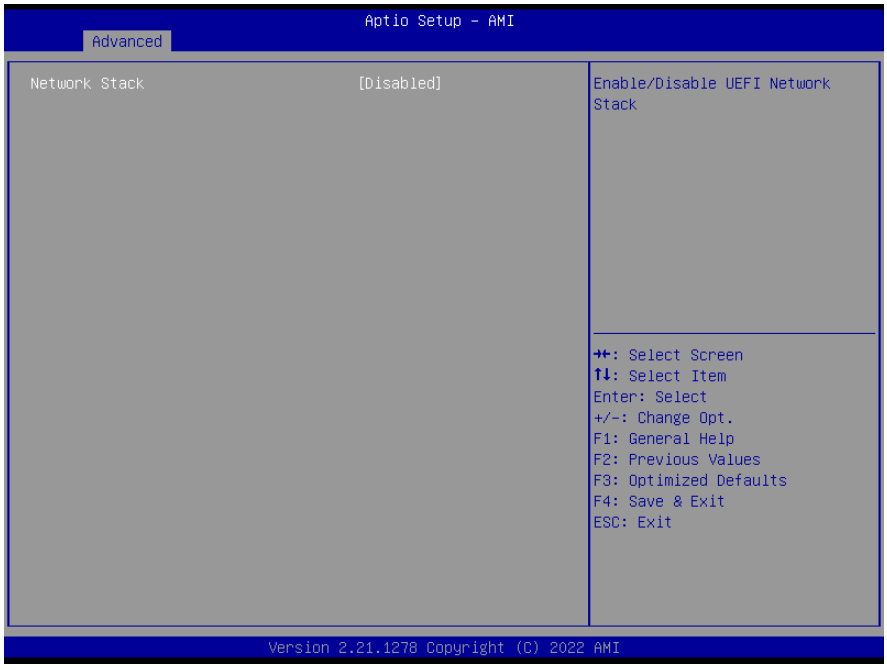
3.6.2.10 USB Configuration

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



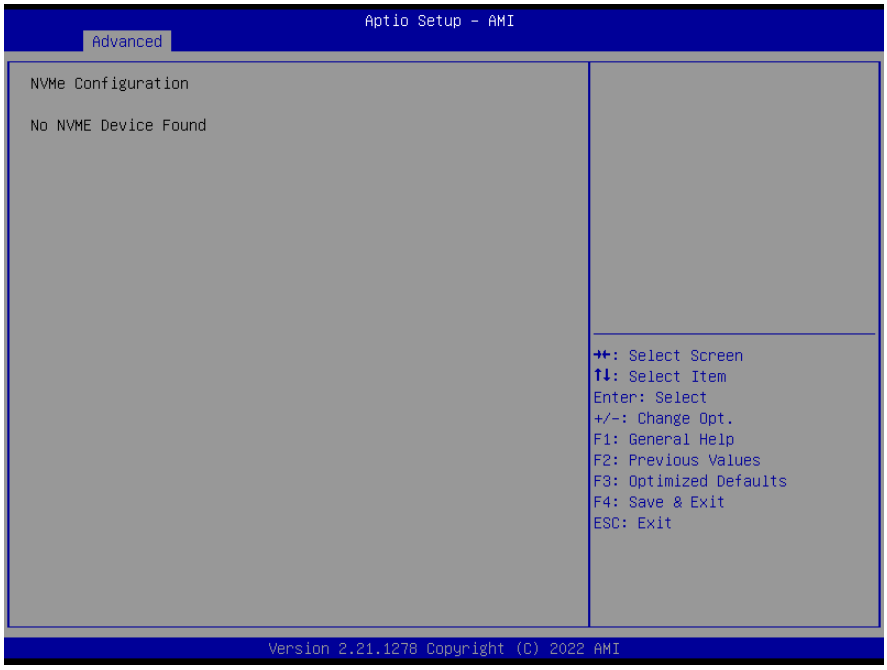
Item	Options	Description
XHCI Hand-off	Enabled**[Default]**, Disabled	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
USB Mass Storage Driver Support	Disabled Enabled**[Default]**,	Enable/Disable USB Mass Storage Driver Support.
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.
JetFlashTranscend 8GB 1100	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.

3.6.2.11 Network Stack Configuration

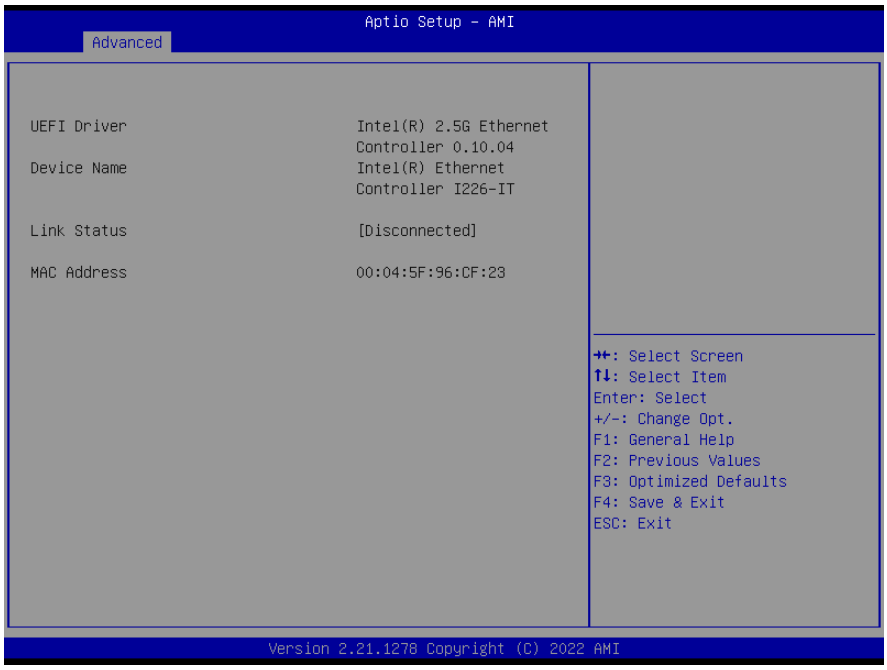


Item	Options	Description
Network Stack	Disabled**[Default]**, Enabled	Enable/Disable UEFI Network Stack.

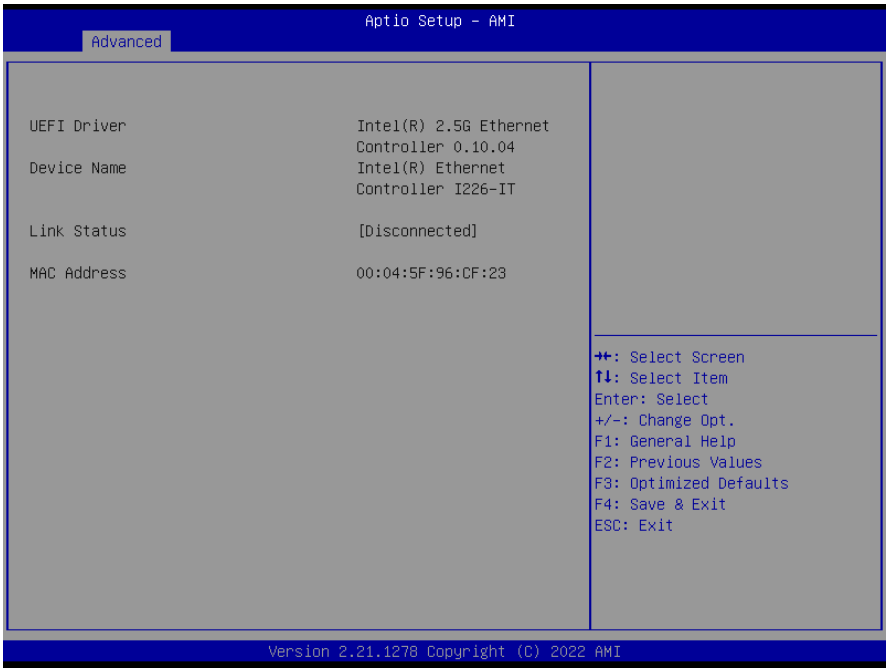
3.6.2.12 NVMe Configuration



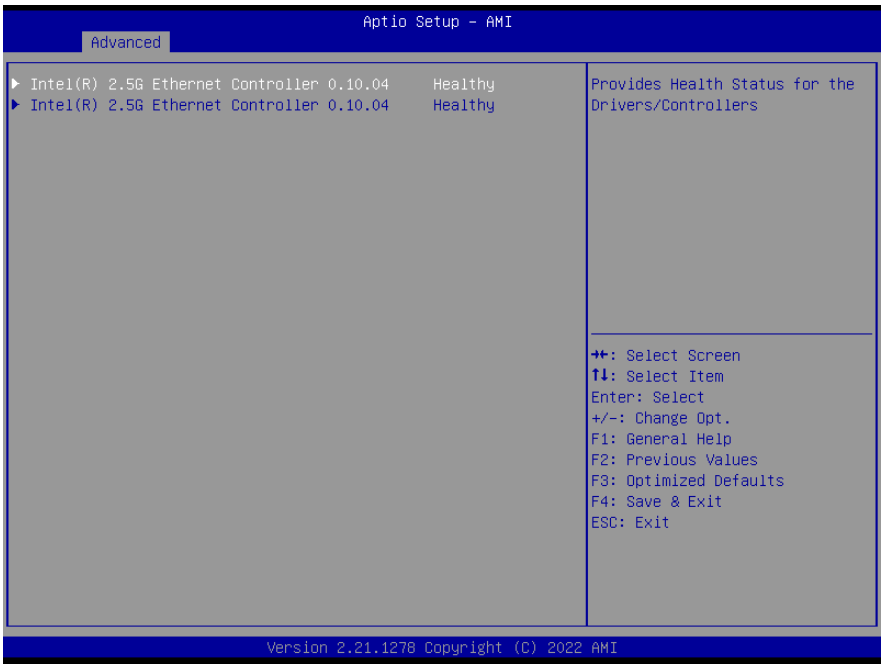
3.6.2.13 Intel® Ethernet Controller I226-IT – 00:04:5F:96:CF:22



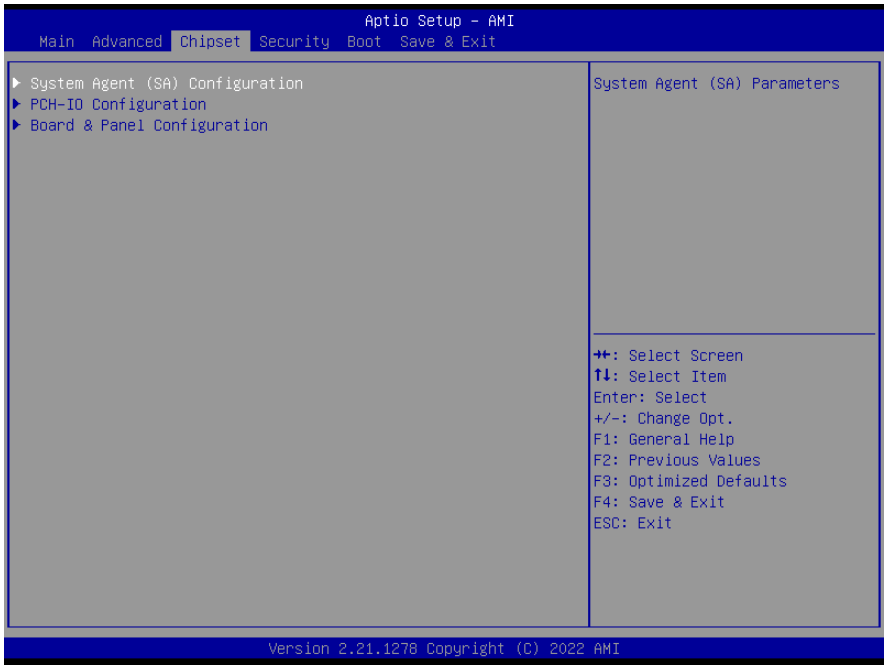
3.6.2.14 Intel® Ethernet Controller I226-IT – 00:04:5F:96:CF:23



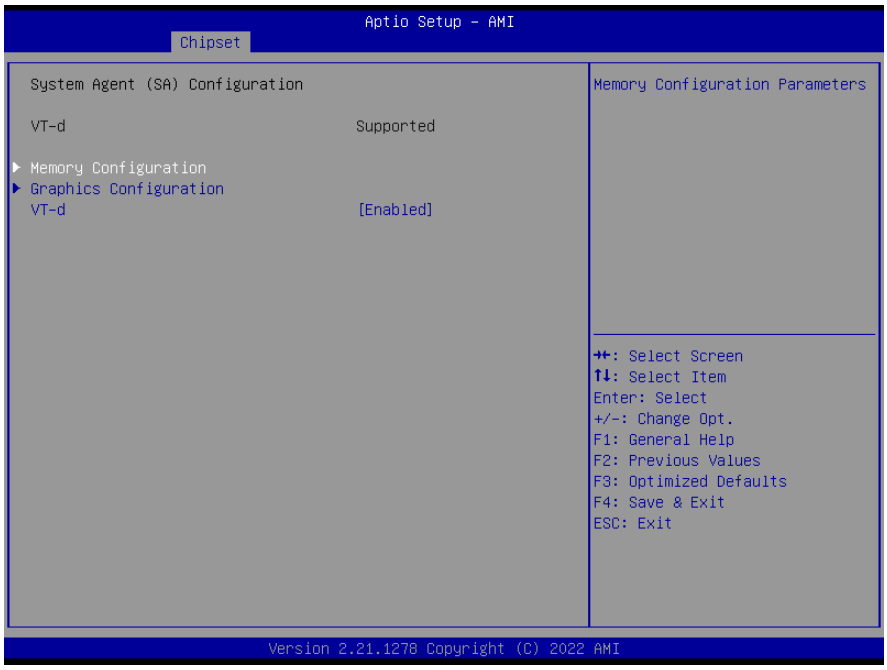
3.6.2.15 Driver Health



3.6.3 Chipset

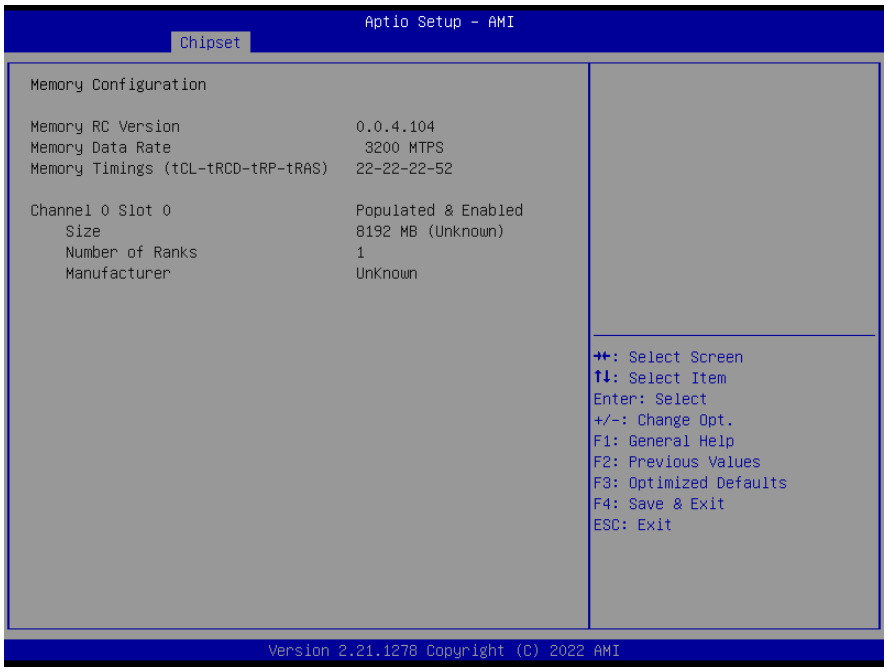


3.6.3.1 System Agent (SA) Configuration

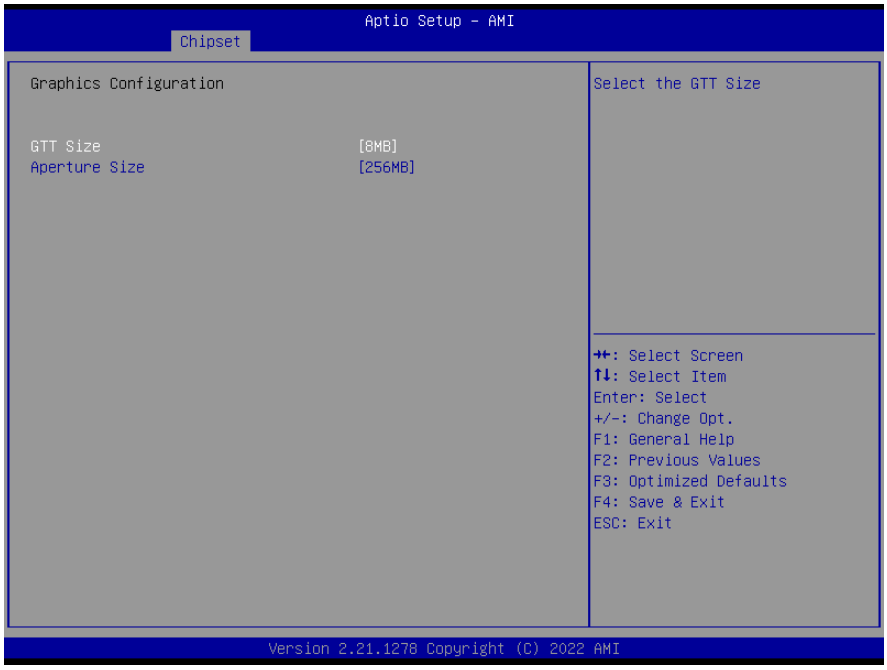


Item	Option	Description
VT-d	Disabled Enabled**[Default]**	VT-d capability.

3.6.3.1.1 Memory Configuration

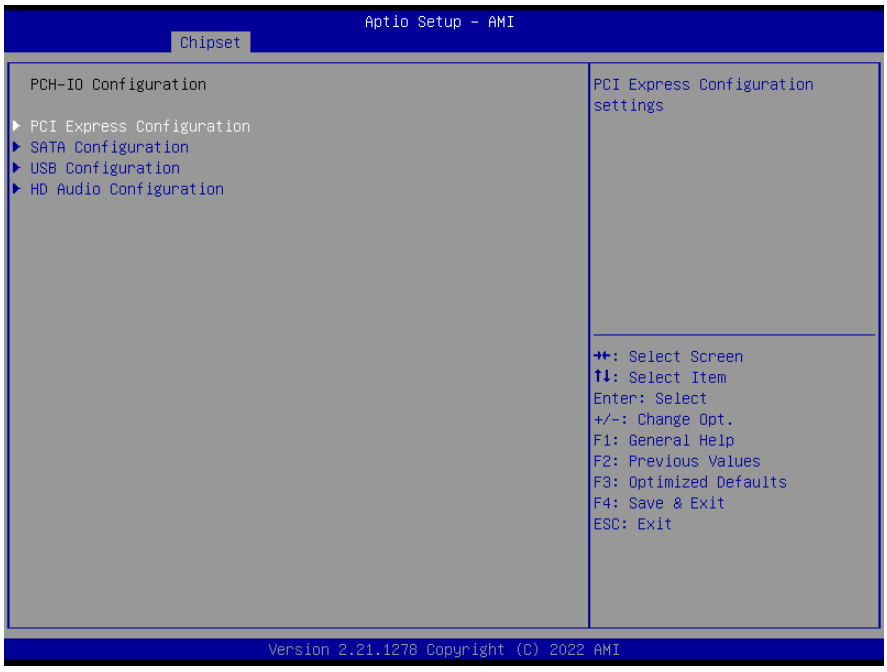


3.6.3.1.2 Graphics Configuration

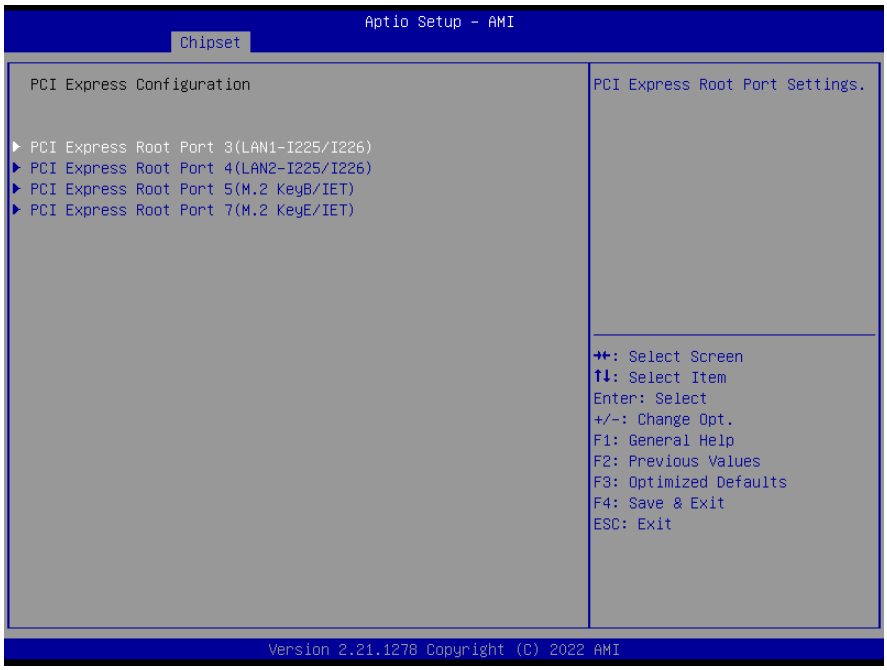


Item	Option	Description
GTT Size	2MB 4MB 8MB**[Default]**	Select GTT Size
Aperture Size	128MB 256MB**[Default]** 512MB 1024MB	Select the Aperture Size Note : Above 4GB MMIO BIOS assignment is automatically enabled when selecting 2048MB aperture. To use this feature, please disable CSM Support.

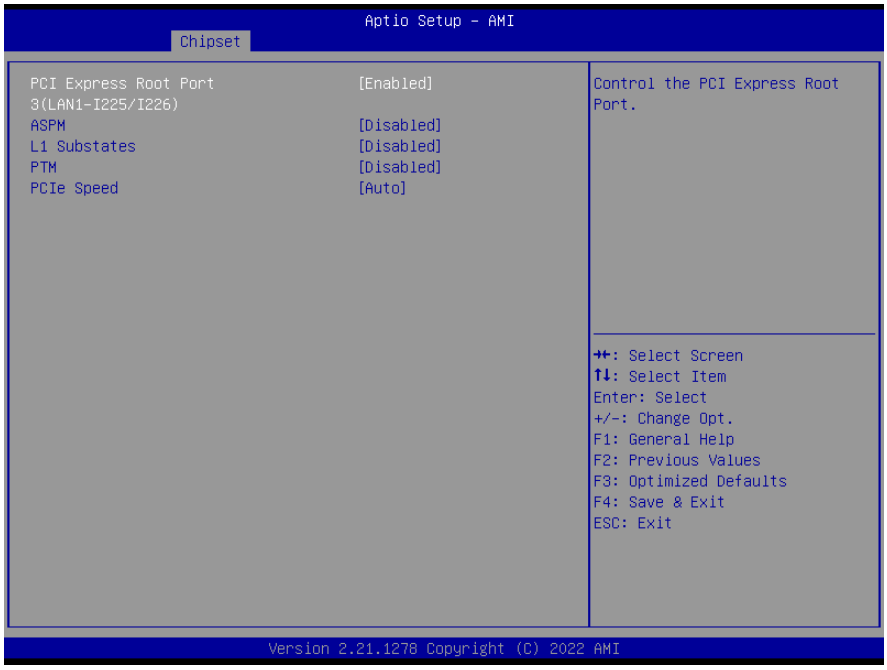
3.6.3.2 PCH-IO Configuration



3.6.3.2.1 PCI Express Configuration

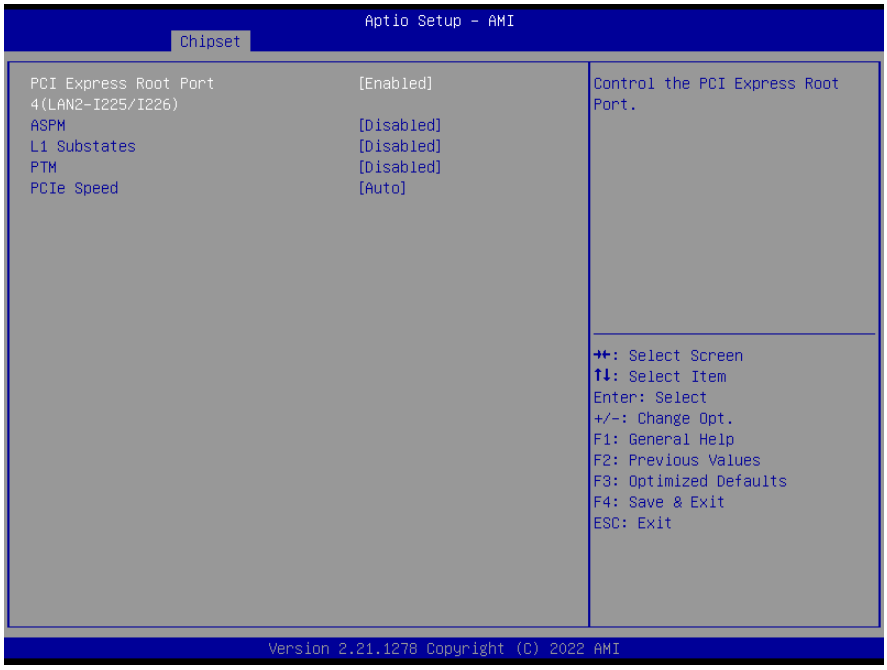


3.6.3.2.1.1 PCI Express Root Port 3(LAN1-I225/I226)



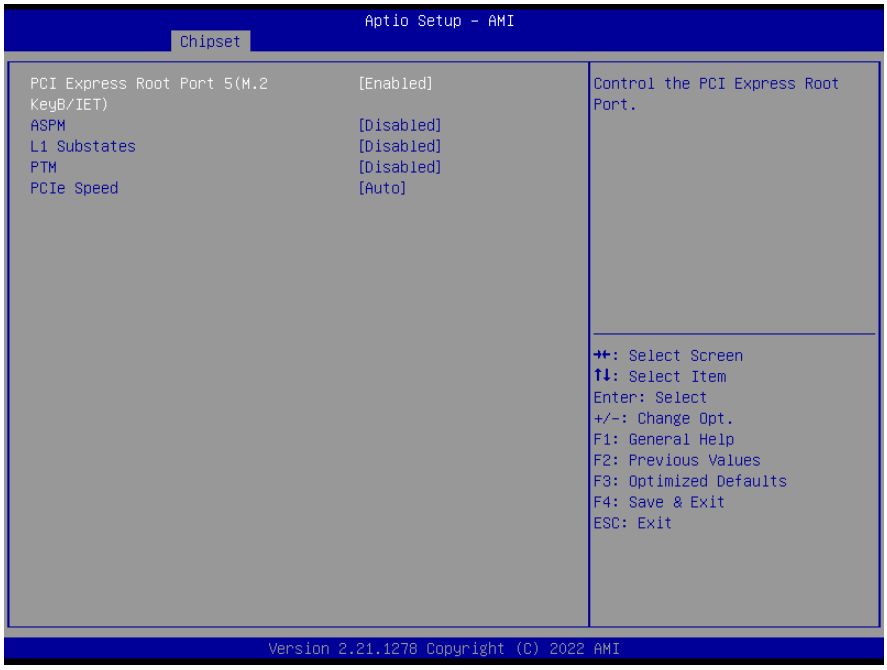
Item	Option	Description
PCI Express Root Port 3 (LAN1-I225/I226)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]**, L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PTM	Disabled**[Default]**, Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe speed

3.6.3.2.1.2 PCI Express Root Port 4(LAN2-I225/I226)



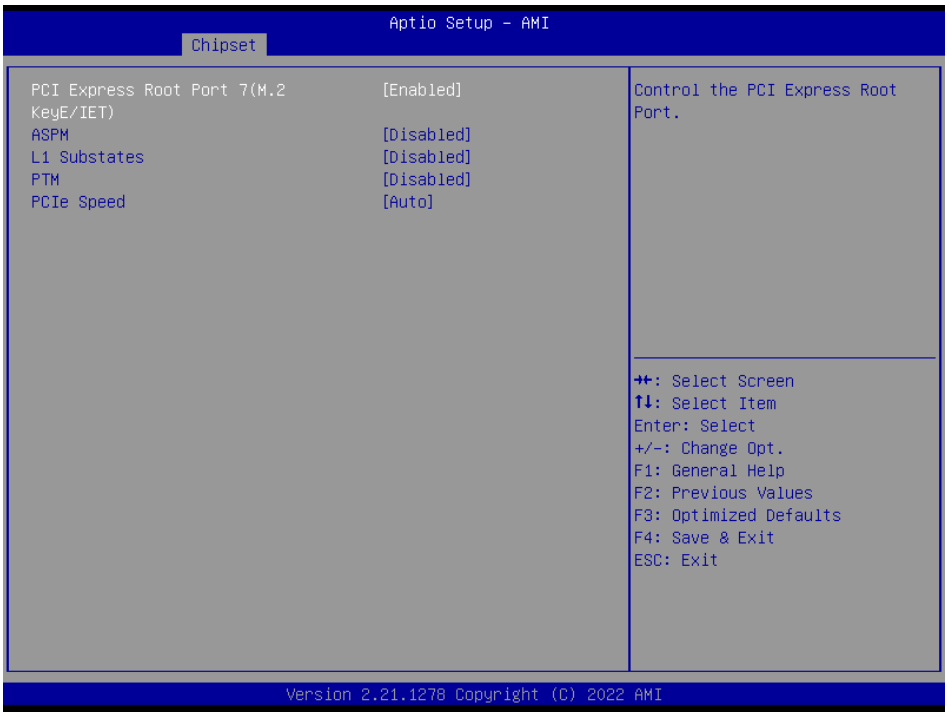
Item	Option	Description
PCI Express Root Port 4 (LAN2-I225/I226)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]**, L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PTM	Disabled**[Default]**, Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe speed

3.6.3.2.1.3 PCI Express Root Port 5(M.2 KeyB/IET)



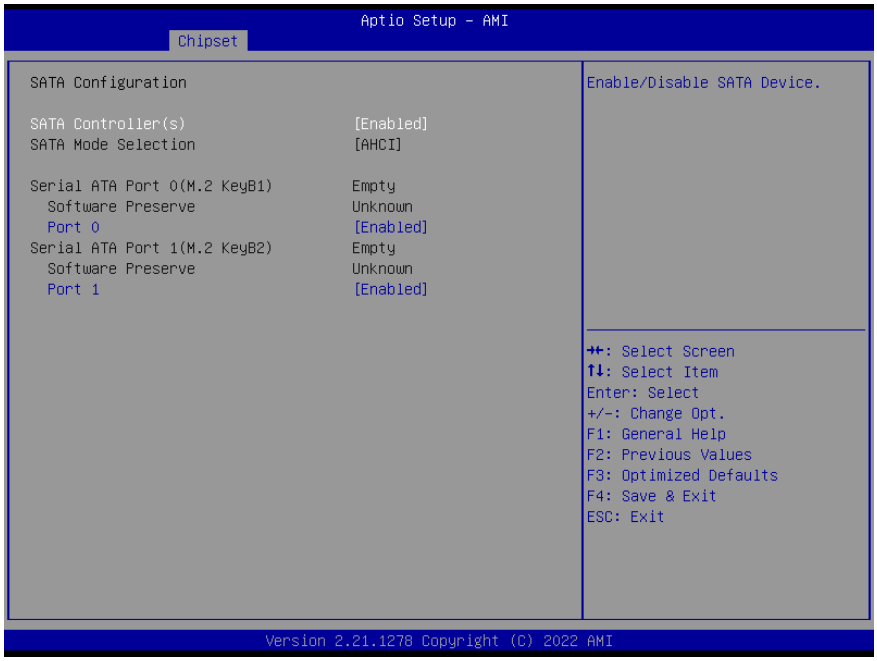
Item	Option	Description
PCI Express Root Port 5(M.2 KeyB/IET)	Disabled Enabled**[Default]**,	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled**[Default]**, L1.1 L1.1 & L1.2	PCI Express L1 Substates settings.
PTM	Disabled**[Default]**, Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe speed

3.6.3.2.1.4 PCI Express Root Port 7(M.2 KeyE/IET)



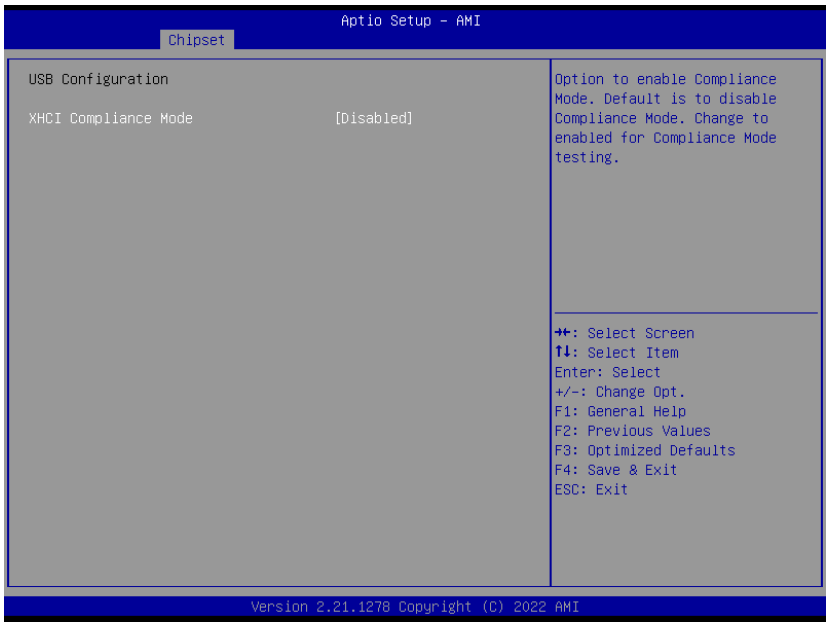
Item	Option	Description
PCI Express Root Port 7(M.2 KeyE/IET)	Enabled**[Default]**, Disabled	Control the PCI Express Root Port.
ASPM	Disabled**[Default]** L0s L1 L0sL1 Auto	Set the ASPM Level: Force L0s – Force all links to L0s State AUTO – BIOS auto configure DISABLE – Disables ASPM.
L1 Substates	Disabled L1.1 L1.1 & L1.2**[Default]**,	PCI Express L1 Substates settings.
PTM	Disabled**[Default]**, Enabled	Enable/Disable Precision Time Measurement
PCIe Speed	Auto**[Default]** Gen1 Gen2 Gen3	Configure PCIe speed.

3.6.3.2.2 SATA Configuration



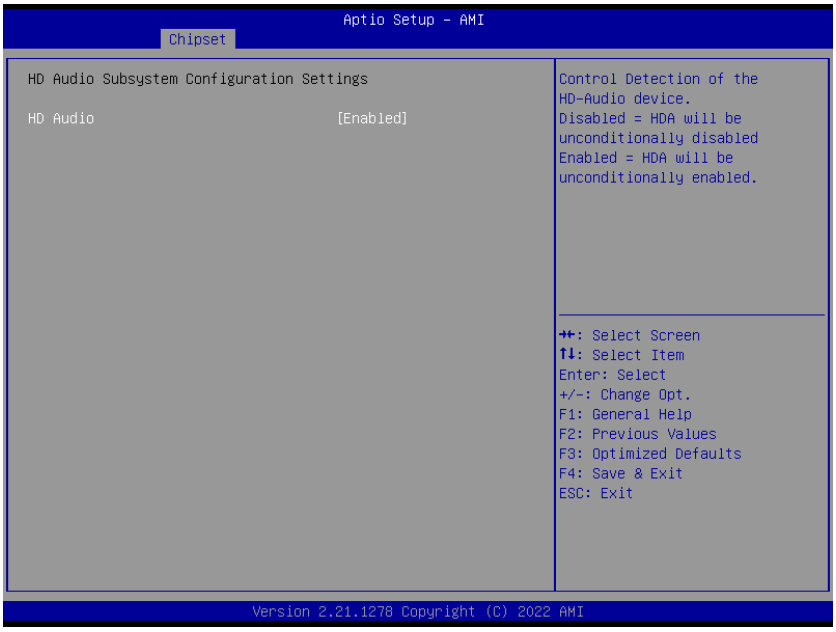
Item	Option	Description
SATA Controller(s)	Enabled**[Default]** Disabled,	Enable/Disable SATA Device.
Port 0/1	Enabled**[Default]** Disabled,	Enable or Disable SATA Port.

3.6.3.2.3 USB Configuration



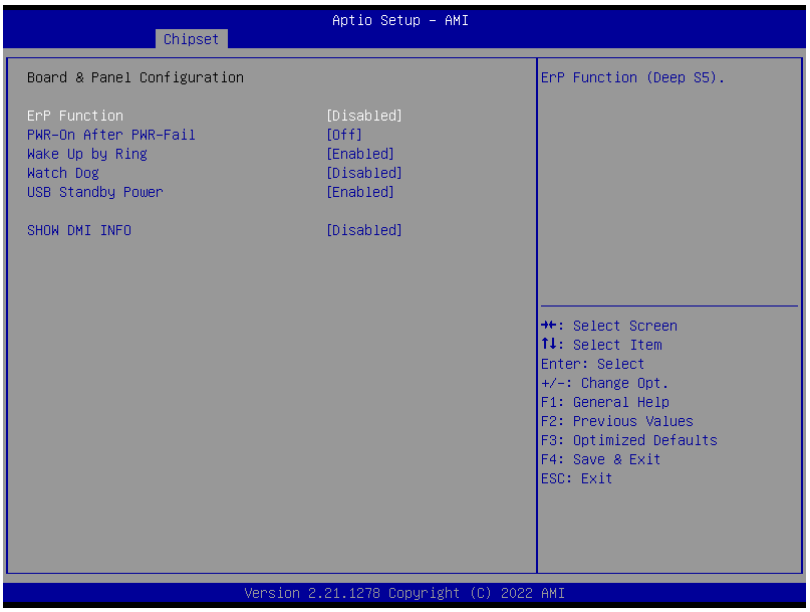
Item	Option	Description
XHCI Compliance Mode	Disabled**[Default]** Enabled	Option to enable Compliance Mode. Default is to disable Compliance Mode. Change to enabled for Compliance Mode testing.

3.6.3.2.4 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.

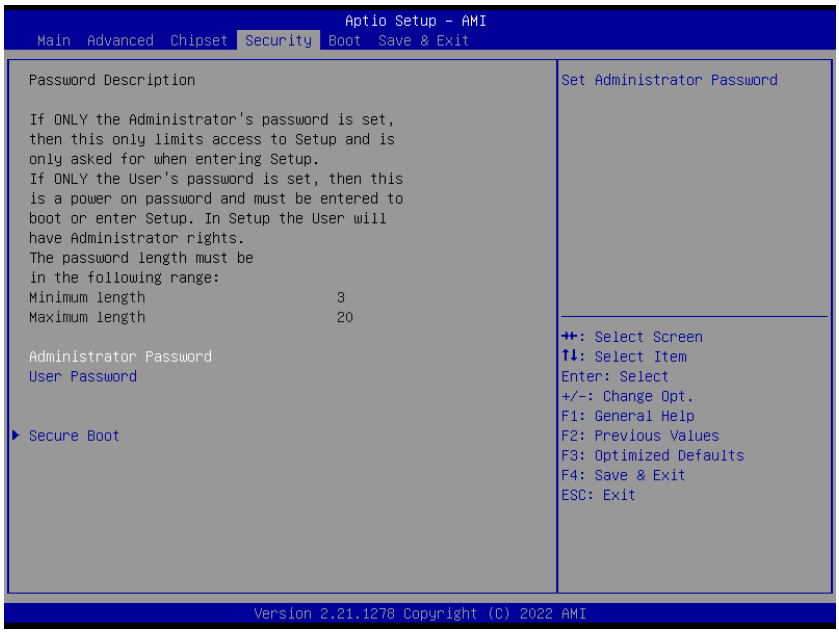
3.6.3.2 Board & Panel Configuration



Item	Option	Description
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 Ring	Disabled Enabled**[Default]**	Wake Up by Ring from S3/S4/S5.
Watch Dog	Disabled**[Default]** 30 sec 40 sec 50 sec 1 min 2 min 10 min 30 min	Select WatchDog.
USB Standby Power	Disabled Enabled**[Default]**	Enable/Disabled USB Standby Power during S3/S4/S5.
SHOW DMI INFO	Disabled**[Default]** Enabled	SHOW DMI INFO.

3.6.4 Security



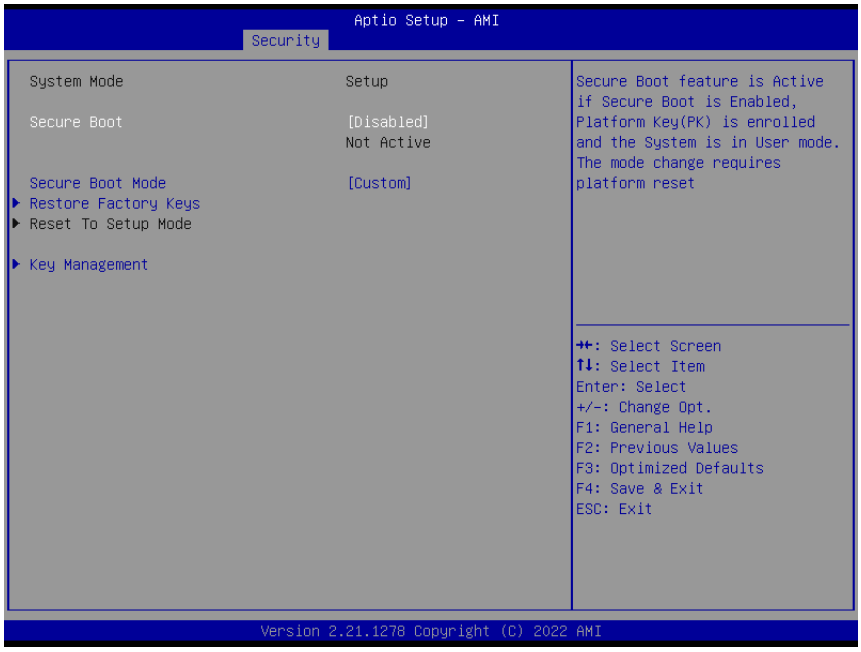
- **Administrator Password**

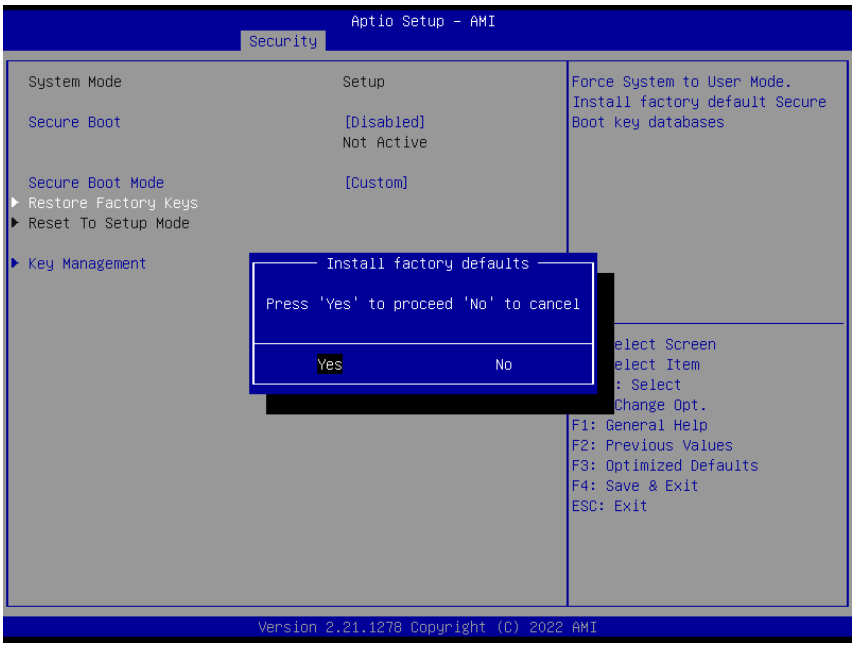
Set setup Administrator Password

- **User Password**

Set User Password

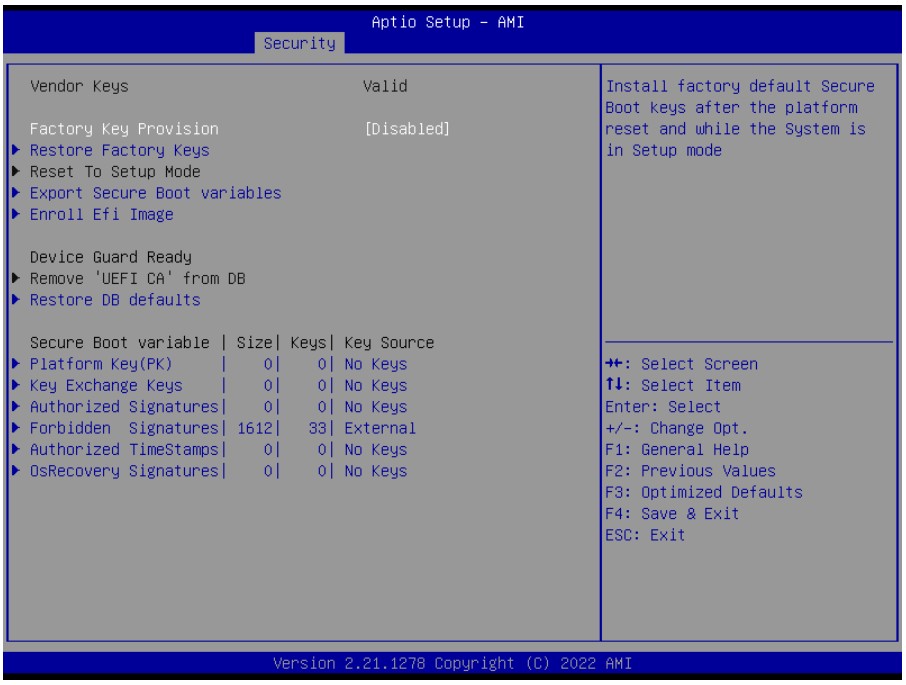
3.6.4.1 Secure Boot





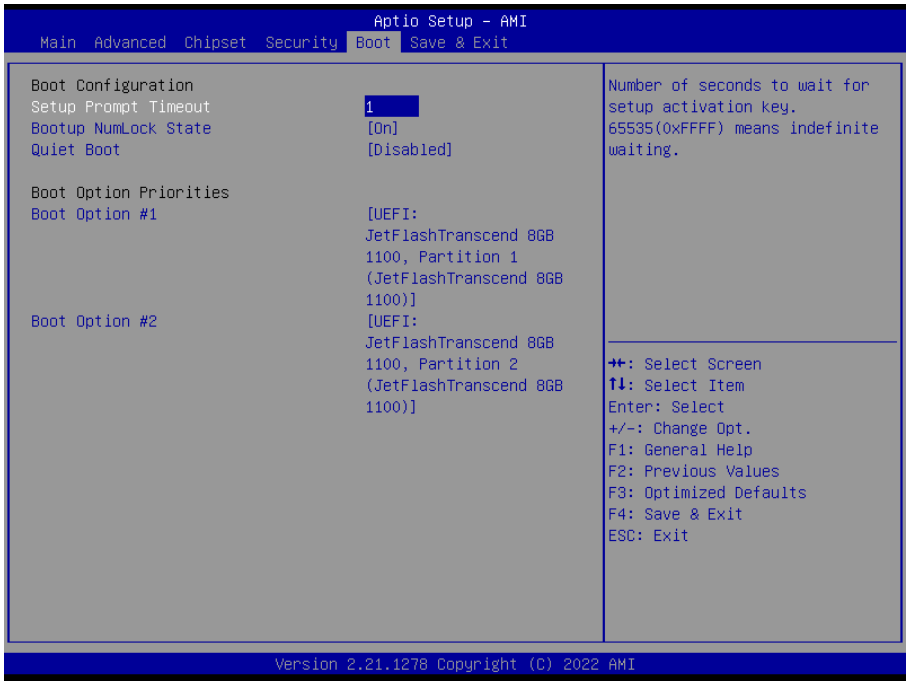
Item	Option	Description
Secure Boot	Disabled**[Default]** Enabled	Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset.
Secure Boot Mode	Standard Custom**[Default]**	Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication.

3.6.4.1.1 Key Management



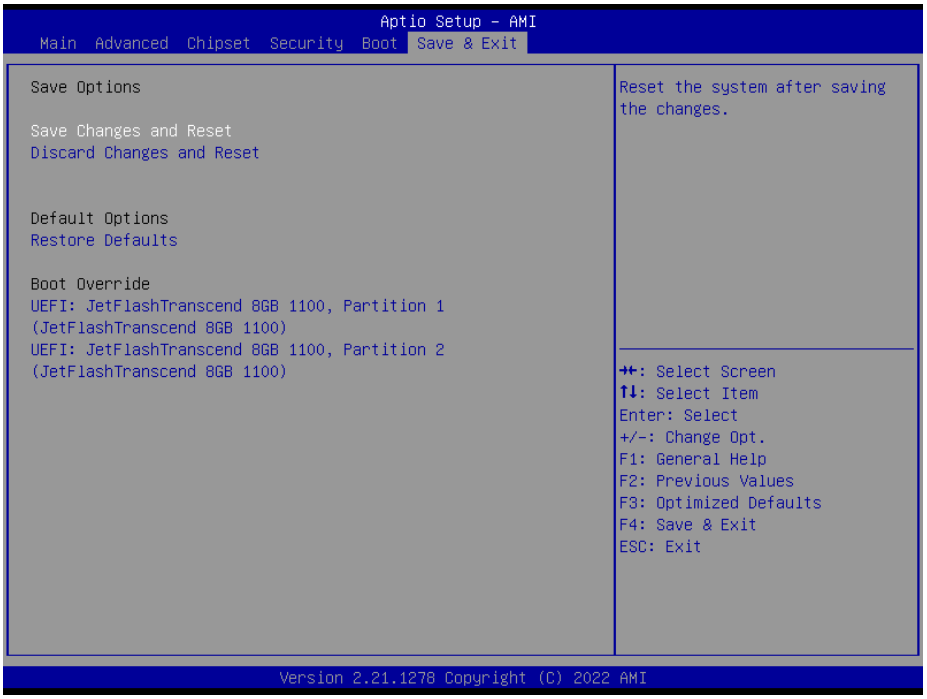
Item	Option	Description
Factory Key Provision	Disabled**[Default]** Enabled	Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode.

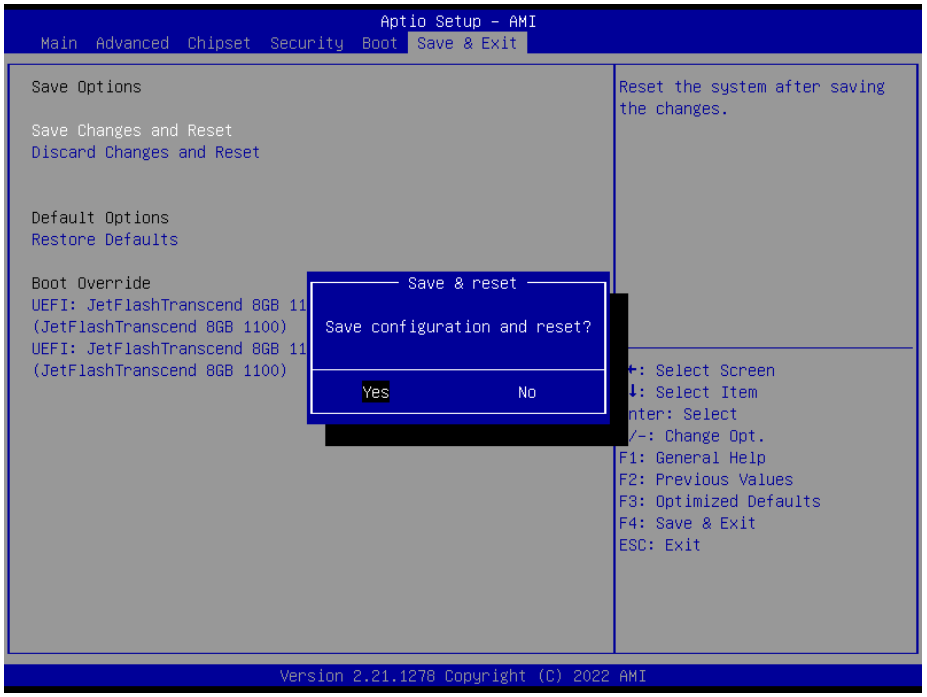
3.6.5 Boot



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
Quiet Boot	Disabled**[Default]** Enabled	Enables or disables Quiet Boot option
Boot Option #1/2	Set the system boot order.	

3.6.6 Save and exit





3.6.6.1 Save Changes and Reset

Reset the system after saving the changes.

3.6.6.2 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.

3.6.6.3 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. Drivers Installation

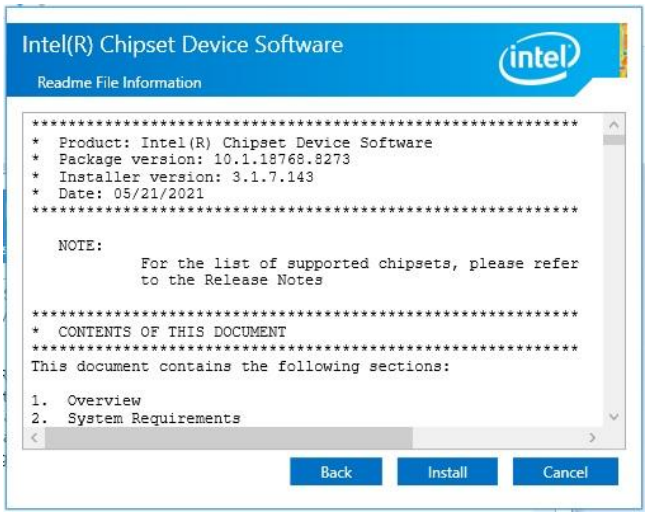


Note: Installation procedures and screen shots in this section are for your reference and may not be exactly the same as shown on your screen.

4.1 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**.

4.2 Install ME Driver

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

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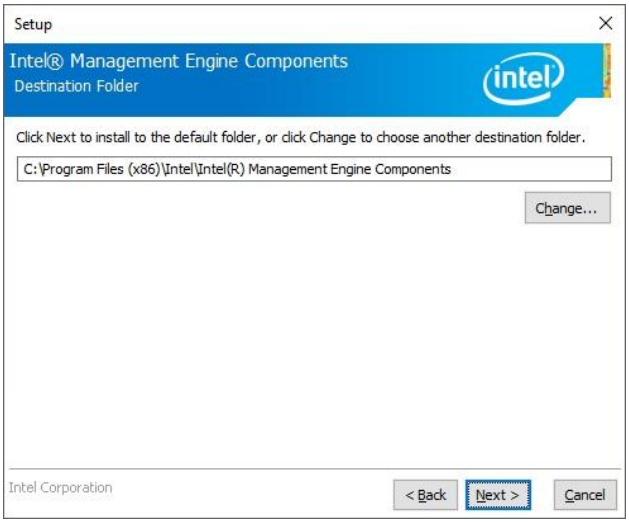
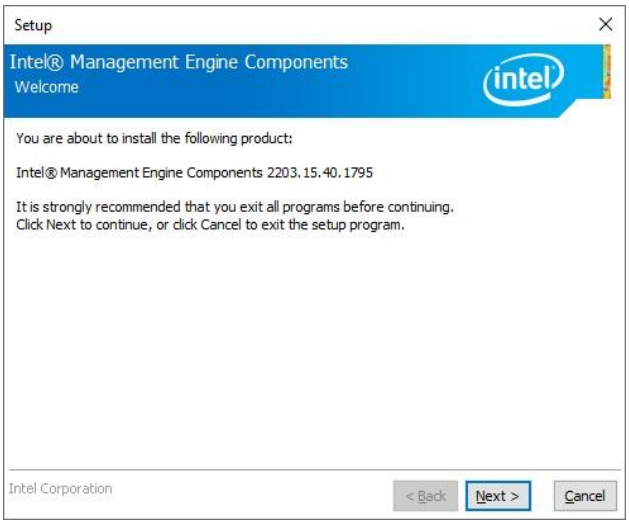
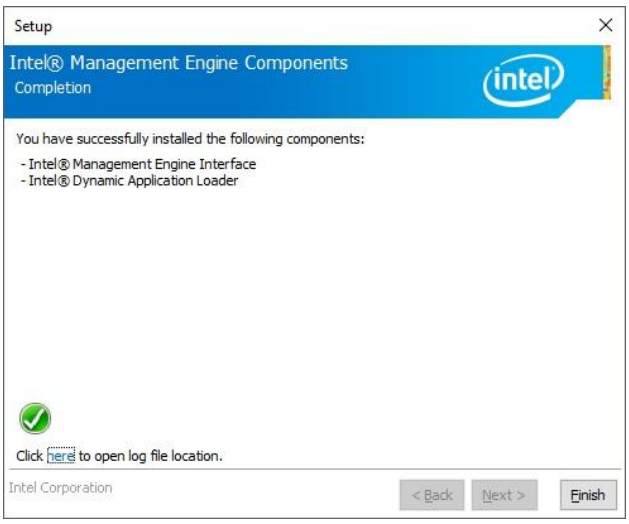
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system. If the warning message appears while the installation process, click Continue to go on.



Step 3. Click **Next** to proceed setup.



Step1. Click **Next** to start installation.



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

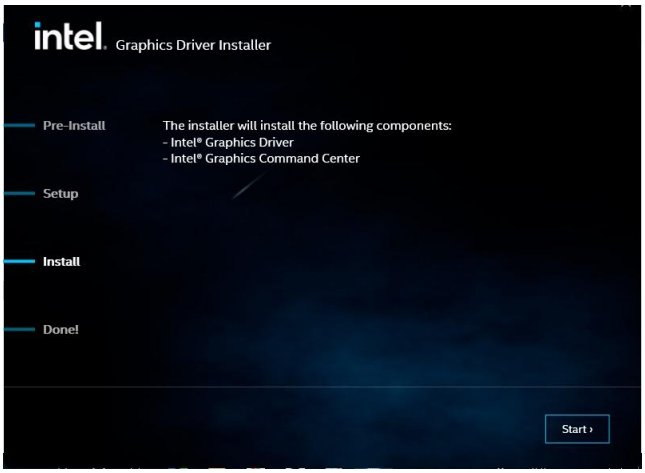


Step 2. Click **Next**.

4.3 Install VGA Driver

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

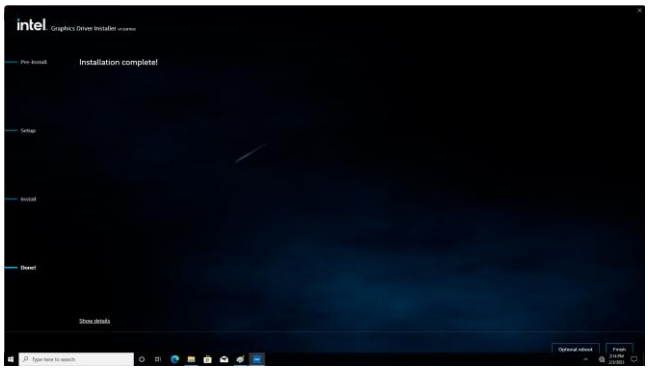
Note: The installation procedures and screen shots in this section are based on Windows 10 operation system.



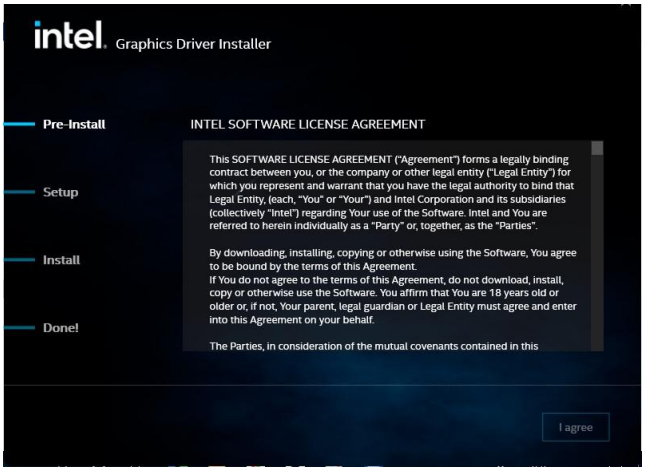
Step 3. Click **Start.**



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



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

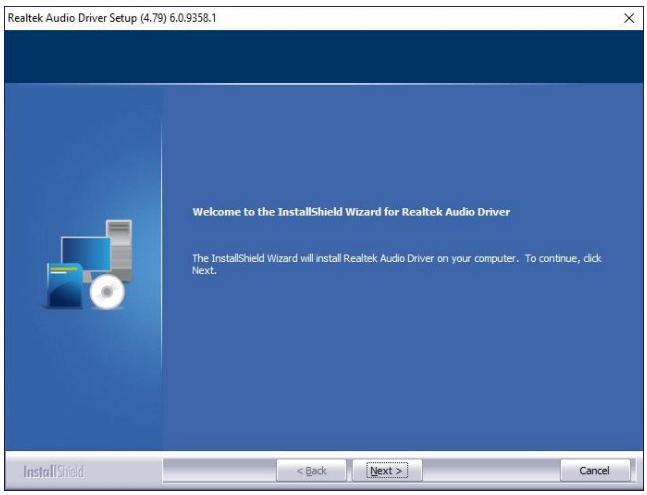


Step 2. Click **I agree**.

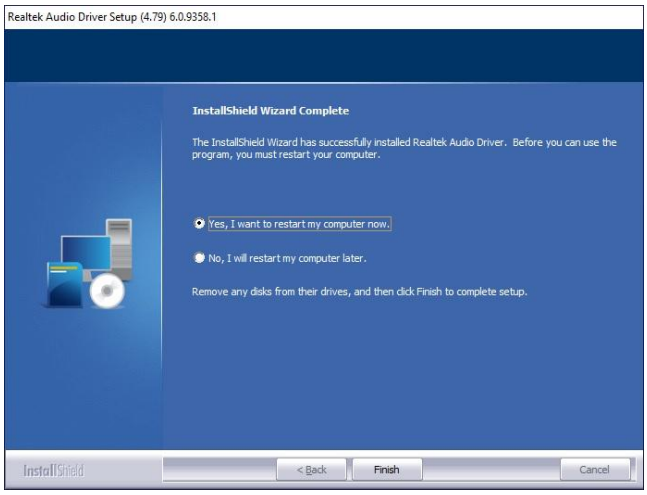
4.4 Install Audio Driver (For Realtek ALC888S)

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 **Next** to continue setup.

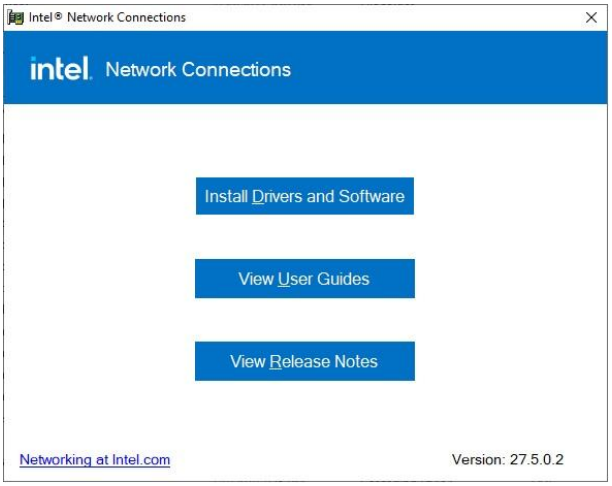


Step 2. Click **Finish** to complete the setup.

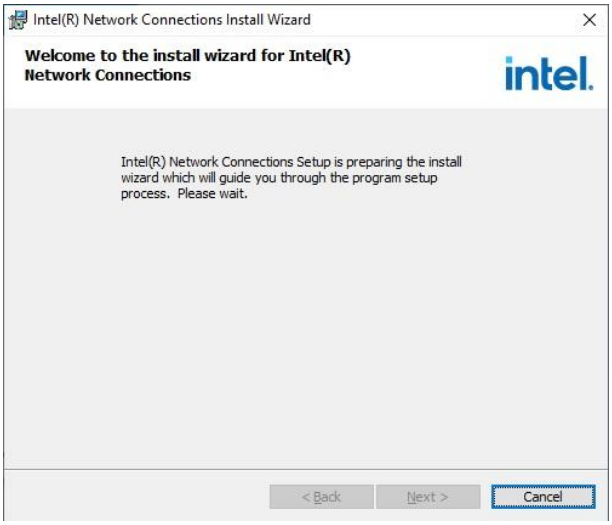
4.5 Install Ethernet Driver

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.



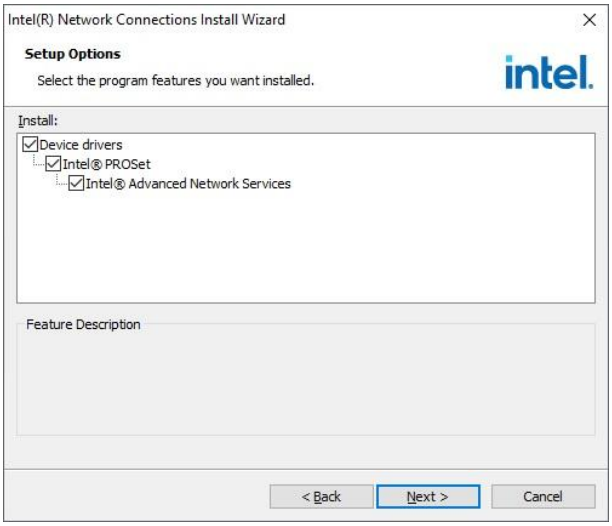
Step 1. Click **Install Drivers and Software**.



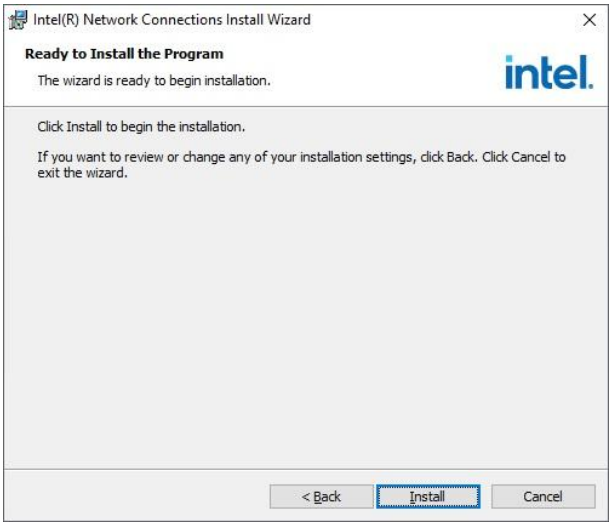
Step 2. Click **Next**.



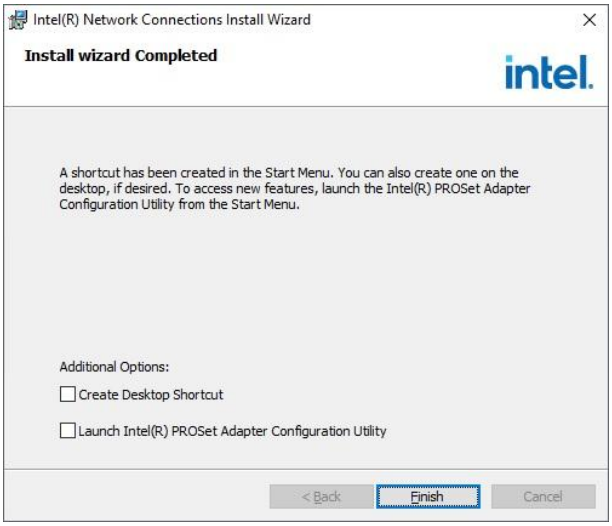
Step 3. Click **Next**.



Step 4. Click **Next**.



Step 5. Click **Install.**



Step 6. Click **Finish** to complete the setup.