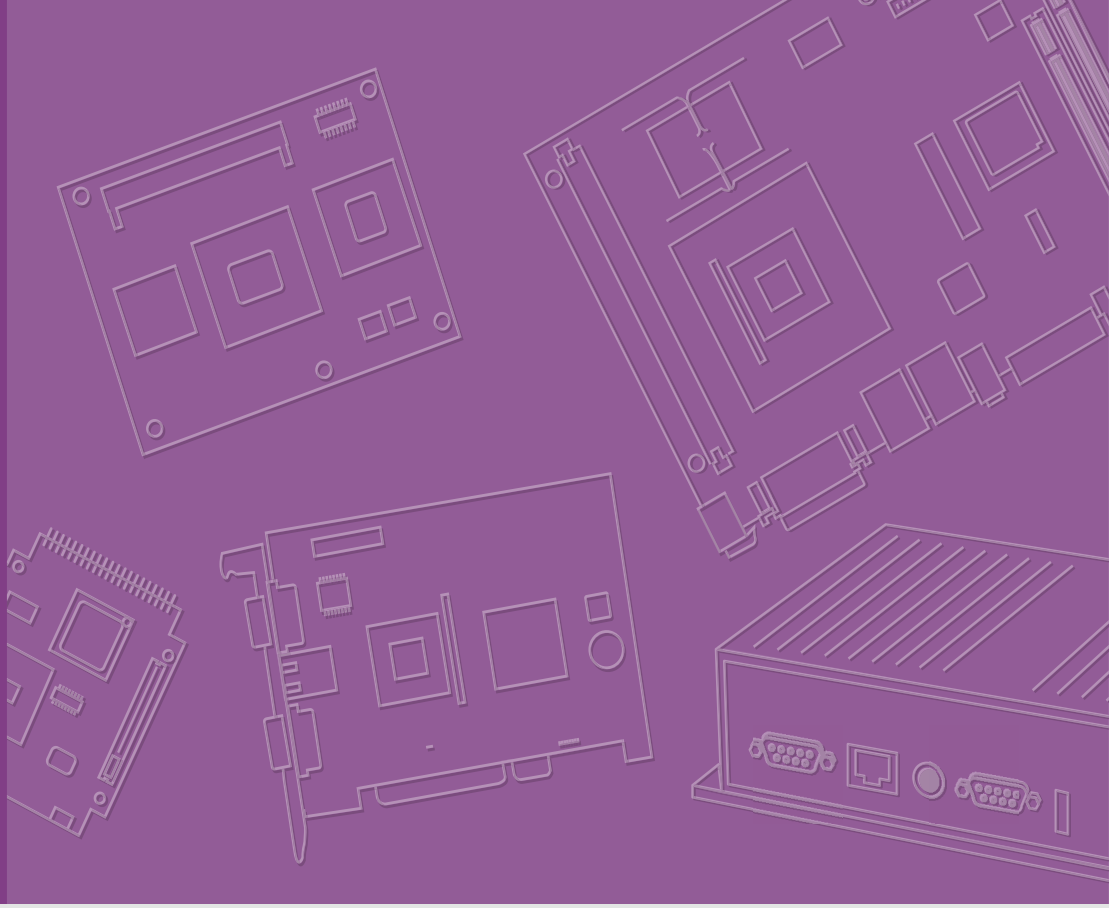


User Manual

ROCK-301

Fanless Embedded Computer

ADVANTECH

Enabling an Intelligent Planet

Attention!

This package contains a hard-copy user manual in Chinese for China CCC certification purpose, Please download the latest English user manual and drivers on website:
https://www.advantech.com/en/products/4b060db2-87e3-4e24-8b8a-ab0af74bfad6/rock-301/mod_794a1adc-27fb-40cf-95b5-2fc164f31ef2
Please disregard the printed Chinese copy of the user manual if the product is not to be sold and/or installed in China.

申請商：研華股份有限公司
地址：台北市內湖區瑞光路 26 巷 20 弄 1 號
電話：02-77323399

設備名稱：電腦 Equipment name				型號（型式）：Rock-301 Type designation (Type)		
單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛 Lead (Pb)	汞 Mercury (Hg)	鎘 Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated Diphenyl ethers (PBDE)
電路板	—	○	○	○	○	○
內外殼（外殼、內部框架…等）	○	○	○	○	○	○
其它固定組件（螺絲、夾具、卡榫）	—	○	○	○	○	○
線材	—	○	○	○	○	○

備考 1. 〝超出 0.1 wt %〞及〝超出 0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。
Note 1: “Exceeding 0.1 wt %” and “exceeding 0.01 wt %” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考 2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。
Note 2: “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考 3. 〝－〞係指該項限用物質為排除項目。
Note 3: The “–” indicates that the restricted substance corresponds to the exemption.

Copyright

Acknowledgments

Intel and Pentium are trademarks of Intel® Corporation.

Microsoft Windows and MS-DOS are registered trademarks of Microsoft® Corp.

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

Product Warranty (3 Years)

Advantech warrants the original purchaser that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that have been subject to misuse, abuse, accident, or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe your product to be defective, follow the steps outlined below.

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages displayed when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number clearly on the outside of the package and ship the package prepaid to your dealer.

Part No. Edition 1

Printed in China December 2024

Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This type of cable is available from Advantech. Please contact your local supplier for ordering information.

CE

This product has passed the CE test for environmental specifications. Test conditions for passing include the equipment being operated within an industrial enclosure. In order to protect the product from damage caused by electrostatic discharge (ESD) or EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

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 this event, users are required to correct the interference at their own expense.

甲類警語

警告使用者：這是甲類資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當對策。

Technical Support and Assistance

1. Visit the Advantech website at www.advantech.com/support to obtain the latest product information.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before calling:
   - 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

Optional Items

Part number	Description
96PSA-A230W24P4-3	ADP A/D 100-240V 230W 24V C14 TERMINAL BLOCK 4P
1700034872-01	M12-RJ45 cable for LAN 10/100Mbps
1700035017-01	M12-DB9 cable for CAN port
1700035018-01	M12-DB9 cable for COM port
1700035019-01	M12-terminal 10pin cable for GPIO port
1700035020-01	M12-terminal *2 5pin cable for remote control
1700033565-01	M12-terminal 6pin cable for power input
1652001524	Terminal block 5pin for M12-terminal 6pin cable

Warnings, Cautions, and Notes

Warning! *Warnings indicate conditions that if not observed can cause personal injury!*

Les avertissements indiquent des conditions qui, si elles ne sont pas respectées, peuvent provoquer des blessures!

Caution! *Cautions are included to help prevent hardware damage and data losses.*

Des précautions sont incluses pour vous aider à éviter d'endommager le matériel ou de perdre des données.

Note! *Notes provide additional optional information.*

Document Feedback

To assist us with improving this manual, we welcome all comments and constructive criticism. Please send all feedback in writing to support@advantech.com.

Packing List

Before system installation, check that the items listed below are included and in good condition. If any item does not accord with the list, contact your dealer immediately.

- 1 x ROCK-301 unit
- 5x screws (for M.2, mPCIe module installation)
- 1x wall mount kit

Ordering Information

Part Number	Description
ROCK-301-V701DA1	i7-1365URE,8GB RAM, 64GB NVME, 4 PoE, -40 - 71 °C

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping or letting the equipment fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. Do not cover the openings.
8. By means of a power cord connected to a socket-outlet with a grounded connection.
9. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
10. Position the power cord away from high-traffic areas. Do not place anything over the power cord.
11. All cautions and warnings on the equipment should be noted.
12. If the equipment is not used for a long time, disconnect it from the power source to avoid damage from transient overvoltage.
13. Never pour liquid into an opening. This may cause fire or electrical shock.
14. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
15. If any of the following occurs, have the equipment checked by service personnel:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture.
    - The equipment is malfunctioning, or does not operate according to the user manual.
    - The equipment has been dropped and damaged.
    - The equipment shows obvious signs of breakage.
16. CAUTION: Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
17. CAUTION: 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.
18. CAUTION: Always ground yourself to remove any static charge before touching the motherboard, backplane, or add-on cards. 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 on a static-dissipative surface or in a static-shielded bag when they are not in the chassis.
19. CAUTION: Any unverified component could cause unexpected damage. To ensure the correct installation, please always use the components (ex. screws) provided with the accessory box.
20. This model is intended to be supplied by an UL-certified power supply suitable for use at TMA 71°C (159.8 °F) min., and the out- put is rated 12Vdc/

20A,24Vdc/10A, ES1. If you need further assistance, contact Advantech for additional information.

21. 本產品於國內裝置使用時，其電源僅限使用機架電源模組所提供直流電源輸入，不得使用交流電源及附加其他電源轉換裝置提供電源，其電源輸入電壓及電流請依說明書規定使用。
22. 警告使用者：為避免電磁干擾，本產品不應安裝或使用於住宅環境。

Consignes de sécurité

1. Lisez attentivement ces instructions de sécurité.
2. Conservez ce manuel d'utilisation pour référence ultérieure.
3. Débranchez cet équipement de toute prise secteur avant de le nettoyer. Utilisez un chiffon humide. N'utilisez pas de détergents liquides ou en spray pour le nettoyage.
4. Pour les équipements enfichables, la prise de courant doit être située près de l'équipement et doit être facilement accessible.
5. Gardez cet équipement à l'abri de l'humidité.
6. Placez cet équipement sur une surface fiable pendant l'installation. Le laisser tomber ou le laisser tomber peut provoquer des dommages.
7. Les ouvertures du boîtier sont destinées à la convection d'air. Protégez l'équipement contre la surchauffe. NE COUVREZ PAS LES OUVERTURES.
8. Assurez-vous que la tension de la source d'alimentation est correcte avant de connecter l'équipement à la prise de courant. Le câble de la source d'alimentation doit être blindé.
9. Positionnez le cordon d'alimentation de sorte que personne ne puisse marcher dessus. Ne placez rien sur le cordon d'alimentation. La tension et le courant nominal du cordon doivent être supérieurs à la tension et au courant indiqués sur le produit.
10. Toutes les précautions et avertissements sur l'équipement doivent être notés.
11. Si l'équipement n'est pas utilisé pendant une longue période, débranchez-le de la source d'alimentation pour éviter tout dommage par surtension transitoire.
12. Ne versez jamais de liquide dans une ouverture. Cela peut provoquer un incendie ou un choc électrique.
13. N'ouvrez jamais l'équipement. Pour des raisons de sécurité, l'équipement ne doit être ouvert que par un technicien qualifié.
14. Si l'une des situations suivantes se présente, faites vérifier l'équipement par le personnel de service:
    - Lecordond'alimentationoulaficheestendommagé.
    - Duliquideapénétrédansl'équipement.
    - L'équipementaétéexposéàl'humidité.
    - L'équipementnefonctionnepasbien,ouvousnepouvezpaslefaire fonctionner selon le manuel de l'utilisateur.
    - L'équipementesttombéetaétéendommagé.
    - L'équipementprésentedessignesévidentsderupture.
15. ATTENTION: L'ordinateur est fourni avec un circuit d'horloge en temps réel alimenté par batterie. Il y a un risque d'explosion si la batterie n'est pas remplacée correctement. Remplacez uniquement par un type identique ou équivalent recommandé par le fabricant. Jetez les piles usagées conformément aux instructions du fabricant.
16. ATTENTION: L'ordinateur est muni d'un circuit en temps réel de l'horloge alimentée par betterie. Il y a un danger d'explosion si la pile est replacée de façon incorrecte. Remplacez uniquement par un type identique ou équivalent recom-

mandé par le fabricant. Jetez les piles usagées selon les instructions du fabricant.

17. ATTENTION: débranchez toujours complètement le cordon d'alimentation de votre châssis lorsque vous travaillez avec le matériel. N'établissez pas de connexions lorsque l'appareil est sous tension. Les composants électroniques sensibles peuvent être endommagés par des surtensions soudaines.
18. ATTENTION: mettez-vous toujours à la terre pour éliminer toute charge statique avant de toucher la carte mère, le fond de panier ou les cartes d'extension. Les appareils électroniques modernes sont très sensibles aux charges électriques statiques. Par mesure de sécurité, utilisez en tout temps un bracelet antistatique. Placez tous les composants électroniques sur une surface dissipant l'électricité statique ou dans un sac blindé antistatique lorsqu'ils ne sont pas dans le châssis.
19. Ce modèle est destiné à être alimenté par une alimentation certifiée UL adaptée à une utilisation à TMA 71°C (159,8 °F) min., et la sortie est évaluée à 12 Vcc/ 20 A, 24 Vcc/10 A, ES1. Si vous avez besoin d'aide supplémentaire, contactez Advantech pour obtenir des informations supplémentaires.

Contents

Chapter 1

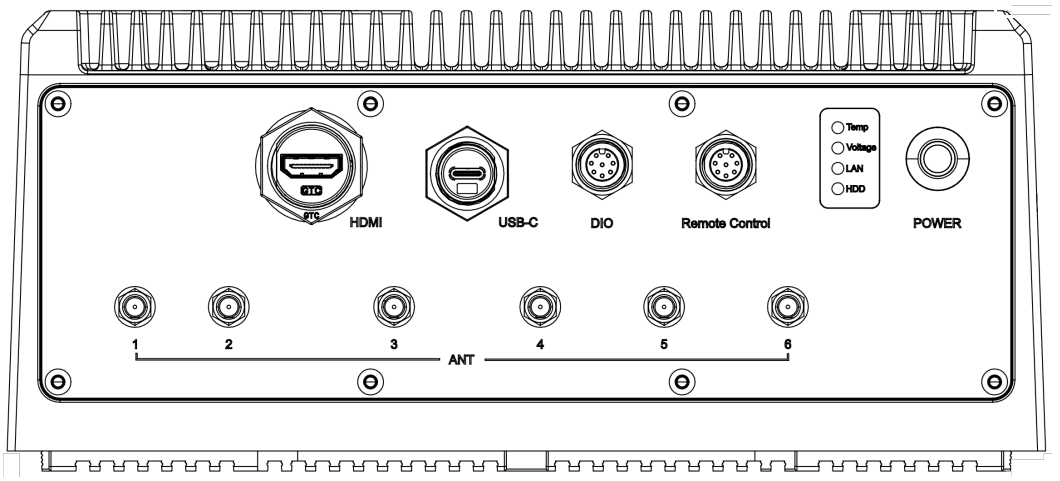
General Introduction

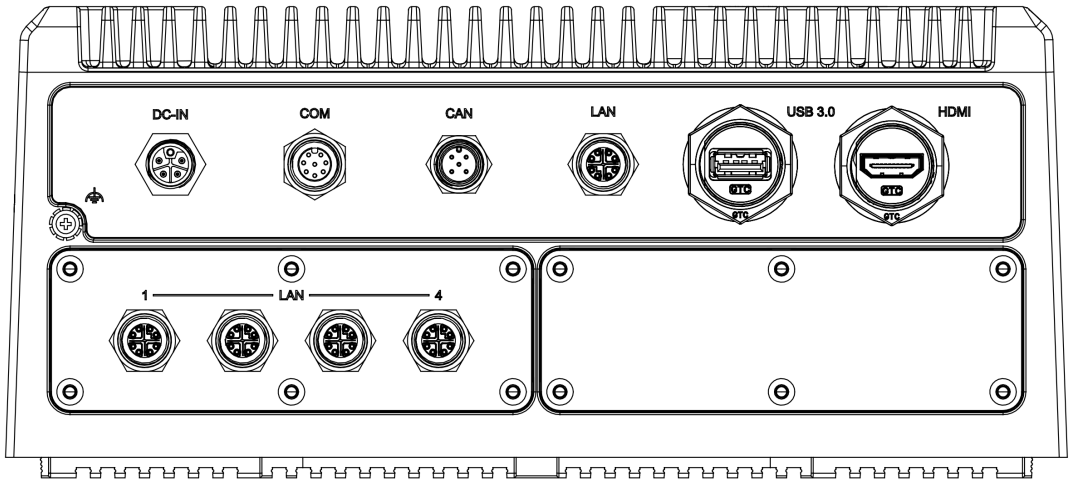
This chapter details background information for the ROCK-301 series.

1.1 Introduction

The ROCK-301 is a fanless embedded box PC designed for mission-critical applications. It leverages the 13th Gen Intel® Core™ processors to provide high performance and reliability. The ROCK-301 features an IP65-rated enclosure, making it ideal for harsh environments where water and dust protection are essential.

ROCK-301 I/O Overview





1.2 Features

- 13th Gen Intel® Core™ i7 CPU
- Fanless operation with a temperature range of -40 to 71°C
- IP65-rated enclosure for water and dust resistance
- High-speed DDR5 8GB RAM and NVMe 64GB SSD
- M.2 2280 slot for storage/AI expansion
- MIL-STD810H and E-Mark compliances
- Off-the-shelf I/O module expansion
- 3-year warranty and 10-year longevity

1.3 Specifications

- **CPU:** Intel Core™ i7-1365URE 1.7/4.9 GHz
- **GPU:**
  - Intel® Iris® Xe Graphics 1.20 / 1.30 GHz
  - 2 x HDMI 2.0b with 4Kx2K support at 48-60Hz/24bpp
- **Graphic output:**
  - HW Encode: Supports AVC, MPEG-2, HEVC, and VP9.
  - HW Decode: Supports Direct3D* 9 Video API (DXVA2), Direct3D 12 Video API, Intel Media SDK, MFT (Media Foundation Transform) filters, Intel VA API
- **BIOS:** AMI EFI 256 Mbit
- **System memory:**
  - 1 x SO-DIMM socket up to 32GB, DDR5 4800 MT/S
  - 1 x SO-DIMM socket with 8GB DDR5 (up to 32GB RAM by option. Please contact Advantech if you want to expand your memory capacities.)
- **Storage:**
  - Onboard NVME SSD 64GB
  - mSATA: 1 x full size mSATA storage (leverage mPCIe slot)
  - 1 x SATA and power for 2.5" SSD/HDD (option)
- **Remote control:** 1 x M12 A-code (Power ON/OFF, WDT, Reset, DC-out 12V/ 1A)
- **Serial port:** 1 x M12 A-code RS-232/422/485 with 8 kV/15 kV ESD protection
- **CANbus port:** 1 x M12 A-code CANbus 2.0 A/B with 8 kV/15 kV ESD protection
- **DIO port:** 1 x M12 A-code 4DI, 4DO with 8 kV/15 kV ESD protection
- **USB port:**
  - 1x M20 USB 3.0/2.0 type A
  - 1x M20 USB 4.0 type C with 8 kV/15 kV ESD protection
- **Ethernet/power over Ethernet port:**
  - 1 x M12 X-code Speed: 10/100/1000M/2.5G with 8 kV/15 kV ESD protection
  - 4 x M12 X-code 10/100 Mbps PoE (IEEE802.3af, maximum power output of 60W) with 8 kV/15 kV ESD protection
- **Expansion slot:**
  - 1 x full-size mini PCIe/mSATA slot (with PCIe Gen3/ USB 2.0 & SATA)
  - 1 x M.2 3042/3052 B Key (with PCIe Gen 3, USB 3.0 & 2.0 signals)
  - 1 x M.2 2280 M Key (with PCIe x4 Gen 4 signal)
  - 1 x Modular I/O expansion
- **Watchdog timer:** 255-level timer interval, setup by software
- **LED:** 4x LED Temperature (Red), Voltage (Red), 4G/5G (Green), storage (Green).
- **Power requirement:**
  - Power type: ATX and AT (V mode only support AT)
  - Input voltage: In-Vehicle: +12/24V_{DC} (input range 9-36V, default 12V)
  - Vehicle Power Ignition: Selectable boot-up & shut-down voltage, on/off delay time (30-240 seconds)
  - Over Voltage Protection: 38.5V
    Over Current Protection: 30A
    ESD Protection: with 8k contact/ 15kV air ESD protection Surge Protection: 1kV (line to line)

- **Dimensions (W x H x D):** 260 x 180 x 115 mm/ 10.23 x 7.08 x 4.52 inch (without wall-mounting)
- **Mounting:** Desk/Wall-mounting
- **Enclosure:** Fanless system
- **Operating temperature:**
  - MIL-STD-810H Method 514.8
    With extended temperature peripherals: - 40 - 71 °C/- 40 ~ 159.8 °F extended temperature peripherals
- **Relative humidity:** 95% @ 60 °C/ 140°F (non-condensing)
- **Environment:**
  - IP Class (Solid Particle): IP class 6X (operating with protected mating interfaces against water and dust incursion)
  - IP Class (Water): IP class X5 (operating with protected mating interfaces against water and dust incursion)
- **Operating temperature:** Military MIL-STD-810H Method 514.8, -40-71 °C/ -40~159.8°F (with extended temperature peripherals)
- **Storage temperature:** Military, MIL-STD-810H Method 514.8, -40 ~ 85 °C/ -40~185 °F
- **Storage humidity:** IEC 60068, 95% @ 40 °C (non-condensing)
- **Vibration:**
  - Military MIL-STD-810H Method 514.8 (vertical 3.98 Grms)
  - Vehicle EN 60721-3-5 (5M3. 10~200Hz, 3 m2/S3)
- **Shock:**
  - Military: MIL-STD-810H Method 516.8 (40 Grms)
  - Vehicle: EN60721-3-5 Class 5M3 (100G| 6ms)
  - Electronic: IEC 60068-2-27 (with a total maximum power output of PoE restricted to 30W, LAN1/2/3/4 48Vdc/0.156A)
- **Salt Fog - IEC 60068-2-11:** 2021 Salt mist test (48 hours at 35 °C/ 95 °F)
- **EMC:**
  - IEC CE/FCC Class A
  - EN61000-6-4, EN61000-6-2
  - MIL-STD-461 (Compliant)
  - ISO7637-2
- **Safety:**
  - E-Mark (13)
  - CB, UL

Chapter 2

Hardware Installation

This chapter introduces the installation of ROCK-301 hardware.

2.1 Overview of Hardware Installation & Upgrading

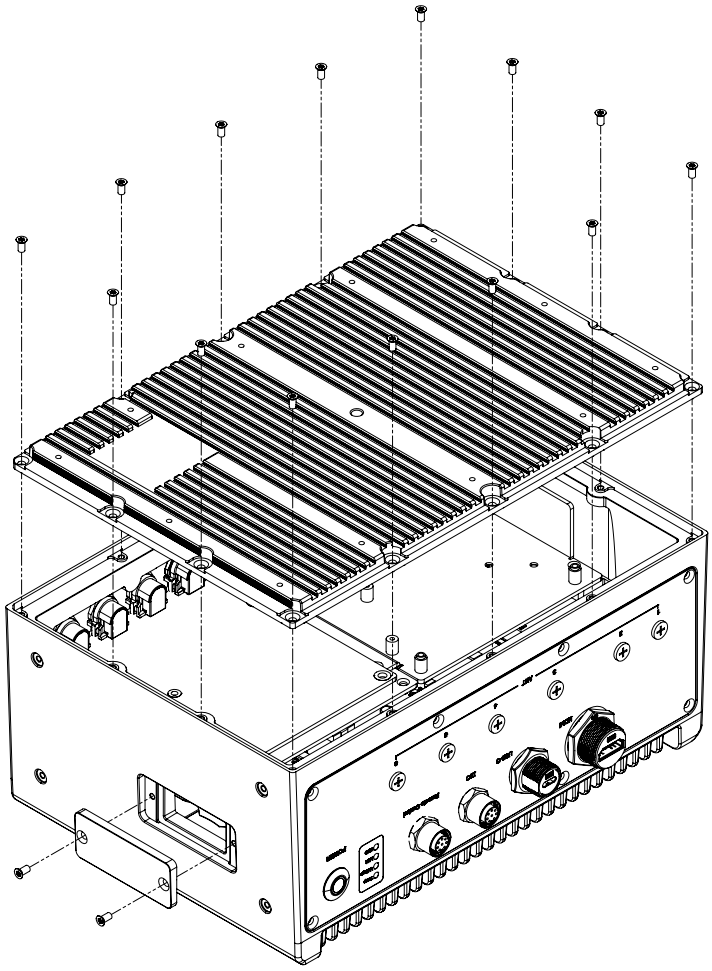
Warning! *Do not remove the aluminum covers until verifying that no power is flowing within the computer. Power must be switched off and the power cord must be unplugged. Take care in order to avoid injury or damage to the equipment.*

2.2 Expansions (mSATA, mPCIe, M.2, SIM, Colin Battery)

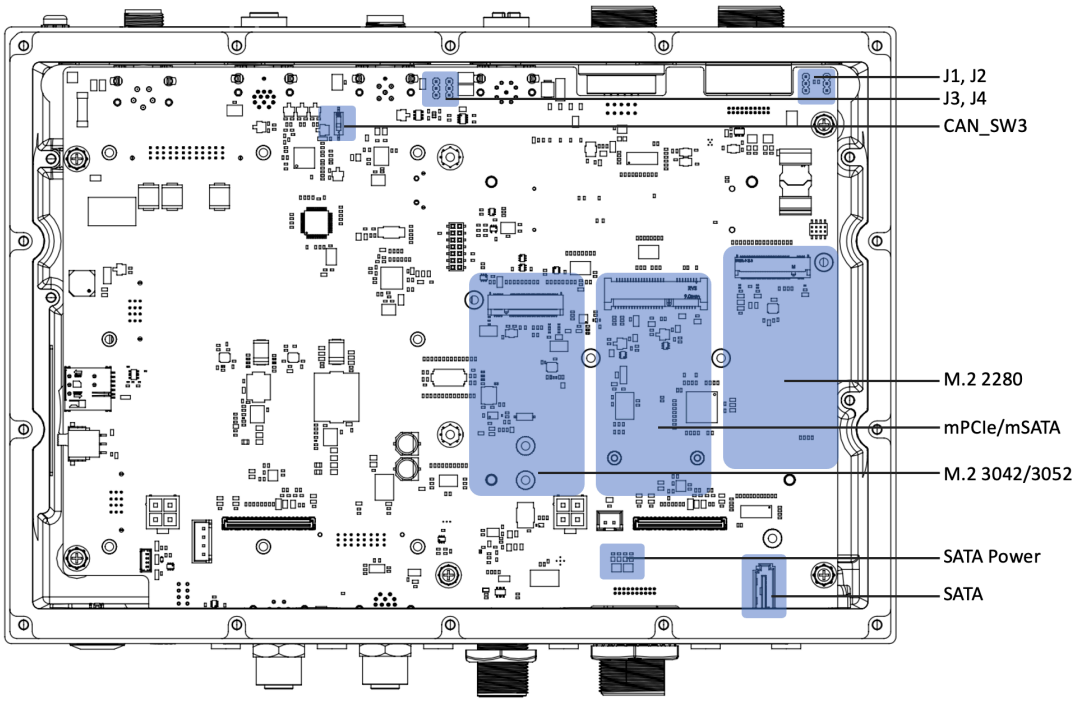
Please contact Advantech sales if you want to install or upgrade the hardware in order to ensure product quality and IP-rated protection.

Remove 14 screws in total to install accessories on the button side of the board for mSATA, mPCIe, M.2. For install SIM card and colin battery, remove a total of 2 screws.

Please use a torque screwdriver to lock the 14 screws with a torque value of 8.0±0.5 kgf-cm after installation to ensure proper IP65 functionality.

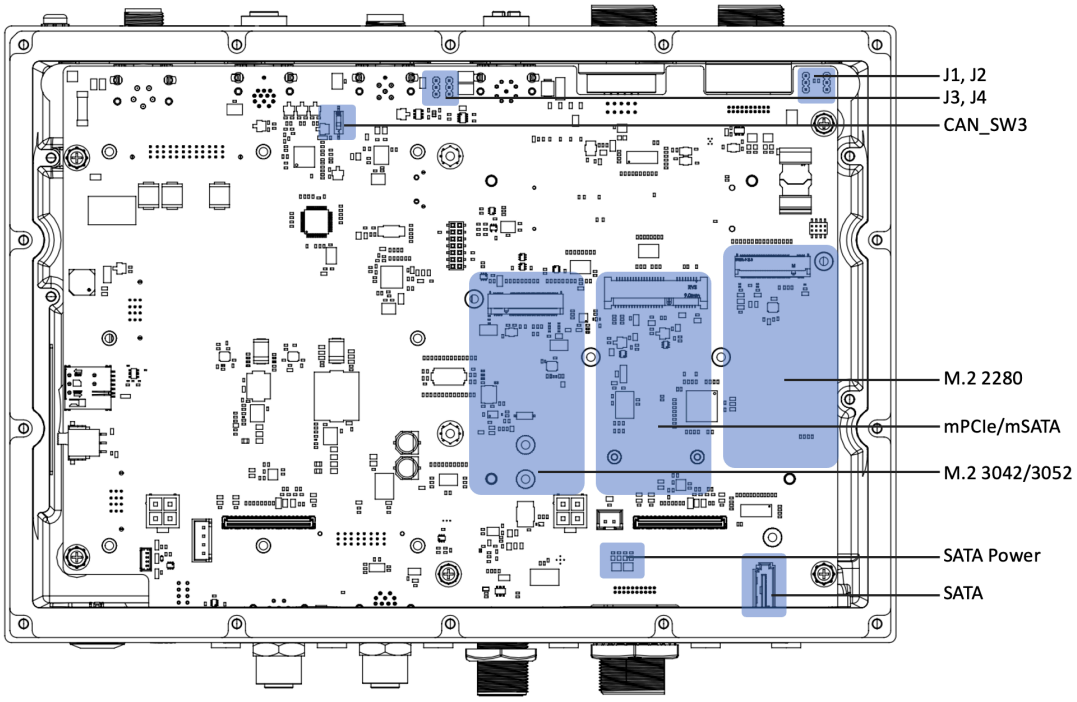


Install accessories on the button side of the board.



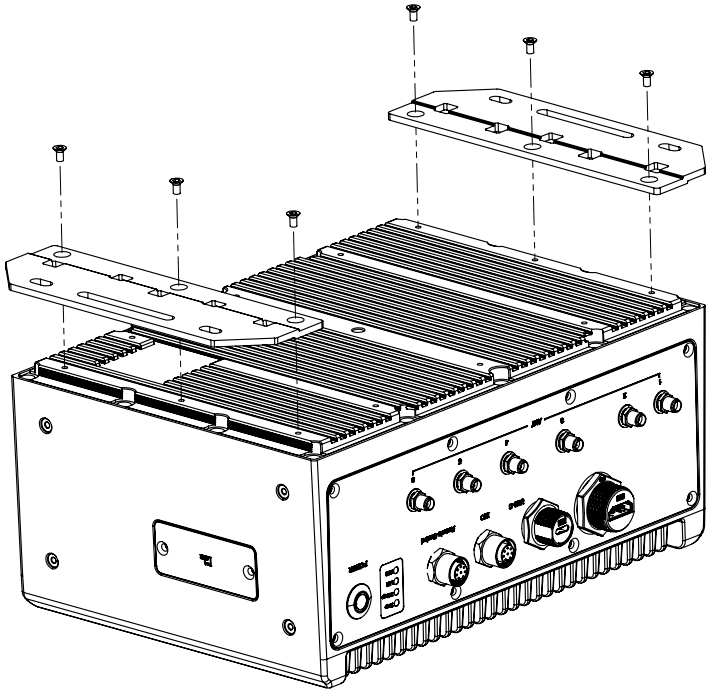
2.3 SATA and Power

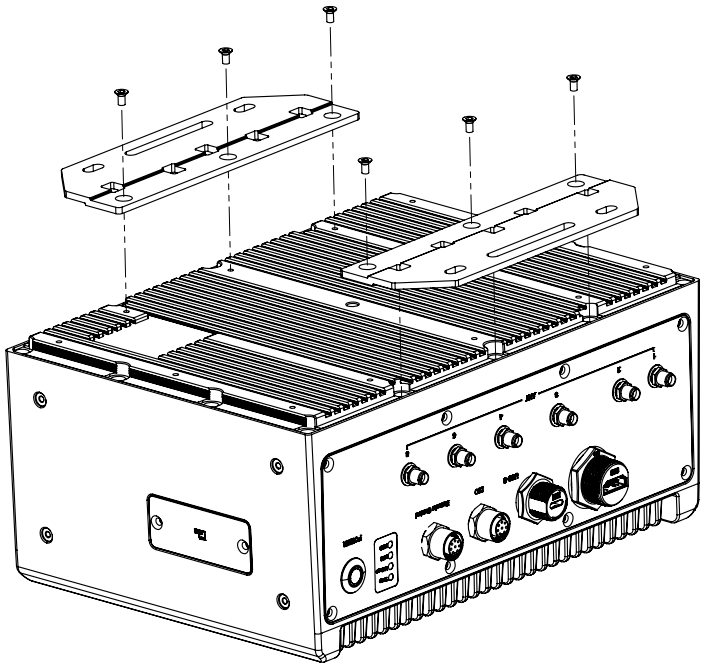
Please check that SATA cable, power cable, and 2.5” HDD mounting kit are ready before set up. If any item does not accord with the table, please contact your dealer immediately.



2.4 Installing Mounting Kit

ROCK-301 offers two mounting options: front-to-back and side-to-side. Users can choose the appropriate installation method based on the site environment.





2.5 Installing Memory & Modular I/O

Please contact Advantech if you want to expand your memory or modular I/O capacities.

Chapter 3

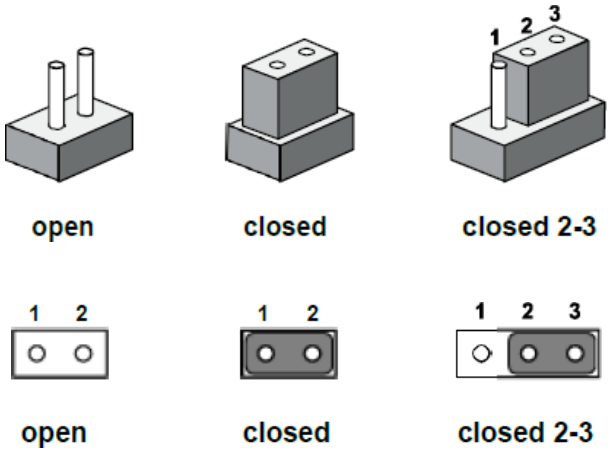
Jumper and Switch Settings

This chapter explains how to set up ROCK-301 Series hardware, including instructions on setting jumpers and connecting peripherals, and how to set switches and read indicators.

Be sure to read all the safety precautions before beginning the installation procedure.

3.1 Setting Jumpers and Switches

It is possible to configure the In-Vehicle Computing Box to match the needs of the application by resetting the jumpers. A jumper is the simplest kind of electrical 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, connect the pins with the clip. To “open” a jumper, remove the clip. Sometimes a jumper has three pins, labeled 1, 2, and 3. In this case, connect either pins 1 and 2, or pins 2 and 3.



A pair of needle-nose pliers may be helpful when working with jumpers. If there are any doubts about the best hardware configuration for the application, contact the local distributor or sales representative before making any changes.

An arrow is used on the motherboard to indicate the first pin of each jumper.

3.1.1 Location of Jumpers, Connectors, and Switches

Table 3.1: Mainboard: Reserved for user setup.

Connector	Description
SATA	SATA connector
SATA PWR1	SATA power Connector
M2B1	M.2 3042/3052
MINIPCIE1	miniPCIe/mSATA
M2M1	M.2 2280

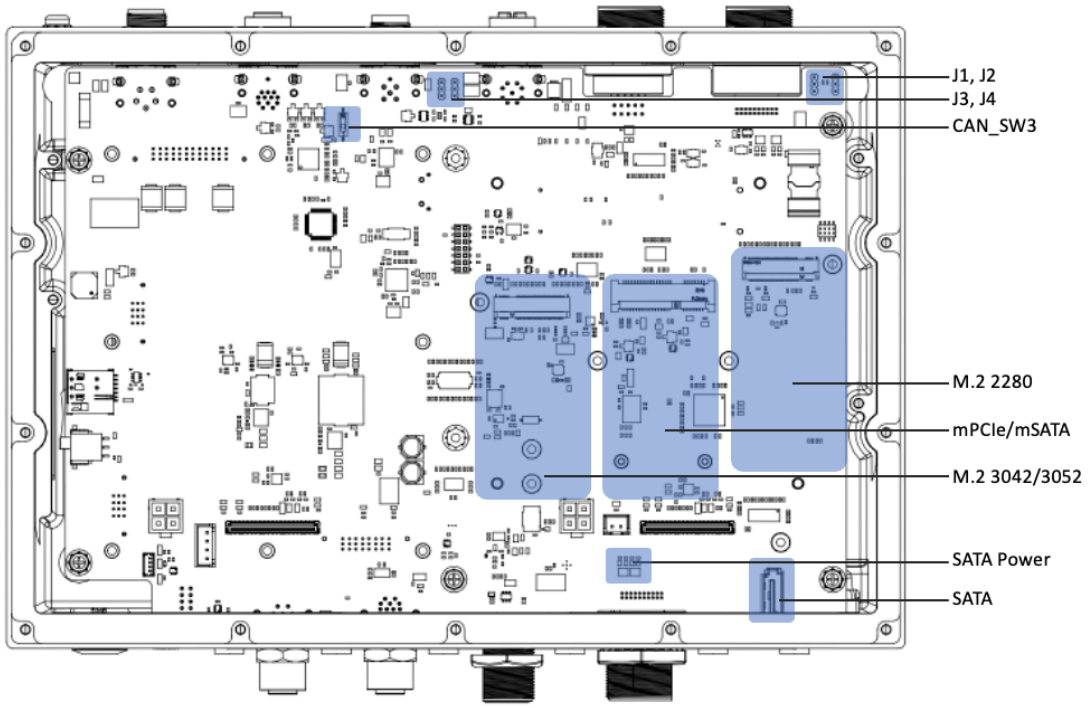


Figure 3.1 Top View of Reserved Connectors

Table 3.2: Power board: Reserved for user setup	
Connector	**Description**
SW1	Power ignition control

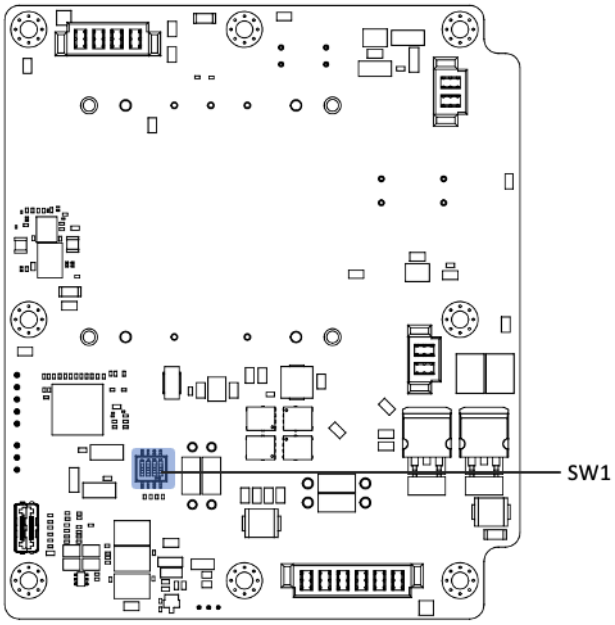


Figure 3.2 Bottom Side of Reserved Connectors

3.2 Jumper Settings

3.2.1 Main Board

3.2.1.1 BIOS Boot Priority (J1, J2)

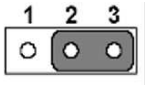


Table 3.3: Clear CMOS (CMOS1)

Setting	Function
2-3 (J1) / 1-2 (J2)	Booting from backup BIOS EEPROM (carrier board)
2-3 (J1) / 2-3 (J2)	Booting from main board (default)

3.2.2 Power Board

3.2.2.1 Power Input Mode (J1)

ROCK-301 provides two power input modes. One is V for in-vehicle and P is for power adapter.

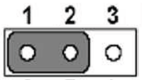


Table 3.4: Power Input Mode

Setting	Function
1-2	V mode (In-vehicle mode, default)
2-3	P mode (power adapter)

3.3 Connector Settings

3.3.1 Main Board

3.3.1.1 SATA Connector (SATA1)

Table 3.5: SATA Connector

Pin	Signal Name	Pin	Signal Name
1	GND	2	SATA0_TX+
3	SATA0_TX-	4	GND
5	SATA0_RX-	6	SATA0_RX
7	GND		

3.3.1.2 SATA Power Connector (SATA_PWR1)

Table 3.6: SATA Power Connector

Pin	Signal Name	Pin	Signal Name
1	+5V	2	GND

3.4 Switch Settings

3.4.1 Main Board

3.4.1.1 CAN Bus Function (CAN_SW3)

Table 3.7: CAN Bus Function (CAN_SW3)

Setting	Function
ON	J1939/ Open
OFF	CAN A/B (default)

3.4.2 Power Board

3.4.2.1 Power Ignition Control Switch (SW1)

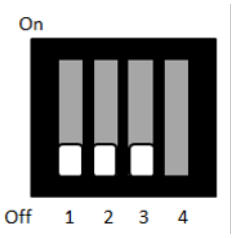


Table 3.8: Power Ignition

Setting			Function		
1	2	3	Ignition ON Timer	Ignition OFF Delay Timer	Ignition OFF Delay Timer (H/W shut-down)
OFF	OFF	OFF	7 (default)	30 (default)	180 (default)
ON	OFF	OFF	10	40	180
OFF	ON	OFF	10	60	180
OFF	ON	ON	30	60	180
OFF	OFF	ON	60	120	180
ON	OFF	ON	120	180	180
OFF	ON	ON	180	240	180
ON	ON	ON	7	0	180

3.4.2.2 Power Ignition SW/HW Setting (SW1, PIN 4)

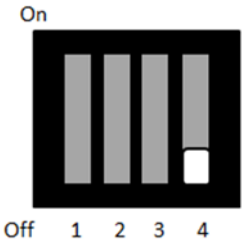


Table 3.9: Power Ignition SW/HW Setting Selection

Setting	Function
Off	Power Ignition SW settings (default)
On	Power Ignition HW settings

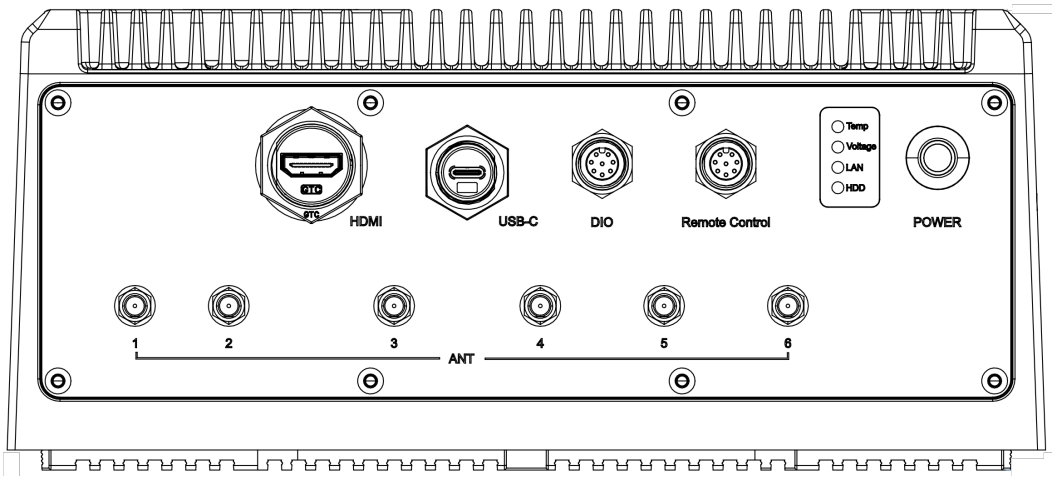
Chapter 4

Pin Assignments

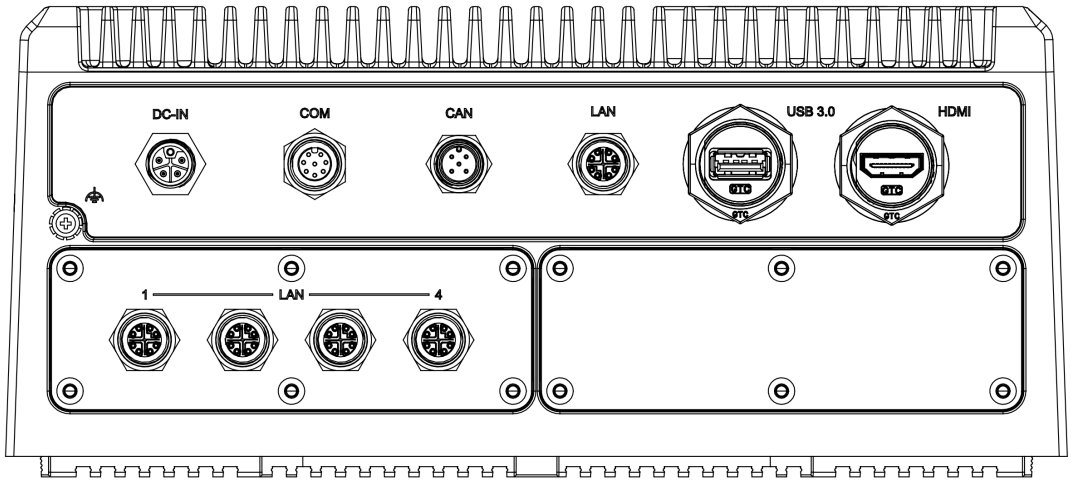
This chapter details Pin Assignments for the ROCK-301 Series.

4.1 I/O Connectors

4.1.1 Front I/O View



4.1.2 Rear I/O View



4.2 I/O Pin Definition

4.2.1 Power Input Connector

ROCK-301 comes with 4-pin M12 A-code power input connector for 12/24 V_{DC} Input for in-vehicle applications.

Table 4.1: Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	+V12	2	+V12
3	GND	4	GND

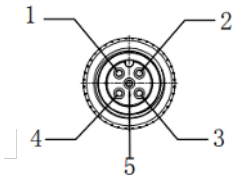


Figure 4.1 Power Input Connector

4.2.2 Power On/Off Button

ROCK-301 comes with a power ON/OFF button that supports dual function of soft power ON/OFF (instant off or 4-second delay), and suspend power functions. There are two LEDs for indicating system status: LED green is for power ON status; and LED red is for power OFF status.

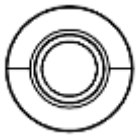


Figure 4.2 Power ON/OFF Button

4.2.3 LED Indicator

ROCK-301 provides 4 LEDs for temperature, DC-IN voltage, 2.5G LAN (LTE module, support by project), and HDD. The temper

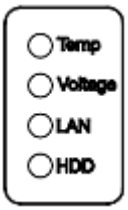


Figure 4.3 LED Indicator

Table 4.2: LED Indicator

Function	Status	Description
Temp./ RED	Blinking	System temperature is below -35 °C/ above 65 °C
	ON	System temperature is below -40 °C/ above 71 °C
	OFF	System temperature is within the normal range or on power-off
Voltage/ RED	Blinking	Voltage is less than 10.8V (12V) or 21.8V (24V)
	ON	Voltage is greater than 13.2V (12V) or 26.4V (24V)
	OFF	Voltage is within the normal range or on power-off status
LAN/ Green	ON	2.5G LAN activity (BOM option 4G/5G module for M.2 B-key)
HDD/ Green	ON	HDD for SATA/mSATA/M.2 M-key NVMe SSD is active

4.2.4 HDMI Connector

ROCK-301 comes with 2 x M25 HDMI type-A connectors.

Figure 4.4 HDMI Connector

Table 4.3: HDMI/Display Port Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	TMDS_Data2+/DP_Data0+	2	GND
3	TMDS_Data2−/DP_Data0-	4	TMDS_Data1+/DP_Data1+
5	GND	6	TMDS_Data1−/DP_Data1-
7	TMDS_Data0+/DP_Data2+	8	GND
9	TMDS_Data0-/DP_Data2-	10	TMDS_Clock+/DP_Data3+
11	GND	12	TMDS_Clock−/DP_Data3-
13	NC	14	NC
15	SCL/AUX_CH+	16	SDA/GND
17	DDC GND/AUX_CH-	18	+5V/Hot plug detect
19	Hot plug detect/Return	20	DP_PWR

4.2.5 USB Connector

ROCK-301 provides up to 1 x USB 3.0 type A interface connectors, and 1 x USB type C which provides plug & play capabilities support.

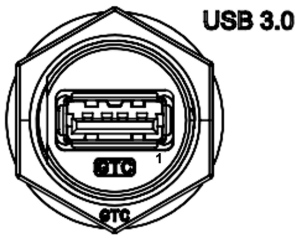


Figure 4.5 USB 3.0 Connector

Table 4.4: USB 3.0 Connector Pin Assignment

Pin	Signal Name	Pin	Signal Name
1	+5V	2	D-
3	D+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+	10	+5V
11	D-	12	D+
13	GND		

Figure 4.6 USB C Connector

Table 4.5: USB C Connector Pin Assignment

Pin	Signal Name	Pin	Signal Name
A1	GND	B1	GND
A2	TX1+	B2	TX2+
A3	TX1-	B3	TX2-
A4	VBUS	B4	VBUS
A5	CC1	B5	CC2
A6	D+	B6	D+
A7	D-	B7	D-
A8	SUB1	B8	SUB2
A9	VBUS	B9	VBUS
A10	RX2-	B10	RX1-
A11	TX2+	B11	TX1+
A12	GND	B12	GND

4.2.6 Ethernet Connector

ROCK-301 provides 1x 10/100/1000/2500 bps and 4 x 10/100 bps with M12 X-code circular connector by additional modular I/O.

- 1x M12 X-code Speed: 10/100/1000M/2.5G with 8 kV/15 kV ESD protection
- 4x M12 X-code 10/100 Mbps PoE (IEEE802.3af, maximum power output of 60W) with 8 kV/15 kV ESD protection

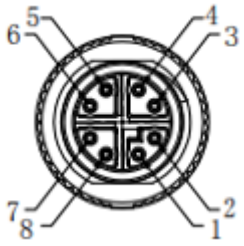


Figure 4.7 2.5G Ethernet Connector

Table 4.6: Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	LAN_2.5G_M0+	2	LAN_2.5G_M0-
3	LAN_2.5G _M1+	4	LAN_2.5G_M1-
5	LAN_2.5G _M3+	6	LAN_2.5G_M3-
7	LAN_2.5G _M2+	8	LAN_2.5G_M2-

4.2.7 COM Connector

ROCK-301 provides 1 x M12 A-code connectors, which offers RS-232/422/485 with 8 kV/15 kV ESD protection.

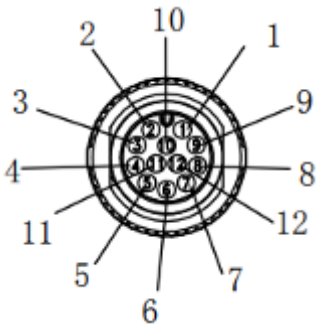


Figure 4.8 COM Port Connector

Table 4.7: COM Connector Pin Assignments

	RS-232	RS-422	RS-485
Pin	**Signal Name**	**Signal Name**	**Signal Name**
1	DCD	Tx-	DATA-
2	RxD	Tx+	DATA+
3	TxD	Rx+	NC
4	DTR	Rx-	NC
5	GND	GND	GND
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC
10	NC	NC	NC
11	NC	NC	NC
12	NC	NC	NC

4.2.8 CAN Bus Connector

ROCK-301 provides 1 x M12 A-code 5-pin connectors, which offers 1 CANbus 2.0 A/B with 8 kV/15 kV ESD protection. This port can be configure to CAN A/B or J1939 via the Jumper J3 & J4.

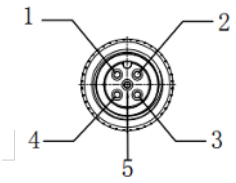


Figure 4.9 CAN Bus Port Connector

Table 4.8: COM Connector Pin Assignments

	CAN A/B	CAN J1939
Pin	**Signal Name**	**Signal Name**
1	-	CAN_SHLD
2	-	CAN_V+
3	GND	CAN_V-
4	CAN_H	CAN_H
5	CAN_L	CAN_L

4.2.9 DIO Connector

ROCK-301 provides 1 x M12 A-code connectors, which offers 4DI, 4DO with 8 kV/15 kV ESD protection.

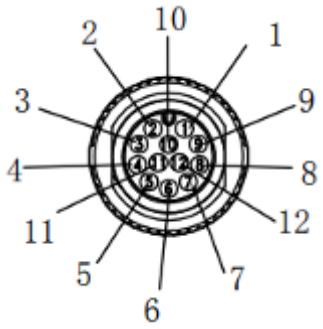


Figure 4.10 DIO Connector

Table 4.9: DIO Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	GPIO_+V5	2	GPIO_0
3	GPIO_1	4	GPIO_2
5	GPIO_3	6	GPIO_4
7	GPIO_5	8	GPIO_6
9	GPIO_7	10	GND
11	GND	12	GND

4.2.10 Remote Control Connector

ROCK-301 provides 1 x M12 A-code connectors, which offers Power ON/OFF, Reset, DC-out 12V/1A for smart FAN.

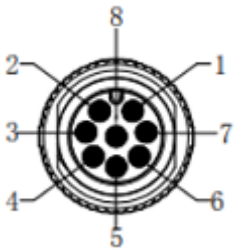


Figure 4.11 Remote Control Port Connector

Table 4.10: Remote Control Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	+V12_FAN	2	GND
3	FFAN_PWM	4	PWR_BTN
5	SYS_RST#	6	Power ON LED
7	FANTACH	8	GND

4.2.11 Clear CMOS

ROCK-301 provides clear CMOS switch, which offers clear CMOS function. The CMOS switch is located on the side of the system. Therefore, you need to first remove the I/O panel on the side of the system to access and configure the CMOS switch. This procedure will allow you to reach and adjust the CMOS switch easily. Please ensure that the computer is completely powered off and unplugged before performing these actions to avoid any potential damage or safety risks

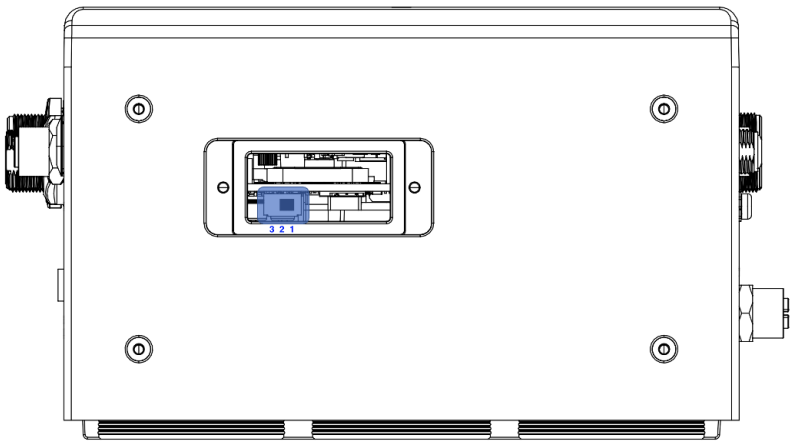


Figure 4.12 CMOS Switch

Table 4.11: Clear CMOS (CMOS1)

Setting	Function
1-2	Normal (default)
2-3	Clear CMOS

Chapter 5

BIOS Setting

BIOS Configuration Data Setup

5.1 Introduction

AMIBIOS has been integrated into many motherboards for over a decade. With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the ROCK-301 BIOS setup screens.

Figure 5.1 Setup Program Initial Screen

AMI's BIOS ROM has a built-in setup program that allows users to modify the basic system configuration. This information is stored in battery-backed CMOS so it retains the setup information when the power is turned off.

5.2 Entering Setup

Turn on the computer and then press <F2> or <DEL> to enter the Setup menu.

5.2.1 Main Setup

When you first enter the BIOS Setup Utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.

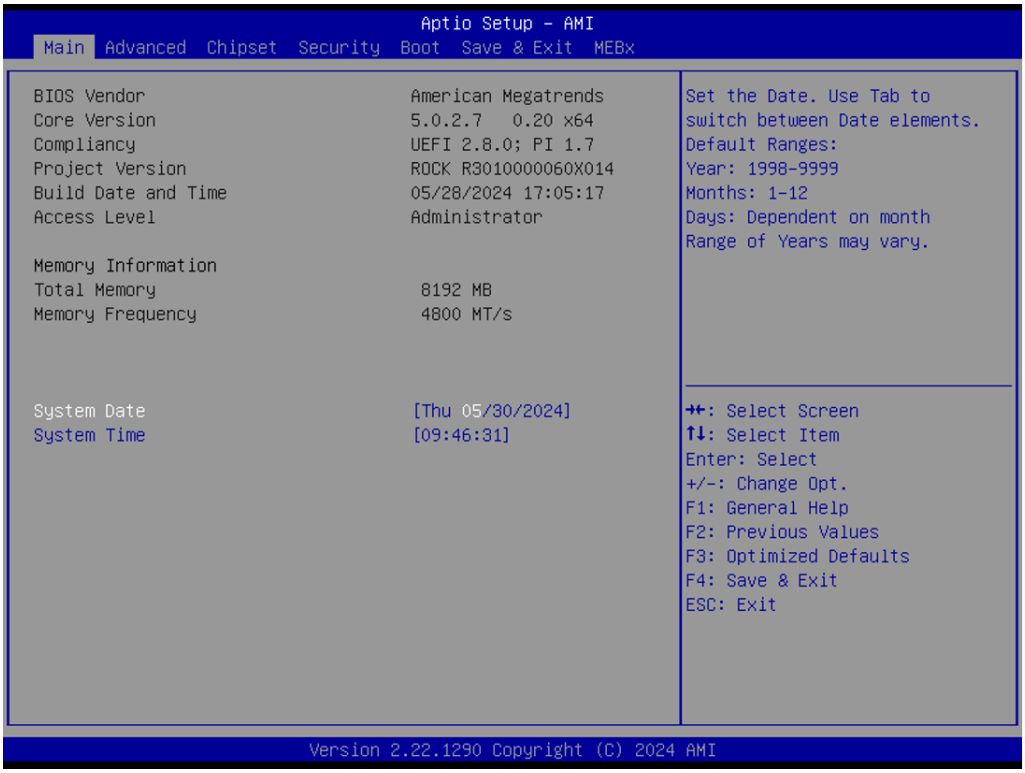


Figure 5.2 Main Setup Screen

The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

- **System Time/System Date**
  Use this option to change the system time and date. Highlight System Time or System Date using the <Arrow> keys. Enter new values through the keyboard. Press the <Tab> key or the <Arrow> keys to move between fields. The date must be entered in MM/DD/YY format. The time must be entered in HH:MM:SS format.

5.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ROCK-301 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS setup options are described in this section. The Advanced BIOS Setup screens are shown below. The sub menus are described on the following pages.

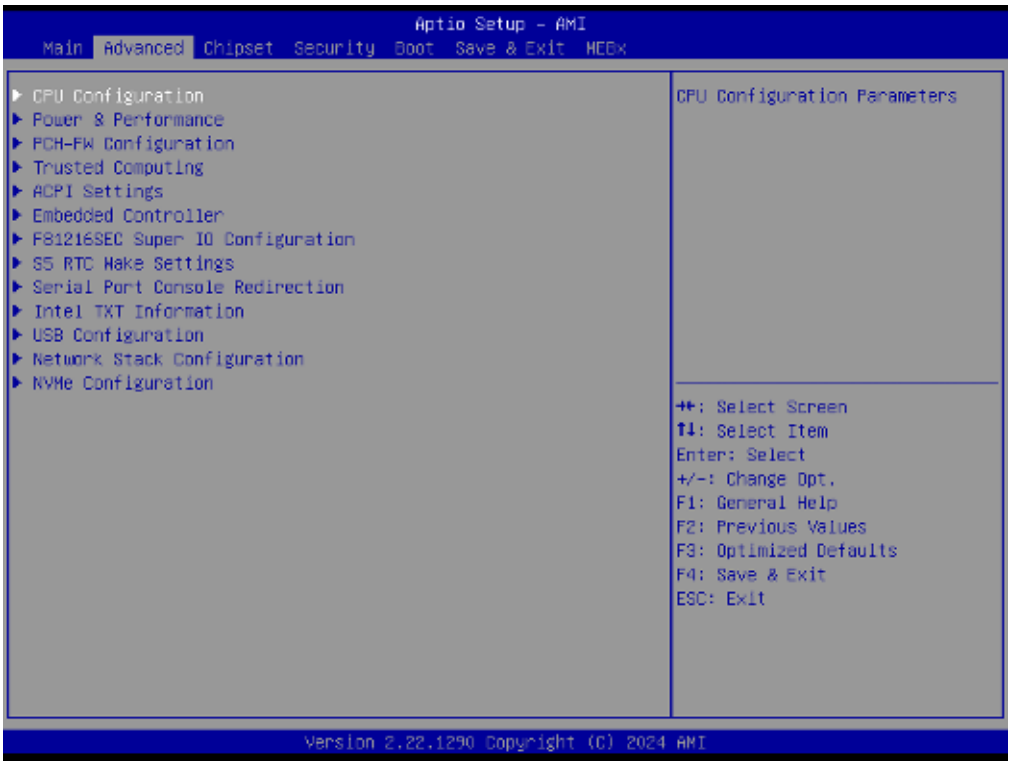


Figure 5.3 Advanced BIOS Features Setup Screen

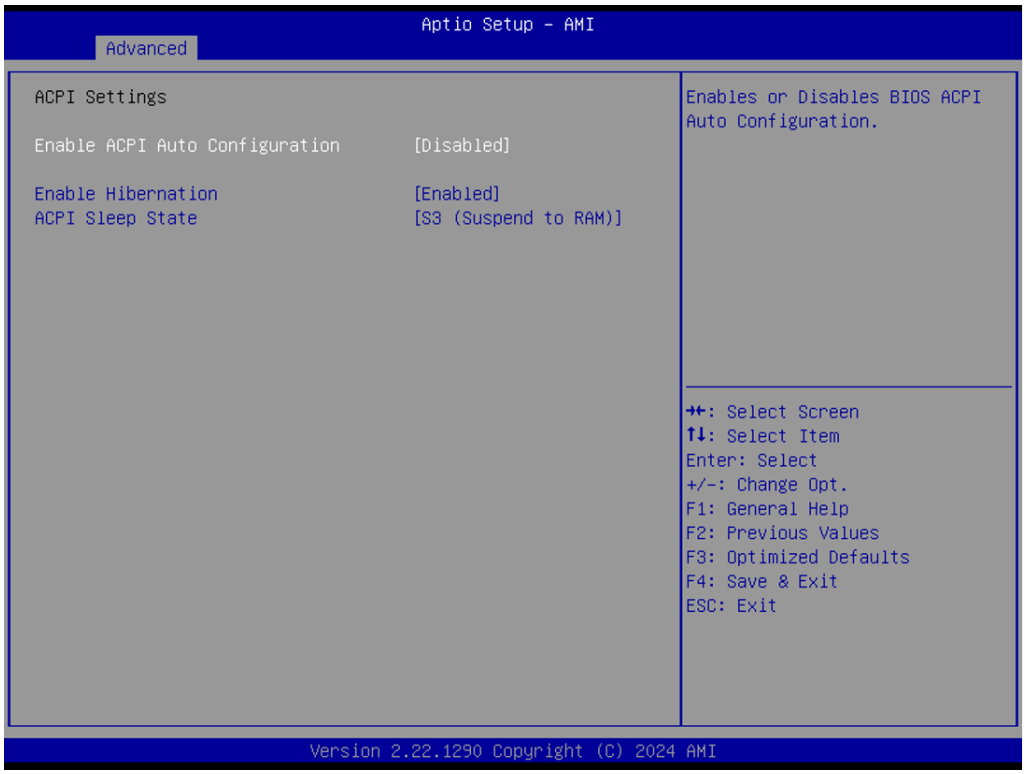
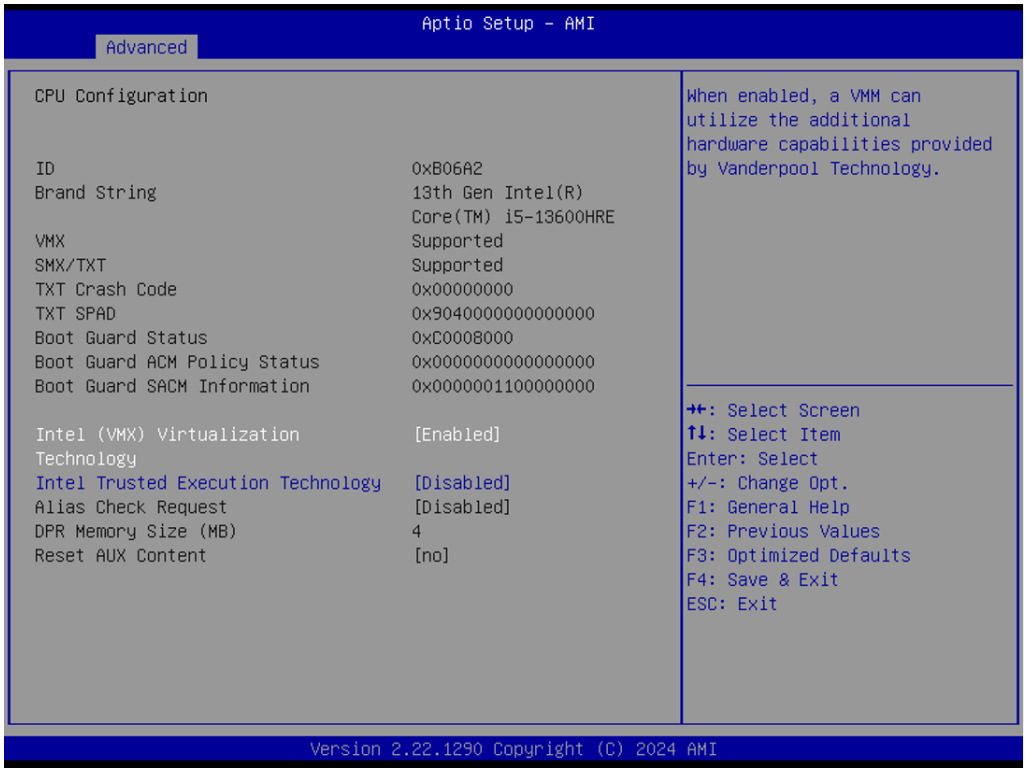


Figure 5.4 ACPI Settings

- **Enable ACPI Auto Configuration**
  Enables or Disables BIOS auto configuration.
- **Enable Hibernation**
  Enables or Disables system ability to Hibernate (OS/S4 sleep state).
- **ACPI Sleep State**
  Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.

5.2.2.1 CPU Configuration



- **Intel(VMX)VirtualizationTechnology**
  Enables or Disables VMX configuration.
- **IntelTrustedExecution Technology**
  Enables or Disables IntelTrustedExecution configuration.
- **Alias Check Request**
  Enables or Disables alias check request configuration.

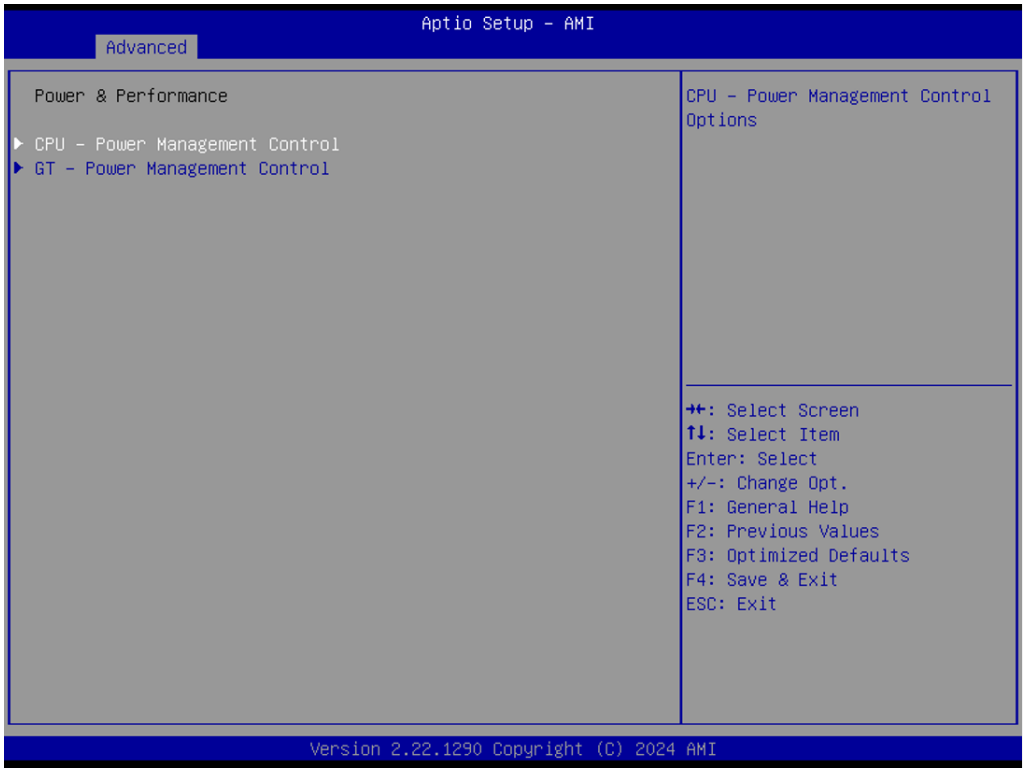


Figure 5.5 Power & Performance

- **CPU- Power Management Control**
- **GT- Power Management Control**

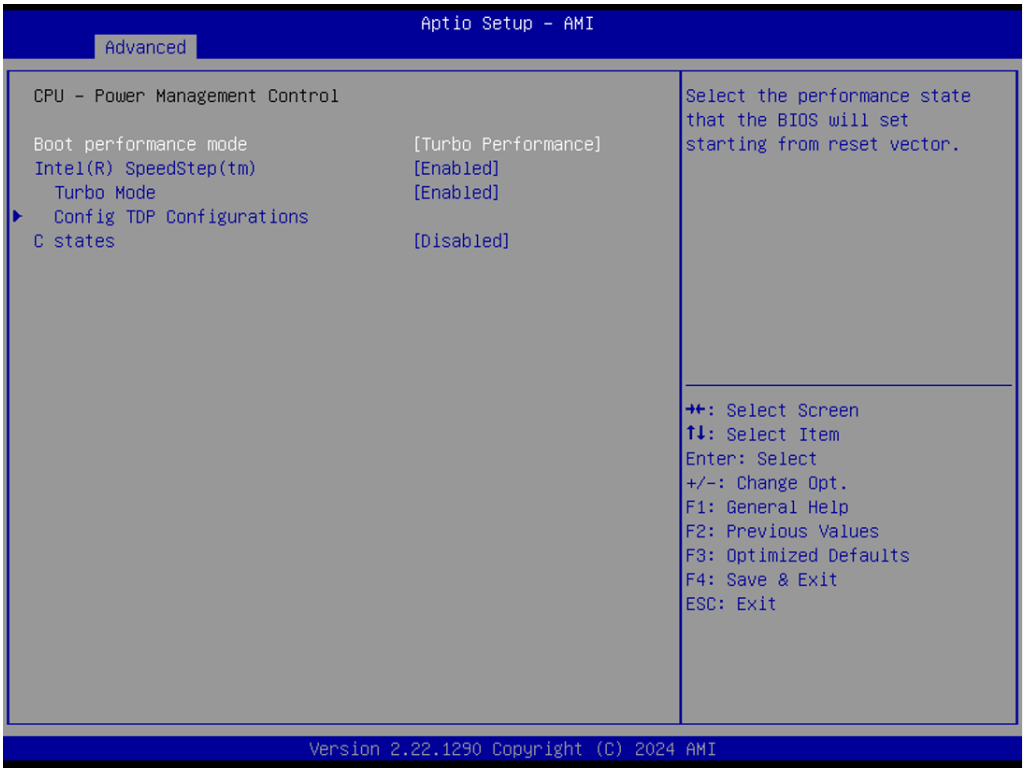


Figure 5.6 CPU- Power Management Control

- **Boot performance mode**
  Max Battery, Max Non-Turbo Performance, Turbo Performance.
- **Intel® SpeedStep™**
  Enable/Disable.
- **Turbo Mode**
  Enable/Disable.
- **Config TDP Configurations**
- **C states**
  Enable/Disable.
- **Configurable TDP Boot Mode**
  Nominal/Up/Down/Deactivate TDP selection.

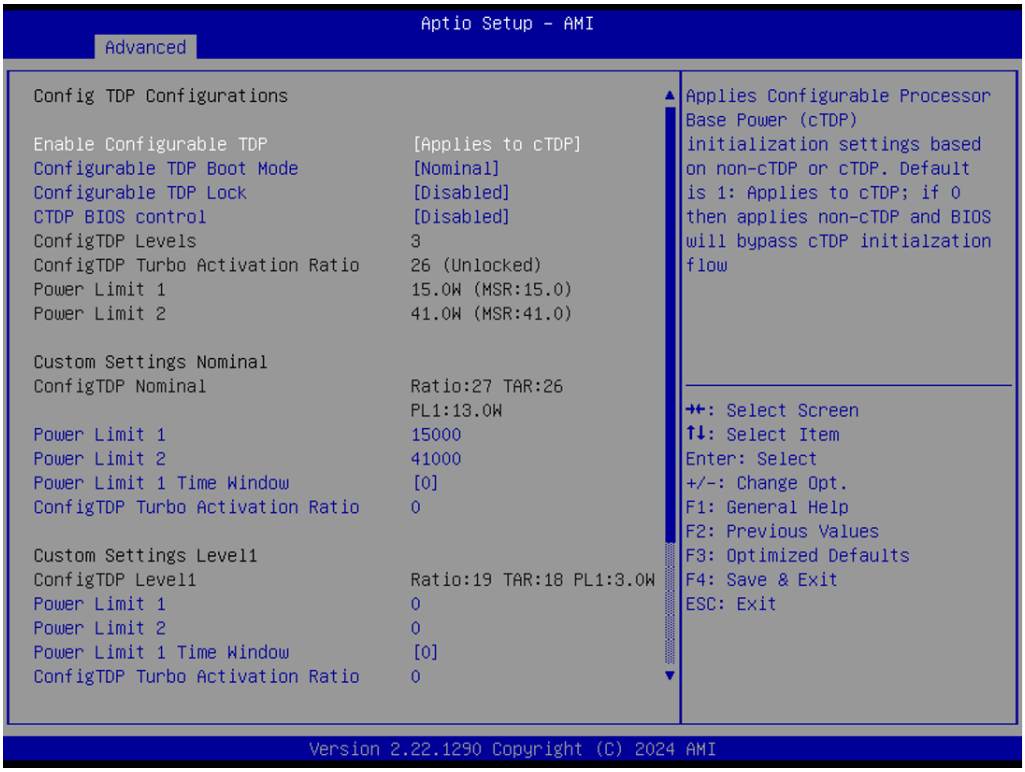


Figure 5.7 Configurable TDP Boot Mode

- **Enable Contisurable TDP**
  Applies To CIDPI/ Applies To Non-CIDPI.
- **Configurable TDP Boot Mode**
  Nominal/Down/Up/Deactivte.
- **Configurable TDP Lock**
  Enable/Disable.
- **CTOP BIOS control**
  Enable/Disable.

- **GT- Power Management Control**
  Disable/Enable.

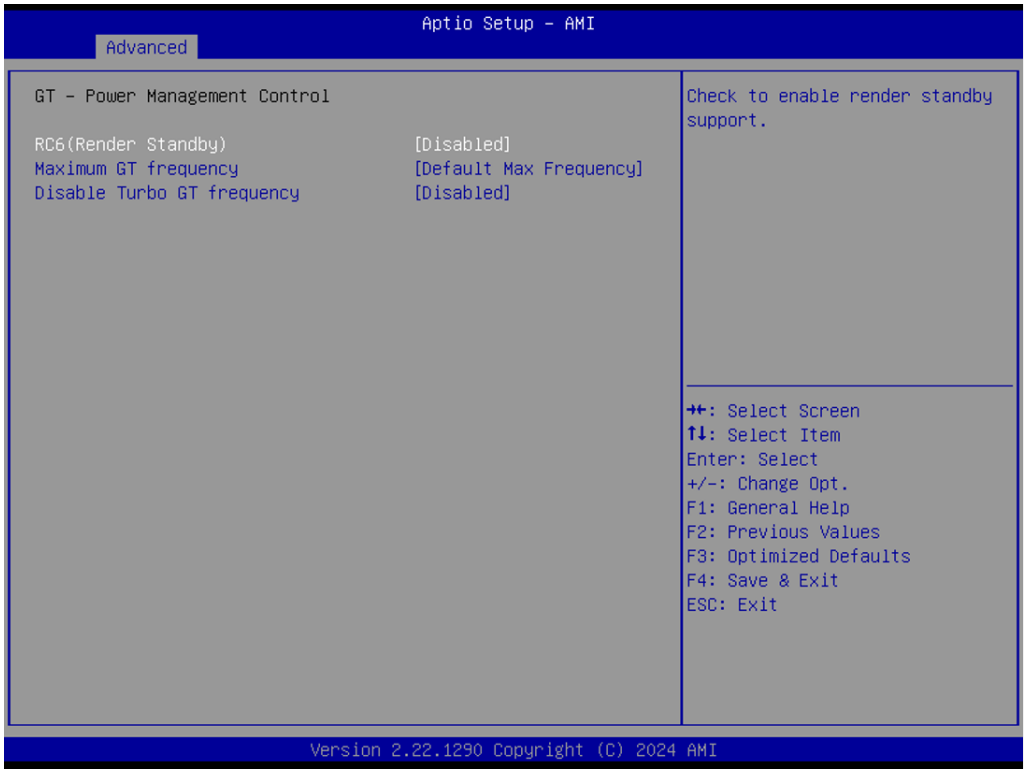


Figure 5.8 GT- Power Management Control

- **GT- Power Management Control**
  Disable/Enable.
- **Maximum GT frequency**
  Default Max Frequency.
- **Disable Turbo GT frequency**
  Disable/Enable.

5.2.2.2 PCH-FW Configuration

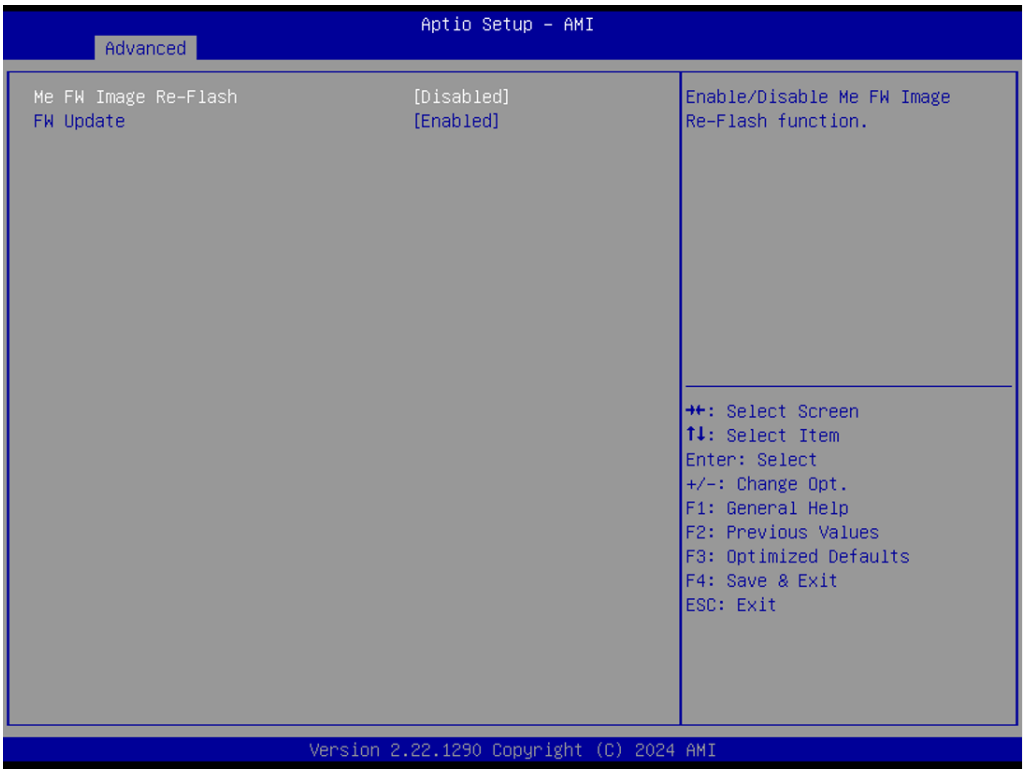


Figure 5.9 PCH-FW Configuration

- **Me FH Image Re-Flash**
  Disable/Enable.
- **F/W Update**
  Disable/Enable.

5.2.2.3 Trusted Computing

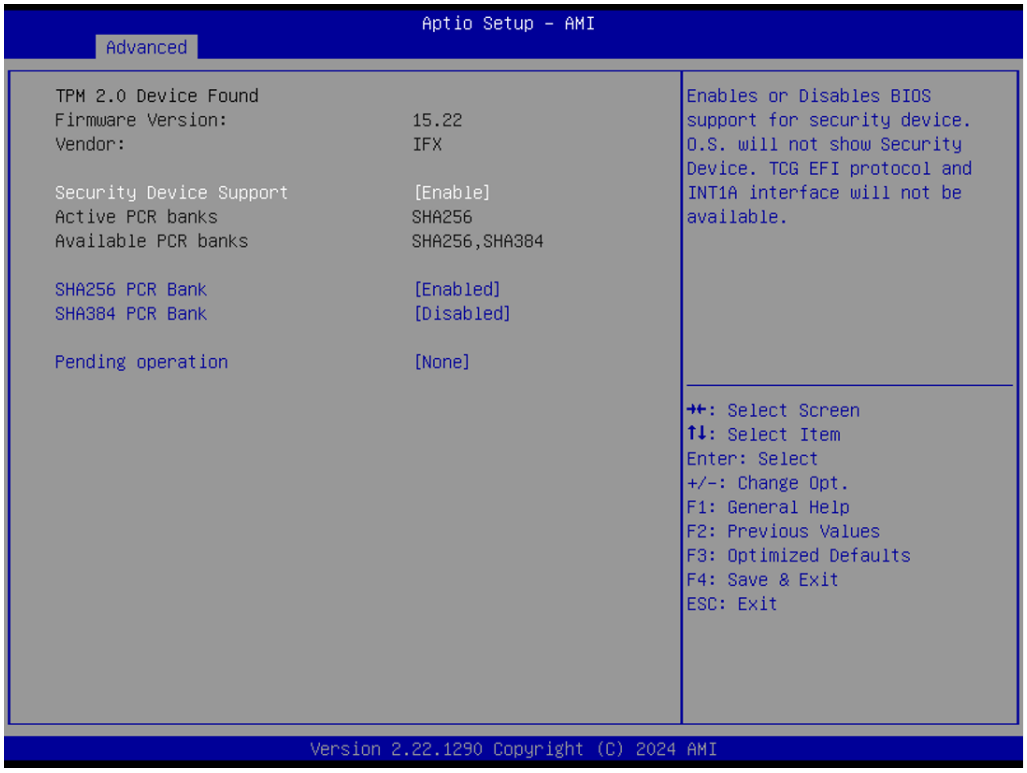


Figure 5.10 Trusted Computing

- **Security Device Support**
  Disable/Enable.
- **SHA256 POR Bank**
  Disable/Enable.
- **SHA384 POR Bank**
  Disable/Enable.
- **Pending operation**
  None/TPM Clear.

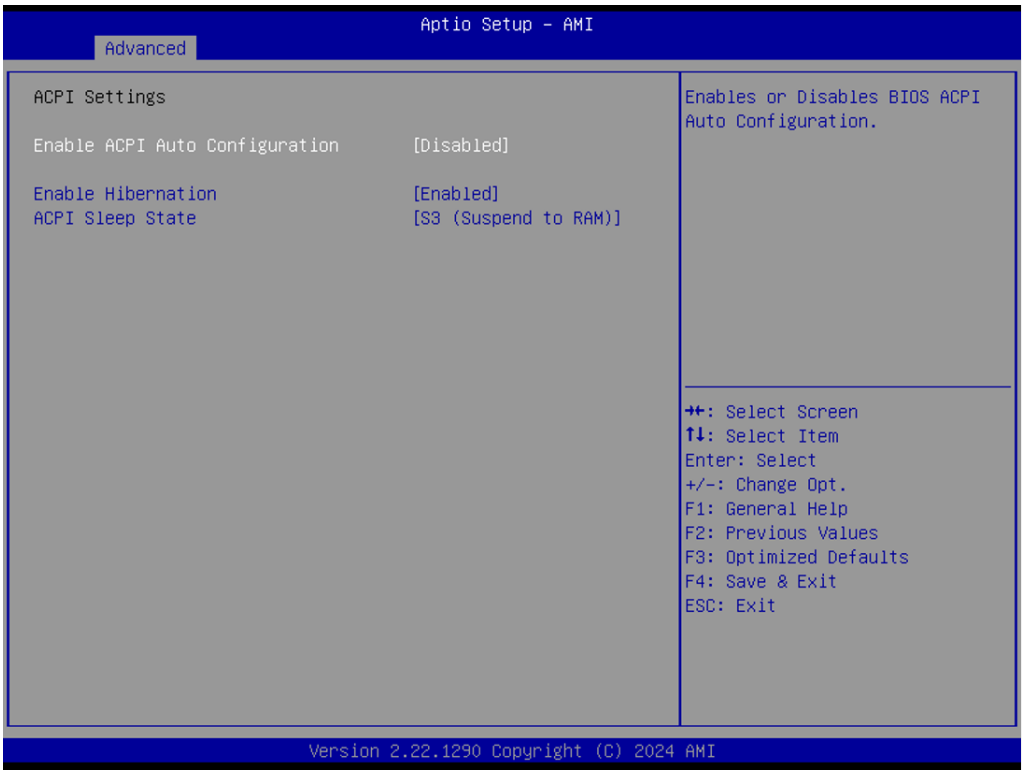


Figure 5.11 ACPI Settings

- **Enable ACPI Auto Configuration**
  Disable/Enable.
- **Enable Hibernation**
  Disable/Enable.
- **ACPI Sleep State**
  Suspend Disabled/S3 (Suspend to RAM).

5.2.2.4 Embedded Controller

Figure 5.12 Embedded Controller

- **CPU Shutdown Temperature**
  Disable/Enable.
- **Power Saving Mode**
  Normal/Maximum.
- **Serial Port 1 Configuration**
  Watch dog Timer configuration.
- **CAN0 Control**
  Disable/Enable.

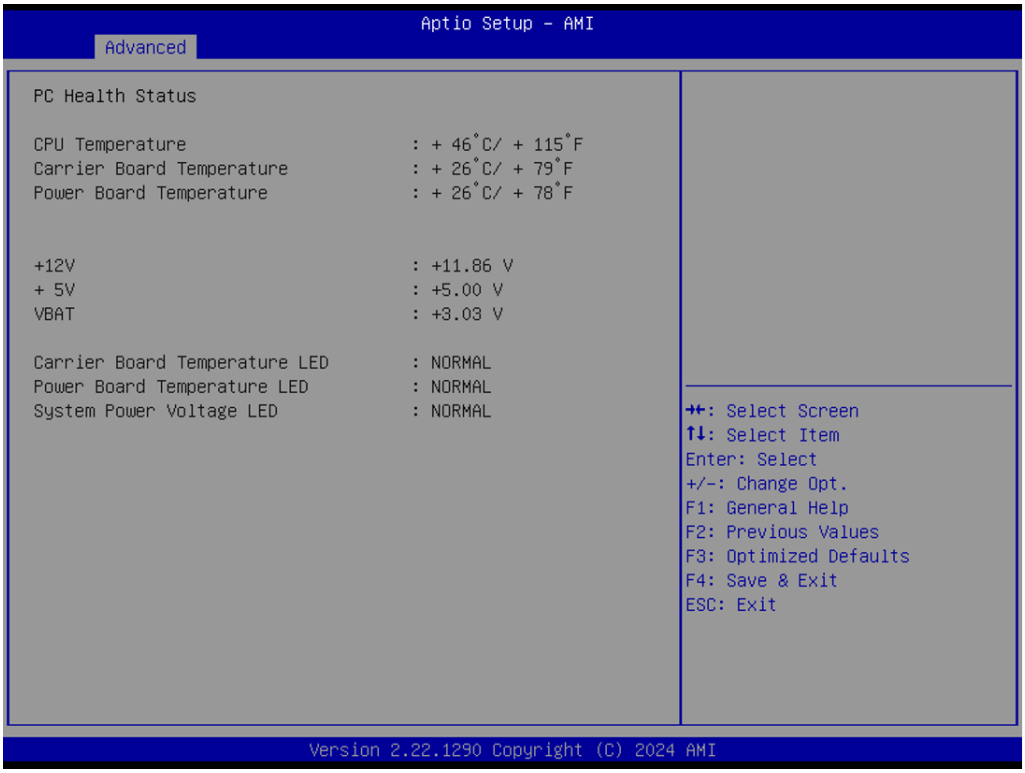


Figure 5.13 PC Health Status

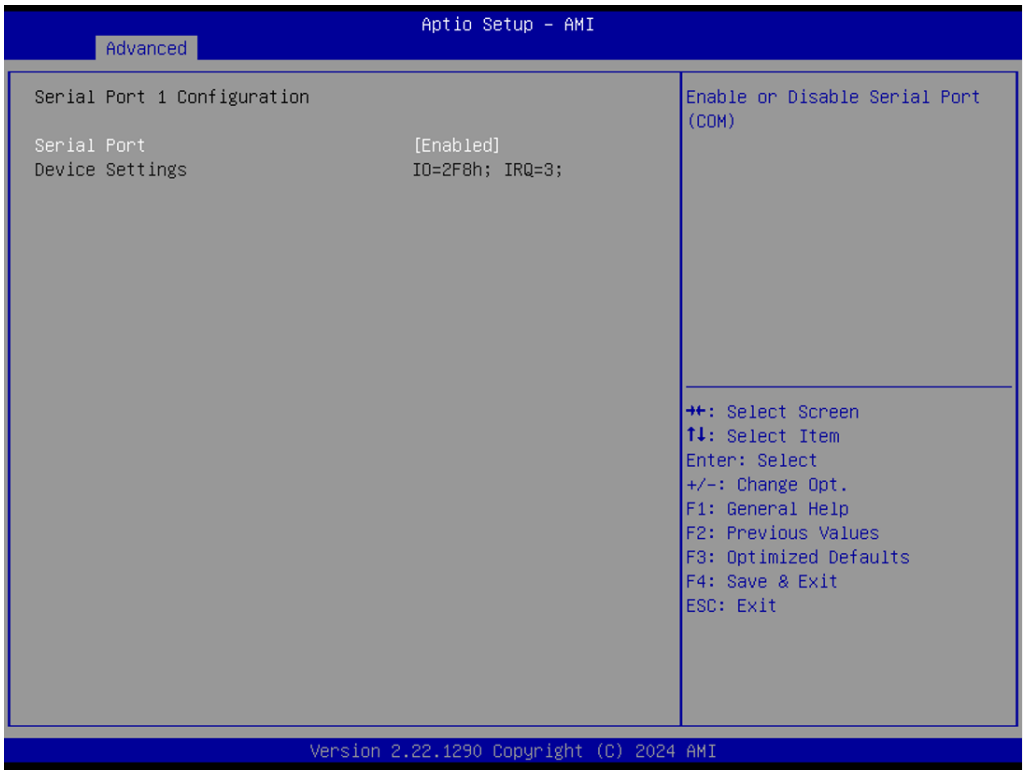


Figure 5.14 Serial Port 2 Configurations

- **Serial Port**
  Enable/Disable.

5.2.2.5 Serial Port Console Redirection

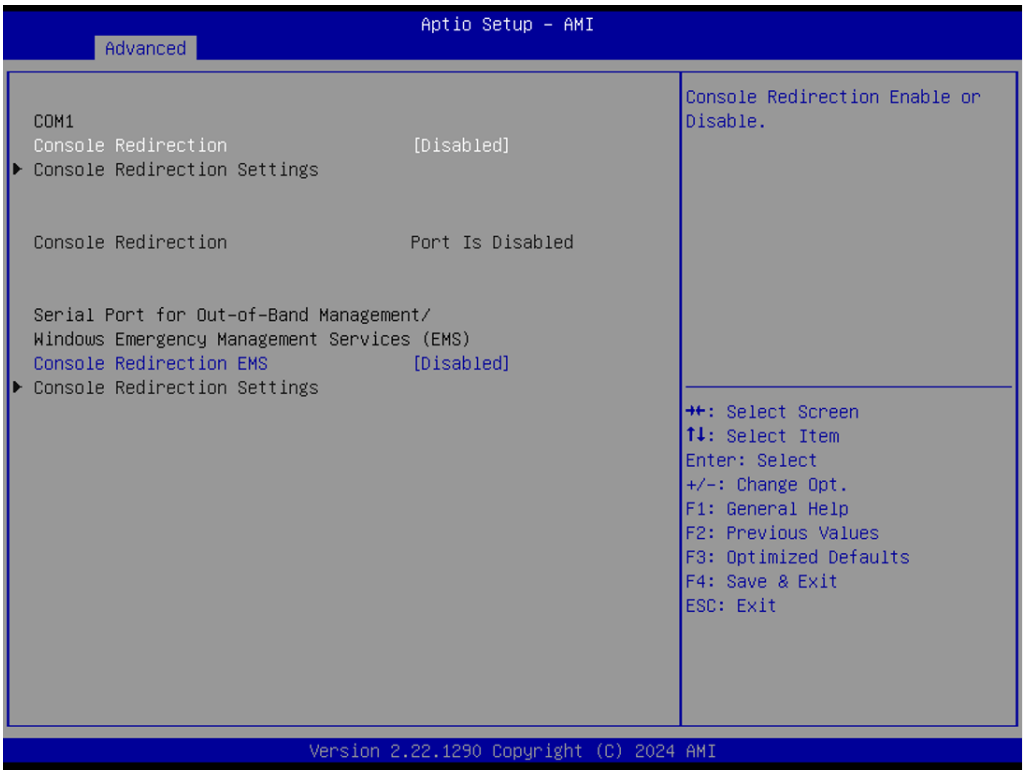


Figure 5.15 Serial Port Console Redirection

- **Console Redirection**
  Disable/Enable.
- **Console Redirection EMS**
  Disable/Enable.

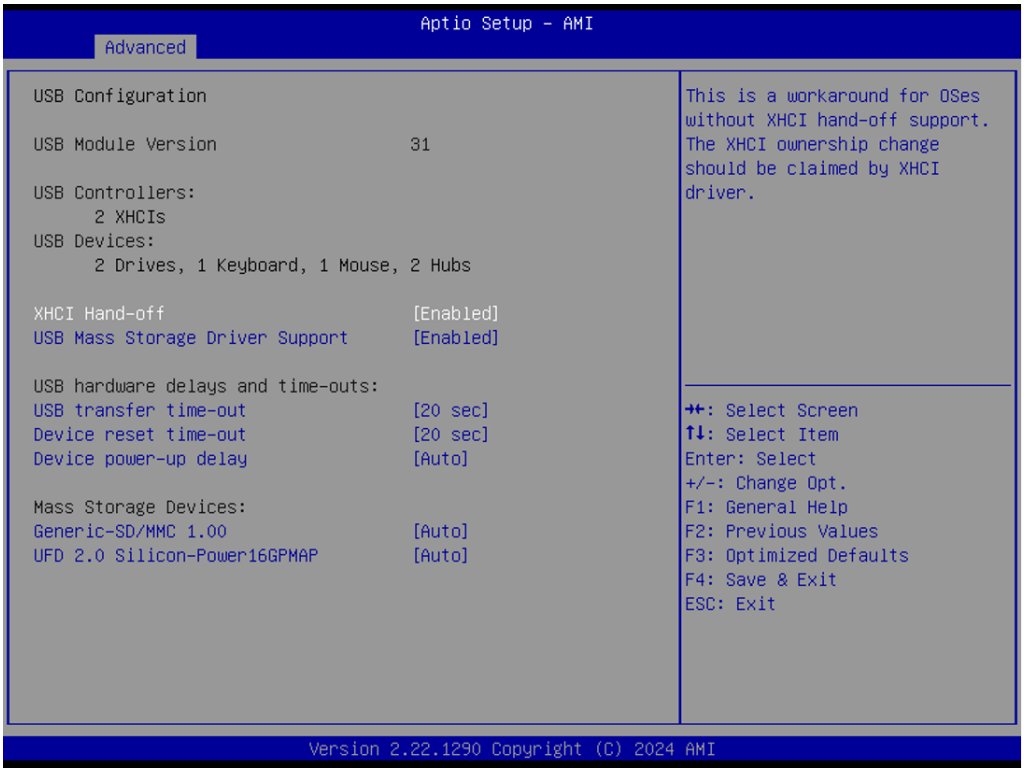


Figure 5.16 USB Configuration

- **XHCI Hand-off**
  Disable/Enable.
- **USB Mass Storage Driver Support**
  Disable/Enable.
- **USB transfer time-out**
  1 sec/5 sec/10 sec/20 sec.
- **Device reset time-out**
  10 sec/20 sec/30 sec/40 sec.
- **Device power-up delay**
  Manual/Auto.
- **Gener 1c-SD/MMC 1.00**
  Manual/Auto.
- **UFD 2.0 Silicon-Power16GPMAP**
  Manual/Auto.

5.2.2.6 NVMe Configuration

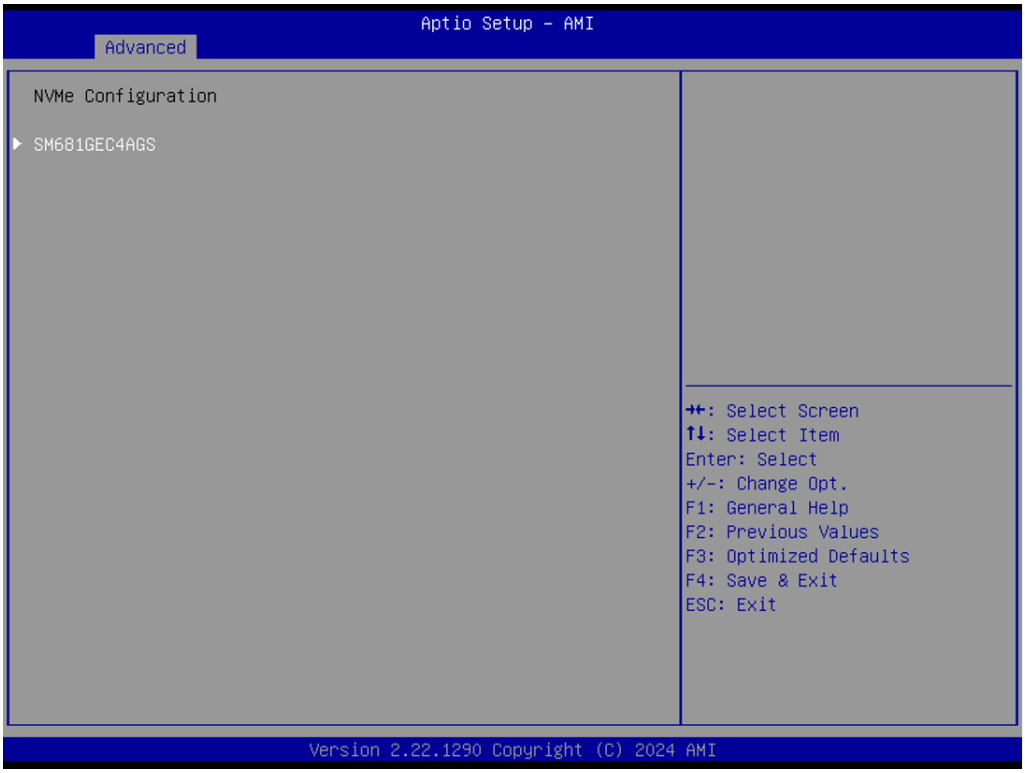


Figure 5.17 NVMe Configuration

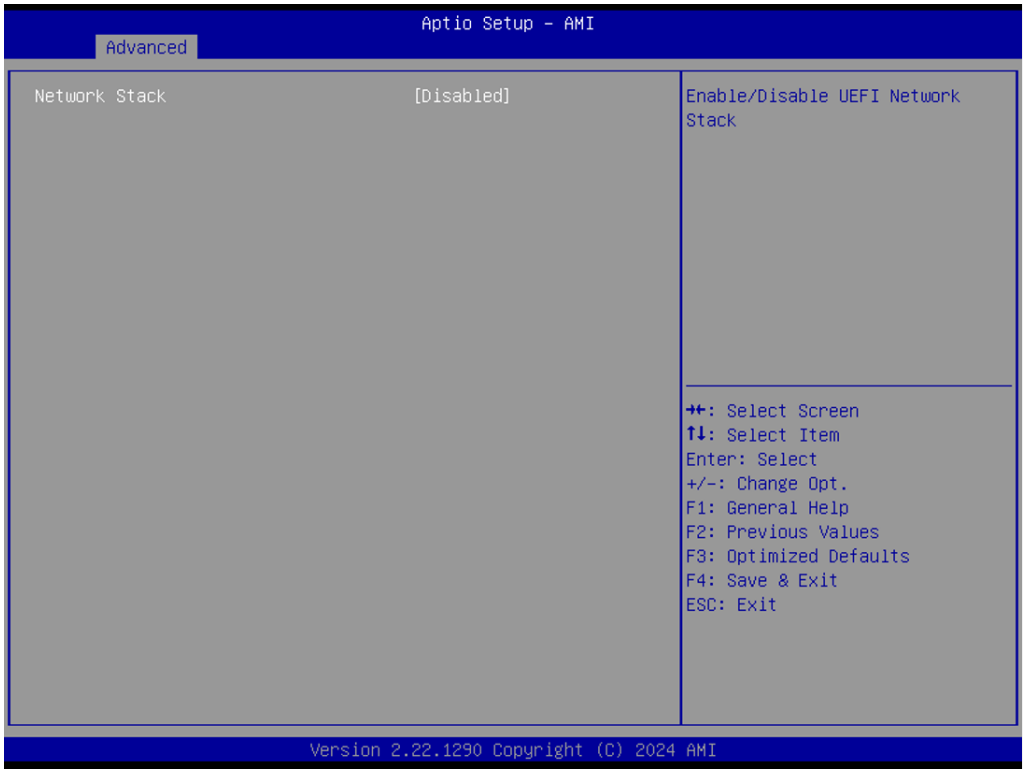


Figure 5.18 Network Stack Configuration

- **Network Stack**
  Disable/Enable.

5.2.3 Chipset Settings

Select the chipset tab from the setup screen to enter the chipset BIOS Setup screen. You can display a chipset BIOS setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

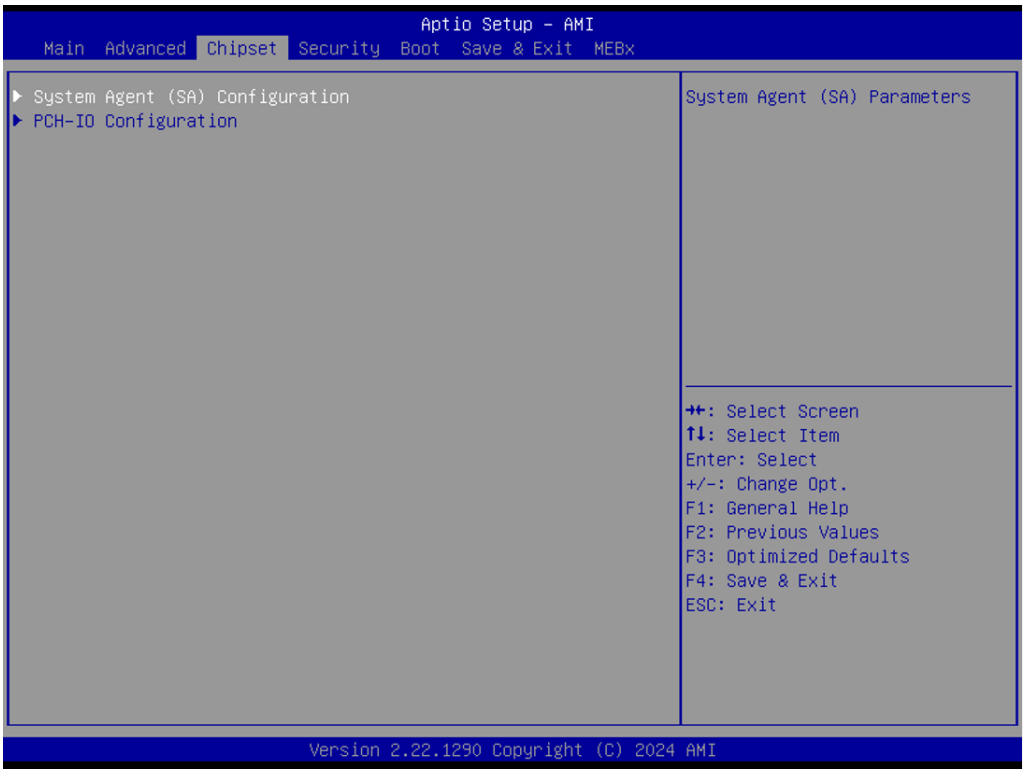


Figure 5.19 Chipset Setup

- **System Agent (SA) Configuration**
- **PCH-IO Configuration**

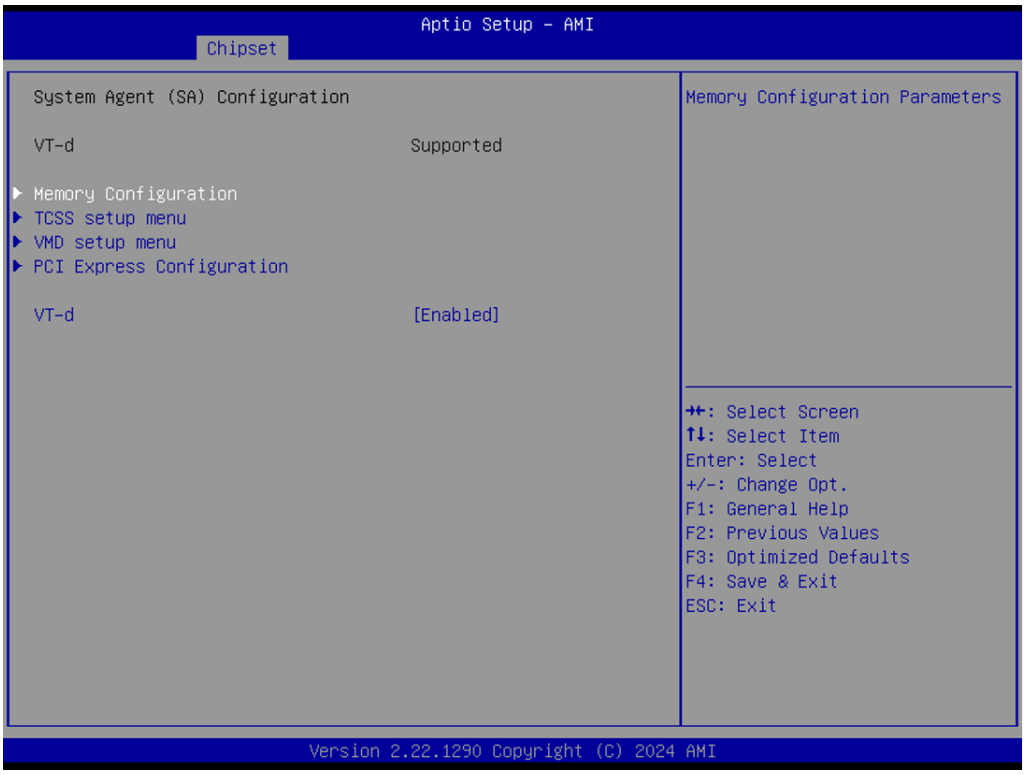


Figure 5.20 System Agent (SA) Configuration

- **Memory Configuration**
- **TCSS setup menu**
- **VMD setup menu**
- **PCI Express Configuration**
- **VT-d**
  Disable/Enable.

Memory Configuration

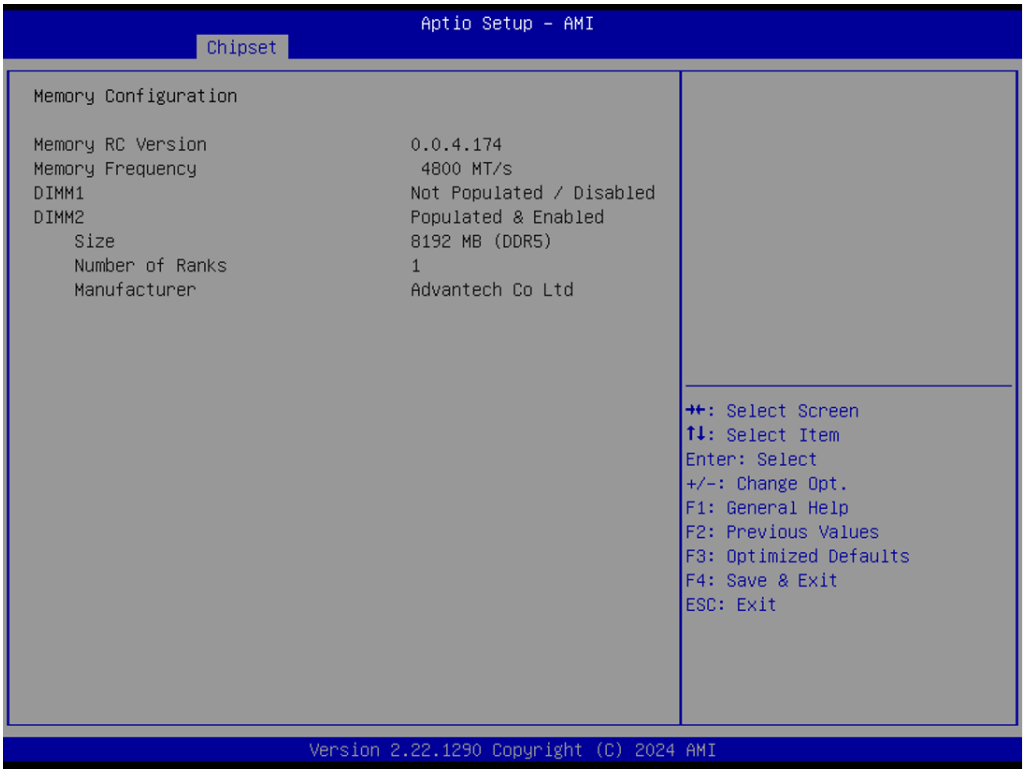


Figure 5.21 Memory Configuration

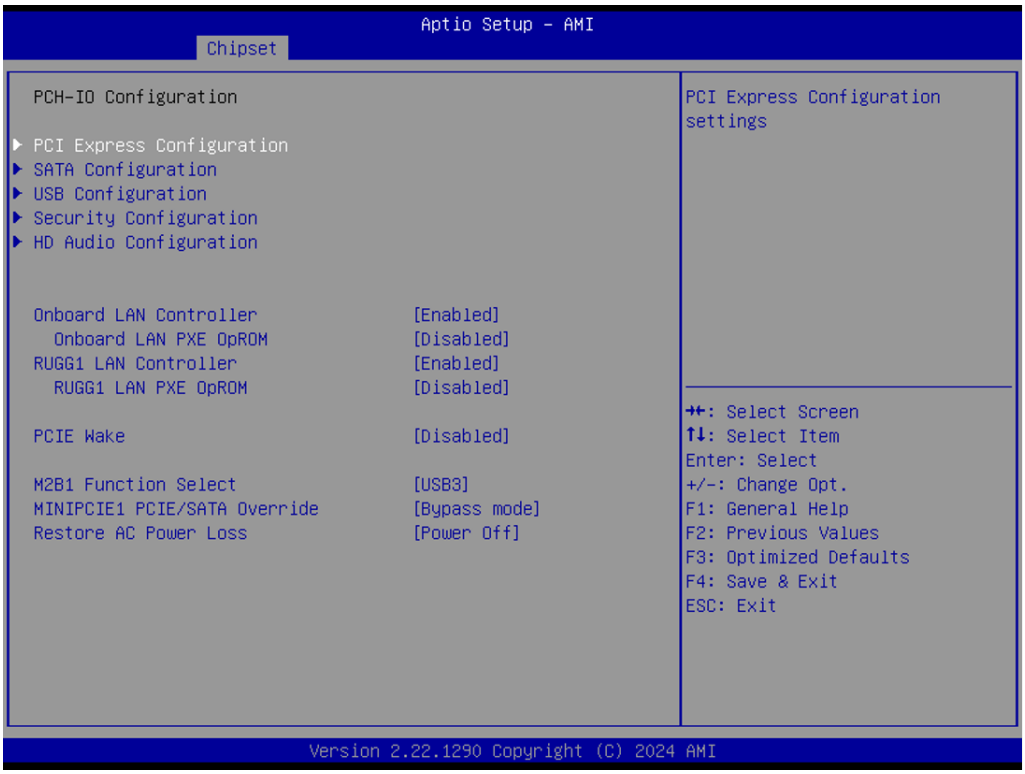


Figure 5.22 PCH-IO Configuration

- **PCI Express Configuration**
- **SATA Configuration**
- **USB Configuration**
- **Security Configuration**
- **HD Audio Configuration**
- **Onboard LAN Controller**
  Disable/Enable.
- **LAN1 PXE OpROM**
  Disable/Enable.
- **RUGG1 LAN Controller (from modular I/O board)**
  Disable/Enable.
- **RUGG1 PXE OpROM**
  Disable/Enable.
- **PCIE Hake**
  Disable/Enable.
- **M281 Function Select**
  USB3.
- **MINIPCIE1 PCIE/SATA Override**
  Bypass mode.
- **Restore AC Power Loss**
  Power off.

Figure 5.23 PCI Express Configuration

- **MINIPCIE1 function**
  Select PCIe/ USB.
- **MINIPCIE2 function select**
  PCIe/ USB.
- **DMI LINK ASPM Control**
  Disable/Enable.
- **MINIPCIE1**
- **MINIPCIE2**
- **M.2 Key E**
- **LAN1 Controller**
- **LAN2 Controller**
- **LAN3 Controller**
- **LAN4 Controller**

Figure 5.24 Module Configuration

- **M.2 Key B**
- **RUGG1**
- **RUGG2**
- **MINIPCIE1**

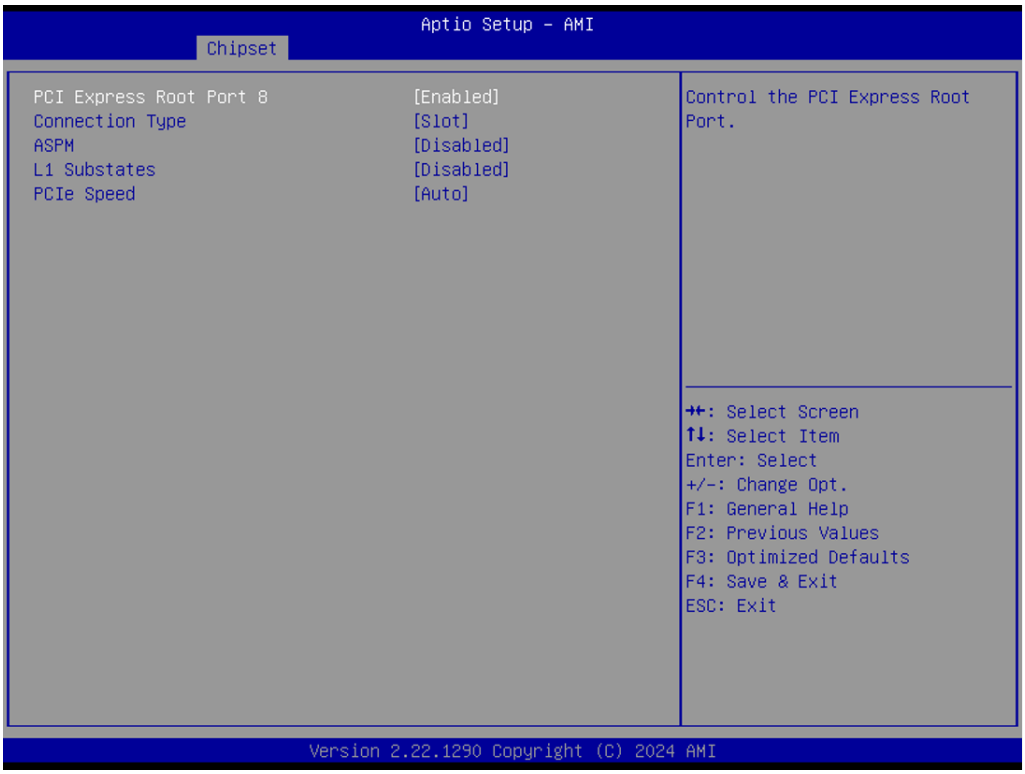


Figure 5.25 M.2 Key Configuration

- **PCI Exaress Root Port 8**
  Disable/Enable.
- **Connection Type**
  Buit-in/ Slot.
- **ASPM**
  - Hot Plug.
  - Disable.
- **L1 Substates**
  Disable/Enable.
- **PCIe Speed**
  Auto/Gen1/Gen2/Gen3.

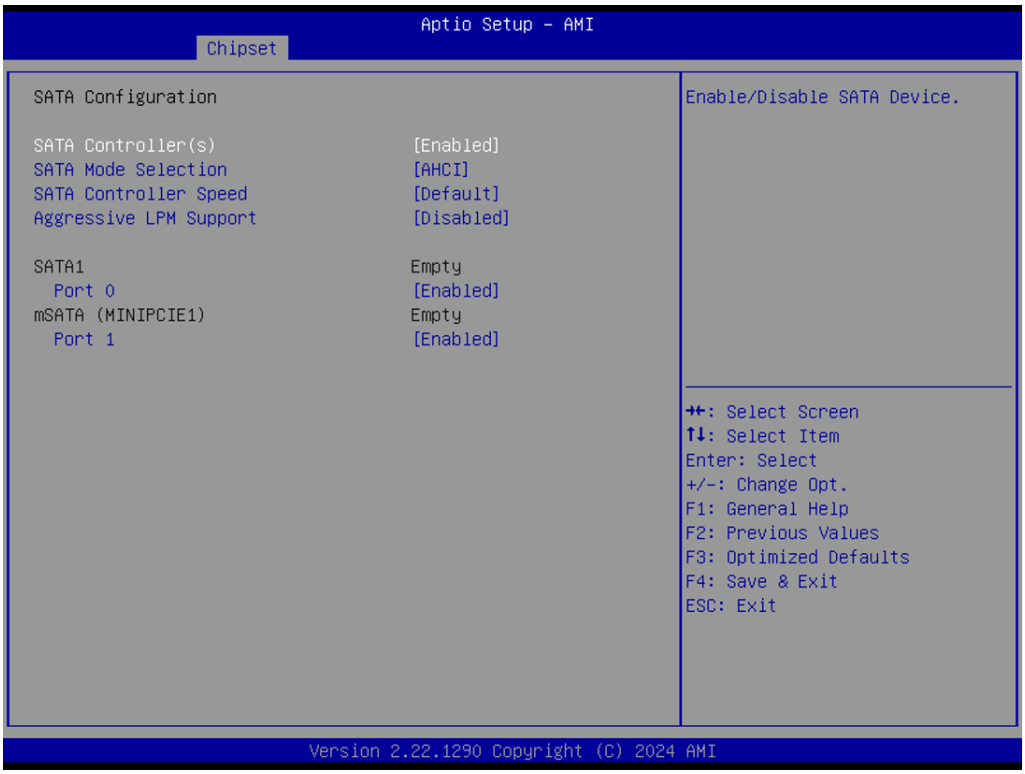


Figure 5.26 SATA Configuration

- **SATA Controller(s)**
  Enable/Disable SATA Device.
- **SATA Mode Selection**
  Determines how SATA controller(s) operate.
- **SATA Controller Speed**
  Default.
- **Aggressive LPM Support**
  Disable
- **Port 0**
  Enable or Disable SATA port.
- **SATA Device Type**
- **SATA Port 0 DevSlp**
- **Port 1**
  Enable or Disable SATA port.

Figure 5.27 USB Configuration

– **USB Port Disable Override**
Disable/Enable.

Figure 5.28 Security Configuration Settings

- **RTC Memory Lock**
  Disable/Enable.
- **BIOS Lock**
  Disable/Enable.

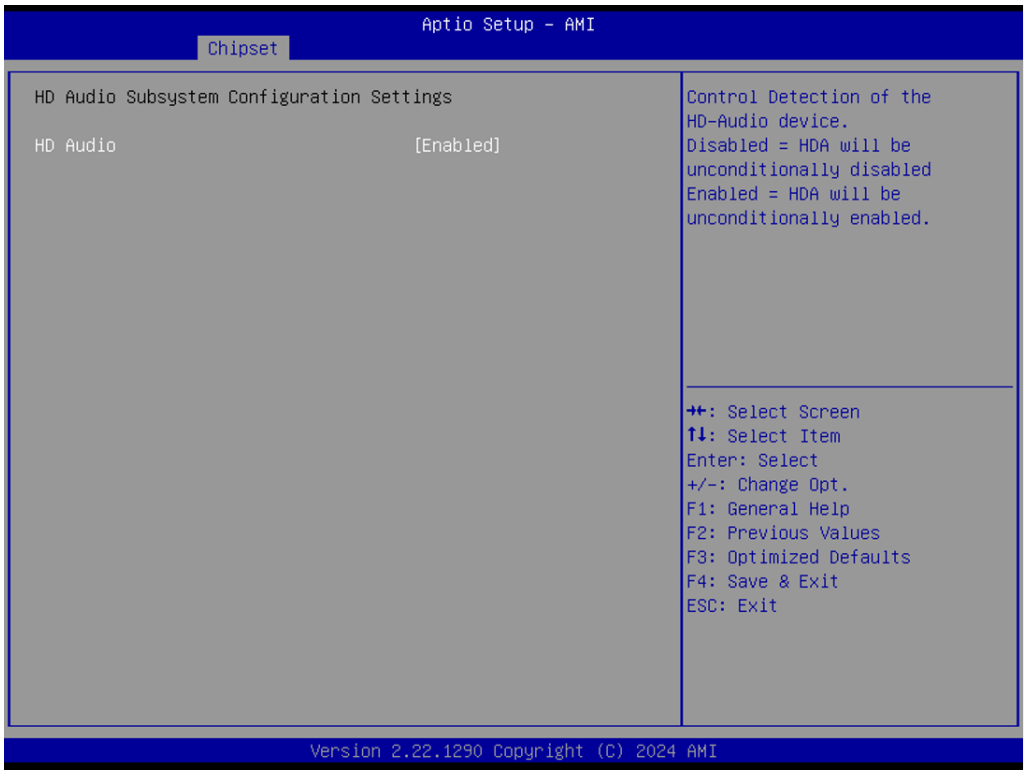


Figure 5.29 HD Audio Configuration

– **HD Audio**
Control Detection of the HD-Audio device.
▫ Disabled= HDA will be unconditionally disabled.
▫ Enabled= HDA will be unconditionally enabled.
▫ Auto= HDA will be enabled if present, disabled otherwise.

5.2.3.1 Security Boot

Figure 5.30 Security Setup

Select Security Setup from the Setup main BIOS setup menu. All Security Setup options, such as password protection, are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

- **Change Administrator/User Password:**
  Select this option and press <ENTER> to access the sub menu, and then type in the password.

5.2.4 Boot Settings

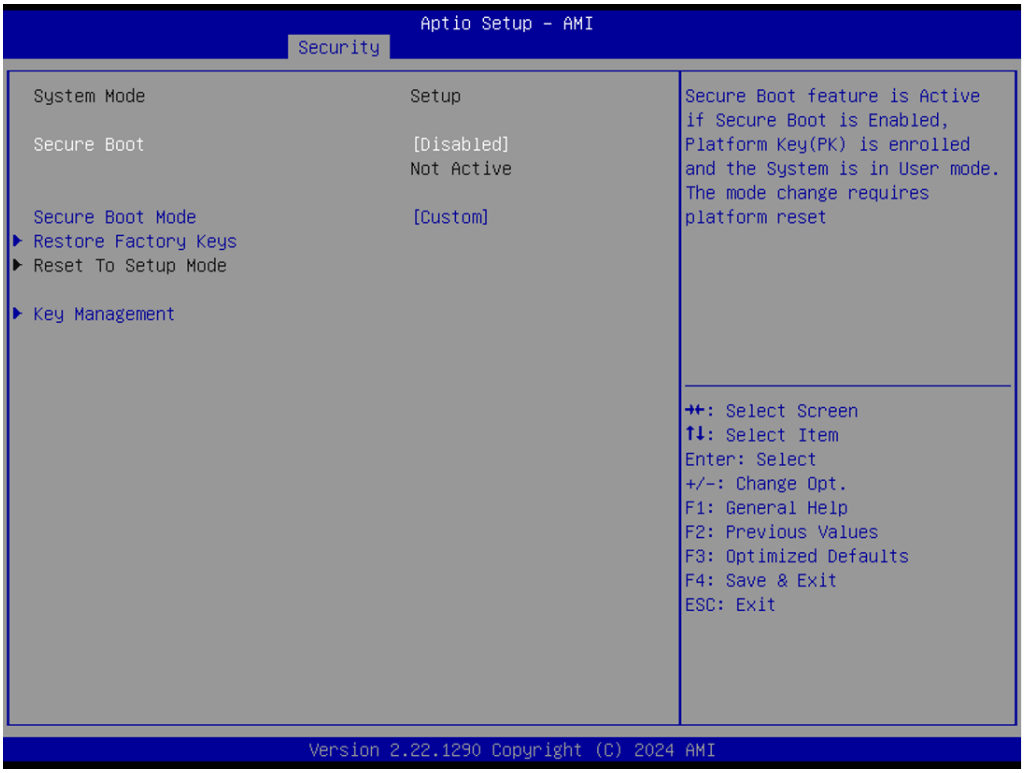


Figure 5.31 Boot Settings

- **Secure Boot**
  Disable/Enable.
- **Secure Boot Mode**
  Custom.
- **Restore Factory Keys**
- **Reset To Setup Mode**
- **Key Management**

5.2.5 Save & Exit

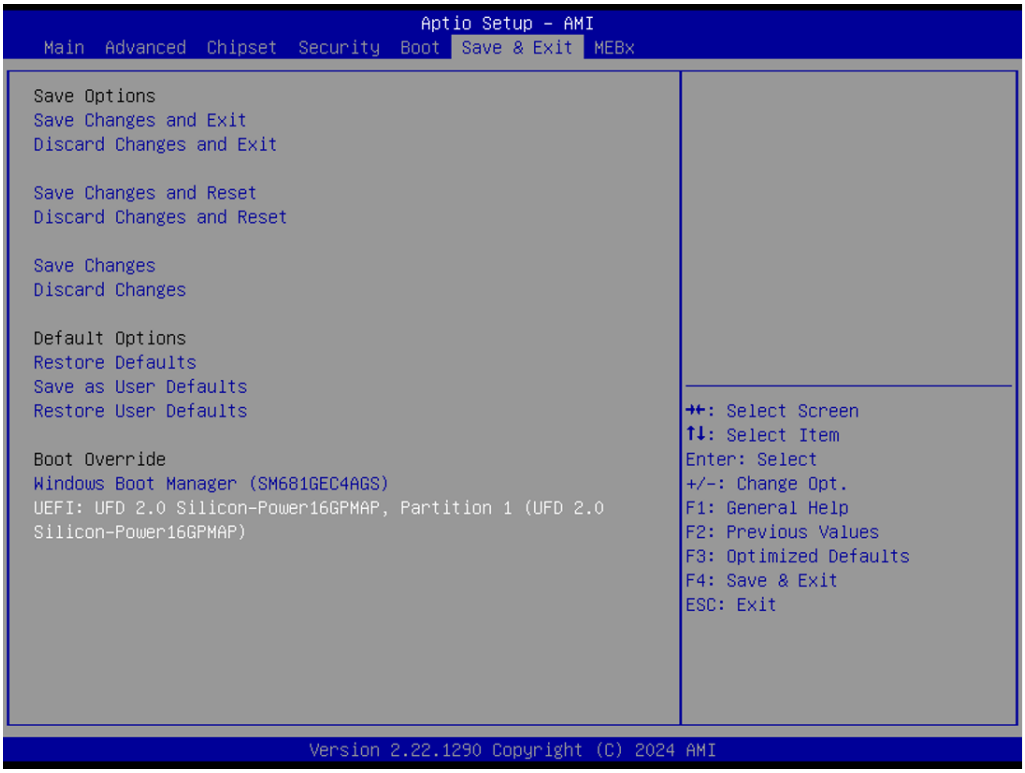


Figure 5.32 Save & Exit

- **Save betas**
- **Save Changes and Exit**
- **Discard Changes and Exit**
- **Save Changes and Reset**
- **Discard Changes and Reset**
- **Save Changes**
- **Discard Changes**
- **Default dot ions**
- **Restore Defaults**
- **Save as User Defaults**
- **Restore User Defaults**

Chapter 6

S/W Introduction and Installation

- S/W Introduction
- Driver Installation
- Advantech iManager

6.1 S/W Introduction

Advantech Embedded Software Services' mission is to “Enhance quality of life with Advantech platforms and Microsoft Windows embedded technology” We enable Windows Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows Embedded Software solutions easily and widely available to the embedded computing community.

6.2 Driver Installation

The Intel Chipset Software Installation (CSI) utility installs the Windows INF files that outline how the operating system and chipset components will be configured.

6.2.1 Windows Driver Setup

ROCK-301 supports Windows* 10. To install the drivers on a windows- based operation system, please connect to internet and browse the website http:// support.advant- ech.com.tw and download the drivers that you want to install and fol- low Driver Setup instructions to complete the installation.

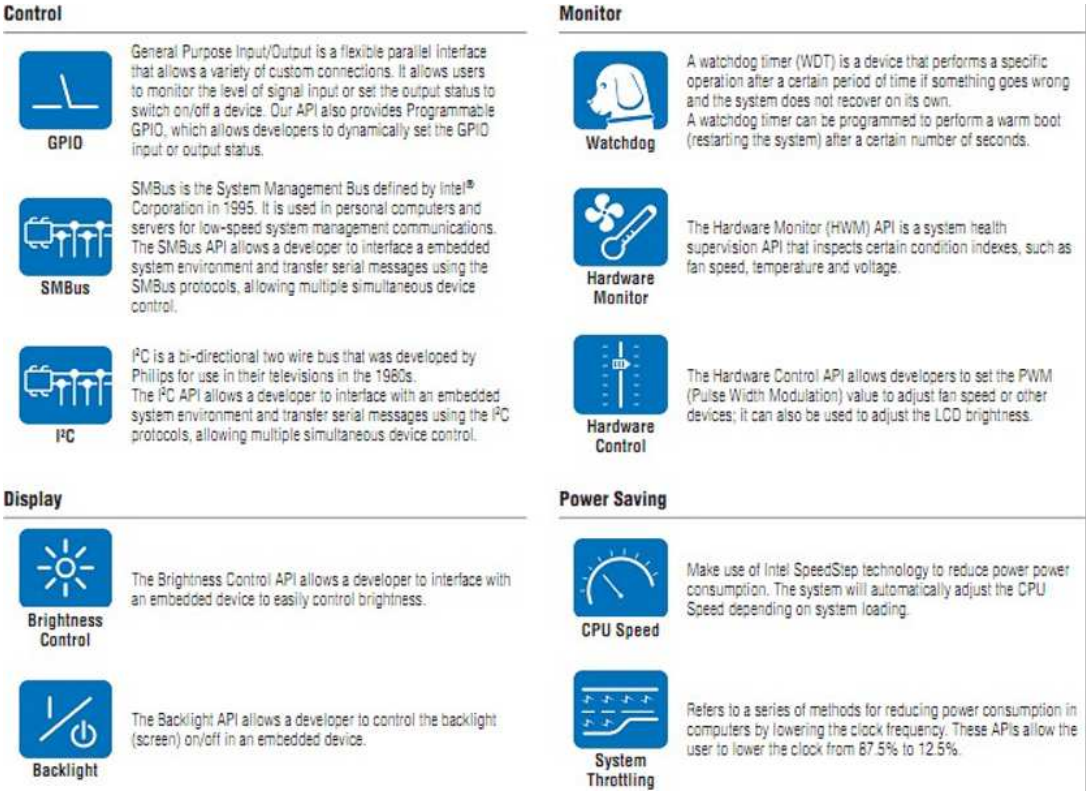
6.2.2 Other OS

ROCK-301 supports Linux: Ubuntu (by Request)

6.3 Advantech iManager

Advantech's platforms come equipped with iManager, a micro controller that provides embedded features for system integrators. Embedded features have been moved from the OS/BIOS level to the board level to increase reliability and simplify integration.

iManager runs whether the operating system is running or not; it can count the boot times and running hours of the device, monitor device health, and provide an advanced watchdog to handle errors. iManager also comes with a secure and encrypted EEPROM for storing important security keys or other customer defined information. All the embedded functions are configured through API and provide corresponding utilities. These APIs comply with PICMG EAPI (Embedded Application Programmable Interface) specifications and unify in the same structures. This makes these embedded features easier to integrate, speed up development, and provide software continuity during hardware upgrade. Please refer to Advantech iManager 2.0 Software API User Manual for more details.



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