ARES-5320 Series

Fanless DIN-Rail Embedded System with Intel® Elkhart Lake Atom Processor

User's Manual

Version 1.0

P/N: 4016532000100P

2024.04

Revision History

Version	Date	Description
1.0	2024.04	Initial release

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Copyright Notice

All Rights Reserved.

The information in this document is subject to change without prior notice in order to improve the reliability, design and function. It does not represent a commitment on the part of the manufacturer.

Under no circumstances will the manufacturer be liable for any direct, indirect, special, incidental, or consequential damages arising from the use or inability to use the product or documentation, even if advised of the possibility of such damages.

This document contains proprietary information protected by copyright. All rights are reserved. No part of this document may be reproduced by any mechanical, electronic, or other means in any form without prior written permission of the manufacturer.

Declaration of Conformity

CE

The CE symbol on your product indicates that it is in compliance with the directives of the Union European (EU). A Certificate of Compliance is available by contacting Technical Support.

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 kind of cable is available from ARBOR. Please contact your local supplier for ordering information.

Warning

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

FCC Class A

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

(1) This device may not cause harmful interference, and

(2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE:

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.

RoHS

ARBOR Technology Corp. certifies that all components in its products are in compliance and conform to the European Union's Restriction of Use of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive 2002/95/EC.

The above mentioned directive was published on 2/13/2003. The main purpose of the directive is to prohibit the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products. Member states of the EU are to enforce by 7/1/2006.

ARBOR Technology Corp. hereby states that the listed products do not contain unintentional additions of lead, mercury, hex chrome, PBB or PBDB that exceed a maximum concentration value of 0.1% by weight or for cadmium exceed 0.01% by weight, per homogenous material. Homogenous material is defined as a substance or mixture of substances with uniform composition (such as solders, resins, plating, etc.). Lead-free solder is used for all terminations (Sn(96-96.5%), Ag(3.0-3.5%) and Cu(0.5%)).

SVHC / REACH

To minimize the environmental impact and take more responsibility to the earth we live, Arbor hereby confirms all products comply with the restriction of SVHC (Substances of Very High Concern) in (EC) 1907/2006 (REACH --Registration, Evaluation, Authorization, and Restriction of Chemicals) regulated by the European Union.

All substances listed in SVHC < 0.1 % by weight (1000 ppm)

Important Safety Instructions

Read these safety instructions carefully

1. Read all cautions and warnings on the equipment.
2. Place this equipment on a reliable surface when installing. Dropping it or letting it fall may cause damage
3. Make sure the correct voltage is connected to the equipment.
4. For pluggable equipment, the socket outlet should be near the equipment and should be easily accessible.
5. Keep this equipment away from humidity.
6. The openings on the enclosure are for air convection and protect the equipment from overheating. DO NOT COVER THE OPENINGS.
7. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
8. Never pour any liquid into opening. This may cause fire or electrical shock.
9. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
10. If one of the following situations arises, get the equipment checked by service personnel:
    a. The power cord or plug is damaged.
    b. Liquid has penetrated into the equipment.
    c. The equipment has been exposed to moisture.
    d. The equipment does not work well, or you cannot get it to work according to the user's manual.
    e. The equipment has been dropped or damaged.
    f. The equipment has obvious signs of breakage.
11. Keep this User's Manual for later reference.

Warning

The Box PC and its components contain very delicately Integrated Circuits (IC). To protect the Box PC and its components against damage caused by static electricity, you should always follow the precautions below when handling it:

1. Disconnect your Box PC from the power source when you want to work on the inside.
2. Use a grounded wrist strap when handling computer components.
3. Place components on a grounded antistatic pad or on the bag that came with the Box PC, whenever components are separated from the system.

Technical Support

If you have any technical difficulties, please consult the user's manual first at: http://www.arbor.com.tw

Please do not hesitate to call or e-mail our customer service when you still cannot find out the answer.

https://www.arbor-technology.com

E-mail:info@arbor.com.tw

Warranty

This product is warranted to be in good working order for a period of one year from the date of purchase. Should this product fail to be in good working order at any time during this period, we will, at our option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Vendor assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Vendor will not be liable for any claim made by any other related party.

Vendors disclaim all other warranties, either expressed or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the hardware, the accompanying product's manual(s) and written materials, and any accompanying hardware. This limited warranty gives you specific legal rights.

Return authorization must be obtained from the vendor before returned merchandise will be accepted. Authorization can be obtained by calling or faxing the vendor and requesting a Return Merchandise Authorization (RMA) number. Returned goods should always be accompanied by a clear problem description.

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Chapter 1

Introduction

1.1. About this Manual

This manual covers several SKUs of the ARES-5320. Product features, installation images and BIOS screens may vary from model to model.

The table below lists the ARES-5320 SKUs and the major variants:

<table>
<tr><th></th><th>CPU</th><th>DI/DO</th><th>LAN</th><th>COM</th><th>Storage</th></tr>
<tr><td>ARES-5320-x6425A</td><td rowspan="4">Soldered onboard Intel® Atom™ x6425RE Processor</td><td rowspan="2">8 x DI/O</td><td>3 x 2.5GbE</td><td rowspan="2">2 x RS232
2 x RS232(Default) /422/485</td><td rowspan="2">1 x Onboard 64G eMMC
1 x Full-size mSATA slot (colay w/ mPCIe)
1 x 2.5” SSD/HDD tray</td></tr>
<tr><td>ARES-5320-x6425P</td><td>2 x 2.5G PoE + 1 x 2.5GbE</td></tr>
<tr><td>ARES-5320-x6425A-ISO (BTO)</td><td rowspan="2">8 x DI & 8 x DO w/ 2kV isolation</td><td>3 x 2.5GbE</td><td rowspan="2">2 x RS232
2 x RS232(Default) /422/485
4 x 2kV isolated RS232/422/485</td><td rowspan="2">1 x Onboard 64G eMMC
1 x Full-size mSATA slot (colay w/ mPCIe)</td></tr>
<tr><td>ARES-5320-x6425P-ISO (BTO)</td><td>2 x 2.5G PoE + 1 x 2.5GbE</td></tr>
</table>

1.2. Specifications

System	
CPU	Soldered onboard Intel® Atom™ x6425RE Processor
Memory	1 x 260-pin DDR4 SO-DIMM sockets, supporting 3200MHz SDRAM up to 32GB
Chipset	SoC
Graphics	Intel® UHD Graphic for 10th Gen Intel® Processors
LAN Chipset	3 x Intel® i226LM
Watchdog Timer	1~255 levels reset
TPM	dTPM 2.0
I/O	
Serial Port	2 x RS232 2 x RS232(Default)/422/485 4 x 2kV isolated RS232/422/485 (For -ISO ver.)

USB Port	3 x USB-A 3.2 Gen1 (5Gbps)
	1 x USB-A 2.0
LAN	3 x 2.5GbE (For A & A-ISO ver.)
	1 x 2.5GbE + 2 x 2.5GbE PoE (IEEE802.3af) (For P & P-ISO ver.)
Video Port	1 x DP++, up to 4096 x 2160@60Hz
	1 x VGA, up to 1920 x 1200@60Hz
Audio Port	1 x Mic-in 1 x Line-out
Digital I/O	8 x DI/O (For A & P ver.)
	8 x DI & 8 x DO both w/ 2kV isolation (For -ISO ver.)
Expansion Bus	1 x Full-size mPCIe slot (USB2.0, colay w/ mSATA) w/ 1 x nano SIM slot
	1 x Full-size mPCIe slot (PCIe x1 + USB2.0)
	1 x Half-size mPCIe slot (PCIe x1 + USB2.0)
Storage	
Type	1 x Onboard 64G eMMC
	1 x Full-size mSATA slot (colay w/ mPCIe) 1 x 2.5” SSD/HDD tray (For A & P ver.)
Power Requirement	
Power Input	DC 9~36V (4 pin terminal block: V+, V-, SW+, SW-)
Power Ignition	1 x 2 pin terminal block (IGN+, IGN-)
Power Consumption	Max. 65W
Environmental	
Operating Temp.	-20 ~ 70°C, ambient w/ air flow
Storage Temp.	-40 ~ 80°C
Operating Humidity	10-95% @ 70°C (non-condensing)
Vibration	5~500Hz 3 Grms X,Y,Z axis w/ eMMC, according to IEC 68-2-64

Shock	10G peak accel (11 m sec. duration), operation
	30G peak accel (11 m sec. duration), nonoperation
	According to IEC 68-2-27
Qualification	
Certification	CE, FCC (Class A), E-Mark
Mechanical	
Construction	Metal + Aluminum Alloy
Mounting	DIN-rail (standard) Wall mount (optional w/ CTOS BKT, but not supported for -ISO ver.)
Weight	1.9Kg
Dimensions (W x D x H)	70 x 125 x 190 mm
OS Support	
Windows 10 IoT / Windows 11 IoT / Ubuntu	

1.3. Inside the Package

Upon opening the package, carefully inspect the contents. If any of the items is missing or appears damaged, contact your local dealer or distributor. The package should contain the following items:

	1 x ARES-5320 (Product outlook varies according to your model)
ARES-5320-x6425A/ ARES-5320-x6425P	• User's manual • 1 x DIN rail mount bracket • 1 x 2.5" drive bracket & 1 x 2.5" SATA cable • 4 x M3*6mm screws (for DIN rail mount bracket) • 8 x M3*4mm screws (for 2.5" drive & bracket) • 2 x M3*6mm screws (for 2.5" SATA cable) • 1 x 2-pin terminal block plug (for power ignition) • 1 x 4-pin terminal block plug (for power input) • 1 x 10-pin terminal block plug (for digital I/O)
ARES-5320-x6425A-ISO / ARES-5320-x6425P-ISO	• User's manual • 1 x DIN rail mount bracket • 4 x M3*6mm screws (for DIN rail mount bracket) • 1 x 2-pin terminal block plug (for power ignition) • 1 x 4-pin terminal block plug (for power input) • 2 x 10-pin terminal block plug (for digital I/O)

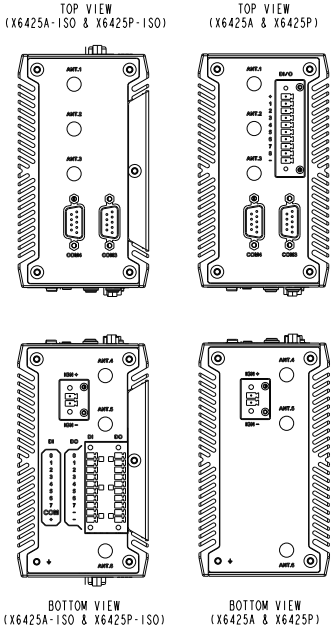
1.4. Ordering Information

ARES-5320-x6425A	ARES-5320 w/ 3 x 2.5GbE, 4 x COM, 4 x USB, 1 x DP, 1 x VGA, 8 x DI/O, 64G eMMC & **1 x 2.5" SSD/HDD Tray**
ARES-5320-x6425P	ARES-5320 w/ **2 x 2.5G PoE** + **1 x 2.5GbE**, 4 x COM, 4 x USB, 1 x DP, 1 x VGA, 8 x DI/O, 64G eMMC & **1 x 2.5" SSD/HDD Tray**
ARES-5320-x6425A-ISO (BTO)	ARES-5320 w/ 3 x 2.5GbE, 8 x **COM(4 x isolated)**, 4 x USB, 1 x DP, 1 x VGA, **8 x isolated DI, 8 x isolated DO** & 64G eMMC
ARES-5320-x6425P-ISO (BTO)	ARES-5320 w/ **2 x 2.5G PoE + 1 x 2.5GbE**, **8 x COM(4 x isolated)** , 4 x USB, 1 x DP, 1 x VGA, **8 x isolated DI, 8 x isolated DO** & 64G eMMC

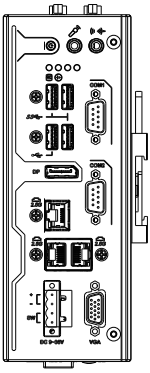
Chapter 2

Getting Started

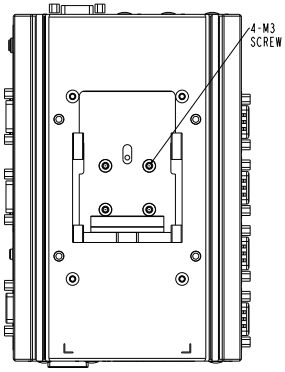
2.1. Dimensions



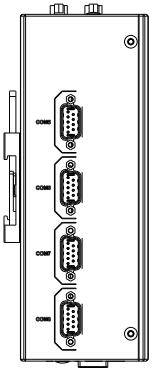
FRONT VIEW
(X6425A)

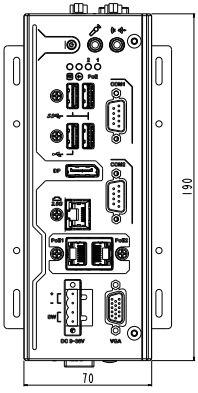


RIGHT VIEW
(X6425A-ISO & X6425P-ISO)
(DIN RAIL MOUNT)

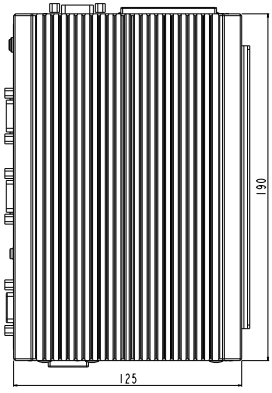


BACK VIEW
(X6425A-ISO & X6425P-ISO)

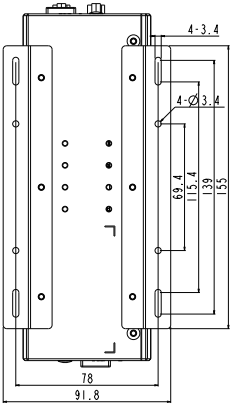




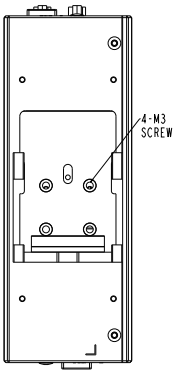
FRONT VIEW
(X6425P)



RIGHT VIEW
(X6425A & X6425P)

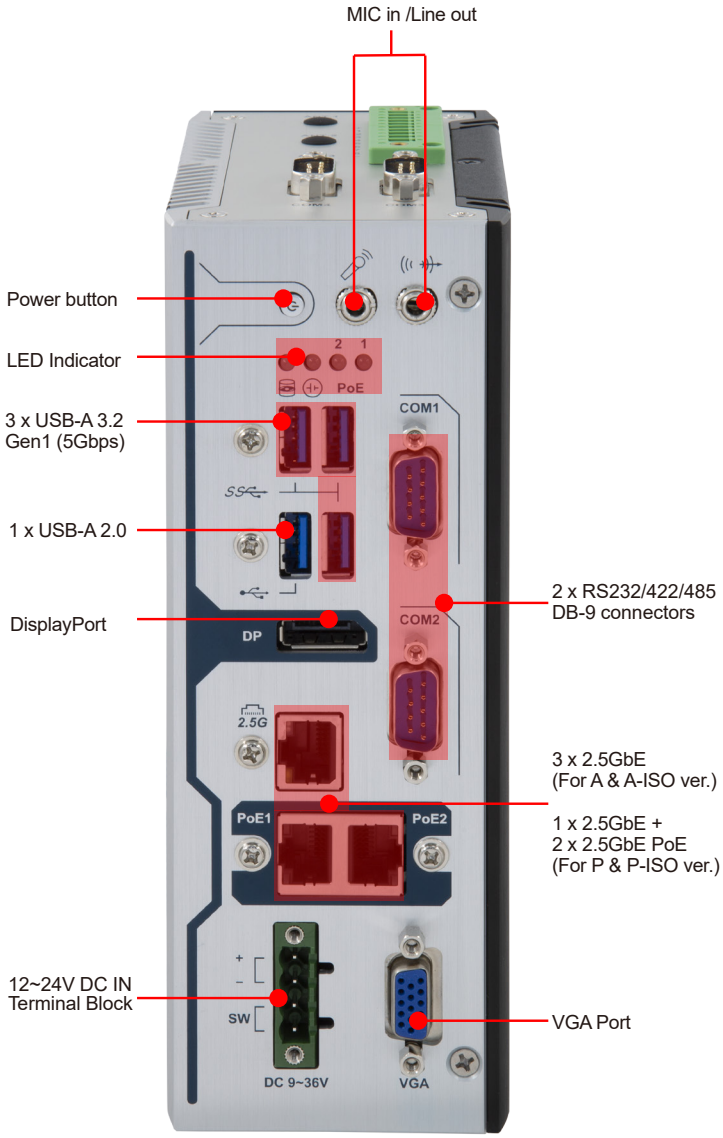


BACK VIEW
(X6425A & X6425P)
(WALL MOUNT)



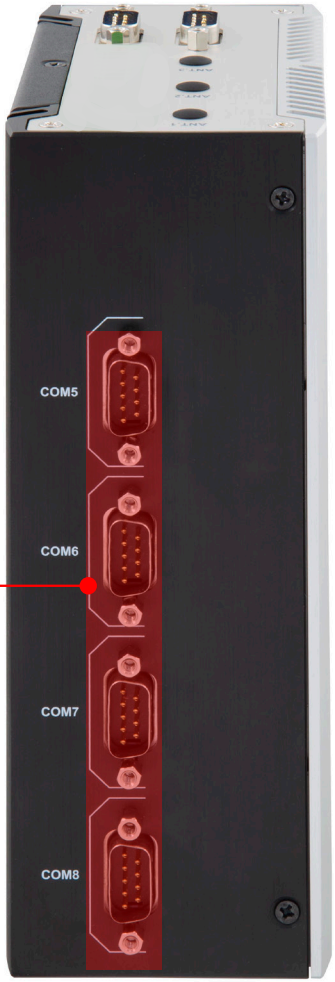
BACK VIEW
(X6425A & X6425P)
(DIN RAIL MOUNT)

2.2. Overview


MIC in /Line out
Power button
LED Indicator
3 x USB-A 3.2
Gen1 (5Gbps)
1 x USB-A 2.0
DisplayPort
12~24V DC IN
Terminal Block
2 x RS232/422/485
DB-9 connectors
3 x 2.5GbE
(For A & A-ISO ver.)
1 x 2.5GbE +
2 x 2.5GbE PoE
(For P & P-ISO ver.)
VGA Port
2 1
PoE
COM1
COM2
DP
2.5G
PoE1
PoE2
SW
DC 9~36V
VGA

2.2.1. Back View

ARES-5320-x6425A-ISO &
ARES-5320-x6425P-ISO

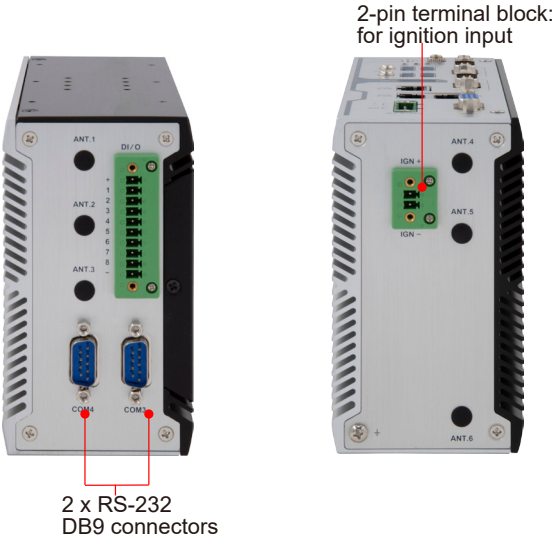


4 x 2KV Isolated
RS-232/422/485

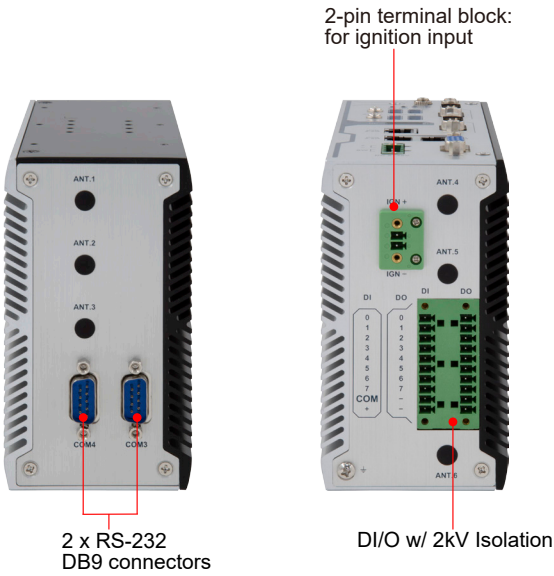
ARES-5320-x6425A &
ARES-5320-x6425P

2.2.2. Top & Bottom View

ARES-5320-x6425A & ARES-5320-x6425P



ARES-5320-x6425A-ISO & ARES-5320-x6425P-ISO

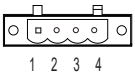


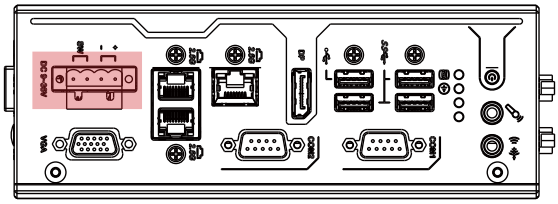
DC In Connector

Connector Type: Onboard 5.00 mm pitch 1x4-pin terminal block

Pin Assignment:

Pin	Description
1	Vin+
2	Vin-
3	PWR_SW-
4	PWR_SW+





Ignition Power Connector

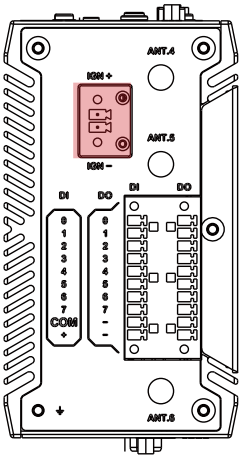
Function: Ignition Power Connector

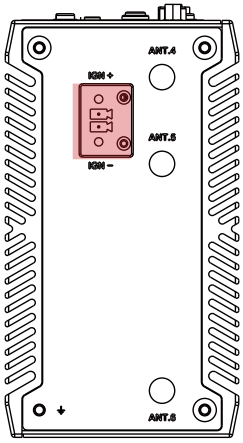
Connector Type: Onboard 2x1-pin box connector

Pin Assignment:

Pin	Description
1	ACC_ON+
2	GND

-x6425A/P-ISO





-x6425A/P

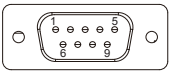
COM Connectors

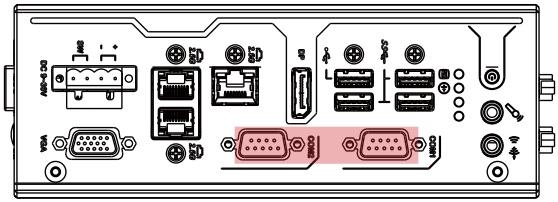
Function: COM1/2/ for RS-232/422/485, COM3/4 for RS-232 only

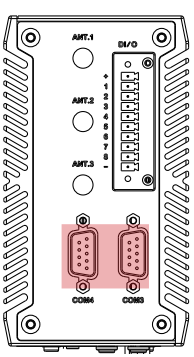
Connector Type: 9-pin D-sub Male Connector

Pin Assignment:

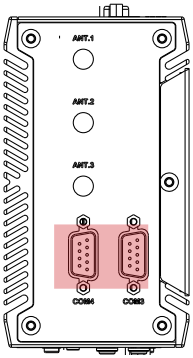
Pin	RS-232	RS-422	RS-485
1	DCD	COM_422 TX-	COM_485 D-
2	RXD	COM_422 TX+	COM_485 D+
3	TXD	COM_422 RX+	
4	DTR	COM_422 RX-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS		
9	RI		







-x6425A/P

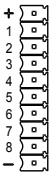


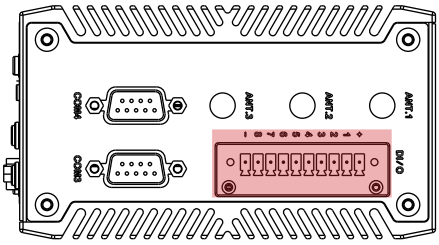
-x6425A/P-ISO

8-Bit DIO

Function: Digital IO Connector

Pin Assignment: Please refer to Appendix A. DIO Signal Connections on page 82





2.3. LED Indicator Status

LED Indicator	Icon	Blinking Mode	Status
PWR Button		Solid Green	The system is in operation(S0)
		Solid Red	The system is in in sleep/hibernate mode(S3/S4) or power off mode(S5)
SATA HDD/SSD		Flashing Red	Data transmitting
RTC		Solid Green	RTC battery is low
PoE		Solid Green	Active

2.4. Driver Installation Note

For operating system of Windows 10, please go to our website at **www.arbor-technology.com** and download the driver pack from the product page. Then unzip the downloaded file and follow the sequence below to install the drivers to prevent errors:

Chipset → Other drivers
Driver Path:

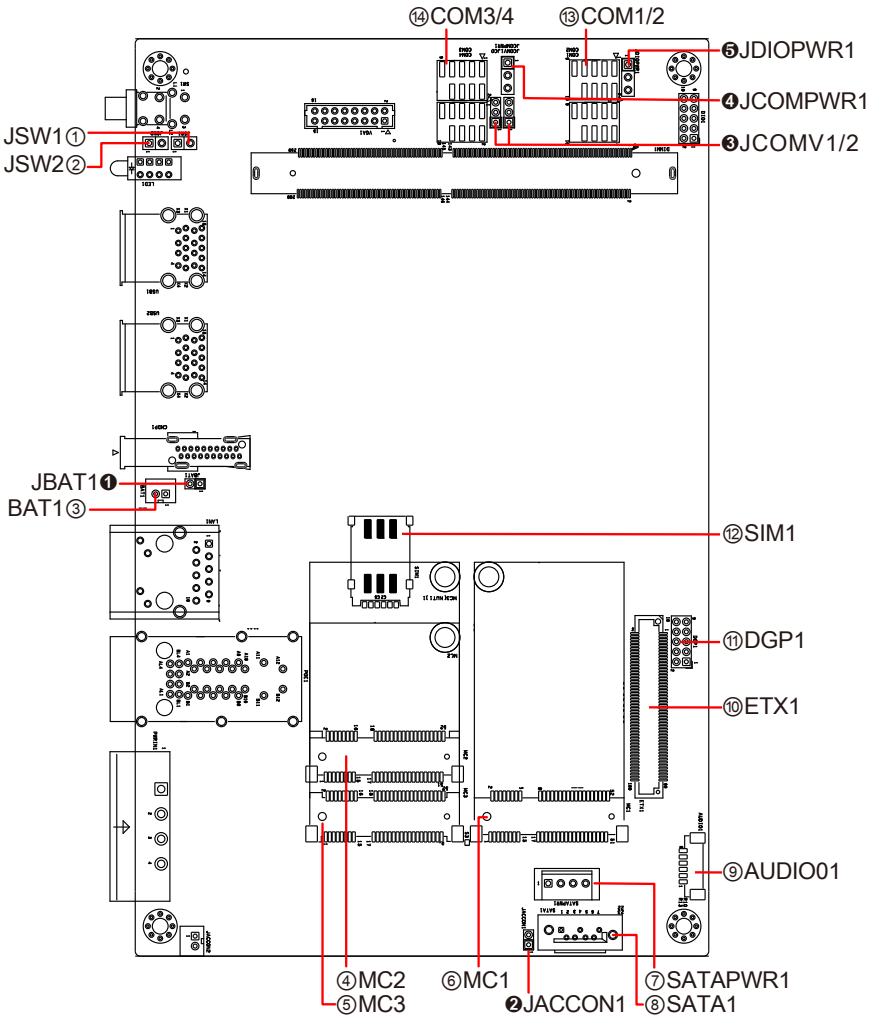
Driver	Path
Chipset	\\Chipset\setupchipset.exe
Audio	\\Audio\Setup.exe
Graphics	\\Graphics\gfx_win_101.2115\Installer.exe
Intel CSME	\\Intel CSME\SetupME.exe
Intel HID Event Filter	\\Intel HID Event Filter\HIDEventFilterDriver-2.2.1.384\Installer\Setup.exe
Intel Serial IO	\\Intel Serial IO\5.123.1.1023
LAN	\\LAN\Wired_driver_28.0_x64\Wired_driver_28.0_x64.exe

Chapter 3

Engine of the Computer

3.1. Board Overview

Main Board



3.1.1. Jumpers & Connectors

Jumpers

Label	Description
❶JBAT1	Clear CMOS Selection
❷JACCON1	Vehicle ACC mode selection
❸JCOMV1/2	RI or Power Select Pin Header
❹JCOMPWR1	RI Power Select Pin Header
❺JDIOPWR1	DIO Power Select Pin Header

Connectors

Label	Description
①JSW1	Reset Pin Header
②JSW2	Power Button Pin Header
③BAT1	RTC Battery Connector
④MC2	Half-Size Mini PCI-e Socket
⑤MC3	Full-Size Mini PCI-e Socket
⑥MC1	Full-Size Mini PCI-e Socket
⑦SATAPWR1	SATA Power Connector
⑧SATA1	SATA 7-pin Connector
⑨AUDIO1	Audio Wafer Connector
⑩ETX1	Daughter Board Connector
⑪DGP1	Debug Port
⑫SIM1	Nano SIM Card Socket
⑬COM1/2	RS-232/RS-422/RS-485 Serial Port Header
⑭COM3/4	RS-232 Serial Port Header

3.1.2. Jumpers & Connectors Settings

❶ JBAT1

Function: Clear CMOS Selection

Connector Type: 2.0mm pitch,1x2 pin header.

Pin Assignment:

Pin	Description	
short	Clear CMOS	
Open	Keep CMOS(default)	

❷ JACCON1

Function: Vehicle ACC mode selection

Jumper Type: 2.00 mm pitch 1x2-pin header

Setting:

Pin	Description	
1	DCIN	
2	ACC_ON	

Setting:
short: Automation mode(default)
open: Vehicle mode

❸ JCOMV1/2

Function: RI or Power Select Pin Header

Jumper Type: Onboard 2.00mm-pitch 3-pin header

Setting:

Pin	Description	
1-2	RI(default)	
2-3	RI_PWR	

❹ JCOMPWR1

Function: RI Power Select Pin Header
Jumper Type: 2.00 mm pitch 1x3-pin header
Setting:

Pin	Description	
1-2	VCC5(default)	
2-3	VCC12	

❺ JDIOPWR1

Function: DIO Power Select Pin Header
Jumper Type: Onboard 2.00mm-pitch 1x3-pin header
Setting:

Pin	Description	
1-2	VCC5(default)	
2-3	VCC12	

① JSW1

Function: Reset Pin Header
Connector Type: 2.00 mm pitch 1x2 pin header
Pin Assignment:

Pin	Description
1	RESET#
2	GND

② JSW2

Function: Power Button Pin Header
Connector Type: 2.00 mm pitch 1x2 pin header
Pin Assignment:

Pin	Description
1	PWR_SW#
2	GND

③ BAT1

Function: RTC battery connector

Connector Type: Onboard 2x1-pin box connector

Pin Assignment:

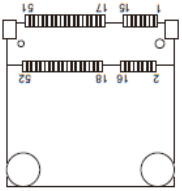
Pin	Description
1	VBATT
2	GND

④ MC2

Function: Half-size mini PCI-e Socket (w/ PCIe 3.0 x1 + USB 2.0)

Connector Type: Mini PCI-e 52-pin Socket

Pin Assignment: The pin assignments conform to the industry standard

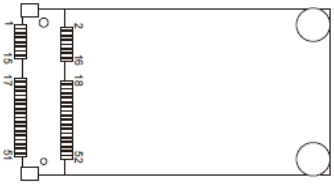


⑤ MC3

Function: Full-size mini PCI-e Socket (w/ PCIe 3.0 x1 + USB 2.0)

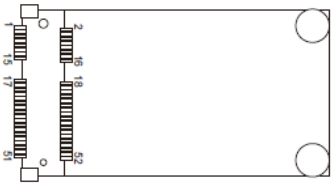
Connector Type: Mini PCI-e 52-pin Socket

Pin Assignment: The pin assignments conform to the industry standard



⑥ MC1

Function: Full-size mini PCI-e Socket (w/ SATA + USB 2.0)
Connector Type: Mini PCI-e 52-pin Socket
Pin Assignment: The pin assignments conform to the industry standard



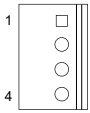
⑦ SATAPWR1

Function: SATA Power Connector

Connector Type: 2.54mm pitch 4-pin Wafer

Pin Assignment:

Pin	Description
1	VCC5
2	GND
3	GND
4	VCC12



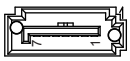
⑧ SATA1

Function: Serial ATA Connector

Connector Type: Standard 7-pin Serial ATA Connector

Pin Assignment:

Pin	Description	Pin	Description
1	GND	2	TXP
3	TXN	4	GND
5	RXN	6	RXP
7	GND		



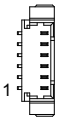
⑨ AUDIO1

Function: Audio Connector

Connector Type: 1.25 mm pitch 1x6 wire to board connector

Pin Assignment:

Pin	Description
1	MIC_L
2	MIC_R
3	GND
4	GND
5	Line Out_L
6	Line Out_R



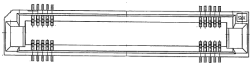
⑩ ETX1

Function: Daughter Board Connector

Connector Type: 100-pin Connector

Pin Assignment: ARBOR original design pin out

For requirement of customized daughter board, please contact ARBOR.



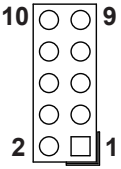
⑪ DGP1

Function: Debug Port

Connector Type: 2.00mm pitch 10-pin Header

Pin Assignment:

Pin	Description	Pin	Description
1	ESPI_CLK	2	GND
3	ESPI_CS0#	4	ESPI_IO0
5	ESPI_RST#	6	3VSB
7	ESPI_IO3	8	ESPI_IO2
9	VCC3	10	ESPI_IO1

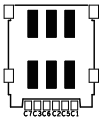


⑫ SIM1

Function: Nano SIM Card Socket

Connector Type: Nano SIM Card Socket

Pin Assignment: The pin assignments conform to the industry standard.



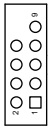
⑬ COM1/2

Function: RS-232/RS-422/RS-485 Serial Port Header

Connector Type: 2.00mm pitch 9-pin Header

Pin Assignment:

Pin	RS-232	RS-422	RS-485
1	DCD	COM_422 TX-	COM_485 D-
2	RXD	COM_422 TX+	COM_485 D+
3	TXD	COM_422 RX+	
4	DTR	COM_422 RX-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS		
9	RI		



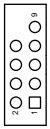
⑭ COM3/4

Function: RS-232 Pin Header

Connector Type: 2.00mm pitch 9-pin Header

Pin Assignment:

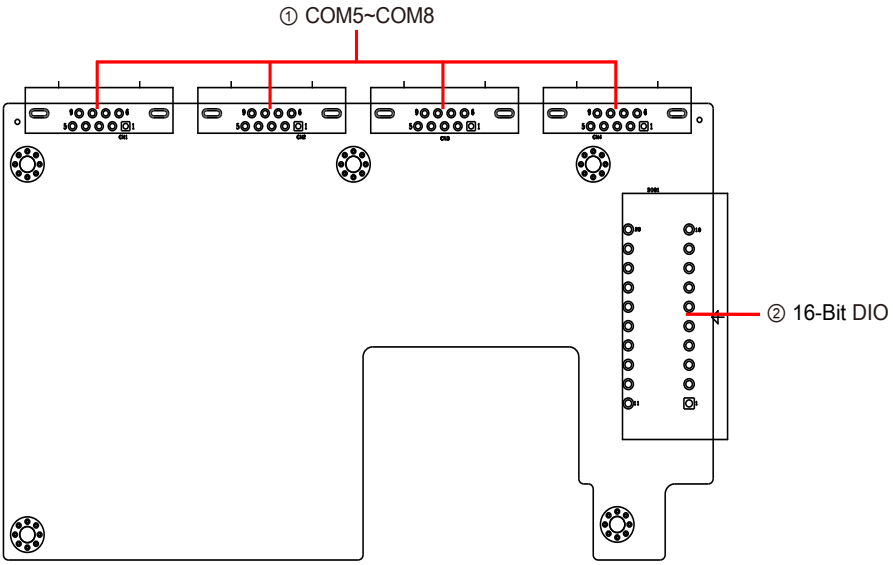
RS-232			
Pin	Description	**Pin**	Description
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI		



3.2. Daughter Board - SCDB-148Q

Function: RS-232/422/485 Serial Port and isolated digital I/O daughter board
Applicable models: ARES-5320-x6425A-ISO & ARES-5320-x6425P-ISO

Board Top:



3.2.1. Connectors Settings

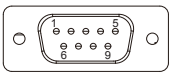
① COM5~COM8

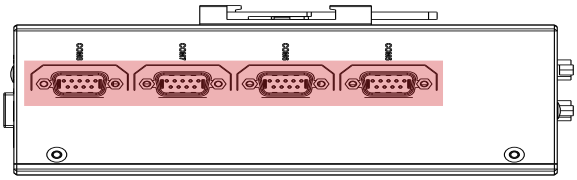
Function: COM5/6/7/8 for RS-232/422/485

Connector Type: 9-pin D-sub Male Connector

Pin Assignment:

Pin	RS-232	RS-422	RS-485
1	DCD	COM_422 TX-	COM_485 D-
2	RXD	COM_422 TX+	COM_485 D+
3	TXD	COM_422 RX+	
4	DTR	COM_422 RX-	
5	GND	GND	GND
6	DSR		
7	RTS		
8	CTS		
9	RI		





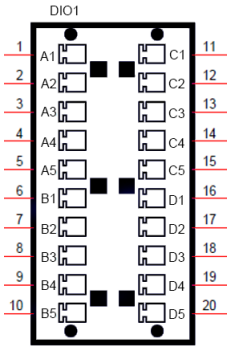
② 16-Bit DIO

Function: Digital Input & Output

Connector Type: 20-pin Terminal Block

Pin Assignment:

Pin	Description	Pin	Description
1	DIN_00	11	DOUT_00
2	DIN_01	12	DOUT_01
3	DIN_02	13	DOUT_02
4	DIN_03	14	DOUT_03
5	DIN_04	15	DOUT_04
6	DIN_05	16	DOUT_05
7	DIN_06	17	DOUT_06
8	DIN_07	18	DOUT_07
9	COM	19	GND_ISO
10	+24V_ISO	20	GND_ISO



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Chapter 4

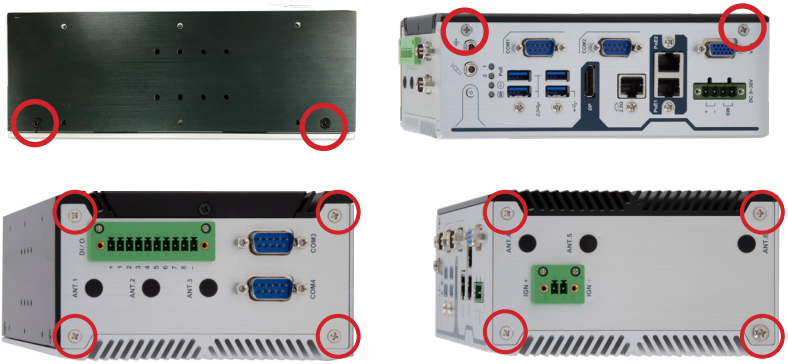
Installation & Maintenance

4.1. Disassembling and Assembling the Computer

4.1.1. Disassembling the Computer

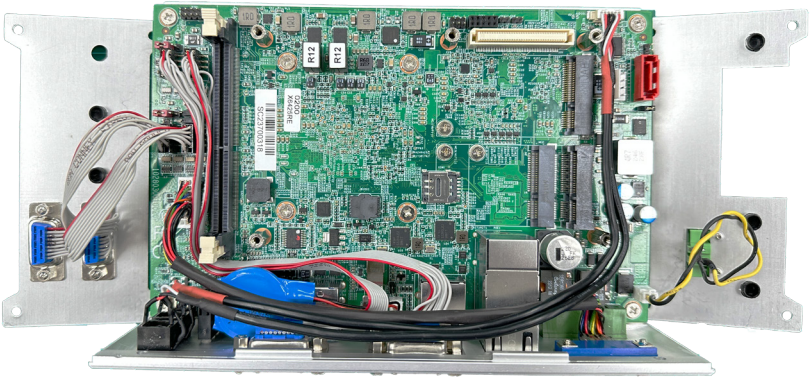
To use onboard jumpers/connectors or to install/remove internal components, you will need to open the computer to access the inside of the computer. Follow through the guide below to disassembly the computer. (Product photo varies according to the SKUs. But the disassembling procedures for various SKUs are basically the same.)

1. Remove the screws on the rear, bottom and top sides as shown below .



2. Then lift the L shape chassis away from the assembly.

3. Now you can access the components on the main board and configure or connect them as required.



4.1.2. Assembling the Computer

After you make required hardware installation and jumpers settings, assemble the computer by performing the proceeding steps in reverse order.

4.2. Installing the Hardware

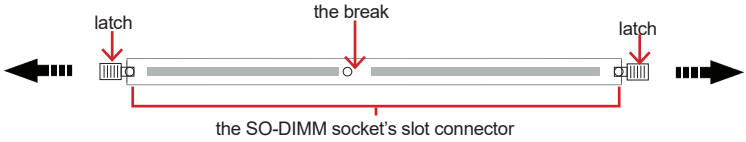
4.2.1. Installing a Memory Module

1. Remove the top cover from the computer as described in 4.1. Disassembling and Assembling the Computer on page 30.

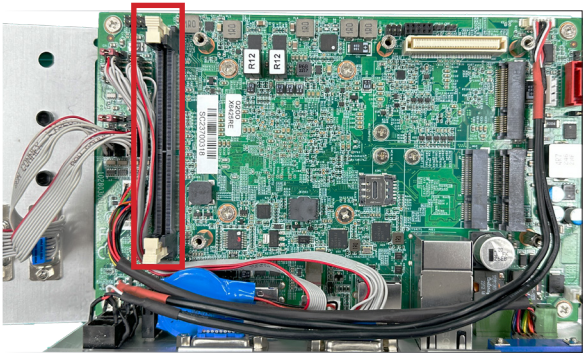
2. Locate the SO-DIMM sockets on the main board.

   The SO-DIMM sockets are vertical type, and each socket has two latches for fixing the memory modules. The memory module can only be installed by one direction due to the notch.

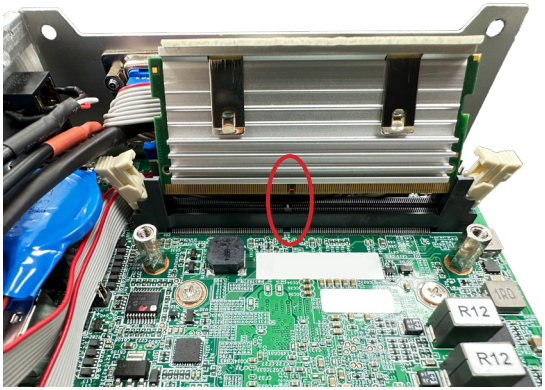
3. Pull back both latches from the socket.



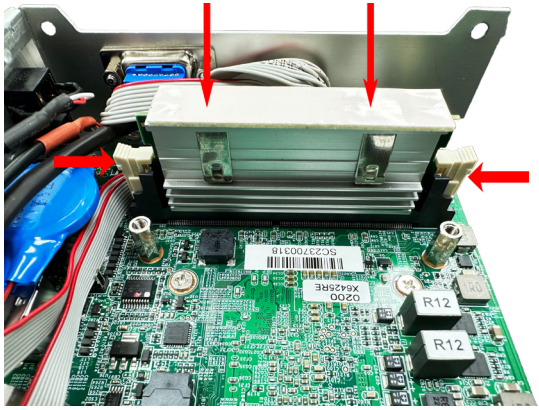
4. Locate memory module sockets.



5. Confront the memory module's golden finger at the SO-DIMM socket. Position the memory module at the SO-DIMM socket, with the memory module's key notch aligned at the break of the SO-DIMM's slot connector.

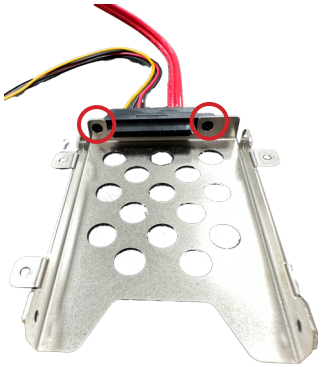


6. Vertically plug the memory module to the DIMM socket. "Fully" plug the memory module until both latches auto-lock the memory module in place.

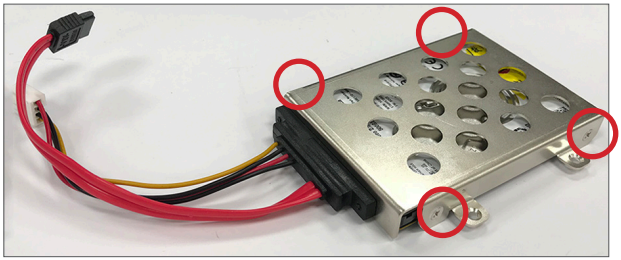


4.2.2. Installing a SSD/HDD (for -x6425A and -x6425P)

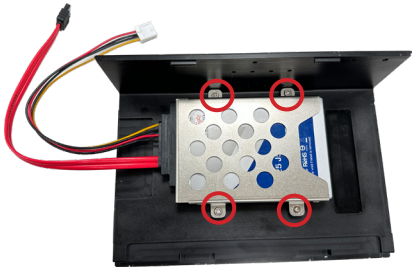
1. Fasten two screws to secure the SATA and power connectors onto the bracket.



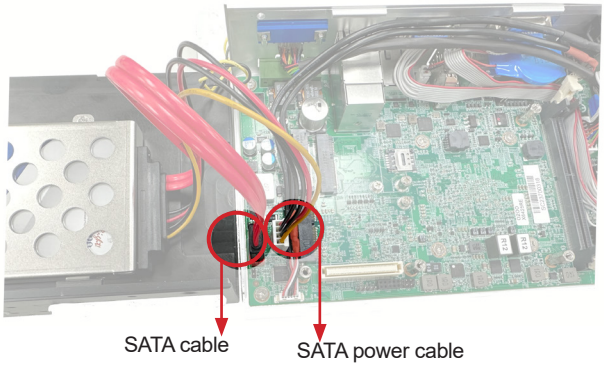
2. Slide the 2.5” HDD or SSD storage device into the drive bay and ensure it connects to the SATA connector. Using the 4 screws coming with the storage device kit, fix the storage device in place to the bracket.



3. Secure the drive bay back to the L-shape chassis by fastening the 4 screws you removed in Step 1.



4. Connect the SATA cable to the SATA connector on the adapter. Then connect the SATA power cable to the SATA power connector on the main board.

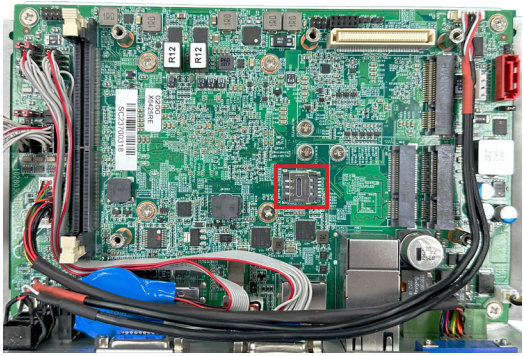


5. Reassemble the computer by performing the steps in 4.1.2. Assembling the Computer on page 31 in reverse order.

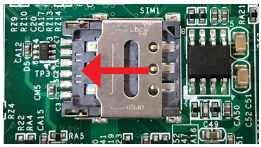
4.2.3. Installing a SIM Card and relative connection module

1. Remove the top cover from the computer as described in 4.1. Disassembling and Assembling the Computer on page 30.

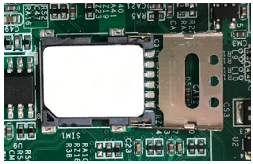
2. Locate the SIM card slot on the main board.



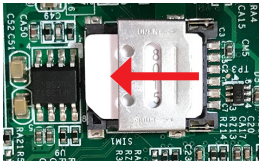
3. Slide the SIM card holder cover towards the OPEN edge and then lift the cover to open it.



4. Insert the SIM card into the card holder as shown below.



5. Close the SIM card holder door and slide the door to the LOCK edge to lock into place.



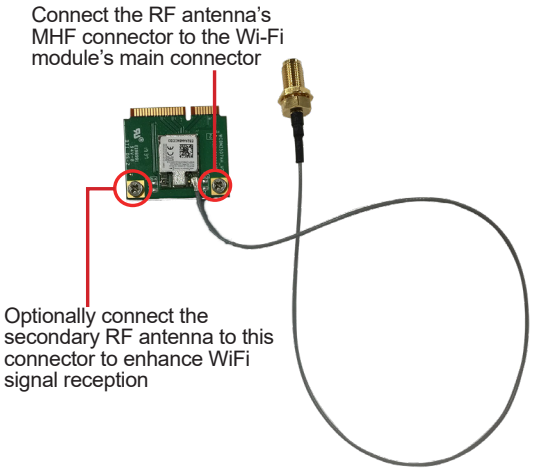
6. Close the SIM card holder door and slide the door to the LOCK edge to

4.2.4. Installing Wi-Fi Module

The computer has a mPCIe socket for Wi-Fi module installation. To install a Wi-Fi module:

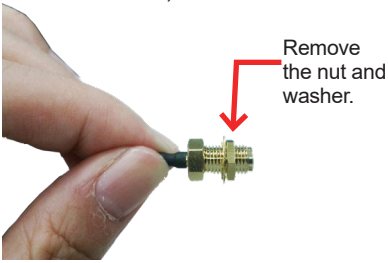
1. In order to make the half-size Wi-Fi module compatible with the Mini-card socket, extend the Wi-Fi module with a “mini half bracket”. Join them together by using two screws.

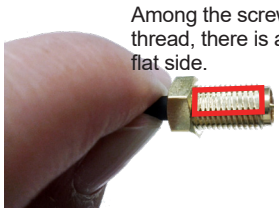
2. Connect the RF antenna’s MHF connector to the Wi-Fi module.



3. Plug the Wi-Fi module into the Mini-card socket by a slanted angle. Fully plug the module, and note the notch on the Wi-Fi module should meet the break on the connector.
   Press down the module and fix the module in place by fastening the screw.

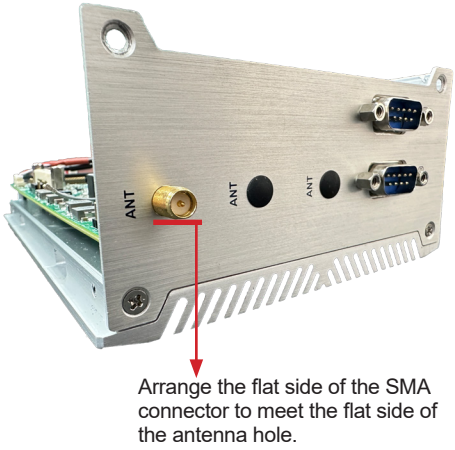
4. From the SMA end of the RF antenna, remove the washer and the nut. Save the washer and nut for later use. Note that the SMA connector is in the form of a threaded bolt, with one flat side.





5. Remove the plastic plug from the antenna hole. Keep the plastic plug for any possible restoration in the future.

6. Pass the SMA connector through the above mentioned antenna hole. Make sure that you align the connector's flat side with the antenna hole's flat side.



7. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

Mount the washer and the nut to the SMA connector. Tighten the nut.

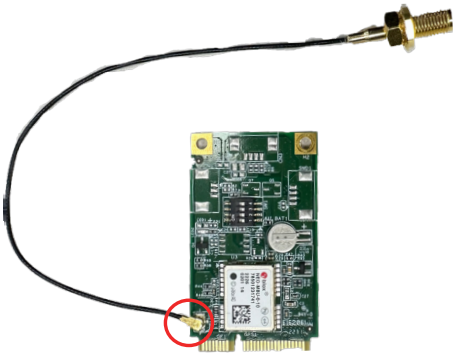
8. If you are using two antennas, repeat the steps above for another antenna.
9. Have an external antenna. Screw and tightly fasten the antenna to the SMA connector. Swivel the antenna to an angle of best signals.

4.2.5. Installing GPS Module

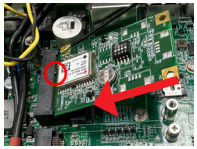
The computer has a mPCIe socket for GPS module installation. To install a GPS module:

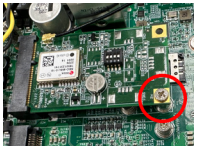
1. Locate the M.2 E-Key socket for GPS module.
2. Prepare the GPS module kit. The module is a Mini-card socket form factor.

3. Connect the antenna to the GPS module.

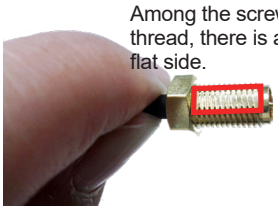


4. Plug the GPS module into the Mini-card socket by a slanted angle. Fully plug the module, and note the notch on the GPS module should meet the break on the connector.
   Press down the module and fix the module in place by fastening the screw.



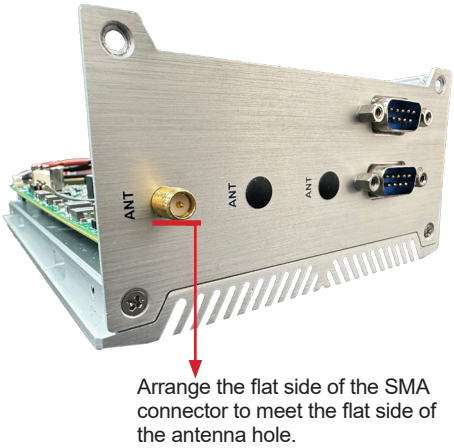


5. From the SMA end of the RF antenna, remove the washer and the nut. Save the washer and nut for later use. Note that the SMA connector is in the form of a threaded bolt, with one flat side.



6. Remove the plastic plug from the antenna hole. Keep the plastic plug for any possible restoration in the future.

7. Pass the SMA connector through the above mentioned antenna hole. Make sure that you align the connector's flat side with the antenna hole's flat side.



8. Mount the washer first and then the nut to the SMA connector. Make sure the nut is tightened.

Mount the washer and the nut to the SMA connector. Tighten the nut.

9. If you are using two antennas, repeat the steps above for another antenna.
10. Have an external antenna. Screw and tightly fasten the antenna to the SMA connector. Swivel the antenna to an angle of best signals.

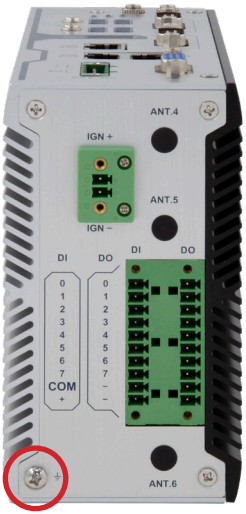
4.3. Ground the Computer

Follow the instructions below to ground the computer to land. Be sure to follow every grounding requirement in your place.

> **Warning** Whenever the unit is installed, the ground connection must always be made first of all and disconnected lastly.

1. See the illustration below. Remove the ground screw from the bottom panel.

2. Attach a ground wire to the bottom panel with the screw.



-x6425A-ISO
-x6425P-ISO

-x6425A
-x6425P

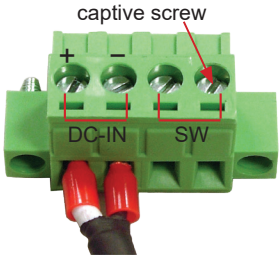
4.4. Wire DC-in Power Source

4.4.1. Automation Mode

> **Warning** Only trained and qualified personnel are allowed to install or replace this equipment.

Follow the instructions below for connecting the computer to a DC-input power source.

1. Before wiring, make sure the power source is disconnected.
2. Find the terminal block in the accessory box.
3. Use the wire-stripping tool to strip a short insulation segment from the output wires of the DC power source.
4. Identify the positive and negative feed positions for the terminal block connection. See the symbols printed on the rear panel indicating the polarities and DC-input power range in voltage.
5. Insert the exposed wires into the terminal block plugs. Only wires with insulation should extend from the terminal block plugs. Note that the polarities between the wires and the terminal block plugs must be positive to positive and negative to negative.
6. Use a slotted screwdriver to tighten the captive screws. Plug the terminal block firmly, which wired, into the receptacle on the rear panel.



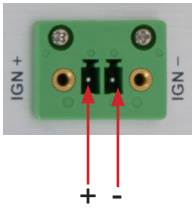
terminal block

4.4.2. Vehicle Application Mode

Follow the instructions below for connecting the computer to a vehicle power source.

1. Make sure JACCON1 jumper is open for vehicle power mode. (Refer to 3.1.1. Jumpers & Connectors on page 19.)

2. For vehicle application, DC power Input wiring pin configuration is as below. Please connect the Acc pin with your car Acc, and the device will be activated when you turn your ignition key to Acc.



4.5. Mounting

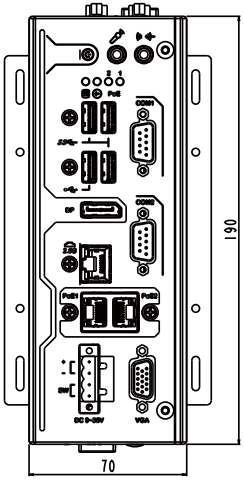
4.5.1. Wall Mounting

To wall mount the computer using the optional wall-mount kit:

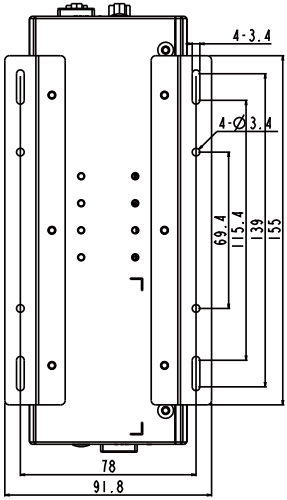
1. Select a proper mounting location with adequate wall strength to support the mounted unit.
2. Locate the 6 screw holes on the computer's rear side. Use the screws included in the wall-mount kit to assemble the brackets to the computer’s rear side.

   Suggested mounting screws. M3*4L screws (qty: 6).

3. Use the other screw holes and cutouts on both wall-mount brackets to mount the computer to a wall.



Front View
-X6425P

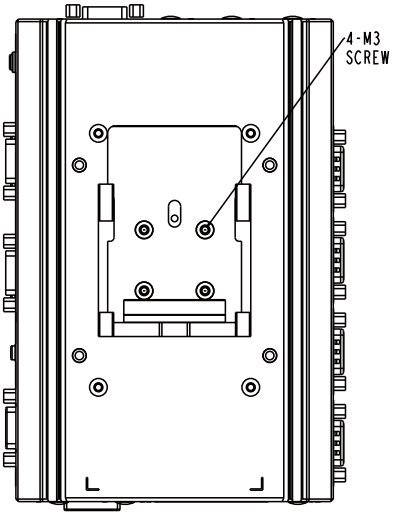


Back View
-X6425A/P

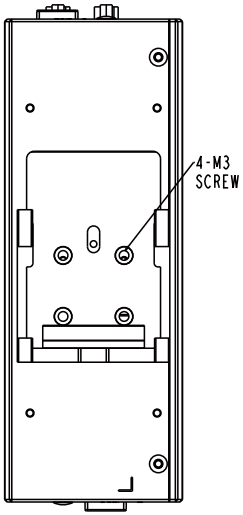
4.5.2. DIN-Rail Mounting

To mount the computer using the provided DIN-rail mounting kit:

1. Select a proper mounting location with adequate wall strength to support the mounted unit.
2. Screw the DIN-rail mounting clip to the rear side of the computer.



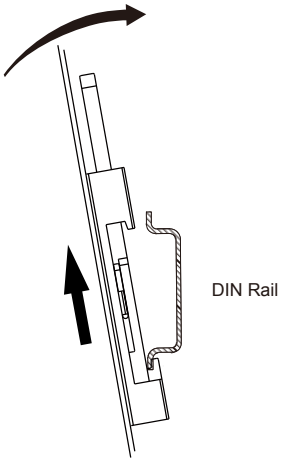
Right View
-X6425A/P-ISO



Back View
-X6425A/P

After you screw the DIN-rail mounting clip to the computer:

1. Snap the DIN Rail clip to the upper edge of the DIN Rail.
2. Lift the computer firmly upward and then forward towards the DIN Rail until the DIN Rail clip tab engages and snaps to the upper edge of the DIN Rail.



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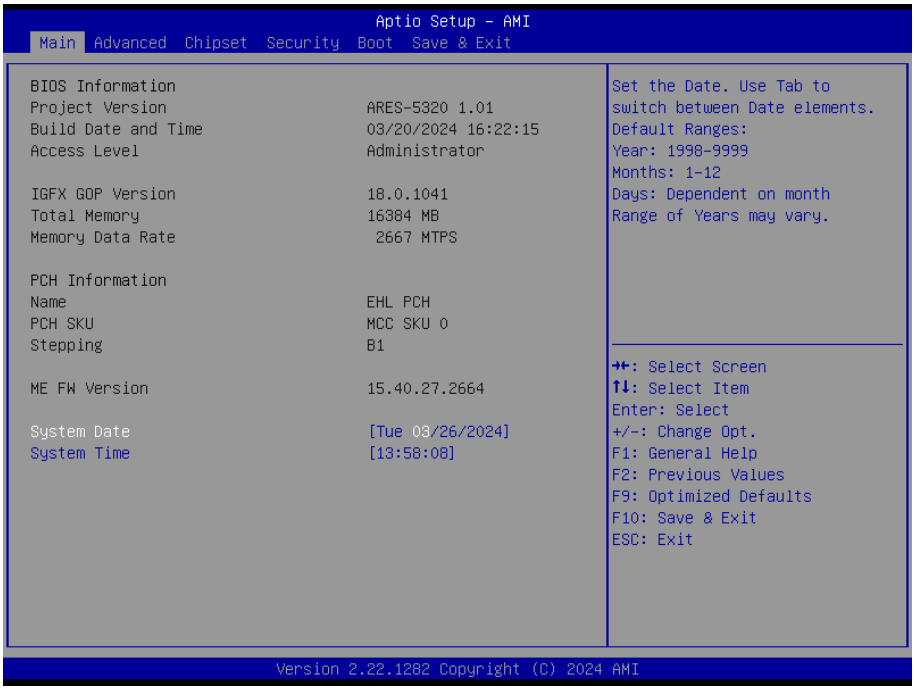
Chapter 5

BIOS

The BIOS Setup utility is featured by American Megatrends Inc to configure the system settings stored in the system's BIOS ROM. The BIOS is activated once the computer powers on. When the computer is off, the battery on the main board supplies power to BIOS RAM.

To enter the BIOS Setup utility, keep hitting the "Delete" key upon powering on the computer.



Note: Actual model name and board information varies according to your model.

Menu	Description
Main	See 5.1. Main on page 52
Advanced	See 5.2. Advanced on page 53
Chipset	See 5.3. Chipset on page 69
Security	See 5.4. Security on page 77
Boot	See 5.5. Boot on page 79
Save & Exit	See 5.6. Save & Exit on page 80

Key Commands

The BIOS Setup utility relies on a keyboard to receive user's instructions. Hit the following keys to navigate within the utility and use the utility.

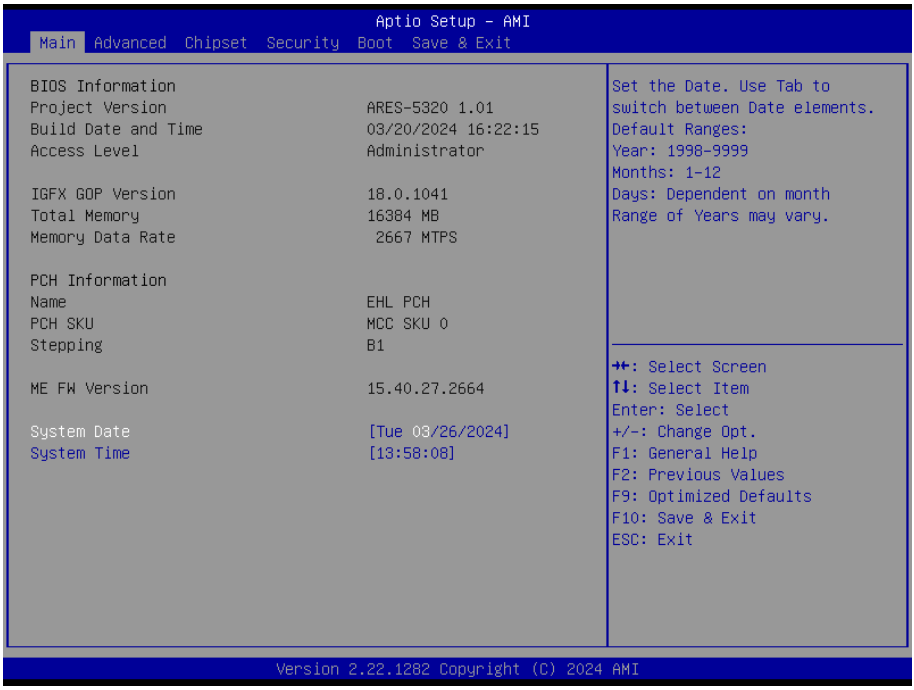
Keystroke	Function
← →	Moves left/right between the top menus.
↓ ↑	Moves up/down between highlight items.
Enter	Selects an highlighted item/field.
Esc	► On the top menus: Use **Esc** to quit the utility without saving changes to CMOS. (The screen will prompt a message asking you to select **OK** or **Cancel** to exit discarding changes. ► On the submenus: Use **Esc** to quit current screen and return to the top menu.
Page Up / +	Increases current value to the next higher value or switches between available options.
Page Down / -	Decreases current value to the next lower value or switches between available options.
F1	Opens the **Help** of the BIOS Setup utility.
F2	Restore previous values.
F9	Loads optimized default values.
F10	Exits the utility saving the changes that have been made. (The screen then prompts a message asking you to select **OK** or **Cancel** to exit saving changes.)

Note: Pay attention to the "WARNING" that shows at the left pane onscreen when making any change to the BIOS settings.

This BIOS Setup utility is updated from time to time to improve system performance and hence the screenshots hereinafter may not fully comply with what you actually have onscreen.

5.1. Main

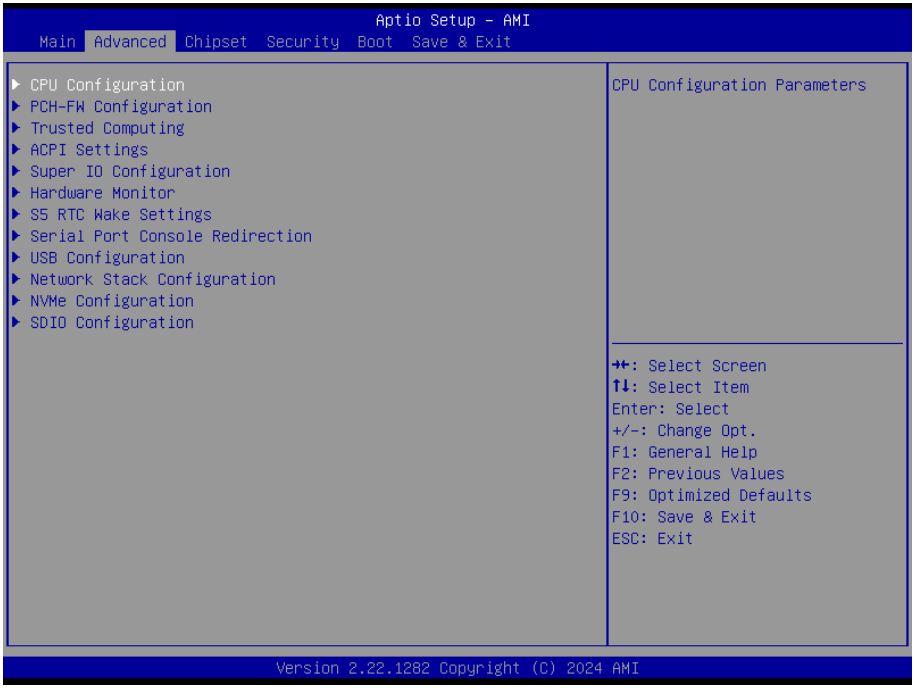
The **Main** menu features the settings of **System Date** and **System Time** and displays some BIOS info.



Note: Actual model name and board information varies according to your model.

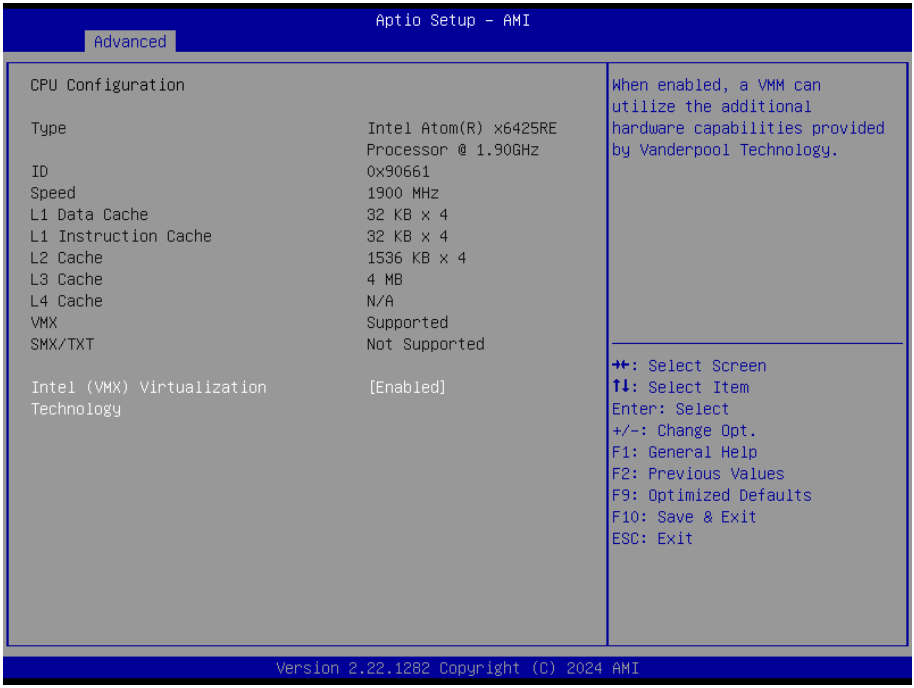
Setting	Description
System Date	Sets system date.
System Time	Sets system time.

5.2. Advanced



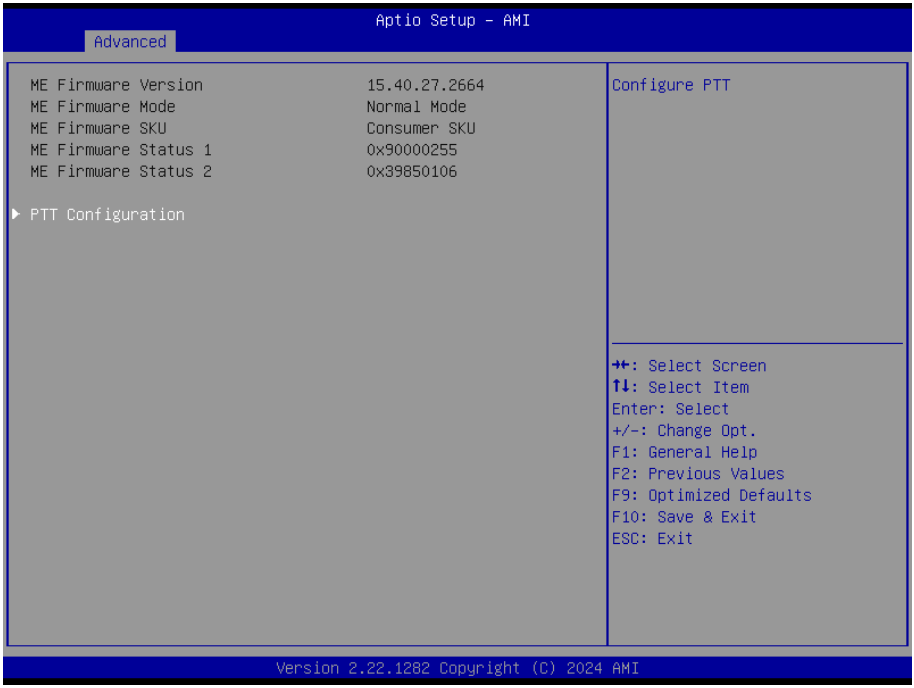
Setting	Description
CPU Configuration	See 5.2.1. CPU Configuration on page 54
PCH-FW Configuration	See 5.2.2. PCH-FW Configuration on page 55
Trusted Computing	See 5.2.3. Trusted Computing on page 56
ACPI Settings	See 5.2.4. ACPI Settings on page 58
Super IO Configuration	See 5.2.5. Super IO Configuration on page 59
Hardware Monitor	See 5.2.6. Hardware Monitor on page 61
S5 RTC Wake Settings	See 5.2.7. S5 RTC Wake Settings on page 62
Serial Port Console Redirection	See 5.2.8. Serial Port Console Redirection on page 63
USB Configuration	See 5.2.9. USB Configuration on page 64
Network Stack Confifuration	See 5.2.10. Network Stack Configuration on page 66
NVMe Configuration	See 5.2.11. NVME Configuration on page 67
SDIO Configuration	See 5.2.12. SDIO Configuration on page 68

5.2.1. CPU Configuration



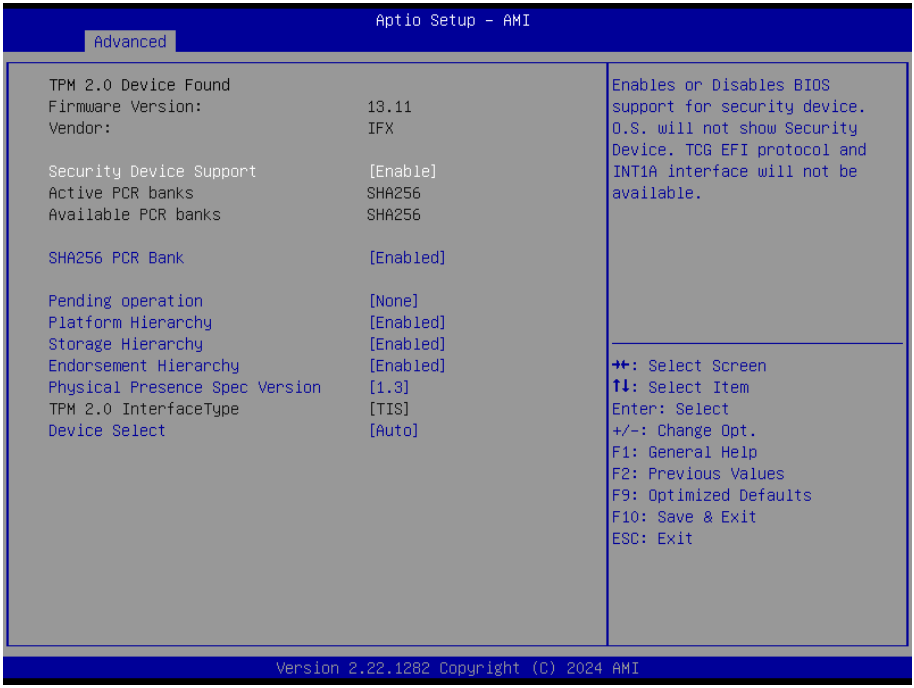
Setting	Description
Intel Virtualization Technology	When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology ► Options: **Enabled** (default) or **Disabled**

5.2.2. PCH-FW Configuration



Setting	Description
PTT Configuration	Select TPM device: PTT or dPTM. PTT - Enables PTT in SKuMgr dTPM1.2 - Disables PTT in SKuMgr Warning! PTT/dTPM will be disabled and all data saved on it will be lost. ► Options: **Enabled** (default) or **Disabled**

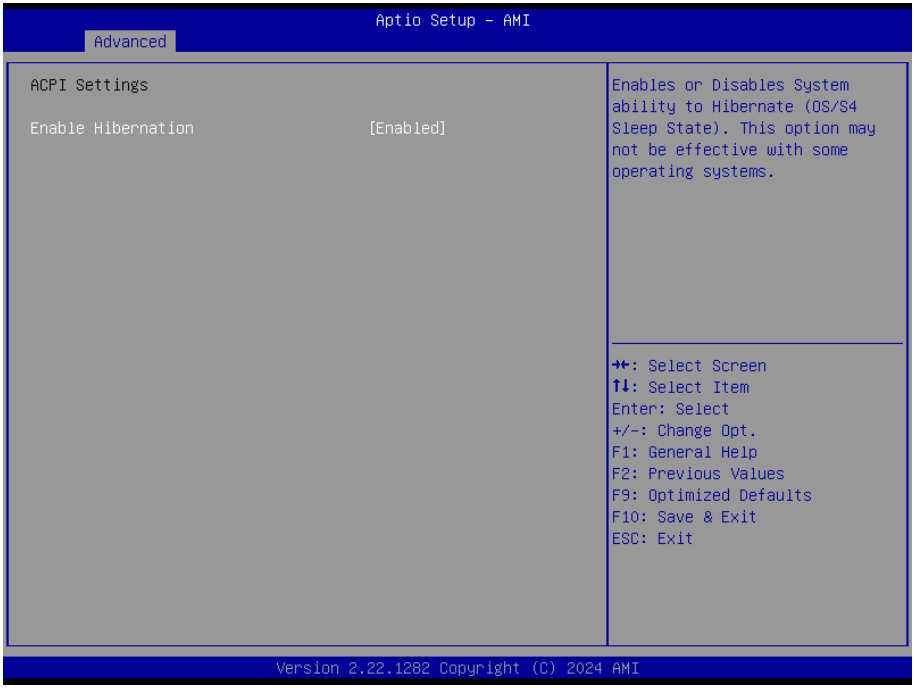
5.2.3. Trusted Computing



Setting	Description
Security Device Support	This item enables or disables BIOS support for security device. OS will not show Security Device. Options are: **Enabled** (Default) / **Disabled**
SHA256 PCR Bank	Enables or disables SHA-1 PCR Bank. Options are: **Enabled** (Default) / **Disabled**
Pending operation	This item schedule an operation for the security device. Options are: **None** (Default) / **TPM Clear**
Platform Hierarchy	Enables or disables Platform Hierarchy Options are: **Enabled** (Default) / **Disabled**
Storage Hierarchy	Enables or disables Storage Hierarchy Options are: **Enabled** (Default) / **Disabled**
Endorsement Hierarchy	Enables or disables Endorsement Hierarchy. Options are: **Enabled** (Default) / **Disabled**

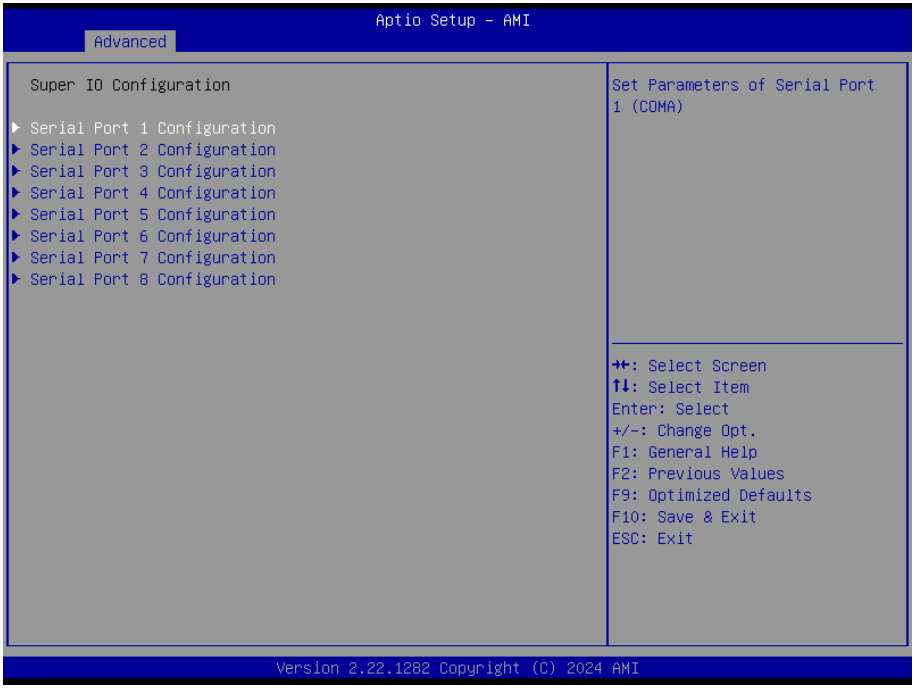
Physical Presence Spec Version	This item select to tell O.S. to support PPI Spec Version Options are: **1.3** (Default) / **1.2**
Device Select	TPM 1.2 will restruct support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices, Auto will support both TPM 2.0 devices and TPM 1.2 deviced. Options are: **Auto**(Default)/**TPM 1.2/TPM 2.0**

5.2.4. ACPI Settings



Setting	Description
Enable Hibernation	Only available when BIOS ACPI Auto Configuration is enabled. **Enables** (default) or **Disables** System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

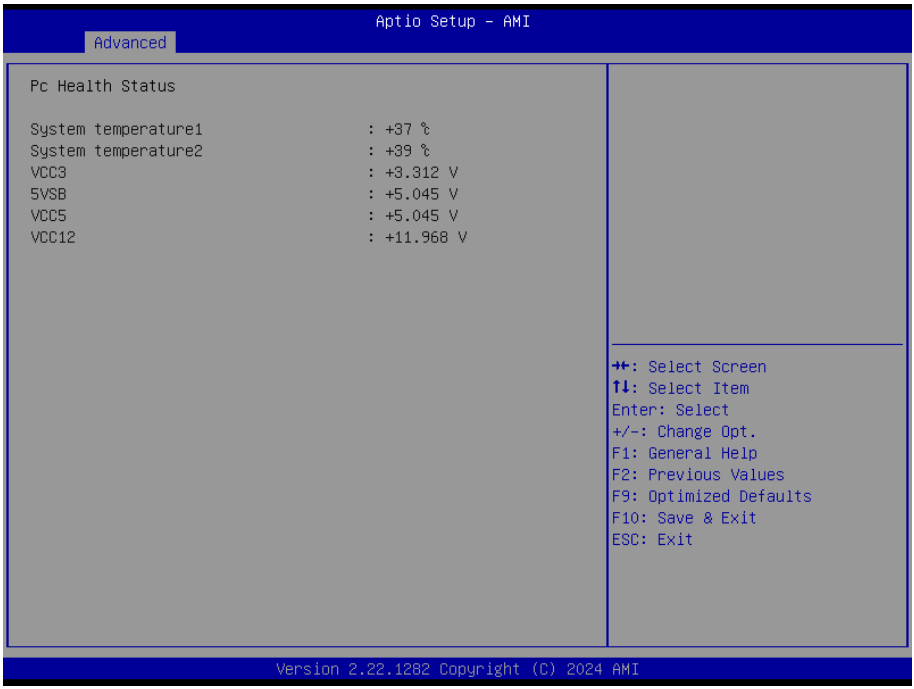
5.2.5. Super IO Configuration



Note: The quantity of serial ports varies according to your model.

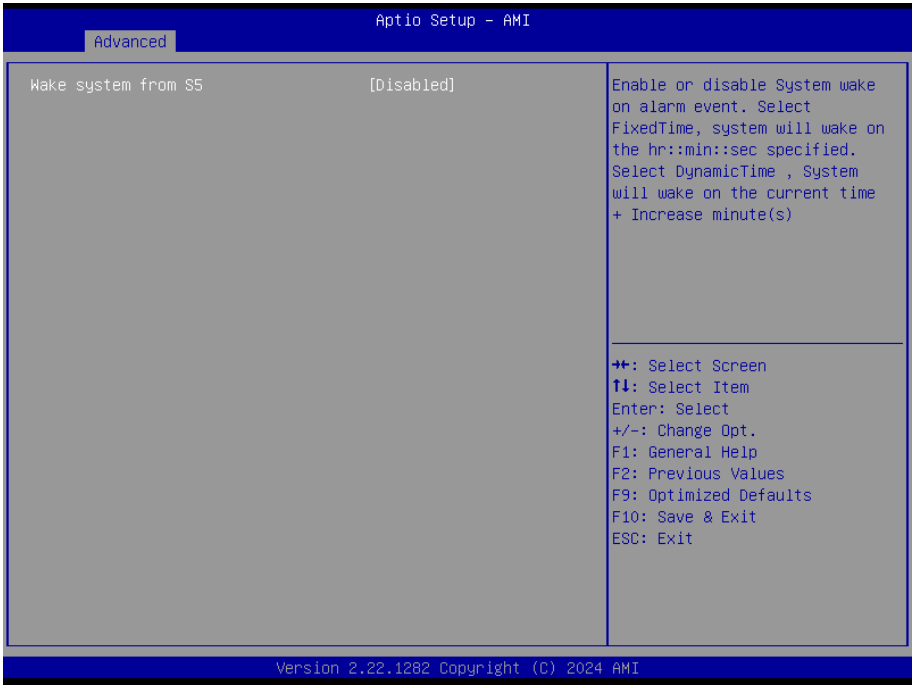
Setting	Description
Serial Port 1/2/3/4/5/6/7/8 Configuration	To configure each COM port settings. Serial Port 1: ► **Options: Enable** and **Disable** Serial Port (COM) (default) ► **Options:** Mode Select for **RS-232** (default) **RS-422, RS-422(Termination Resistor), RS-485, RS-485(Termination Resistor)** Serial Port2: ► **Options: Enable** and **Disable Serial Port** (COM) (default) ► **Options:** Mode Select for **RS-232** (default) **RS-422, RS-422(Termination Resistor), RS-485, RS-485(Termination Resistor)** Serial Port3: ► **Options: Enable** and **Disable Serial Port** (COM) (default) Serial Port4: ► **Options: Enable** and **Disable** Serial Port (COM) (default) Serial Port5: ► **Options: Enable** and **Disable** Serial Port (COM) (default) ► **Options:** Mode Select for **RS-232** (default) **RS-422, RS-422(Termination Resistor), RS-485** Serial Port6: ► **Options: Enable** and **Disable** Serial Port (COM) (default) ► **Options:** Mode Select for **RS-232** (default) **RS-422, RS-422(Termination Resistor), RS-485** Serial Port7: ► **Options: Enable** and **Disable** Serial Port (COM) (default) ► **Options:** Mode Select for **RS-232** (default) **RS-422, RS-422(Termination Resistor), RS-485** Serial Port8: ► **Options: Enable** and **Disable** Serial Port (COM) (default) ► **Options:** Mode Select for **RS-232** (default) **RS-422, RS-422(Termination Resistor), RS-485** Note: The quantity of serial ports varies according to your model.

5.2.6. Hardware Monitor



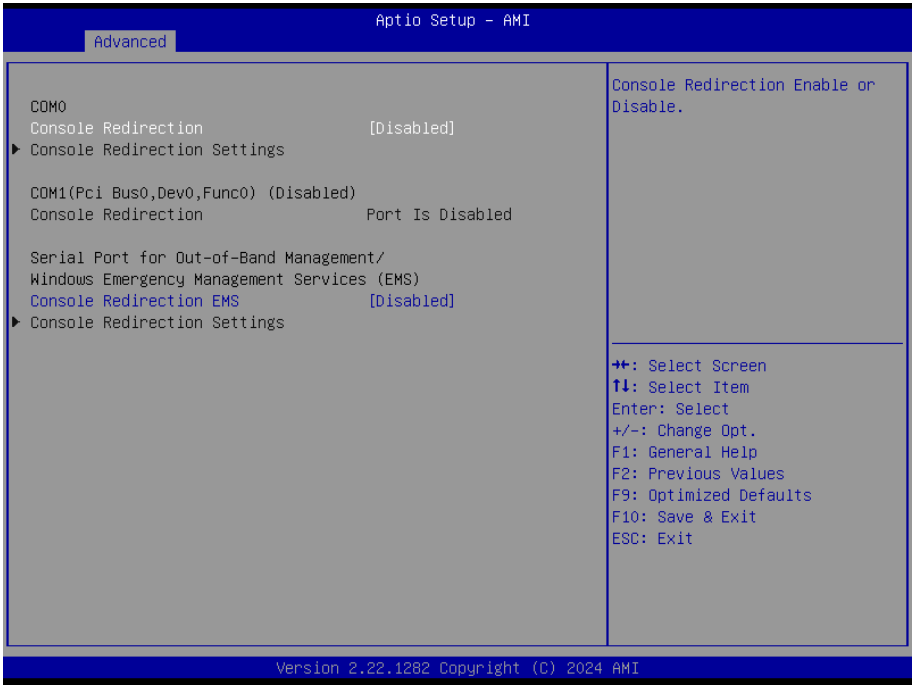
The page shows the PC health status.

5.2.7. S5 RTC Wake Settings



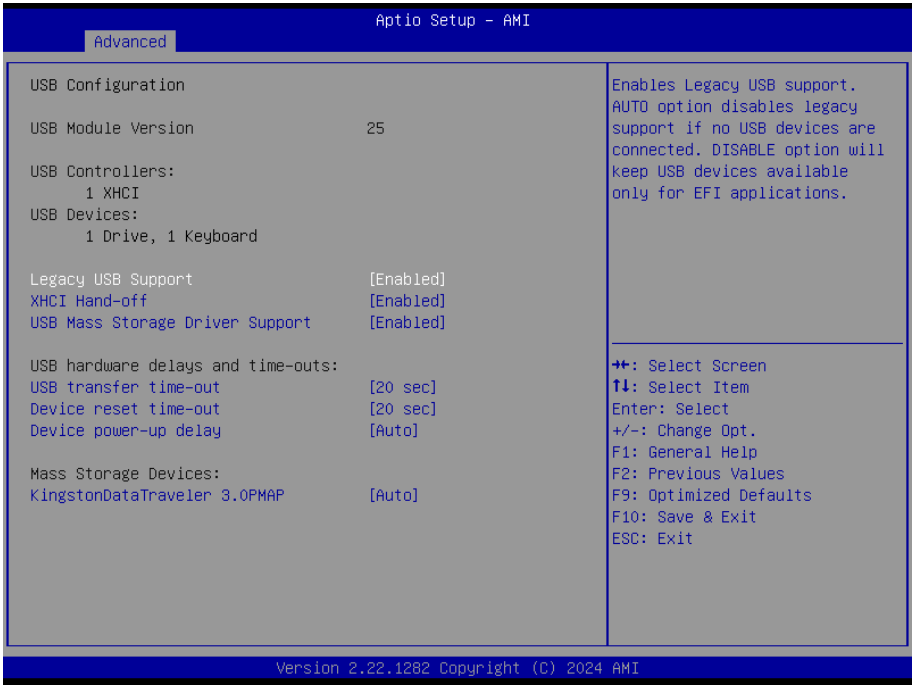
Setting	Description
Wake System from S5	**Enable** or **Disable** (default) system wake on alarm event. ► Options available are: **Disabled** (default): **Fixed Time:** System will wake on the hr::min::sec specified. **DynamicTime:** If selected, you need to set **Wake up minute increase** from 1 - 5. System will wake on the current time + increase minute(s).

5.2.8. Serial Port Console Redirection



Setting	Description
Console Redirection	Use this item to enable or disable Console Redirection. The optional settings: [**Disabled**]; [**Enabled**]. When set as [**Enabled**], user can make further settings in the following items:
Console Redirection EMS	Console Redirection Enable or Disable The default setting is: **Disable**.

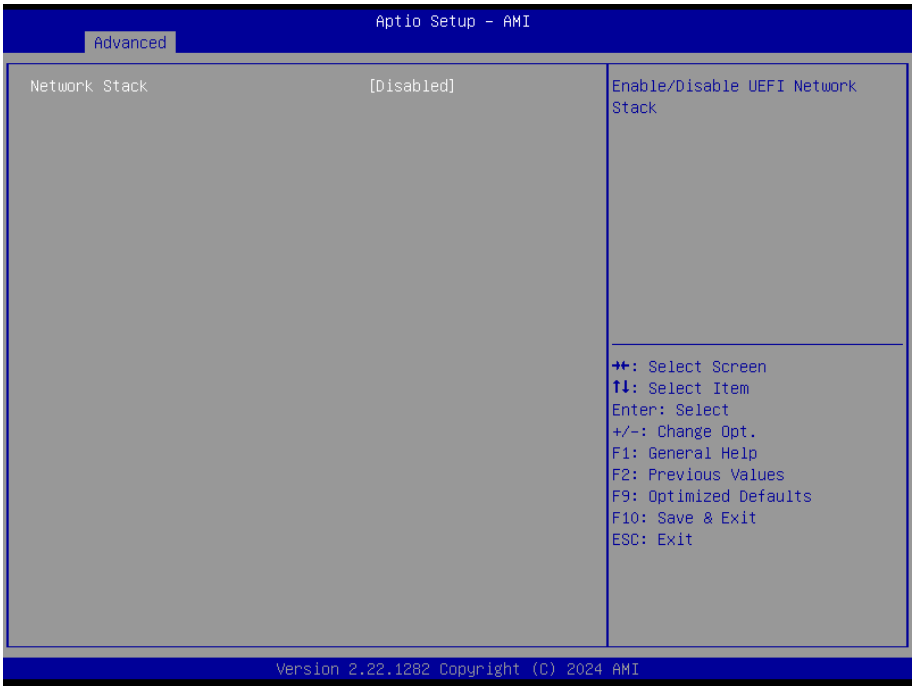
5.2.9. USB Configuration



Setting	Description
Legacy USB Support	Enables/disables legacy USB support. ► Options available are **Enabled** (default), **Disabled** and **Auto**. ► Select **Auto** to disable legacy support if no USB device are connected. ► Select **Disabled** to keep USB devices available only for EFI applications.
XHCI Hand-off	This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver. ► The optional settings are: **Enabled** (default) **/ Disabled**.
USB Mass Storage Driver Support	Enables/disables USB Mass Storage Driver Support. ► The optional settings are: **Enabled** (default) **/ Disabled**.
USB hardware delay and time-out	

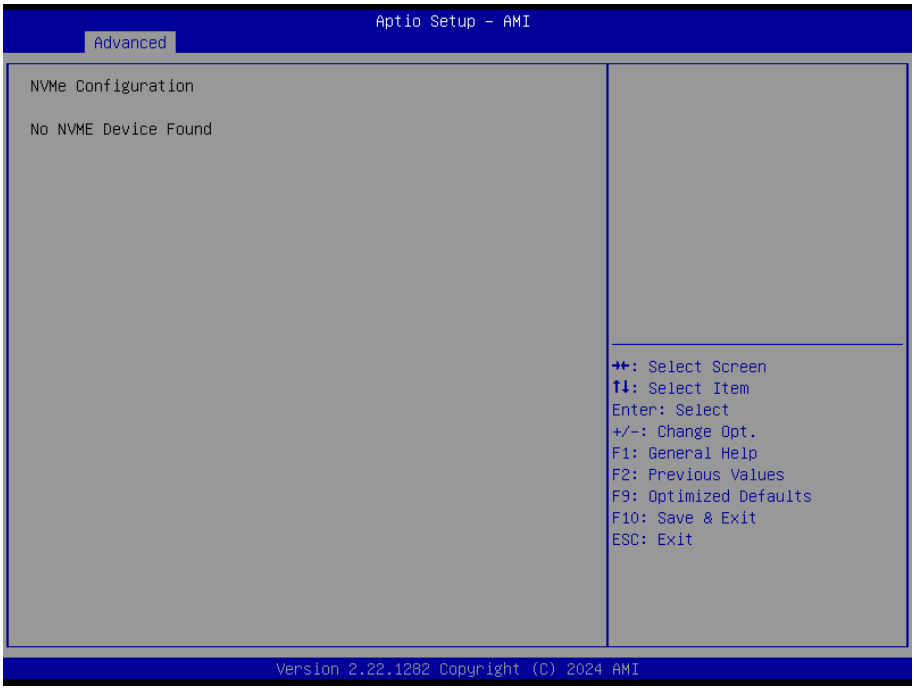
USB transfer time-out	Use this item to set the time-out value for control, bulk, and interrupt transfers. ► Options: **1 sec, 5 sec, 10 sec, 20 sec** (default)
Device reset time-out	Use this item to set USB mass storage device start unit command time-out. ► Options available are: **10 sec, 20 sec** (default)., **30 sec, 40 sec**
Device power-up delay	Use this item to set 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 100 ms, for a hub port the delay is taken from hub descriptor. ► Options available are: **Auto**: Default **Manual**: Select **Manual** you can set value for the following sub-item: 'Device Power-up delay in seconds', the delay range in from 1 to 40 seconds, in one second increments.

5.2.10. Network Stack Configuration



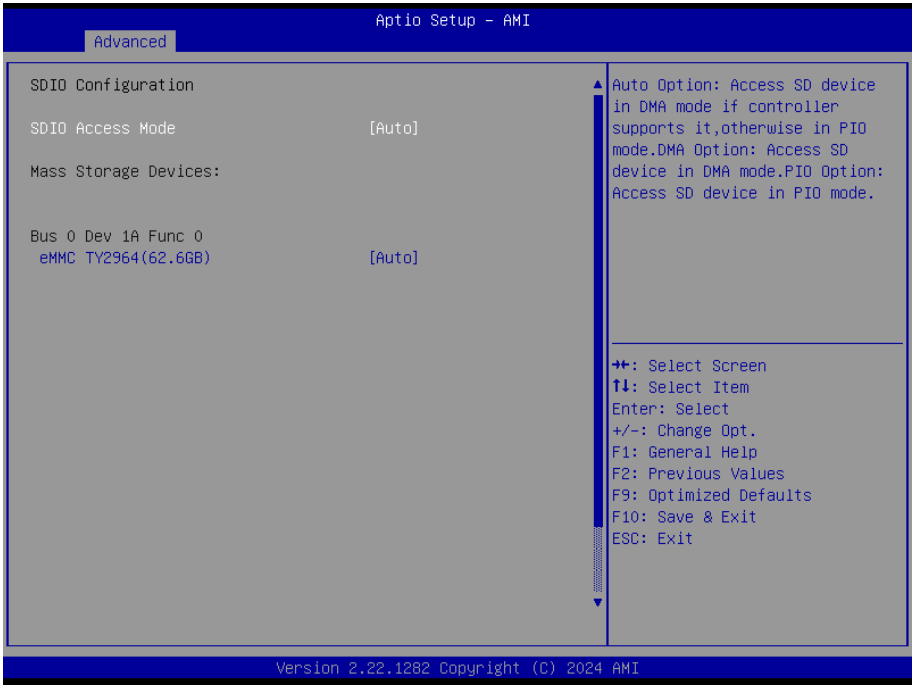
Setting	Description
Network Stack	**Enable** or **Disable** (default) UEFI network stack.

5.2.11. NVME Configuration



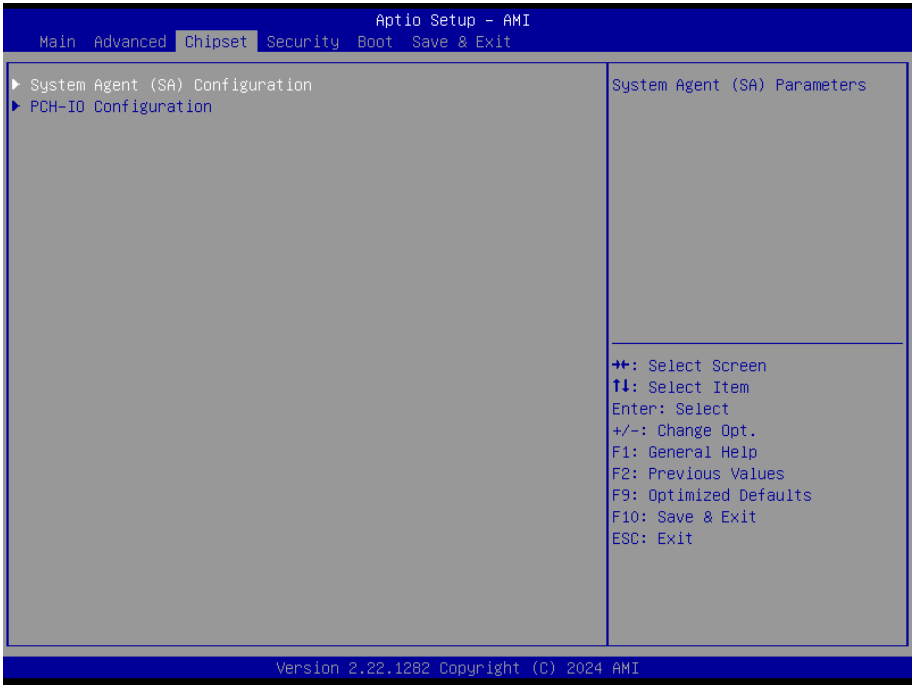
Access this submenu to view the NVMe controller and driver information.

5.2.12. SDIO Configuration



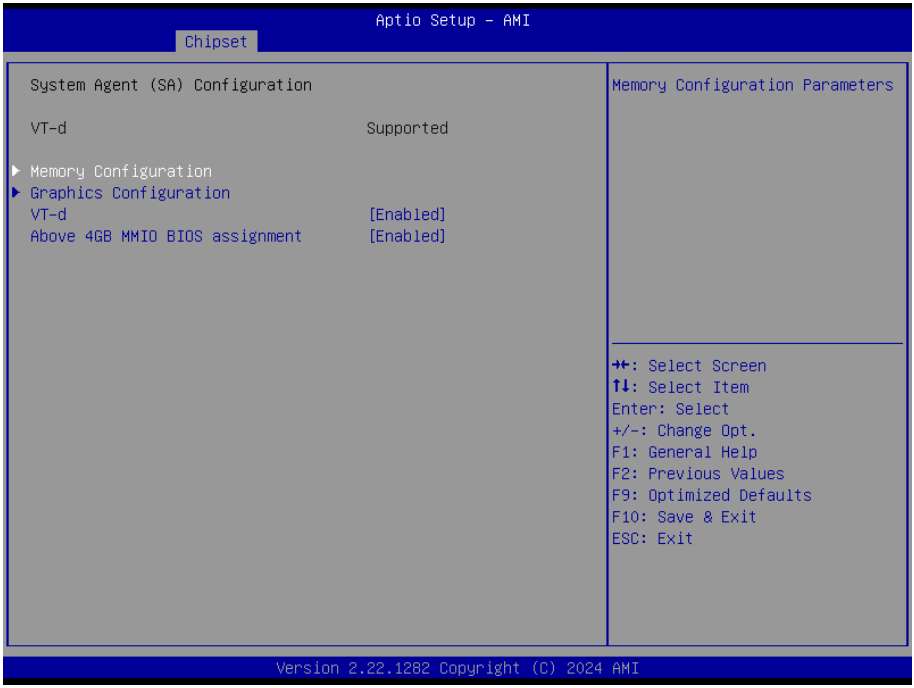
Setting	Description
SDIO Access Mode	Access SD device in DMA mode. Optons are: **Auto, ADMA, SDMA, PIO**
Mass storage device	Mass storage devive emulation type. Options are: **Auto, Floppy, Forced FDD, Hard Disk**

5.3. Chipset



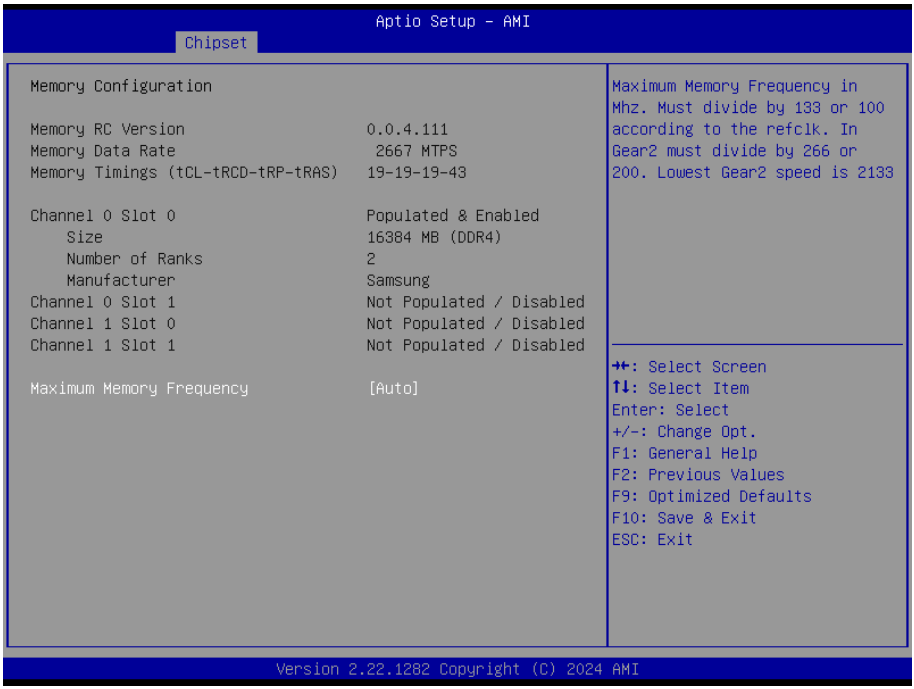
Submenu	Description
System Agent (SA) Configuration	See 5.3.1. System Agent (SA) Configuration on page 70
PCH-IO Configuration	See 5.3.2. PCH-IO Configuration on page 72

5.3.1. System Agent (SA) Configuration



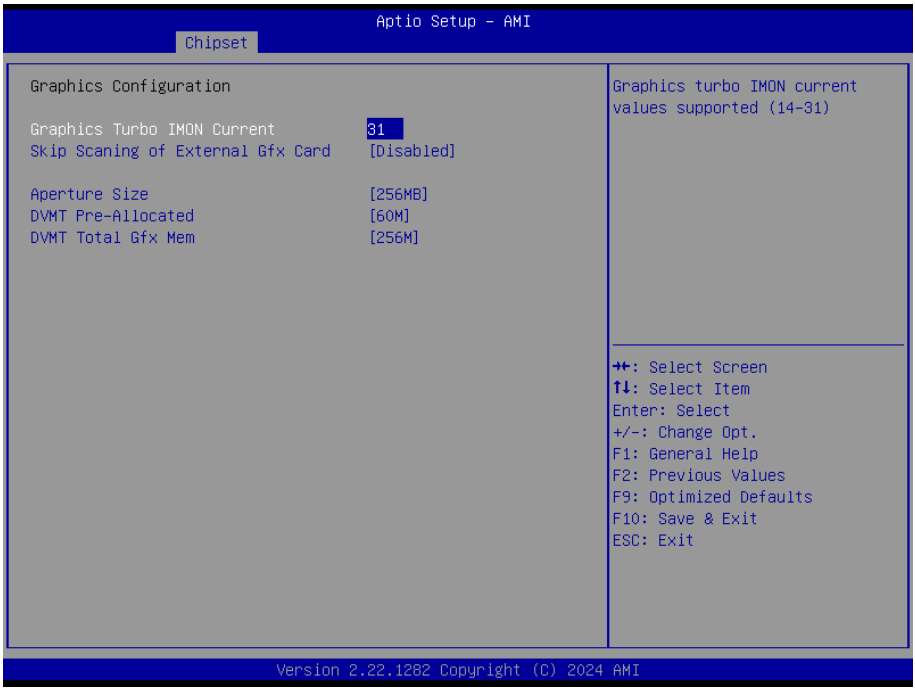
Submenu	Description
System Agent (SA) Configuration	
Memory Configuration	See 5.3.1.1. Memory Configuration on page 71
Graphics Configuration	See 5.3.1.2. Graphics Configuration on page 72
VT-d	**Enabled** (default) or **Disabled** VT-d function
Above 4GB MMIO BIOS Assignment	**Enabled** (default) or **Disabled** above 4GB MemoryMappedIO BIOS assignment.

5.3.1.1. Memory Configuration



Access this submenu to view the memory configuration and adjuste the memory Frequency.

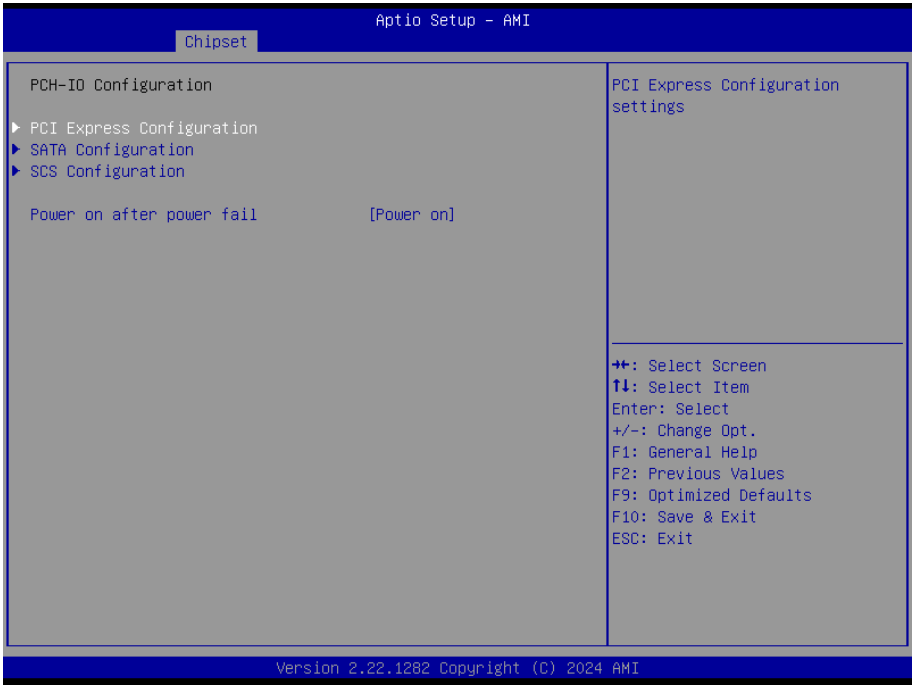
5.3.1.2. Graphics Configuration



Note: This page varies according to your model.

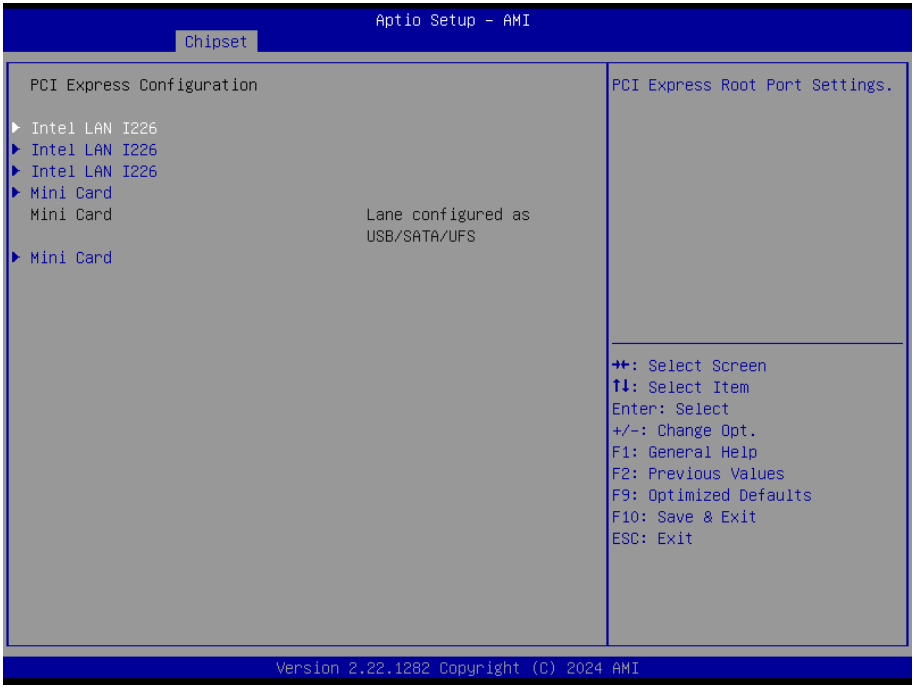
Setting	Description
Graphics Turbo IMON Current	Graphics turbo IMON current values supported(14-31)
Skip Scaning if External Gfx card	Scanning for External Gfx Card on PEG and PCH PCIE Ports. Options are: **Disabled**(default), **Enableed**
Aperture Size	Select the Aperture Size ► Options: **128MB, 256MB** (default), **512MB**,**1024MB**, **2024MB.**
DVMT Pre-Allocated	Select the DVMT 5.0 Pre-allocated (Fixed) Graphic Memory size used by the Internal Graphic Device. ► **60M** is the default.
DVMT Total Gfx Mem	Select the DVMT 5.0 Total Graphic Memory size used by the Internal Graphic Device. ► Options: **128MB, 256MB** (default) and **Max.**

5.3.2. PCH-IO Configuration



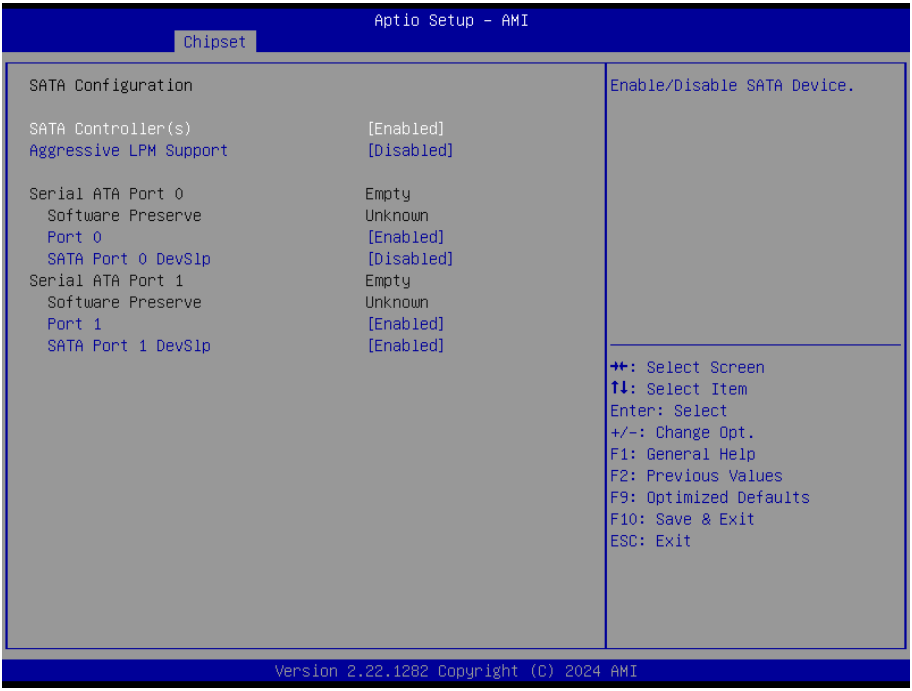
Setting	Description
PCI Express Configuration	See 5.3.2.1. PCI Express Configuration on page 74
SATA Configuration	See 5.3.2.2. SATA Configuration on page 75
SCS Configuration	Enable/Disable onboard NIC. ► Options are: **Enabled** (default), **Disabled.**
Power on after power fail	Specify what state to go to when power is re-applied after a power failure (G3 state) Options are: **Power on**, **Power Off**

5.3.2.1. PCI Express Configuration



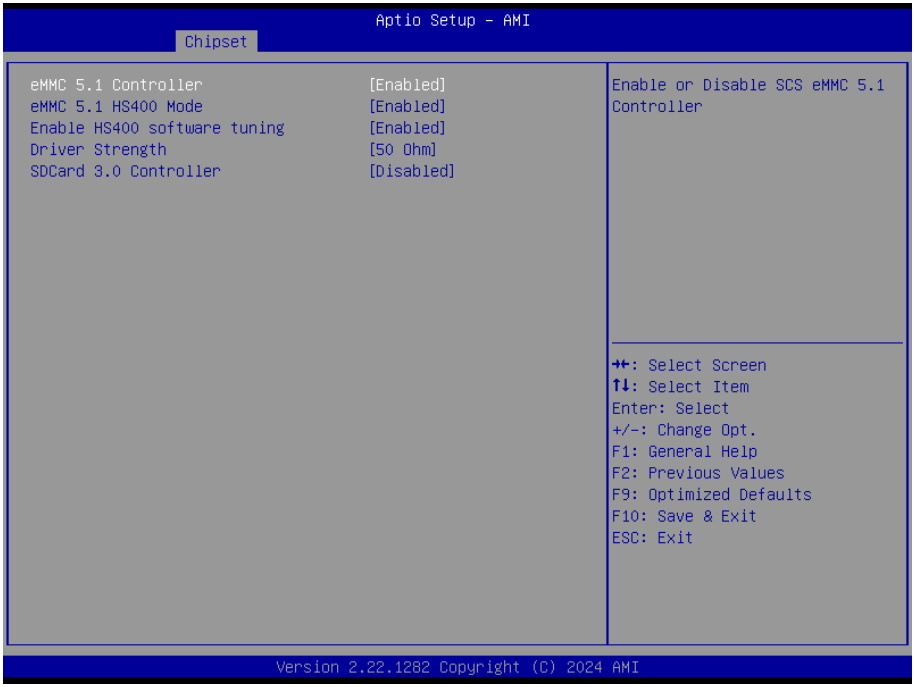
Setting	Description
Intel Lan I226	**Intel Lan I226**: Control the PCI Express Root Port. ► Options are: **Enabled** (default), **Disabled**. **ASPM**: Set the ASPM level ► Options are: **Disabled** (default), **L0s**, **L1**, **L0sL1**, **Auto** **L1 Substates**: PCI Express L1 Substates settings. ► Options are: **Disabled** (default), **L1.1**, **L1.1 & L1.2** **PCIe Speed**: Configure PCIe Speed. ► Options are: **Auto** (default), **Gen1, Gen2, Gen3, Gen4**
Mini Card	**Mini Card**: Control the PCI Express Root Port. ► Options are: **Enabled** (default), **Disabled**. **ASPM**: Set the ASPM level ► Options are: **Disabled** (default), **L0s**, **L1**, **L0sL1**, **Auto** **L1 Substates**: PCI Express L1 Substates settings. ► Options are: **Disabled** (default), **L1.1**, **L1.1 & L1.2**

5.3.2.2. SATA Configuration



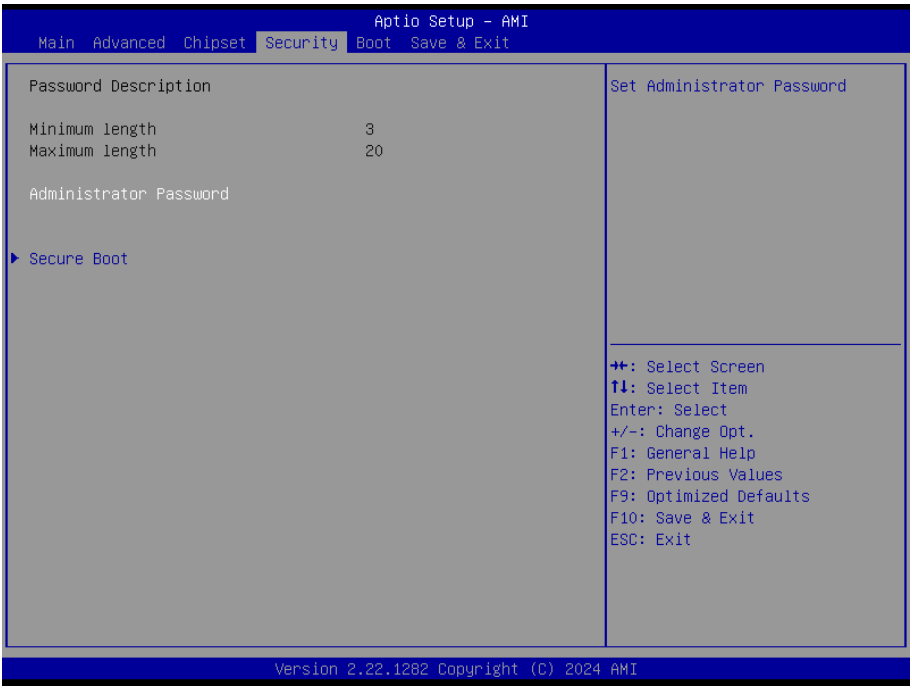
Setting	Description
SATA Controller(s)	**Enabled** (default) / **Disabled** SATA device(s).
Aggressive LPM Support	**Enabled** / **Disabled** (default).
Serial ATA Port 0/1	SATA device information. *Available SATA ports depend on your device.
Port 0/1	**Enables** (default) / **disables** the SATA port.
SATA Port 0/1 DevSlp	**Enables** / **disables** (default) the SATA port DevSlp. Board rework for LP needed before enable.

5.3.2.3. SCS Configuration



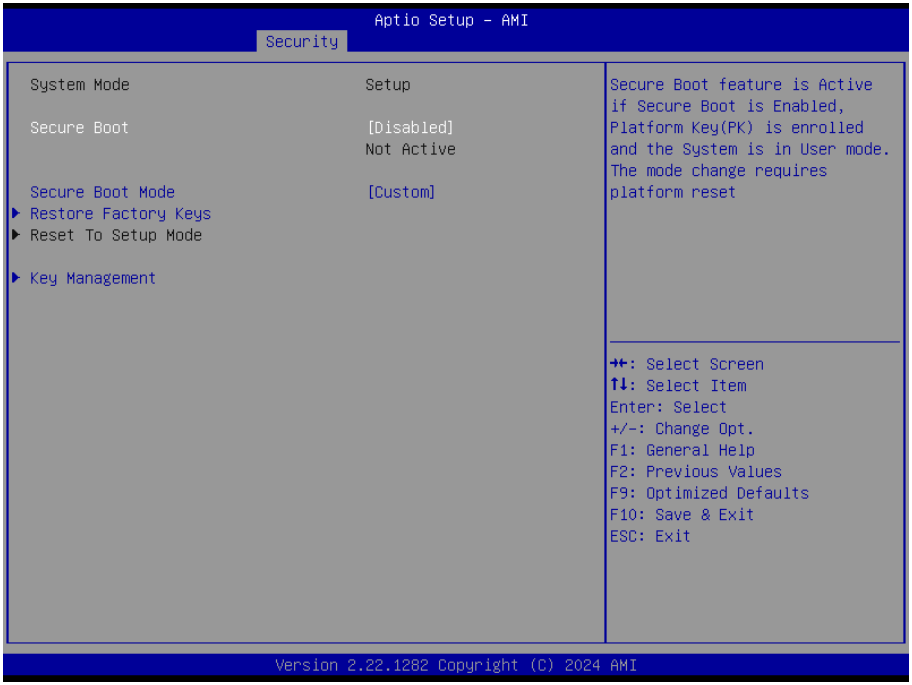
Setting	Description
eMMC 5.1 Controller	**Enabled**(default) / **Disabled** SCS eMMC 5.1 Controller.
eMMC 5.1 HS400 Mode	**Enabled**(default) / **Disabled** SCS eMMC 5.1 HS400 Mode.
Enable HS4000 software tuning	**Enabled**(default) / **Disabled** software tunuing at expense at boot of time.
Driver Strength	Sets I/O driver strength. Options are: **33 0hm, 40 0hm, 50 0hm**
SDcard 3.0 Controller	**Enabled**(default) / **Disabled** SCS SDHC 3.0 Controller

5.4. Security



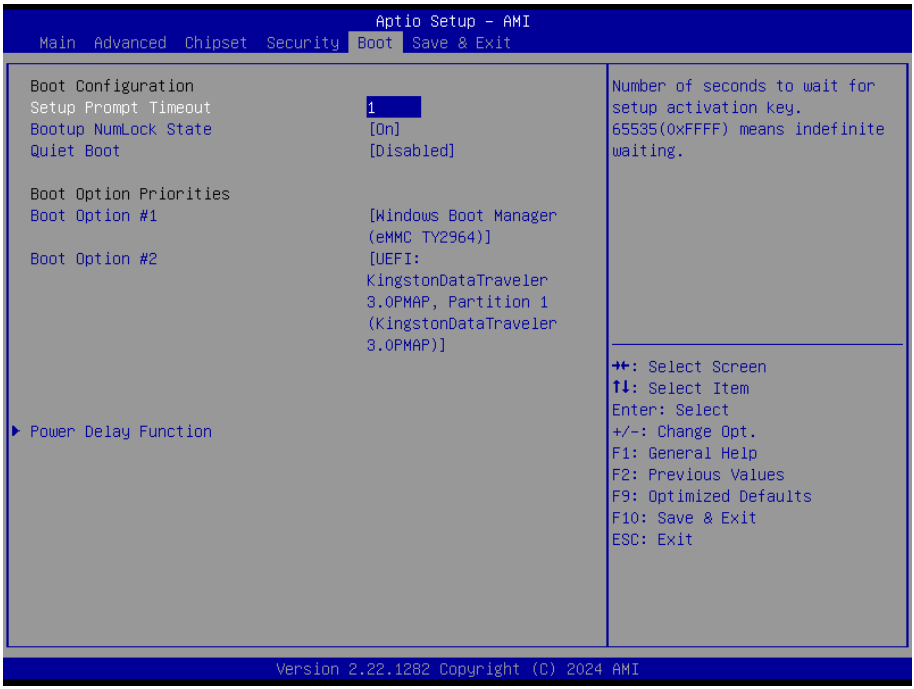
Setting	Description
Administrator Password	To set up an administrator password: 1. Select **Administrator Password**. 2. An **Create New Password** dialog then pops up onscreen. 3. Enter your desired password that is no less than 3 characters and no more than 20 characters. 4. Hit [Enter] key to submit.
Security Boot	See 5.4.1 Security Boot on page 78

5.4.1. Security Boot



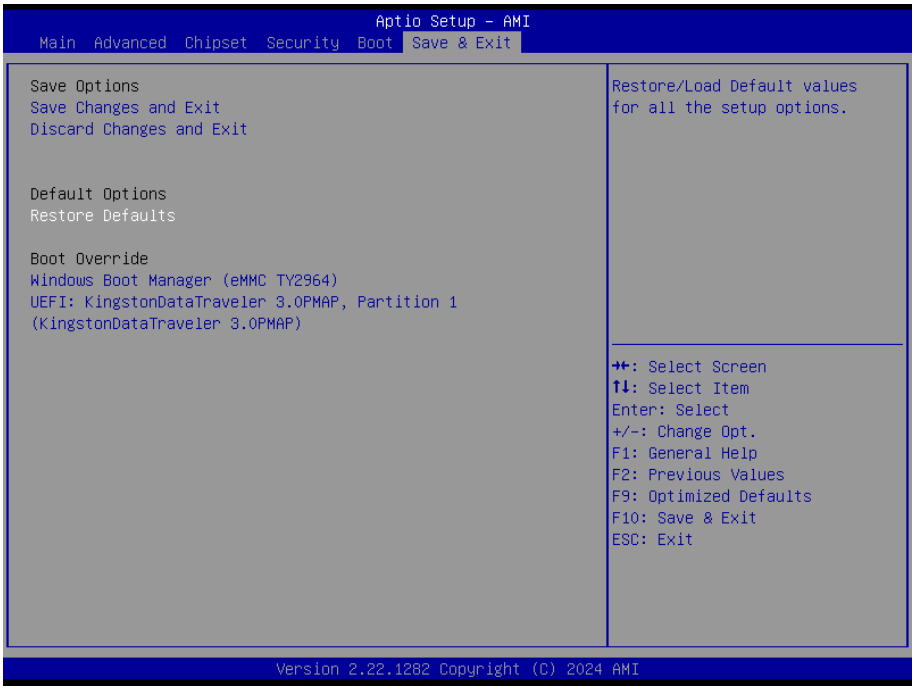
Setting	Description
Secure Boot	**Enabled**/**Disabled** (default) secure boot.
Secure Boot Mode	Allow users to set the secure boot selector. Options are: **Standard**/**Custome** (default) mode.
Restore Factory Keys	Force system to restore default secure boot key database.
Reset to Setup Mode	Delete all secure boot key databases.
Key Management	Allow users to modify secure variables and set key management page.

5.5. Boot



Setting	Description
Setup Prompt Timeout	Set how long to wait for the prompt to show for entering BIOS Setup. ► The default setting is **1** (sec). ► Set it to **65535** to wait indefinitely.
Bootup NumLock State	Sets whether to enable or disable the keyboard's NumLock state when the system starts up. ► Options available are **On** (default) and **Off**.
Quiet Boot	Sets whether to display the POST (Power-on Self Tests) messages or the system manufacturer's full screen logo during booting. ► Select **Disabled** to display the normal POST message, which is the default.
Boot Option Priority	Set the system boot priorities.
Power Delay Function	Set the system support power delay function ► Options are: Enabled -> Support power delay function. Disabled -> Power on/off manually operated.

5.6. Save & Exit



Setting	Description
Save Changes and Exit	Saves the changes and quits the BIOS Setup utility.
Discard changes and Exit	Exit system setup without saving the changes.
Restore Defaults	Restore/Load defaults values for all the setup options.
Boot Override	**Boot Override** presents a list in context with the boot devices in the system.

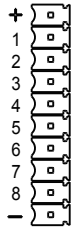
Appendix

Appendix A. DIO Signal Connections

A.1. 8-Bit DIO Signal Connections (for -x6425A and -x6425P)

The 4 x DI, 4 x DO connector offers 8-bit DIO, power (+5V) and ground pin. Each bit of DIO can be set as digital input or output.

Please see the DC characteristics for detail.



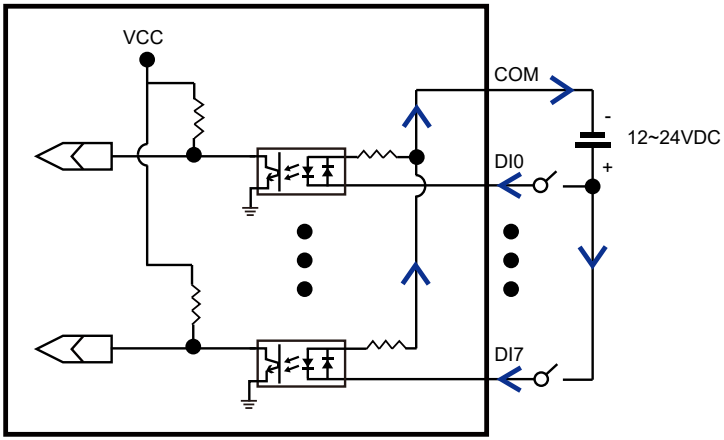
Parameter	SYM.	MIN.	TYP.	MAX.	UNIT	Conditions
I/OD TTL Level bi-directional pin with schmitt trigger, open drain output with 12mA source-sink capability, 5V tolerance						
Input Low Threshold Voltage	VI-			0.8	V	
Input High Threshold Voltage	VI+	2.0			V	
Output Low Current	IOL		+12		mA	VOL=0.4V

A.2. 16-Bit Opto-Isolated DIO Signal Connections (for -ISO)

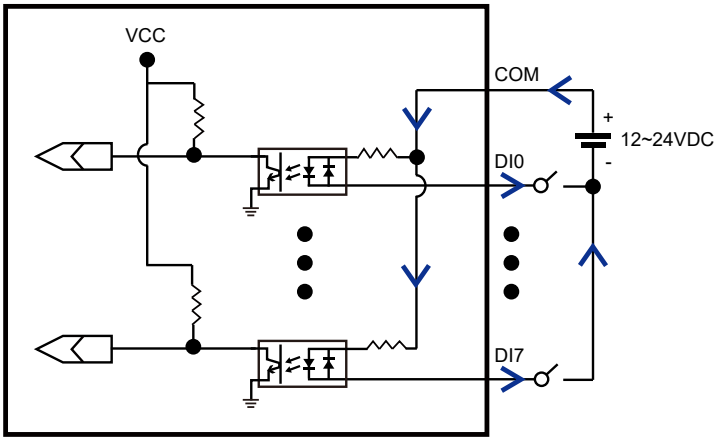
A.2.1. Wet Contact DI with NPN / PNP connection

Digital Input - Wet Contact	
V_{off}	V_{on}
Max. 6V	12~24V

PNP

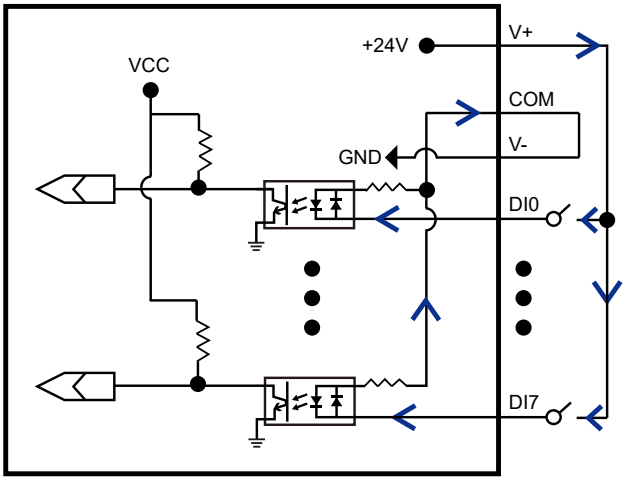


NPN

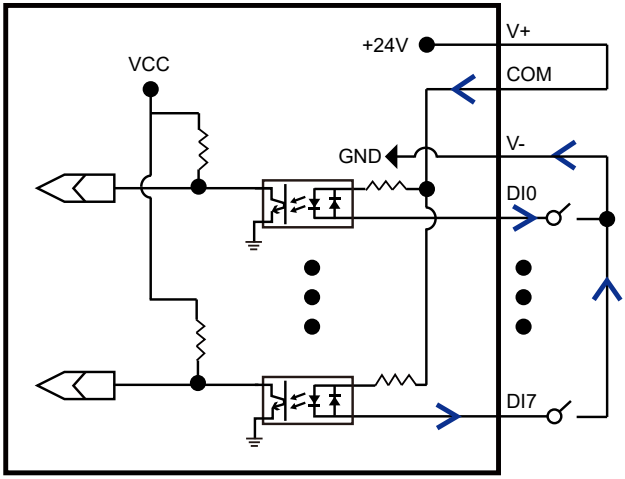


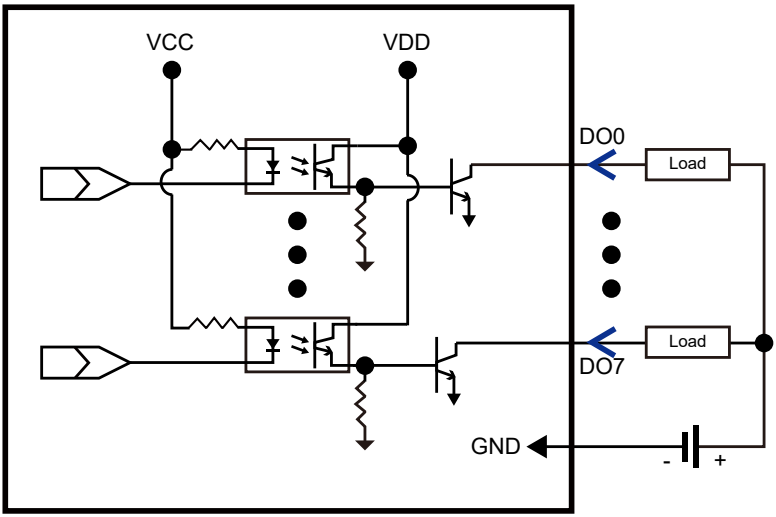
A.2.2. Dry Contact DI with NPN / PNP connection

PNP



NPN



A.2.3. Isolated Digital Output Connections

When an isolated output channel is being used as an output channel, if an external voltage (maximum 24V) is applied, the current will flow from the external voltage source to the system. Make sure that the current through each out pin does not exceed 100 mA.