SCH3X2-D7
SCH3X2-RD7

Micro-Grid Intel 13/12th CPU Fanless Computer

User's Manual

Revision Date: Jul.2.2024

Safety Information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area.
- If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your local distributor.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter any technical problems with the product, contact your local distributor

Statement

Revision History

Revision	Date (yyyy/mm/dd)	Changes
V1.0	2024/01/15	First release
V1.1	2024/05/24	Change 2.5G to 1G for IEC-61850-3
V1.2	2024/7/2	Add Accessories Kit for option
V1.3	2025/1/10	Power Change to 16~31V

Packing List

Item	Description	Q'ty
1	SCH3X2-D7/RD7 Micro-Grid Intel 13/12th CPU Fanless Computer	1
2	Driver CD	1
3	SSD Tray Key	1
4.	Single Rack Mount Bracket & Screw	1 set

Ordering information

Model Number	Description
SCH3X2-D7	Micro-Grid Fanless Computer with Intel 13th /12th Gen Intel® Raptor Lake-S/Alder Lake-S LGA1700 Socket Processor / Core i9/i7/i5/i3 Processor TDP 65W, up to 64G SO-DIMM DDR4 3200MHz, 2 × 1GbE RJ45, 2 x USB3.2, 2 x USB3.0, 2 x USB2.0, 2 x DP, 2 x 2.5" SwapSSD Tray, DC-IN 16~31V , Operating Temperature -20°C~+60°C
SCH3X2-RD7	Micro-Grid Fanless Computer with Intel 13th /12th Gen Intel® Raptor Lake-S/Alder Lake-S LGA1700 Socket Processor / Core i9/i7/i5/i3 Processor / TDP 65W, up to 64G SO-DIMM DDR4 3200MHz, 2 × 1GbE RJ45, 2 x USB3.2, 2 x USB3.0, 2 x USB2.0, 2 x DP, 2 x 2.5" SwapSSD Tray, DC-IN 16~31V with redundant, Operating Temperature -20°C~+60°C

Accessories Kit (Option)

P/N	Description	Q'ty
0ZAKSCH3X2000001	Accessories Kit for SCH3X2/SCH4X2 Single Machine Rackmount Bracket	1 set
0ZAKSCH3X2000000	Accessories Kit for SCH3X2/SCH4X2 Dual Machine Rackmount Bracket	1 set

RoHS Compliance

Perfectron RoHS Environmental Policy and Status Update

Perfectron is a global citizen for building the digital infrastructure. We are committed to providing green products and services, which are compliant with

European Union RoHS (Restriction on Use of Hazardous Substance in Electronic Equipment) directive 2011/65/EU, to be your trusted green partner and to protect our environment.

In order to meet the RoHS compliant directives, Perfectron has established an engineering and manufacturing task force to implement the introduction of green products. The task force will ensure that we follow the standard Perfectron development procedure and that all the new RoHS components and new manufacturing processes maintain the highest industry quality levels for which Perfectron are renowned.

The model selection criteria will be based on market demand. Vendors and suppliers will ensure that all designed components will be RoHS compliant

Table of Contents

Chapter 1 : Production Introduction

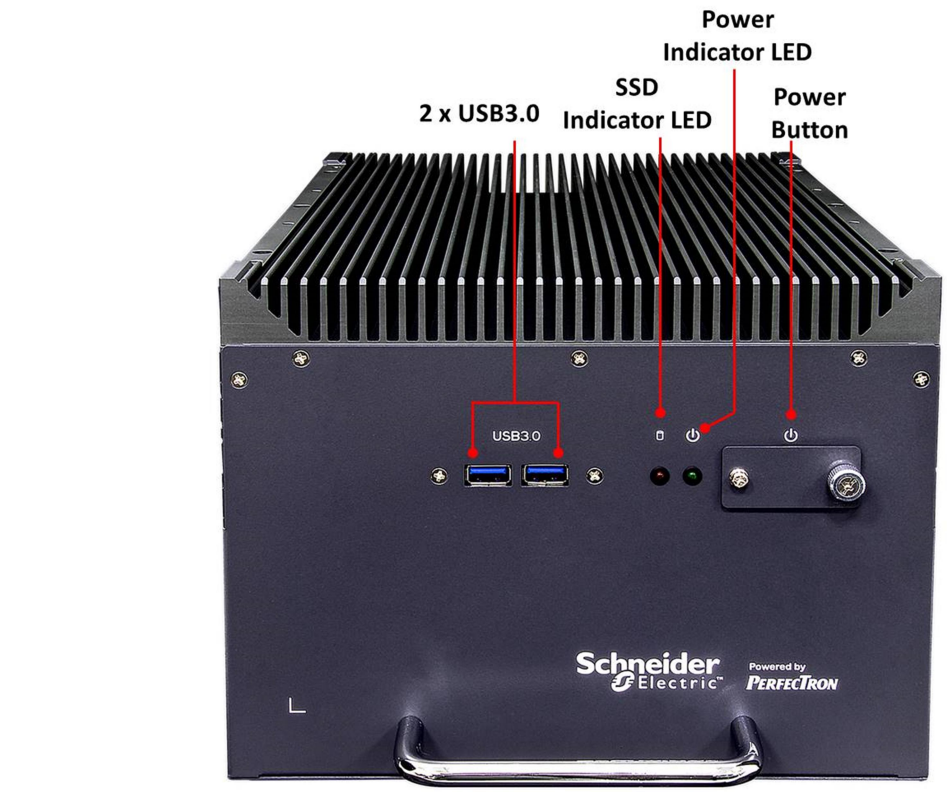
1.1 Specifications

System

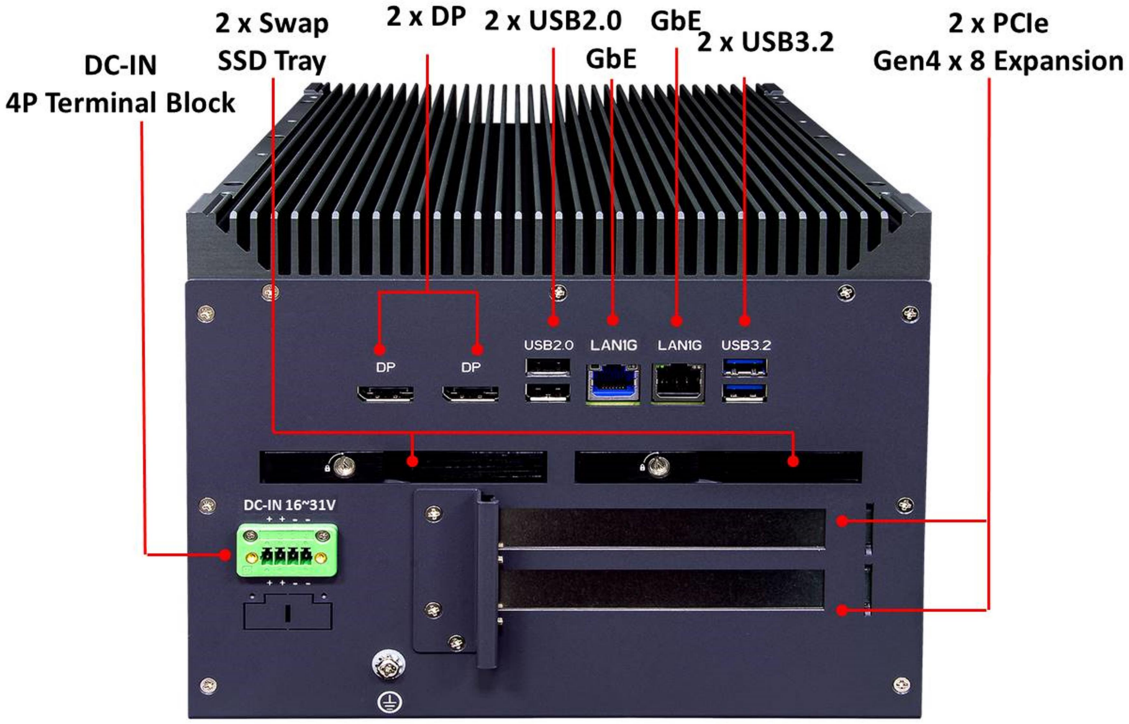
CPU	13th/12th Gen Intel® Raptor Lake-S/Alder Lake-S LGA1700 Socket Processor / Core i9/i7/i5/i3 Processor up to TDP 65W
Memory Capacity	DDR4 SO-DIMM 3200 MHz up to 64G
Chipset	Q670
Display	
GPU	Intel® UHD Graphics
Display Port	DisplayPort 1.4, DP++ Max resolution up to 4K (4096x2304@60Hz)
2nd Display Port	DisplayPort 1.4, DP++ Max resolution up to 4K (4096x2304@60Hz)
Expansion	
PCIe Slot	2 x PCIe Gen4 x 8 Slot
Ethernet	
Ethernet	Intel® I219-LM Giga LAN
Front I/O	
Power Button	1 x Power Button
Indicator	1 x HDD backlight / 1 x Power backlight
USB3.0	2 x USB 3.0
Rear I/O	
Power Input	1 x 4P Terminal Block 9~36V DC-IN
LAN	2 x 1GbE RJ45
USB3.2	2 x USB 3.2
USB2.0	2 x USB2.0
DisplayPort	2 x DP
Storage	2 x Swap SSD Tray(1 x 2.5" 3D TLC 128GB)
Power	
Power Input	DC-IN 16~31V(With Redundant)

OS support list	
OS	Windows® 11 64bit, / Windows® 10 IoT LTSC 64bit (LTSC 2021)
	Ubuntu 22.04 / Linux (support by request)
Mechanical and Environmental	
Dimension	220 x 315 x167 mm (W x D x H)
Operating Temp.	-20°C to 60°C
Storage Temp.	-40°C to 85°C
Relative Humidity	5% to 95%, non-condensing
System Design	Fanless
Mechanical and Environmental	
IEC-61850-3 / IEEE-1613 / UL 62368-1 / EN60945 / CE / FCC	

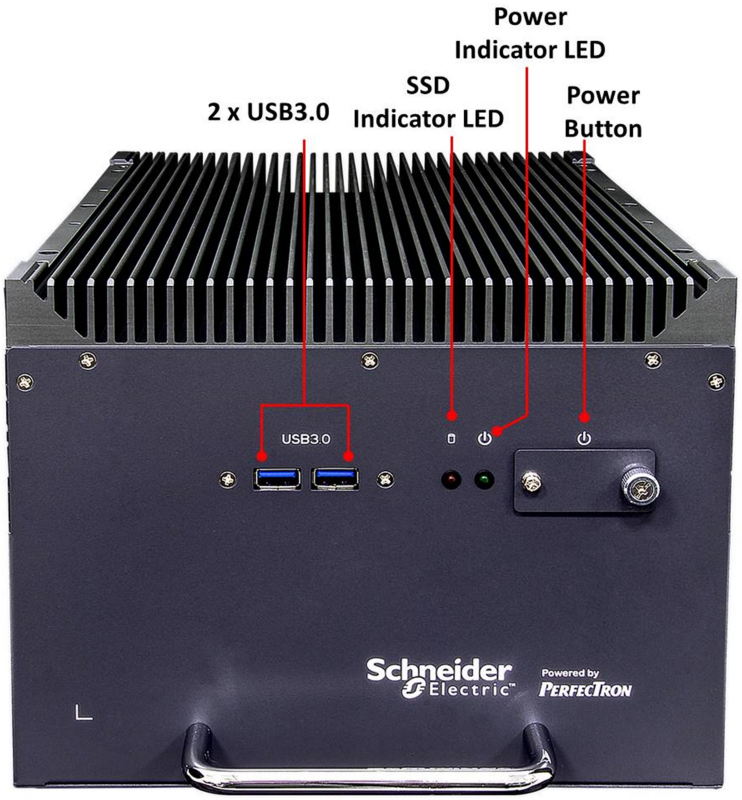
1.2 SCH3X2-D7 Front Panel I/O Placement



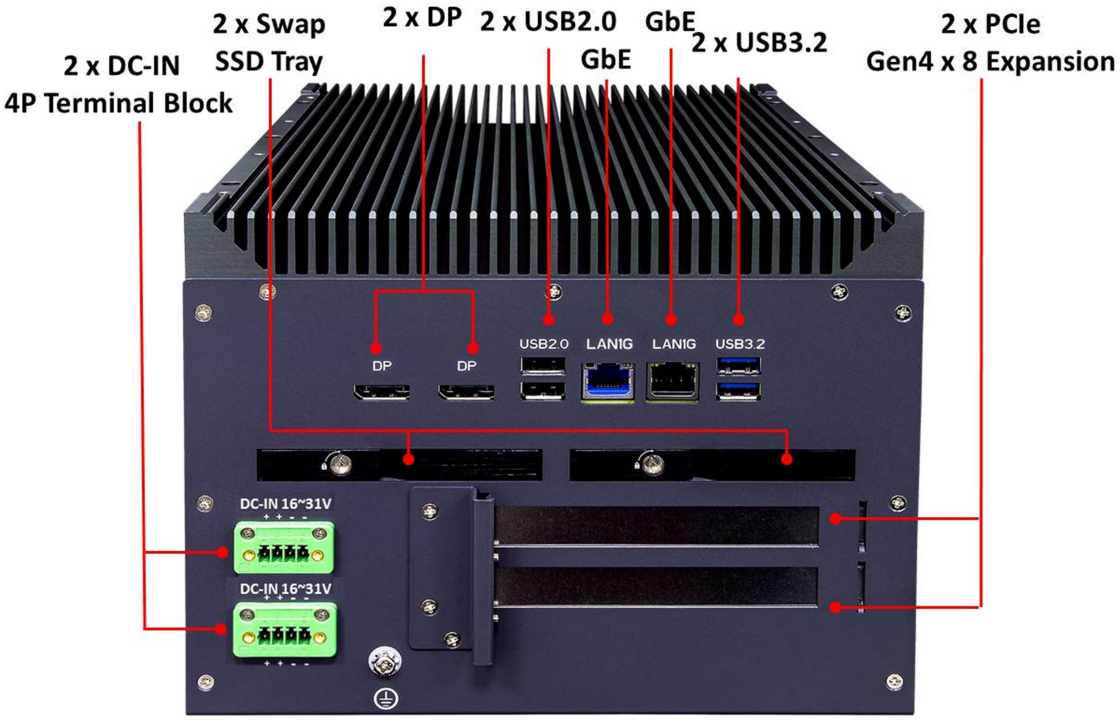
1.3 SCH3X2-D7 Rear Panel I/O Placement



1.4 SCH3X2-RD7 Front Panel I/O Placement

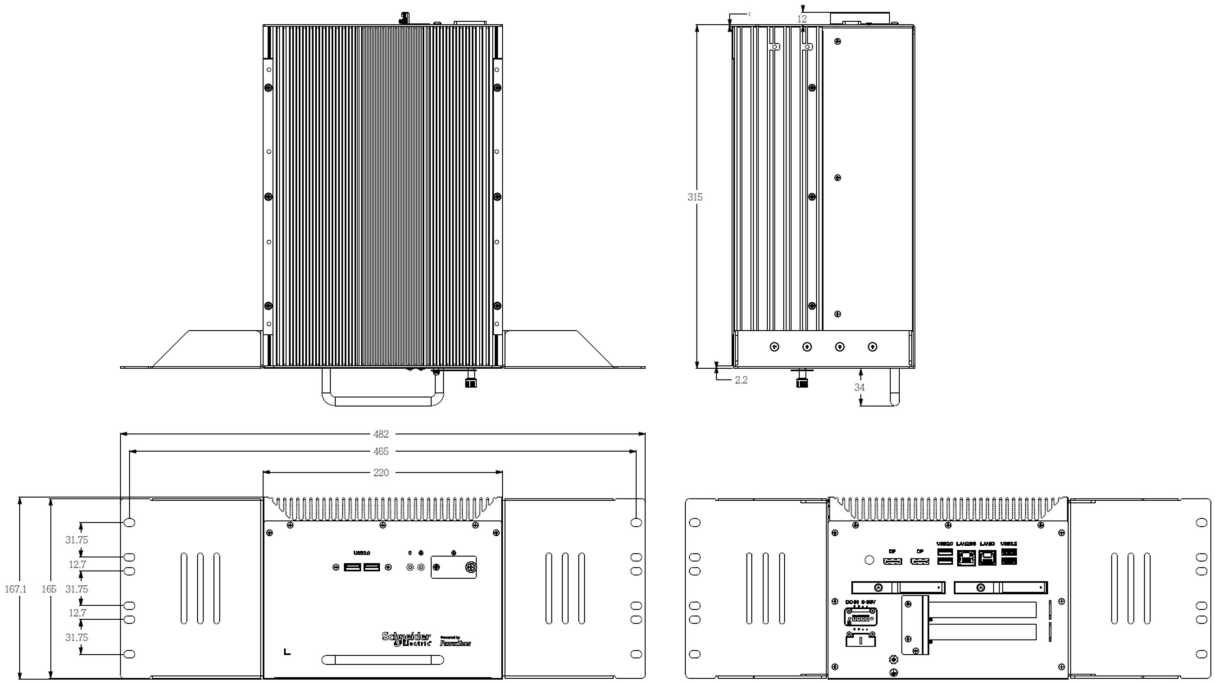


1.5 SCH3X2-RD7 Rear Panel I/O Placement

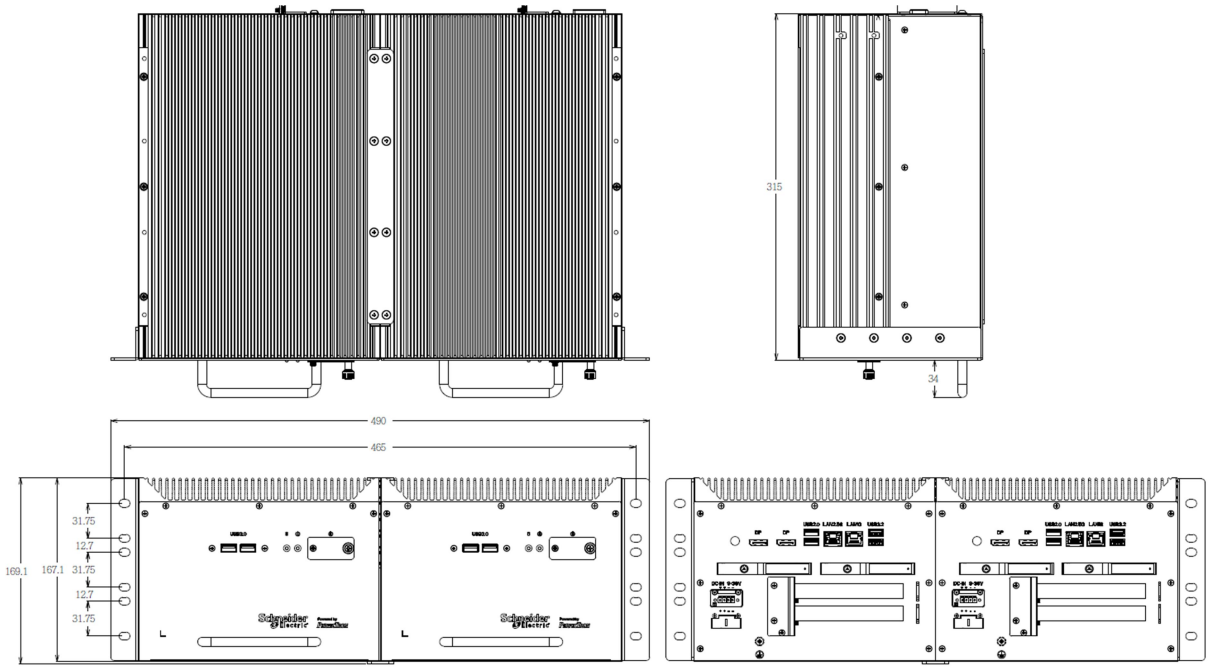


1.6 SCH3X2-D7 Mechanical Dimensions

Single System :

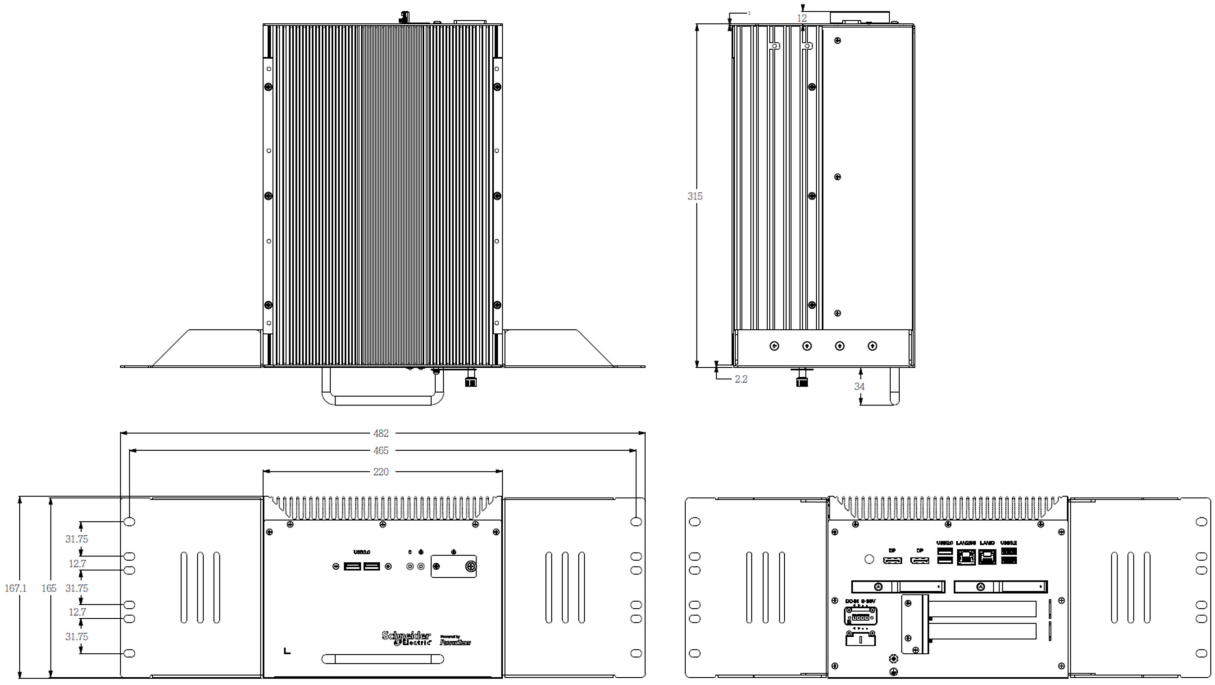


Dual System :

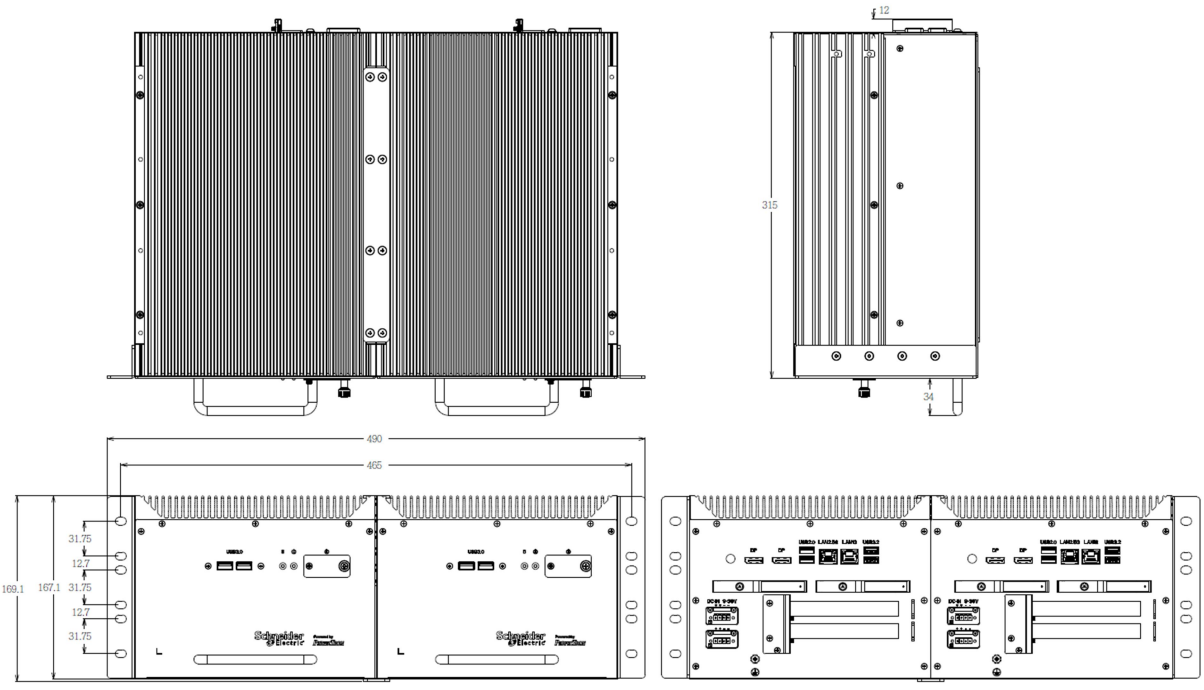


1.7 SCH3X2-RD7 Mechanical Dimensions

Single System :



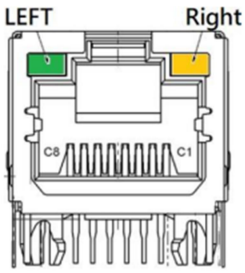
Dual System :



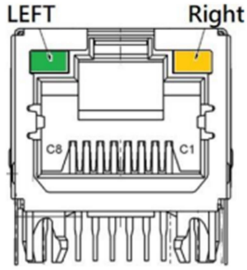
Chapter 2 : Rear I/O Port

2.1 LAN port LED Indications

2.5G LAN :

Diagram	LED	Color	State	Condition
	Link	N/A	Off	LAN link is not established
		Green	On	LAN link is established
			Blinking	LAN activity occurring
	Speed	N/A	Off	10 M/100M b/s data rate
		Orange	On	1000 M data rate
		Green	On	2500 Mb/s data rate

1G LAN :

Diagram	LED	Color	State	Condition
	Link	N/A	Off	LAN link is not established
		Green	On	LAN link is established
			Blinking	LAN activity occurring
	Speed	N/A	Off	10 Mb/s data rate
		Green	On	100 Mb/s data rate
		Orange	On	1000 Mb/s data rate

Chapter 3: System Setup

This chapter provides more detailed information and let you know how to install components into the SCH3X2-D7/RD7 series embedded system.

Prior to removing the chassis cover, make sure the unit's power is off and disconnected from the power sources to prevent electric shock or system damage.

3.1 2.5" Easy swap SSD installation

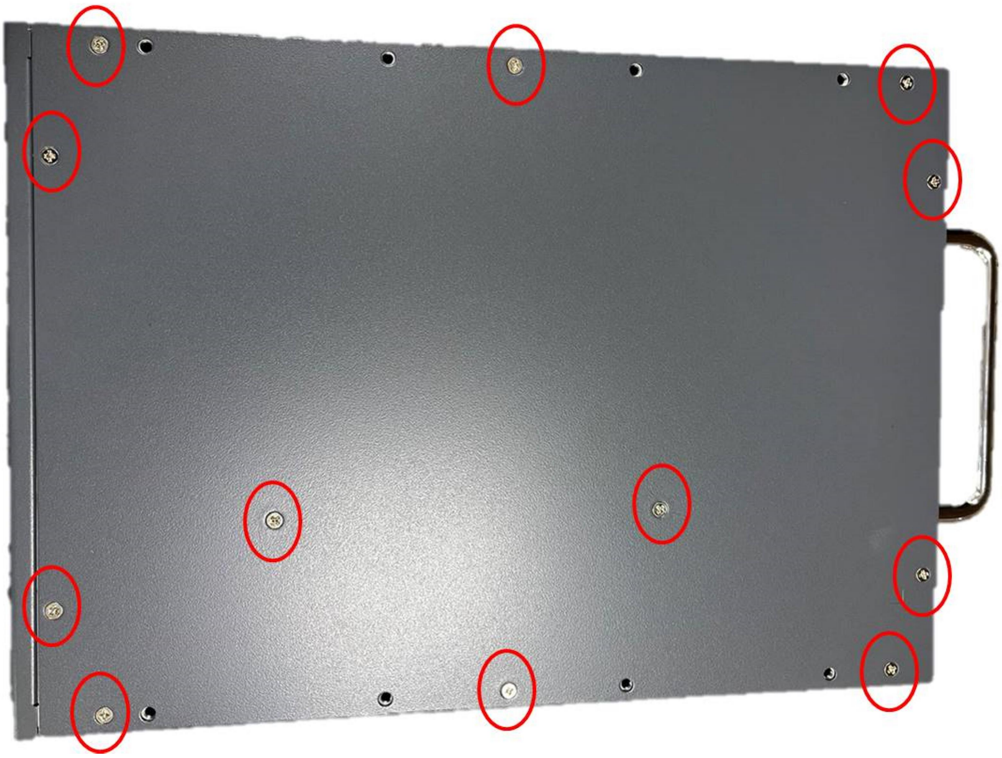
SCH3X2-D7/RD7 series supports two 2.5" Easy swap SSD

- Use Tri-angle security key to open keylock and pull out 2.5" SSD tray.
- Put 2.5"SSD on the tray and make sure SSD is fixed and push the tray back.
- Use Tri-angle security key to lock the tray door.

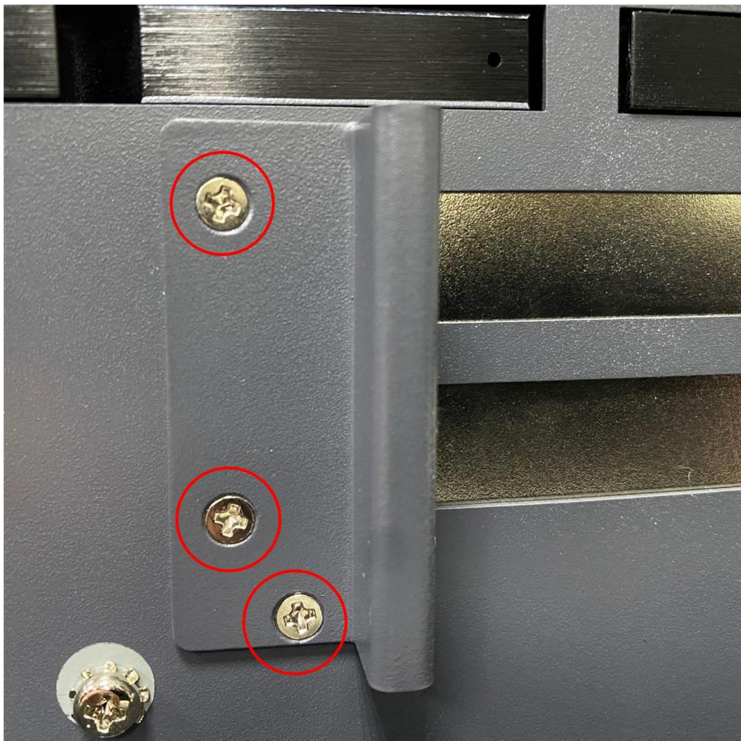
3.2 PCIe Card installation

SCH3X2-D7/RD7 series supports two PCIe Gen3 x 8 slot :

- Remove the back cover screws



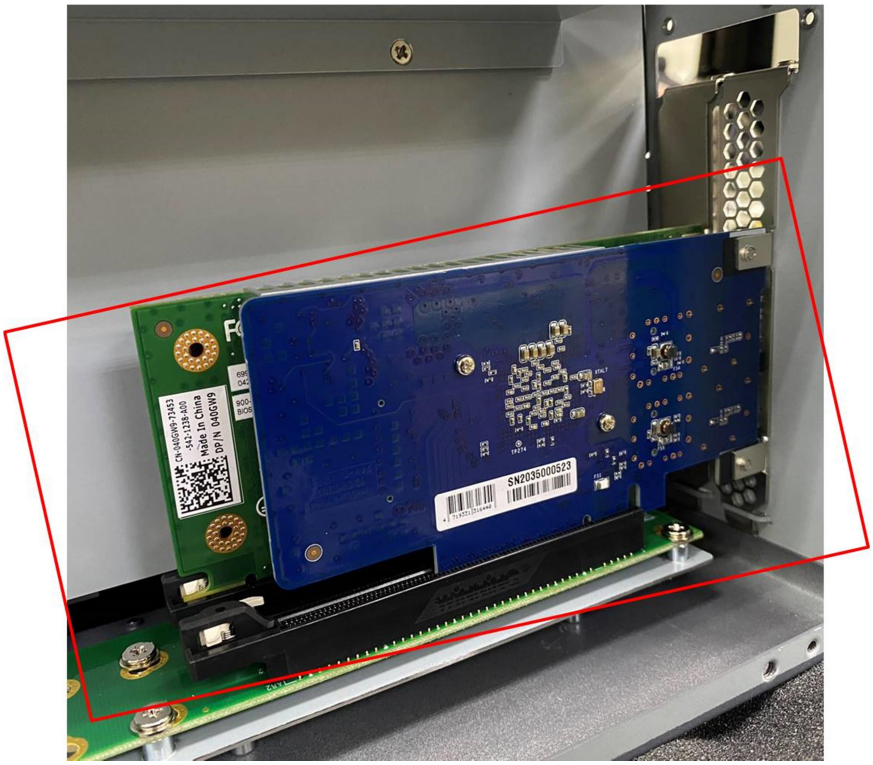
- Remove the BKT-1 screw of the cover



- Remove the BKT-2 screws of the cover

- 2*PCIe x8 Slot

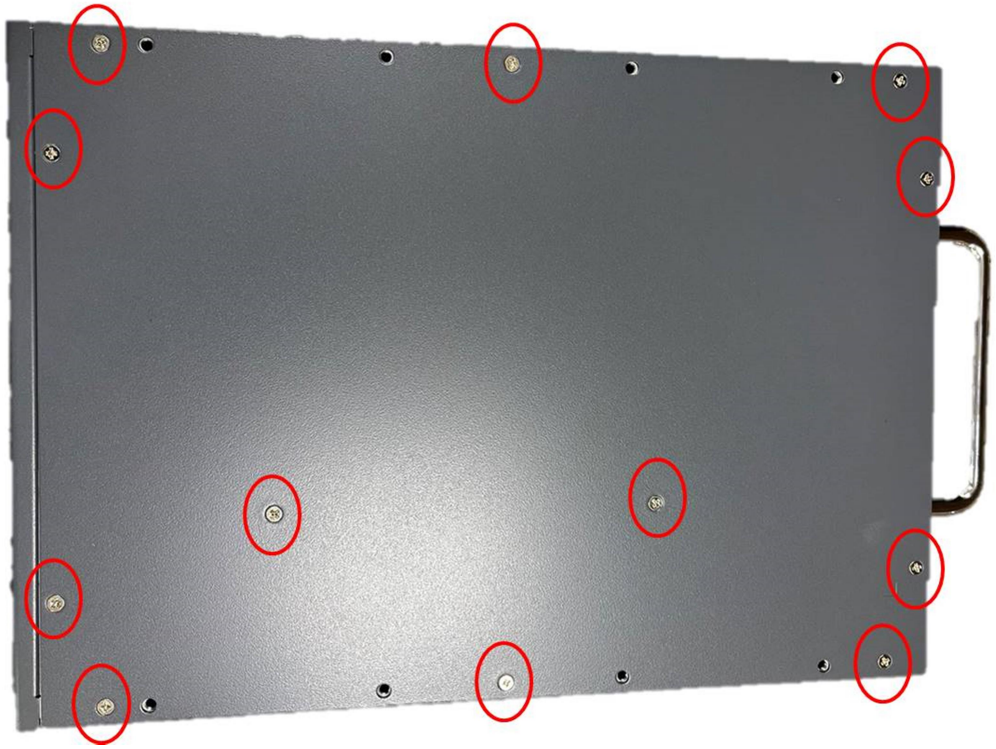
- Install PCIe Card



- Lock BKT-2 screw

- Lock BKT-1 screw

- Lock back cover screws



Chapter 4: AMI BIOS UTILITY

This chapter provides users with detailed descriptions on how to set up a basic system configuration through the AMI BIOS setup utility.

4.1 Starting

To enter the setup screens, perform the following steps:

- Turn on the computer and press the <Del> key immediately.
- After the <Del> key is pressed, the main BIOS setup menu displays. Other setup screens can be accessed from the main BIOS setup menu, such as the Chipset and Power menus.

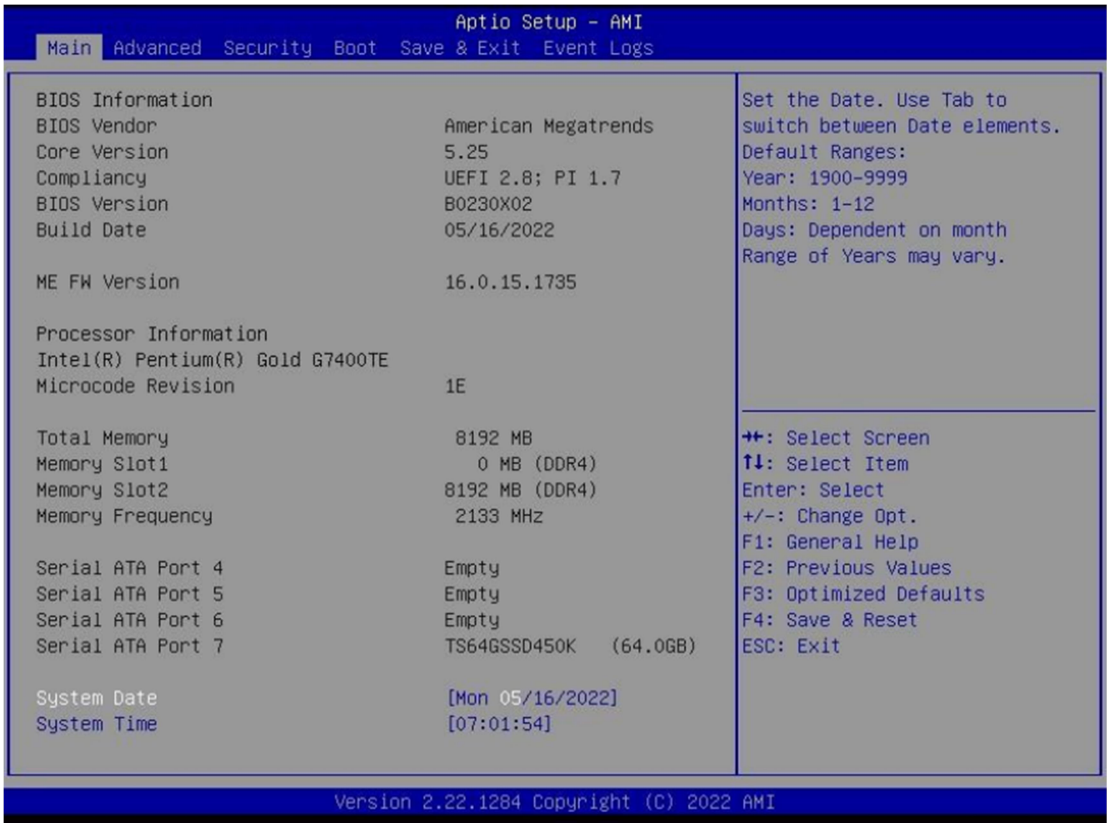
4.2 Navigation Keys

The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. Some of the hot keys are <F1>, <F10>, <Enter>, <ESC>, and <Arrow> keys.

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

Left/Right	The Left and Right <Arrow> keys moves the cursor to select a menu.
Up/Down	The Up and Down <Arrow> keys moves the cursor to select a setup screen or sub-screen.
+– Plus/Minus	The Plus and Minus <Arrow> keys changes the field value of a particular setup setting.
Tab	The <Tab> key selects the setup fields.
F1	The <F1> key displays the General Help screen.
F10	The <F10> key saves any changes made and exits the BIOS setup utility.
Esc	The <Esc> key discards any changes made and exits the BIOS setup utility.
Enter	The <Enter> key displays a sub-screen or changes a selected or highlighted option in each menu.

4.3 Main Page



BIOS Information
It displays BIOS related information.

ME FW Version
ME Firmware Version.

Processor Information
Display the installed CPU brand.

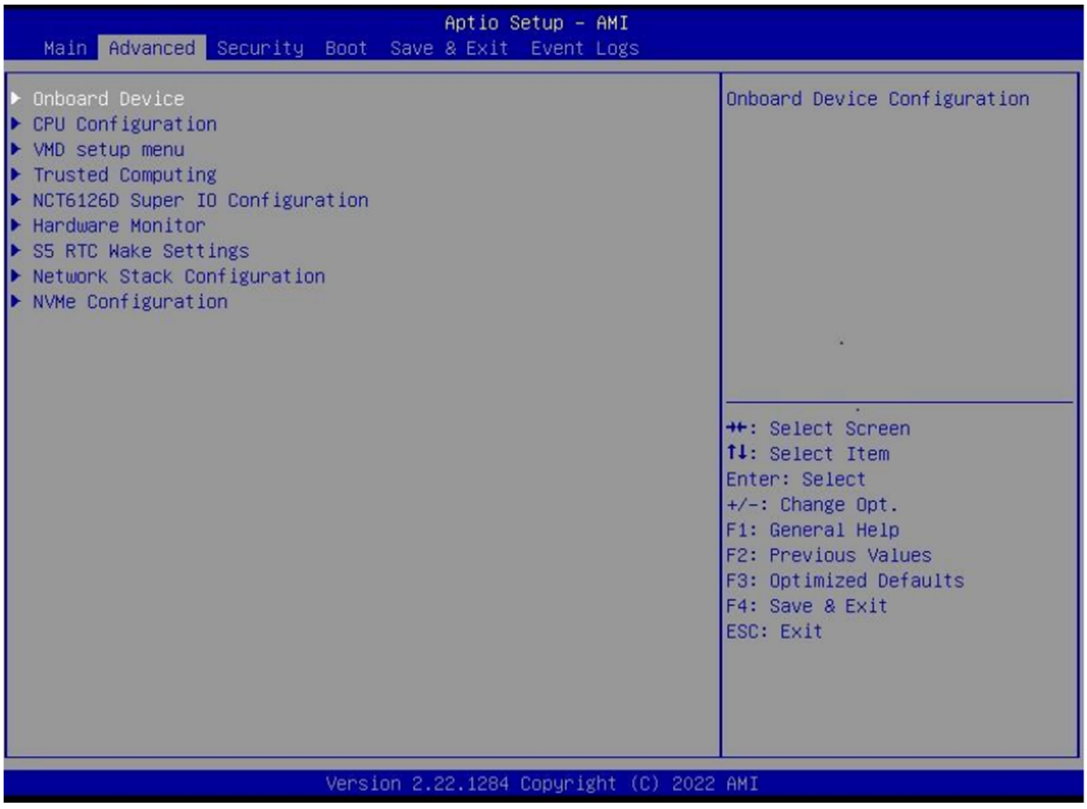
Memory Information
This displays the installed memory size, installed memory size of Slot 1 & Slot2, and the installed memory frequency.

Serial ATA Port 4/5/6/7
Display the installed SATA device model/size of port 4/5/6/7.

System Date
Set the Date. Use Tab to switch between Date elements. Default Ranges: Year: 1998-9999 Months: 1-12 Days: dependent on month. Range of Years may vary.

System Time
Set the Time. Use Tab to switch between Time elements. hh: 0-23 mm: 0-59 ss: 0-59

4.4 Advance Page



Onboard Device
Onboard Device Configuration

CPU Configuration
CPU Configuration Parameters

VMD setup menu
VMD Configuration setting

Trusted Computing
Trusted Computing Settings

NCT6126D Super IO Configuration
System Super IO Chip Parameters.

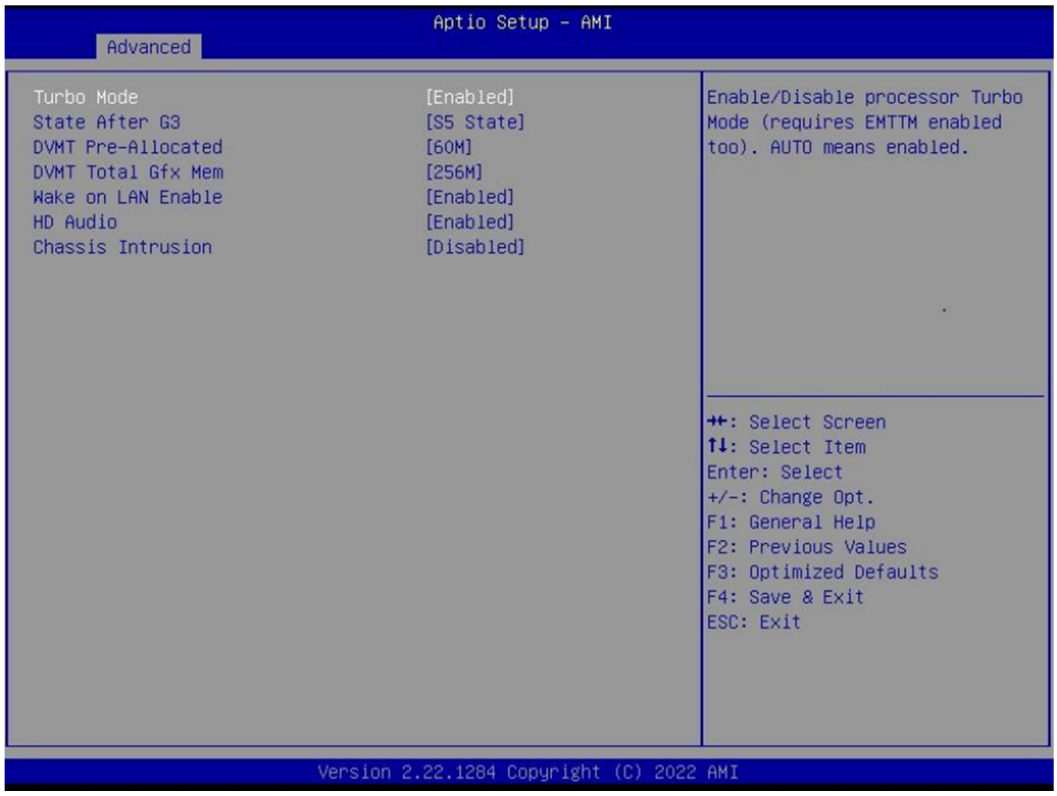
HW Monitor
Monitor hardware status

S5 RTC Wake Settings
Enable system to wake from S5 using RTC alarm.

Network Stack Configuration
Network Stack Settings.

NVMe Configuration
NVMe Device Options Settings

4.4.1 Onboard Device



Turbo Mode
Enable/Disable processor Turbo Mode (requires Intel Speed Step or Intel Speed Shift to be available and enabled. Disabled / Enabled

State After G3
Specify what state to go to when power is re-applied after a power failure (G3 state). S0 State / S5 State

DVMT Pre-Allocated
Select DVMT 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device. 32M/F7 / 36M / 40M / 44M / 48M / 52M / 56M /60M / 64M

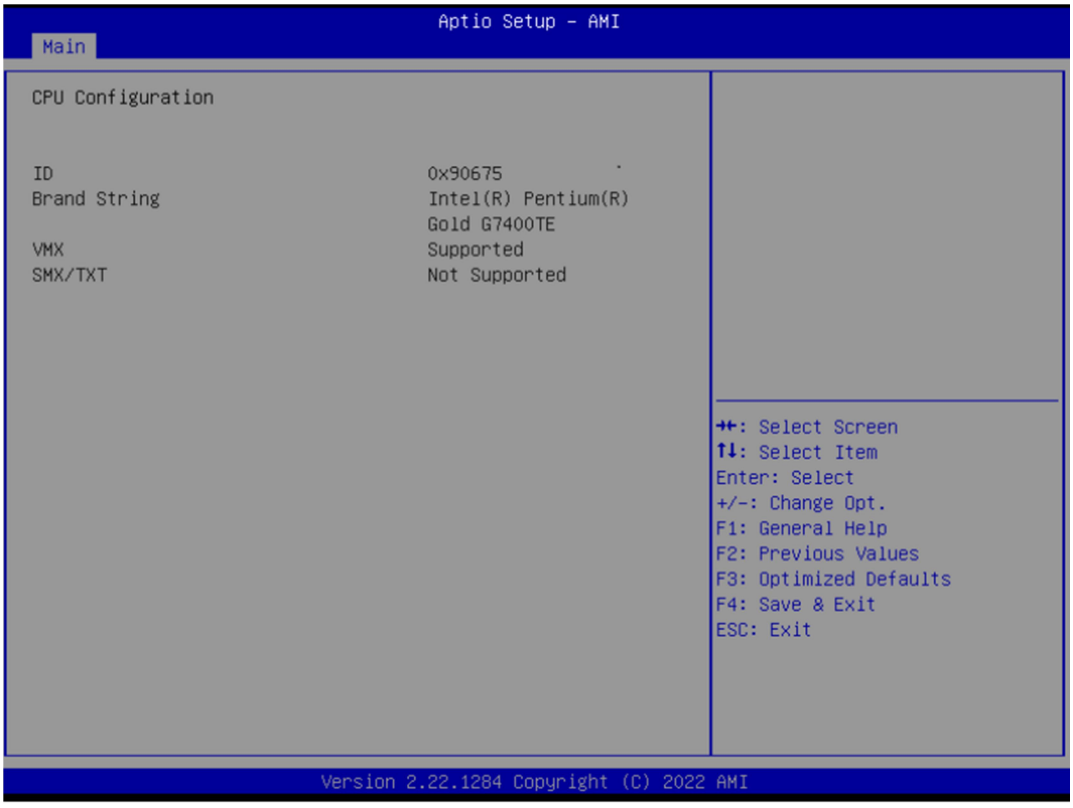
DVMT Total Gfx Mem
Select DVMT5.0 Total Graphic Memory size used by the Internal Graphics Device. 128M / 256M / MAX

Wake on LAN Enable
Enable/Disable integrated LAN to wake the system. Disabled / Enabled

HD Audio
Control Detection of the HD-Audio device. Disabled: HDA will be unconditionally disabled. Enabled: HDA will be unconditionally enabled. Disabled / Enabled

Chassis Intrusion
Configure Chassis Intrusion. Disabled / Enabled / Reset

4.4.2 CPU Configuration



ID
Displays CPU Signature

Brand String
Displays the CPU brand string

VXM
L3 Cache Size

SMX/TXT
SMX/TXT Supported or Not

4.4.3 VMD setup menu

Enable VMD controller
Enable/Disable to VMD controller. Disabled / Enabled

4.4.4 Trusted Computing

Security Device Support
Enables or Disables BIOS support for security device. O.S. will not show Security Device. TCG EFI protocol and INT1A interface will not be available. Disabled / Enabled

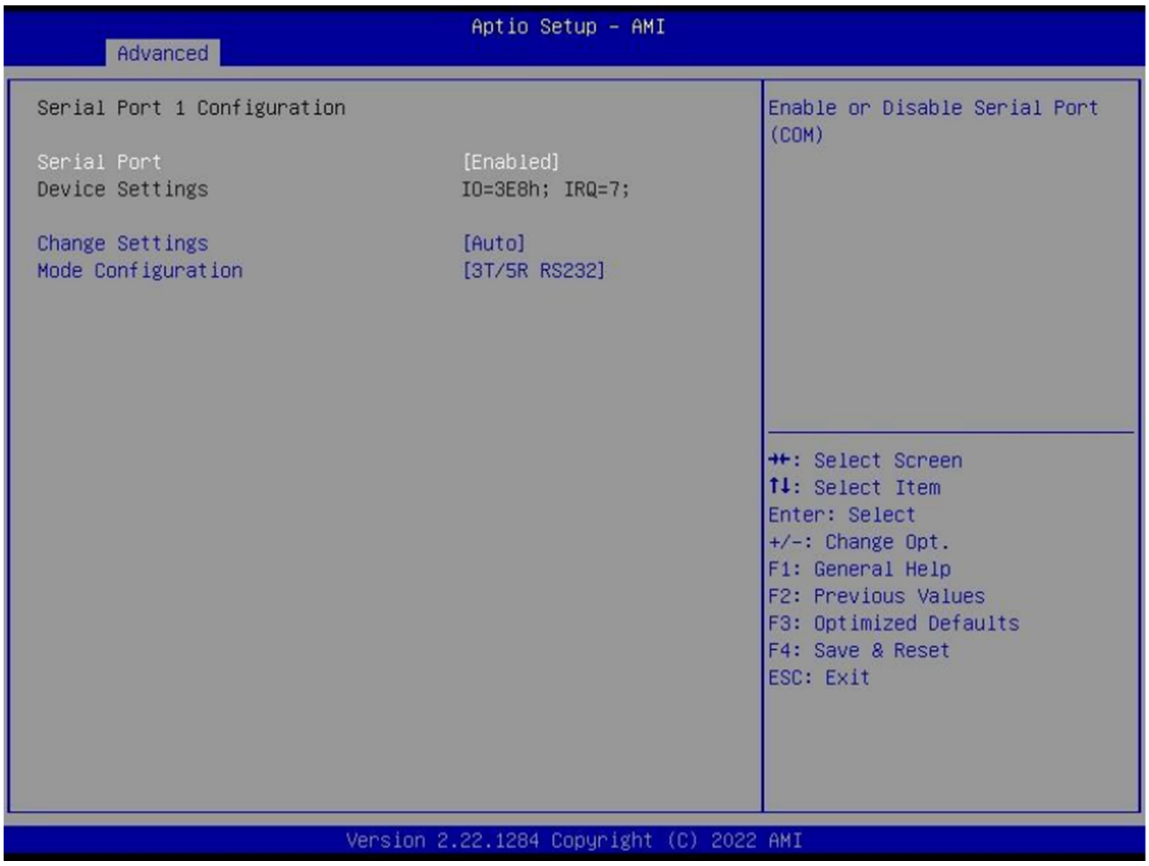
Pending operation
Schedule an Operation for the ecurity Device. NOTE: Your Computer will reboot during restart in order to change State of Security Device. None / TPM Clear

4.4.5 NCT6126D Super IO Configuration

Serial Port 1 Configuration
Set Parameters of Serial Port 1 (COMA)

Serial Port 2 Configuration
Set Parameters of Serial Port 2 (COMB)

4.4.6 Serial Port 1 Configuration



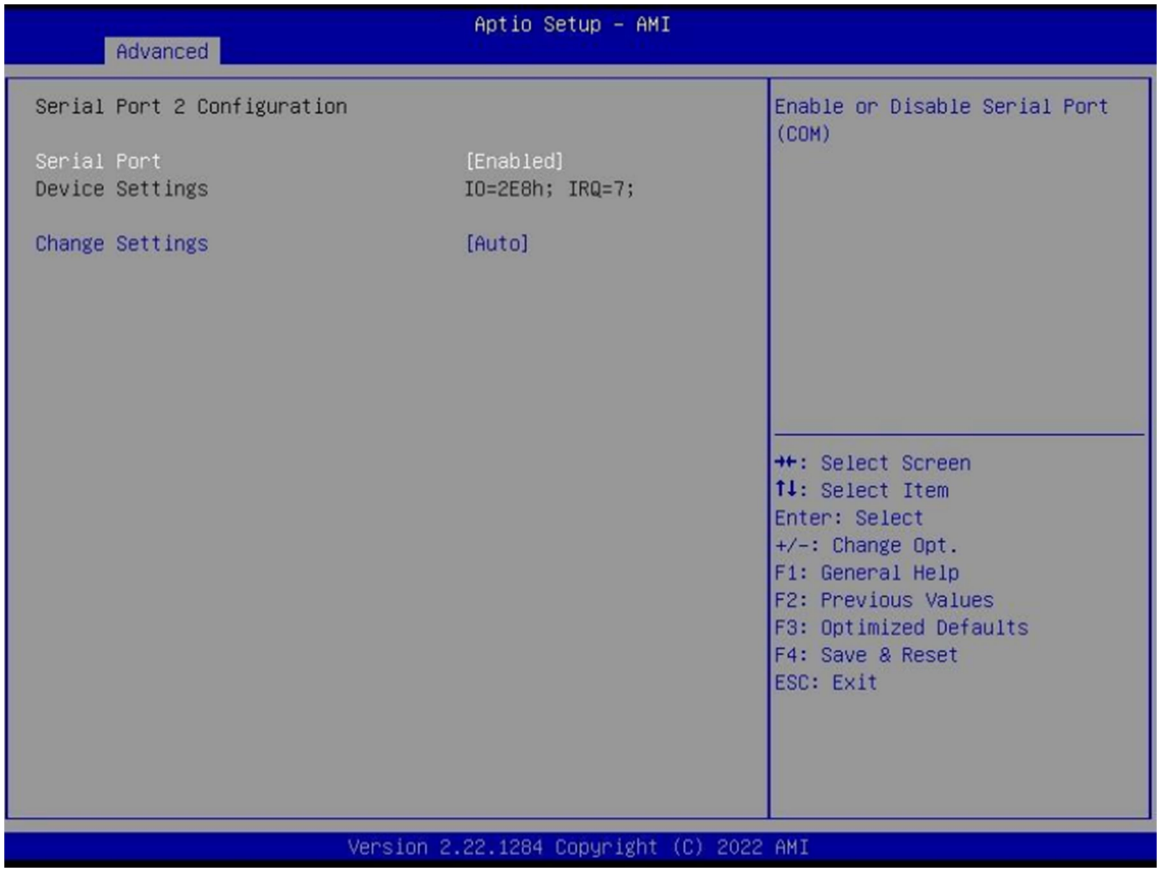
Serial Port
Enable or Disable Serial Port (COM). Disabled / Enabled

Device Settings
Device Super IO COM1 Address and IRQ.Read only

Change Settings
Select an optimal setting for Super IO Device. Auto / IO=3E8h; IRQ=7; / IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; / IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; / IO=220h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; / IO=228h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

Mode Configuration
Configure serial port as RS232/RS422/RS485. 1T/1R RS422 / 3T/5R RS232 / 1T/1R RS485 TX ENABLE Low Active / 1T/1R RS422 with termination resistor / 1T/1R RS485 with termination resistor TX ENABLE Low Active / Disabled

4.4.7 Serial Port 2 Configuration

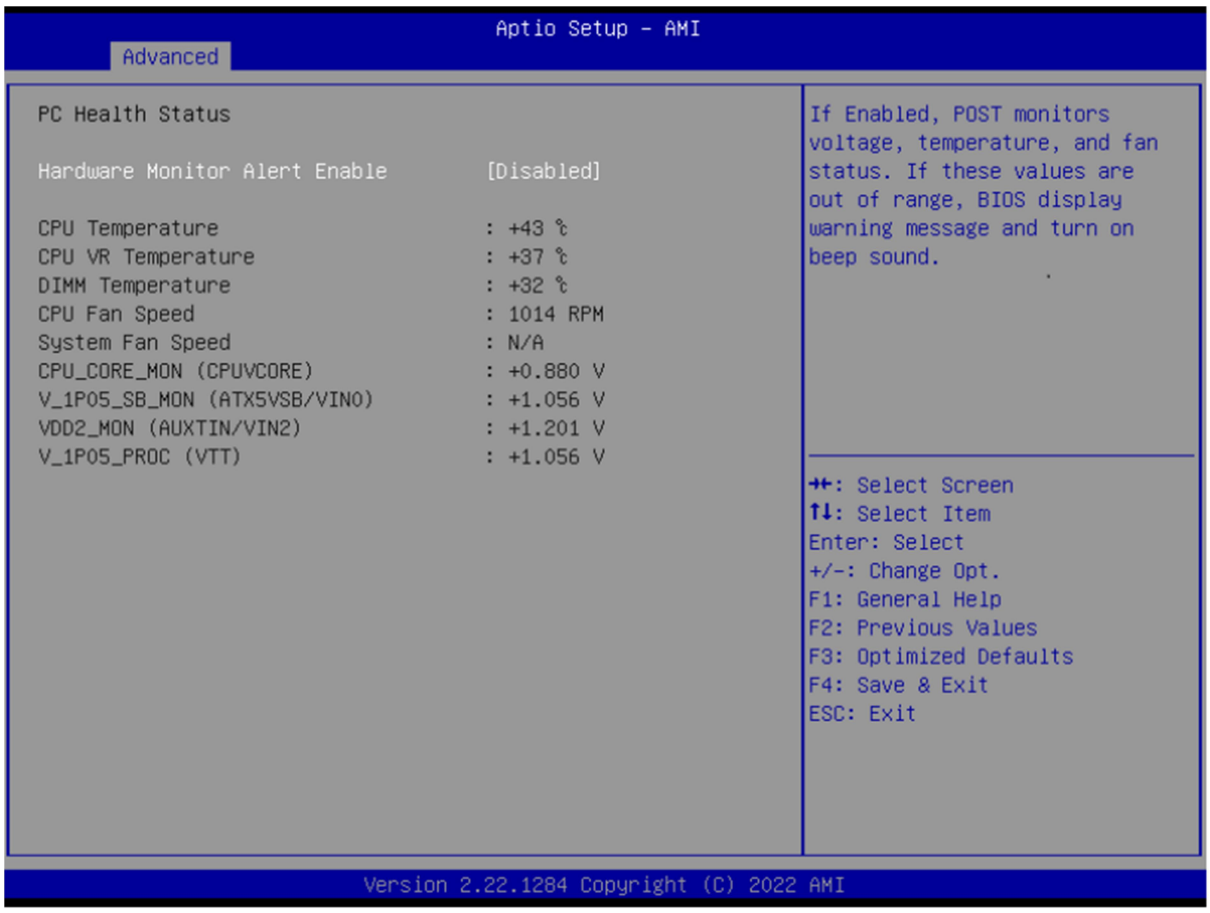


Serial Port
Enable or Disable Serial Port (COM). Disabled / Enabled

Device Settings
Device Super IO COM2 Address and IRQ.Read only

Change Settings
Select an optimal setting for Super IO Device. Auto / IO=3E8h; IRQ=7; / IO=3E8h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; / IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; / IO=220h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12; / IO=228h, IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12;

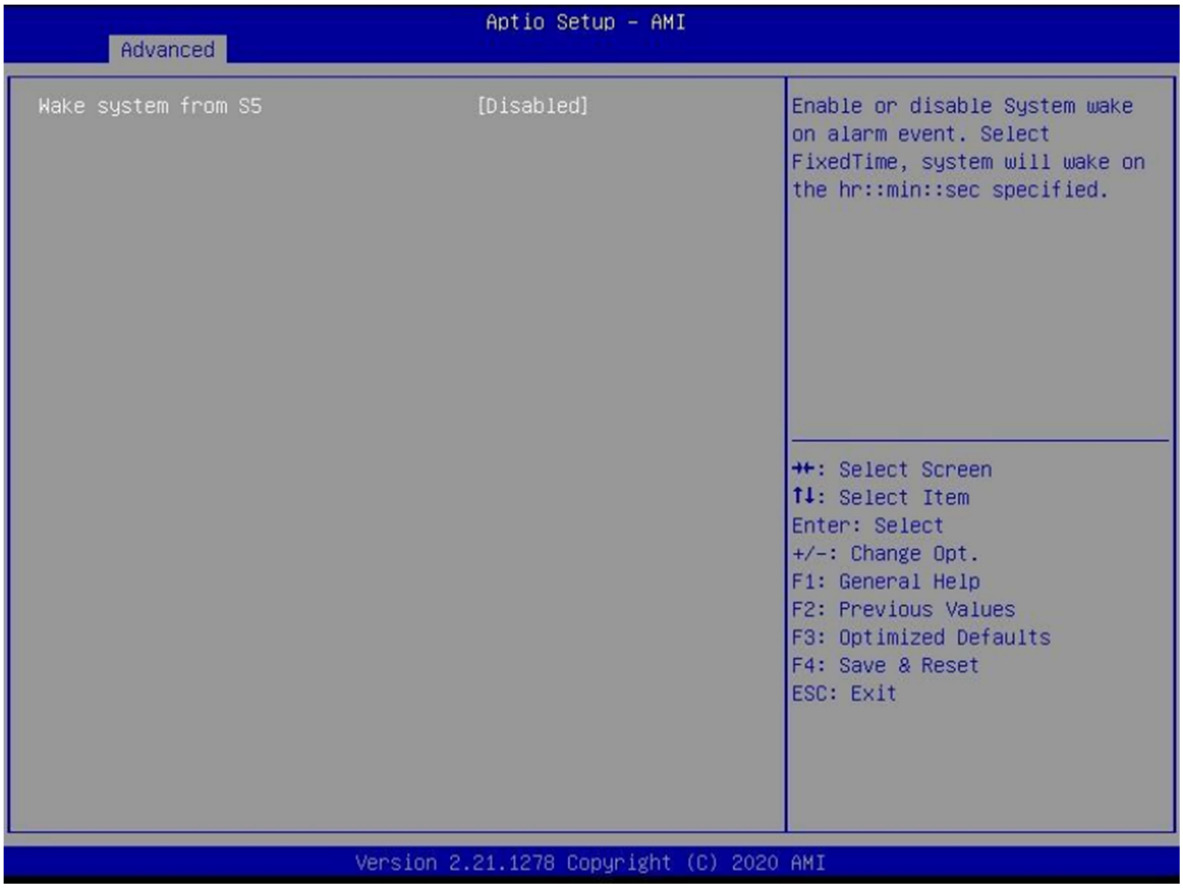
4.4.8 Hardware Monitor



Hardware Monitor Alert Enable
[Disabled If Enabled, POST monitors voltage, temperature, and fan status. If these values are out of range, BIOS display warning message and turn on beep sound. Disabled / Enabled]

System Fan Enable (Suppressed if Hardware Monitor Alert is Disabled)
If Enabled, POST monitors system fan status. If this value is out of range, BIOS display warning message and turn on beep sound. Disabled / Enabled

4.4.9 S5 RTC Wake Settings



Wake system from S5
Enable or disable System wake on alarm event. Select Fixed Time, system will wake on the hr:min:sec specified. Disabled / Fixed Time

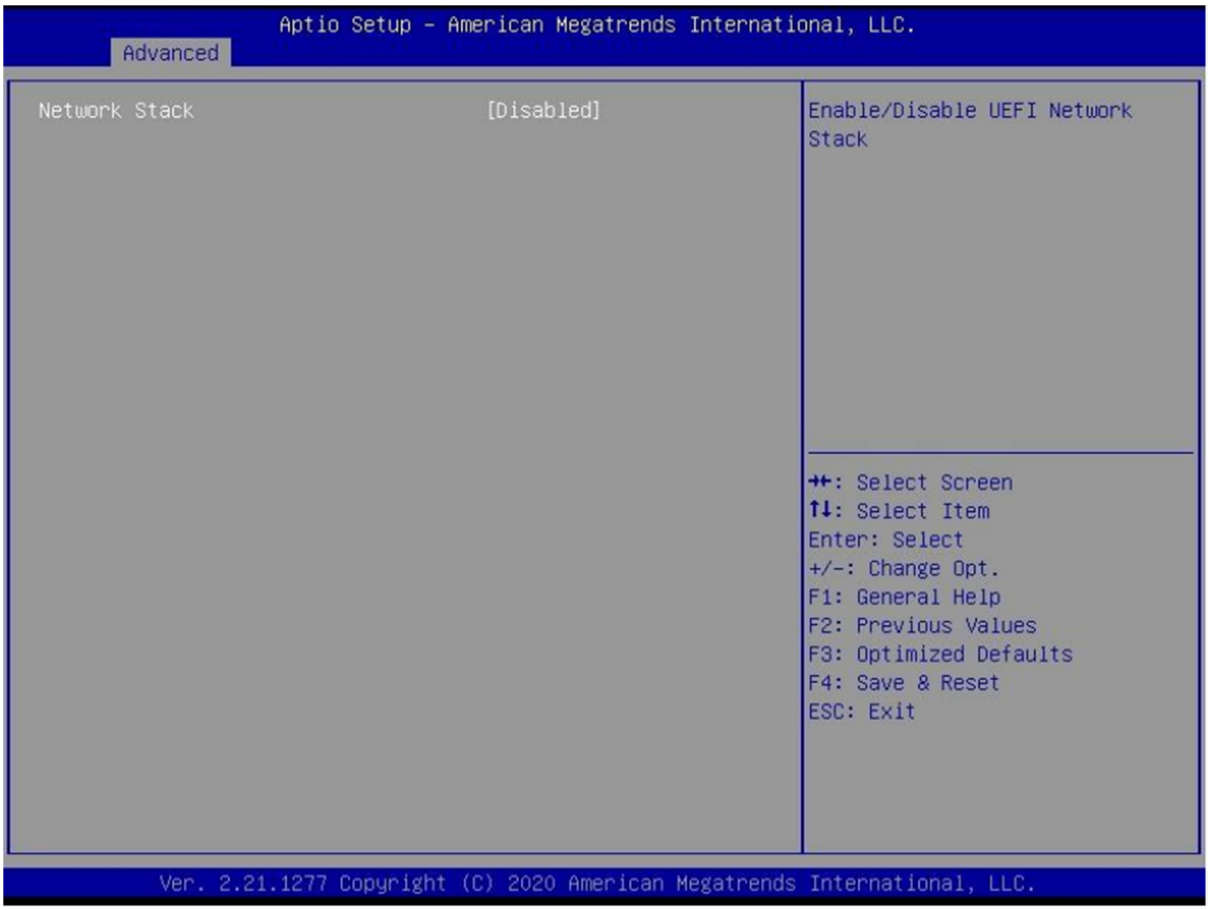
Wake up hour(Show when Wake system from S5 set to Fixed Time)
Select 0-23. For example enter 3 for 3am and 15 for 3pm. 0

Wake up minute(Show when Wake system from S5 set to Fixed Time)
Select 0-59. For example enter 3 for 3am and 15 for 3pm. 0

Wake up second(Show when Wake system from S5 set to Fixed Time)
Select 0-59. For example enter 3 for 3am and 15 for 3pm. 0

Wake system from S5 (when set to [Dynamic time])
Wake up minute increase Select 1-5. 1

4.4.10 Network Stack Configuration

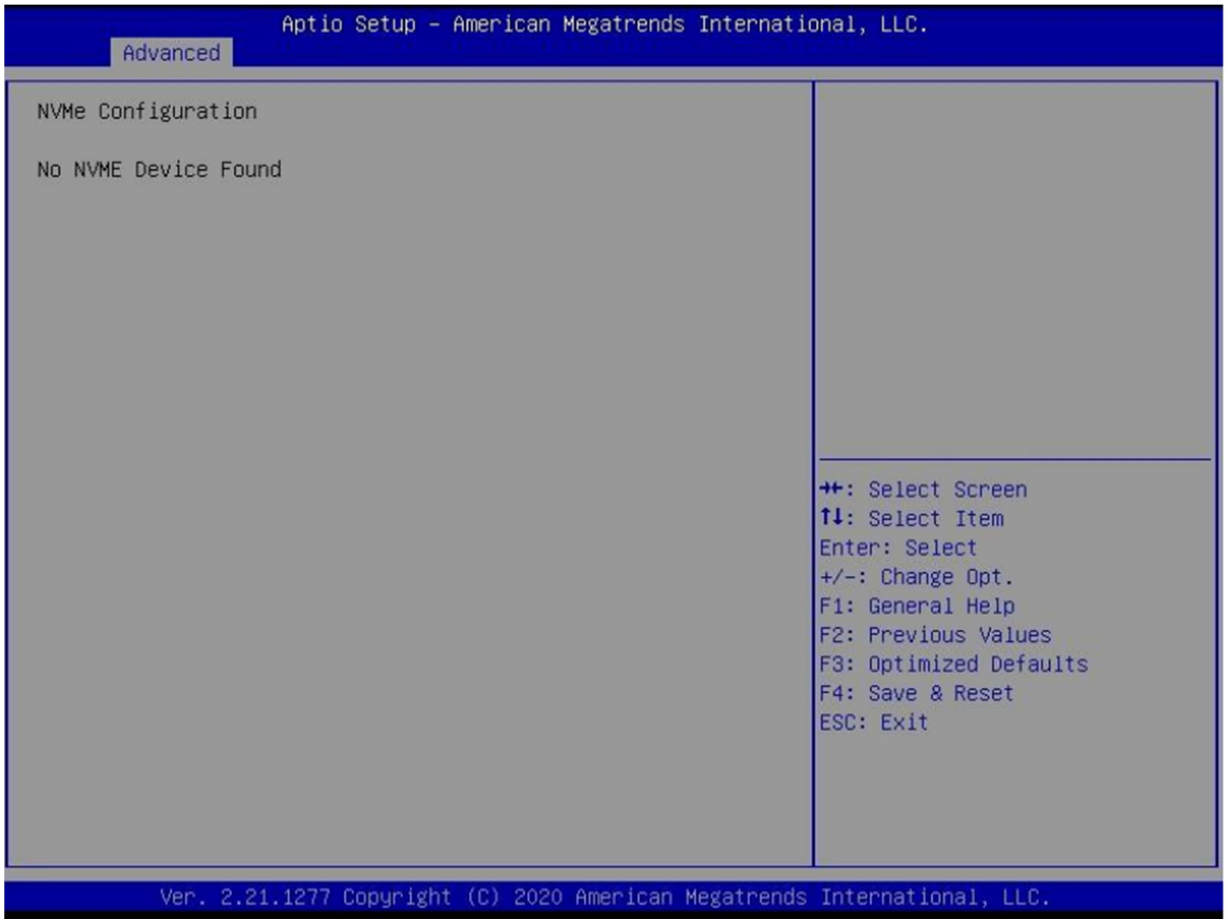


Network stack
Enable/Disable UEFI Network Stack. Disabled / Enabled

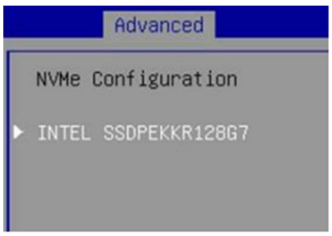
Ipv4 PXE Support (Available when Network stack Enabled)
Enable/Disable Ipv4 PXE Boot Support. If disabled IPV4 PXE boot option will not be created. Disabled / Enabled

Ipv6 PXE Support (Available when Network stack Enabled)
Enable/Disable Ipv6 PXE Boot Support. If disabled IPV6 PXE boot option will not be created. Disabled / Enabled

4.4.11 NVMe Configuration



(Device)
Here shows the Device Name you installed. A sample screenshot shows below.



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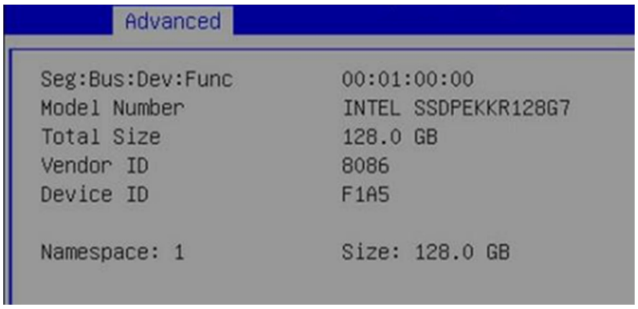
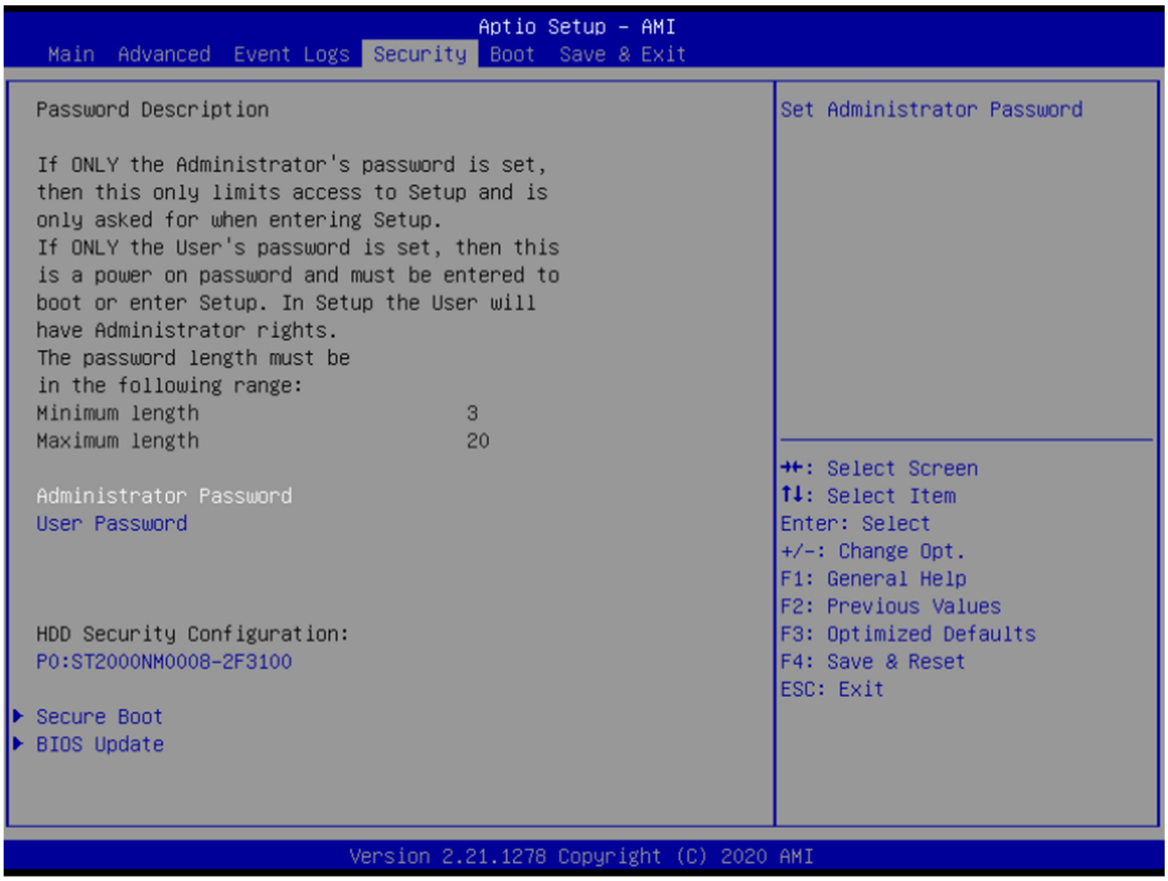


4.5 Security Page



Administrator Password
Set Administrator Password

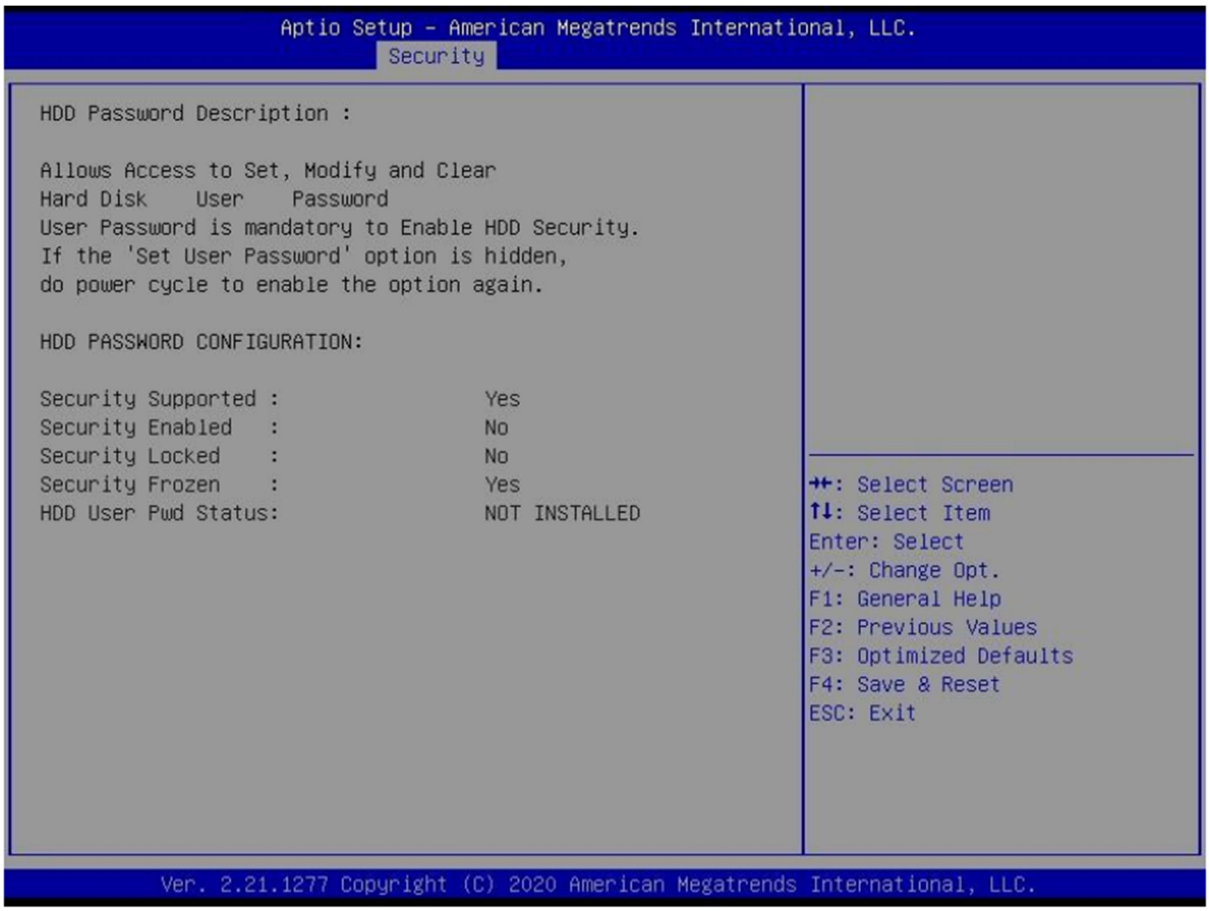
User Password
Set User Password.

HDD Security drive
HDD Security Configuration for selected drive
Press Enter when selected to go into the associated Sub-Menu.

Secure Boot
Set User Password.
Press Enter when selected to go into the associated Sub-Menu.

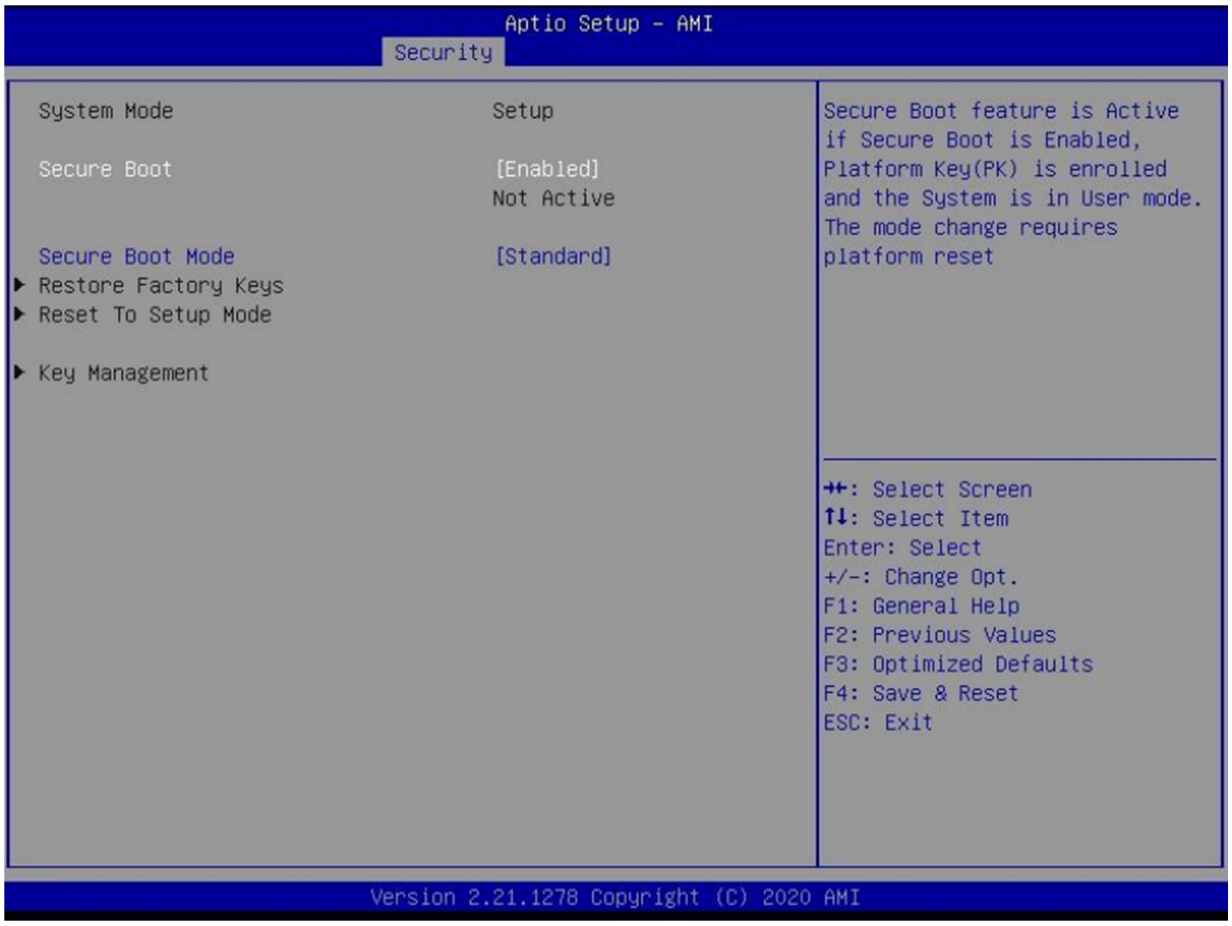
BIOS Update
BIOS Update support
Press Enter when selected to go into the associated Sub-Menu.

4.5.1 HDD Security configuation



(Device)
Read only

4.5.2 Secure Boot



Secure Boot
Secure Boot feature is Active if Secure Boot is Enabled. Platform Key (PK) is enrolled and the System is in User mode. The mode change requires platform reset. Disabled / Enabled

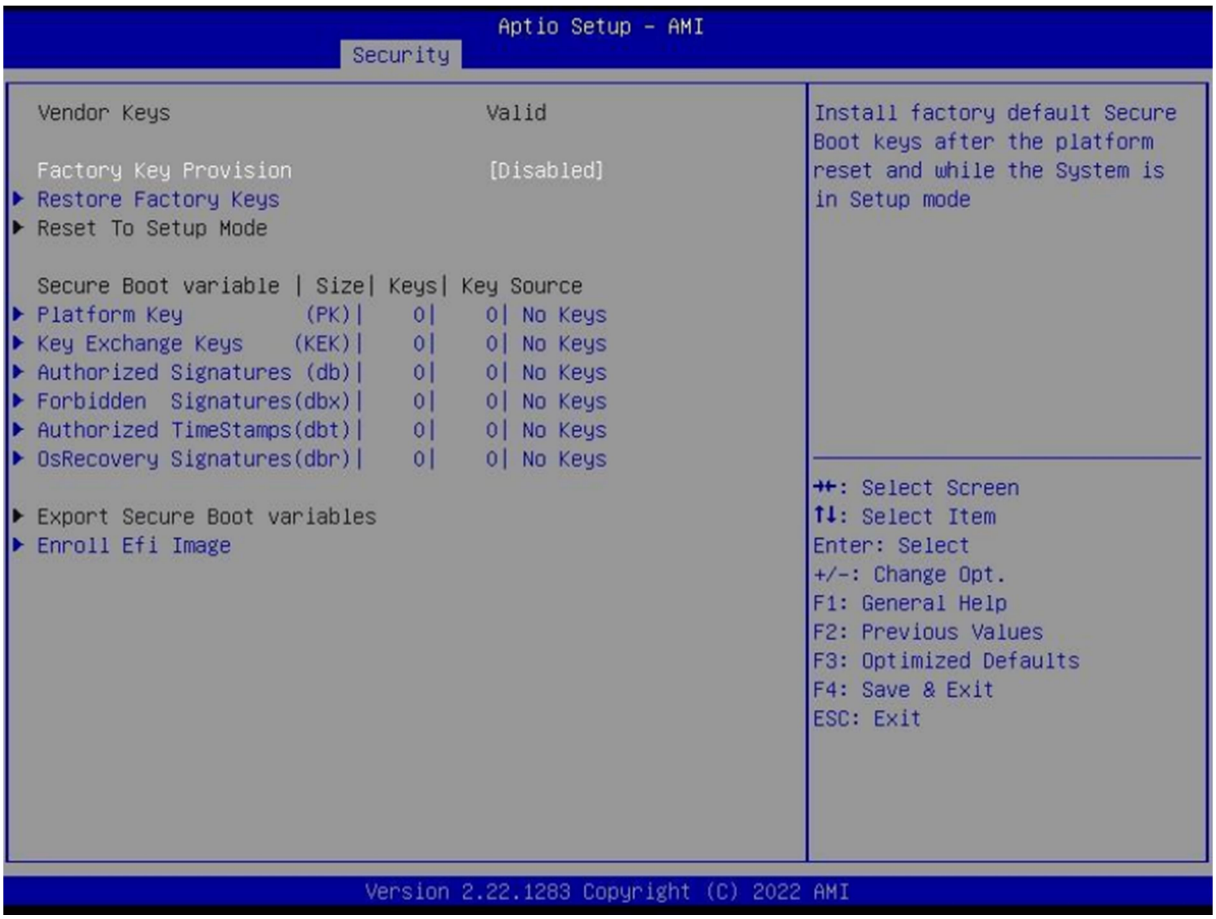
Secure Boot Mode
Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication. Custom / Standard

Restore Factory Keys
Force System to User Mode. Install factory default Secure Boot key databases.

Reset to Setup Mode
Delete all Secure Boot key databases from NVRAM.

Key Management
Enables expert users to modify Secure Boot Policy variables without full authentication

4.5.3 Key Management



Factory Key Provision
Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode. Disabled / Enabled

Restore Factory Keys
Force System to User Mode. Install factory default Secure Boot key databases

Reset to Setup Mode
Delete all Secure Boot key databases from NVRAM

Platform Key (PK)
Enroll Factory Defaults or load certificates from a file: 1.Public Key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory,External,Mixed

Key Exchange Keys
Enroll Factory Defaults or load certificates from a file: 1.Public Key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory,External,Mixed

Authorized Signatures
Enroll Factory Defaults or load certificates from a file: 1.Public Key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory,External,Mixed

Forbidden Signatures
Enroll Factory Defaults or load certificates from a file: 1.Public Key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory,External,Mixed

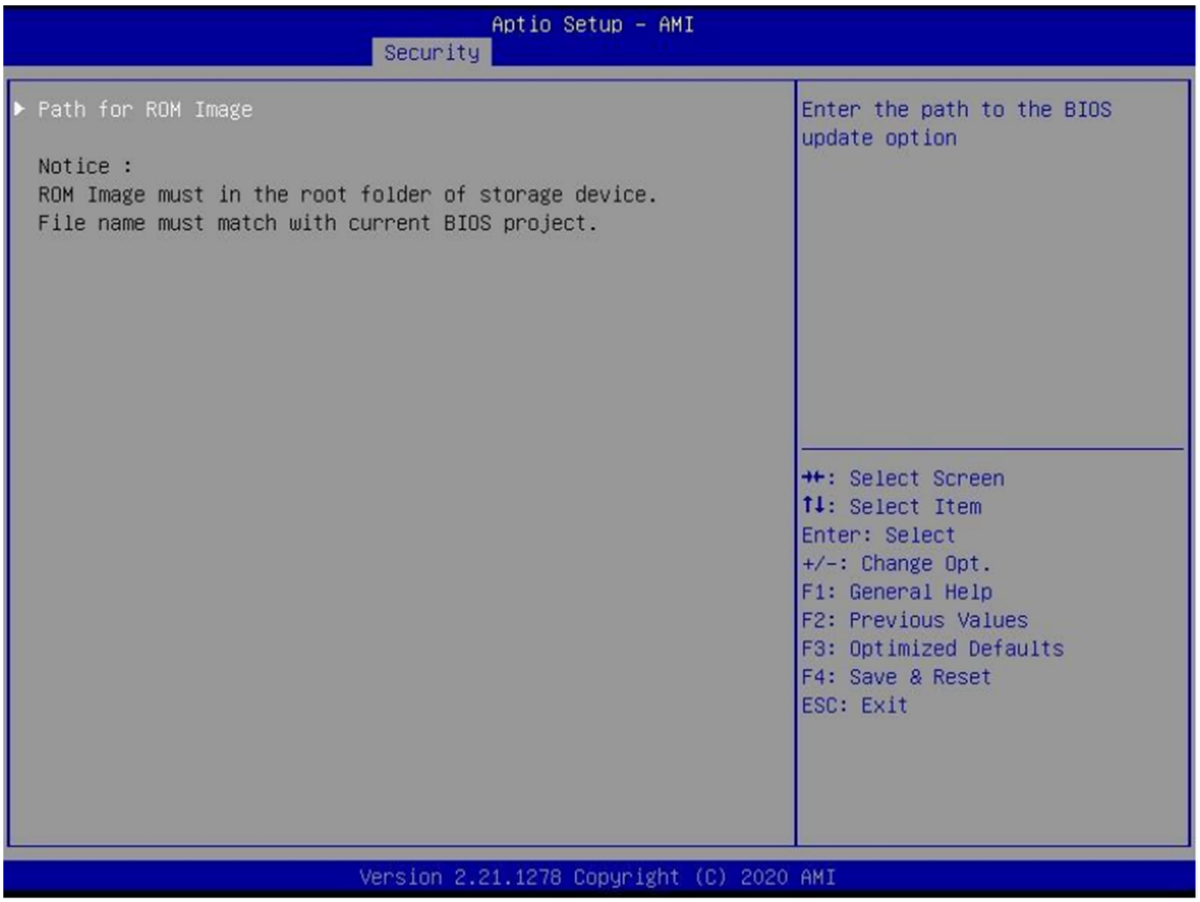
Authorized TimeStamps
Enroll Factory Defaults or load certificates from a file: 1.Public Key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory,External,Mixed

OsRecovery Signatures
Enroll Factory Defaults or load certificates from a file: 1.Public Key Certificate: a)EFI_SIGNATURE_LIST b)EFI_CERT_X509 (DER) c)EFI_CERT_RSA2048 (bin) d)EFI_CERT_SHAXXX 2.Authenticated UEFI Variable 3.EFI PE/COFF Image(SHA256) Key Source: Factory,External,Mixed

Export Secure Boot variables
Copy NVRAM content of Secure Boot variables to files in a root folder on a file system device

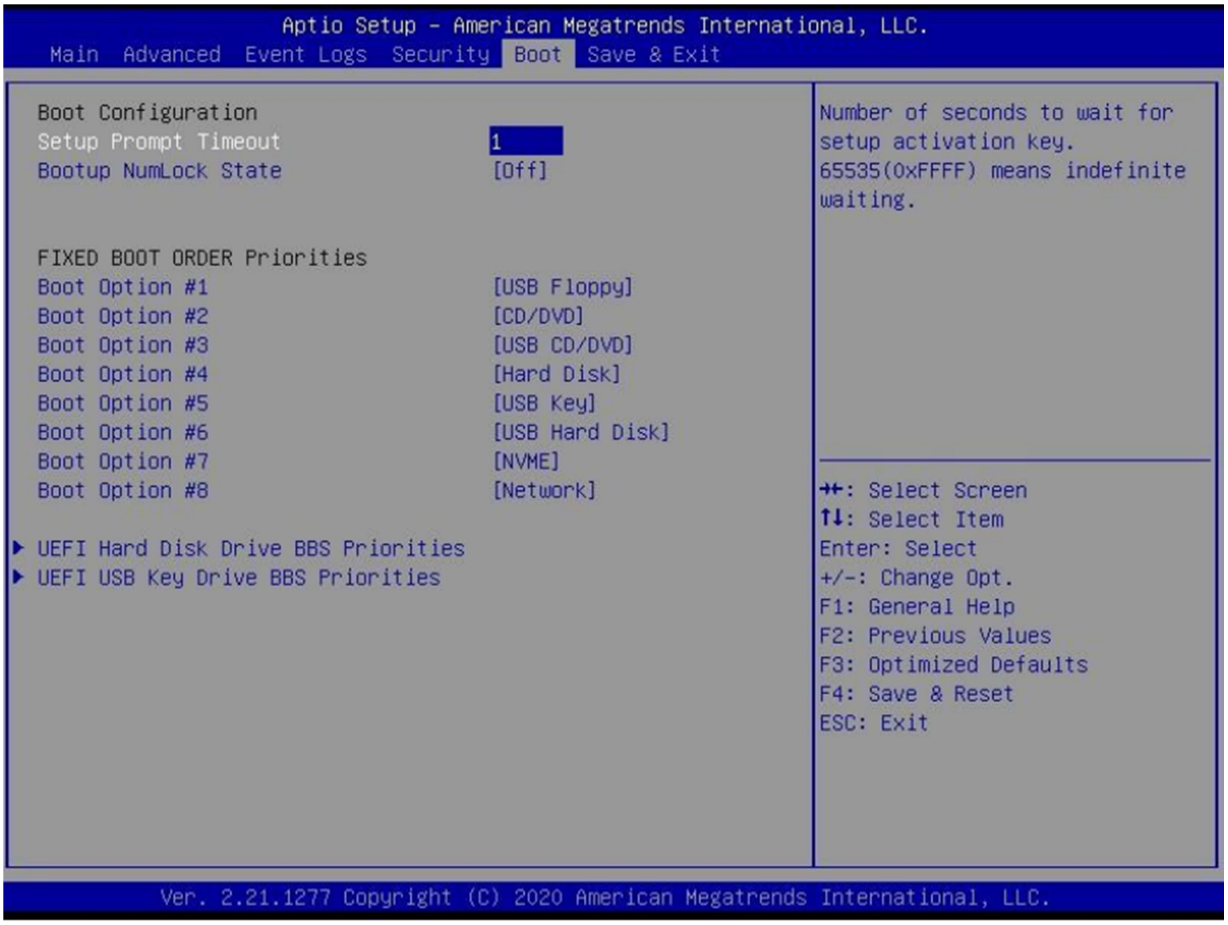
Enroll Efi Image
Allow the image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db)

4.5.4 BIOS Update



Path for ROM Image
Enter the path to the BIOS update option.

4.6 Boot Page



Setup Prompt Timeout
Number of seconds to wait for setup activation key. 65535 (0xFFFF) means indefinite waiting. 1

Bootup NumLock State
Select the keyboard NumLock state. On / Off

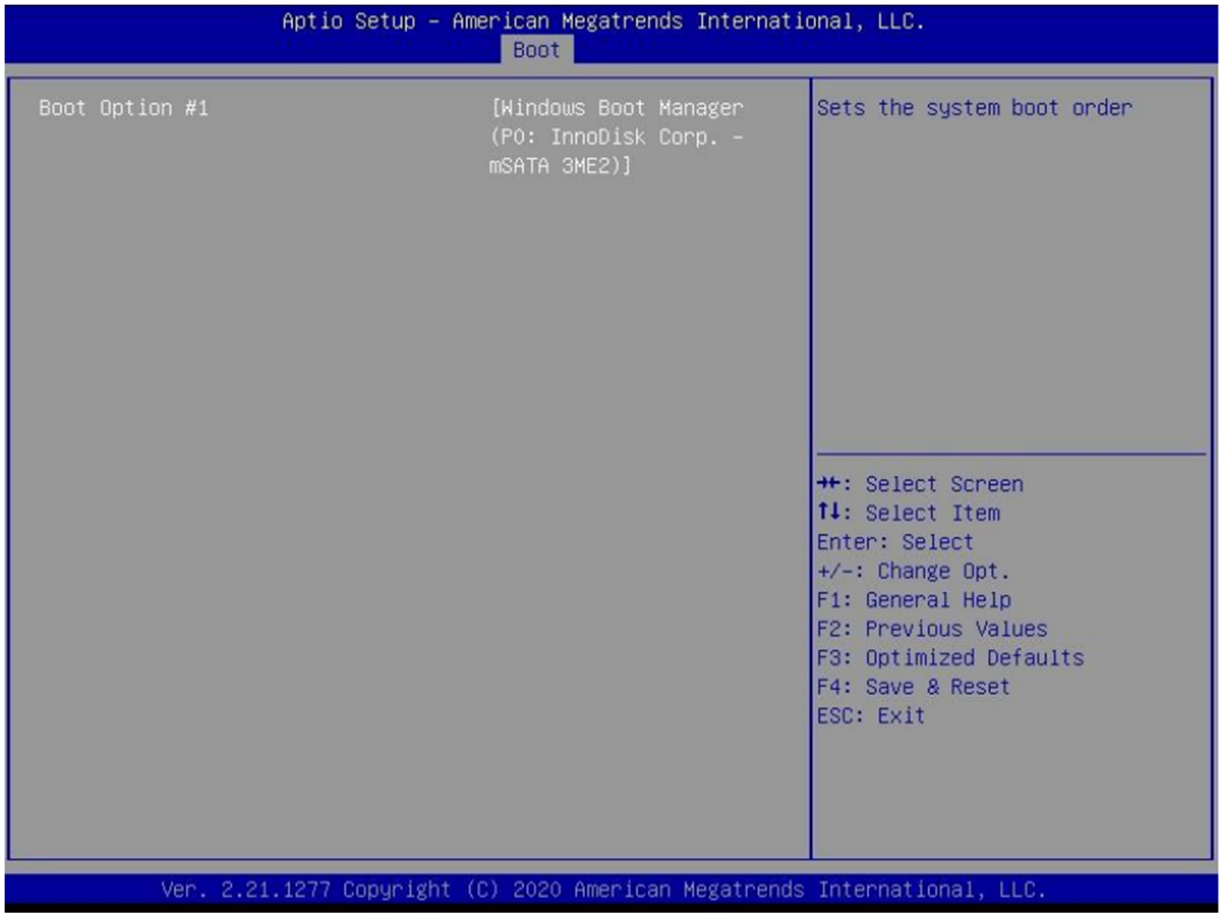
Boot Option #1 ~ Boot Option #8
[Sets the system boot order. Device Name / Disabled

(UEFI) Hard Disk Drive BBS Priorities
Specifies the Boot Device Priority sequence from available Hard Disk Drives.

(UEFI) USB KEY Drive BBS Priorities
Specifies the Boot Device Priority sequence from available Hard Disk Drives.

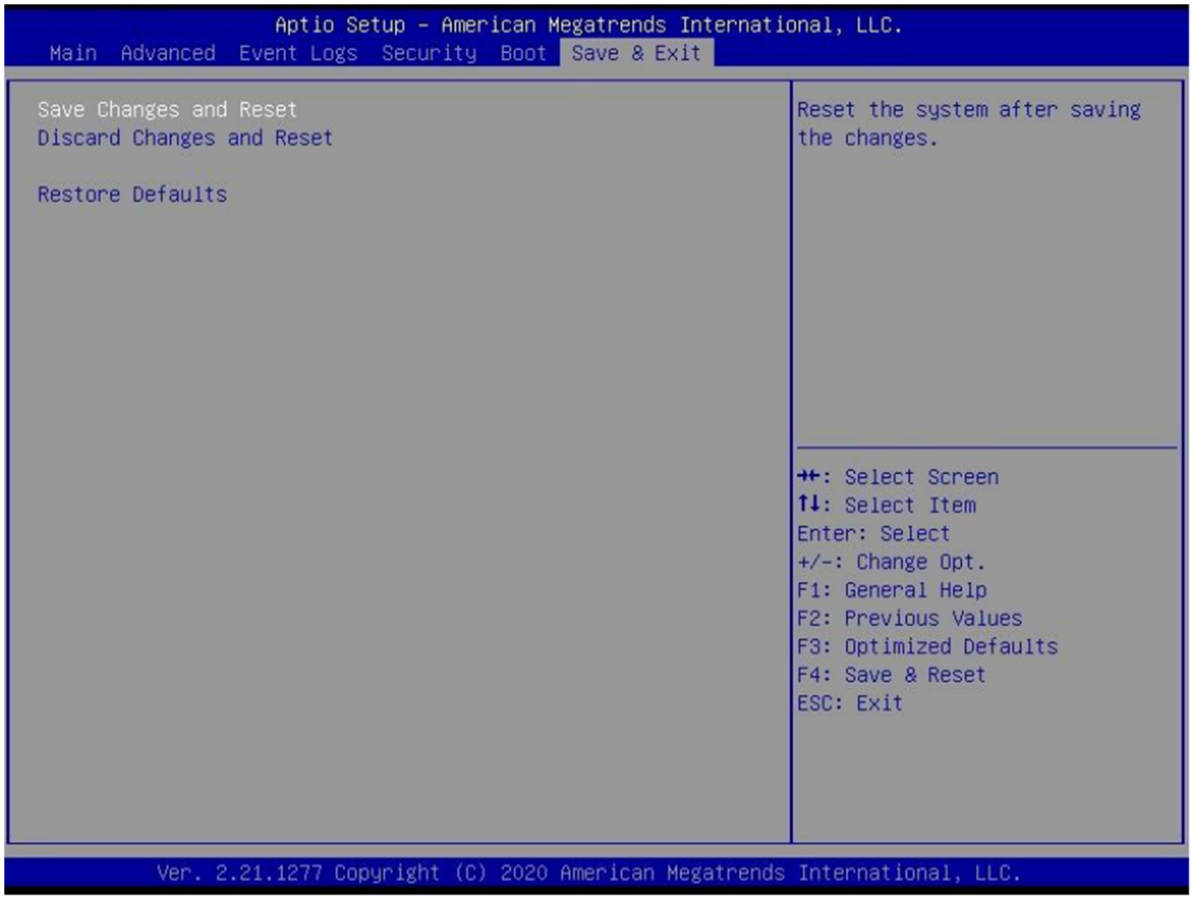
(UEFI) USB Hard Disk Drive BBS Priorities
Specifies the Boot Device Priority sequence from available Hard Disk Drives.

4.6.1 (List Boot Device Type) Drive BBS Priorities



Boot Option #1
Sets the system boot order. Boot Device Name #1 of this type / Disabled

4.7 Save & Exit Page

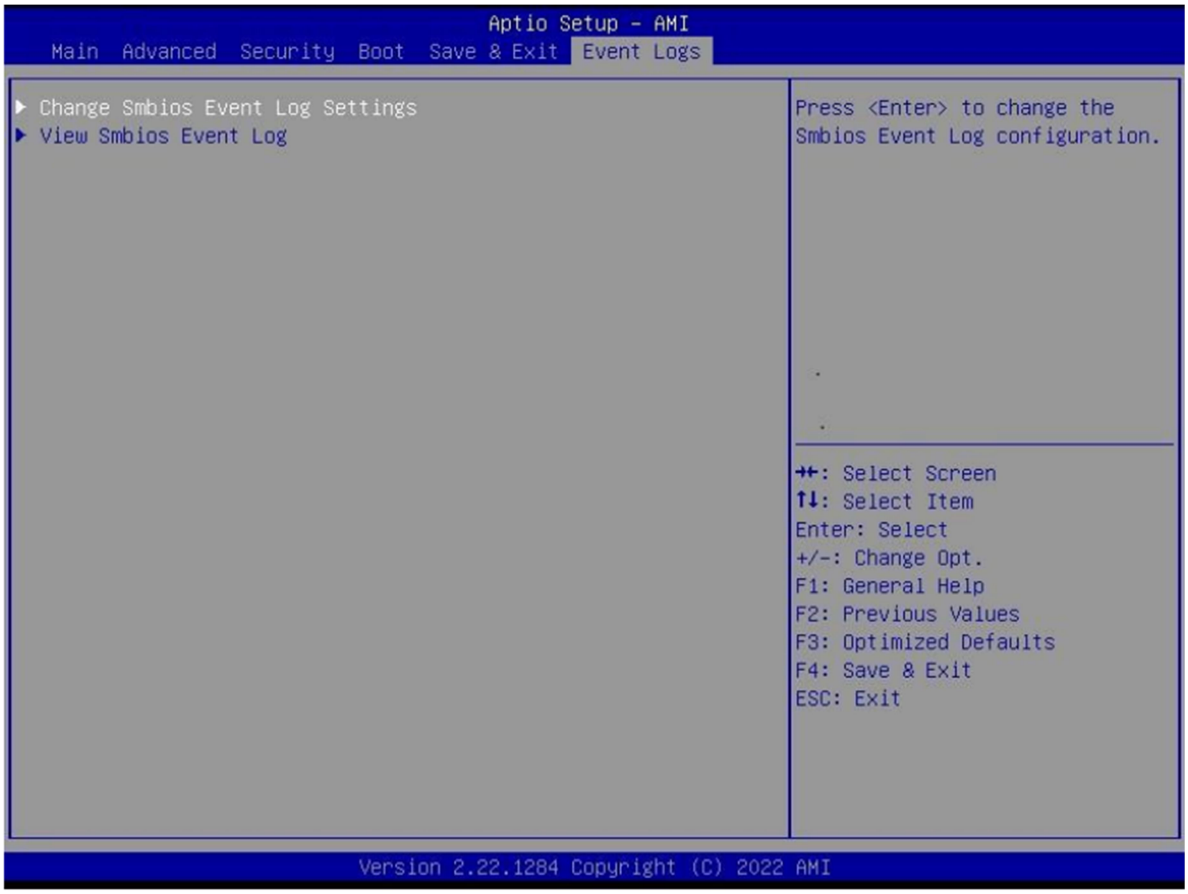


Discard Changes and Exit
Exit system setup without saving any changes.

Save Changes and Reset
Reset the system after saving the changes.

Restore Defaults
Restore/Load Default values for all the setup options.

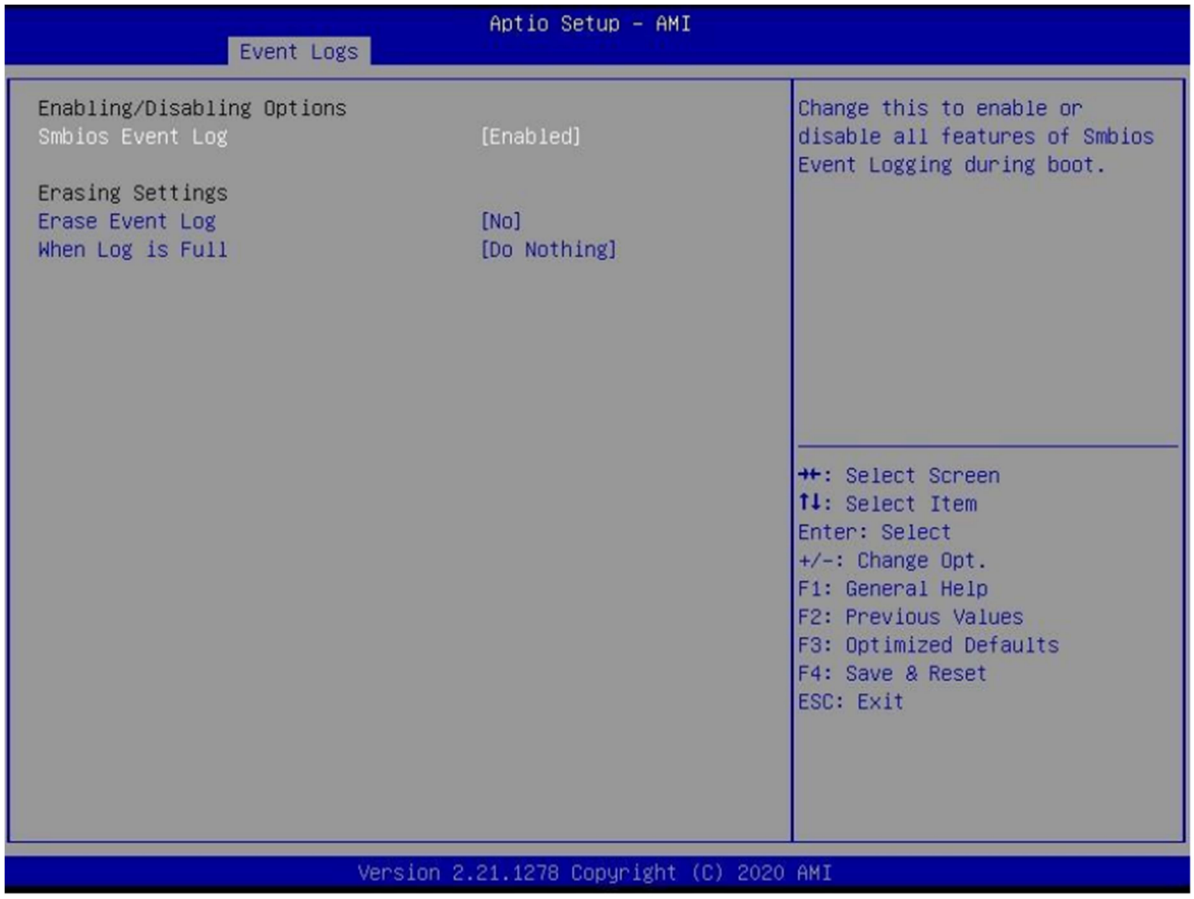
4.8 Event Logs



Change Smbios Event Log Settings
Press <Enter> to change the Smbios Event Log configuration.

View Smbios Event Log
Press <Enter> to change the Smbios Event Log records.

4.8.1 Change Smbios Event Log Setting



Smbios Event Log
Change this to enable or disable all feature of Smbios Event Logging during boot. Disabled / Enabled

Erase Event Log
Choose options for erasing Smbios Event Log. Erasing is done prior to any logging activation during reset. No / Yes, next reset / Yes, every reset

Whea Log is Full
Choose options for reactions to a full Smbios Event Log. Do Nothing / Erase Immediately

4.8.2 ViewSmbios Event Log

DATE / TIME / ERROR CODE / SEVERITY / COUNT
Description: Log Area Reset and Count is applicable only for Multi-Events. By Events. MM/DD/YY HH:MM:SS Smbios 0x16 N/A N/A