Alderamin Pico Mk5 Series

Version:
v1.0.0

Date:
05.08.2025

Contents

1 Copyright

2 Regulatory Compliances

2.1 Complies with the following EU directives

No	Short Name
2014/35/EU	Low Voltage Directive (LVD)
2014/30/EU	Electromagnetic Compatibility (EMC)
2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment Directive (RoHS2)
2015/863/EU	Amendment to Annex II in Directive 2011/65/EU regards the list of restricted substances (RoHS3)

2.2 References of standards applied

Standard	Reference	Issue
EN 62368-1	Safety requirements: Audio/video, information and communication technology	2014+A11:2017+AC2015
ETSI EN 301 489-1	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements	V1.9.2 V2.2.3
ETSI EN 301 489-17	Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 17: Specific conditions for Broadband Data Transmission Systems	V3.3.1
EN 55032	Electromagnetic compatibility (EMC) of multimedia equipment: Emission Requirements	2015+A11:2020 2015+A1:2020
EN 55035	Electromagnetic compatibility (EMC) of multimedia equipment: Immunity requirements	2017 2017+A11:2020
EN 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions	2014
EN IEC 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions	2019+A1:2021
EN 61000-3-3	Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems	2013 2013+A1:2019

3 Safety Instructions

Please read these instructions carefully and retain them for future reference.

1. Disconnect this equipment from the power outlet before cleaning. Do not use liquid or sprayed detergent for cleaning. Use a moist cloth or sheet.
2. Keep this equipment away from humidity.
3. Ensure the power cord is positioned to prevent tripping hazards and do not place anything on top of it.
4. Pay attention to all cautions and warnings on the equipment.
5. If the equipment is not used for an extended period, disconnect it from the main power to avoid damage from transient over-voltage.
6. **Prolonged usage with less than 8V may damage the PSU or destroy the mainboard.**
7. Never pour any liquid into openings as this could cause fire or electrical shock.
8. Have the equipment checked by service personnel if:
    - The power cord or plug is damaged.
    - Liquid has penetrated the equipment.
    - The equipment has been exposed to moisture in a condensation environment.
    - The equipment does not function properly, or you cannot get it to work by following the user manual.
    - The equipment has been dropped and damaged.
9. Do not leave this equipment in an unconditioned environment, with storage temperatures below -20 degrees or above 60 degrees Celsius for extended periods, as this may damage the equipment.
10. Unplug the power cord when performing any service or adding optional kits.
11. Lithium Battery Caution:
    - Risk of explosion if the battery is replaced incorrectly. Replace only with the original or an equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.
    - Do not remove the cover, and ensure no user-serviceable components are inside. Take the unit to a service center for service and repair.

⚠ Warning!
Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

⚠ Caution!
Always ground yourself to remove any static charge before touching the CPU card. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

4 Technical Details

Feature	Specification	Details
Processor	CPU	Intel® Meteor Lake-U Core™ Ultra 7 155U / Ultra 5 125U Processor
Memory	System Memory	DDR5 4800 MHz, 1 x 262-pin SO-DIMM, Max. 48GB (Non-ECC)
Graphics	GPU	Intel® Iris Xe Graphics
Display	Display Interface	DisplayPort 1.2, HDMI 1.4
Storage	Storage Slots	1 x 2.5” HDD/SSD Bracket 1 x M.2 B Key 2242 SATA SSD Slot 1 x M.2 M Key 2280 NVMe/SATA SSD Slot
Networking	Ethernet	4 x Intel® I226-LM 2.5G LAN (optional PoE module) Additional 2 x Intel® I210-IT Giga LAN (optional)
Audio	Audio	Realtek® ALC888S
Security	I/O Chipset	Nuvoton NCT6126D
	TPM	Nuvoton NPCT760AABYX TPM 2.0
Expansion	Expansion Slots	1 x M.2 2242/3042/3052 B Key (USB2.0/PCIe X1/SATAIII) 1 x M.2 2280 M Key (PCIe 4.0 X4, SATAIII) 1 x M.2 2230 E Key (PCIe X1, USB2.0)
Indicators	Indicators	Power LED, HDD LED
I/O Ports	Front I/O	3 x RS232 1 x RS232/422/485 8-bit GPIO in DB9 Type 2 x USB 2.0 1 x Line-out HDD LED & Power LED Power Button 4 x SMA holes
	Rear I/O	4 x RJ-45 1 x USB Type C (PD15W, 5V/3A, DP Alt mode, USB3.2 Gen1) 4 x USB 3.2 Gen 2 (10 Gbps) 1 x USB 2.0 (blue type connector) 1 x HDMI 1.4 1 x DisplayPort 1.2 1 x 3-pin Terminal Block Power Input 1 x 2-pin Terminal Block Remote Power on/off 1 x Nano SIM Slot with Cover 2 x SMA holes
Watchdog Timer	Watchdog	1~255 steps programmable by software
Power	Power Input	8~26V Wide Range DC Input with Terminal Block Connectivity
Cooling	Thermal Design	Fanless
Mechanical	Mounting	Wall Mount / Side Mount 75 mm x 75 mm VESA Holes & DIN Rail Mount Combo Kit (optional)
	Dimensions	8.3” x 5.9” x 2.5” (210 x 150 x 63 mm)
	Material	Top Cover: Aluminum Alloy Bezel and Chassis: Steel
Environ	Oper	-40°C to 60°C (with 0.7 m/s airflow and extended-temp SSD/mSATA/RAM)

4.1 ☒ Important Notes

Restricted Access Location (RAL) A Restricted Access Location is an area with extreme temperatures where only authorized personnel may enter for specific purposes.

1. Access is limited to trained personnel aware of location restrictions and necessary precautions.
2. Entry requires security measures such as tools, lock-and-key, or controlled access by the responsible authority.

Power Consumption Considerations Ensure power consumption is within the power supply's specifications.

- Recommended AC Adapters:
  - **AC/DC 24V/5A, 120W** (3-PIN Terminal Block Power Adaptor, PN 6913SDR12024)
  - **AC/DC 24V/9.58A, 230W** (3-PIN Terminal Block Power Adaptor, PN WIPC05000360)

Ambient Temperature Precaution

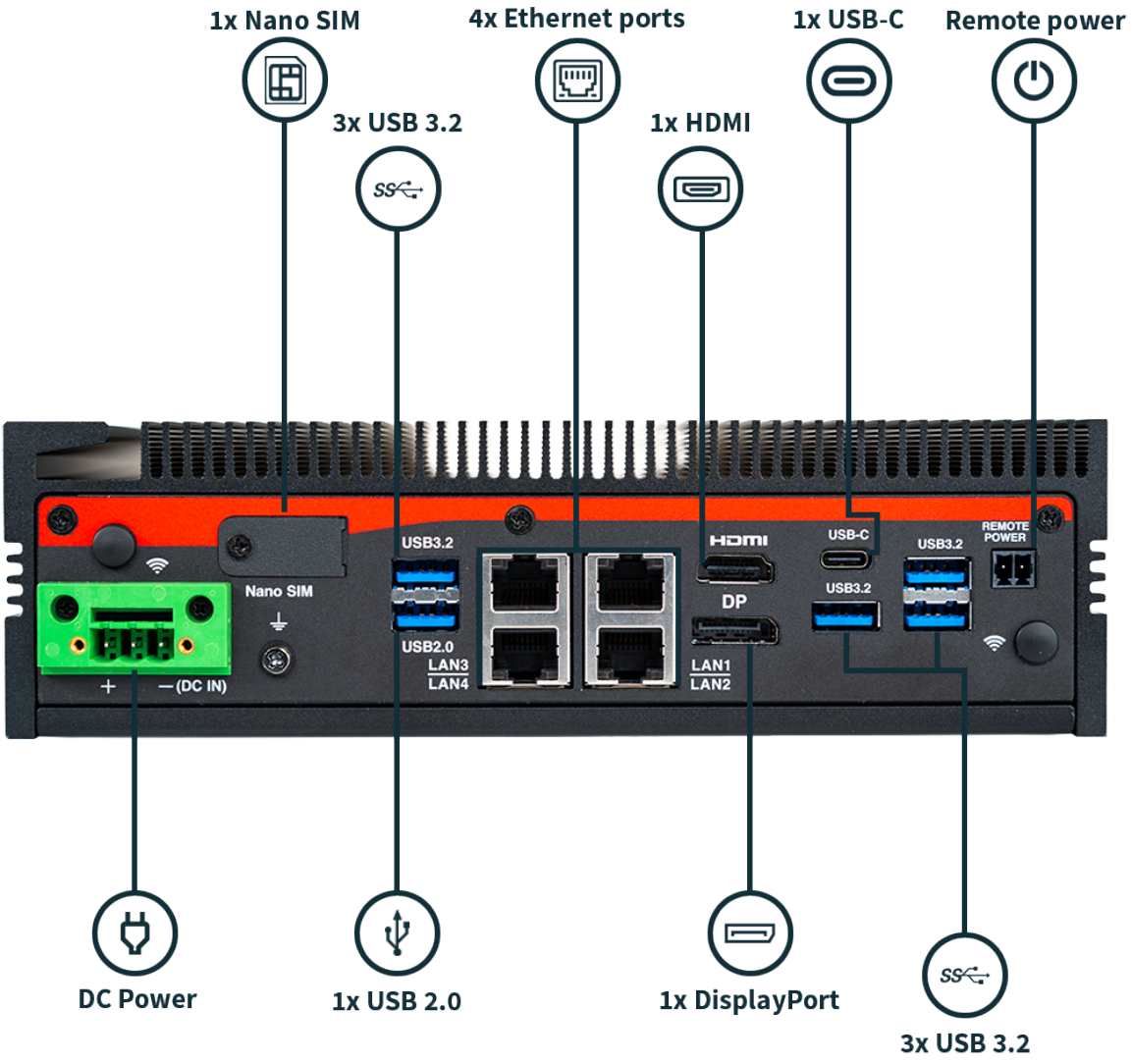
- The maximum safe operating temperature is **70°C** if the external AC adapter model power draw is limited to 90W for **6913SDR12024** or 125W for **WIPC05000360** if it is placed in the same high-temperature area as the embedded system.

Lithium Battery Safety Warning

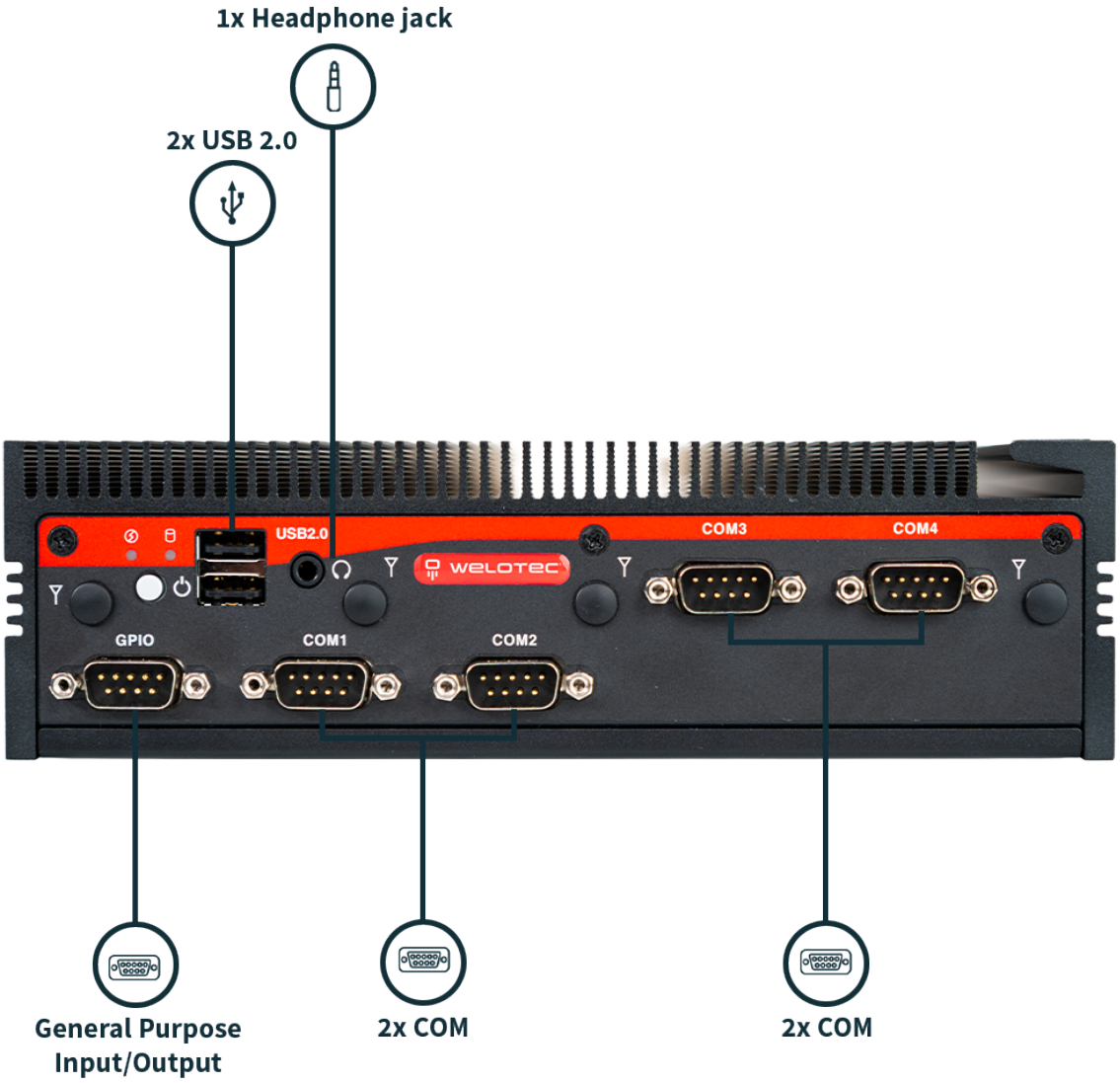
- **Caution:** This system contains a **lithium battery**.
- Do **NOT** puncture, mutilate, or dispose of it in fire.
- Risk of **explosion** if replaced incorrectly — use only manufacturer-recommended replacements.
- Dispose of batteries as per manufacturer instructions and local regulations.

5 Interfaces and Connections

5.1 Front I/O

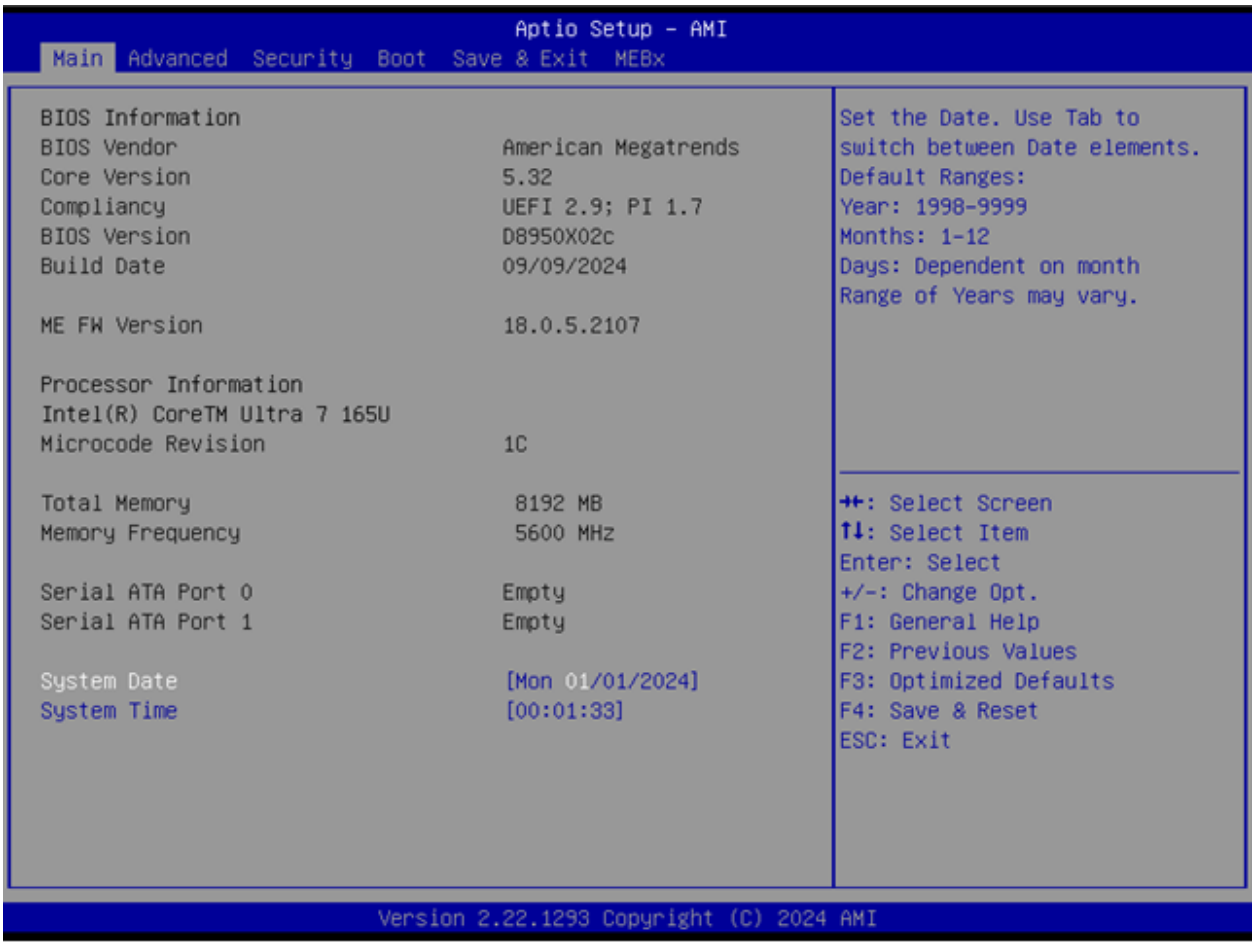


5.2 Rear I/O


1x Headphone jack
2x USB 2.0
USB2.0
COM3
COM4
GPIO
COM1
COM2
General Purpose Input/Output
2x COM
2x COM

6 BIOS

6.1 Main Page



The **Main Page** provides an overview of essential system information. These fields are read-only and cannot be modified:

- **BIOS Vendor:** American Megatrends
- **Core Version:** 5.32
- **Compliancy:** UEFI 2.9 ; PI 1.7
- **BIOS Version:** Displays the current BIOS version
- **Build Date:** Shows the BIOS build date
- **ME FW Version:** Displays the Management Engine firmware version
- **Processor Information:** Displays the installed CPU brand
- **Microcode Revision:** Displays CPU microcode revision
- **Total Memory:** Shows the installed memory size
- **Memory Frequency:** Displays the memory frequency

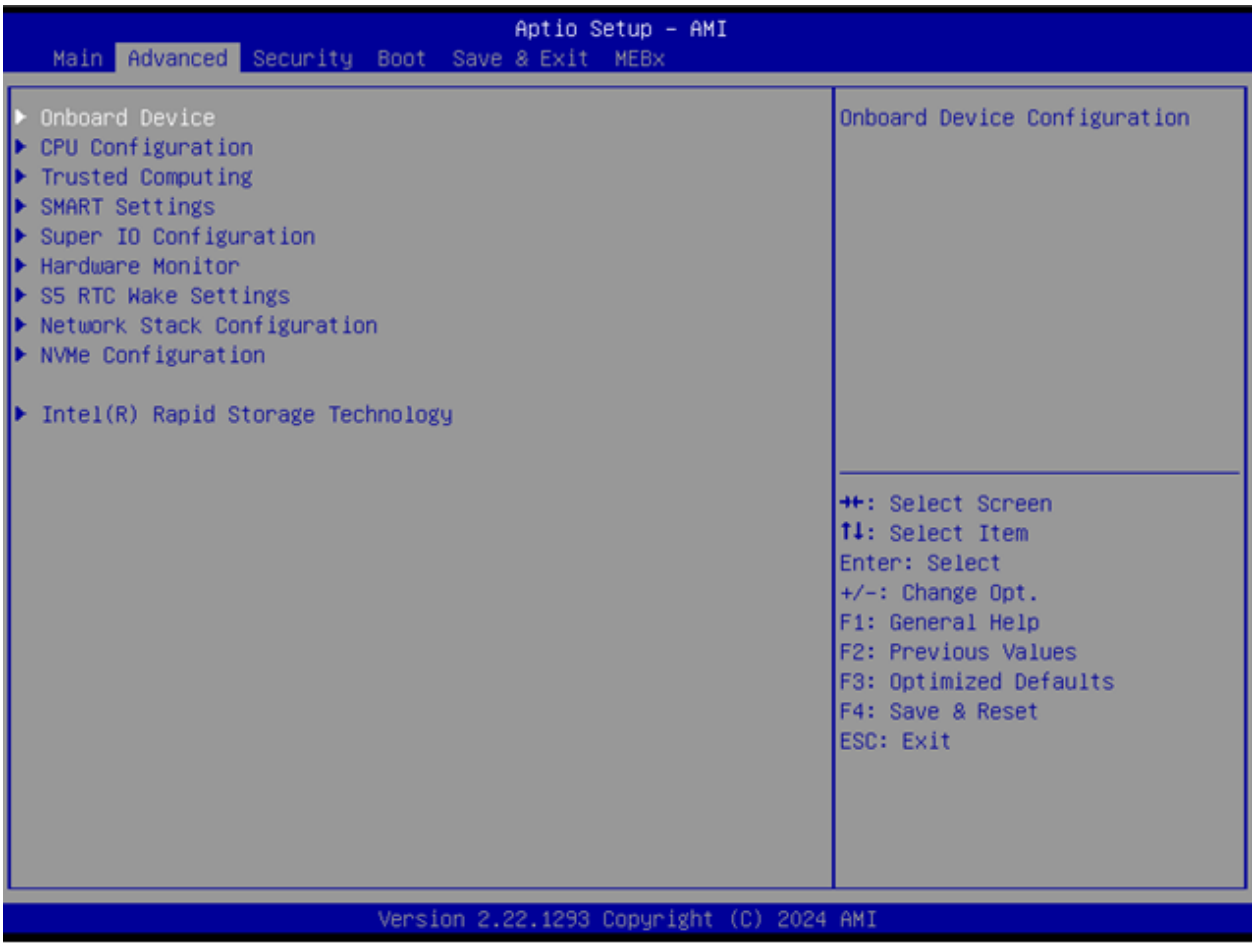
- **Serial ATA Port 0 / Port 1:** Lists the connected SATA device model and size

6.1.1 System Date & Time

The **System Date & Time** settings allow configuring the system's real-time clock:

- **System Date**
  - Format: `[Www mm/dd/yyyy]`
  - `Www`: Day of the week (Mon–Sun)
  - `mm`: Month (1–12)
  - `dd`: Day (1–31)
  - `yyyy`: Year (1998–9999)
  - Use Tab to move between elements
- **System Time**
  - Format: `[hh:mm:ss]`
  - `hh`: Hours (0–23)
  - `mm`: Minutes (0–59)
  - `ss`: Seconds (0–59)
  - Use Tab to move between elements

6.2 Advanced Page

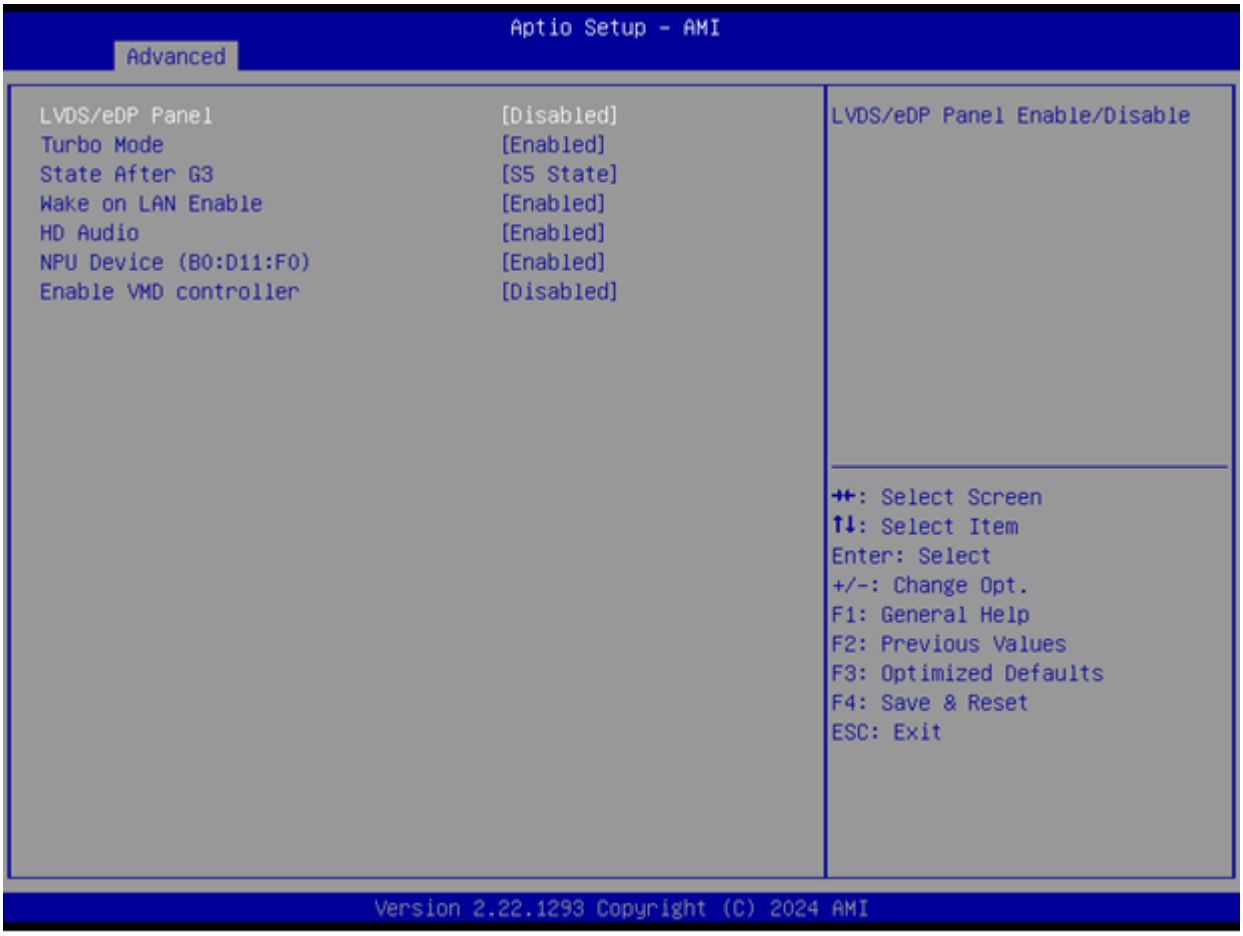


The **Advanced Page** gives you access to detailed configuration menus for advanced users.

6.2.1 Advanced Configuration Options

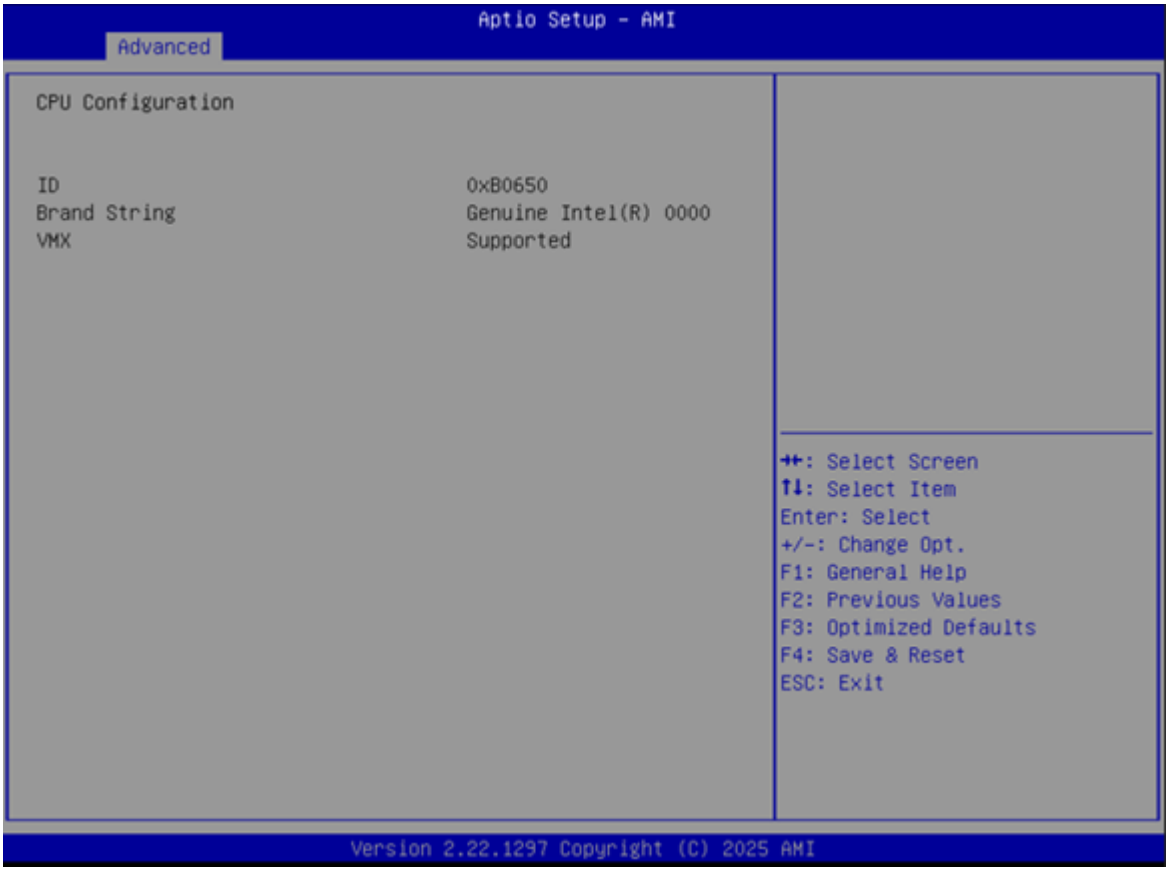
- **Onboard Device Configuration**
- **CPU Configuration**
- **Trusted Computing**
- **SMART Settings**
- **Super IO Configuration**
- **Hardware Monitor**
- **S5 RTC Wake Settings**
- **Network Stack Configuration**
- **NVMe Configuration**
- **Intel® Rapid Storage Technology**

6.3 Onboard Device Configuration



- **LVDS/eDP Panel:** Enable or disable panel output
  - Default: Disabled
- **Turbo Mode:** Enable or disable CPU Turbo Boost
  - Default: Enabled
- **State After G3:** Defines system state after power loss
  - Options: S0 State, S5 State
  - Default: S5 State
- **Wake on LAN Enable:** Allow wake-up from LAN
  - Default: Enabled
- **HD Audio:** Control detection of HD-Audio
  - Default: Enabled
  - Enabled = HDA always on, Disabled = HDA always off
- **NPU Device (B0:D11:F0):** Enable or disable Neural Processing Unit
  - Default: Enabled
- **Enable VMD Controller:** Enable or disable the VMD controller
  - Default: Disabled

6.4 CPU Configuration



The **CPU Configuration** page shows processor details:

- **ID:** Displays CPU Signature
  - Not selectable
- **Brand String:** Displays CPU model name
  - Not selectable
- **VMX:** Shows if Virtual Machine Extensions are supported
  - Not selectable

6.5 Trusted Computing

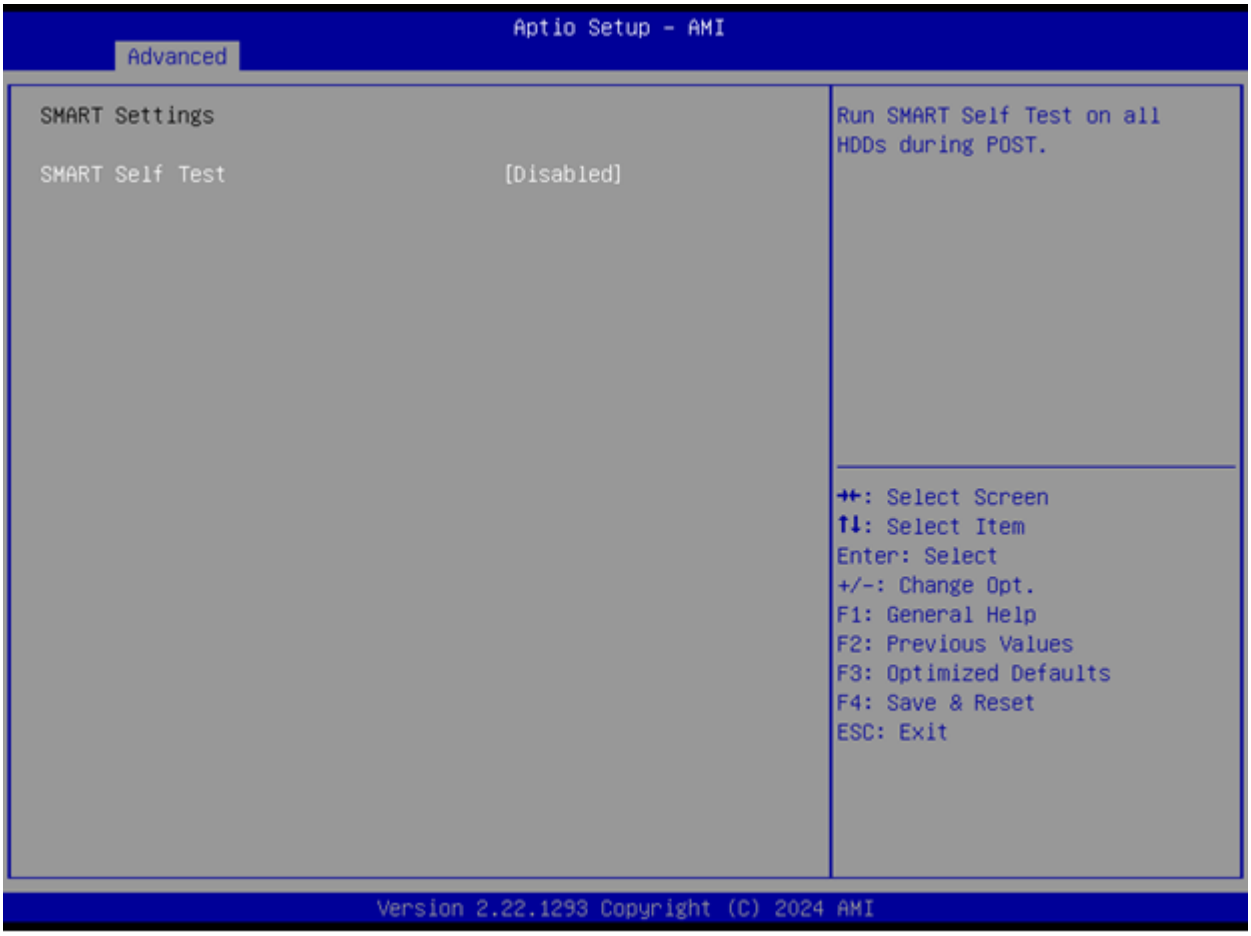
The **Trusted Computing** menu provides TPM configuration:

- **Firmware Version:** Shows TPM firmware version
  - Not selectable
- **Vendor:** Displays TPM manufacturer
  - Not selectable
- **Security Device Support:** Enable or disable TPM security
  - Default: Enabled
  - If disabled, TCG EFI protocol and INT1A interface will not be available
- **Pending Operation:** Schedule a TPM clear
  - Default: None
  - Options: None, TPM Clear
  - *Note*: System will reboot to change state

6.6 SMART Settings

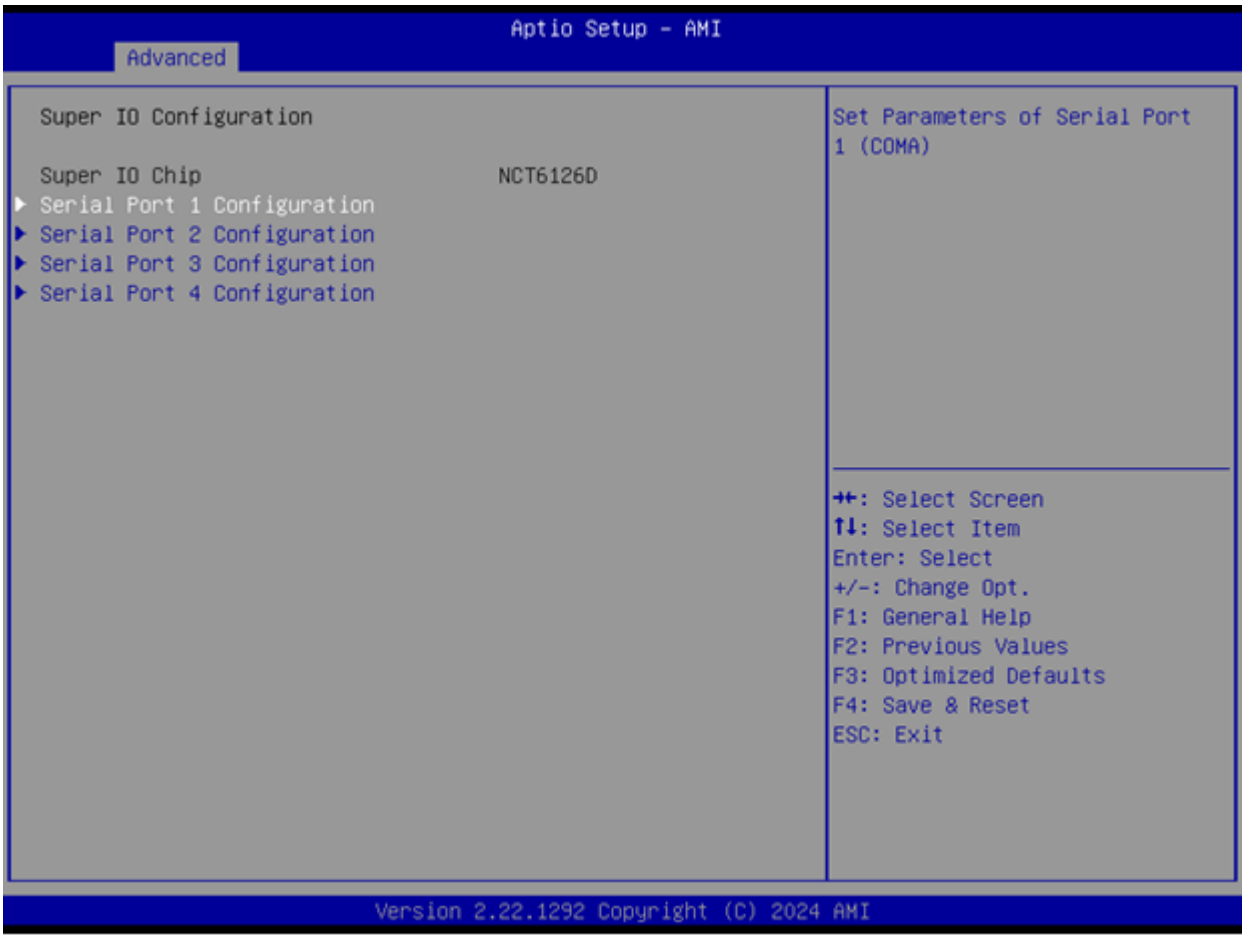
- **SMART Self Test:** Enable SMART self-test on all HDDs during POST
  - Default: Disabled
  - Options: Enabled, Disabled

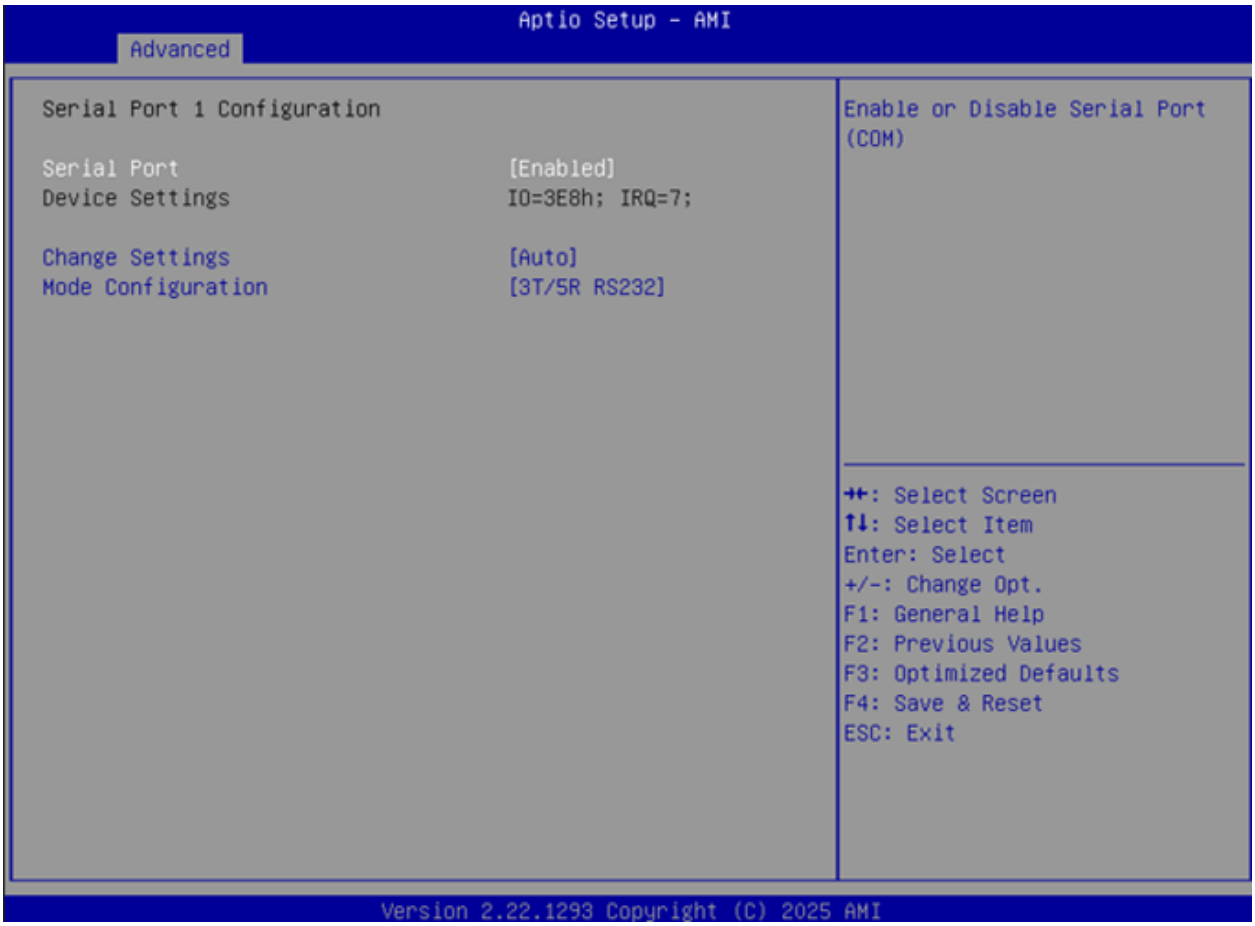
6.7 Super IO Configuration



This section allows configuring serial port parameters.

6.7.1 Serial Port 1 Configuration





- **Serial Port:** Enable or disable COM1
  - Default: Enabled
  - Options: Enabled, Disabled
- **Device Settings:** Shows COM1 address/IRQ
  - Not selectable
- **Change Settings:**
  - Default: Auto
  - Possible values:
    - 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:**
  - Default: 3T/5R RS232
  - Possible values:
    - 1T/1R RS422

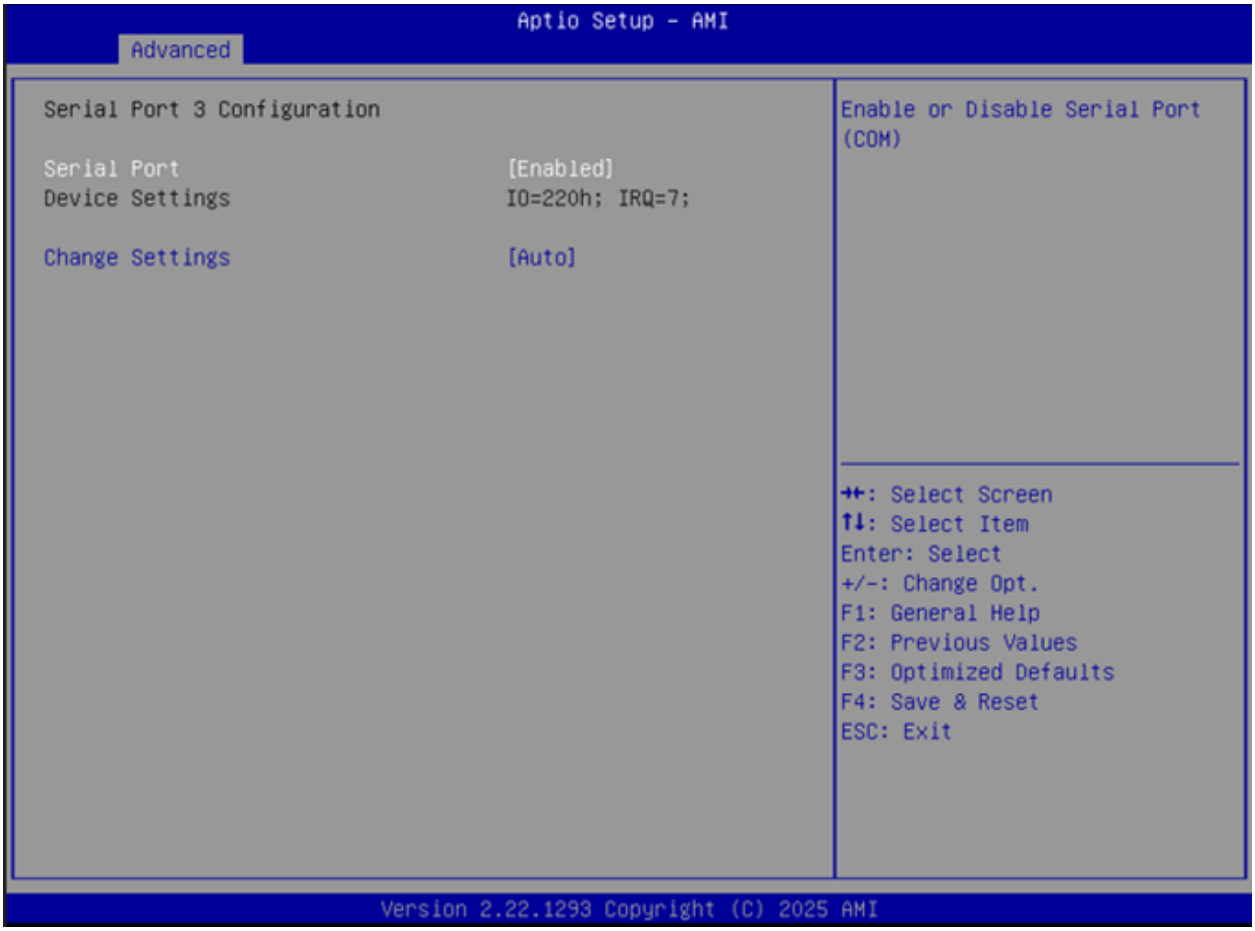
* 3T/5R RS232
* 1T/1R RS485 TX ENABLE Low Active
* 1T/1R RS422 with termination resistor
* 1T/1R RS485 with termination resistor TX ENABLE Low Active
* Disabled

6.7.2 Serial Port 2 Configuration

- **Serial Port:** Enable or disable COM2
  - Default: Enabled
  - Options: Enabled, Disabled
- **Device Settings:** Shows COM2 address/IRQ
  - Not selectable
- **Change Settings:**
  - Default: Auto
  - Possible values:
    * Auto
    * IO=2E8h;IRQ=7
    * IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12

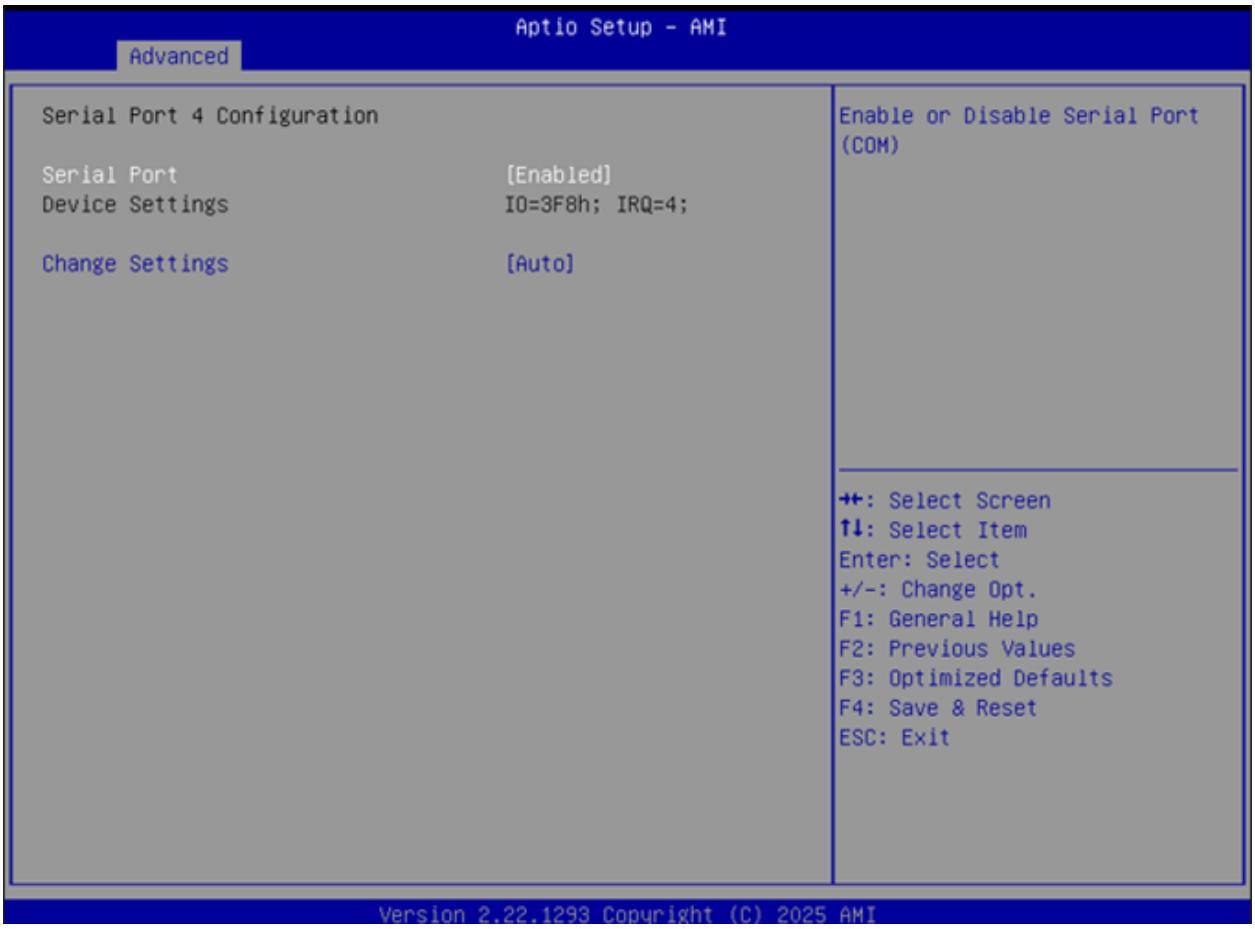
* IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12
* IO=220h;IRQ=3,4,5,6,7,9,10,11,12
* IO=228h;IRQ=3,4,5,6,7,9,10,11,12

6.7.3 Serial Port 3 Configuration



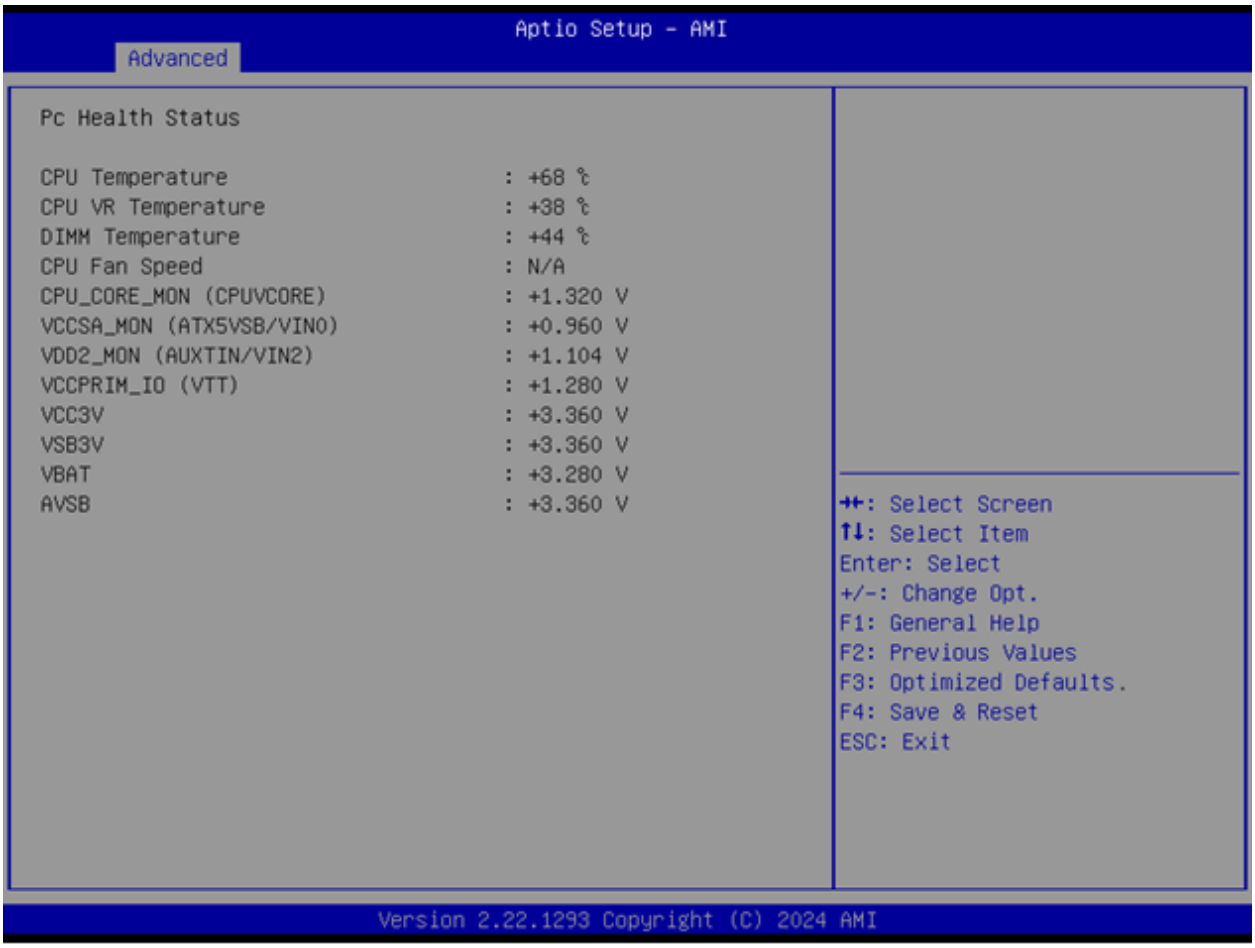
- **Serial Port:** Enable or disable COM3
  - Default: Enabled
  - Options: Enabled, Disabled
- **Device Settings:** Shows COM3 address/IRQ
  - Not selectable
- **Change Settings:**
  - Default: Auto
  - Possible values:
    * Auto
    * IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12
    * IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12
    * IO=220h;IRQ=3,4,5,6,7,9,10,11,12
    * IO=228h;IRQ=3,4,5,6,7,9,10,11,12

6.7.4 Serial Port 4 Configuration



- **Serial Port:** Enable or disable COM4
  - Default: Enabled
  - Options: Enabled, Disabled
- **Device Settings:** Shows COM4 address/IRQ
  - Not selectable
- **Change Settings:**
  - Default: Auto
  - Possible values:
    - Auto
    - IO=3F8h;IRQ=4
    - IO=3F8h;IRQ=3,4,5,6,7,9,10,11,12
    - IO=2F8h;IRQ=3,4,5,6,7,9,10,11,12
    - IO=3E8h;IRQ=3,4,5,6,7,9,10,11,12
    - IO=2E8h;IRQ=3,4,5,6,7,9,10,11,12

6.8 Hardware Monitoring

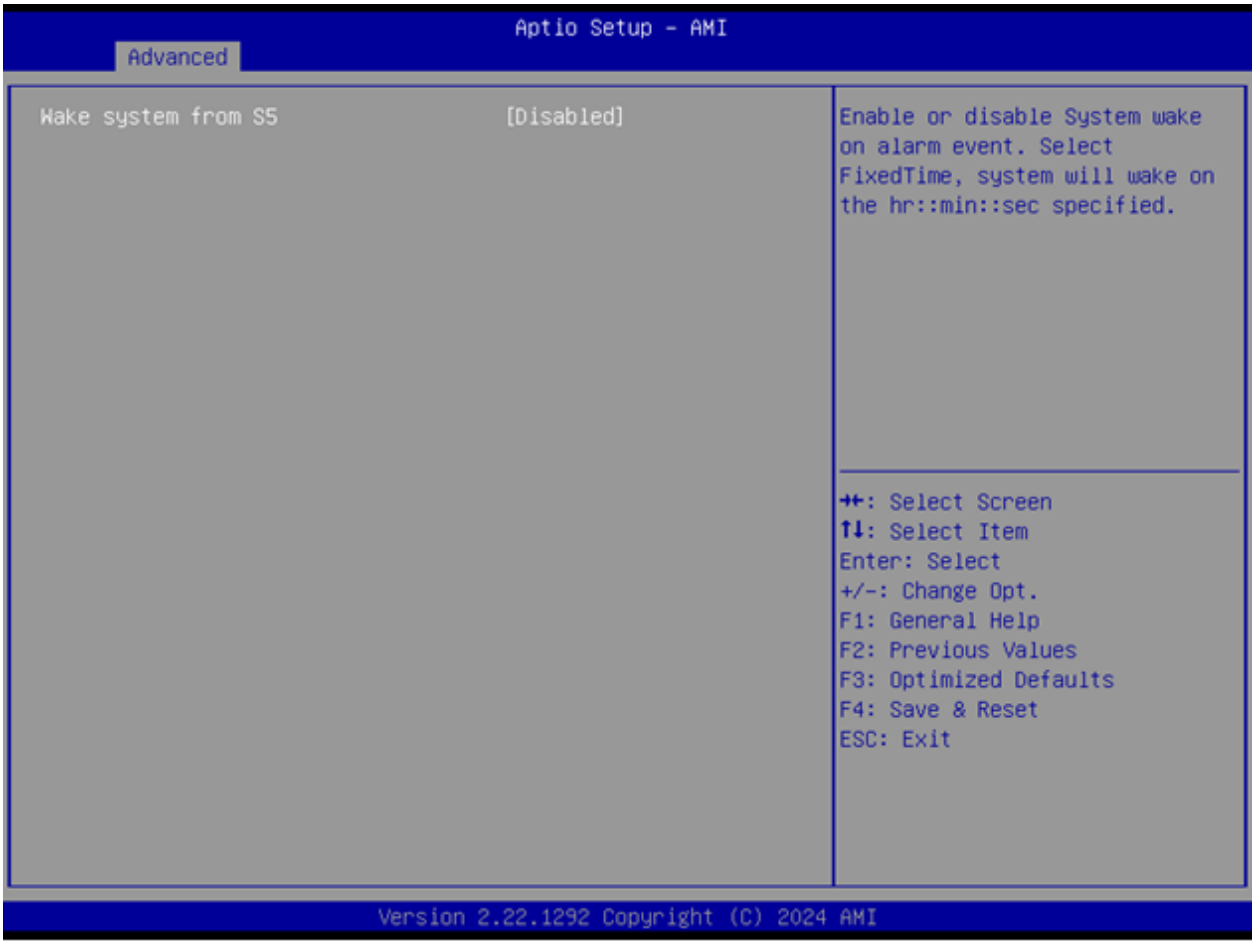


This section shows real-time hardware status:

- **CPU Temperature**
- **CPU VR Temperature**
- **DIMM Temperature**
- **CPU Fan Speed**
- **CPU_CORE_MON (CPUVCORE) Voltage**
- **VCCSA_MON (ATX5VSB/VIN0) Voltage**
- **VDD2_MON (AUXTIN/VIN2) Voltage**
- **VCCPRIM_IO (VTT) Voltage**
- **VCC3V**
- **VSB3V**
- **VBAT**
- **AVSB**

All fields above are display-only and cannot be modified.

6.9 S5 RTC Wake Settings

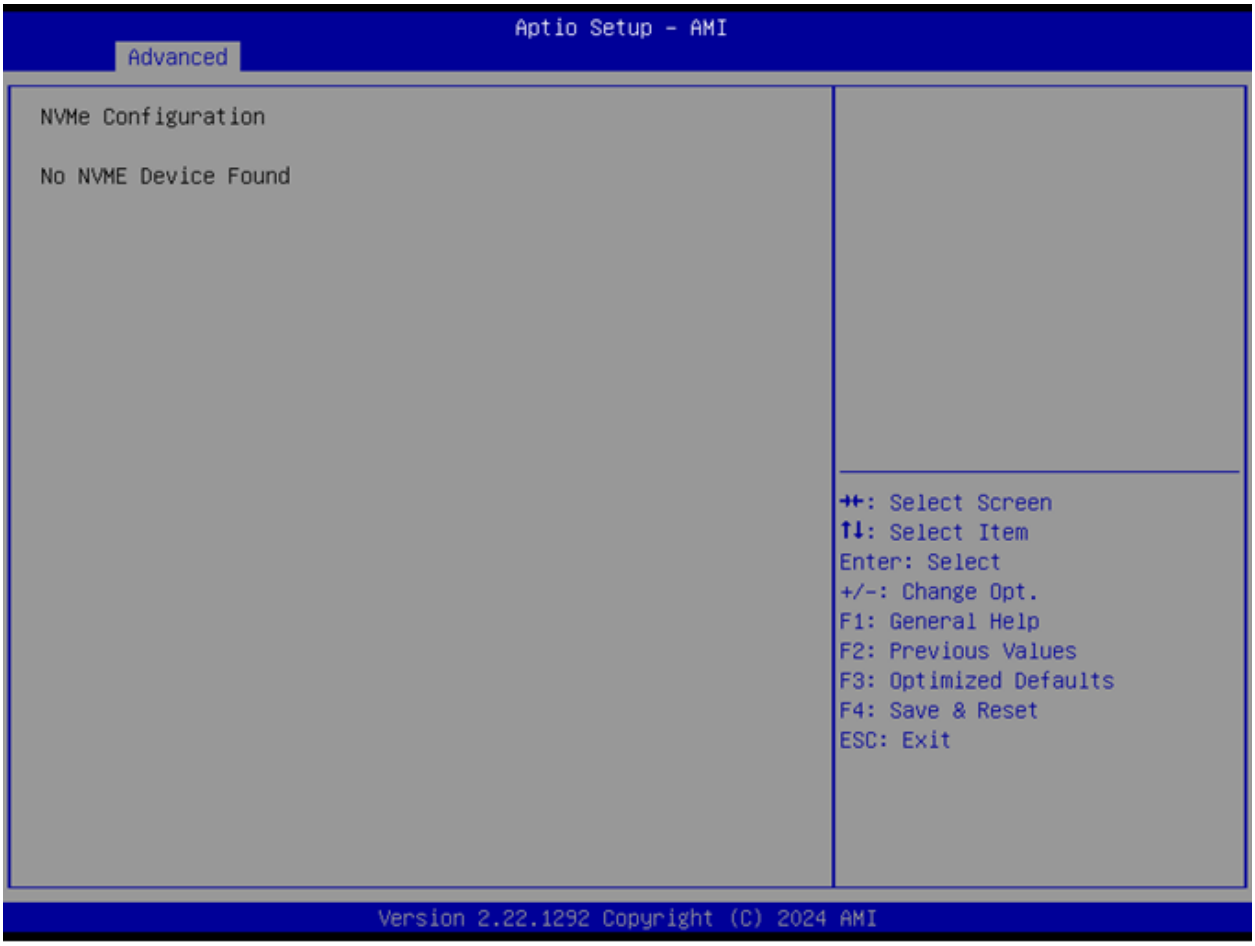


- **Wake system from S5:**
  - Default: Disabled
  - Options: Disabled, Fixed Time
- **Wake up hour:**
  - Default: 0
  - Range: 0–23
- **Wake up minute:**
  - Default: 0
  - Range: 0–59
- **Wake up second:**
  - Default: 0
  - Range: 0–59

6.10 Network Stack Configuration

- **Network Stack:**
  - Default: Disabled
  - Options: Enabled, Disabled
- **IPv4 PXE Support:**
  - Default: Disabled
  - Options: Enabled, Disabled
- **IPv6 PXE Support:**
  - Default: Disabled
  - Options: Enabled, Disabled

6.11 NVMe Configuration

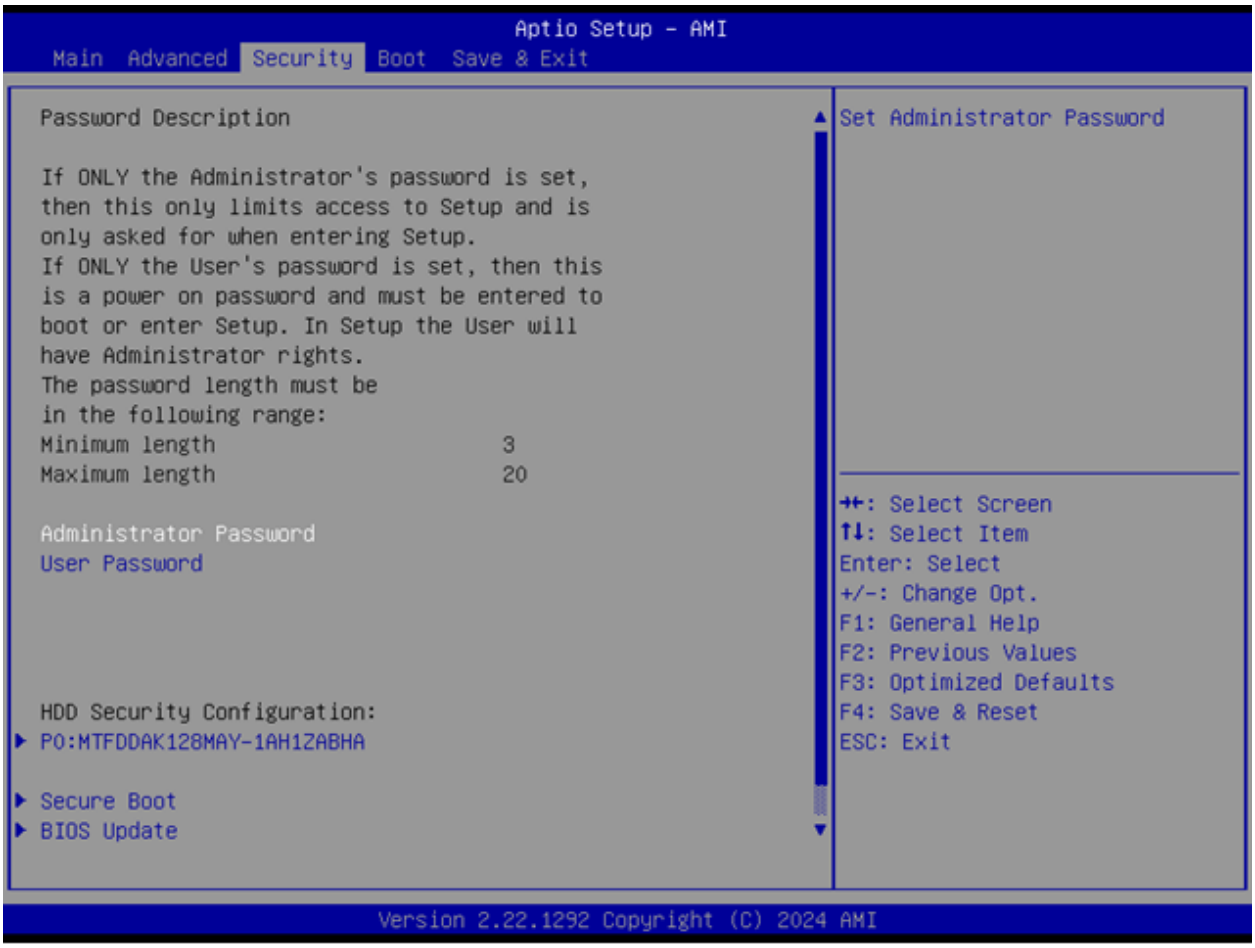


- View and manage connected NVMe devices

6.12 Intel® Rapid Storage Technology

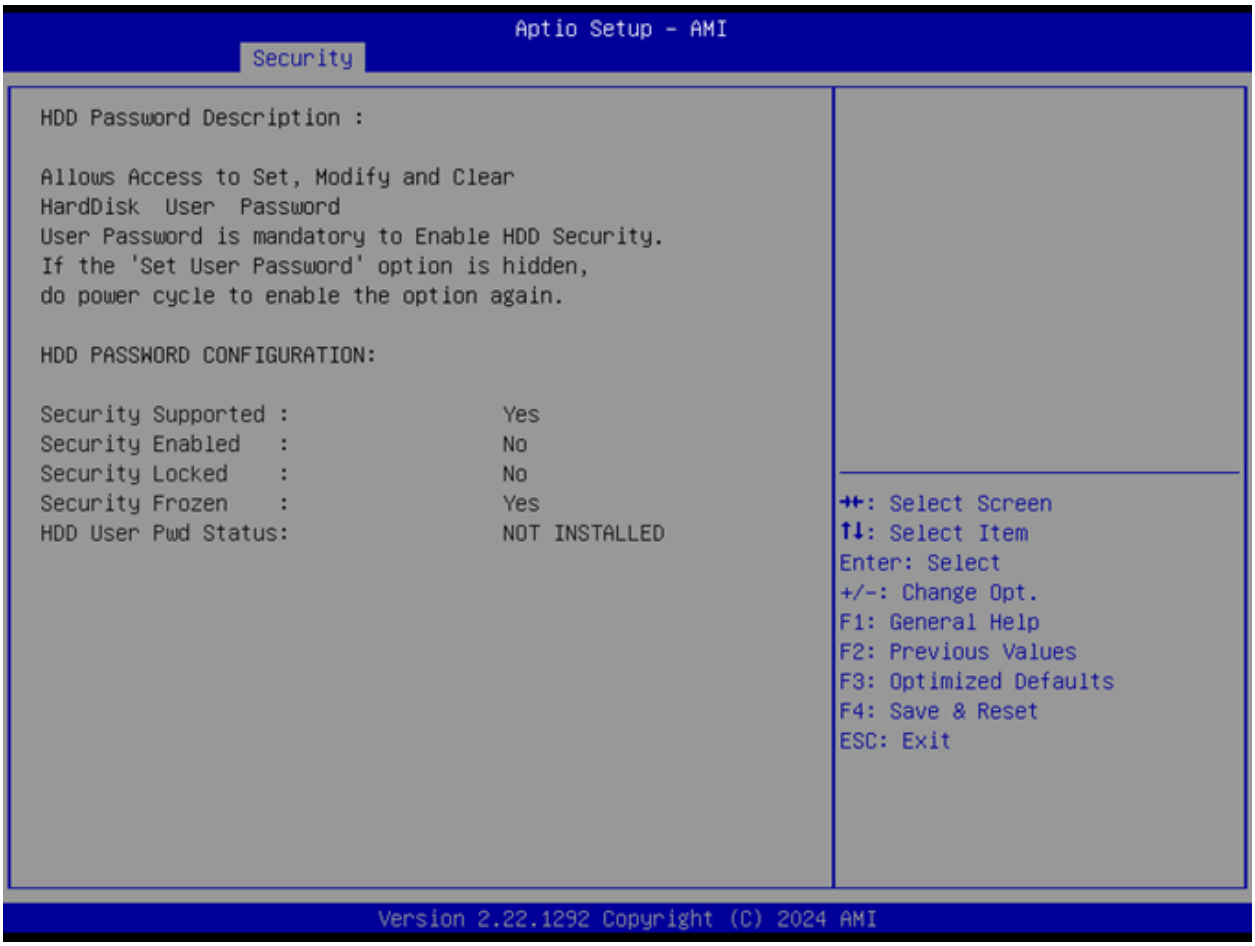
- Configure RAID volumes and manage Intel® RST

6.13 Security Page



The **Security Page** allows you to manage BIOS-level security features, passwords, and secure boot.

6.13.1 Security Options



- **Administrator Password:** Set or modify the administrator password to control BIOS access
- **User Password:** Set or modify a user-level password
- **HDD Security Drive:** Configure HDD password security for data protection
  - *Press Enter* to open the HDD Security sub-menu
- **Secure Boot:** Configure the secure boot feature to enforce trusted OS loaders
  - *Press Enter* to open the Secure Boot sub-menu
- **BIOS Update:** Launch the BIOS update utility
  - *Press Enter* to open the BIOS Update menu

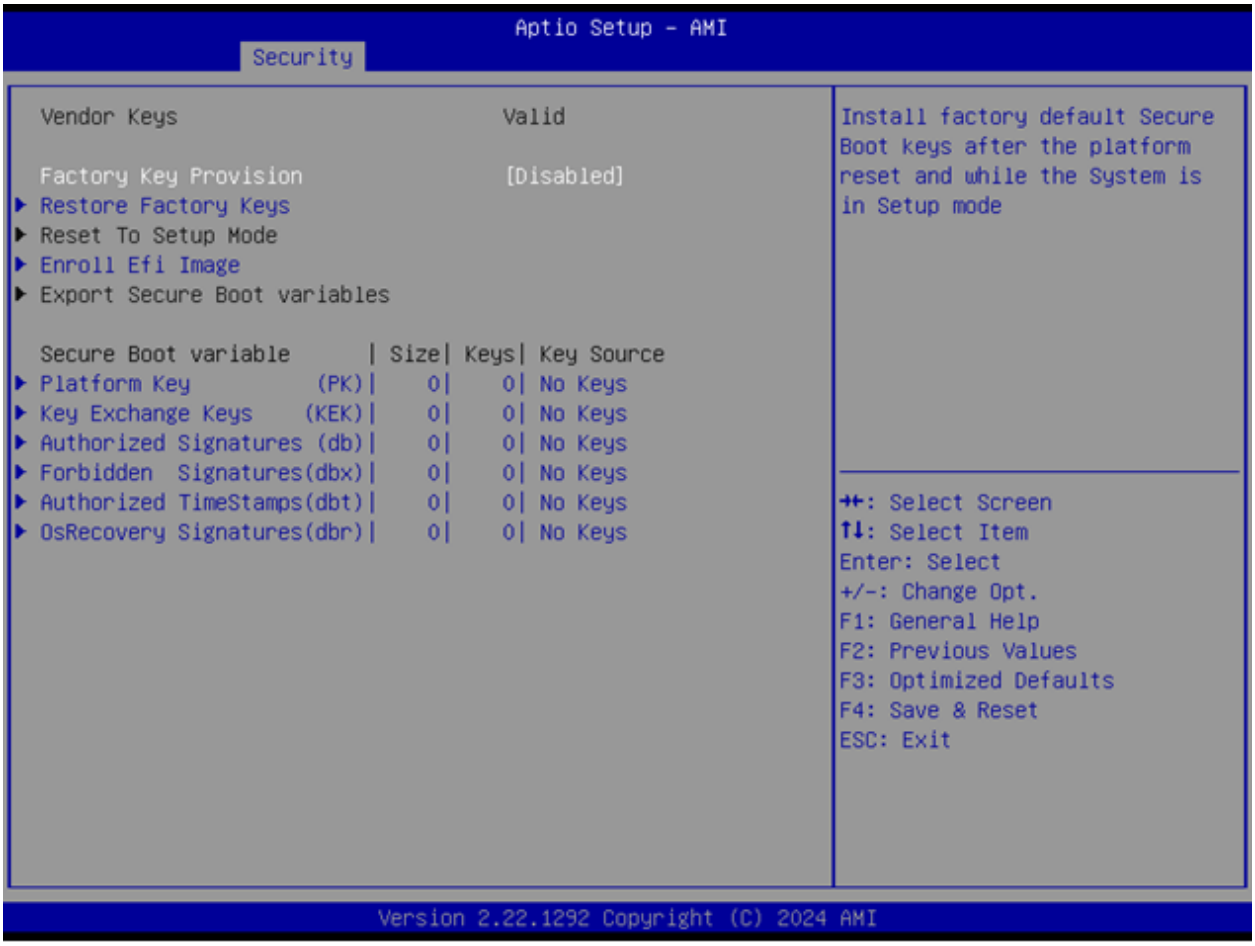
6.14 Secure Boot

The **Secure Boot** menu allows fine-grained security configuration of boot keys and policies:

- **Secure Boot:**
  - Default: Enabled
  - Options: Enabled, Disabled
  - When enabled, the platform key (PK) must be enrolled and system is in User mode
  - Mode change requires a platform reset
- **Secure Boot Mode:**
  - Default: Standard
  - Options: Standard, Custom
  - In Custom mode, you can configure Secure Boot Policy variables manually
- **Restore Factory Keys:**
  - Force system to User Mode and reinstall factory default Secure Boot key databases
- **Reset to Setup Mode:**
  - Deletes all Secure Boot keys from NVRAM
- **Key Management:**
  - Advanced certificate management for Secure Boot

- *Press Enter* to open Key Management

6.14.1 Key Management



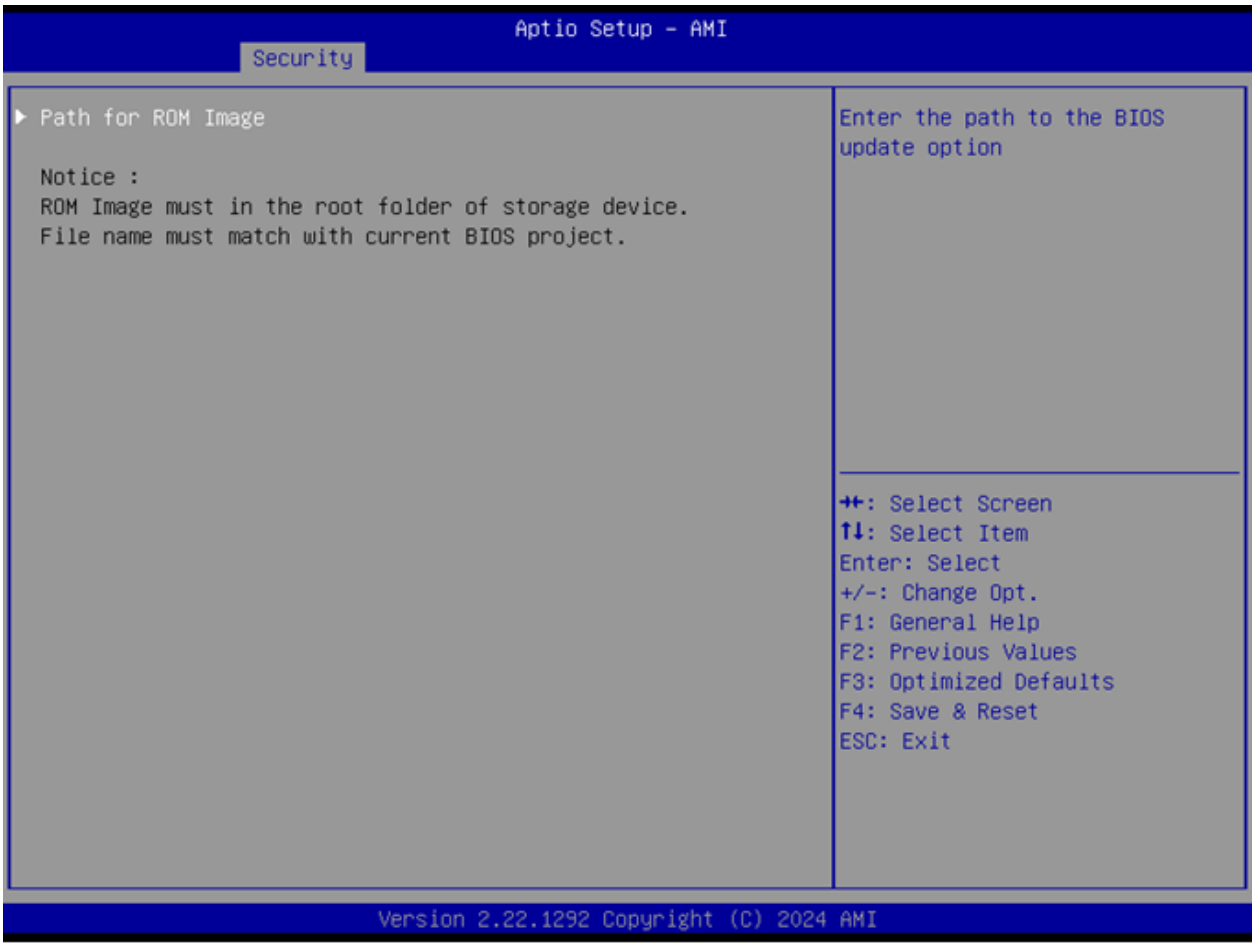
This sub-menu provides advanced options to manage Secure Boot certificates:

- **Factory Key Provision:**
  - Default: Disabled
  - Options: Enabled, Disabled
  - Installs factory default Secure Boot keys after a platform reset in Setup mode
- **Restore Factory Keys:**
  - Reinstalls factory default Secure Boot key databases
- **Reset to Setup Mode:**
  - Deletes all Secure Boot key databases from NVRAM
- **Enroll EFI Image:**
  - Allows specific EFI images to run in Secure Boot mode
  - Enrolls the SHA256 certificate of a PE image into the authorized signature database (db)
- **Export Secure Boot Variables:**
  - Save the NVRAM content of Secure Boot variables to a file
- **Platform Key (PK):**

  - Displays size, count, and source of keys
  - Allows enrollment from factory or custom
- **Key Exchange Keys (KEK):**
  - Same functionality as PK, but for key exchange
- **Authorized Signatures (db):**
  - Shows enrolled signatures
- **Forbidden Signatures (dbx):**
  - Shows blocked signatures
- **Authorized TimeStamps (dbt):**
  - Manages time-based keys
- **OsRecovery Signatures (dbr):**
  - Handles signatures for OS recovery images

All key items above support factory, modified, and mixed key sources.

6.15 BIOS Update

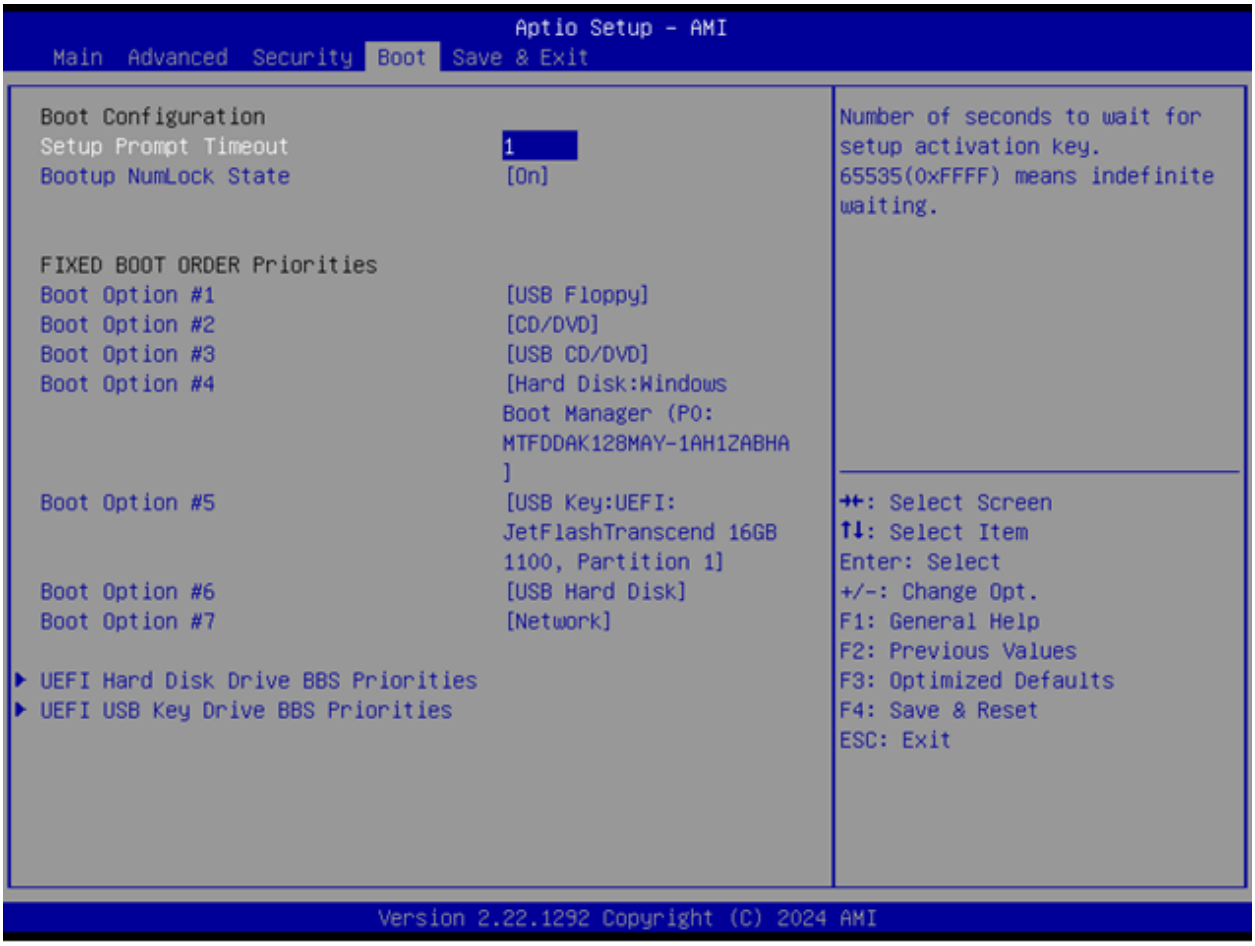


The **BIOS Update** sub-menu lets you specify a file path to a BIOS ROM image:

- **Path for ROM Image:**

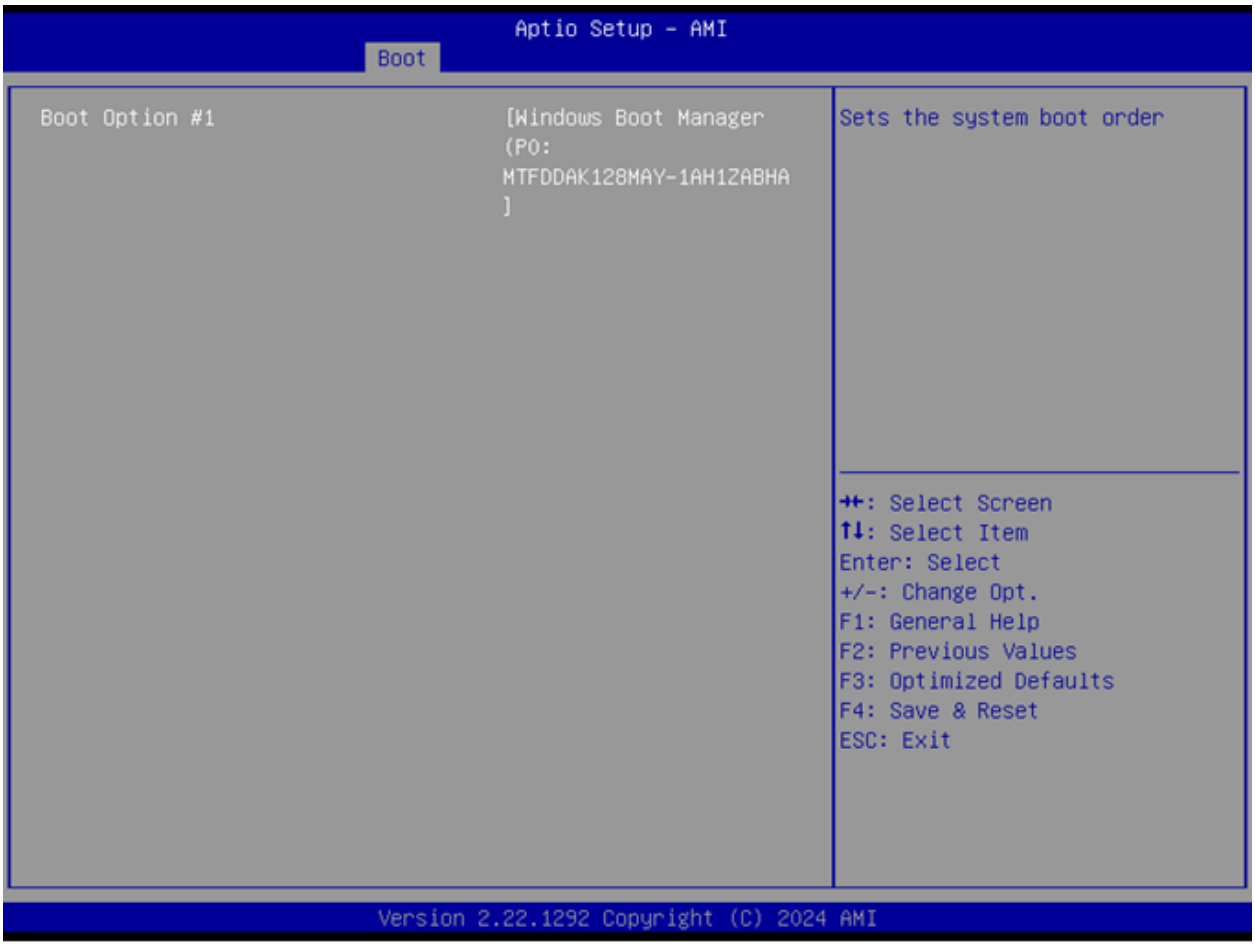
- Enter the location of the BIOS update image

6.16 Boot Page



The **Boot Page** allows configuring boot priorities and timeouts:

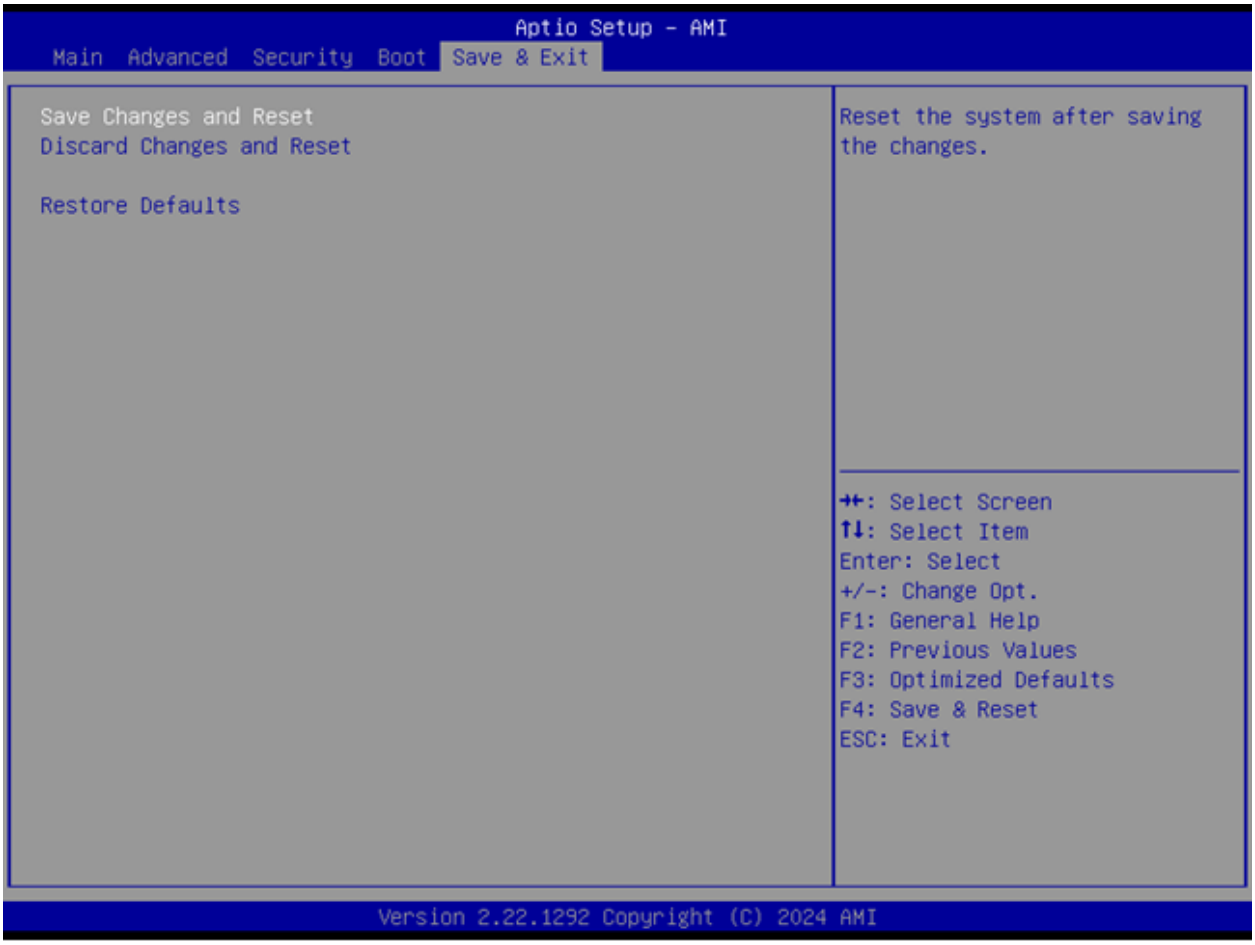
- **Setup Prompt Timeout:**
  - Default: 1 second
  - Range: 1–65535 (0xFFFF means indefinite)
  - Sets how long the BIOS waits for user input
- **Bootup NumLock State:**
  - Default: On
  - Options: On, Off
  - Controls keyboard NumLock



- **Boot Option #1–#7:**
  - Define priority among USB, CD/DVD, hard disk, network, and disabled
  - Examples:
    - USB Floppy
    - CD/DVD
    - USB Hard Disk
    - Network
    - Disabled
- **(UEFI) USB Floppy Drive BBS Priorities:**
  - Configure boot device order for UEFI USB floppy devices
- **(UEFI) CDROM/DVD Drive BBS Priorities:**
  - Configure boot device order for UEFI CD/DVD devices
- **(UEFI) USB CDROM/DVD ROM Drive BBS Priorities:**
  - Configure boot device order for UEFI USB CD/DVD devices
- **(UEFI) Hard Disk Drive BBS Priorities:**
  - Configure boot device order for UEFI hard disks
- **(UEFI) USB Key Drive BBS Priorities:**
  - Configure boot device order for UEFI USB key drives

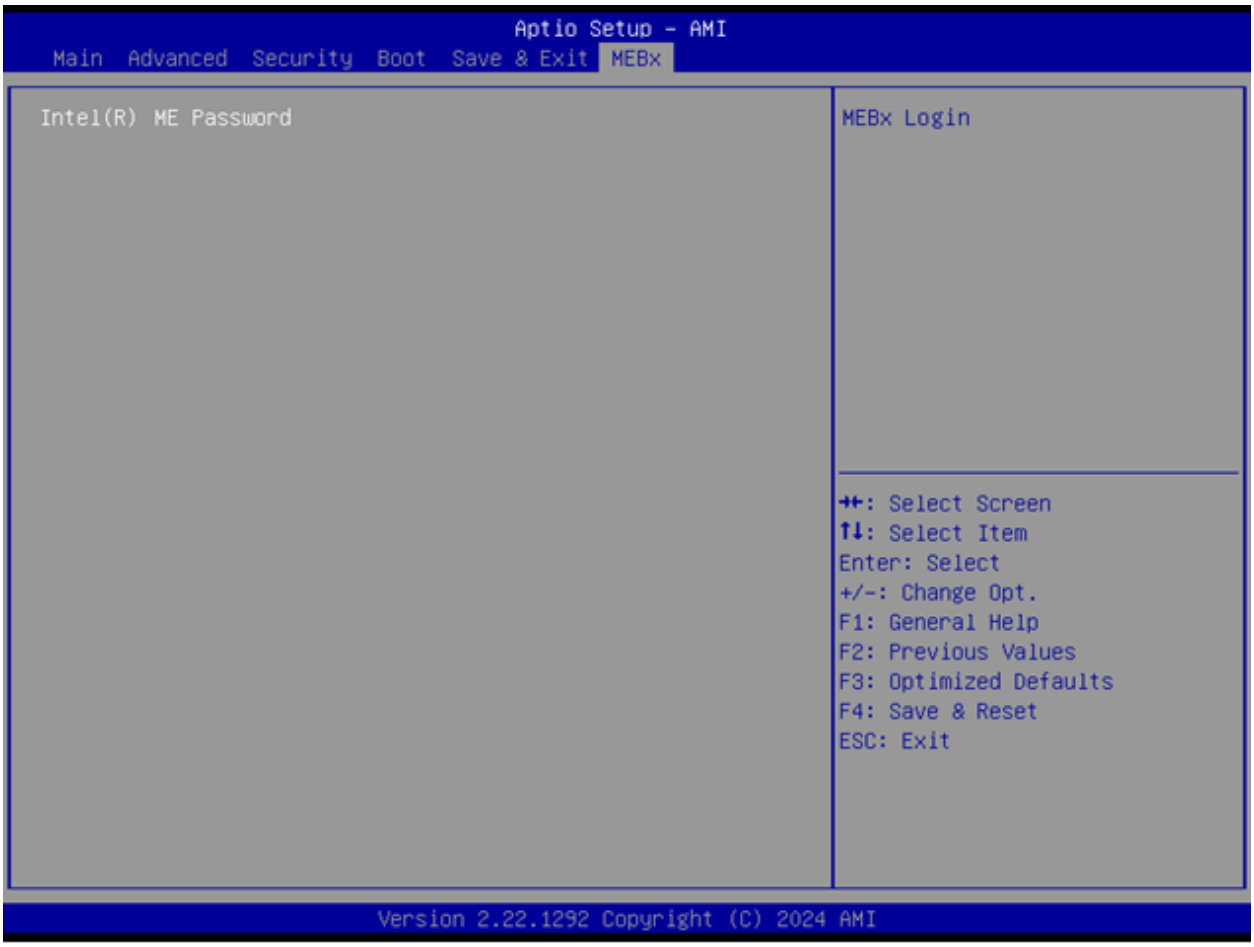
- **(UEFI) USB Hard Disk Drive BBS Priorities:**
  - Configure boot device order for UEFI USB hard disks
- **(UEFI) Network Drive BBS Priorities:**
  - Configure boot device order for UEFI network devices

6.17 Save & Exit



- **Save Changes and Reset:** Save configuration and restart
- **Discard Changes and Reset:** Restart without saving
- **Restore Defaults:** Reset all BIOS settings to factory defaults

6.18 MEBx



If the platform supports Intel AMT, the **MEBx** page allows secure remote management:

- **Intel® ME Password:** Default: `admin`
  - Requires immediate password change on first login
  - **Password Policy:**
    1. Minimum 8, maximum 32 characters
    2. Must include:
       * at least one digit (0–9)
       * at least one ASCII special character (excluding `:`, `,`, `"`)
       * at least one upper-case and one lower-case letter

This page will not appear if Intel AMT is not supported.