# ROBOX500

## ROS 2 AMR Controller

## User Manual

USER MANUAL

AXIOMTEK

www.axiomtek.com

# Disclaimers

This manual has been carefully checked and believed to contain accurate information. Axiomtek Co., Ltd. assumes no responsibility for any infringements of patents or rights of any third party, or any liability arising from such uses.

Axiomtek does not warrant or assume any legal liability or responsibility for the accuracy, completeness or usefulness of any information in this document. Axiomtek does not make any commitment to update any information in this manual.

Axiomtek reserves the right to change or revise this document and/or product at any time without notice.

No part of this document may be reproduced, stored in a retrieval system, or transmitted in any forms or by any means, electronic, mechanical, photocopying, recording, among others, without prior written permissions of Axiomtek Co., Ltd.



**Sep. 2024, Version A2**

**Printed in Taiwan**

## Safety Precautions

Before getting started, please read the following important safety precautions.

1. The ROBOX500 does not come with an operating system which must be loaded first before installation of any software into the computer.
2. Be sure to ground yourself to prevent static charge when installing any internal components. Use a grounding wrist strap and place all electronic components in any static-shielded devices. Most electronic components are sensitive to static electrical charge.
3. Disconnect the power cord from the ROBOX500 prior to making any installation. Be sure both the system and all external devices are turned OFF. A sudden surge of power could ruin sensitive components. Make sure the ROBOX500 is properly grounded.
4. Make sure the voltage of the power source is correct before connecting it to any power outlet.
5. Turn OFF the system power before cleaning. Clean the system using a cloth only. Do not spray any liquid cleaner directly onto the screen.
6. Do not leave equipment in an uncontrolled environment where the storage temperature is below -40℃ or above 80℃ as it may damage the equipment.
7. Do not open the system's back cover. If opening the cover for maintenance is a must, only a trained technician is allowed to do so. Integrated circuits on computer boards are sensitive to static electricity. To avoid damaging chips from electrostatic discharge, observe the following precautions:
   - Before handling a board or integrated circuit, touch an unpainted portion of the system unit chassis for a few seconds. This will help discharge any static electricity on the human body.
   - When handling boards and components, wear a grounding wrist strap available from most electronic component stores.
8. Follow these simple precautions to protect yourself from harm and the products from damage.
   - To avoid electrical shock, always disconnect the power from the PC chassis before manual handling. Do not touch any components on motherboard while the PC is powered on.
   - Disconnect the power before making any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

## Battery Information

Batteries, battery packs, and accumulators must not be disposed of as unsorted household waste. Please use the public collection system to return, recycle, or treat such items in compliance with local regulations.


※ Cautions are included to help prevent hardware damage and data losses.

For example,

The battery is at risk of exploding if incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions."

※ As for the RTC battery used in the system, when the battery voltage drops below 2.5V, the REAL-TIME CLOCK (RTC) RAM in the CMOS will be cleared, including the date, time, system password, and system configuration parameters. At this point, the battery must be replaced, and all parameters need to be reconfigured. Please refer to Chapter 2.4 for instructions on how to replace the battery.

## Classifications

1. Degree of production against electric shock: not classified.
2. Degree of protection against ingress of water: IP40/30*
3. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air, oxygen or nitrous oxide.
4. Mode of operation: Continuous

*Please refer to the IP rating for ROBOX500 SKUs in the 1.6 Model List.

# General Cleaning Tips

Please keep the following precautions in mind while understanding the details fully before and during any cleaning of the computer and any components within.

A piece of dry cloth is ideal for cleaning the device.

1. Be cautious of any tiny removable components when using a vacuum cleaner to absorb dirt on the floor.
2. Turn the system off before cleaning up the computer or any components within.
3. Avoid dropping any components inside the computer or getting the circuit board damp or wet.
4. For cleaning, be cautious of all kinds of cleaning solvents or chemicals which may cause allergy to certain individuals.
5. Keep foods, drinks or cigarettes away from the computer.

**Cleaning Tools:**

Although many companies have created products to help improve the process of cleaning computers and peripherals, users can also use household items accordingly for cleaning. Listed below are items available for cleaning computers or computer peripherals.

Pay special attention to components requiring designated products for cleaning as mentioned below.

- Cloth: A piece of cloth is the best tool to use when rubbing up a component. Although paper towels or tissues can be used on most hardware as well, it is recommended to use a piece of cloth.
- Water or rubbing alcohol: A piece of cloth may be somewhat moistened with water or rubbing alcohol before being rubbed on the computer. Unknown solvents may be harmful to plastic parts.
- Vacuuming dust, dirt, hair, cigarette and other particles out of a computer can be one of the best methods of cleaning a computer. Over time these items may restrict the airflow in a computer and cause circuitry to corrode.
- Cotton swabs: Cotton swabs moistened with rubbing alcohol or water are applicable to reach areas in keyboard, mouse and other areas.
- Foam swabs: If possible, it is better to use lint free swabs such as foam swabs.

**【Note】:** ***It is strongly recommended that the user should shut down the system before starting to clean any single component.***

## Please follow the steps below:

1. Close all application programs;
2. Close operating software;
3. Turn off power button;
4. Remove all devices;
5. Pull out the power cable.

## Scrap Computer Recycling

Please inform the nearest Axiomtek distributor as soon as possible for suitable solutions in case computers require maintenance or repair; or for recycling in case computers are out of order.

## Trademarks Acknowledgments

# Table of Contents

# SECTION 1
# INTRODUCTION

This section contains general information and detailed specifications of the ROBOX500. Section 1 consists of the following sub-sections:

- General Descriptions
- System Specifications
- Dimensions
- I/O Outlets
- Packing List
- Model List

## 1.1 General Descriptions

The ROBOX500 is a purpose-built AMR controller that is based on the 12th/13th Gen Intel® processor and aims at heavy-duty vehicles such as forklifts and road rollers. It is equipped with four/Eight GMSL camera interfaces, which provide a more stable and longer distance for image transmission, optimizing the data processing and then ensuring the precision of working action. The ROBOX500 features rich I/O such as 2 M12-type LANs, 4 USB ports, 2 CAN, 4 RS-232/422/485 and 16-CH DI, 8-CH DO, 2-CH SSR to meet the demands of AMR. Also, it provides a variety of M.2 slots to support Wi-Fi/Bluetooth modules, 5G modules, AI modules and NVMe. Moreover, the wide power input can range from 9 – 60 VDC and the wide operating temperature is from -40°C to 70°C.

*Please refer to the IP rating for ROBOX500 SKUs in the 1.6 Model List.

**Features**

- 12th / 13th generation Intel® Core™ i7 processor (Alder Lake P)
- Supporting wide range of DC power input from 9 to 60VDC (Typical 12/24/48VDC).
- GMSL camera interfaces supported.
- Lockable I/O interfaces supported.
- AI accelerator supported.

**Reliable and Stable Design**

The ROBOX500 embedded system supports 12th/13th generation Intel® Core™ i7 processor, with high flexibility and multi-functional design to present the best solution for any industrial field applications.

**Flexible Connectivity**

It features rich I/o such as two M12-type LANs, four M12-type USB ports, two CAN, four RS-232/422/485 and 16-CH DI, 8-CH DO to meet the demands of AMR.

**Embedded O.S. Supported**

ROBOX500 can support Linux operating systems

## 1.2 System Specifications

- **CPU**
  - 12th / 13th generation Intel® Core™ i7 processor, CPU TDP max. up to 28W
- **BIOS**
  - American Megatrends Inc. UEFI (Unified Extensible Firmware Interface) BIOS.
- **System Memory**
  - Two 260-pin unbuffered DDR4-2666 MHz SO-DIMM sockets, up to 64 GB
- **Display**
  - 1 x HDMI (Resolution:4K/2K@30Hz)
- **USB Ports**
  - 4 x M12-USB 3.0
  - 1 x USB 3.0 Type-A
  - 1 x USB 2.0 Type-A
- **Serial Ports**
  - 4 x RS-232/422/485
  - 2 x CANbus
- **DIO**
  - Isolated 16DI / 8DO
  - 2-ch SSR max. 30Vdc/1A
- **Audio**
  - 2 x Audio (Mic-in, Line-out)
- **Mini Card Interface**
  - 1 x M.2 Key E 2230 for Wi-Fi/Bluetooth module
  - 1 x M.2 Key B 3052 for 5G module
  - 1 x M.2 Key M 2242 slot for AI module
  - 1 x SIM slot
- Storage
  - 1 x M.2 Key M 2280 for NVMe
- Indicator
  - 1 x Green LED as indicator for PWR status
  - 1 x Orange LED as indicator for HDD active
  - 2 x Green LED as indicator for programmable
  - 2 x Orange/Green Bi-color LED as LAN status
- **Antenna**
  - 4 x SMA type connector openings for antenna
- **Power Supply**
  - 9~60VDC input (typical 12/24/48VDC input)
- **Operation Temperature**
  - -40 °C ~+70 °C (-40 °F ~ 158 °F), with W.T. SSD & Memory: Alder Lake P (Operating environment varies depending on the CPU model in use.)
- **Storage Temperature**
  - -40 °C ~+85 °C (-40 °F ~ 185 °F)
- **Humidity**
  - 10% ~ 95% (non-condensation)
- **Vibration Endurance**
  - 3.5Grm (5-500Hz, X, Y, Z directions)
- **Weight**
  - 3.87kg

- **Dimension**
  - 289 mm (11.38") (W) x 106.5 mm (4.19") (D) x 161.7 mm (6.37") (H)

### 1.2.1 Driver Contents

Please download the drivers from the Axiomtek official website.

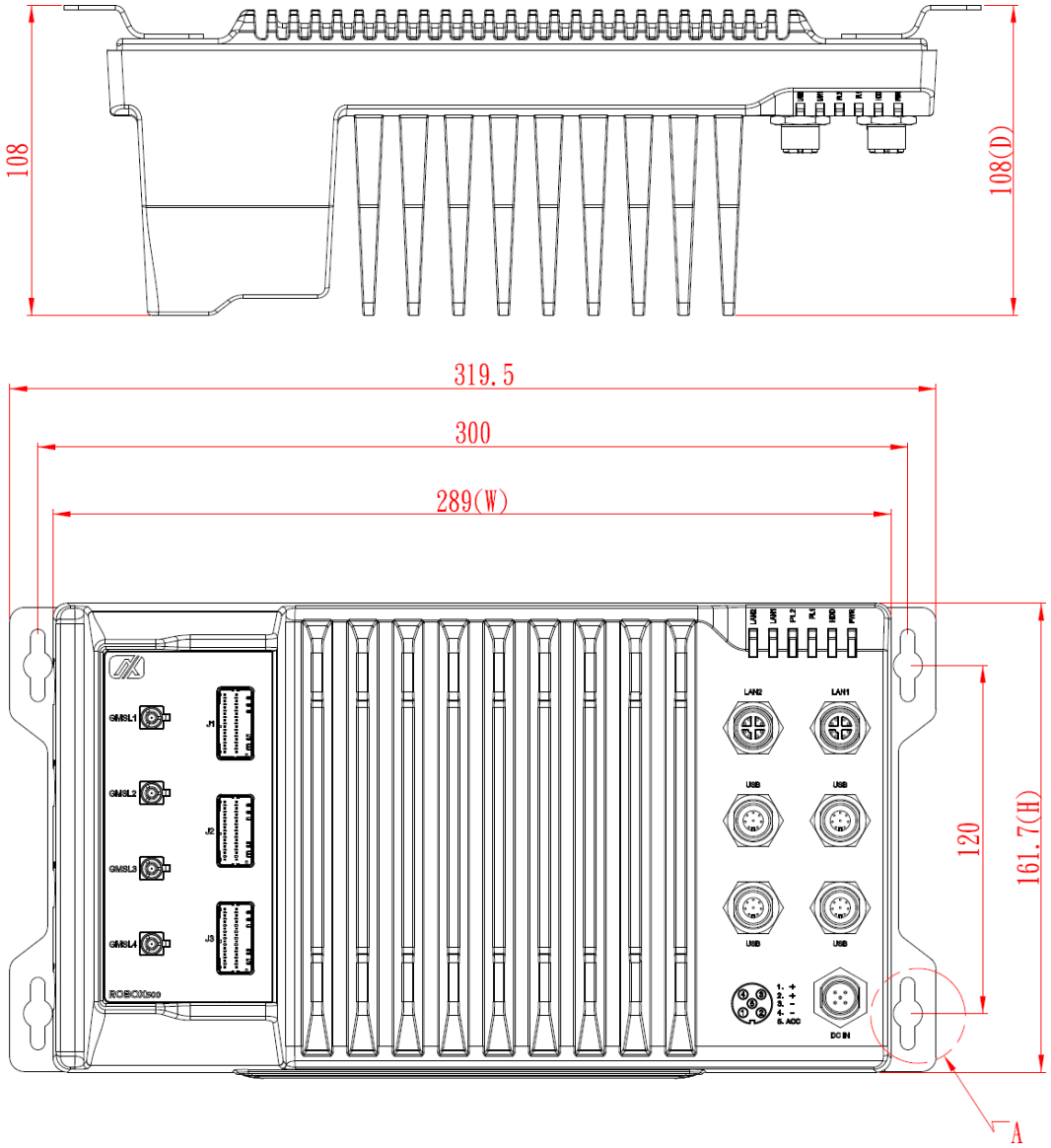
- **User's Manual**

**【Note】:** ***All specifications and images are subject to change without notice.***

## 1.3 Dimensions

The following diagrams show the dimensions and outlines of the ROBOX500.

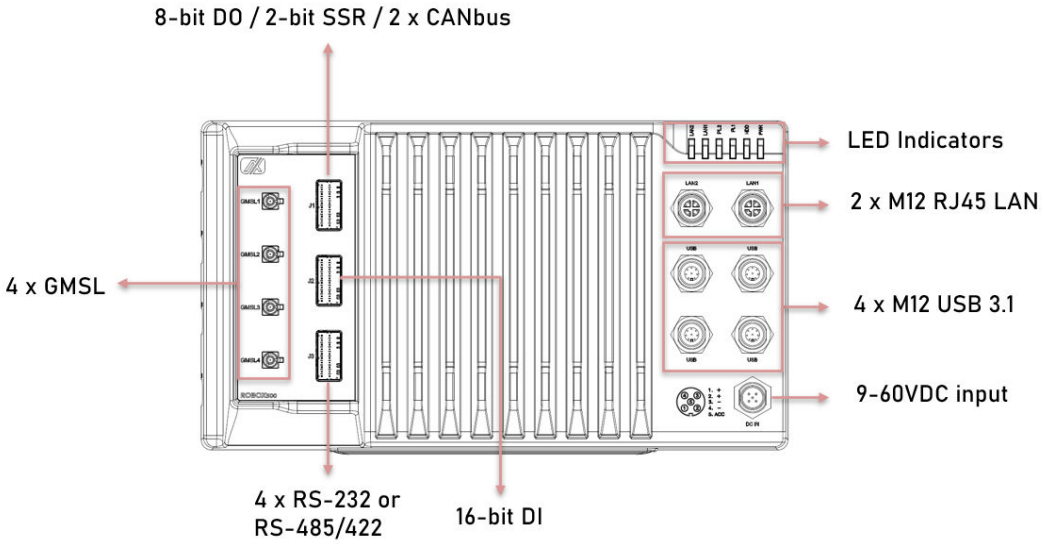
### 1.3.1 ROBOX500 Dimensions

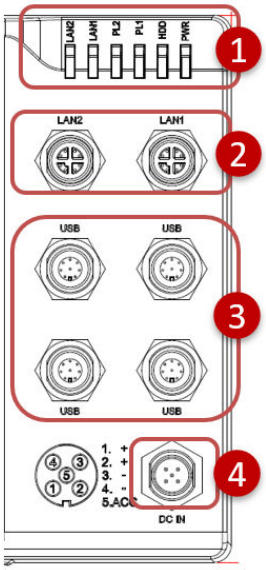


## 1.4 I/O Outlets

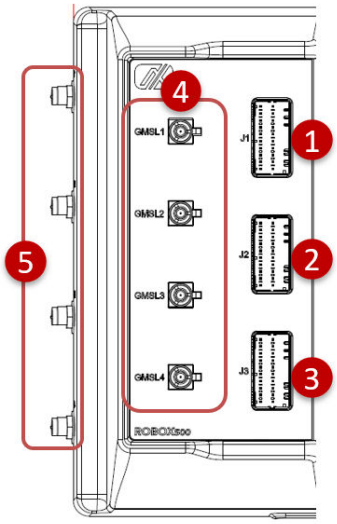
The following figures show I/O outlets on the ROBOX500.

**Front View**



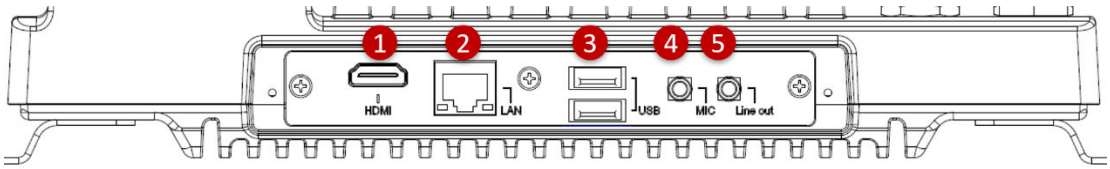




| | |
|---|---|
| 1 | **LED Indicators**<br>**Power, HDD, User Define 1 and 2, LAN1 and LAN2 Link Status(from right to left)** |
| 2 | **2 Port Intel i210 Gbe LAN** |
| 3 | **4 Port USB 3.1 Gen 1** |
| 4 | **Support 9-60V Wide Rang DC Power Input**<br>**Typical 12V/24V/48V Battery** |




| | |
|---|---|
| 1 | 2 Port CAN Bus 2.0 A/B，1.5KV Isolated<br>8 Bit Isolated Digital Output，80mA@24Vdc<br>2 Bit Isolated Digital Output with DMOS，Max. 30Vdc/1A |
| 2 | 16 Bit Isolated Digital Input，Max. 30Vdc |
| 3 | 4 Port RS232/RS422/RS485<br>RS232：TxD, RxD, RTS, CTS, GND<br>RS422：TxD+, TxD-, RxD+, RxD-, GND<br>RS485：D+, D-, GND |
| 4 | 4/5/8 Port GMSL |
| 5 | 4 Port Wireless ANT |

**Rear View**




| | |
|---|---|
| 1 | 1 Port HDMI 1.4，Resolution up to 4Kx2K 30hz |
| 2 | 1 Port Intel i210 Gbe LAN |
| 3 | 1 Port USB 3.1 Gen 1<br>1 Port USB 2.0 |
| 4 | 1 Mic Input |
| 5 | 1 Line Out |

## 1.5 Packing List

The ROBOX500 comes with the following bundle package:

- **ROBOX500 system unit x 1**
- **Terminal block x 1**
- **Wall mount kit x 1**
- **Wall mount kit screws x 4**
- **Mini Card slot screws x 4**
- **M12 Power Cable x1**

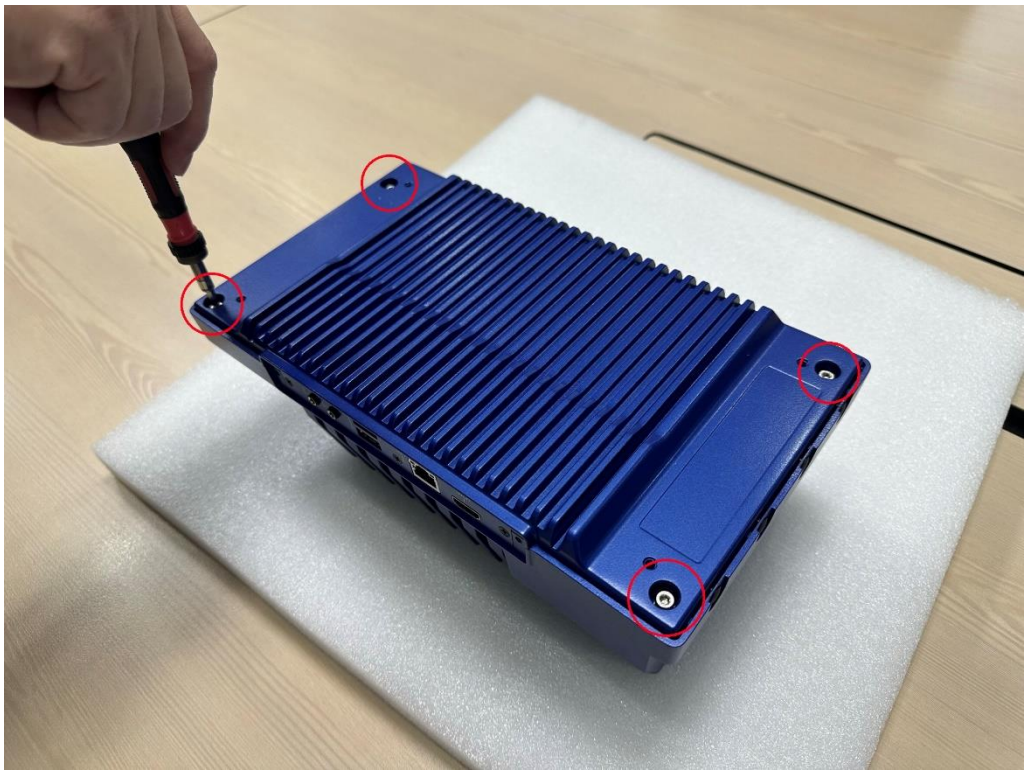
**This page is intentionally left blank**.

# SECTION 2
# HARDWARE INSTALLATION

The ROBOX500 is convenient for various hardware configurations, such as DRAM, NVMe SSD (Solid State Drive), and M.2 card modules. Section 2 contains guidelines for hardware installation.

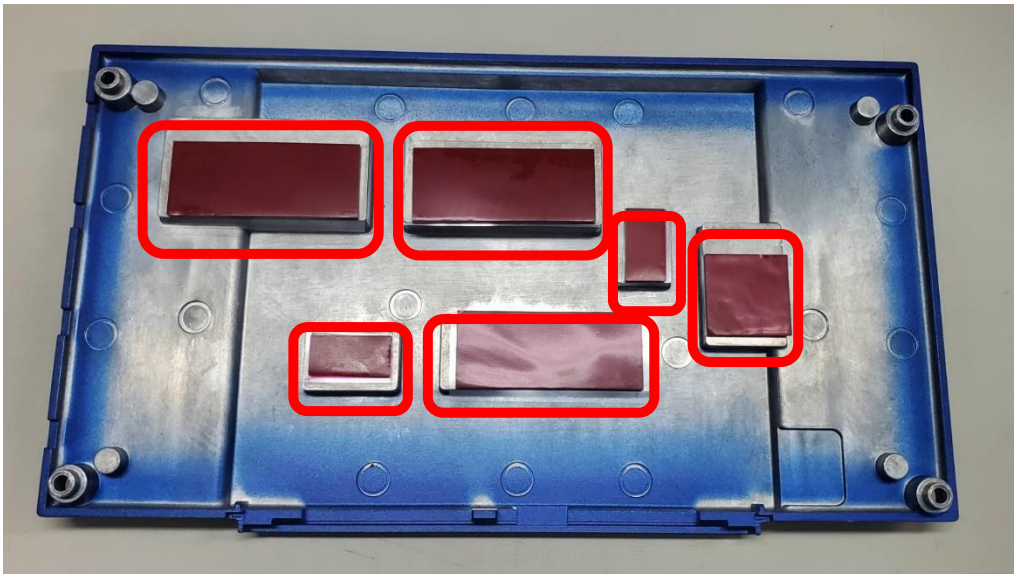
## 2.1 Installing thermal pads

Step 1. Turn off the system and unplug the power cord.
Step 2. Loosen all screws to remove the back cover.



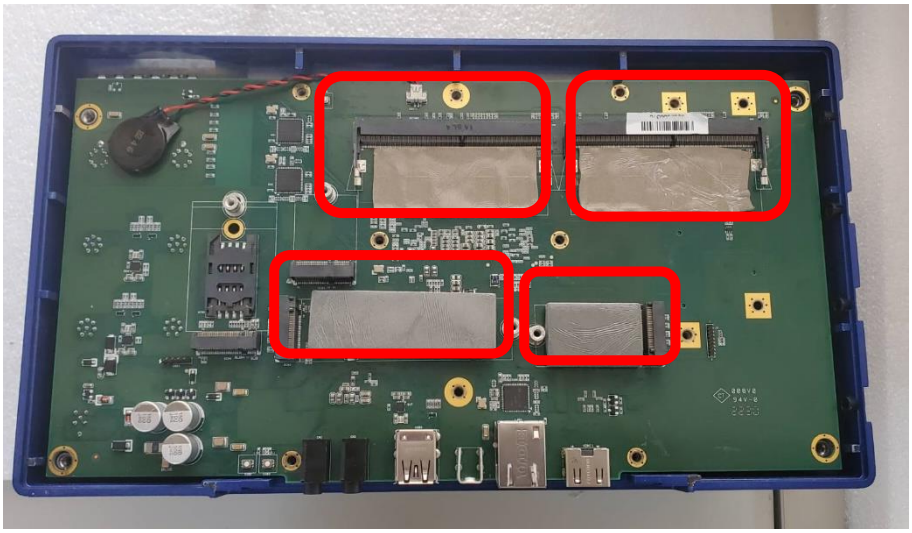
Step 3. Put the thermal pads on the raised area.

**【Note】: *Remove*** *the red film of the thermal pad after installation.*



Step 4. Put the thermal pads on the SO-DIMM socket, NVMe SSD socket, AI Module socket.

【Note】: ***Remove*** *the red film of the thermal pad after installation.*

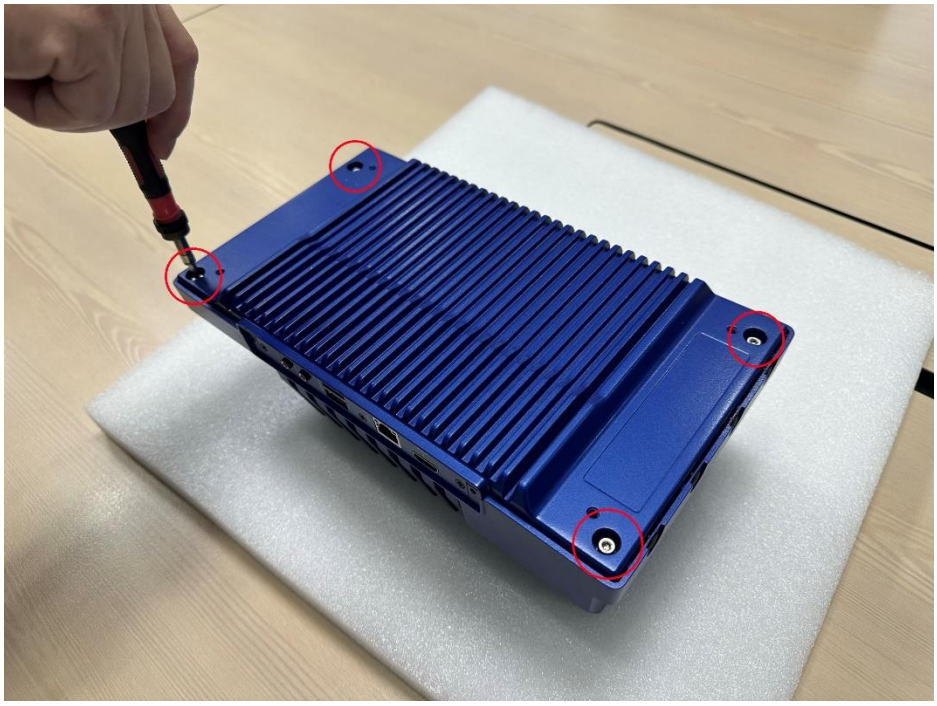


【Note】: ***It is suggested that the thermal pads be put on the motherboard's corresponding positions as shown.***

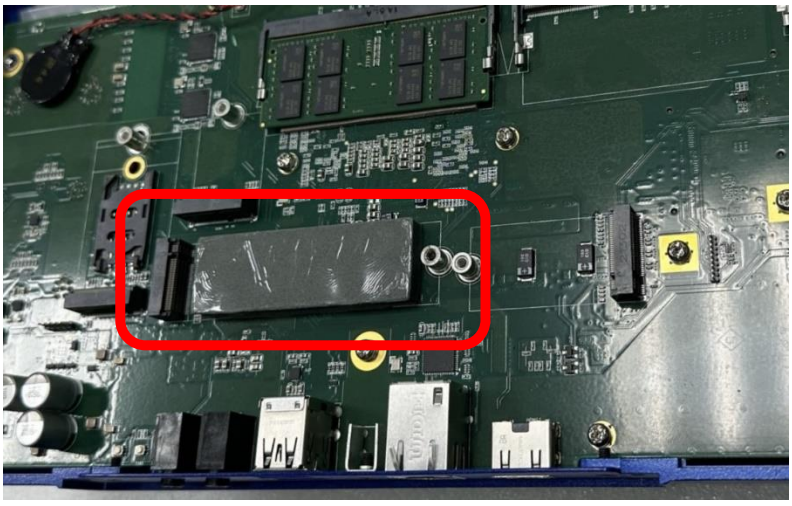
## 2.2 Install M.2 NVMe SSD

Step 1. Turn off the system and unplug the power cord.

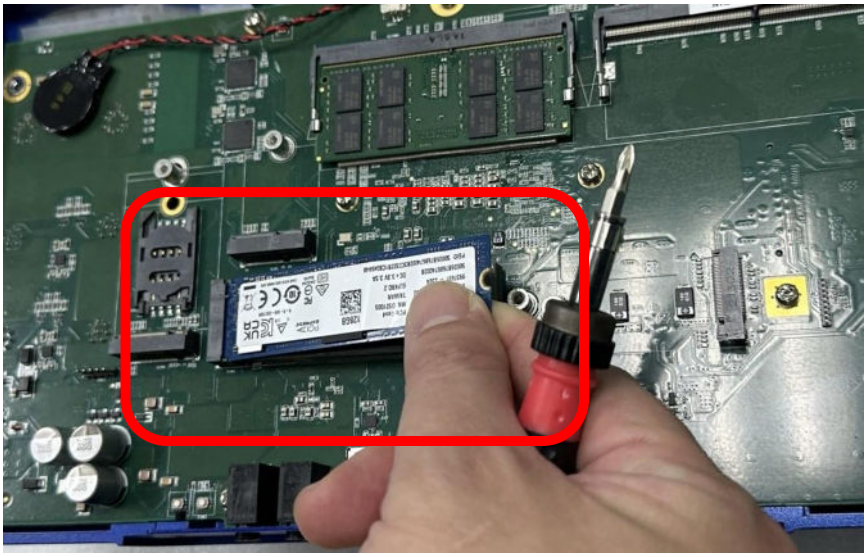
Step 2. Loosen all screws to remove the back cover.



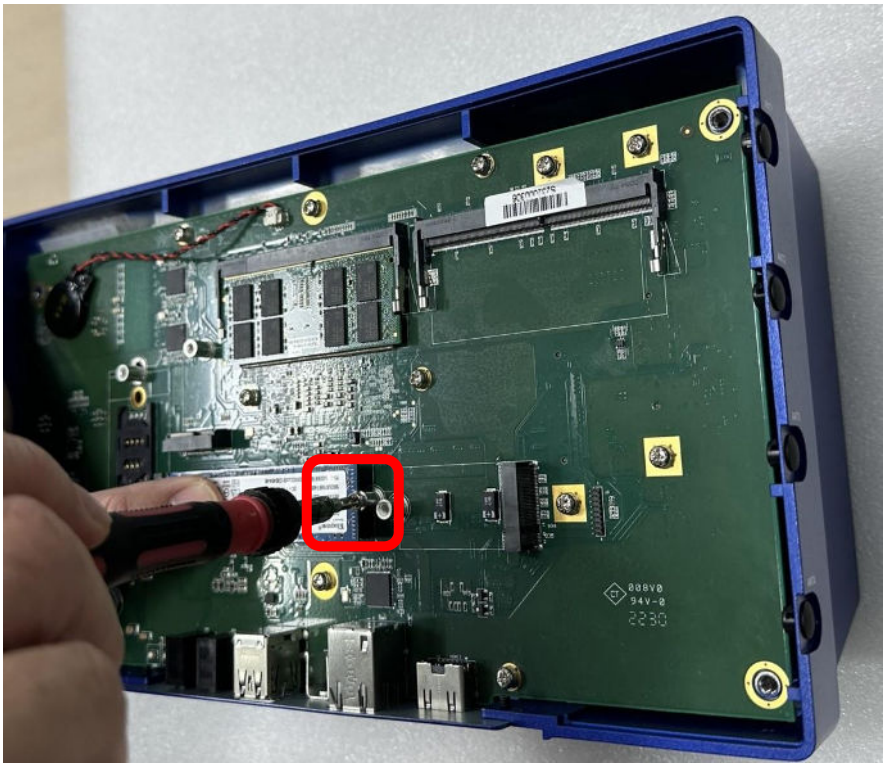
Step 3. Locate the NVMe SSD socket on the main board.



Step 4. Insert the gold-colored contact of the NVMe SSD module into the socket.



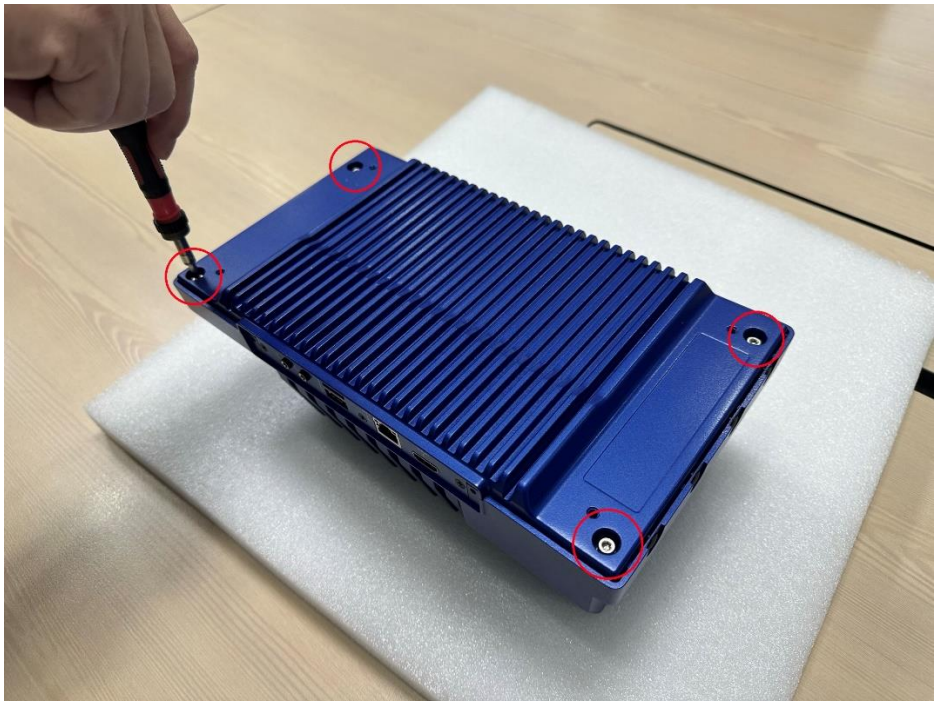
Step 5. Fasten the screw as shown.



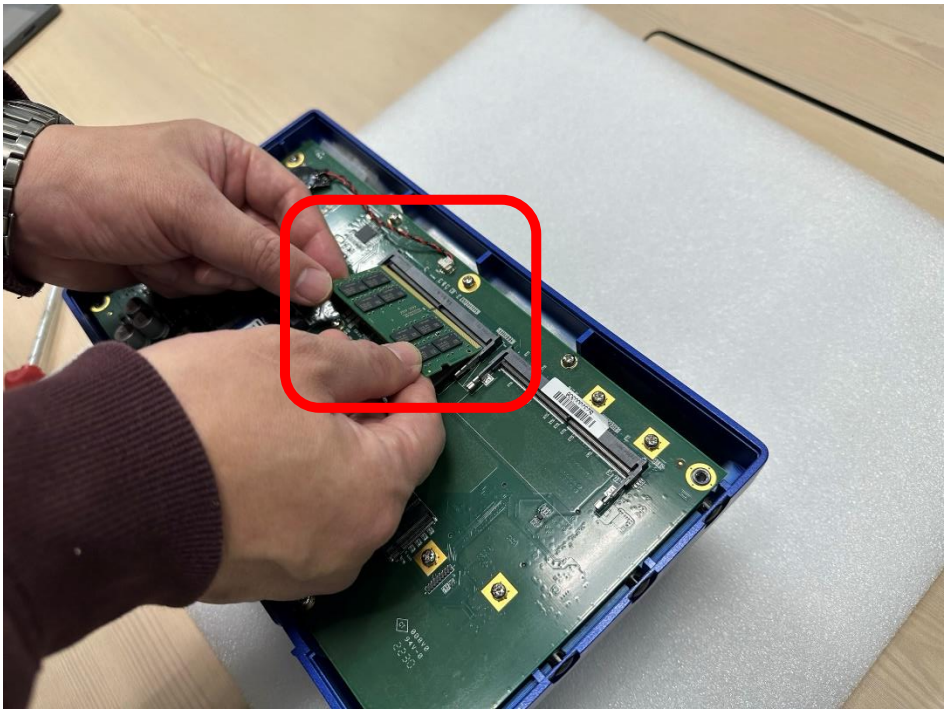
## 2.3 Installing SO-DIMM

Step 1. Turn off the system and unplug the power cord.

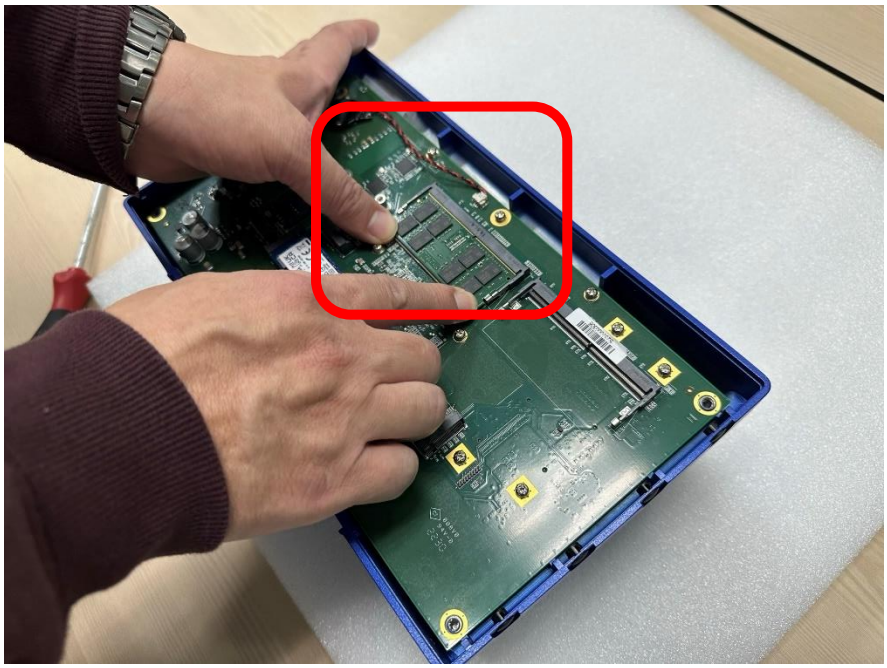
Step 2. Loosen all screws to remove the back cover.



Step3. Locate the Dual SO-DIMM sockets on the main board.



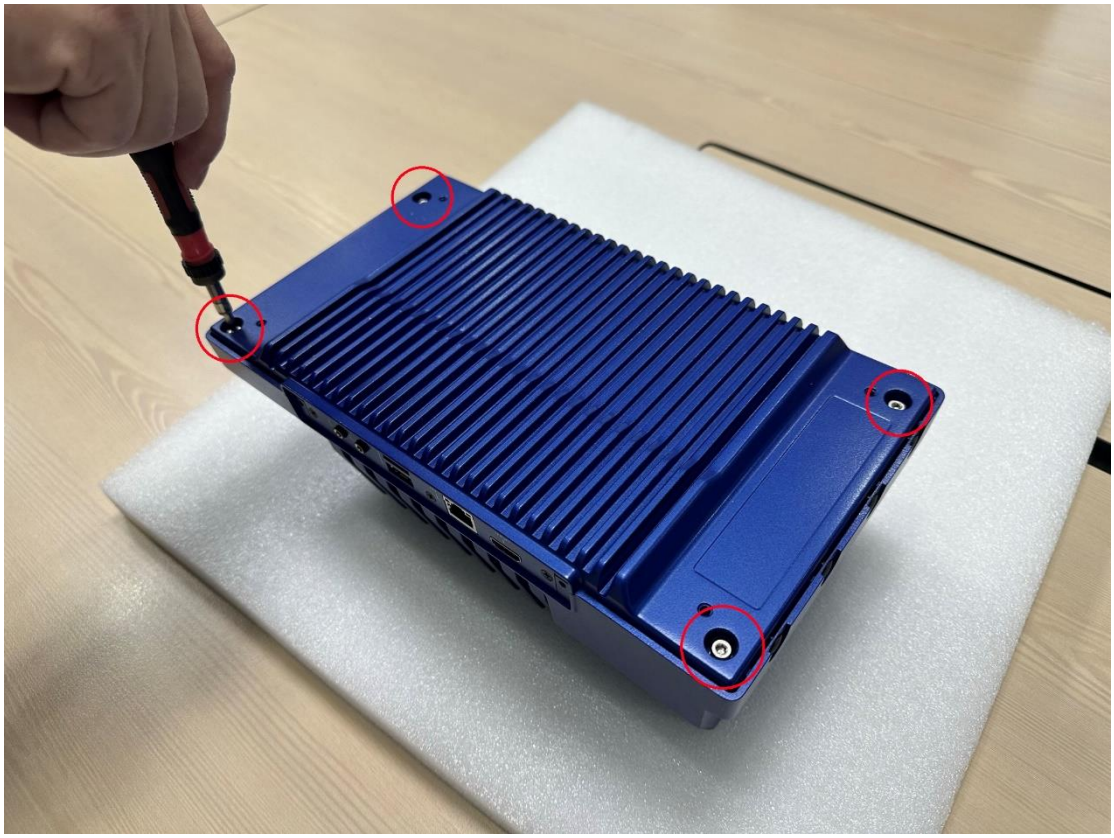
Step 4. Insert the gold-colored contact of the memory module into the socket and push the module's two end latches down until locked.



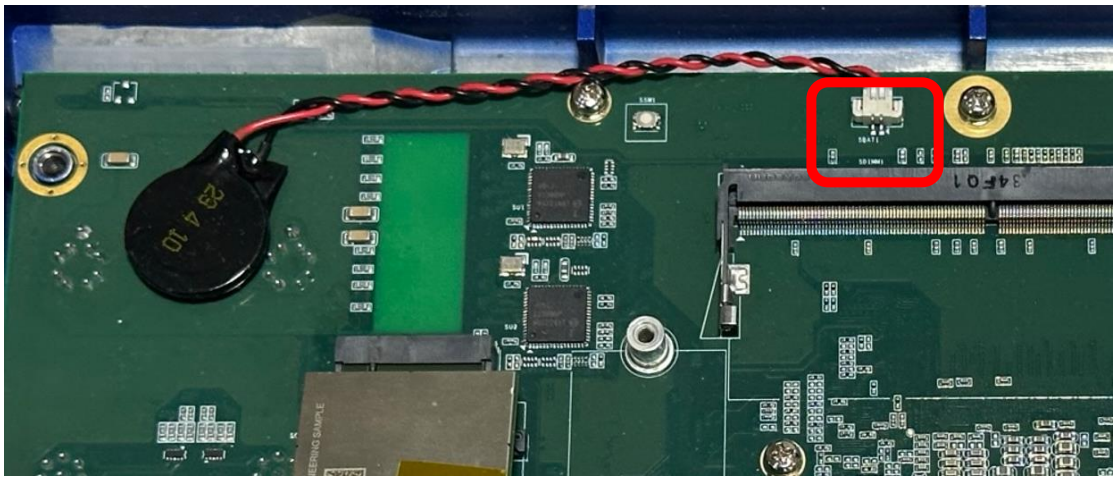
Step 5. Put the back cover back onto the system and fasten all screws.

## 2.4 Installing RTC Battery

Step 1. Turn off the system and unplug the power cord.
Step 2. Loosen all screws to remove the back cover.



Step 3. Unplug the connecter of the RTC battery and change the new one.

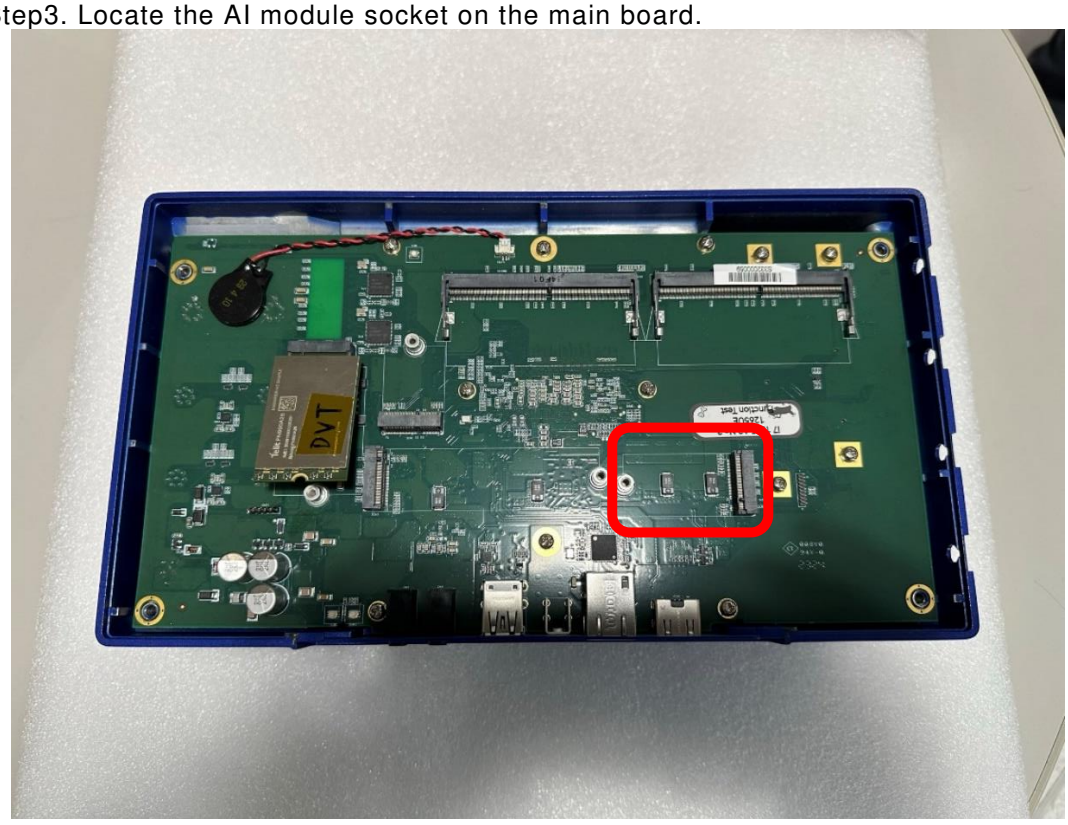


Step 4. Put the back cover back onto the system and fasten all screws.

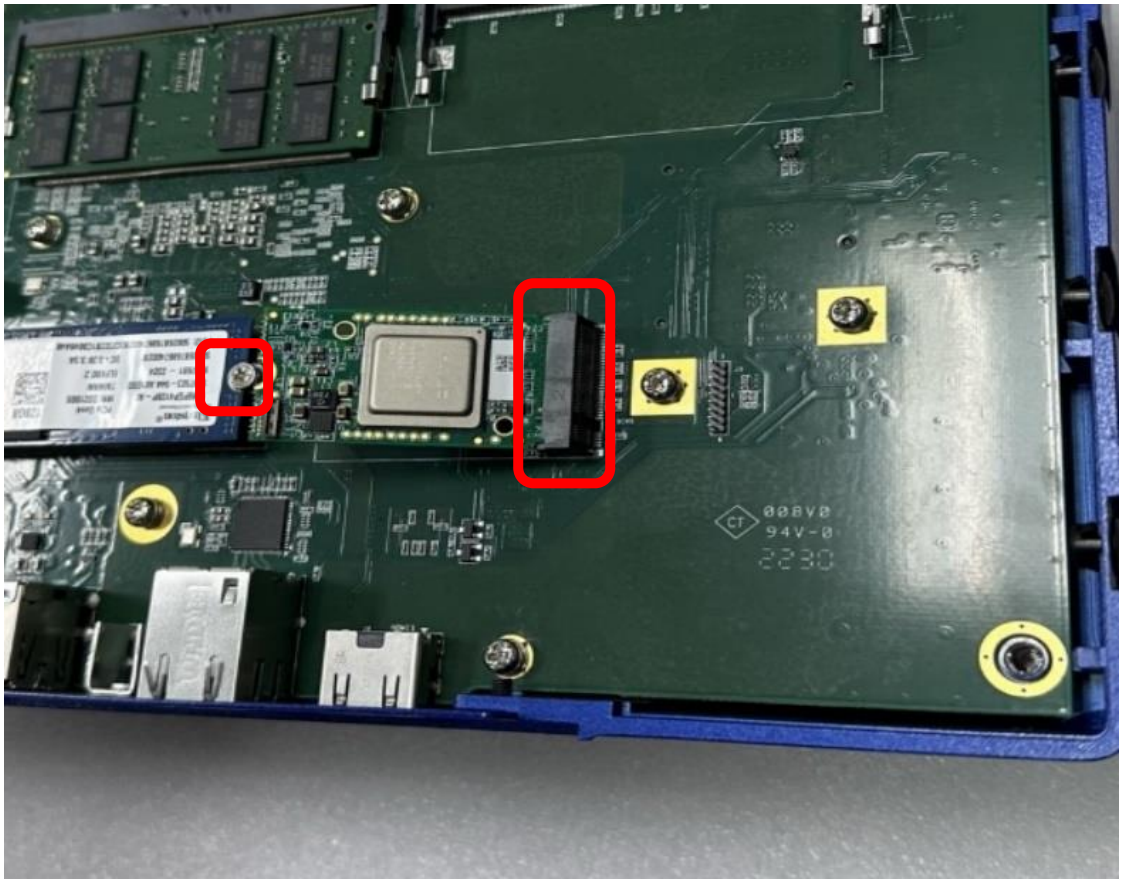
## 2.5 Installing AI Module

Step 1. Turn off the system and unplug the power cord.
Step 2. Loosen all screws to remove the back cover.

Step3. Locate the AI module socket on the main board.



Step 4. Insert the gold-colored contact of the AI module into the socket.
Step 5. Fasten the screw as shown.

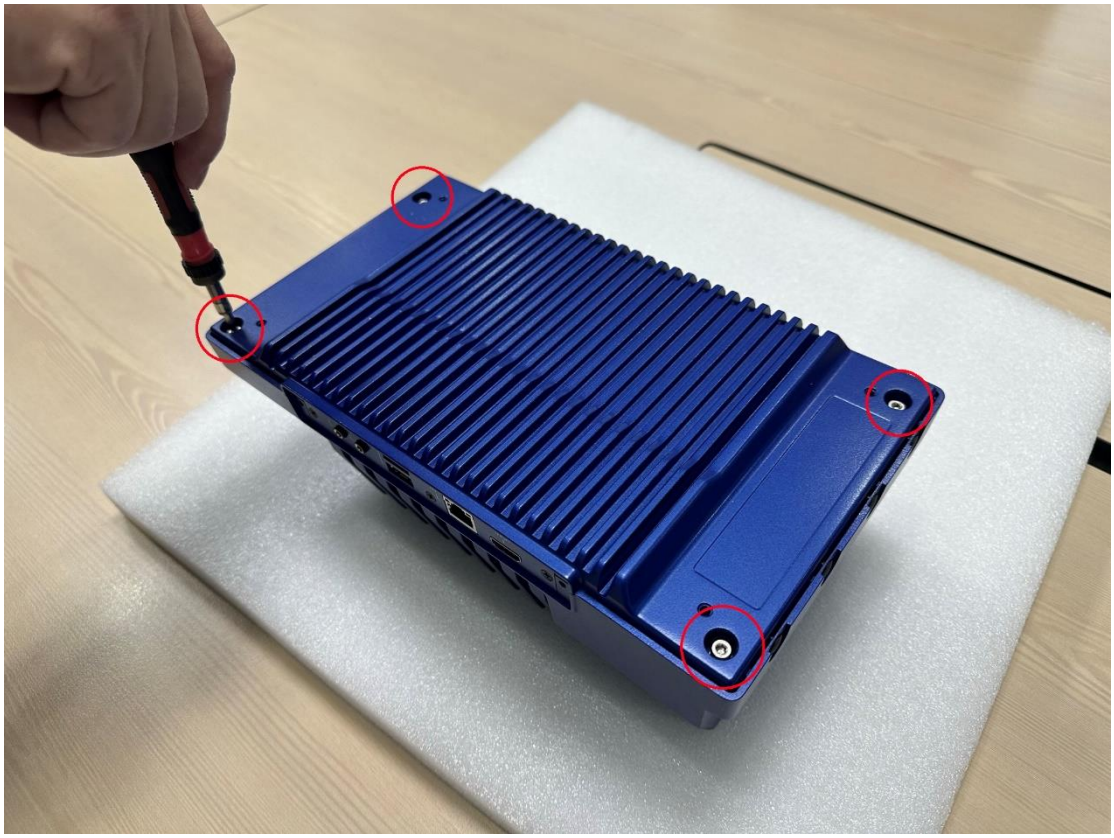


Step 6. Put the back cover back onto the system and fasten all screws.

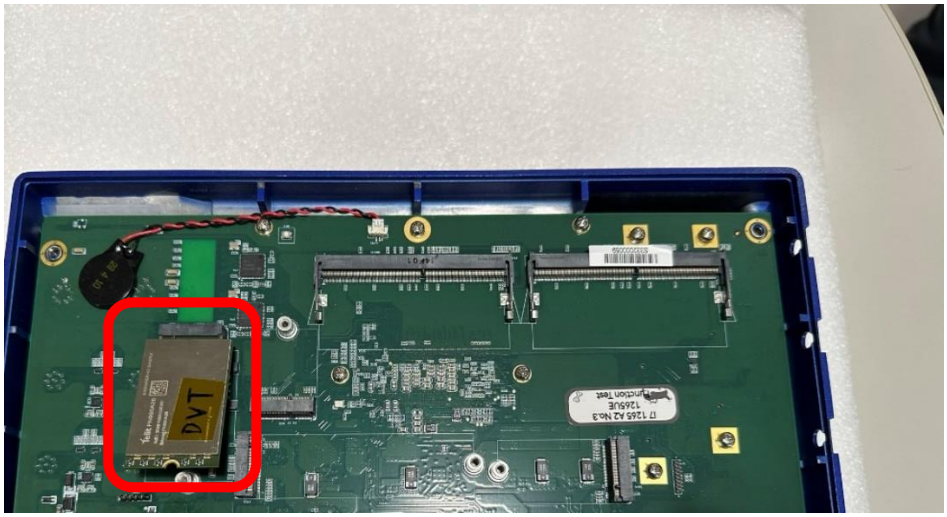
## 2.6 Installing 5G/LTE Module

Step 1.Turn off the system and unplug the power cord.

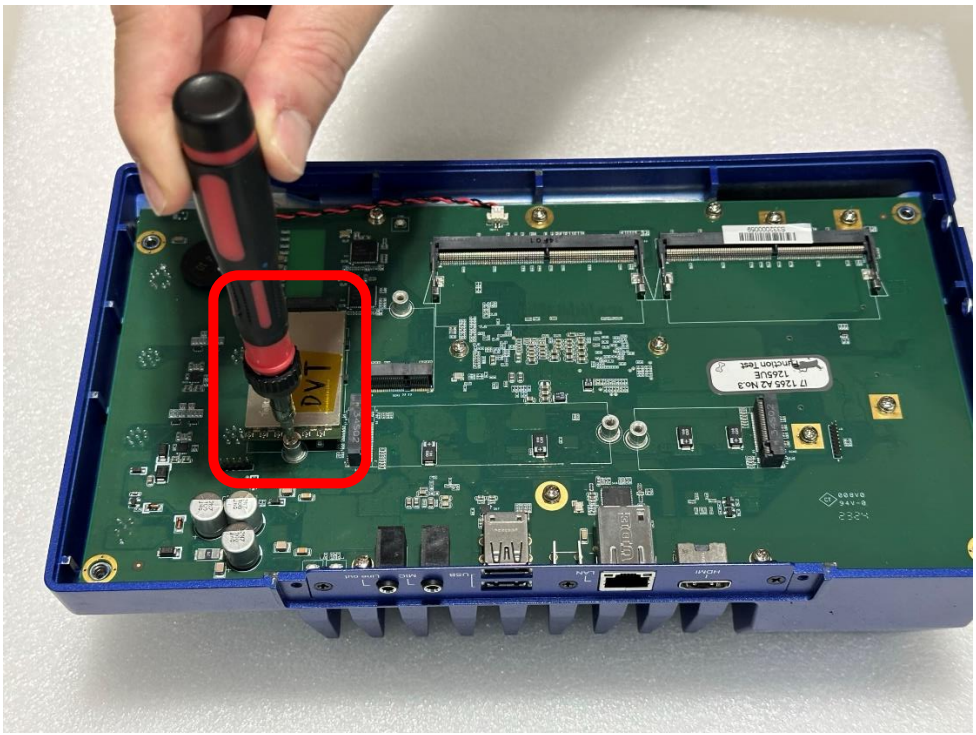
Step 2. Loosen all screws to remove the back cover.



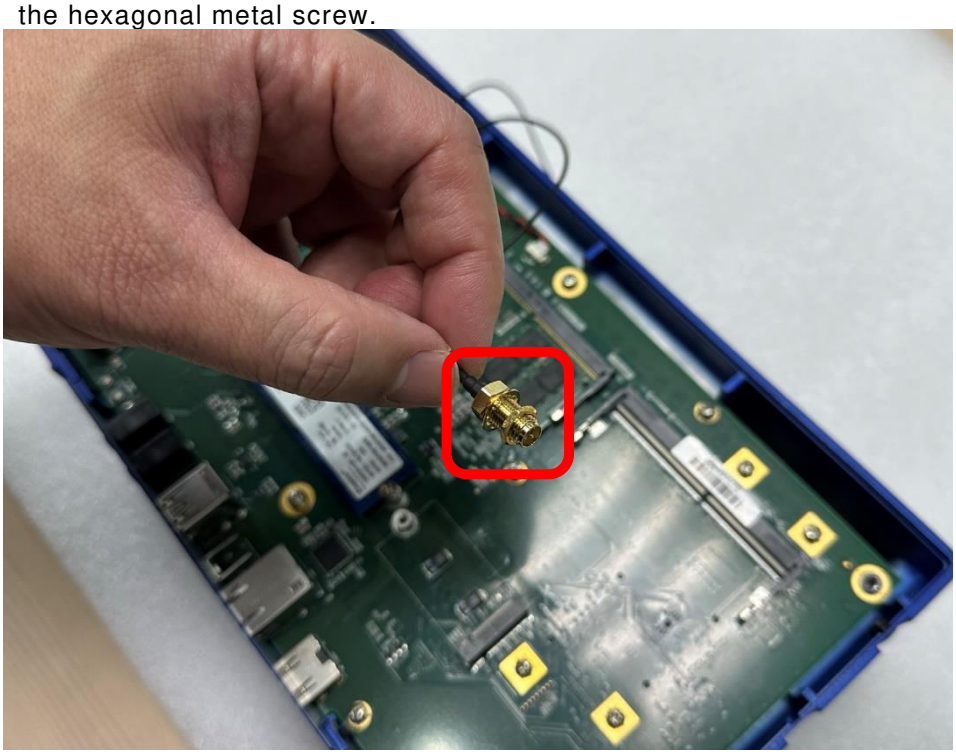
Step3. Locate the 5G/LTE module sockets on the main board.



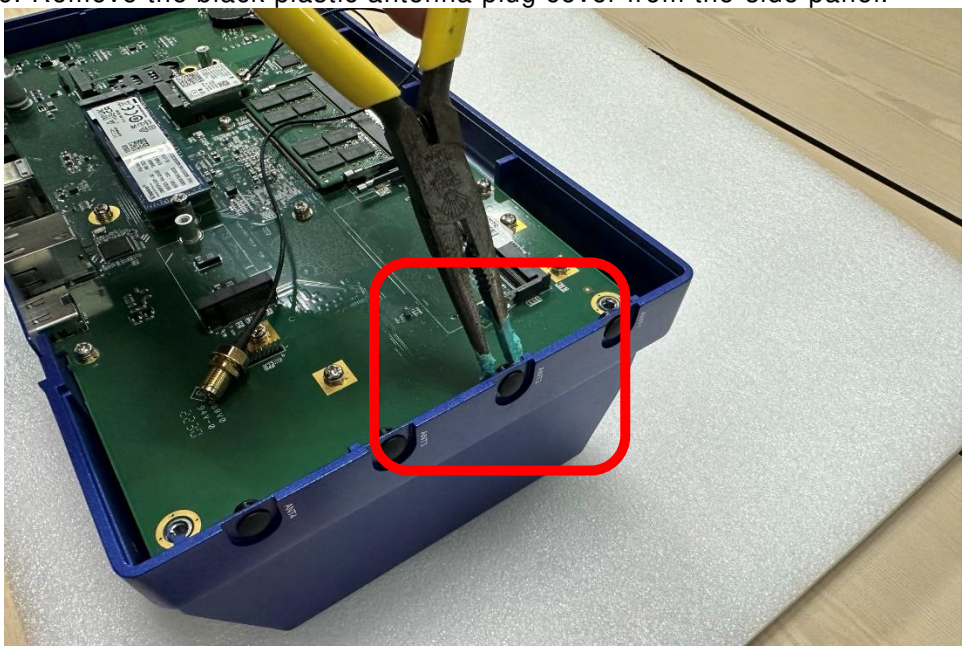
Step 4. Fasten the screw as shown.



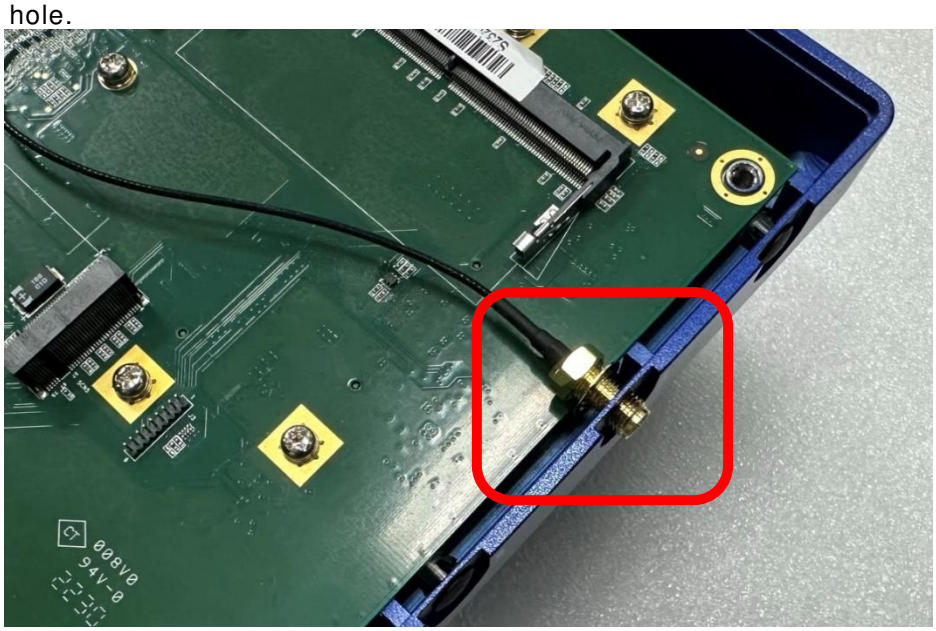

Step 5. Connect the RF cables to the connectors of the 5G/LTE module. Remove the hexagonal metal screw.



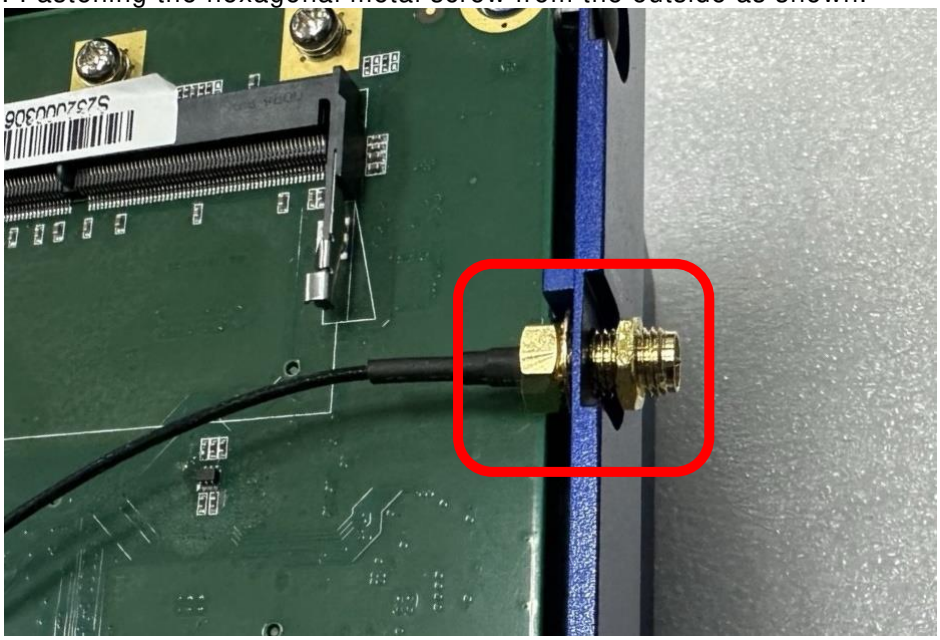
Step 6. Remove the black plastic antenna plug cover from the side panel.



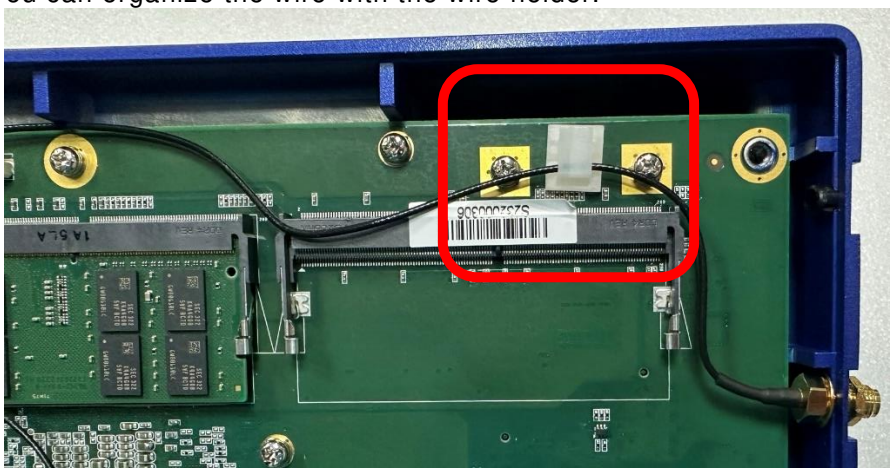
Step 7. Place the RF cable and insert the end of the RF cable through the antenna hole.



Step 8. Fastening the hexagonal metal screw from the outside as shown.



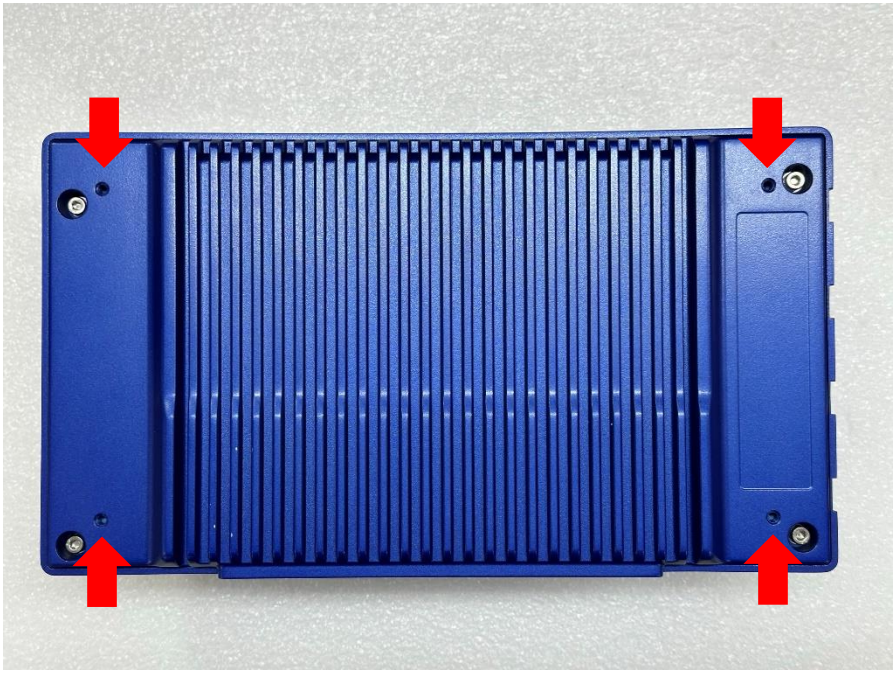
Step9. You can organize the wire with the wire holder.



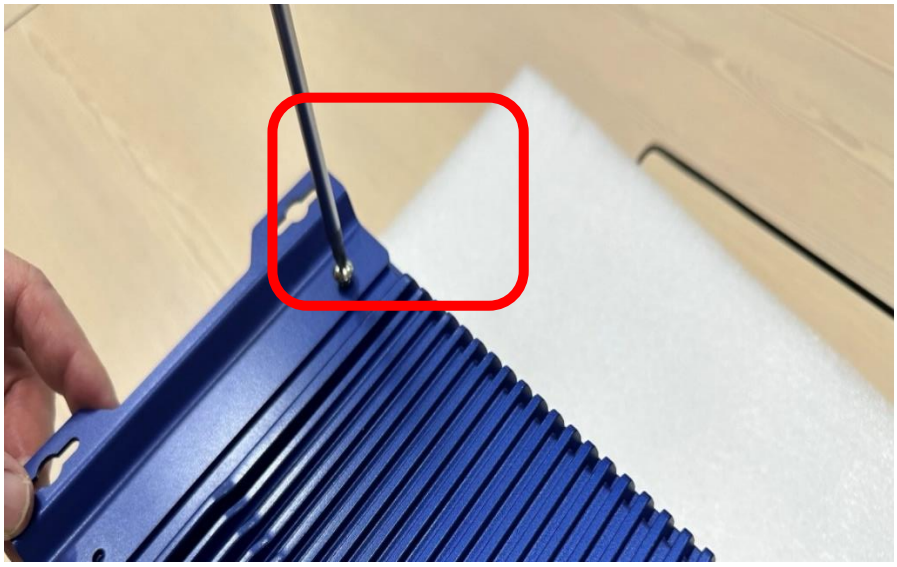
Step 10. Put the back cover back onto the system and fasten all screws.

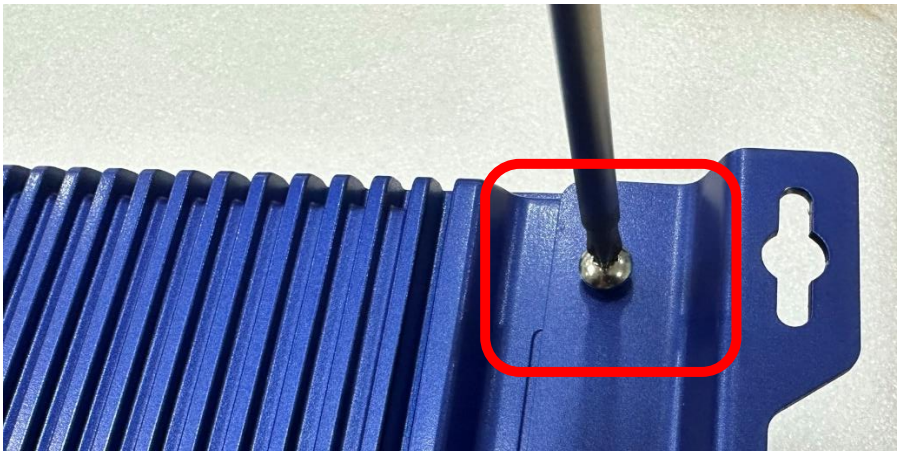
## 2.7 Installing the Wall Mount Kit

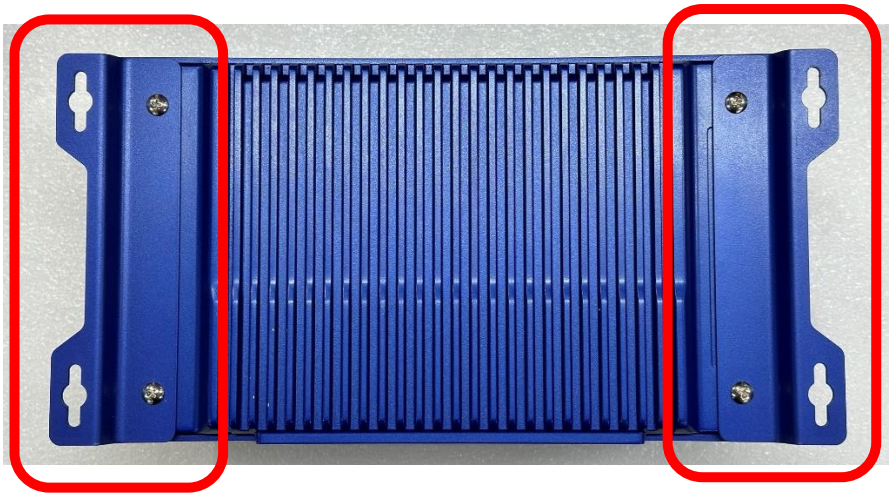
Step1. Locate the screw holes for wall mount kit.



Step 2. Put the wall mount kit and fasten the screws as shown.





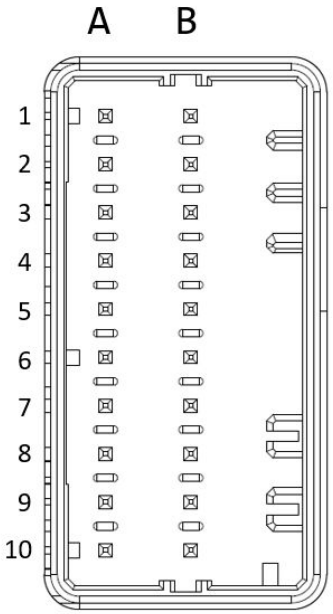


**This page is intentionally left blank.**

# SECTION 3
# CONNECTOR SETTINGS

## 3.1 Connectors

For J1, J2, J3 I/O connector pin define as below:




Please refer to pin assignments below:

### 3.1.1 DC-in Power Connector

The system supports the 9~60V (Default 12/24/48V) DC-in connector for system power input. Use a 16AWG power wire for the system that consumes up to 150w.

| Pins | Signals |
|---|---|
| 1 | Vin+ |
| 2 | Vin+ |
| 3 | Vin- |
| 4 | Vin- |
| 5 | ACC/IGN |


**【Note】:*Connect the DC-in power connector for the ROBOX500 in-vehicle system as follows:***

- **When using in-Vehicle applications, connect the ACC/IGN pin to the accessory power of the vehicle.**
- **If the ACC/IGN action behavior is not correct and causes the system to shut down abnormally, please set according to Appendix D.**

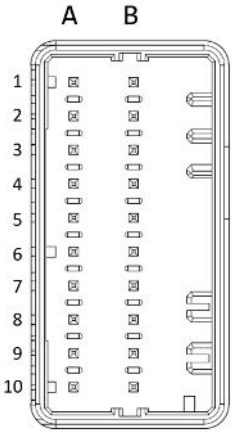
### 3.1.2 HDMI Connector

The HDMI Rev1.4b (High-Definition Multimedia Interface) is a compact digital interface which is capable of transmitting high-definition video and high-resolution audio over a single cable. Pin definition follows ***HDMI Type A standard***.

### 3.1.3 Serial Port Connector(J3)

The ROBOX500 has 4 serial ports. COM1~COM4 are RS-232/422/485 ports. Please refer to Chapter 4 for detailed BIOS settings.

| PIN | COM | RS-485 | RS-422 | RS-232 |
|---|---|---|---|---|
| A1 | COM1 | D+ | Tx+ | Rx |
| A2 | COM1 | D- | Tx- | CTS |
| A3 | COM1 | N/A | Rx+ | Tx |
| A4 | COM1 | N/A | Rx- | RTS |
| A5 | COM1 | GND | GND | GND |
| A6 | COM2 | D+ | Tx+ | Rx |
| A7 | COM2 | D- | Tx- | CTS |
| A8 | COM2 | N/A | Rx+ | Tx |
| A9 | COM2 | N/A | Rx- | RTS |
| A10 | COM2 | GND | GND | GND |



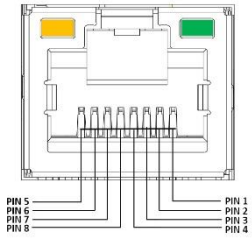

| PIN | COM | RS-485 | RS-422 | RS-232 |
|---|---|---|---|---|
| B1 | COM3 | D+ | Tx+ | Rx |
| B2 | COM3 | D- | Tx- | CTS |
| B3 | COM3 | N/A | Rx+ | Tx |
| B4 | COM3 | N/A | Rx- | RTS |
| B5 | COM3 | GND | GND | GND |
| B6 | COM4 | D+ | Tx+ | Rx |
| B7 | COM4 | D- | Tx- | CTS |
| B8 | COM4 | N/A | Rx+ | Tx |
| B9 | COM4 | N/A | Rx- | RTS |
| B10 | COM4 | GND | GND | GND |

### 3.3.4 Ethernet & Power of Ethernet Connector (LAN1~LAN3)

**RJ45**

The functions of all RJ45 are described below:

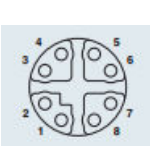
| Pins | LAN Signal | Pins | LAN Signal |
|---|---|---|---|
| 1 | MDI0+ | 5 | MDI2+ |
| 2 | MDI0- | 6 | MDI2- |
| 3 | MDI1+ | 7 | MDI3+ |
| 4 | MDI1- | 8 | MDI3- |
| ACT | Activity link LED (Orange)<br>OFF: No link<br>Blinking: data activity detected | | |
| Speed | Speed LED<br>Orange: 1000M Link established; data activity detected<br>Green: 100M Link established; data activity detected | | |




**M12 (X Code)**

The functions of all M12 are described below:

| Pins | LAN Signal | Pins | LAN Signal |
|---|---|---|---|
| 1 | MDI0+ | 5 | MDI3+ |
| 2 | MDI0- | 6 | MDI3- |
| 3 | MDI1+ | 7 | MDI2- |
| 4 | MDI1- | 8 | MDI2+ |
| LED | Activity link LED<br>Orange Blinking: 1000M Link established; data activity detected<br>Green Blinking: 100M Link established; data activity detected | | |



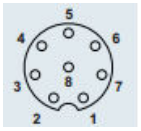

### 3.1.5 USB 3.0 Connector

The Universal Serial Bus connectors are compliant with USB 3.0 (5 GB/s), ideal for connecting USB peripherals such as scanners, cameras and other USB devices. Pin definition follows ***USB Implementers Forum, Inc***.

#### M12 (A Code)

The functions of all M12 are described below:

| Pins | Signal | Pins | Signal |
|---|---|---|---|
| 1 | TX+ | 5 | RX- |
| 2 | D- | 6 | RX+ |
| 3 | D+ | 7 | TX- |
| 4 | Vbus | 8 | GND |




### 3.1.6 Audio Connector

These two 3.5mm audio jacks are ideal for connecting ***TRS*** stereo plugs for Audio Mic-In and Audio Line-out.

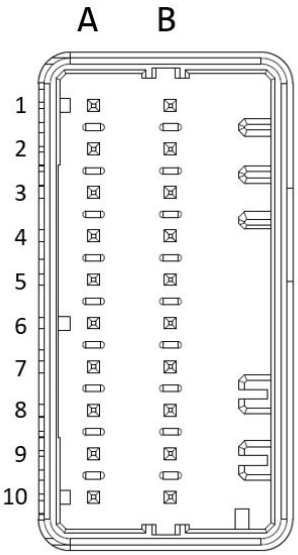
| Pins | Signals |
|---|---|
| MIC | Microphone In |
| Line out | Line Out |

### 3.1.7 Digital I/O (J1, J2)

The ROBOX500 supports 8CH isolated digital outputs and 2CH SSR, 16CH isolated digital inputs.

**J1：Digital Output**

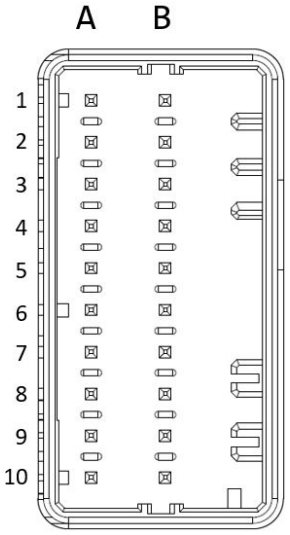
| PIN | Signal |
|---|---|
| A1 | DO0 |
| A2 | DO1 |
| A3 | DO2 |
| A4 | DO3 |
| A5 | DO4 |
| A6 | DO5 |
| A7 | DO6 |
| A8 | DO7 |
| A9 | DO GA EGND |
| A10 | DO GA COM+ |




| PIN | Signal |
|---|---|
| B1 | Vout1 |
| B2 | Vout2 |
| B3 | Vin GND |
| B4 | Vin + |
| B5 | CAN2 GND |
| B6 | CAN2 H |
| B7 | CAN2 L |
| B8 | CAN1 GND |
| B9 | CAN1 H |
| B10 | CAN1 L |

**J2：Digital Input**

| PIN | Signal |
|---|---|
| A1 | DI0 |
| A2 | DI1 |
| A3 | DI2 |
| A4 | DI3 |
| A5 | DI4 |
| A6 | DI5 |
| A7 | DI6 |
| A8 | DI7 |
| A9 | GND |
| A10 | N/A |




| PIN | Signal |
|---|---|
| B1 | DI8 |
| B2 | DI9 |
| B3 | DI10 |
| B4 | DI11 |
| B5 | DI12 |
| B6 | DI13 |
| B7 | DI14 |
| B8 | DI15 |
| B9 | GND |
| B10 | NA |

**【Note】：** ***Please refer to Appendix B for more information about Digital I/O***

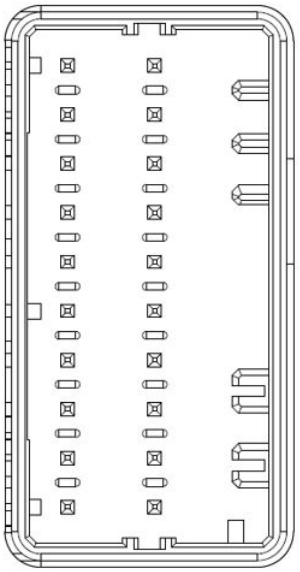
### 3.1.8 SIM Card Slots (S1)

The ROBOX500 includes one SIM slot on the front side of the system for inserting a SIM Card. It is mainly used for 3G/4G/LTE wireless network applications on CN10 and CN12. PIN definition follows ISO/IEC 7810:2003, ID-000.

### 3.1.9 CAN Bus (J1)

The ROBOX500 supports CAN 2.0A/B.

| PIN | Signal |
|---|---|
| A10 | DO GA COM+ |
| A9 | DO GA EGND |
| A8 | DO7 |
| A7 | DO6 |
| A6 | DO5 |
| A5 | DO4 |
| A4 | DO3 |
| A3 | DO2 |
| A2 | DO1 |
| A1 | DO0 |



| PIN | Signal |
|---|---|
| B10 | CAN1 L |
| B9 | CAN1 H |
| B8 | CAN1 GND |
| B7 | CAN2 L |
| B6 | CAN2 H |
| B5 | CAN2 GND |
| B4 | Vin + |
| B3 | Vin_GND |
| B2 | Vout2 |
| B1 | Vout1 |

# SECTION 4
# BIOS SETUP UTILITY

This section provides users with detailed descriptions in terms of how to set up basic system configurations through the BIOS setup utility.

## 4.1 Starting

To enter the setup screens, follow the steps below:

1. Turn on the computer and press the <Del> key immediately.
2. After press the <Del> key, the main BIOS setup menu displays. Users can access to other setup screens, such as the Advanced and Chipset menus, from the main BIOS setup menu.

It is strongly recommended that users should avoid changing the chipset's defaults. Both AMI and system manufacturer have carefully set up these defaults that provide the best performance and reliability.

## 4.2 Navigation Keys

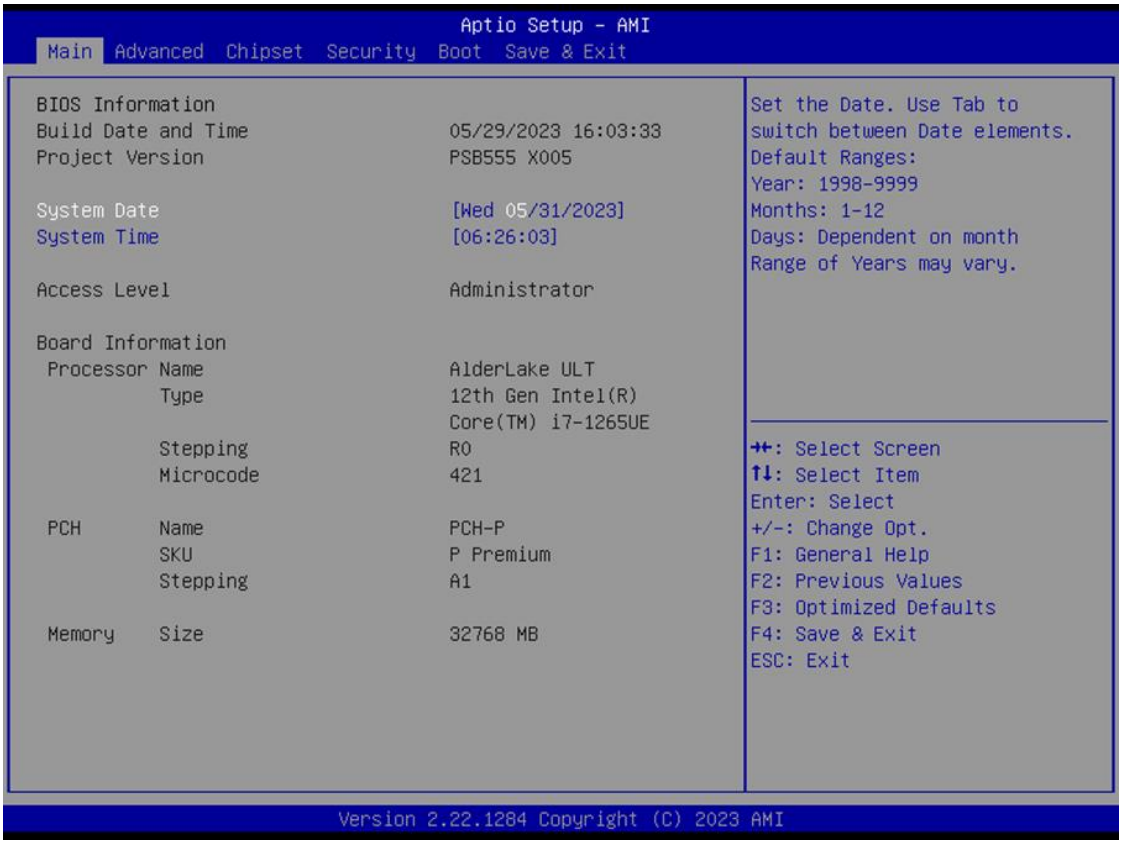
The BIOS setup/utility uses a key-based navigation system called hot keys. Most of the BIOS setup utility hot keys can be used at any time during the setup navigation process. These keys include <F1>, <F2>, <Enter>, <ESC>, <Arrow> keys, and so on.

**【Note】:** ***Some of the navigation keys differ from one screen to another.***

| Hot Keys | Descriptions |
|---|---|
| →← **Left/Right** | The Left and Right <Arrow> keys allow users to select a setup screen. |
| ↑↓ **Up/Down** | The Up and Down <Arrow> keys allow users to select a setup screen or sub-screen. |
| +– **Plus/Minus** | The Plus and Minus <Arrow> keys allow users to change the field value of a particular setup item. |
| **Tab** | The <Tab> key allows users to select setup fields. |
| **F1** | The <F1> key allows users to display the General Help screen. |
| **F2** | The <F2> key allows users to Load Previous Values. |
| **F3** | The <F3> key allows users to Load Optimized Defaults. |
| **F4** | The <F4> key allows users to save any changes they made and exit the Setup. Press the <F4> key to save any changes. |
| **Esc** | The <Esc> key allows users to discard any changes they made and exit the Setup. Press the <Esc> key to exit the setup without saving any changes. |
| **Enter** | The <Enter> key allows users to display or change the setup option listed for a particular setup item. The <Enter> key can also allow users to display the setup sub- screens. |

## 4.3 Main Menu

The Main Menu screen is the first screen users see when entering the setup utility. Users can always return to the Main setup screen by selecting the Main tab. System Time/Date can be set up as described below. The Main BIOS setup screen is also shown below.




**BIOS Information**
Display the auto-detected BIOS information.

**System Language**
Choose the system default language.

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

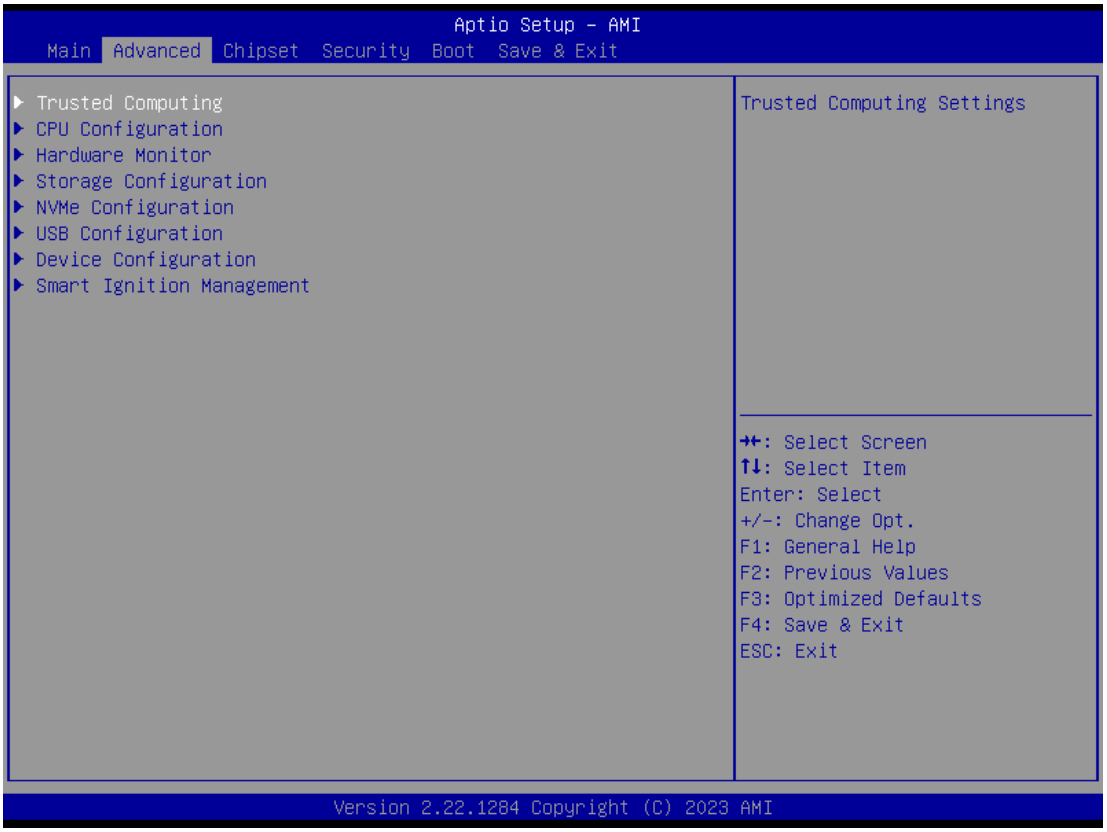
**Access Level**
Display the access level of the current user.

## 4.4 Advanced Menu

The Advanced menu also allows users to set configuration of the CPU and other system devices. Users can select any items in the left frame of the screen to go to sub menus:

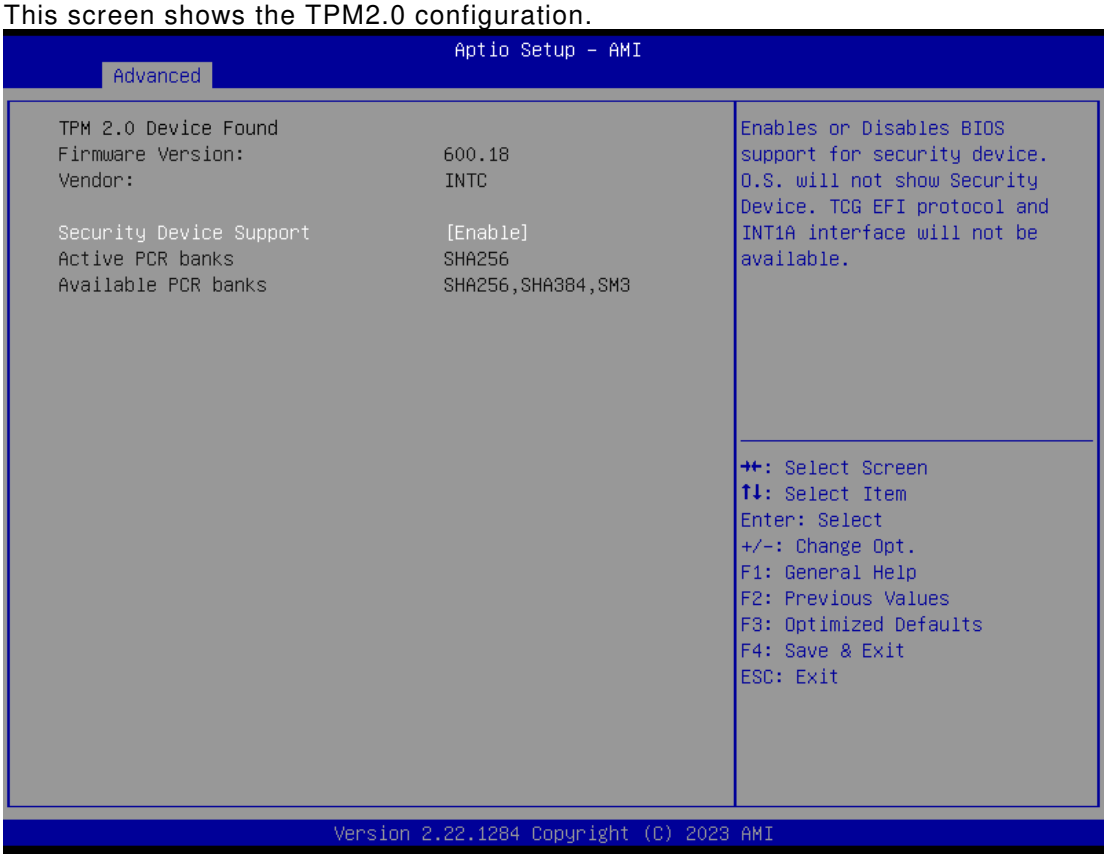
- ► Trusted Computing
- ► CPU Configuration
- ► Hardware Monitor
- ► NVMe Configuration
- ► USB Configuration
- ► Device Configuration
- ► Smart Ignition Management

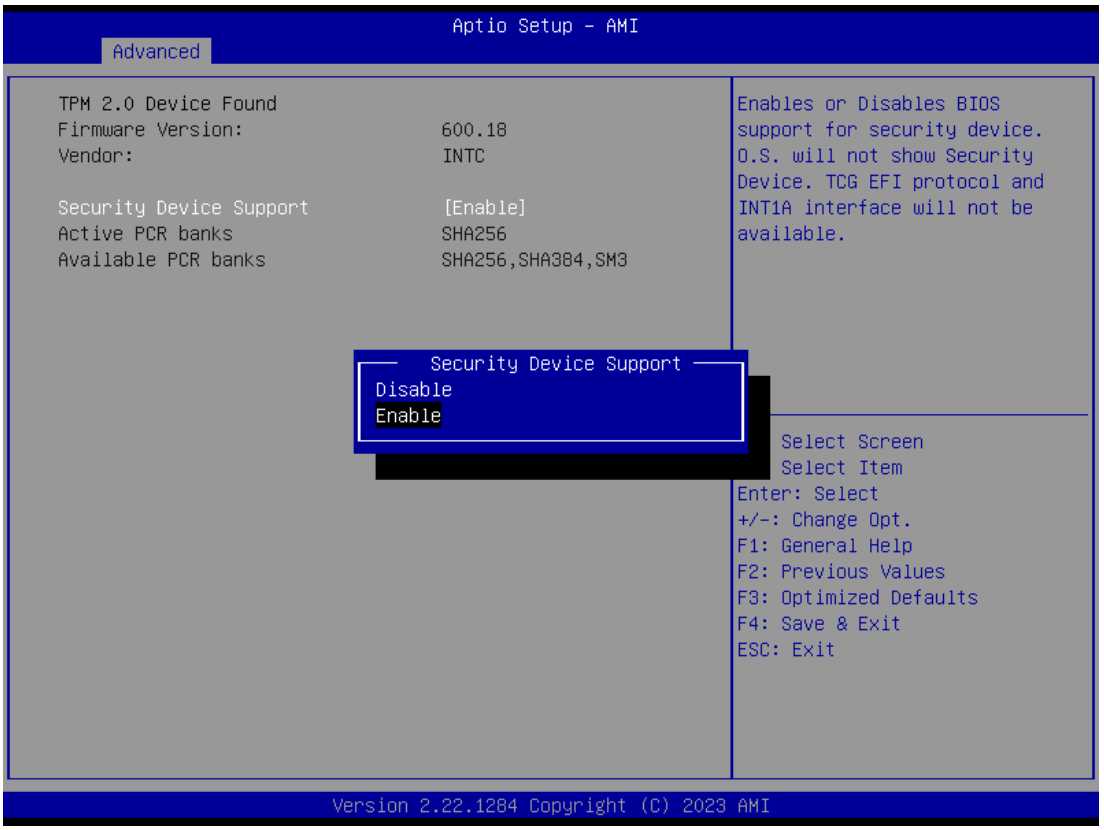
For items marked with "►", please press <Enter> for more options.



## Trusted Computing

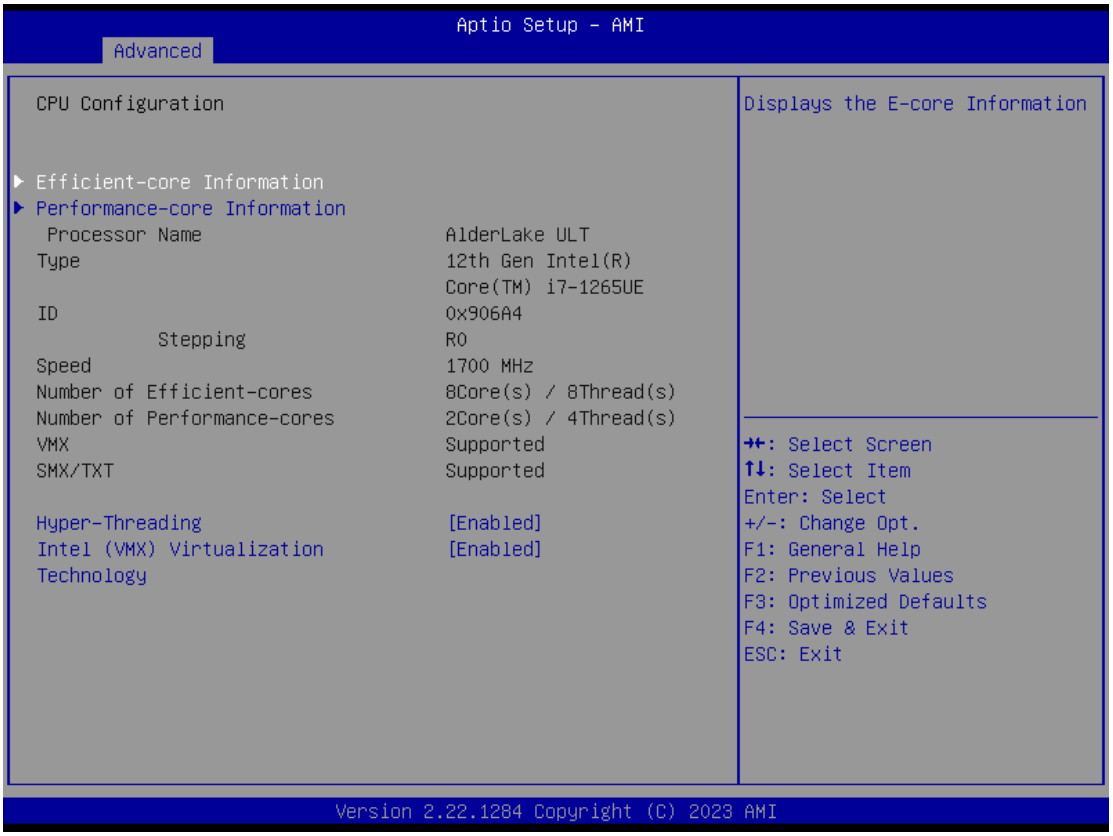
This screen shows the TPM2.0 configuration.



## CPU Configuration

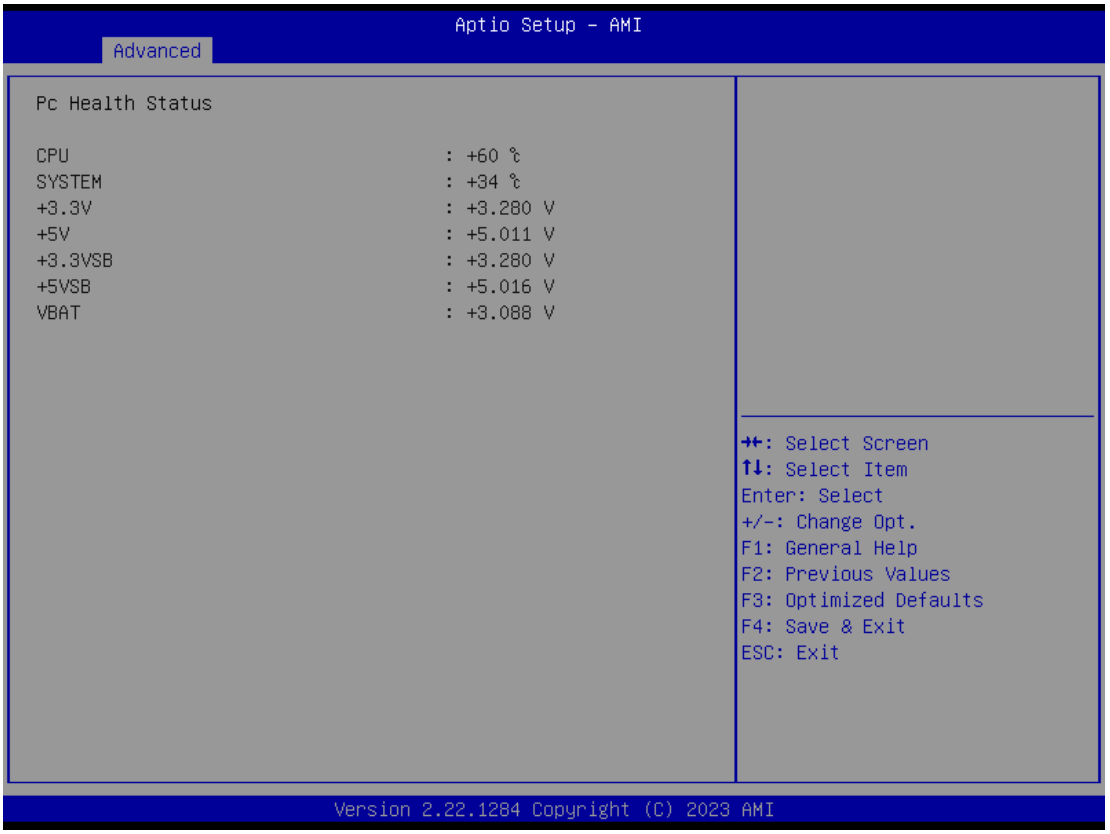
This screen shows the CPU version and its detailed information.




**Intel Virtualization Technology**
It allows a hardware platform to run multiple operating systems separately and simultaneously, enabling one system to virtually function as several systems.

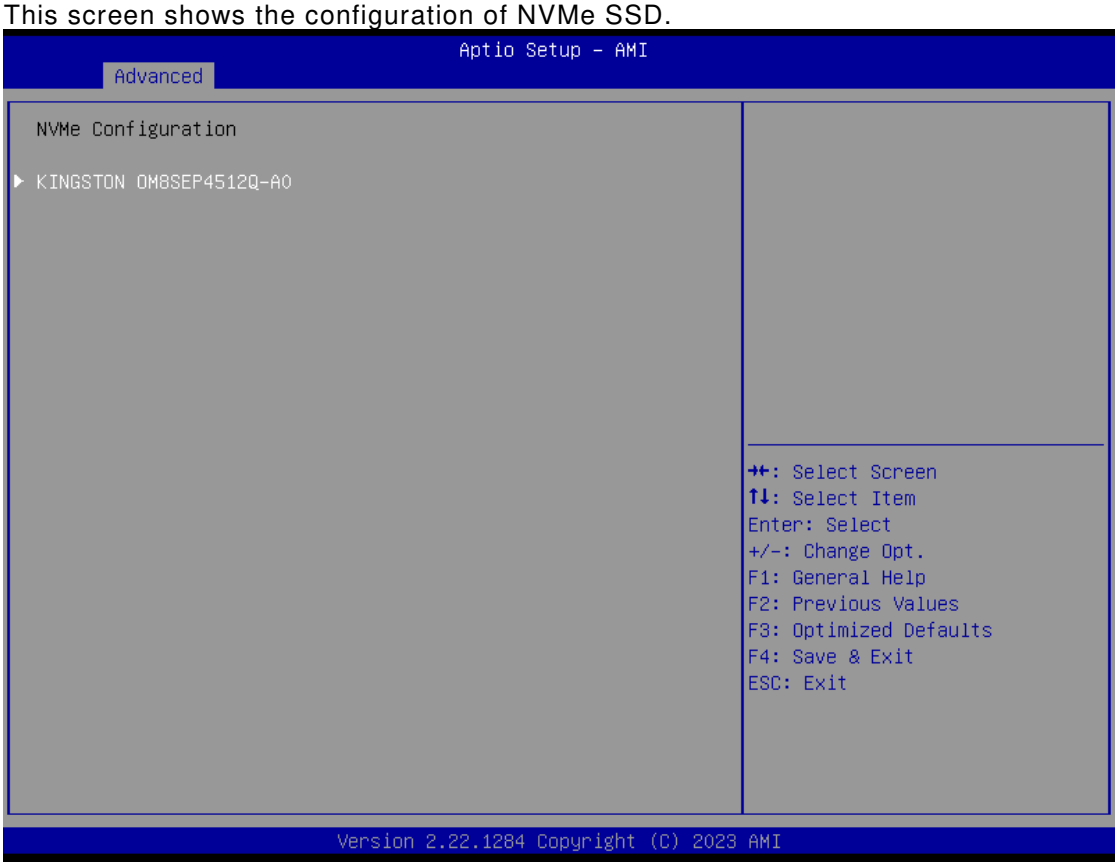
## Hardware Monitor

This screen displays the temperature of system and CPU and system voltages (VCORE, +3.3V, +12V and +5V).



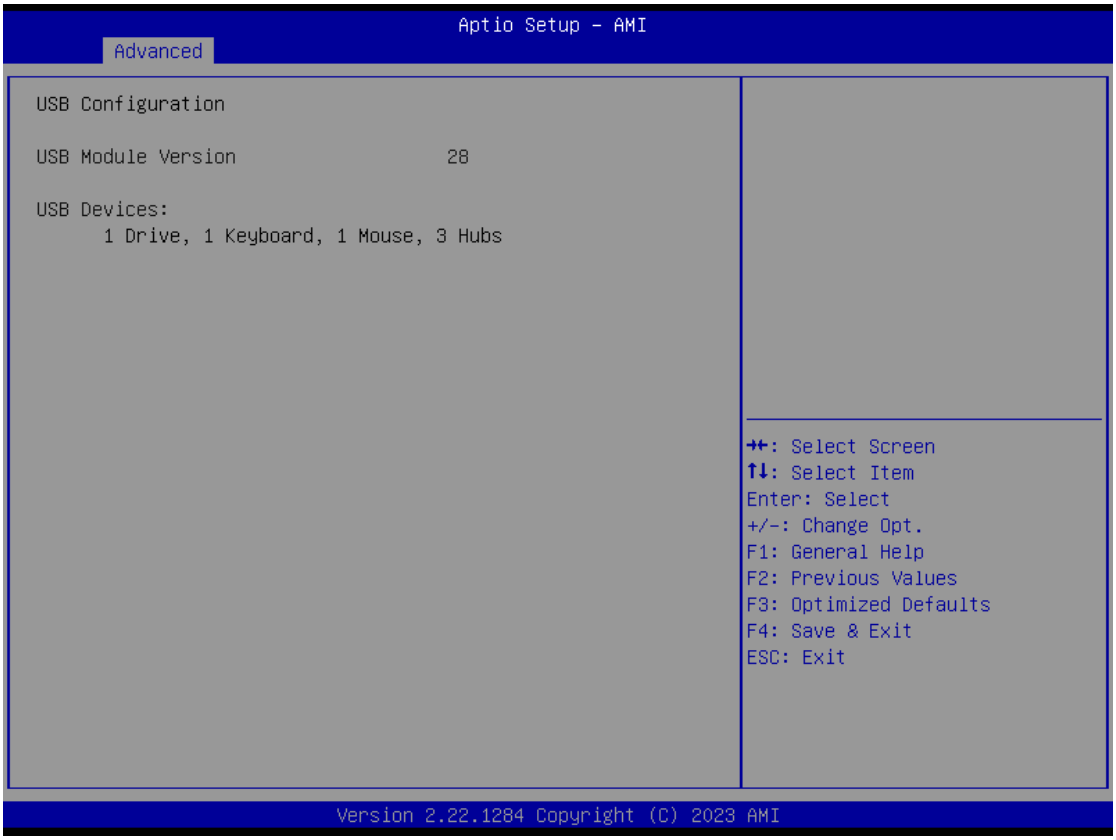
## NVMe Configuration

This screen shows the configuration of NVMe SSD.



## USB Configuration

This screen specifies USB settings.

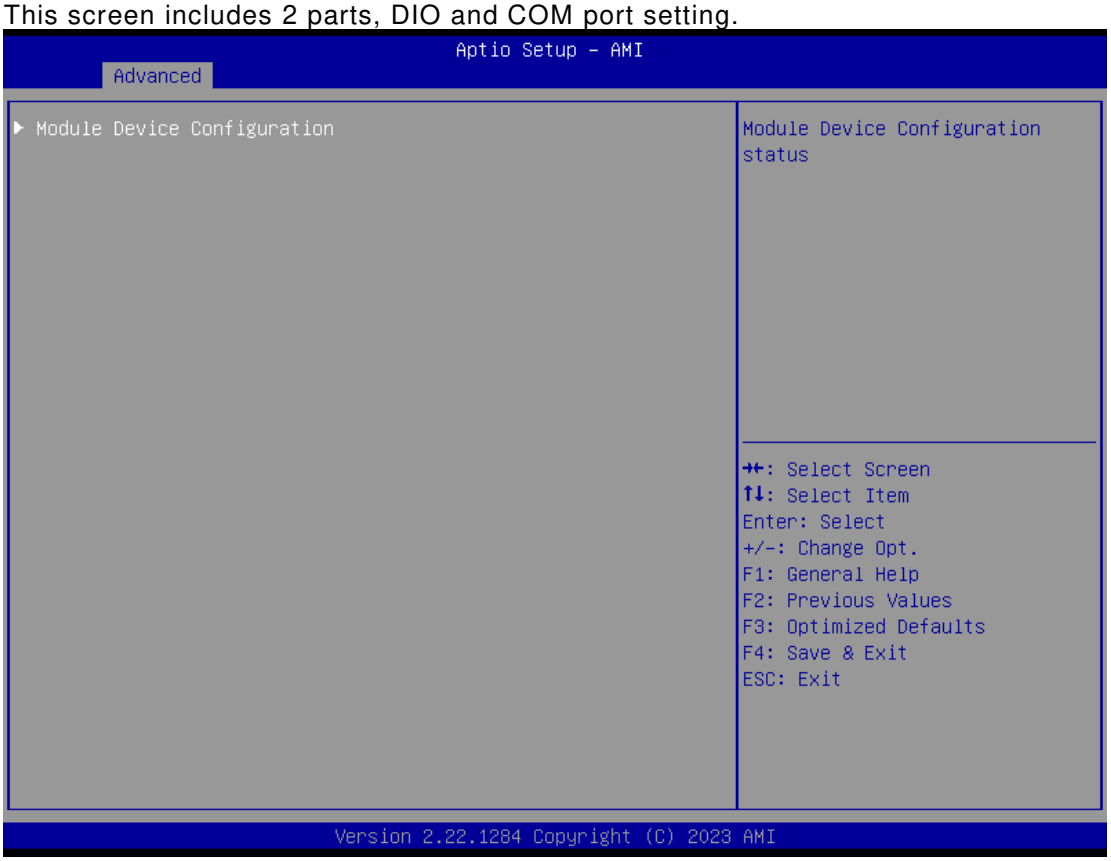



### USB Devices

Display all detected USB devices.

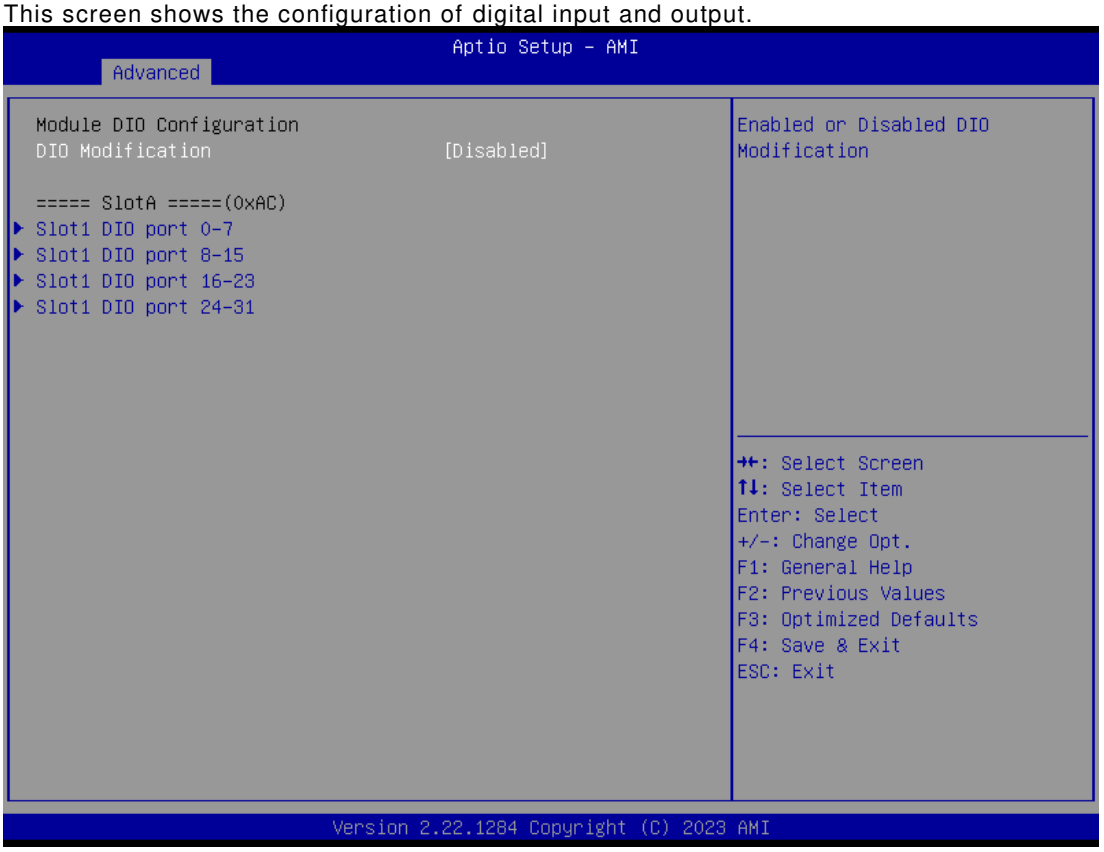
## Module Device Configuration

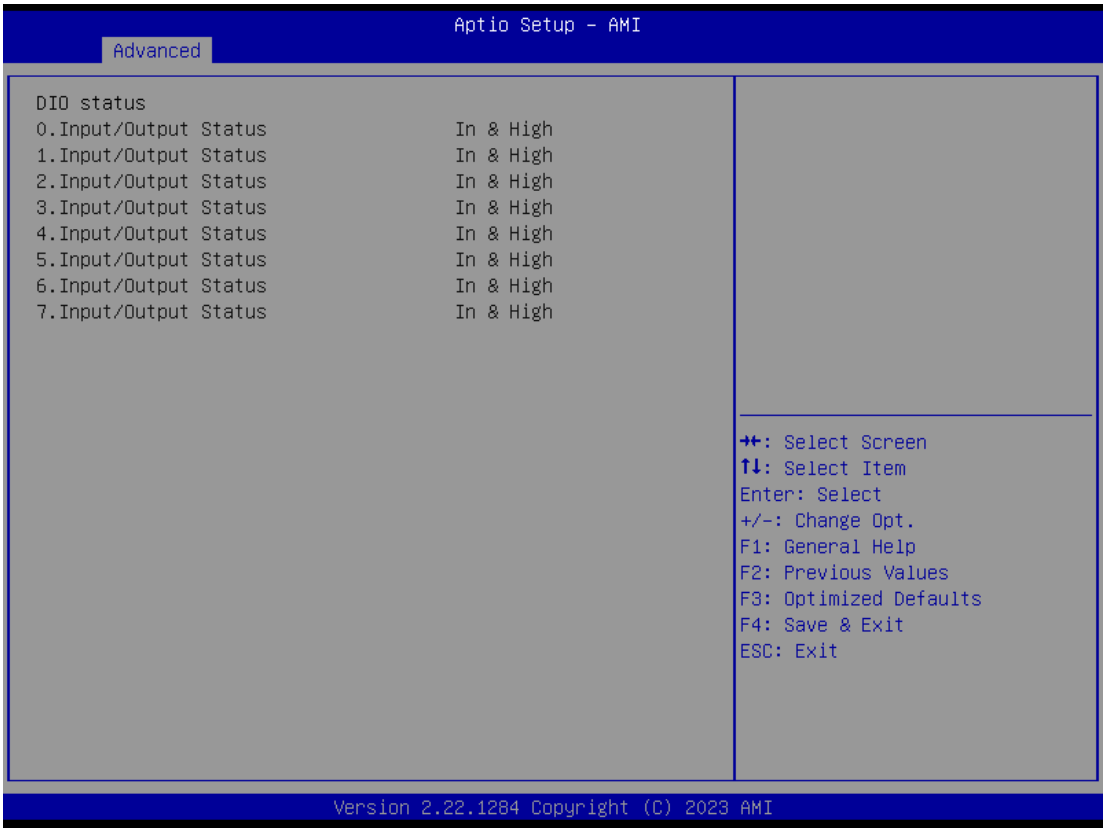
This screen includes 2 parts, DIO and COM port setting.

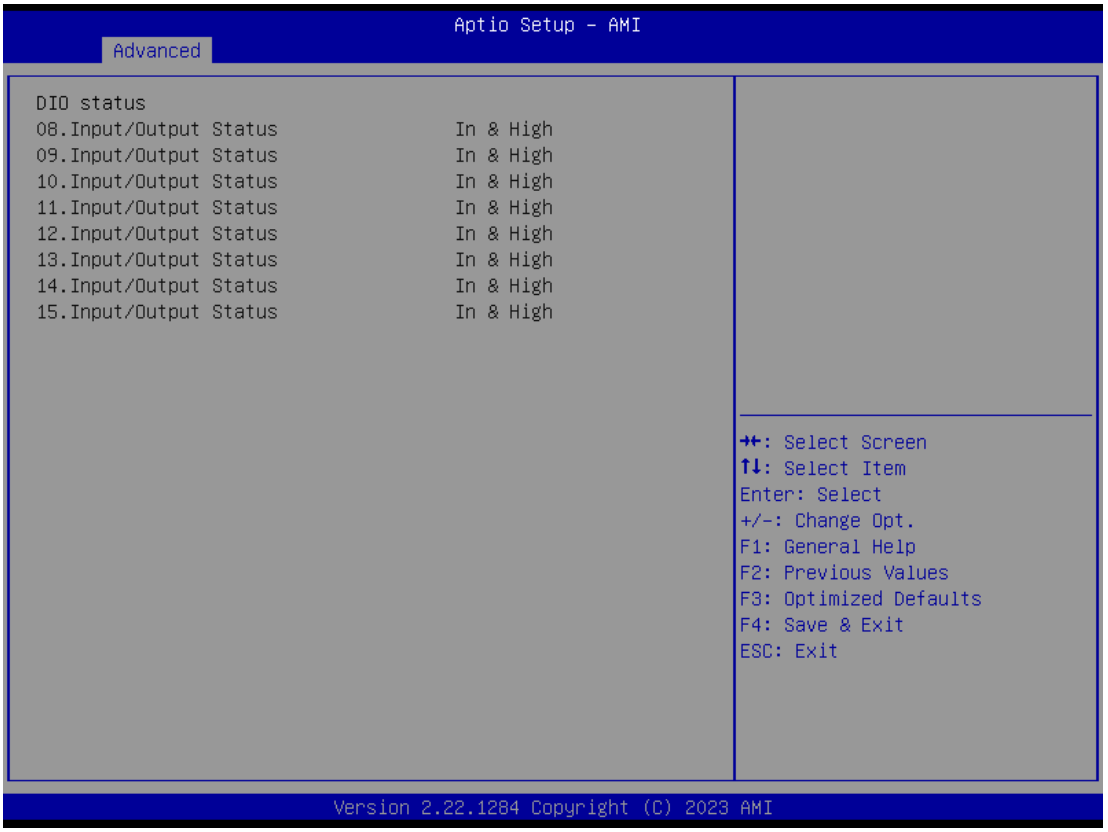


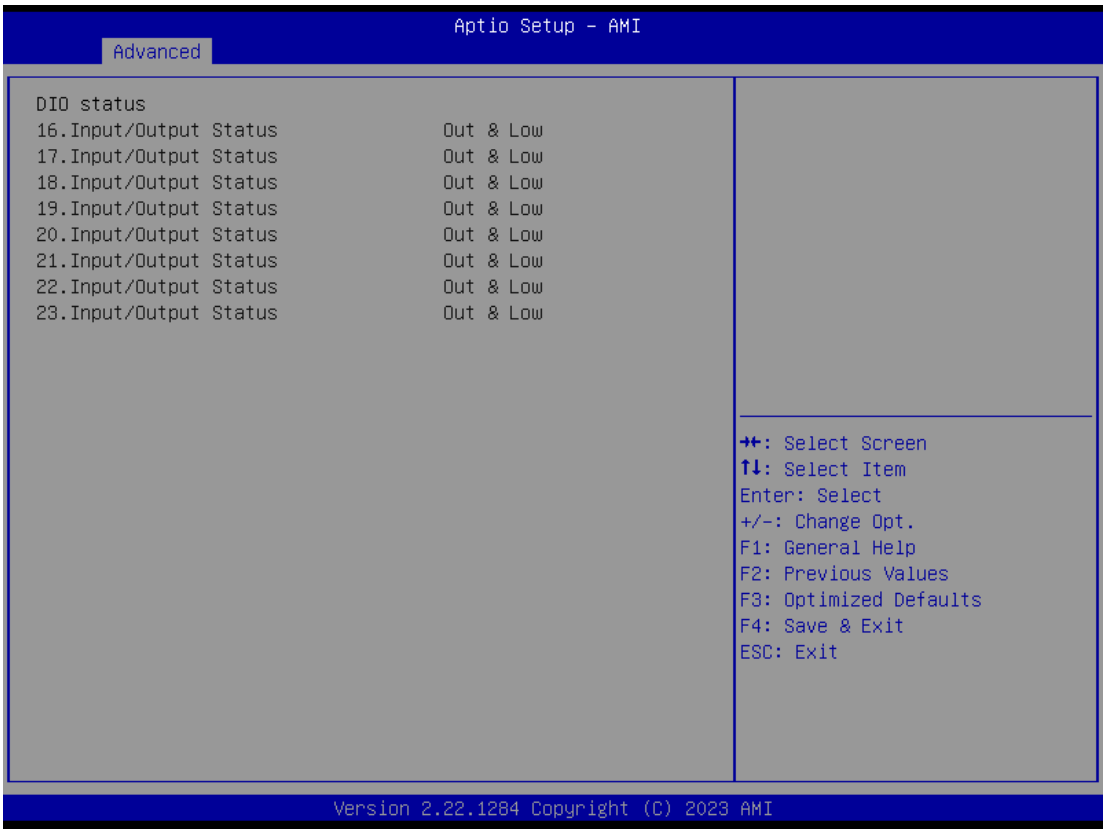

## DIO Configuration

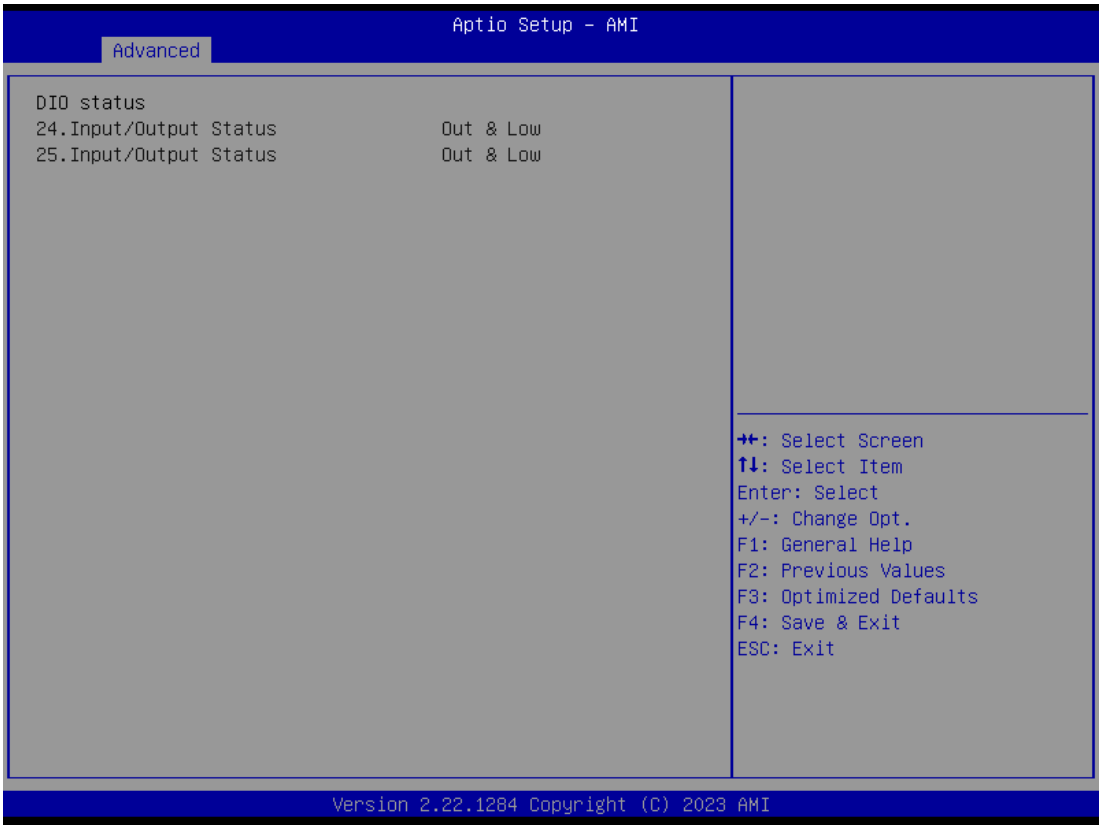
This screen shows the configuration of digital input and output.



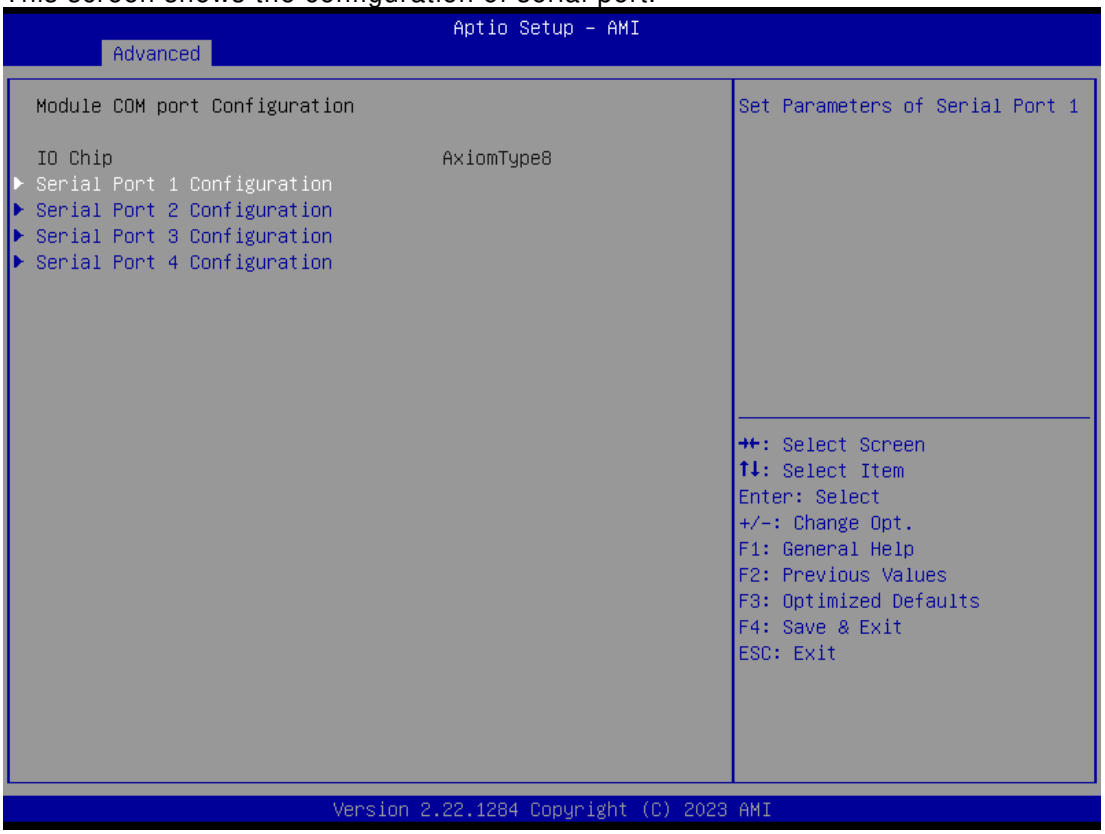

Aptio Setup – AMI
Advanced
DIO status
08.Input/Output Status In & High
09.Input/Output Status In & High
10.Input/Output Status In & High
11.Input/Output Status In & High
12.Input/Output Status In & High
13.Input/Output Status In & High
14.Input/Output Status In & High
15.Input/Output Status In & High
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

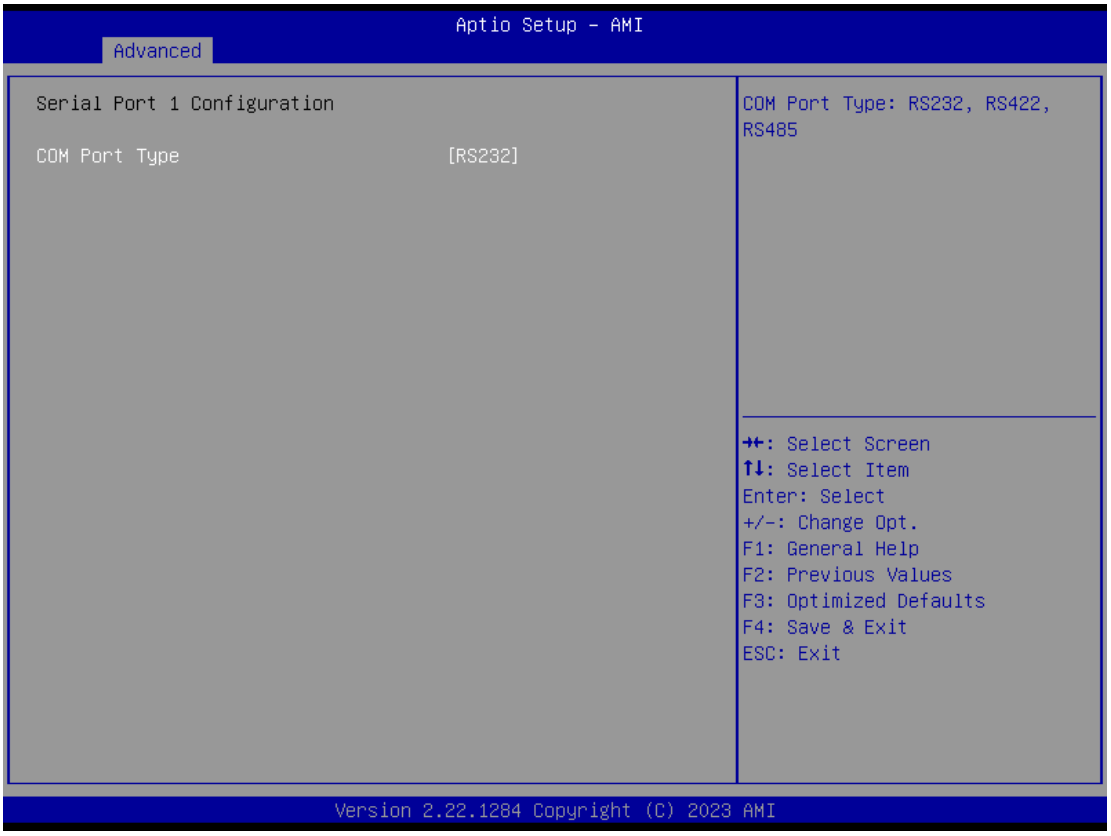

Aptio Setup – AMI
Advanced
DIO status
16.Input/Output Status Out & Low
17.Input/Output Status Out & Low
18.Input/Output Status Out & Low
19.Input/Output Status Out & Low
20.Input/Output Status Out & Low
21.Input/Output Status Out & Low
22.Input/Output Status Out & Low
23.Input/Output Status Out & Low
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

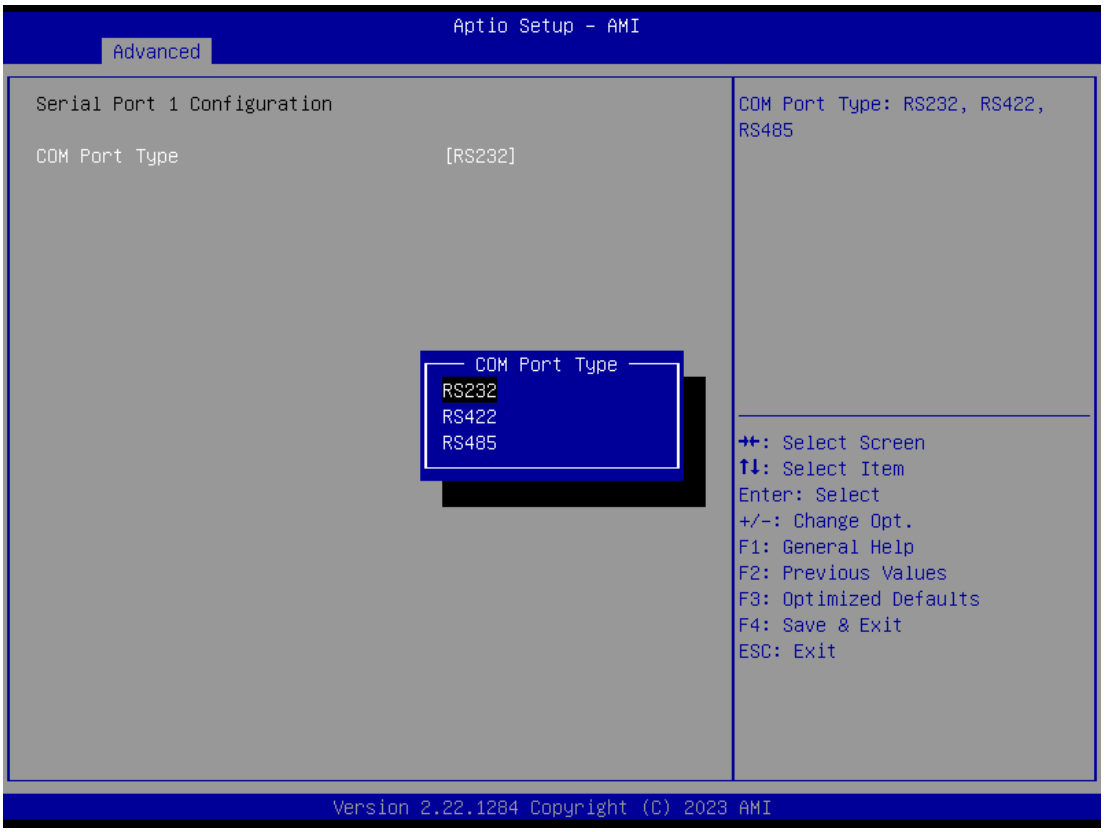



## Serial port configuration

This screen shows the configuration of serial port.



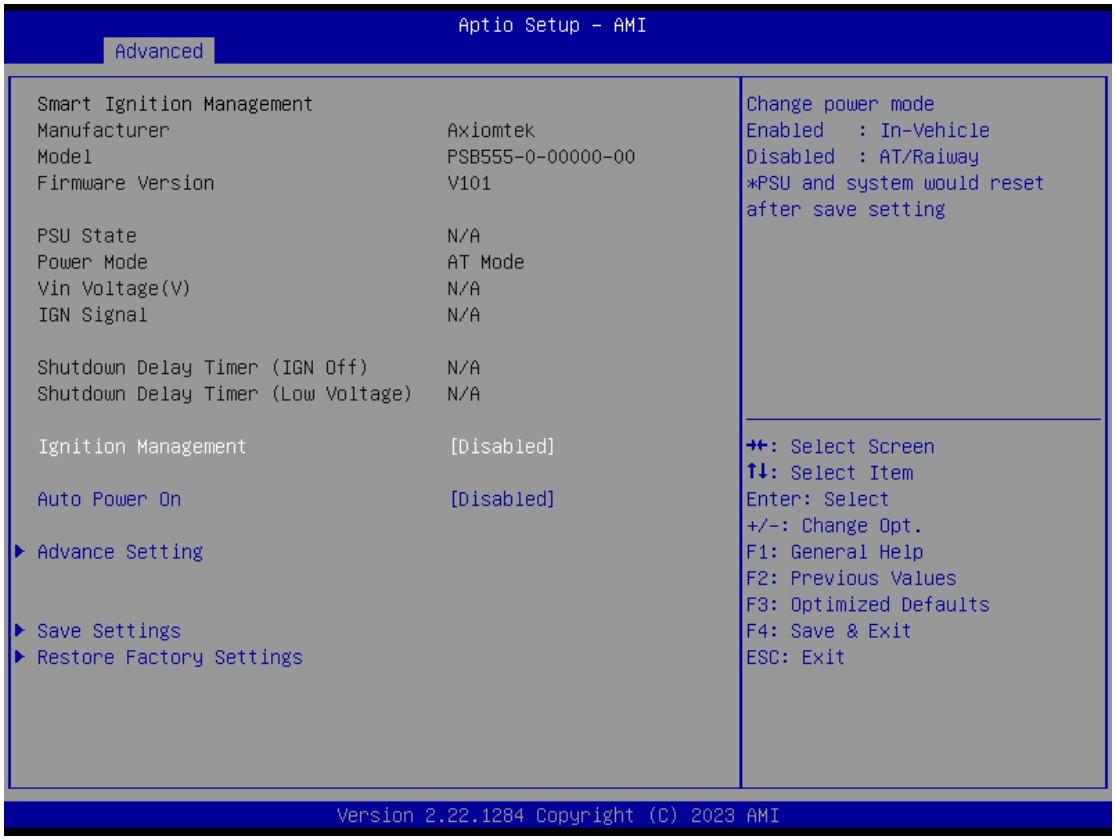

Aptio Setup – AMI
Advanced
Serial Port 1 Configuration
COM Port Type [RS232]
COM Port Type: RS232, RS422, RS485
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup – AMI
Advanced
Serial Port 1 Configuration
COM Port Type [RS232]
COM Port Type: RS232, RS422, RS485
COM Port Type
RS232
RS422
RS485
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

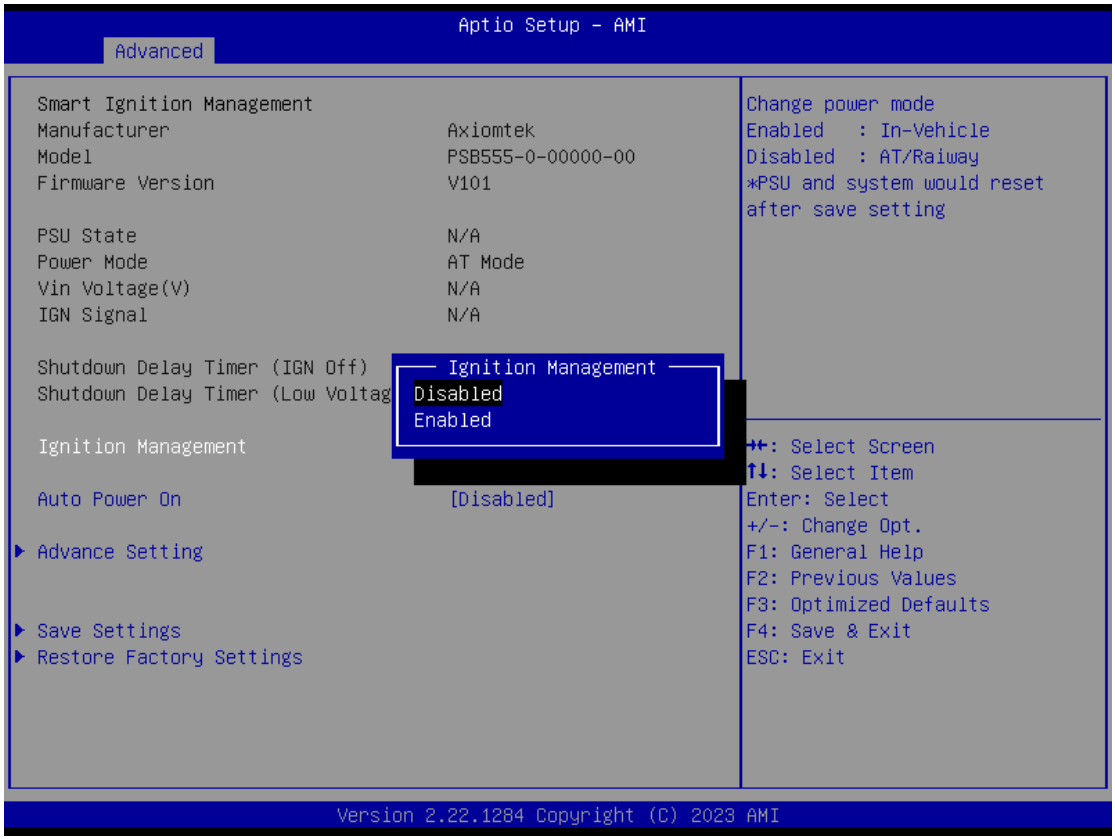
## Smart Ignition Configuration

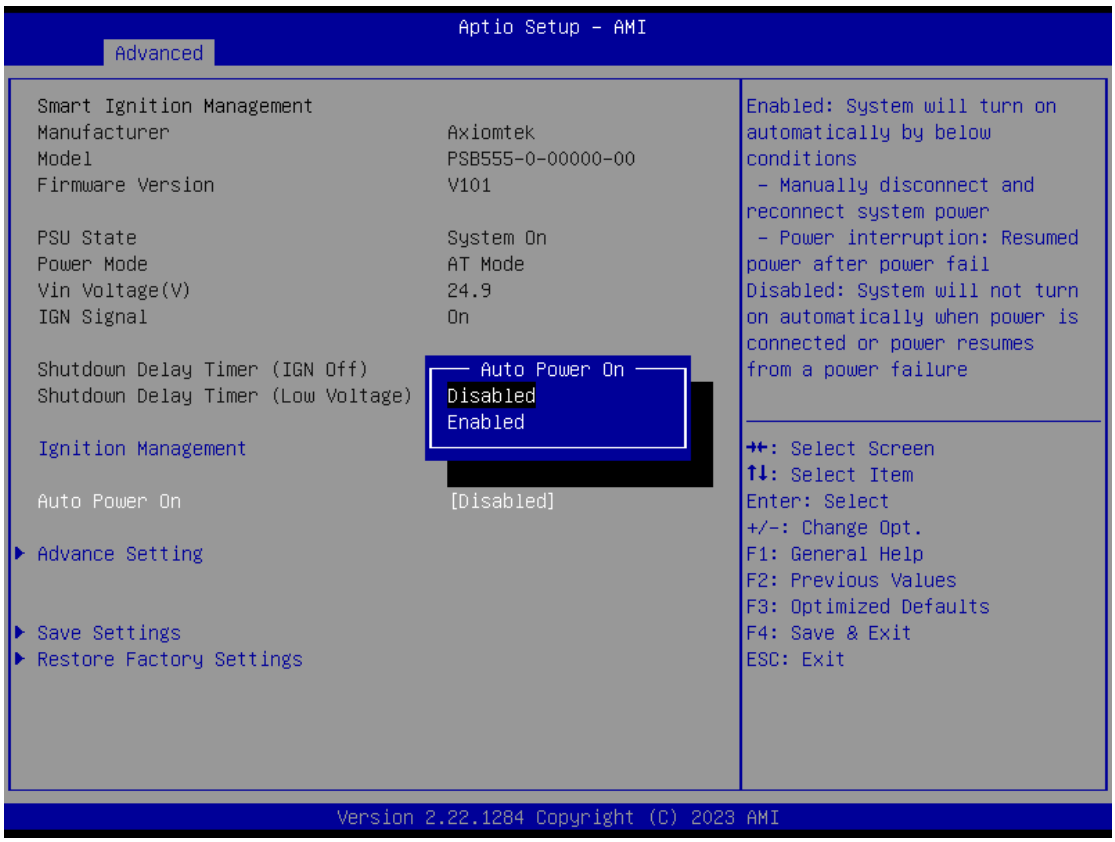
The Smart Ignition Management setting includes Axiomtek's latest technology in ignition management. Please read the description below with pictures.

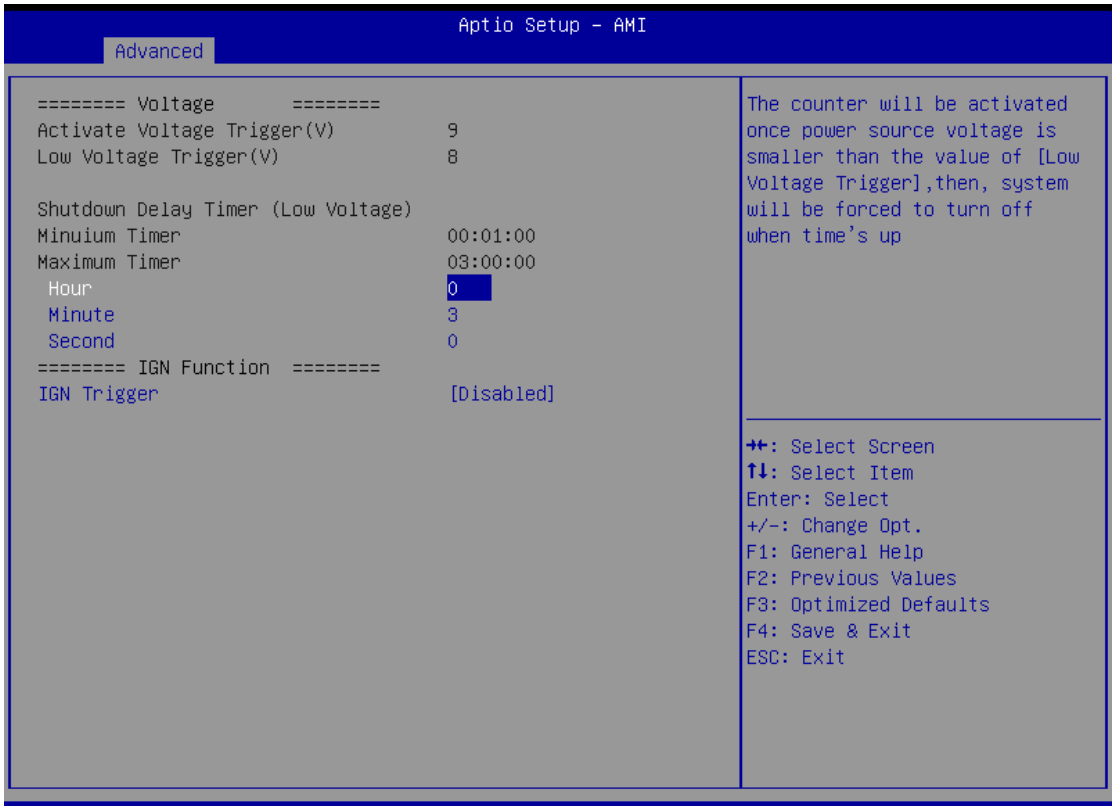
Note:If the user needs to use more in-depth function, please refer to the Smart Ignition technical

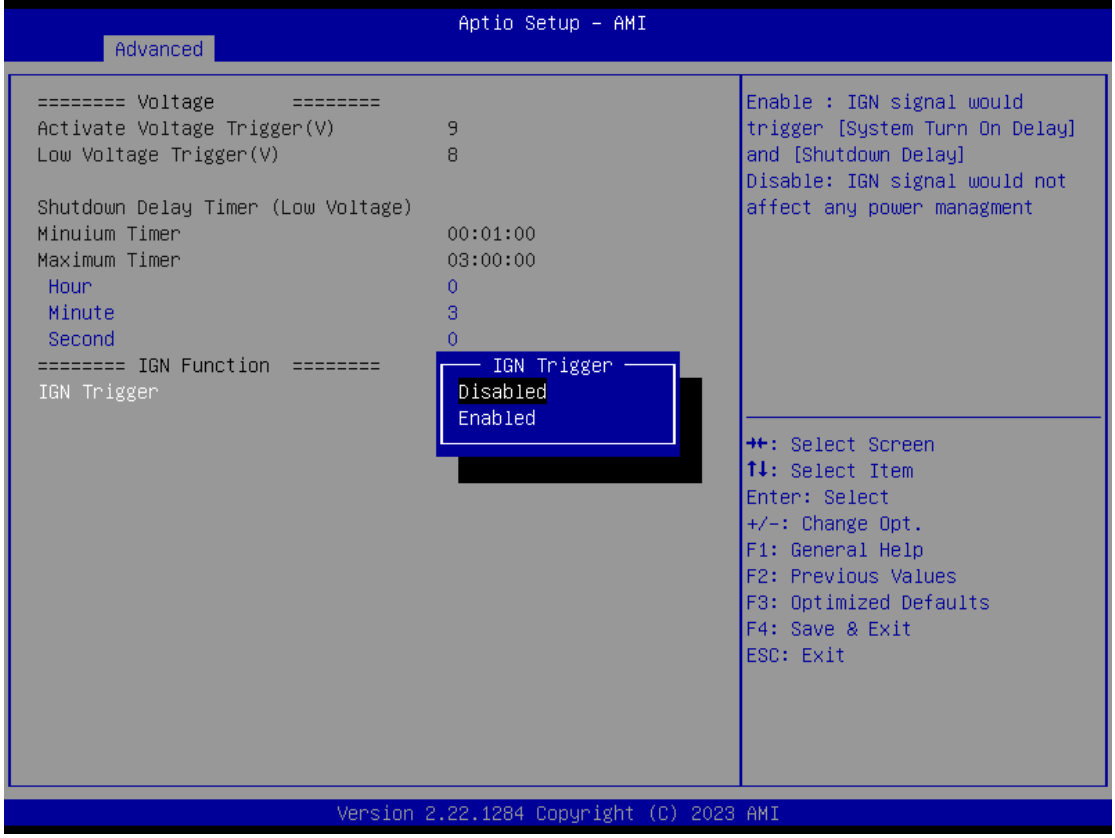


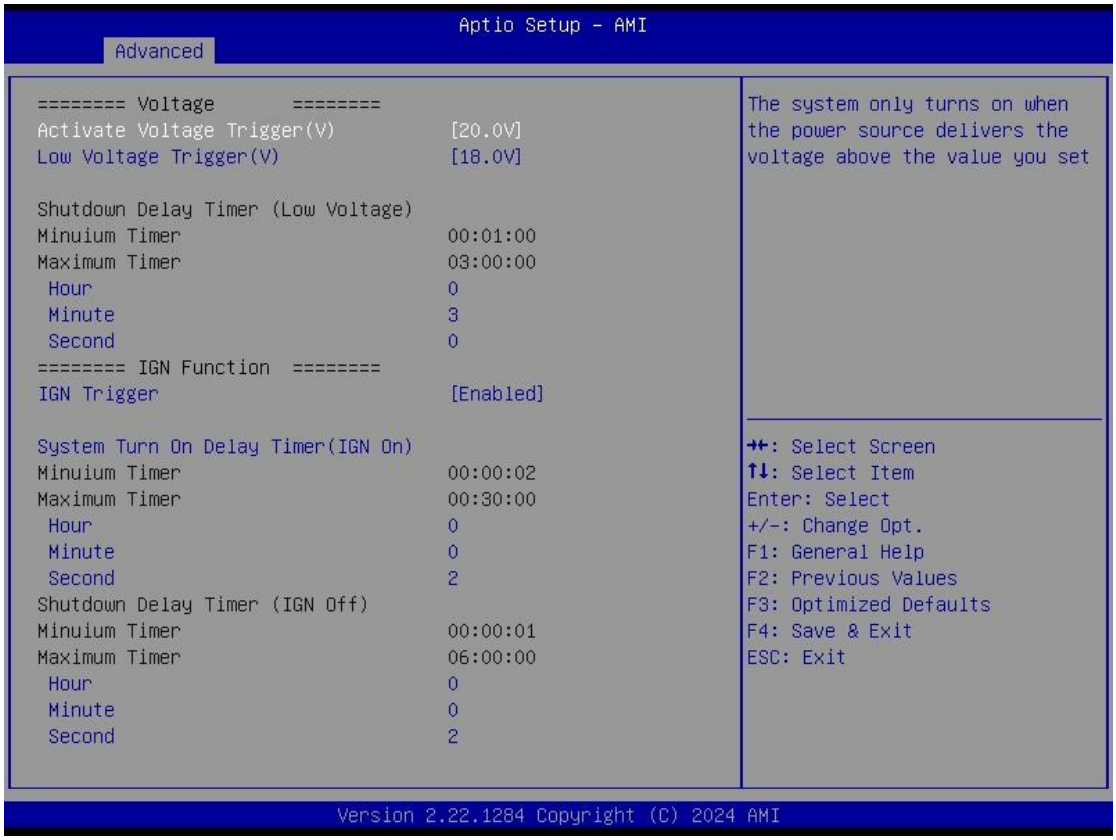

| BIOS menu item | Description |
|---|---|
| **Ignition Management** | **Enabled** (default)<br>Switch to In-Vehicle mode<br>**Disabled**<br>Switch to AT/Railway mode *PSU and system will reset after setting is saved |
| **Auto Power On** | **Enabled**<br>System will turn on automatically under below conditions - Manually disconnects and reconnects system power - Power interruption: Resumes power after power fail<br>**Disabled**<br>System will not turn on automatically when power is connected or when power resumes from a power failure |
| **Advance Setting** | Set system on/off timing and voltage threshold levels |
| **Save Settings** | Save the current settings to PSU |
| **Restore Factory Settings** | Restores factory defaults to remove any incorrect or corrupt settings that might have prevented the system from properly powering on/off. |


Aptio Setup - AMI
Advanced
Smart Ignition Management
Manufacturer Axiomtek
Model PSB555-0-00000-00
Firmware Version V101
PSU State N/A
Power Mode AT Mode
Vin Voltage(V) N/A
IGN Signal N/A
Shutdown Delay Timer (IGN Off)
Shutdown Delay Timer (Low Voltag
Ignition Management
Auto Power On [Disabled]
Advance Setting
Save Settings
Restore Factory Settings
Ignition Management
Disabled
Enabled
Change power mode
Enabled : In-Vehicle
Disabled : AT/Raiway
*PSU and system would reset after save setting
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup - AMI
Advanced
Smart Ignition Management
Manufacturer Axiomtek
Model PSB555-0-00000-00
Firmware Version V101
PSU State System On
Power Mode AT Mode
Vin Voltage(V) 24.9
IGN Signal On
Shutdown Delay Timer (IGN Off)
Shutdown Delay Timer (Low Voltage)
Ignition Management
Auto Power On [Disabled]
Advance Setting
Save Settings
Restore Factory Settings
Auto Power On
Disabled
Enabled
Enabled: System will turn on automatically by below conditions
- Manually disconnect and reconnect system power
- Power interruption: Resumed power after power fail
Disabled: System will not turn on automatically when power is connected or power resumes from a power failure
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

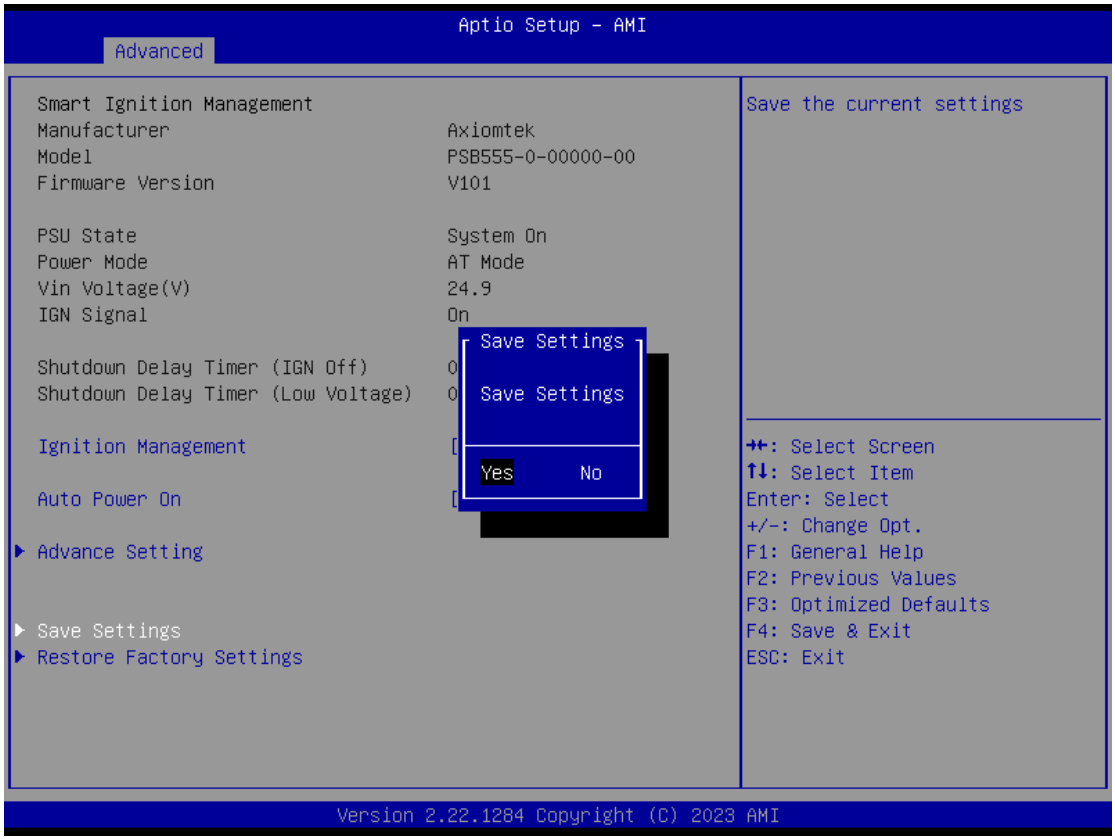

Aptio Setup – AMI
Advanced
======== Voltage ========
Activate Voltage Trigger(V) 9
Low Voltage Trigger(V) 8
Shutdown Delay Timer (Low Voltage)
Minuium Timer 00:01:00
Maximum Timer 03:00:00
Hour 0
Minute 3
Second 0
======== IGN Function ========
IGN Trigger [Disabled]
The counter will be activated once power source voltage is smaller than the value of [Low Voltage Trigger],then, system will be forced to turn off when time's up
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

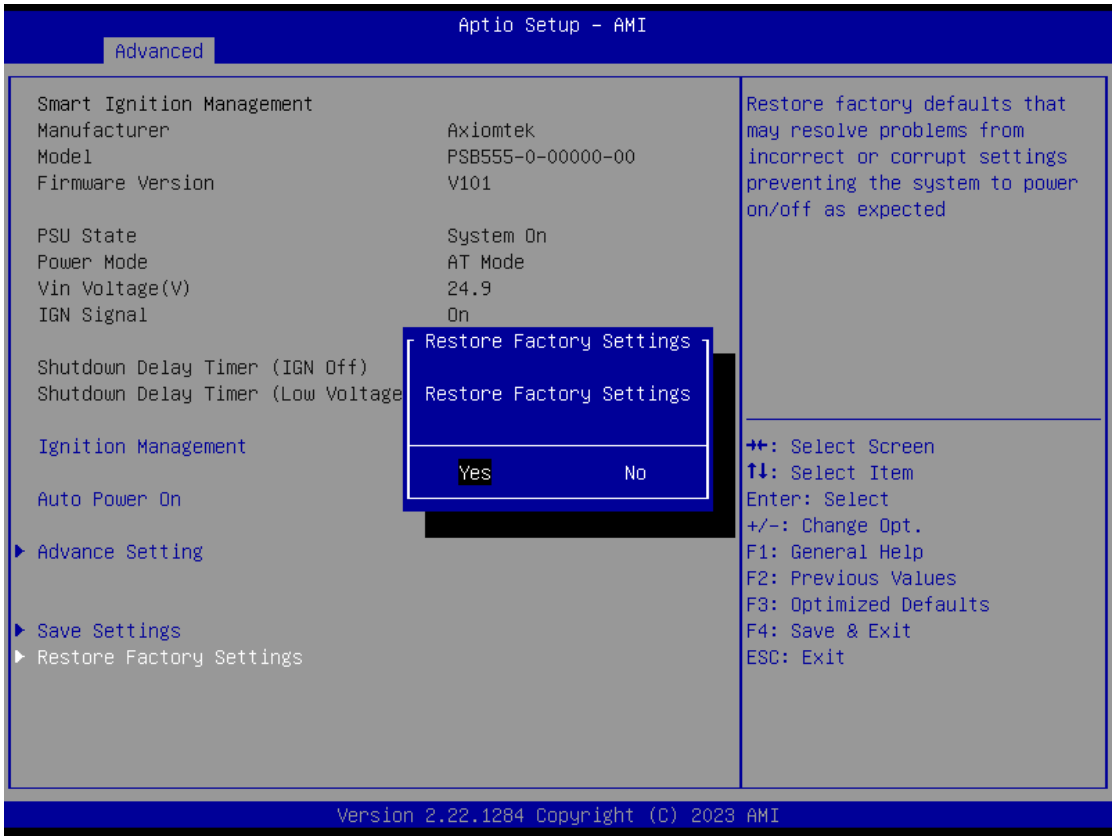

Aptio Setup – AMI
Advanced
======== Voltage ========
Activate Voltage Trigger(V) 9
Low Voltage Trigger(V) 8
Shutdown Delay Timer (Low Voltage)
Minuium Timer 00:01:00
Maximum Timer 03:00:00
Hour 0
Minute 3
Second 0
======== IGN Function ========
IGN Trigger
IGN Trigger
Disabled
Enabled
Enable : IGN signal would trigger [System Turn On Delay] and [Shutdown Delay]
Disable: IGN signal would not affect any power managment
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI




| BIOS menu item | Description |
|---|---|
| **Activate Voltage Trigger** | The system only turns on when the voltage delivered by the power source is higher than the value you set here. |
| **Low Voltage Trigger** | The system will begin countdown stage once voltage drops below the value you set here.<br>If the power source voltage does not come back above the value of [Activate Voltage Trigger] within the time you set for [Shutdown Delay Time (Low Voltage)], the system will shut down and remain off. |
| **Shutdown Delay Timer (Low Voltage)** | The counter will be activated once power source voltage drops below the value defined in [Low Voltage Trigger]. The system will be forced to turn off once timer completes countdown. |
| **IGN Trigger** | Enable<br>IGN signal will trigger [System Turn On Delay] and [Shutdown Delay].<br>Disable<br>IGN signal will not affect any power management. |

| | |
|---|---|
| **System Turn On Delay Timer (IGN On)** | When receiving the IGN signal, the system will be turned on after setup time is counted down.<br>The counter will be reset if IGN is off and on during the system countdown time. |
| **Shutdown Delay Timer (IGN Off)** | When the system is on, IGN voltage goes off, and the system will be gracefully shut down by the operating system after being triggered by the setup timer signal within the time you set.<br>Additionally, if power source voltage is lower than the setup value it will cause the system to turn off as well. |



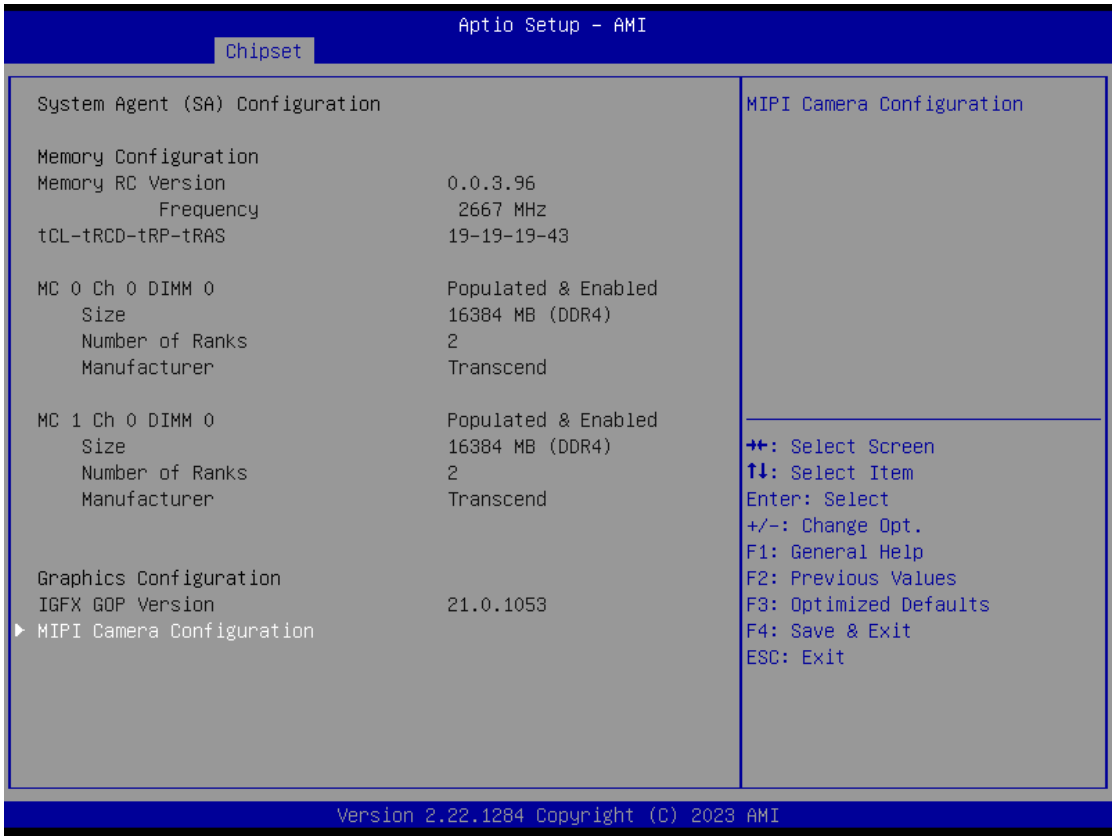

Aptio Setup - AMI
Advanced
Smart Ignition Management
Manufacturer
Axiomtek
Model
PSB555-0-00000-00
Firmware Version
V101
PSU State
System On
Power Mode
AT Mode
Vin Voltage(V)
24.9
IGN Signal
On
Shutdown Delay Timer (IGN Off)
Shutdown Delay Timer (Low Voltage
Ignition Management
Auto Power On
Advance Setting
Save Settings
Restore Factory Settings
Restore Factory Settings
Restore Factory Settings
Yes
No
Restore factory defaults that may resolve problems from incorrect or corrupt settings preventing the system to power on/off as expected
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

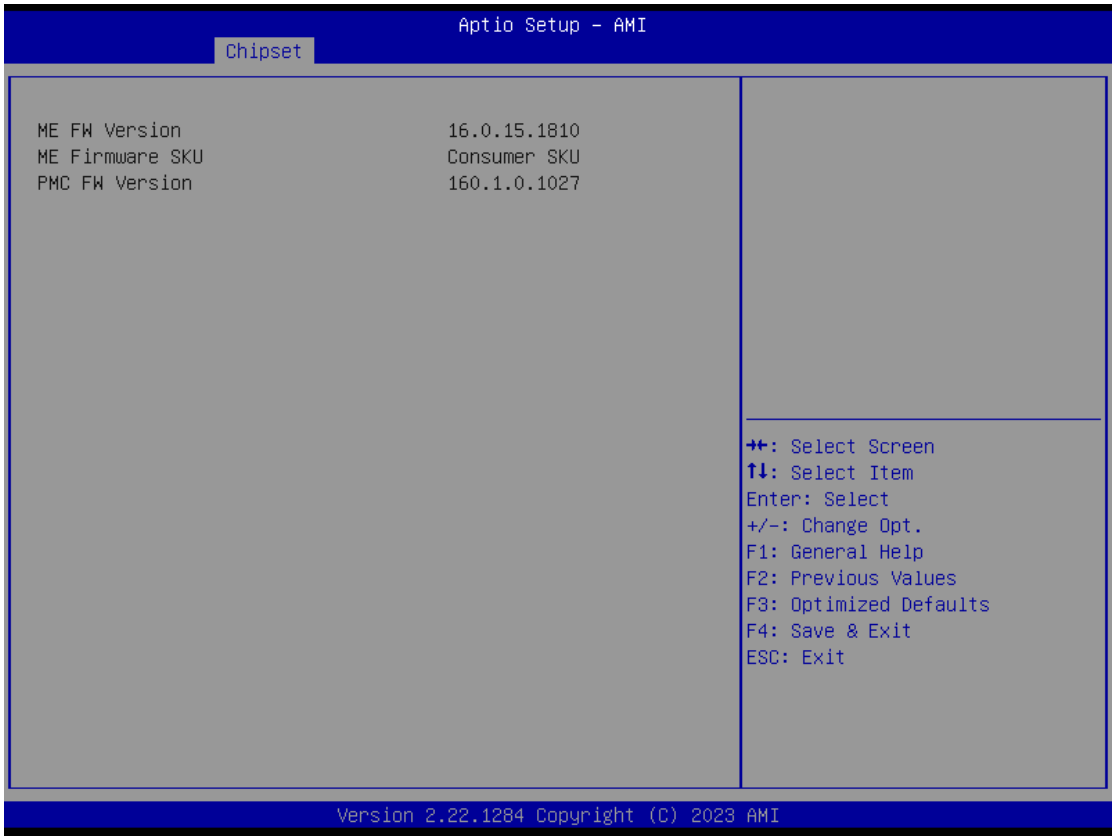
## 4.5 Chipset Menu

The Chipset menu allows users to change the advanced chipset settings. Users can select any of the items in the left frame of the screen to go to the sub menus:

► MIPI Camera Configurations

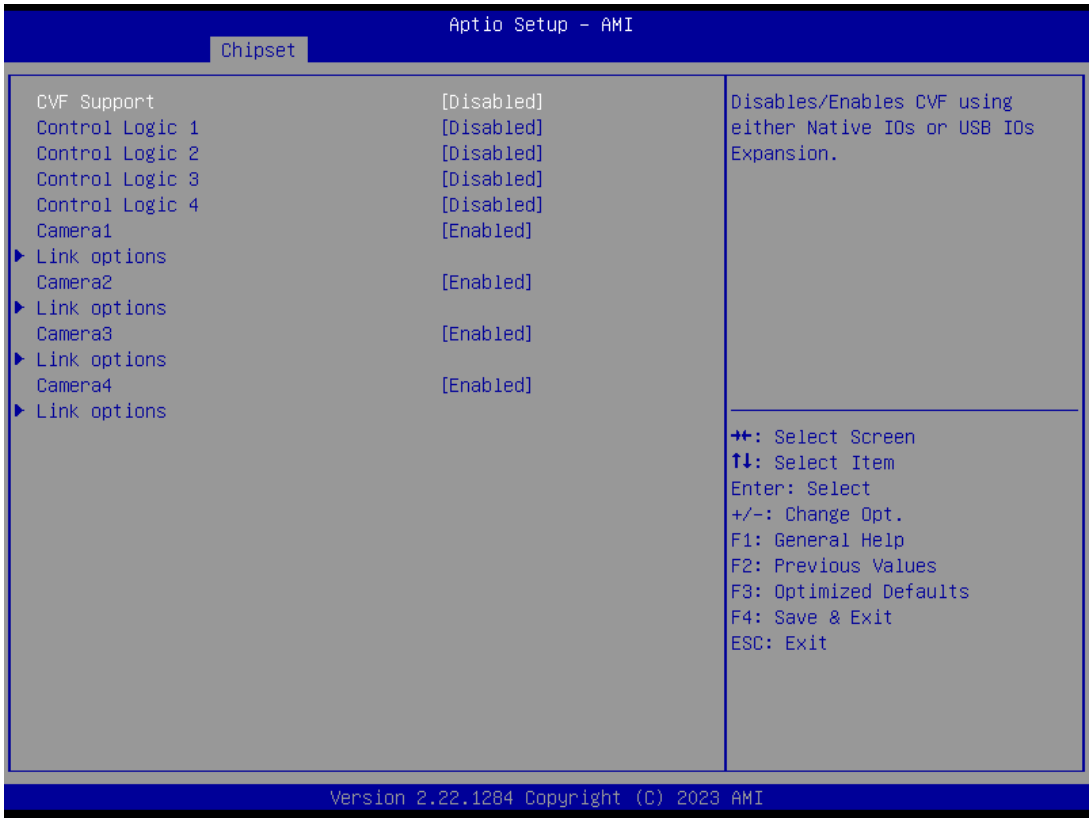
For items marked with "►", please press <Enter> for more options.

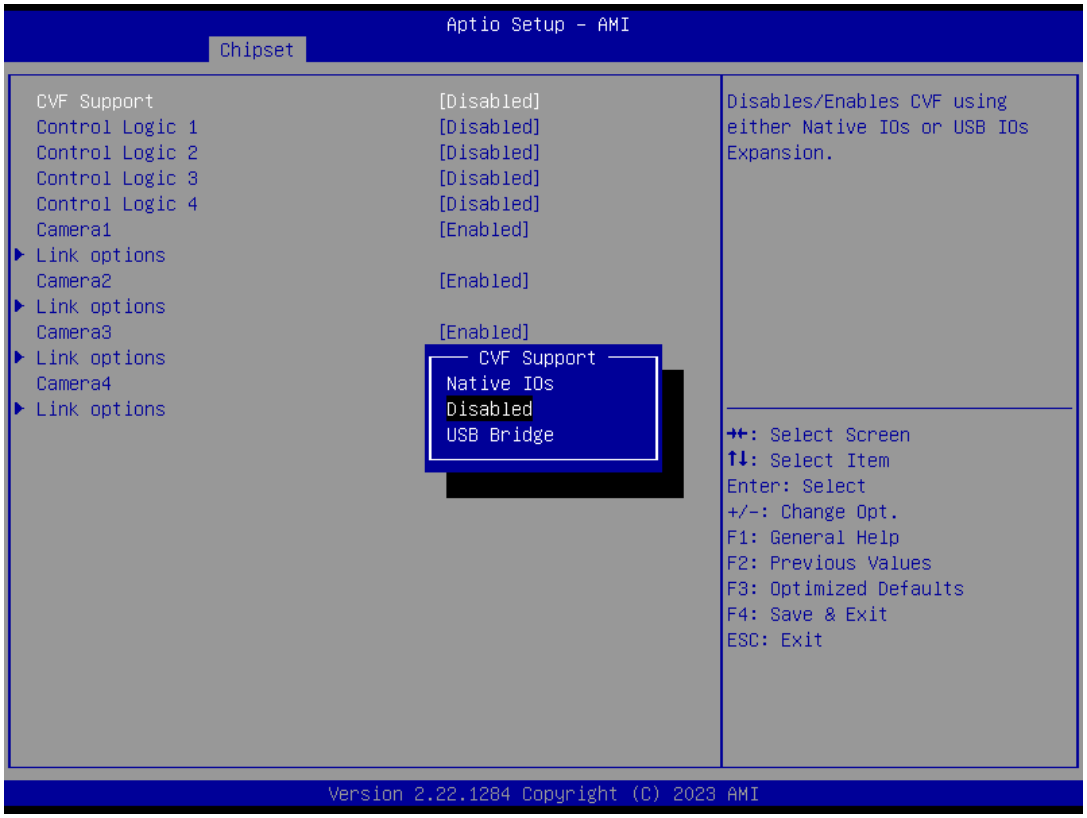


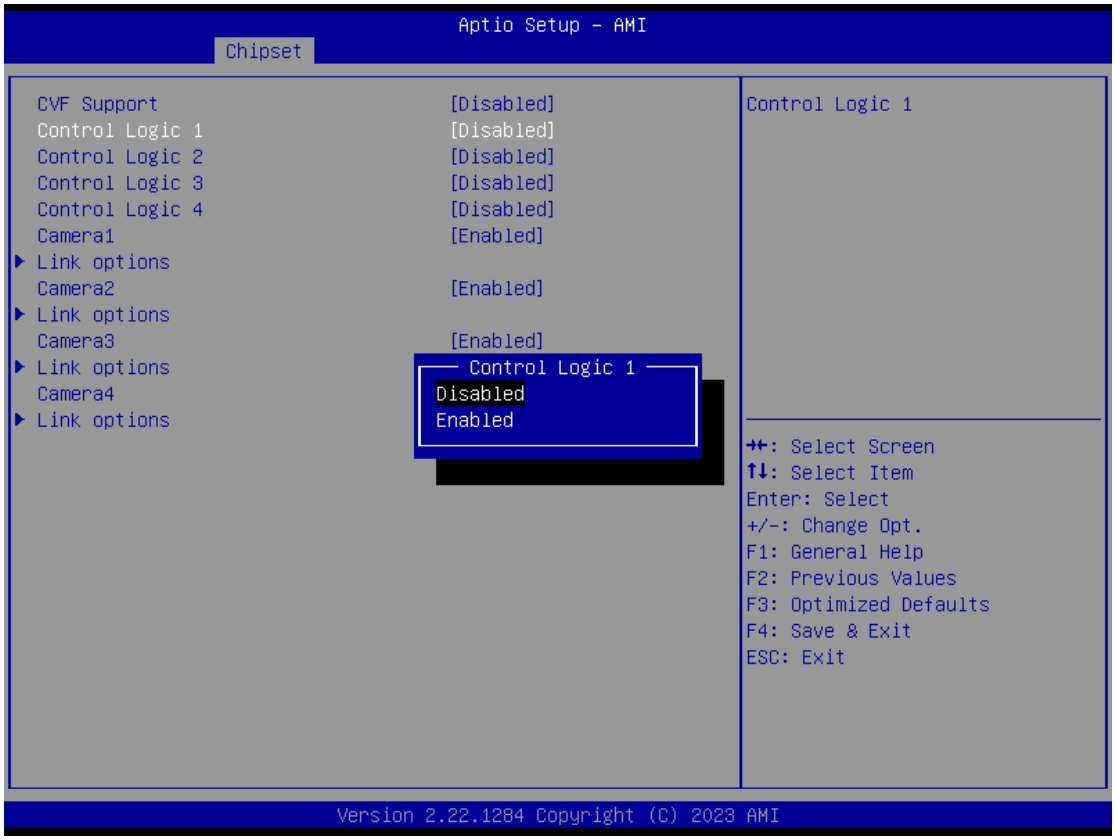

Aptio Setup – AMI
Chipset
ME FW Version
16.0.15.1810
ME Firmware SKU
Consumer SKU
PMC FW Version
160.1.0.1027
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

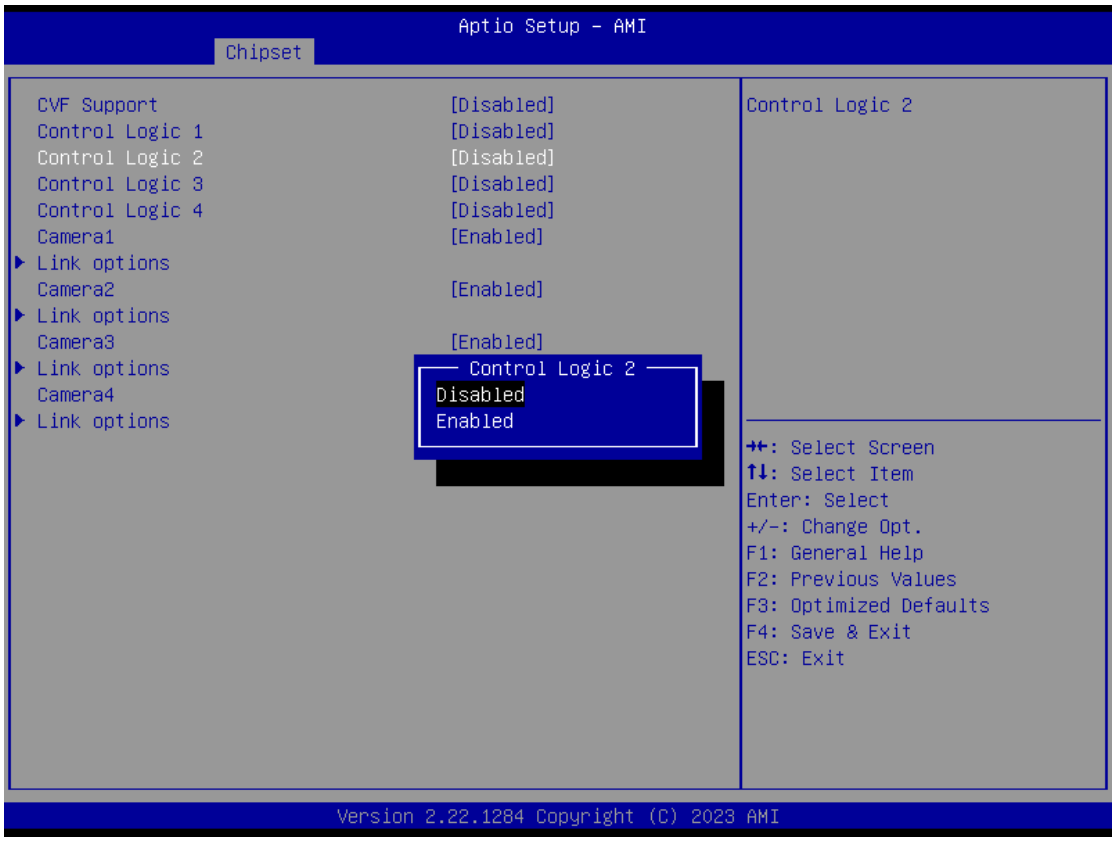
## MIPI Camera Configuration

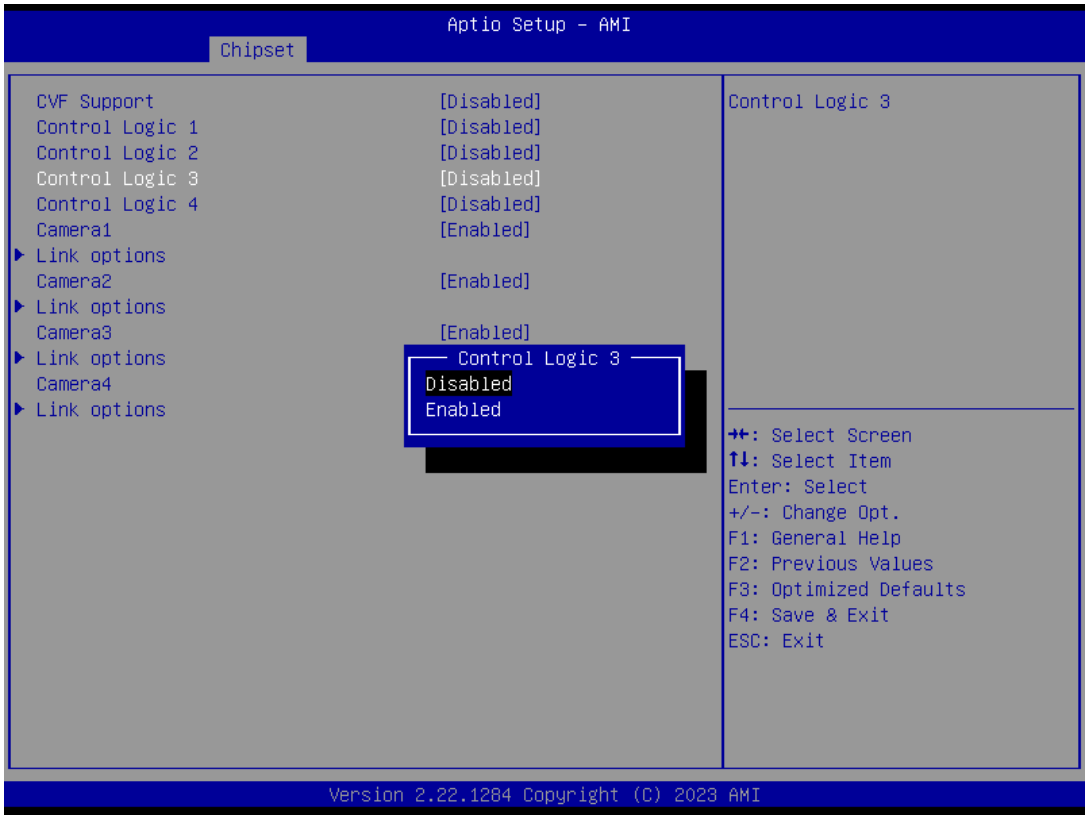
In this page, you can configure the setting of MIPI camera such as Intel RealSense D457

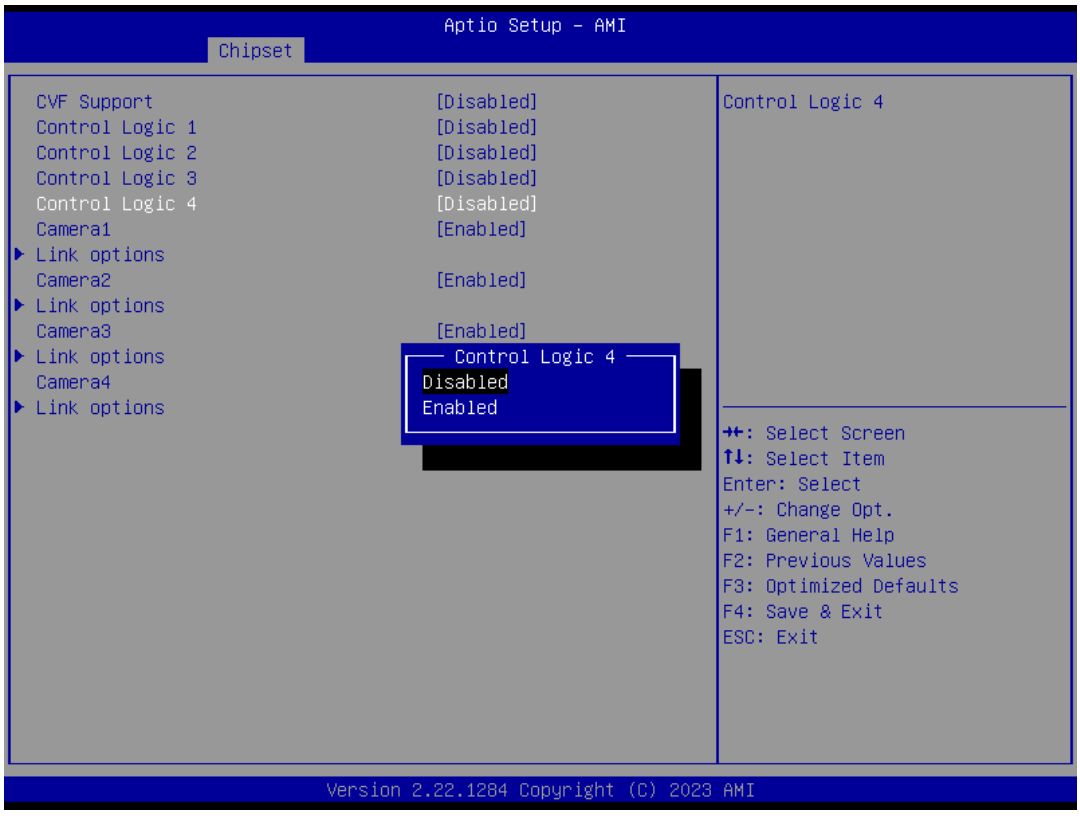


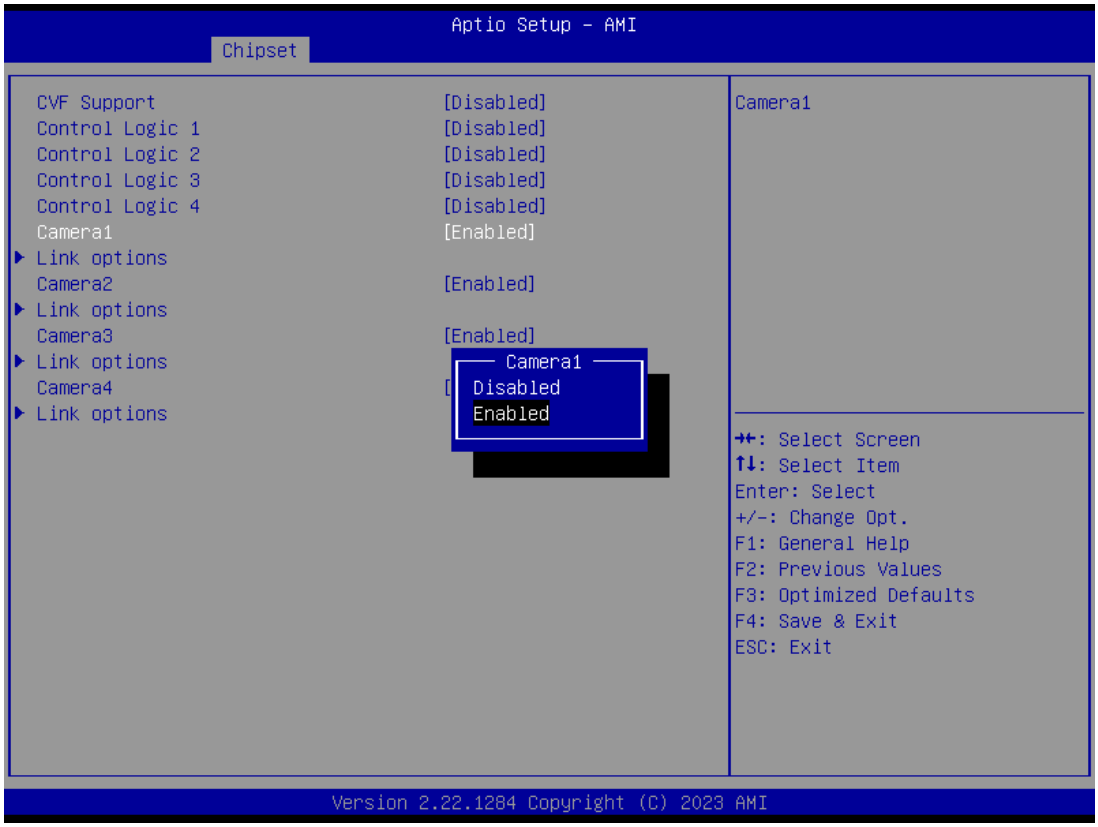



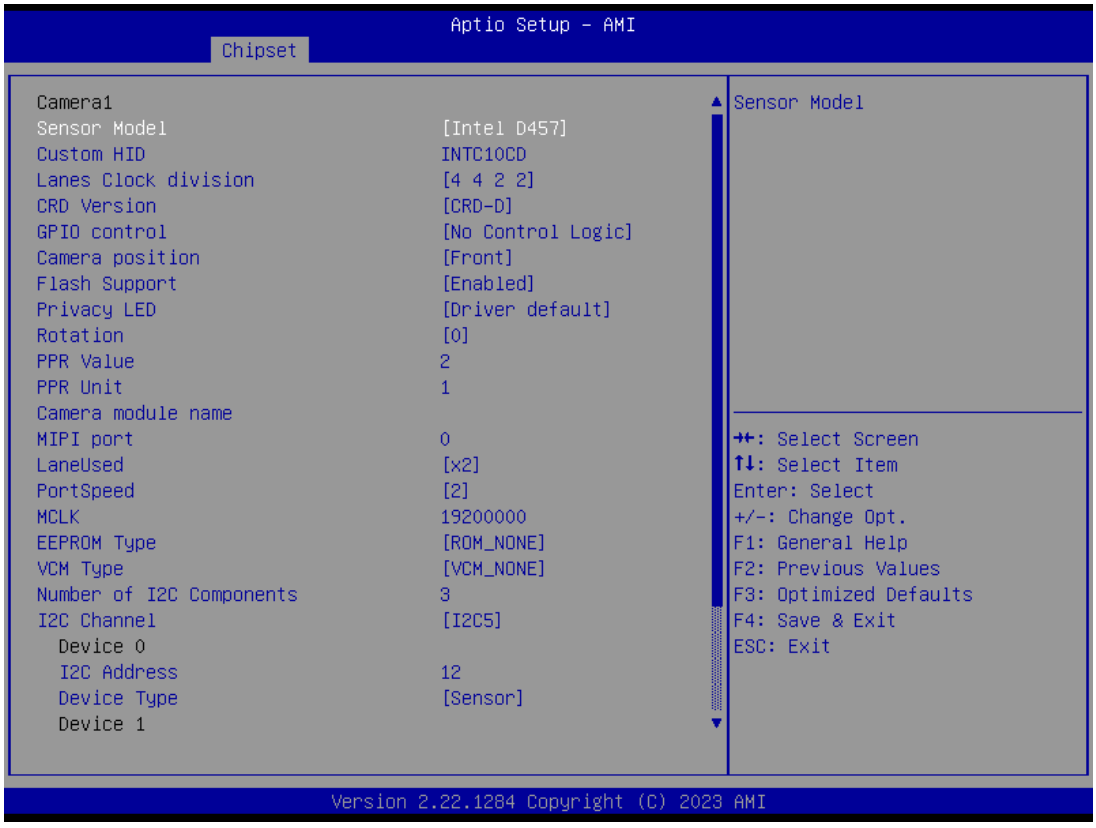

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Control Logic 1
Disabled
Enabled
Control Logic 1
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

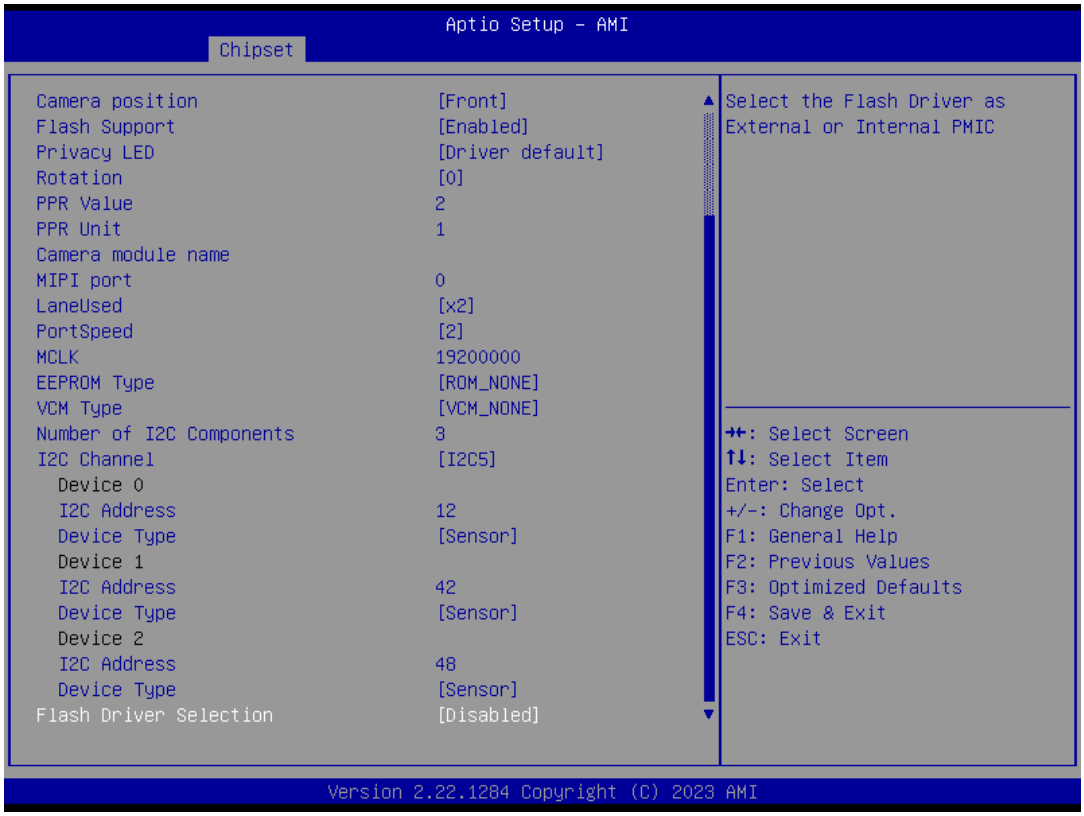

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Control Logic 2
Disabled
Enabled
Control Logic 2
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

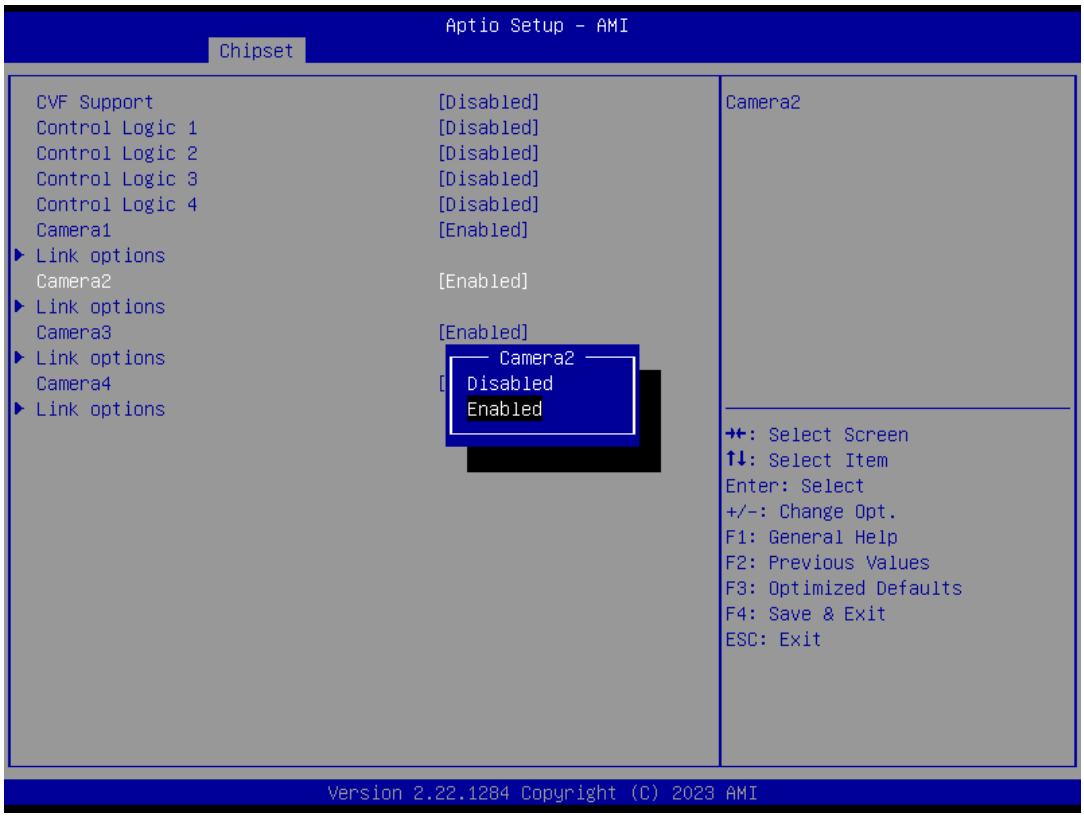

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Control Logic 3
Disabled
Enabled
Control Logic 3
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

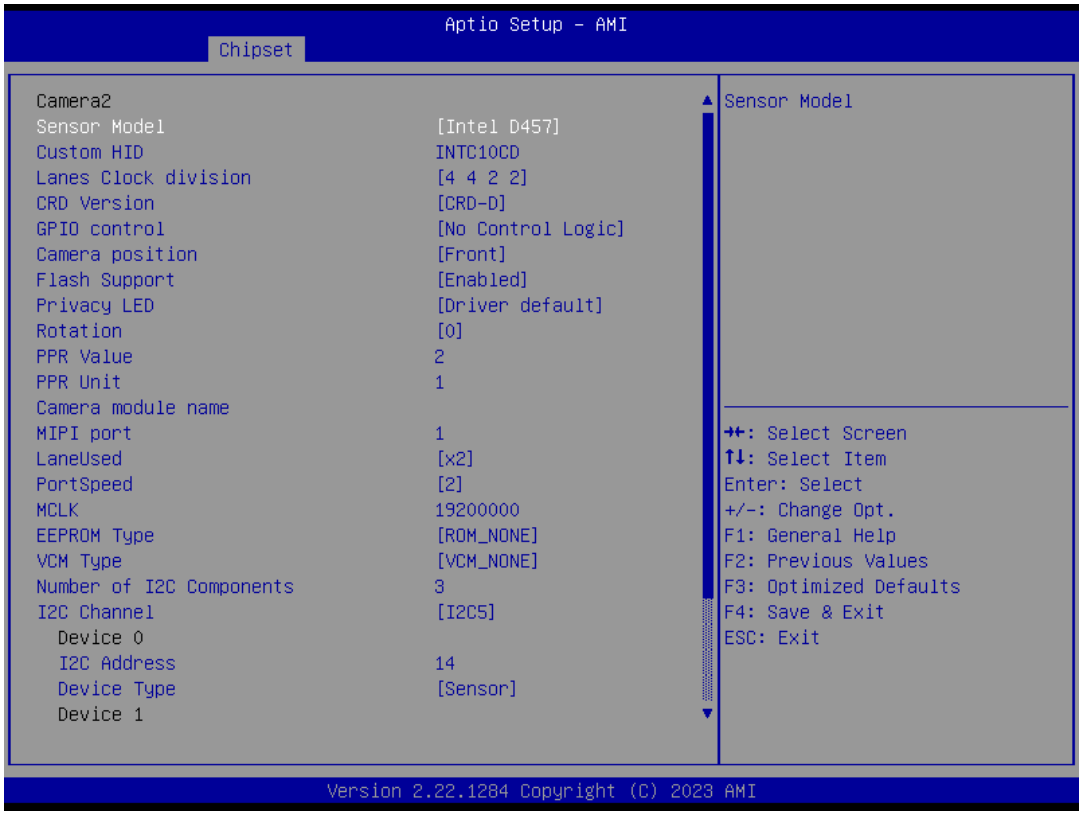

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Control Logic 4
Disabled
Enabled
Control Logic 4
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

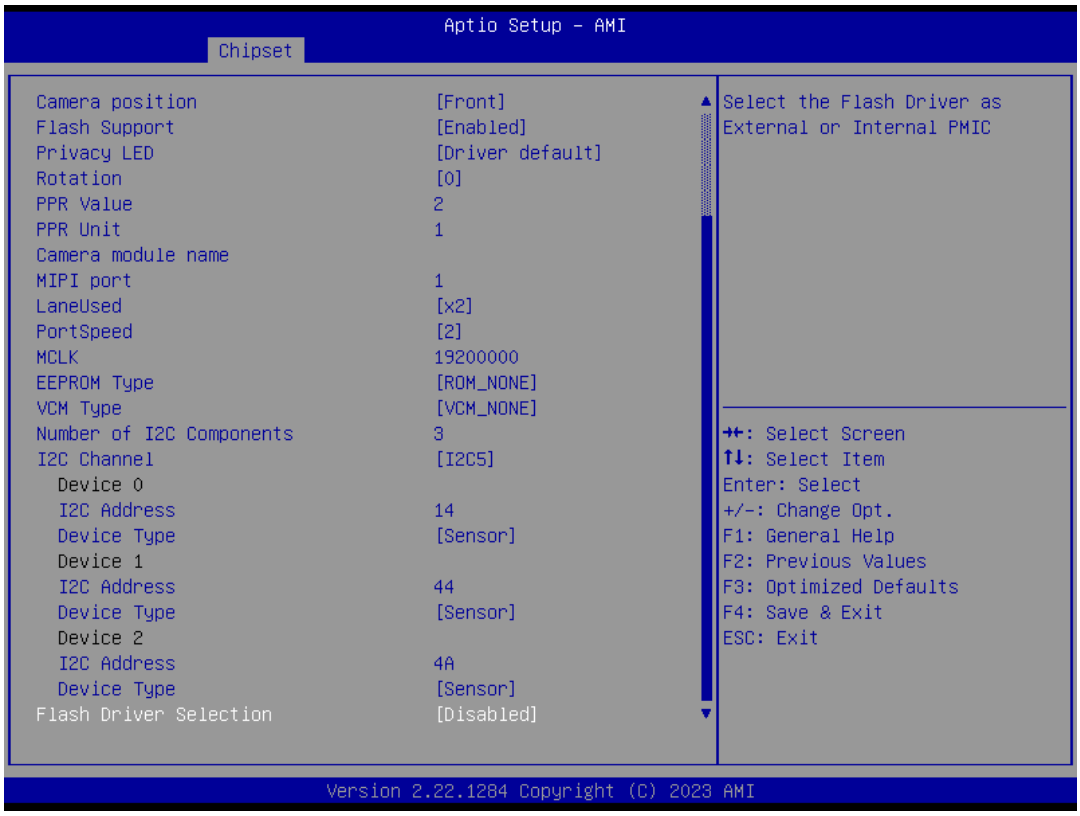

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Camera1
Disabled
Enabled
Camera1
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

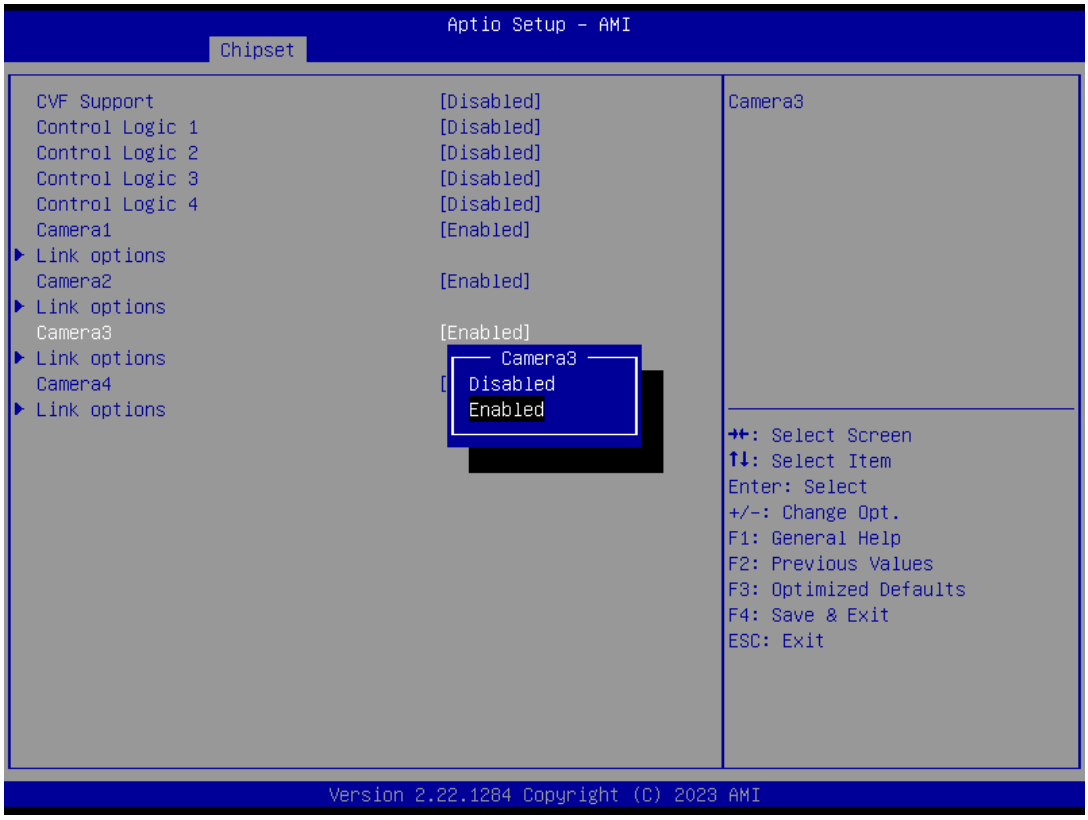

Aptio Setup – AMI
Chipset
Camera1
Sensor Model [Intel D457]
Custom HID INTC10CD
Lanes Clock division [4 4 2 2]
CRD Version [CRD-D]
GPIO control [No Control Logic]
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 0
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 12
Device Type [Sensor]
Device 1
Sensor Model
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

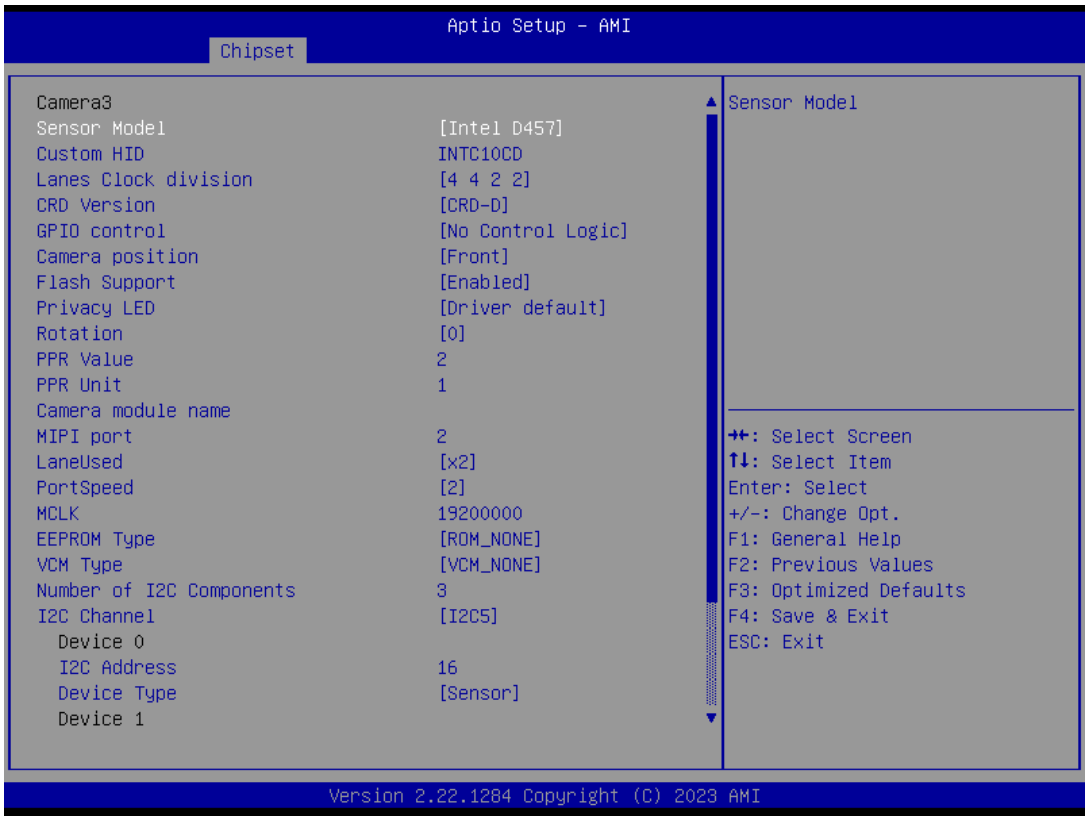

Aptio Setup – AMI
Chipset
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 0
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 12
Device Type [Sensor]
Device 1
I2C Address 42
Device Type [Sensor]
Device 2
I2C Address 48
Device Type [Sensor]
Flash Driver Selection [Disabled]
Select the Flash Driver as External or Internal PMIC
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

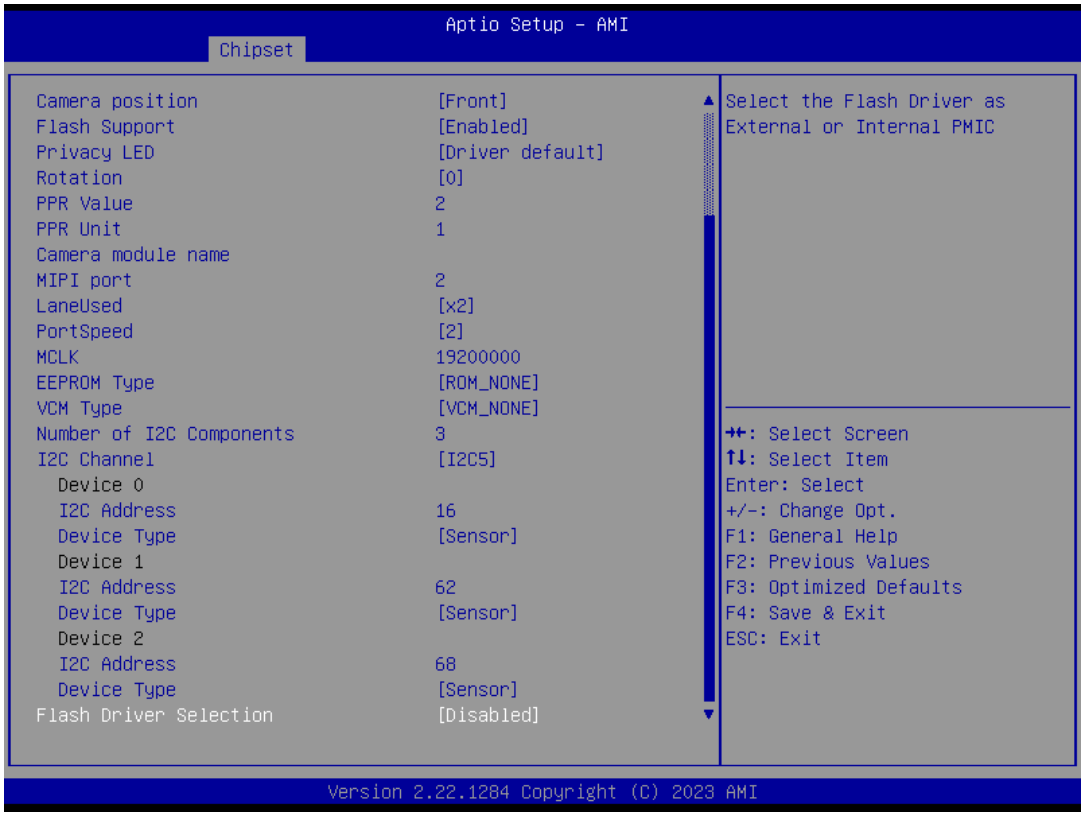

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Camera2
Disabled
Enabled
Camera2
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

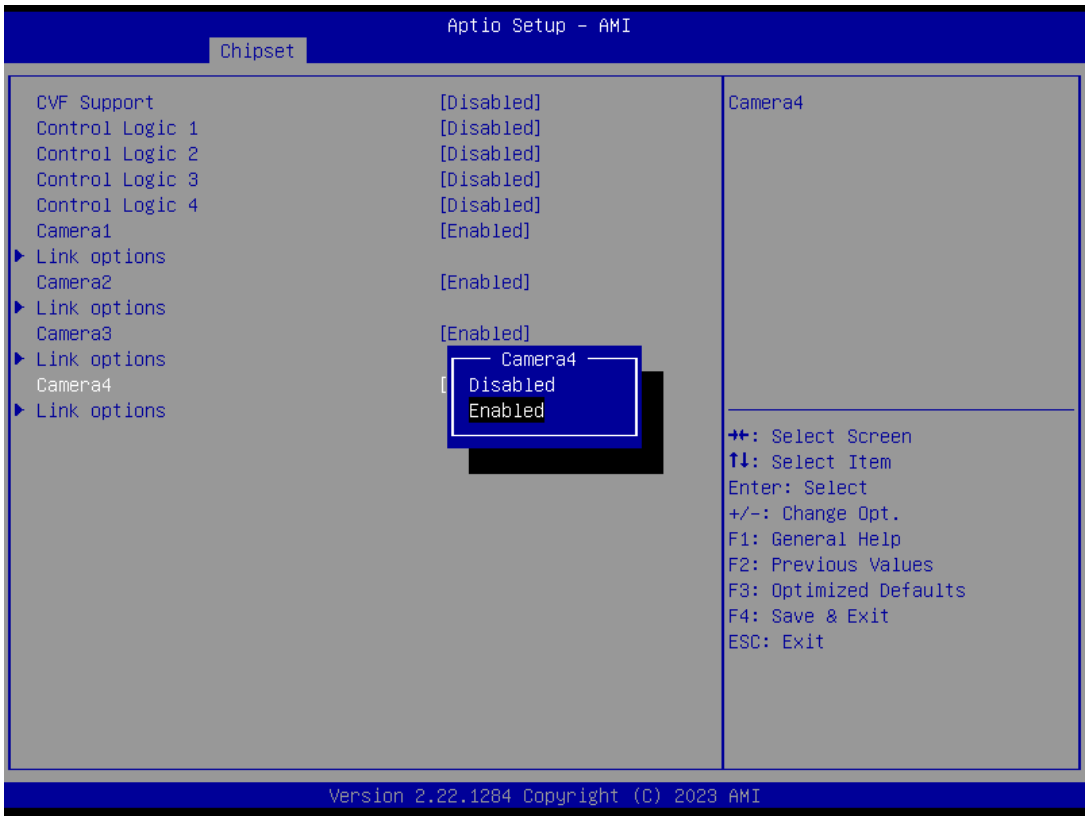

Aptio Setup – AMI
Chipset
Camera2
Sensor Model [Intel D457]
Custom HID INTC10CD
Lanes Clock division [4 4 2 2]
CRD Version [CRD-D]
GPIO control [No Control Logic]
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 1
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 14
Device Type [Sensor]
Device 1
Sensor Model
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

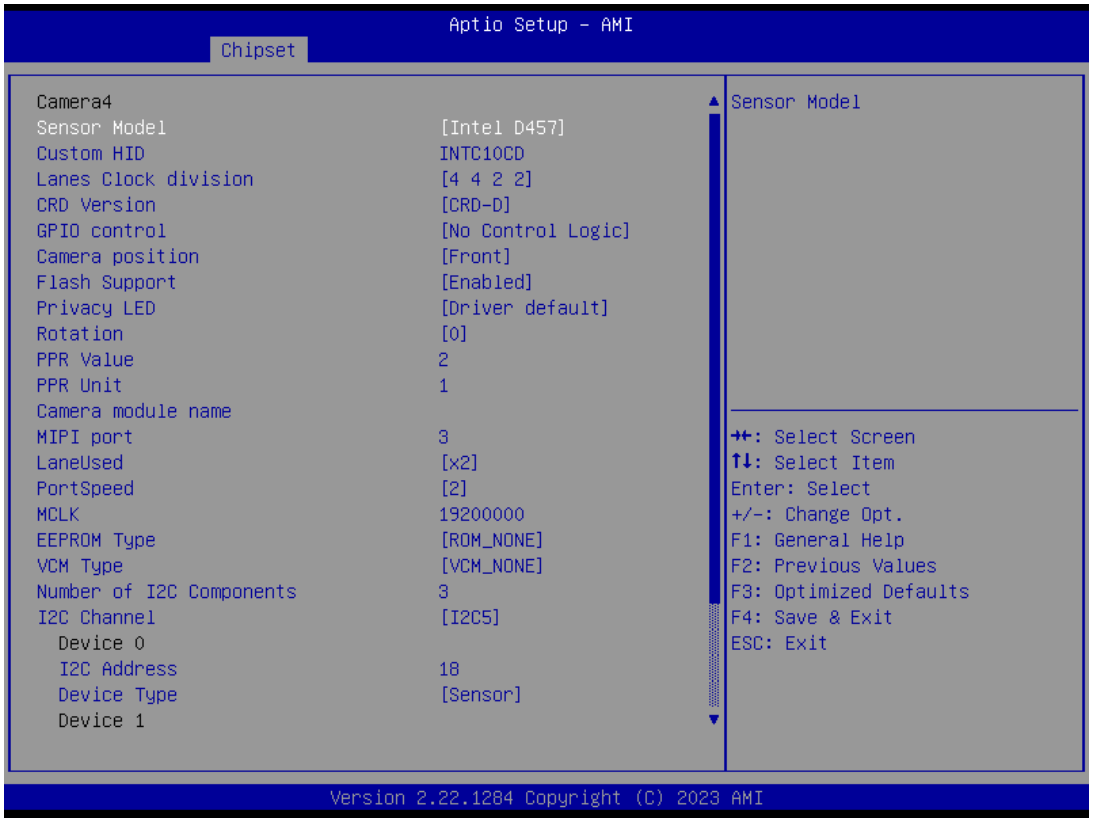

Aptio Setup – AMI
Chipset
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 1
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 14
Device Type [Sensor]
Device 1
I2C Address 44
Device Type [Sensor]
Device 2
I2C Address 4A
Device Type [Sensor]
Flash Driver Selection [Disabled]
Select the Flash Driver as External or Internal PMIC
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

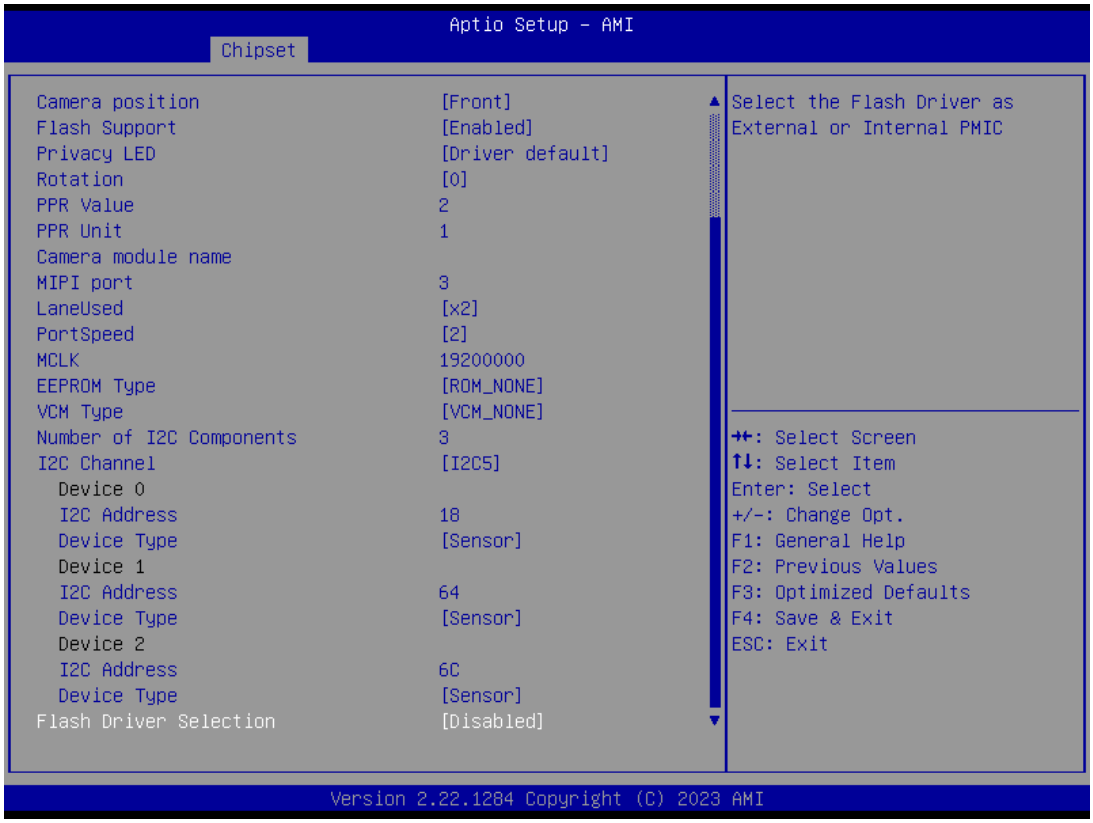

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Camera3
Disabled
Enabled
Camera3
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup – AMI
Chipset
Camera3
Sensor Model [Intel D457]
Custom HID INTC10CD
Lanes Clock division [4 4 2 2]
CRD Version [CRD-D]
GPIO control [No Control Logic]
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 2
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 16
Device Type [Sensor]
Device 1
Sensor Model
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

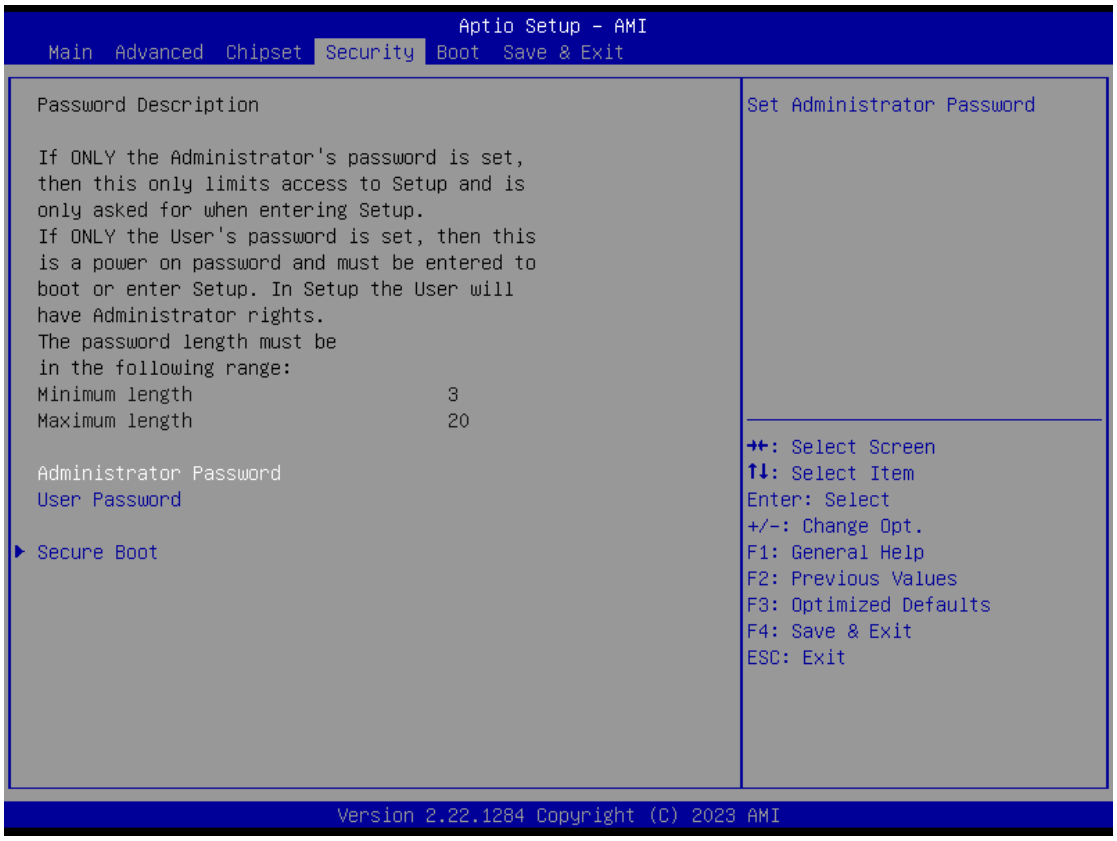

Aptio Setup – AMI
Chipset
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 2
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 16
Device Type [Sensor]
Device 1
I2C Address 62
Device Type [Sensor]
Device 2
I2C Address 68
Device Type [Sensor]
Flash Driver Selection [Disabled]
Select the Flash Driver as External or Internal PMIC
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

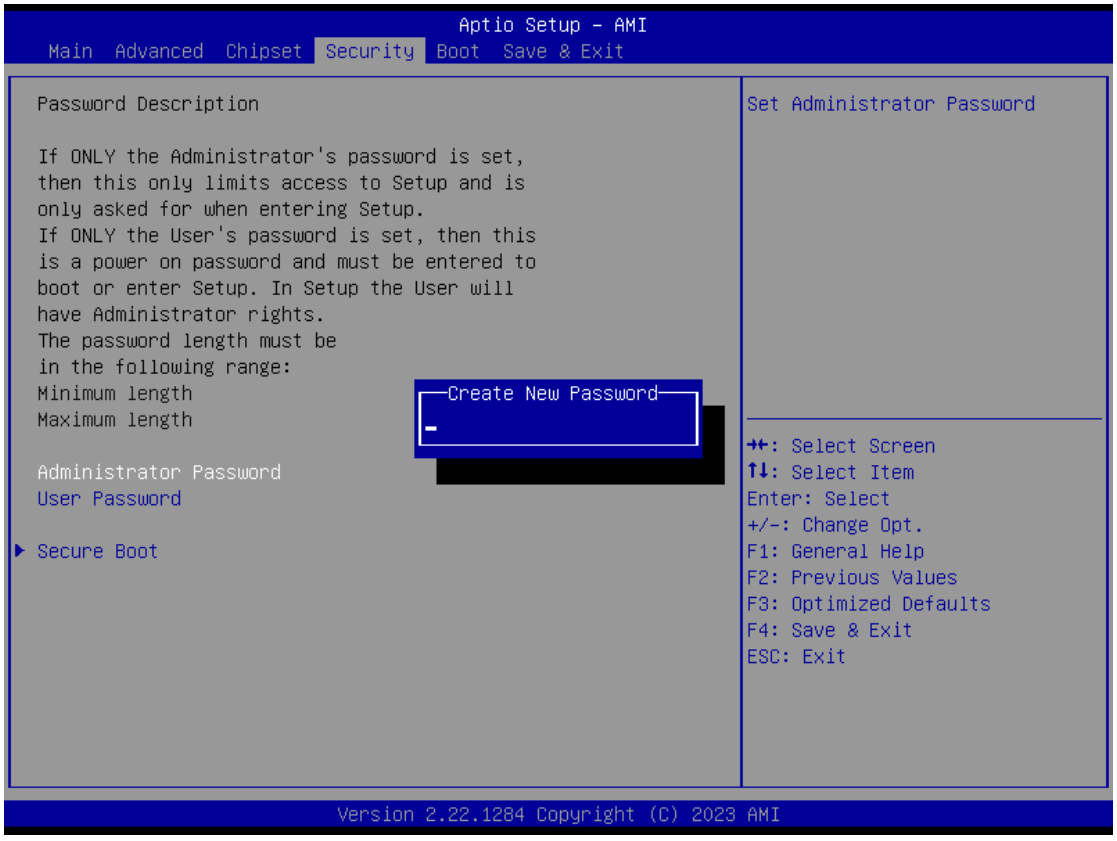

Aptio Setup – AMI
Chipset
CVF Support [Disabled]
Control Logic 1 [Disabled]
Control Logic 2 [Disabled]
Control Logic 3 [Disabled]
Control Logic 4 [Disabled]
Camera1 [Enabled]
Link options
Camera2 [Enabled]
Link options
Camera3 [Enabled]
Link options
Camera4
Link options
Camera4
Disabled
Enabled
Camera4
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

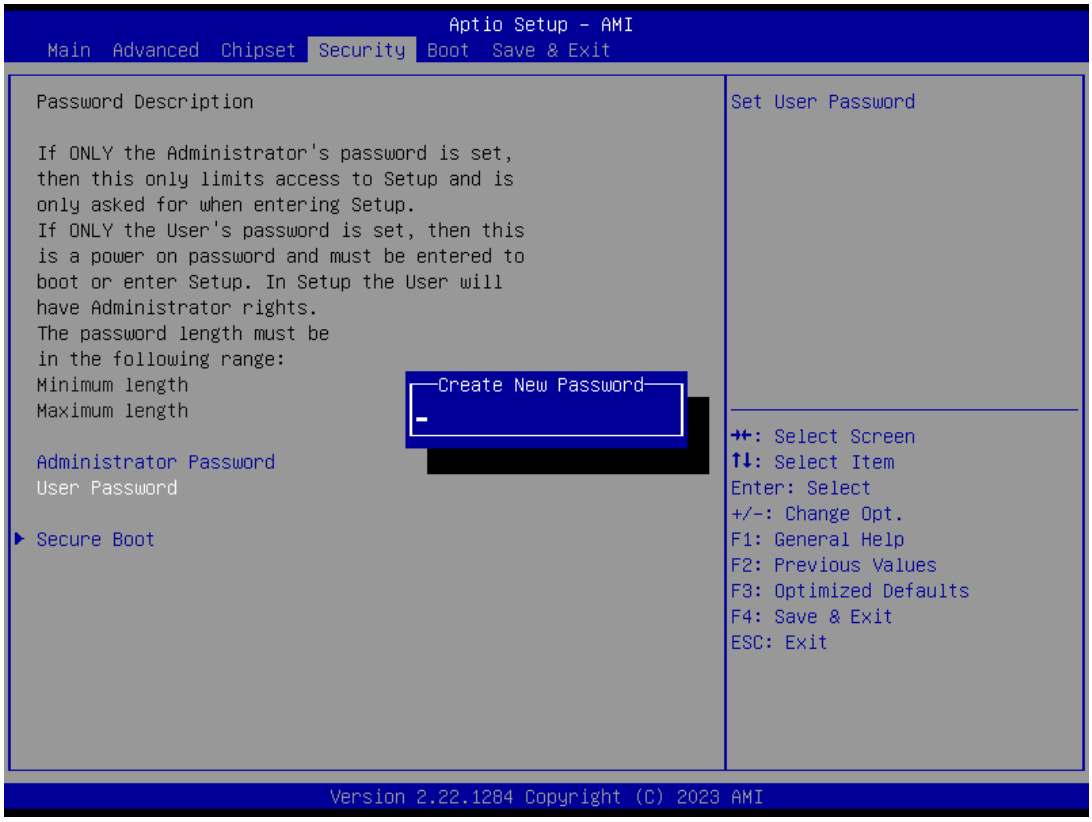

Aptio Setup – AMI
Chipset
Camera4
Sensor Model [Intel D457]
Custom HID INTC10CD
Lanes Clock division [4 4 2 2]
CRD Version [CRD-D]
GPIO control [No Control Logic]
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 3
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 18
Device Type [Sensor]
Device 1
Sensor Model
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup – AMI
Chipset
Camera position [Front]
Flash Support [Enabled]
Privacy LED [Driver default]
Rotation [0]
PPR Value 2
PPR Unit 1
Camera module name
MIPI port 3
LaneUsed [x2]
PortSpeed [2]
MCLK 19200000
EEPROM Type [ROM_NONE]
VCM Type [VCM_NONE]
Number of I2C Components 3
I2C Channel [I2C5]
Device 0
I2C Address 18
Device Type [Sensor]
Device 1
I2C Address 64
Device Type [Sensor]
Device 2
I2C Address 6C
Device Type [Sensor]
Flash Driver Selection [Disabled]
Select the Flash Driver as External or Internal PMIC
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

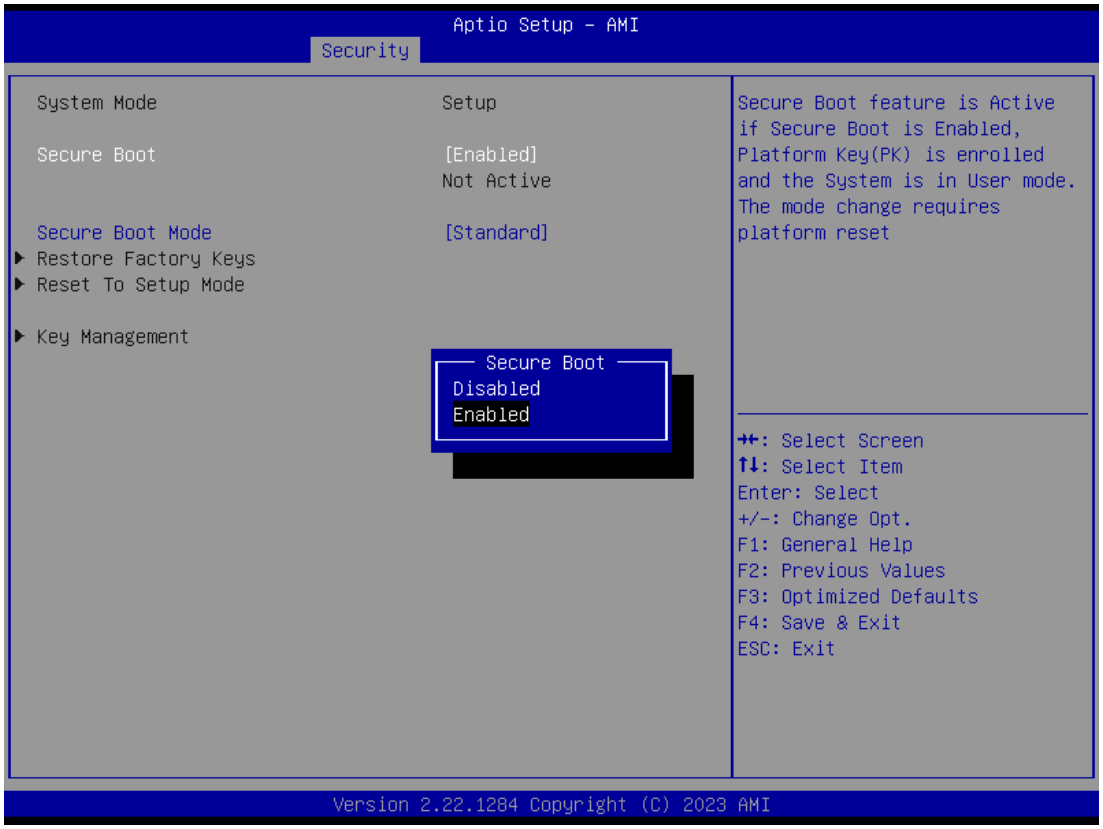
## 4.6 Security

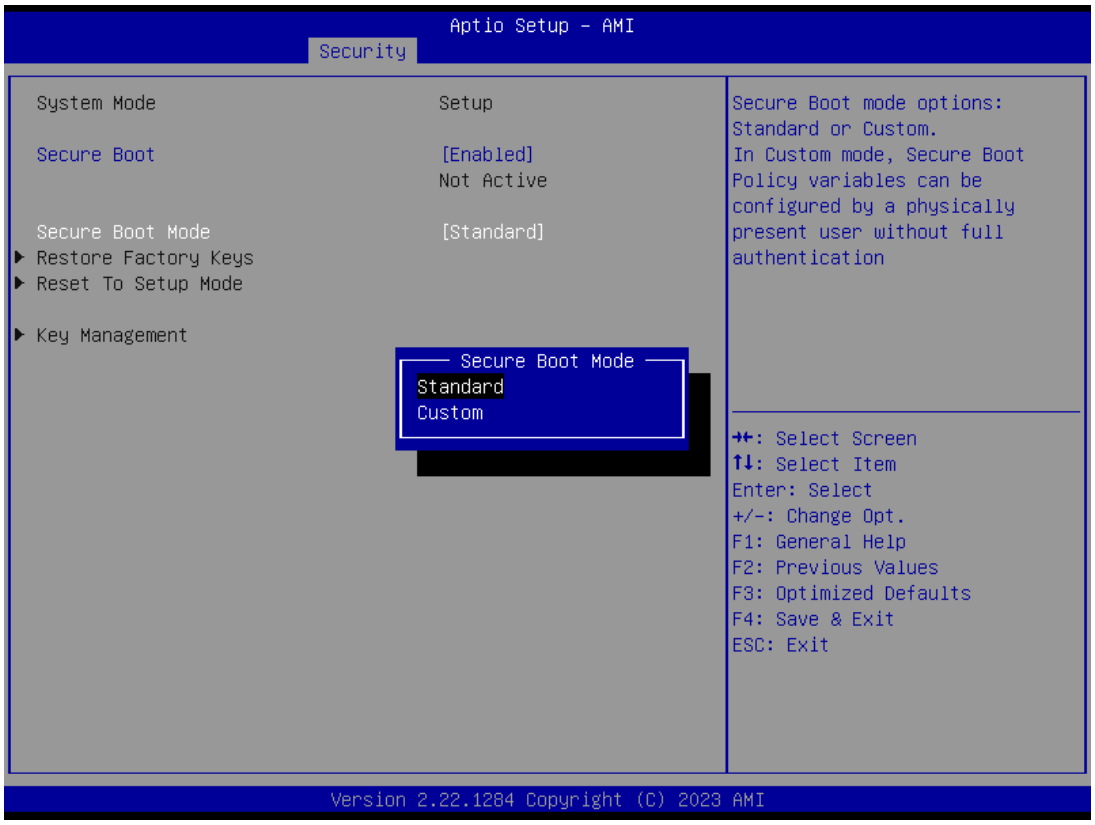

Aptio Setup – AMI
Main Advanced Chipset Security Boot Save & Exit
Password Description
If ONLY the Administrator's password is set,
then this only limits access to Setup and is
only asked for when entering Setup.
If ONLY the User's password is set, then this
is a power on password and must be entered to
boot or enter Setup. In Setup the User will
have Administrator rights.
The password length must be
in the following range:
Minimum length 3
Maximum length 20
Administrator Password
User Password
Secure Boot
Set Administrator Password
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

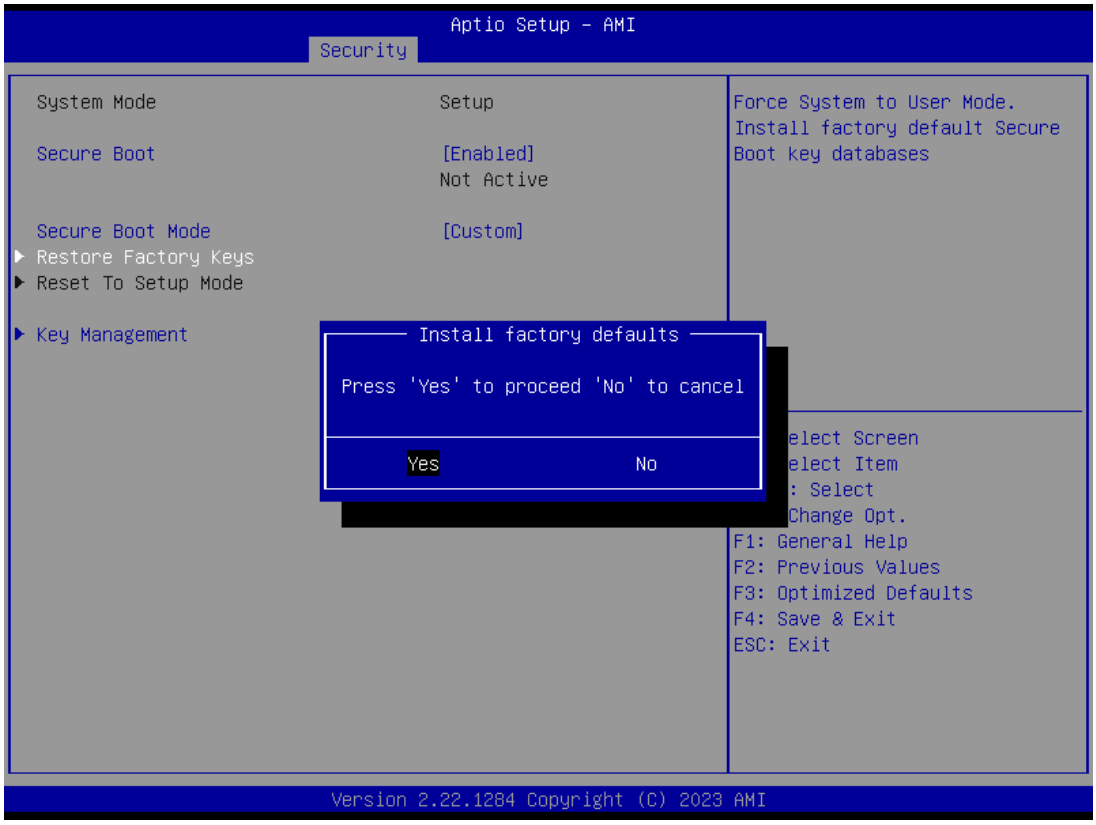

Aptio Setup – AMI
Main Advanced Chipset Security Boot Save & Exit
Password Description
If ONLY the Administrator's password is set,
then this only limits access to Setup and is
only asked for when entering Setup.
If ONLY the User's password is set, then this
is a power on password and must be entered to
boot or enter Setup. In Setup the User will
have Administrator rights.
The password length must be
in the following range:
Minimum length
Maximum length
Create New Password
Administrator Password
User Password
Secure Boot
Set Administrator Password
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

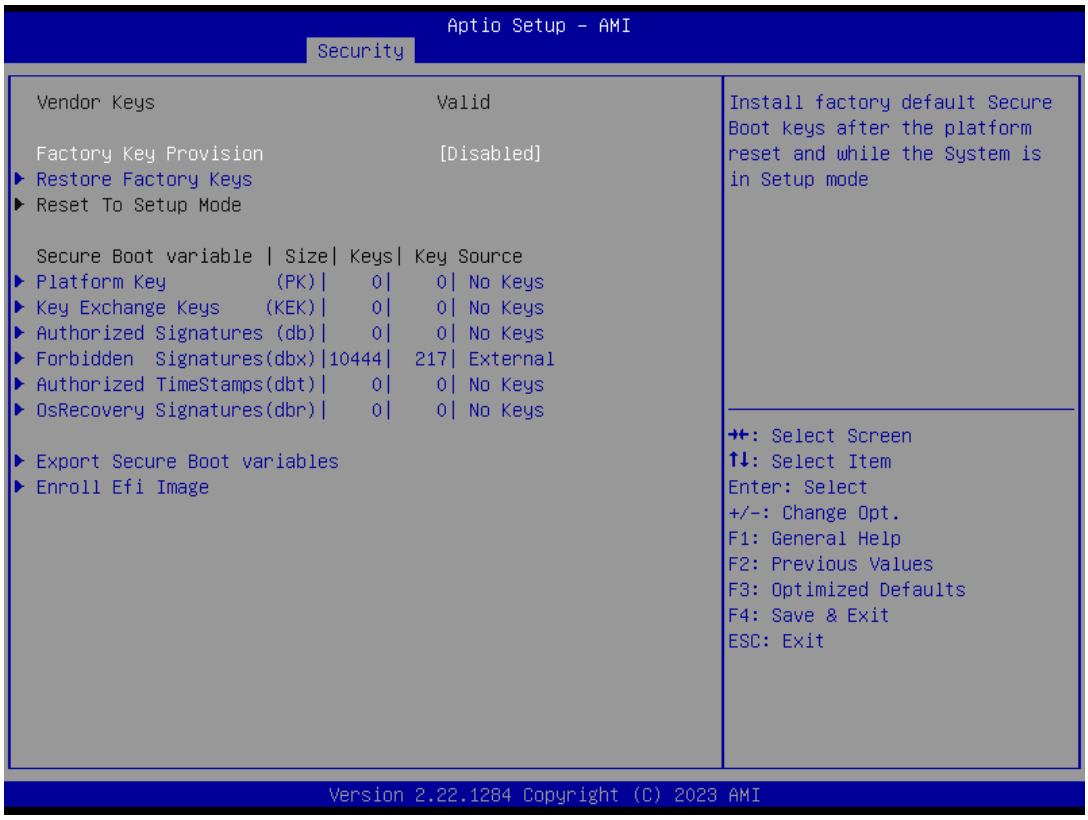

Aptio Setup – AMI
Main Advanced Chipset Security Boot Save & Exit
Password Description
If ONLY the Administrator's password is set,
then this only limits access to Setup and is
only asked for when entering Setup.
If ONLY the User's password is set, then this
is a power on password and must be entered to
boot or enter Setup. In Setup the User will
have Administrator rights.
The password length must be
in the following range:
Minimum length
Maximum length
Create New Password
Administrator Password
User Password
Secure Boot
Set User Password
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

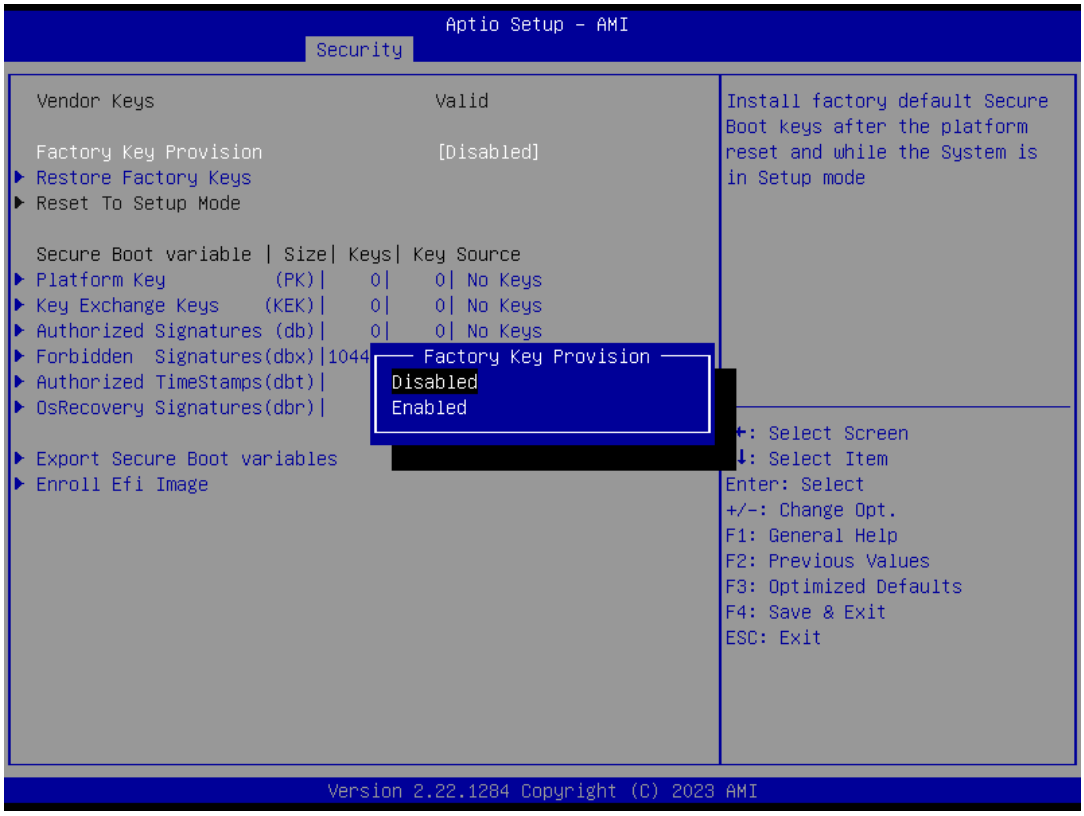

Aptio Setup – AMI
Security
System Mode
Setup
Secure Boot
[Enabled]
Not Active
Secure Boot Mode
[Standard]
Restore Factory Keys
Reset To Setup Mode
Key Management
Secure Boot feature is Active
if Secure Boot is Enabled,
Platform Key(PK) is enrolled
and the System is in User mode.
The mode change requires
platform reset
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

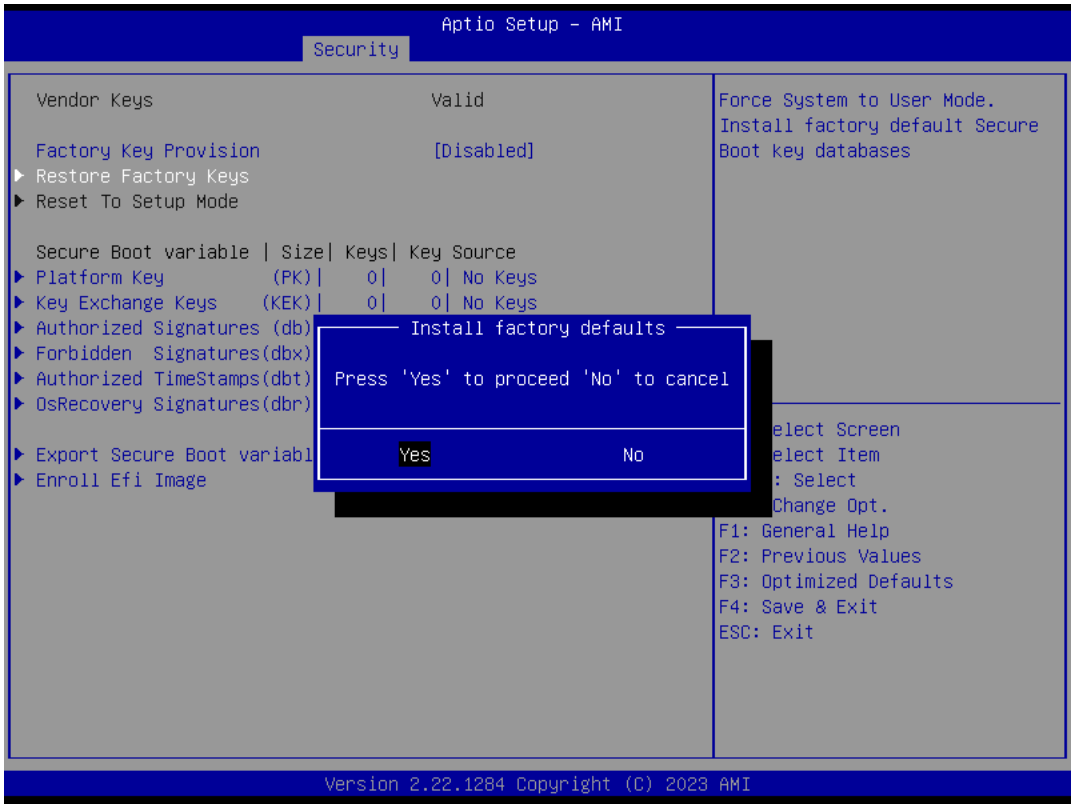

Aptio Setup – AMI
Security
System Mode
Setup
Secure Boot
[Enabled]
Not Active
Secure Boot Mode
[Standard]
Restore Factory Keys
Reset To Setup Mode
Key Management
Secure Boot
Disabled
Enabled
Secure Boot feature is Active if Secure Boot is Enabled, Platform Key(PK) is enrolled and the System is in User mode. The mode change requires platform reset
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

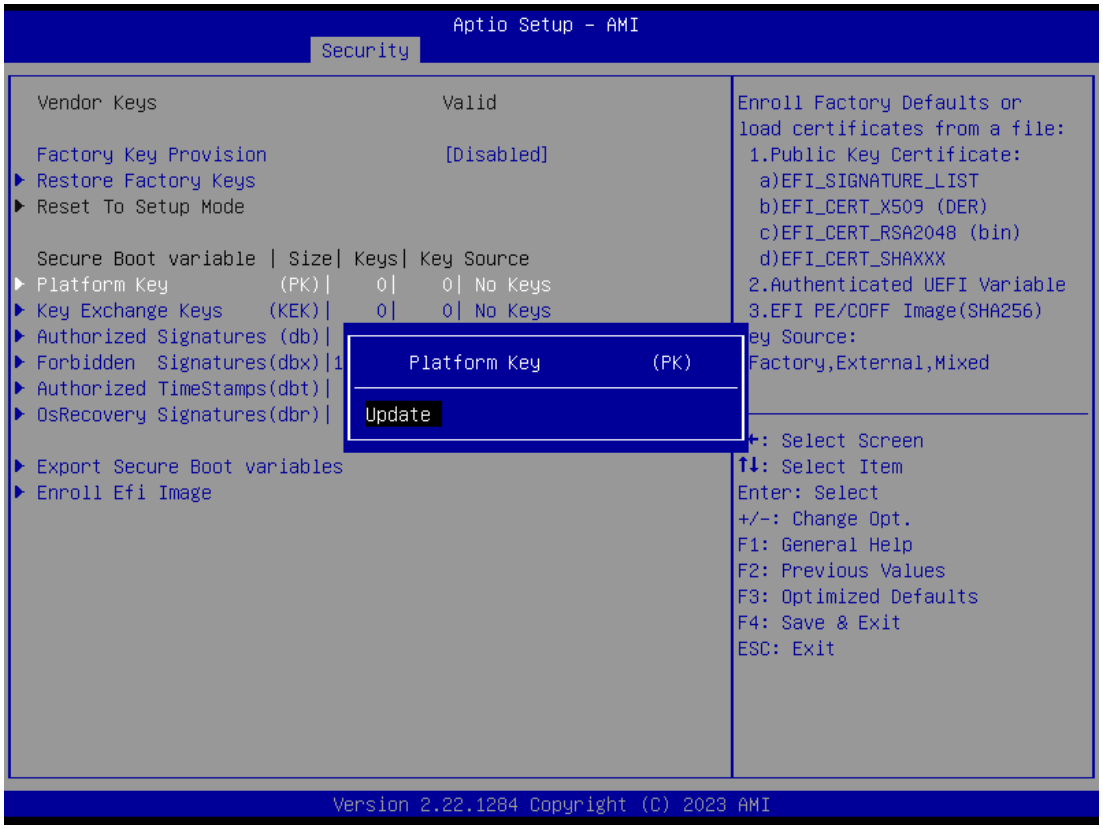

Aptio Setup – AMI
Security
System Mode
Setup
Secure Boot
[Enabled]
Not Active
Secure Boot Mode
[Standard]
Restore Factory Keys
Reset To Setup Mode
Key Management
Secure Boot Mode
Standard
Custom
Secure Boot mode options: Standard or Custom. In Custom mode, Secure Boot Policy variables can be configured by a physically present user without full authentication
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

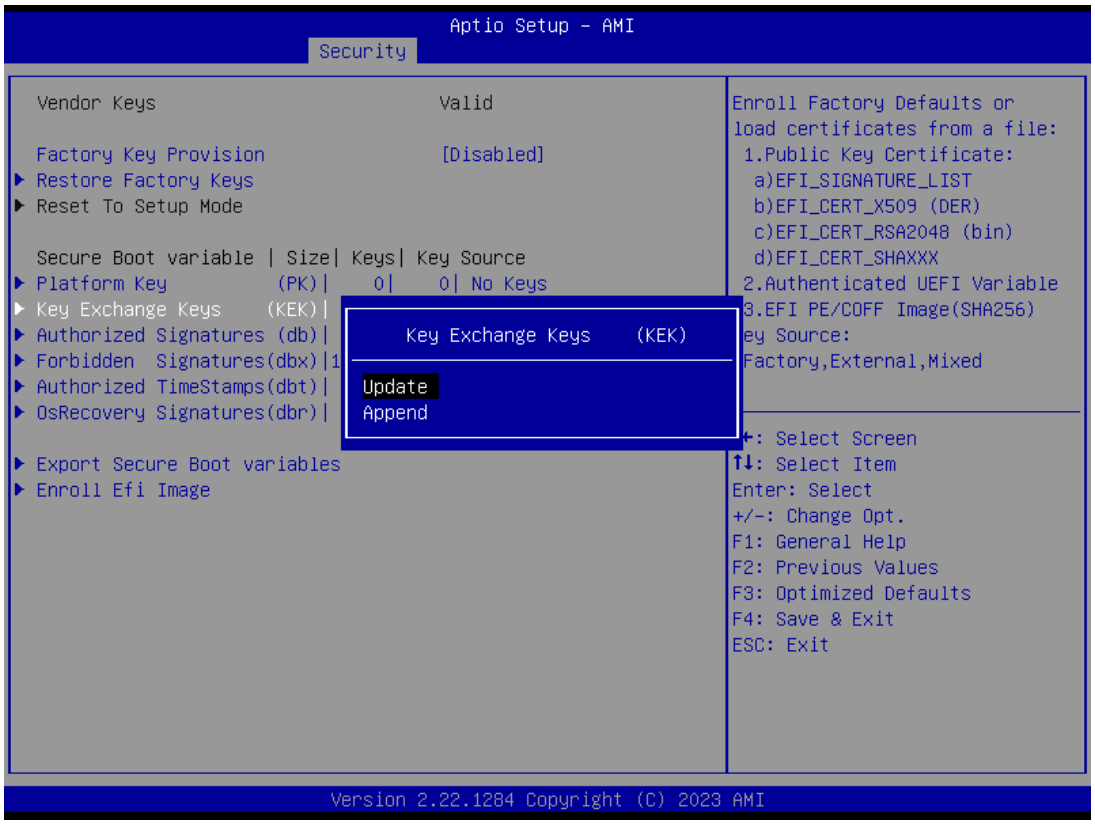

Aptio Setup – AMI
Security
System Mode
Setup
Secure Boot
[Enabled]
Not Active
Secure Boot Mode
[Custom]
Restore Factory Keys
Reset To Setup Mode
Key Management
Install factory defaults
Press 'Yes' to proceed 'No' to cancel
Yes
No
Force System to User Mode. Install factory default Secure Boot key databases
elect Screen
elect Item
: Select
Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

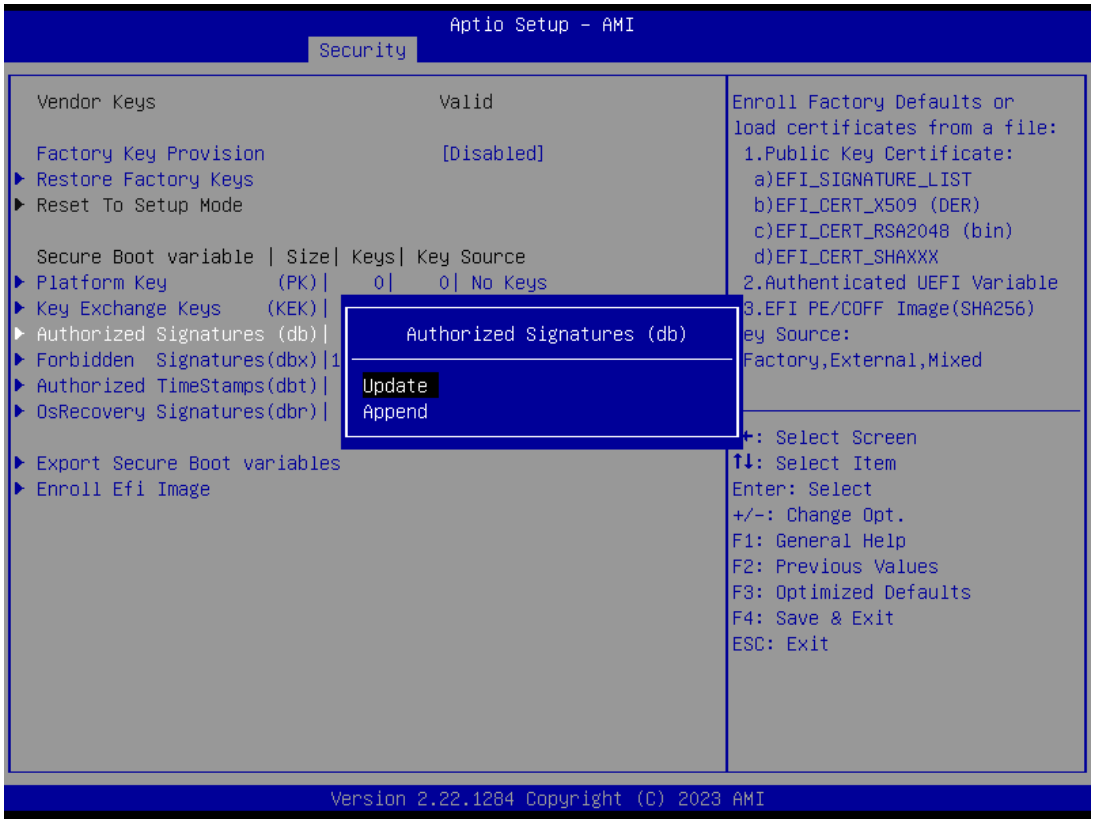

Aptio Setup – AMI
Security
Vendor Keys
Valid
Factory Key Provision
[Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)| 0| 0| No Keys
Authorized Signatures (db)| 0| 0| No Keys
Forbidden Signatures(dbx)|10444| 217| External
Authorized TimeStamps(dbt)| 0| 0| No Keys
OsRecovery Signatures(dbr)| 0| 0| No Keys
Export Secure Boot variables
Enroll Efi Image
Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode
→←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

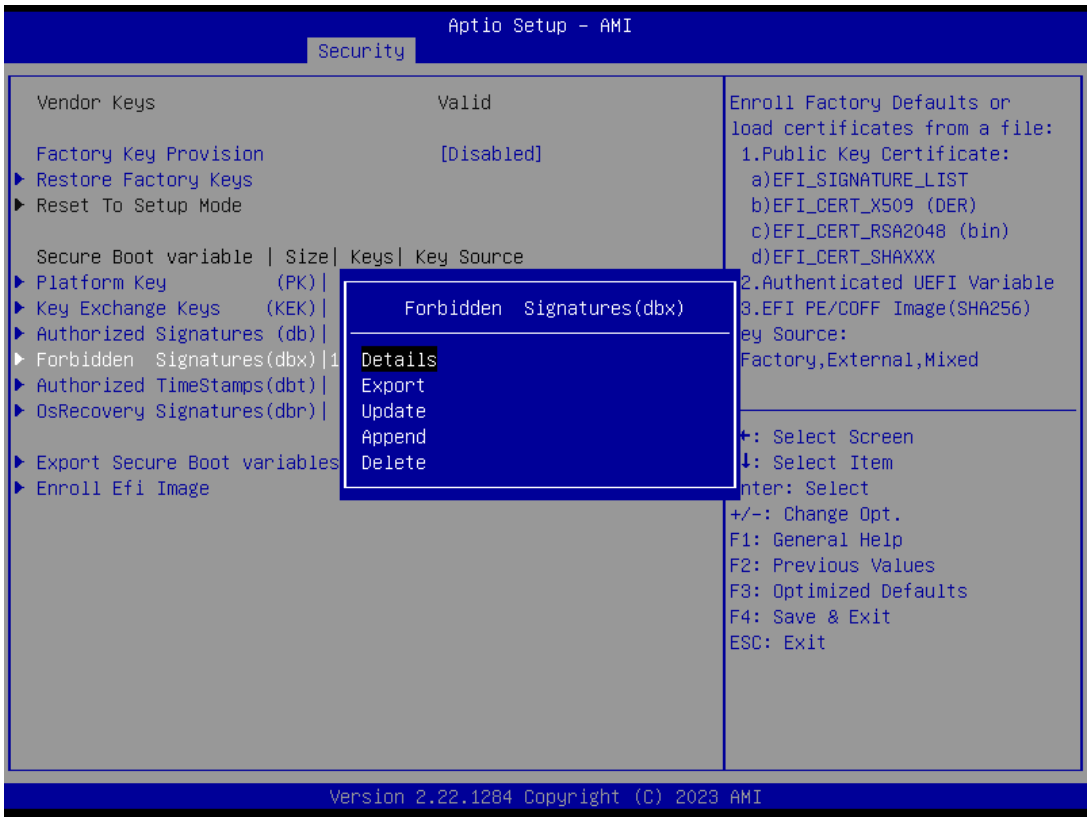

Aptio Setup - AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)| 0| 0| No Keys
Authorized Signatures (db)| 0| 0| No Keys
Forbidden Signatures(dbx)|1044
Authorized TimeStamps(dbt)|
OsRecovery Signatures(dbr)|
Factory Key Provision
Disabled
Enabled
Export Secure Boot variables
Enroll Efi Image
Install factory default Secure Boot keys after the platform reset and while the System is in Setup mode
+: Select Screen
↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

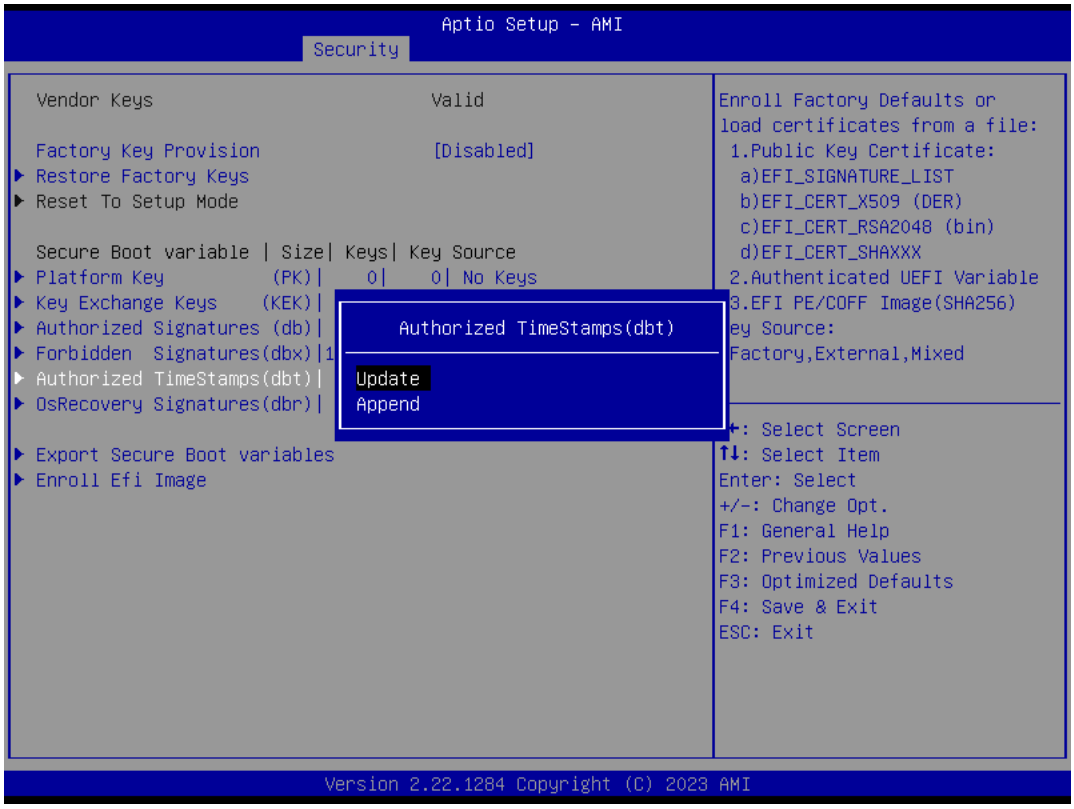

Aptio Setup - AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)| 0| 0| No Keys
Authorized Signatures (db)
Forbidden Signatures(dbx)
Authorized TimeStamps(dbt)
OsRecovery Signatures(dbr)
Export Secure Boot variabl
Enroll Efi Image
Install factory defaults
Press 'Yes' to proceed 'No' to cancel
Yes
No
Force System to User Mode. Install factory default Secure Boot key databases
elect Screen
elect Item
: Select
Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

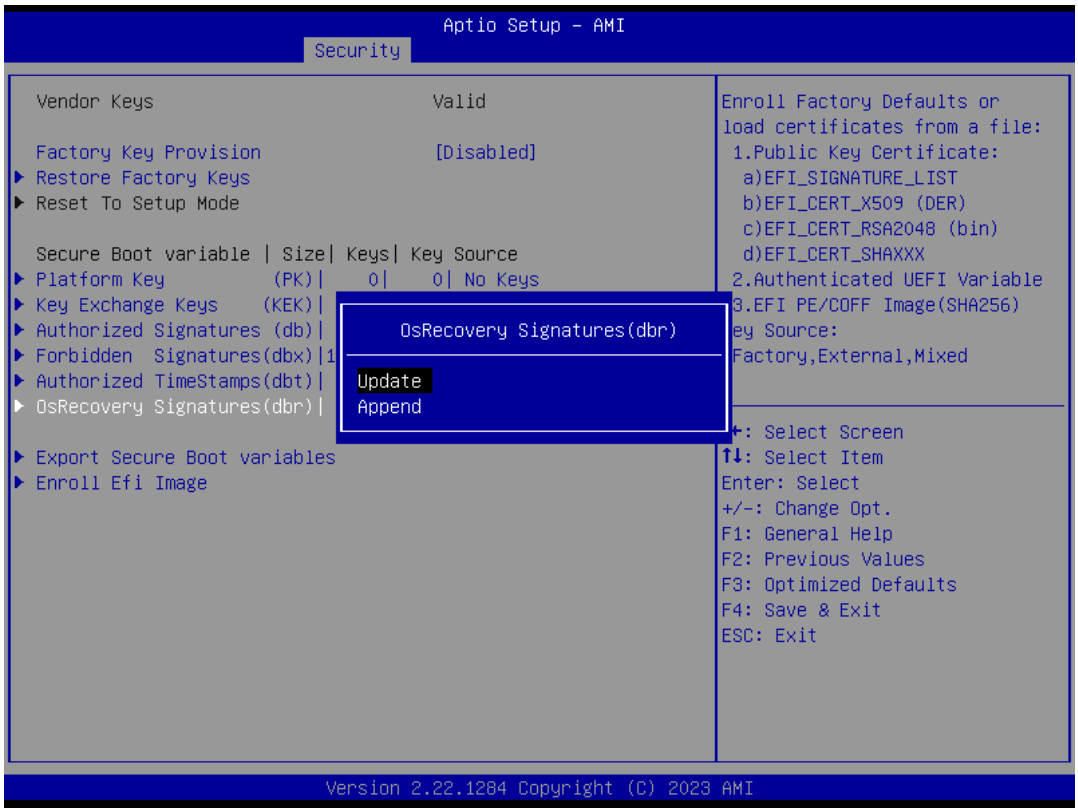

Aptio Setup – AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)| 0| 0| No Keys
Authorized Signatures (db)|
Forbidden Signatures(dbx)|1
Authorized TimeStamps(dbt)|
OsRecovery Signatures(dbr)|
Export Secure Boot variables
Enroll Efi Image
Platform Key (PK)
Update
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)
ey Source:
Factory,External,Mixed
+: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

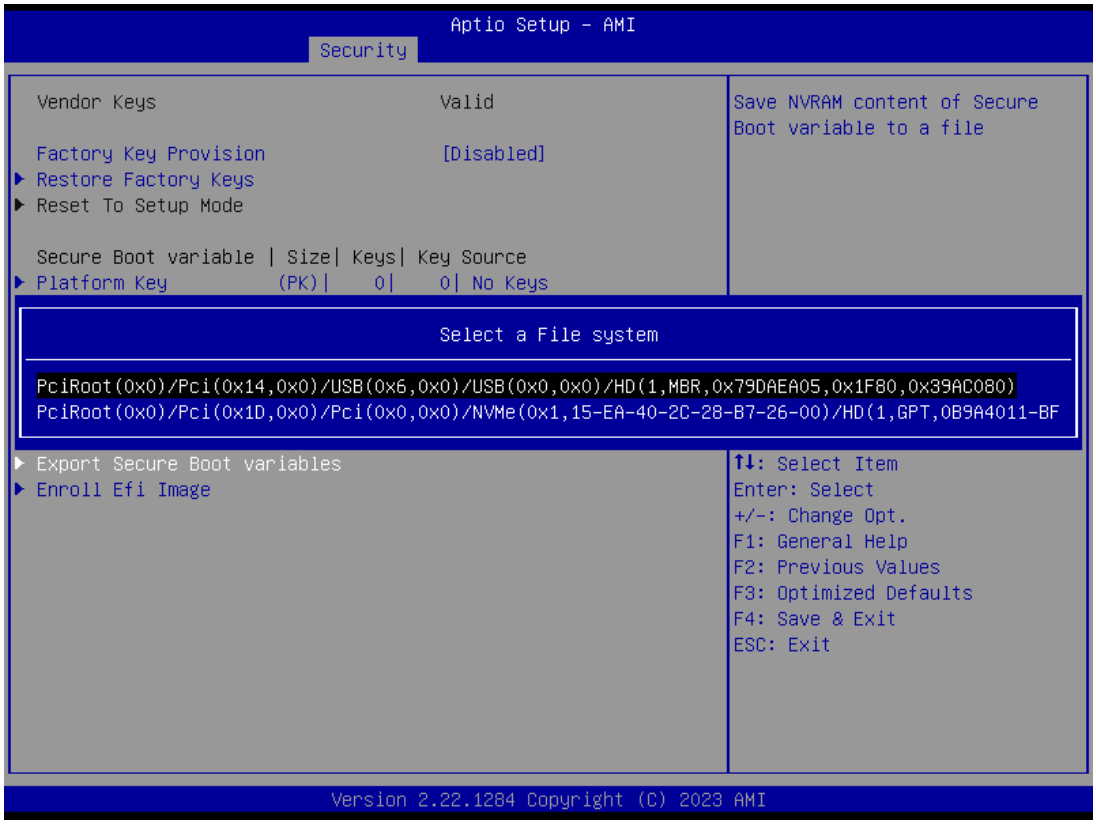

Aptio Setup – AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)|
Authorized Signatures (db)|
Forbidden Signatures(dbx)|1
Authorized TimeStamps(dbt)|
OsRecovery Signatures(dbr)|
Export Secure Boot variables
Enroll Efi Image
Key Exchange Keys (KEK)
Update
Append
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)
ey Source:
Factory,External,Mixed
+: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

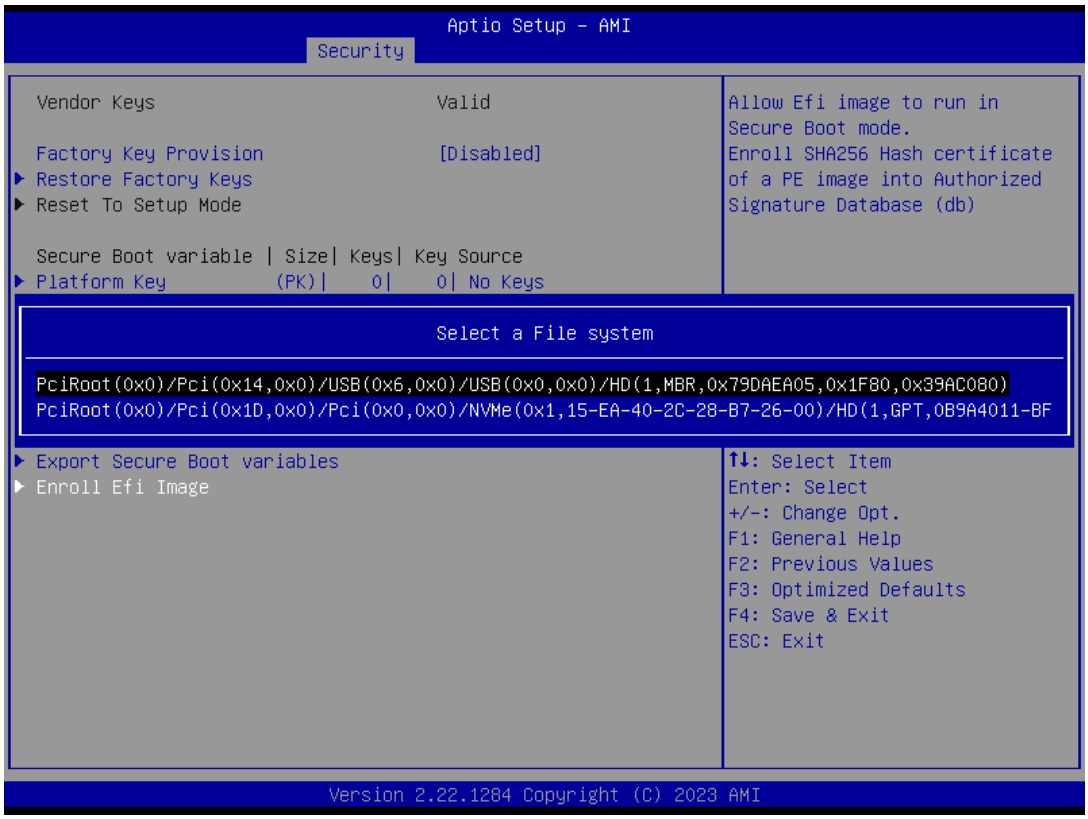

Aptio Setup – AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)|
Authorized Signatures (db)|
Forbidden Signatures(dbx)|1
Authorized TimeStamps(dbt)|
OsRecovery Signatures(dbr)|
Export Secure Boot variables
Enroll Efi Image
Authorized Signatures (db)
Update
Append
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)
ey Source:
Factory,External,Mixed
+: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup – AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)|
Key Exchange Keys (KEK)|
Authorized Signatures (db)|
Forbidden Signatures(dbx)|1
Authorized TimeStamps(dbt)|
OsRecovery Signatures(dbr)|
Export Secure Boot variables
Enroll Efi Image
Forbidden Signatures(dbx)
Details
Export
Update
Append
Delete
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)
ey Source:
Factory,External,Mixed
+: Select Screen
↓: Select Item
nter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup – AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)|
Authorized Signatures (db)|
Forbidden Signatures(dbx)|1
Authorized TimeStamps(dbt)|
OsRecovery Signatures(dbr)|
Export Secure Boot variables
Enroll Efi Image
Authorized TimeStamps(dbt)
Update
Append
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)
ey Source:
Factory,External,Mixed
←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

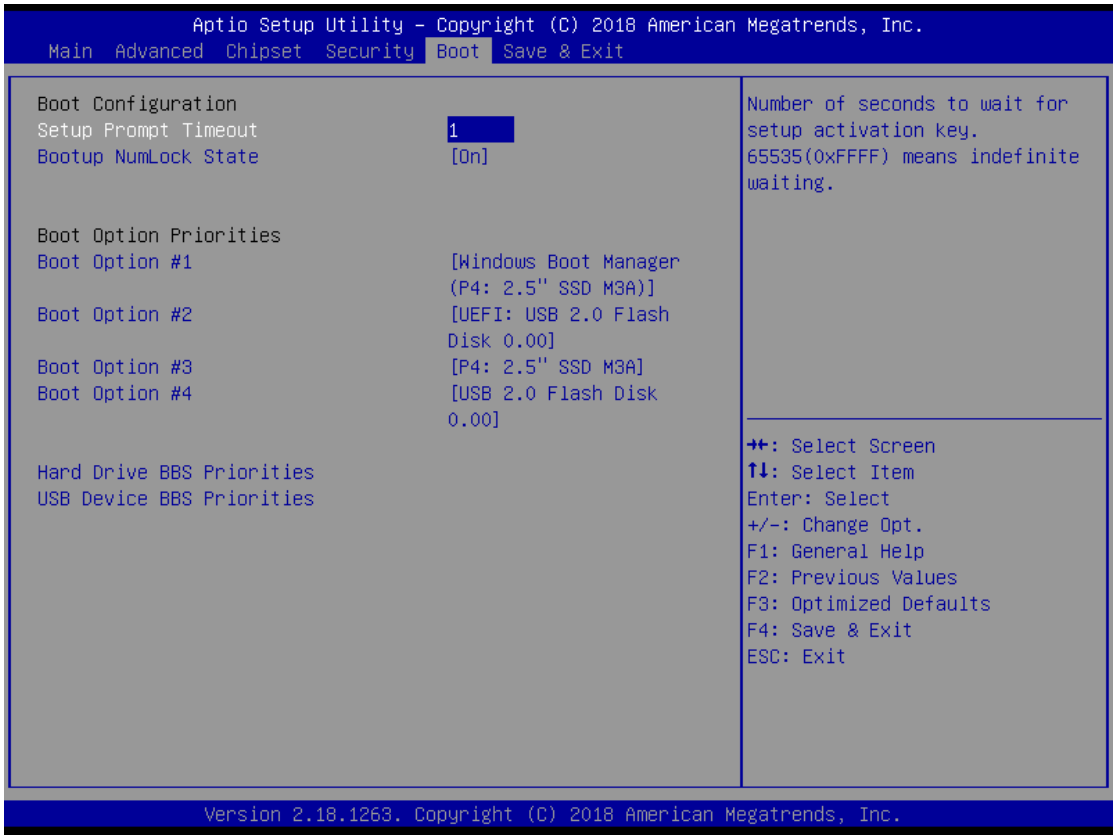

Aptio Setup – AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Key Exchange Keys (KEK)|
Authorized Signatures (db)|
Forbidden Signatures(dbx)|1
Authorized TimeStamps(dbt)|
OsRecovery Signatures(dbr)|
Export Secure Boot variables
Enroll Efi Image
OsRecovery Signatures(dbr)
Update
Append
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)
ey Source:
Factory,External,Mixed
←: Select Screen
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup - AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Save NVRAM content of Secure Boot variable to a file
Select a File system
PciRoot(0x0)/Pci(0x14,0x0)/USB(0x6,0x0)/USB(0x0,0x0)/HD(1,MBR,0x79DAEA05,0x1F80,0x39AC080)
PciRoot(0x0)/Pci(0x1D,0x0)/Pci(0x0,0x0)/NVMe(0x1,15-EA-40-2C-28-B7-26-00)/HD(1,GPT,0B9A4011-BF
Export Secure Boot variables
Enroll Efi Image
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI


Aptio Setup - AMI
Security
Vendor Keys Valid
Factory Key Provision [Disabled]
Restore Factory Keys
Reset To Setup Mode
Secure Boot variable | Size| Keys| Key Source
Platform Key (PK)| 0| 0| No Keys
Allow Efi image to run in Secure Boot mode. Enroll SHA256 Hash certificate of a PE image into Authorized Signature Database (db)
Select a File system
PciRoot(0x0)/Pci(0x14,0x0)/USB(0x6,0x0)/USB(0x0,0x0)/HD(1,MBR,0x79DAEA05,0x1F80,0x39AC080)
PciRoot(0x0)/Pci(0x1D,0x0)/Pci(0x0,0x0)/NVMe(0x1,15-EA-40-2C-28-B7-26-00)/HD(1,GPT,0B9A4011-BF
Export Secure Boot variables
Enroll Efi Image
↑↓: Select Item
Enter: Select
+/-: Change Opt.
F1: General Help
F2: Previous Values
F3: Optimized Defaults
F4: Save & Exit
ESC: Exit
Version 2.22.1284 Copyright (C) 2023 AMI

## 4.7 Boot Menu

The Boot menu allows users to change boot options of the system.




### Setup Prompt Timeout

Use this item to set up number of seconds to wait for setup activation key where 65535(0xFFFF) means indefinite waiting.

### Bootup NumLock State

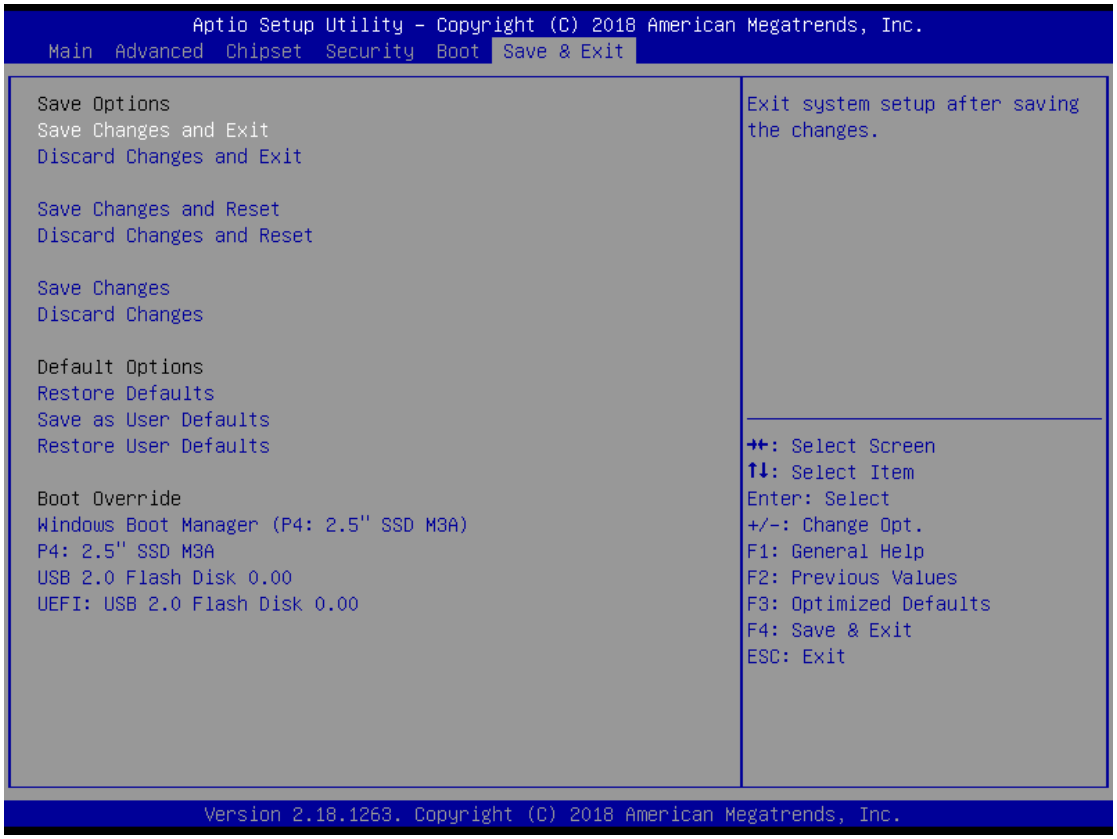
Use this item to select the power-on state for the keyboard NumLock.

### Boot Option Priorities

These are settings for boot priority. Specify the boot device priority sequence from the available devices.

## 4.8 Save & Exit Menu

The Save & Exit menu allows users to load system configurations with optimal or fail-safe default values.




**Save Changes and Exit**

When users have completed the system configuration changes, select this option to leave Setup and return to Main Menu. Select Save Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to save changes and exit.

**Discard Changes and Exit**

Select this option to quit Setup without making any permanent changes to the system configurations and return to Main Menu. Select Discard Changes and Exit from the Save & Exit menu and press <Enter>. Select Yes to discard changes and exit.

**Save Changes and Reset**

When users have completed the system configuration changes, select this option to leave Setup and reboot the computer so the new system configurations take effect. Select Save Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to save changes and reset.

**Discard Changes and Reset**

Select this option to quit Setup without making any permanent changes to the system configuration and reboot the computer. Select Discard Changes and Reset from the Save & Exit menu and press <Enter>. Select Yes to discard changes and reset.

**Save Changes**

When completed the system configuration changes, select this option to save changes. Select Save Changes from the Save & Exit menu and press <Enter>. Select Yes to save changes.

**Discard Changes**

Select this option to quit Setup without making any permanent changes to the system configurations. Select Discard Changes from the Save & Exit menu and press <Enter>. Select Yes to discard changes.

**Restore Defaults**

It automatically sets all Setup options to a complete set of default settings when users select this option. Select Restore Defaults from the Save & Exit menu and press <Enter>.

**Save as User Defaults**

Select this option to save system configuration changes done so far as User Defaults. Select Save as User Defaults from the Save & Exit menu and press <Enter>.

**Restore User Defaults**

It automatically sets all Setup options to a complete set of User Defaults when users select this option. Select Restore User Defaults from the Save & Exit menu and press <Enter>.

**Boot Override**

Select a drive to immediately boot that device regardless of the current boot order.

# APPENDIX A
# WATCHDOG TIMER

## About Watchdog Timer

Software stability is a major issue in most applications. Some embedded systems are not watched by human for 24 hours. It is usually too slow to wait for someone to reboot when a computer hangs. The system needs to be able to reset automatically when things go wrong. The watchdog timer gives us solutions in this regard.

The watchdog timer is a counter that triggers a system to reset when it counts down to zero from a preset value. The software starts the counter with an initial value and must reset it periodically. If the counter ever reaches zero which means the software has crashed, the system will reboot.

## How to Use the Watchdog Timer

The user can configure the watchdog timer using the watchdog function included in the **AxEAPI** developed by Axiomtek.

### 1. EApiWDogStart

To enable the watch dog.

- Syntax:

```
EApiStatus_t EAPI_CALLTYPE EApiWDogStart (
 __IN uint32_t Delay,
__IN uint32_t EventTimeout,
__IN uint32_t ResetTimeout );
```

- Parameters:

***Delay***: Initial delay for the watchdog timer in milliseconds. The first trigger must happen within (*Delay* + EventTimeout**)** milliseconds, of calling *EApiWDogStart*.
***EventTimeout***: Watchdog timeout interval in milliseconds to trigger an event.
***ResetTimeout***: Watchdog timeout interval in milliseconds to trigger a reset.

- Return Value
  Status Codes (EApiStatus_t)
- Example (C#)

```
private static UInt32 EapiStatus;
// WDT is Milliseconds * 1000
if (SecTimer.Checked == true)
    EapiStatus = EApiWDogStart(WDTDelay * 1000, (UInt32)Timer_Counter.Value * 1000, (UInt32)Timer_Counter.Value * 1000);
else if (MinTimer.Checked == true)
    EapiStatus = EApiWDogStart(WDTDelay * 60000, (UInt32)Timer_Counter.Value * 60000, (UInt32)Timer_Counter.Value * 60000);

if (EapiStatus != EAPI_STATUS_SUCCESS)
    MessageBox.Show("WDog Start Error");
```

## 2. EApiWDogTrigger

To write board information values with WDT.

- Syntax

```
EApiStatus_t EAPI_CALLTYPE EApiWDogTrigger ();
```

- Parameters
  None.

- Return Value
  Status Codes (EApiStatus_t)

- Example (C#)

```
private static UInt32 EapiStatus;
EapiStatus = EApiWDogTrigger();
if (EapiStatus != EAPI_STATUS_SUCCESS)
    MessageBox.Show("WDog Trigger Error");
```

## 3. EApiWDogStop

To disable the watch dog.

- Syntax

```
EApiStatus_t EAPI_CALLTYPE EApiWDogStop ();
```

- Parameters
  None.

- Return Value
  Status Codes (EApiStatus_t)
- Example (C#)

```
private static UInt32 EapiStatus;
EapiStatus = EApiWDogStop();
if (EapiStatus != EAPI_STATUS_SUCCESS)
    MessageBox.Show("WDog Stop Error");
```

## Sample Program

```
#include <stdio.h>
#include <stdlib.h>

#include "EApi.h"

#if defined(WIN32) || defined(_WIN32) || defined(__WIN32__) || defined(__NT__)
    //#define _WIN32_WINNT    0x0501
    #include <windows.h>
    #define _msleep(t) Sleep(t)
#else
    #include <unistd.h>
    #define _msleep(t) usleep(t * 1000)
#endif
 static const char* tag = "eapi_runner";

int main (
    int argc,
    char *argv[]
) {
    EApiStatus_t status;
    uint32_t buffer_size = 64;
    uint32_t value;
    char buffer[64];
    //char exit_request = 0;
    uint32_t wdt_runmode = 0;
    uint32_t wdt_timermode = 0;
    uint32_t wdt_event = 0;    // run wdt
    uint32_t wdt_delay = 0;    // run wdt
    uint32_t wdt_reset = 0;    // reload wdt
    bool wdt_check = false;

    //
    // Initialize
    //
    status = EApiLibInitialize ();
    if (status != EAPI_STATUS_SUCCESS) {
        fprintf (stderr, "fail to initialize, status=%d\n", status);
        goto fail;
    }
    fprintf (stderr, "---- intialize: ok\n");

    //
    // Watch dog
    //
    while (wdt_runmode != 4) {
        fprintf(stderr, "1. Run WDT mode\n");
        fprintf(stderr, "2. reload WDT mode\n");
        fprintf(stderr, "3. Stop WDT mode\n");
        fprintf(stderr, "4. Exit\n");
        fprintf(stderr, "Select watch dog run mode: ");
        scanf("%d", &wdt_runmode);

        switch (wdt_runmode)
        {
        case 1:
            fprintf(stderr, "Set watch dog timer mode (0 means second, 1 means minute)\n");
            scanf("%d", &wdt_timermode);

            if (wdt_timermode == 0)
            {
                fprintf(stderr, "WDT timer mode is second.\n");
            }
            else if (wdt_timermode == 1)
            {
                fprintf(stderr, "WDT timer mode is minute.\n");
```

```
            }
            else
            {
                wdt_timermode = 0;
                fprintf(stderr, "WDT timer mode is second.\n");
            }

            fprintf(stderr, "Set watch dog count (Count range is 5-255): ");
            scanf("%d", &wdt_event);

            if (wdt_event < 5 || wdt_event > 255) {
                fprintf(stderr, "Watch dog count is invalid!!!\n\n");
                //goto invalid;
                break;
            }

            wdt_reset = wdt_event;
            if (wdt_timermode == 0)
                status = EApiWDogStart(wdt_delay * 1000, wdt_event * 1000, wdt_reset * 1000);
            else if (wdt_timermode == 1)
                status = EApiWDogStart(wdt_delay * 60000, wdt_event * 60000, wdt_reset * 60000);

            if (status != EAPI_STATUS_SUCCESS) {
                fprintf(stderr, "WDog run Error!!!\n\n");
                goto fail;
            }
            else {
                wdt_check = true;
            }
            break;
        case 2:
            if (wdt_check == true)
            {
                status = EApiWDogTrigger();
                if (status != EAPI_STATUS_SUCCESS) {
                    fprintf(stderr, "WDog Reload Error!!!\n\n");
                    goto fail;
                }
            }
            else
            {
                fprintf(stderr, "Need to run WDT first!!!\n\n");
            }
            break;
        case 3:
            status = EApiWDogStop();
            if (status != EAPI_STATUS_SUCCESS) {
                fprintf(stderr, "WDog Stop Error!!!\n\n");
                goto fail;
            }
            else {
                wdt_check = false;
            }
            break;
        case 4:
            fprintf(stderr, "Exit program!!!\n\n");
            break;
        default:
            fprintf(stderr, "WDog run mode error!!!\n\n");
            break;
        }
    }

fail :

    return 0;
}
```

# APPENDIX B
# DIGITAL I/O

## Digital I/O Specification

**Digital Input:**
Input channels: 16, sink/source type
Input voltage: 0 to 30VDC
Input level for dry contacts:
Logic level 0: close to ground
Logic level 1: open
Input level for wet contacts:
Logic level 1: +/-3VDC max.
Logic level 0: +/- 10VDC min. to +/-30VDC max. (source to digital input)

**Digital output:**
output channels: 2, sink type
output current: 200mA max. per channel
on-state voltage:12~ 24VDC nominal
Isolation: 1.5 KV
Max voltage on COM+: 30VDC

**SSR output:**
output channels: 2, sink type
output current: 200mA max. per channel
on-state voltage:12~ 24VDC nominal
Max voltage on COM+: 30VDC

## Digital I/O Software Programming

Digital I/O are controlled by General Purpose Input / Output (GPIO) in PCA9535.
The relevant control positions are as follows

Digital Input：

I2C address：0x48

Digital Output：

I2C address：0x4A，Data port 0

SSR：

I2C address：0x4A，Data port 1 bit[1:0]

Command byte:

| Command | Register |
|---|---|
| 0 | Input port 0 |
| 1 | Input port 1 |
| 2 | Output port 0 |
| 3 | Output port 1 |
| 4 | Polarity Inversion port 0 |
| 5 | Polarity Inversion port 1 |
| 6 | Configuration port 0 |
| 7 | Configuration port 1 |

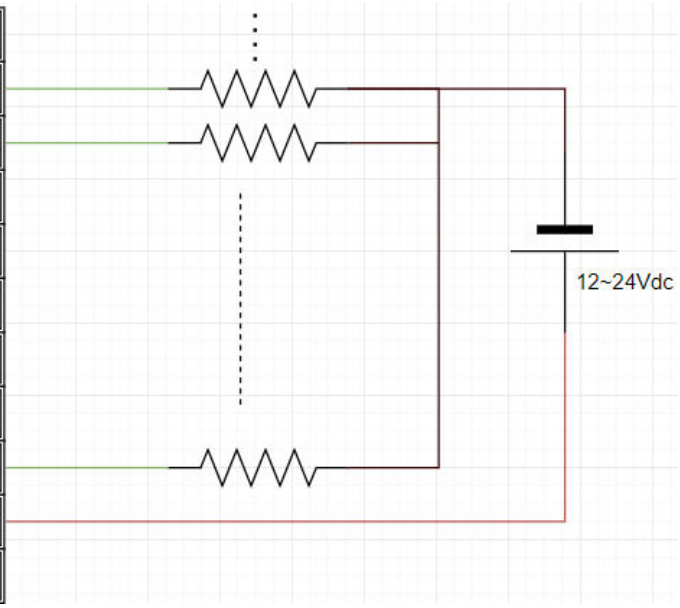
## Digital Input Wiring

There are two connection methods for Digital input, both of which are available.

When DI_GA/GB_COM is connected to V-, if DI is connected to V+, it will act and the received logic will be "LOW". Otherwise, if DI is not connected or connected to V+, it will receive and the received logic will be "HIGH".

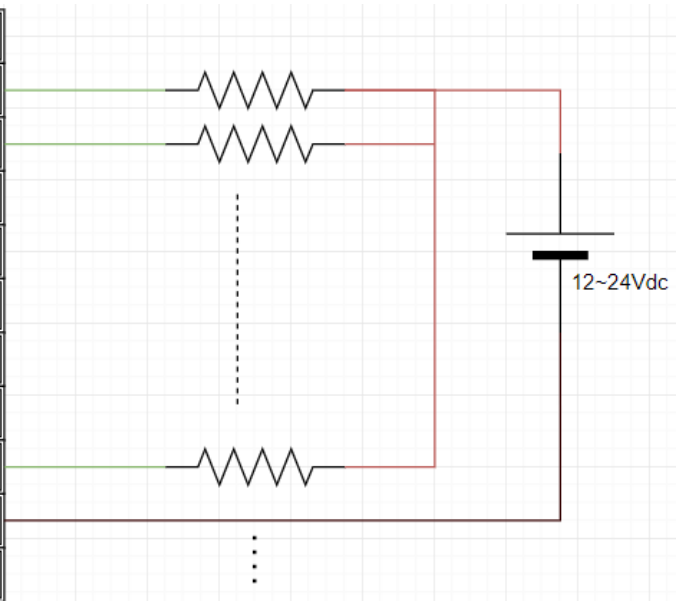
When DI_GA/GB_COM is connected to V+, DI connected to GND will act and the received logic will be "LOW". Otherwise, if DI is not connected or connected to V+, it will be received and the received logic will be "HIGH".**DRY Contact**

| | Name | Pin |
|---|---|---|
| J2 | DI_GB_D0 | B1 |
| | DI_GB_D1 | B2 |
| | DI_GB_D2 | B3 |
| | DI_GB_D3 | B4 |
| | DI_GB_D4 | B5 |
| | DI_GB_D5 | B6 |
| | DI_GB_D6 | B7 |
| | DI_GB_D7 | B8 |
| | DI_GB_COM | B9 |
| | | B10 |



## Wet Contact

| | Name | Pin |
|---|---|---|
| J2 | DI_GA_D0 | A1 |
| | DI_GA_D1 | A2 |
| | DI_GA_D2 | A3 |
| | DI_GA_D3 | A4 |
| | DI_GA_D4 | A5 |
| | DI_GA_D5 | A6 |
| | DI_GA_D6 | A7 |
| | DI_GA_D7 | A8 |
| | DI_GA_COM | A9 |
| | | A10 |

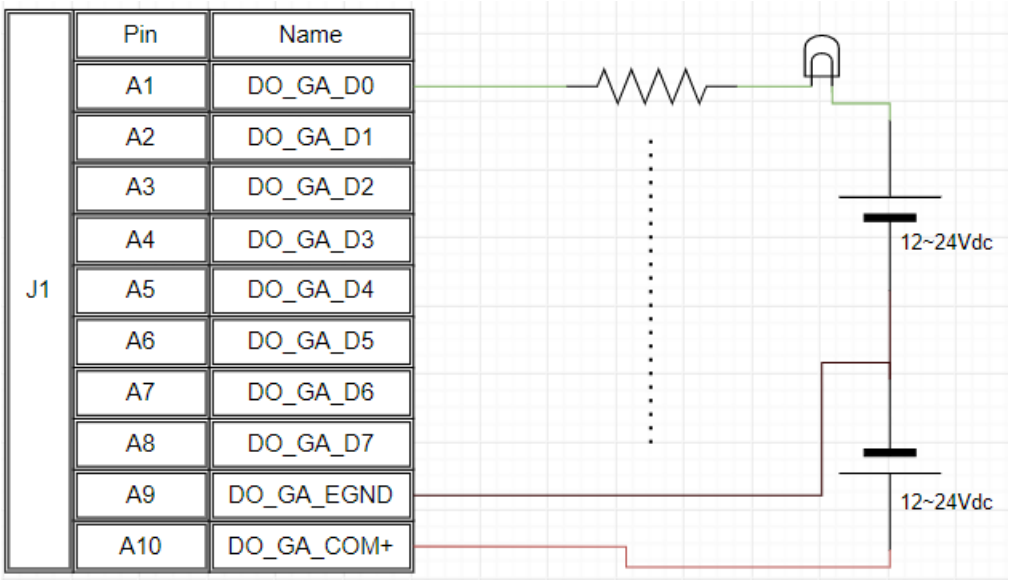



## Digital Output Wiring

The Digital Output Group A is sink mode, so no voltage can be measured.

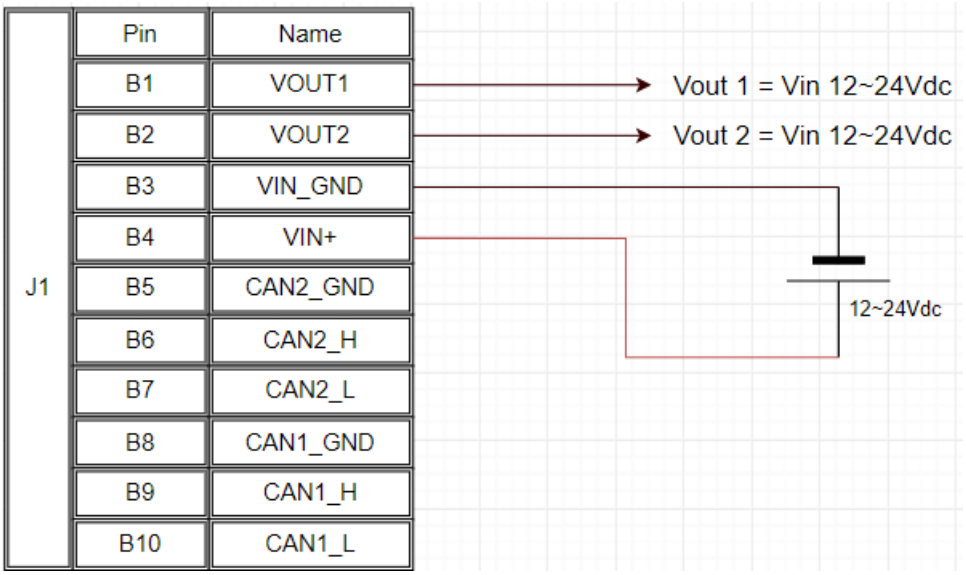
When the logic is "High", DO will act. When the logic is "LOW", DO will not act.

| | Pin | Name |
|---|---|---|
| J1 | A1 | DO_GA_D0 |
| | A2 | DO_GA_D1 |
| | A3 | DO_GA_D2 |
| | A4 | DO_GA_D3 |
| | A5 | DO_GA_D4 |
| | A6 | DO_GA_D5 |
| | A7 | DO_GA_D6 |
| | A8 | DO_GA_D7 |
| | A9 | DO_GA_EGND |
| | A10 | DO_GA_COM+ |



## SSR Contact

The Digital Output Group B is Relay Output, the contact type is NO.. The common contact is VIN+, when the logic is "HIGH", the relay acts, and Vout will output the voltage of Vin.



## Sample Program

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#include "EApi.h"

#if defined(WIN32) || defined(_WIN32) || defined(__WIN32__) || defined(__NT__)
    //#define _WIN32_WINNT    0x0501
    #include <windows.h>
    #define _msleep(t) Sleep(t)
#else
    #include <unistd.h>
    #define _msleep(t) usleep(t * 1000)
#endif

#define MAX_PIN_COUNT (64)
#define STDIN_INPUT_MAX_LENGTH (4)

static const char* tag = "eapi_runner";

int main (
    int argc,
    char *argv[]
) {
    EApiStatus_t status;
    uint32_t value; // Number of DIO pin count
    char input_buf[STDIN_INPUT_MAX_LENGTH];

    //
    // Initialize
    //
    status = EApiLibInitialize ();
    if (status != EAPI_STATUS_SUCCESS) {
        fprintf (stderr, "fail to initialize, status=%d\n", status);
        goto fail;
    }
    fprintf (stderr, "---- intialize: ok\n");

    //
    // Internal DIO
    //
    status = EApiHWMGetCaps (
        EAPI_ID_DIO_COUNTER_INTERNAL,
        &value
    );
    if (status != EAPI_STATUS_SUCCESS) {
        fprintf (stderr, "fail to get dio internal cap, status=%d\n", status);
        goto fail;
    }
    fprintf (stderr, "---- dio internal cap: %u\n", value);

    if (value) {
        uint32_t pin_dir[MAX_PIN_COUNT];
        uint32_t pin_value[MAX_PIN_COUNT];
        char key = 0;
        uint32_t i, j;

        // Hardcode to change DIO pin 4 to output direction.
        i = 4;
        pin_dir[4] = EAPI_OUTPUT;
        status = EApiBoardSetValueWithIndex(
            EAPI_ID_BOARD_SENSOR_DIO_DIRECTION_INTERNAL,
            4,
            pin_dir[4]
        );

        if (status != EAPI_STATUS_SUCCESS) {
            fprintf (stderr,
                "fail to set internal dio dir, index=%d status=%d\n",
                i,
```

```
                status
            );
            goto fail;
        }

        // Dump DIOs direction of all pins
        for (i = 0; i < value; i++) {
            status = EApiBoardGetValueWithIndex(
                EAPI_ID_BOARD_SENSOR_DIO_DIRECTION_INTERNAL,
                i,
                &pin_dir[i]
            );
            if (status != EAPI_STATUS_SUCCESS) {
                fprintf (stderr,
                    "fail to get internal dio dir, index=%d status=%d\n",
                    i,
                    status
                );
                goto fail;
            }
            fprintf (stderr, "---- dio internal dir[%d]: %u\n", i, pin_dir[i]);
        }

        while (1) {
            // Dump DIOs level of all pins
            for (i = 0; i < value; i++) {
                status = EApiBoardGetValueWithIndex(
                    EAPI_ID_BOARD_SENSOR_DIO_INTERNAL,
                    i,
                    &pin_value[i]
                );
                if (status != EAPI_STATUS_SUCCESS) {
                    fprintf (stderr,
                        "fail to get internal dio value, index=%d status=%d\n",
                        i,
                        status
                    );
                    goto fail;
                }
                fprintf (stderr, "---- dio internal value[%d]: %u\n", i, pin_value[i]);
            }


            fprintf (stderr, "press `q` to exit or 0-%d to invert value: ", value - 1);

            // Read char until 0x0a or buffer full from stdin
            memset(input_buf, 0, STDIN_INPUT_MAX_LENGTH);
            j = 0;
            do {
                key = getchar();
                input_buf[j++] = key;
            } while ((j < (STDIN_INPUT_MAX_LENGTH - 1)) && key != 0x0A);


            if (input_buf[0] == 'q' || input_buf[0] == 'Q')
                break;

            i = atoi(input_buf);
            // Toggle the voltage level of the selected pin
            if (i >= 0 && i < value) {
                status = EApiBoardSetValueWithIndex(
                    EAPI_ID_BOARD_SENSOR_DIO_INTERNAL,
                    i,
                    pin_value[i] ? 0 : 1
                );

                if (status != EAPI_STATUS_SUCCESS) {
                    fprintf (stderr,
                        "fail to set internal dio value, status=%d\n",
                        status
                    );
```

```
                    goto fail;
                }
            }
        }
    }

    //
    // External DIO
    //
    status = EApiHWMGetCaps (
        EAPI_ID_DIO_COUNTER_EXTERNAL,
        &value
    );
    if (status != EAPI_STATUS_SUCCESS) {
        fprintf (stderr, "fail to get dio external cap, status=%d\n", status);
        goto fail;
    }
    fprintf (stderr, "---- dio external cap: %u\n", value);

    if (value) {
        ;
    }


fail :

    return 0;
}
```

**This page is intentionally left blank.**