



SHSC-WB001 (REV:1.0)

Product Manual



	신희씨앤엠(주) SHINHEE C&M Co., Ltd	MODEL		
MADE	CHECKED	APPROVE	Date	SEAL
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SHSC-WB001 Controller Use Case



SHSC-WB001 **One Controller for multiple use. Get it today**

SHSC-WB001 will be the soul of the AGV development as all the components can be easily connected and can make our own software to run it.

AGV



SHSC-WB001 will be the soul of the AMR development as all the components can be easily connected and can make our own software to run it.

AMR



Autonomous Forklift

SHSC-WB001 will be the soul of the Autonomous Forklift development as all the components can be easily connected and can make our own software to run it.

Smart Factory



SHSC-WB001 can be used in the Smart Factory production line like edge-PC and can be easily connect and communicate to other machines as the controller has the RS232/485 ports, LAN ports, HDMI ports, CAN ports ,Digital IO to easily connected to other machines to develop their own application.

AI / Machine Learning Development

SHSC-WB001 is made with Intel® Core™ i7 and 32 GB RAM which is very much useful for the high computation and can be used to perform all the AI/Machine Learning and Deep Learning applications.

IOT Development

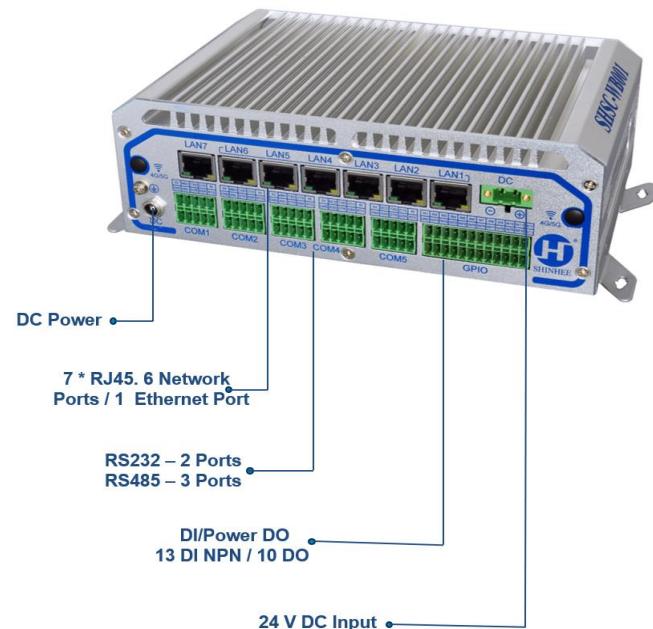
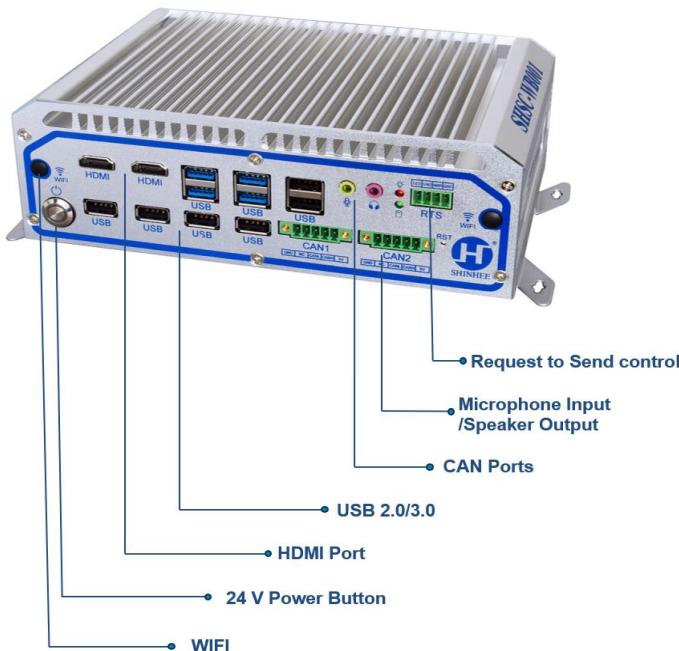
SHSC-WB001 can be used for the IOT Development as our controller has the RS232/485 ports, LAN ports, HDMI ports, CAN ports ,Digital IO and can be used for the high computation.

Labs(Medical/Physical/Chemical)

SHSC-WB001 is made with Intel® Core™ i7 and 32 GB RAM which is very much useful for the high computation and can be used to perform all the Lab developments.

University Students

SHSC-WB001 is made with Intel® Core™ i7 and 32 GB RAM which is very much useful for the high computation and can be used to perform all the students project works for IOT/AI/Robot making and etc.





Clarification

Please read this manual carefully before use and keep it for future reference. Except for the accessories listed with the product, the contents of this manual do not represent the commitment of the company, the company reserves the right to change this manual without notice. We are not responsible for any direct, indirect, intentional or unintentional damages or hazards caused by improper installation or use.

Before ordering a product, please check with your dealer to see if the performance of the product meets your needs. All other trademarks mentioned in this manual are the property of the respective product manufacturers.

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Ordering Information; The following ordering information is for reference, please consult our sales staff or technical personnel.

Module	Description	CPU optional
SHSC-WB001	SHSC-WB001,I5-1135G7,7*LAN,5*COM(3*485+2*232),2*CAN,M.2(NVME)	I5-1165G7



Warm tips:

1. Not ready to install the motherboard, should be stored in the anti-static protective bag.
2. In the bag from the motherboard before taking, should be placed on the hands of grounded metal objects for a while, in order to release the body and hands of static electricity.
3. Before use, it is appropriate to place the motherboard on a stable plane.
4. Please keep the motherboard dry, the open slots of the heatsink are used for ventilation to avoid overheating of the components inside the chassis. Do not cover or block such openings.
5. Before connecting the motherboard to the power supply, please check the power supply voltage.
6. Please place the power cord in a place where it will not be trampled on, and do not stack any objects on the power cord.
7. When you need to connect or unplug any equipment, make sure that all power cords have been unplugged beforehand.
8. To avoid electric shock or product damage, turn off the AC power or unplug the AC power cord from the power outlet every time you unplug or reconfigure the machine or board.
9. Please pay attention to all the cautions and warnings mentioned in the manual.
10. To avoid unnecessary damage to the product caused by frequent switching on and off, wait at least 30 seconds after powering off before powering on again.
11. Equipment in the use of abnormal conditions, please find a professional to deal with.
12. Please do not place the device in the ambient temperature higher than 70 °C work, otherwise it will cause damage to the device.
13. Operation of this equipment in the band 5150–5350 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

Note: if the battery is not properly replaced, there will be a risk of explosion. Be sure to use the same model or equivalent type of battery recommended by the manufacturer.



Chapter 1: Product Introduction

1.1. Product Introduction

SHCNM is equipped with Intel 11th generation I5-1135G7 series processor motherboard and Intel® Iris® Xe Graphics integrated display. It has a rich number of IO interfaces, is stable and durable, and supports multiple operating systems such as Windows 10/11 and Linux. This model adopts high-quality aluminum profiles and sheet metal fanless heat dissipation design. The closed fanless body dissipates heat to eliminate hidden troubles caused by traditional built-in cooling fans and dust. The whole machine has undergone strict tests such as high temperature, low temperature and vibration, and can operate stably for a long time in harsh industrial environments, providing precise and efficient performance for industrial manufacturing.

- ◆ Motherboard SHSC-WB001 Using Intel 11th generation I7-1165G7 processor
- ◆ 1 DDR4 SO-DIMM up to 32GB
- ◆ TPM2.0 optional, 2 M.2 (SSD/WIFI)
- ◆ 7LAN, 23 GPIOs (24V with isolation) ;
- ◆ Optional onboard TPM2.0 protects information security.

The motherboard supports 24-hour uninterrupted stable operation and can be widely used



in artificial intelligence with multi-network port expansion, machine vision (such as automated detection, automatic image analysis and processing), automated production and inspection, bank security monitoring systems, and intelligent building management systems (IBMS).), integrated security management system (ISMS), integrated traffic management system (ITMS), integrated subway monitoring system, home intelligent system, call center system, various industry command and dispatch centers, workstation monitoring system and other industry scenarios.

1.2 Product features

1. Motherboard SHSC-WB001 uses Intel 11th generation I7-1165G7 series processor;
2. HDMI, 10 USB([5V/0.2A]X10), 5 COM(RS232/RS485[20mA])
3. TPM2.0 optional, 2 M.2 (SSD/WIFI)
4. 7LAN, 23 GPIOs (24V with isolation)
5. Aluminum profile and sheet metal fanless design;
6. Wall-mounted installation method, dimensions depth 135.7 x width 233.9 x height 74mm (dimensions with wall-mounting bracket).

The motherboard can work stably in a wide humidity and temperature range of -20-60°C, 0% ~ 90% relative humidity, and no condensation, meeting the various application requirements of industrial-grade products.

Products eliminate unnecessary features and expense, accelerate production, rapid deployment and integration, reduce system downtime and maintenance costs, and support for future upgrades and expansions. Platform functions can be easily expanded and customized to meet customer-specific application needs and provide future-oriented solutions.

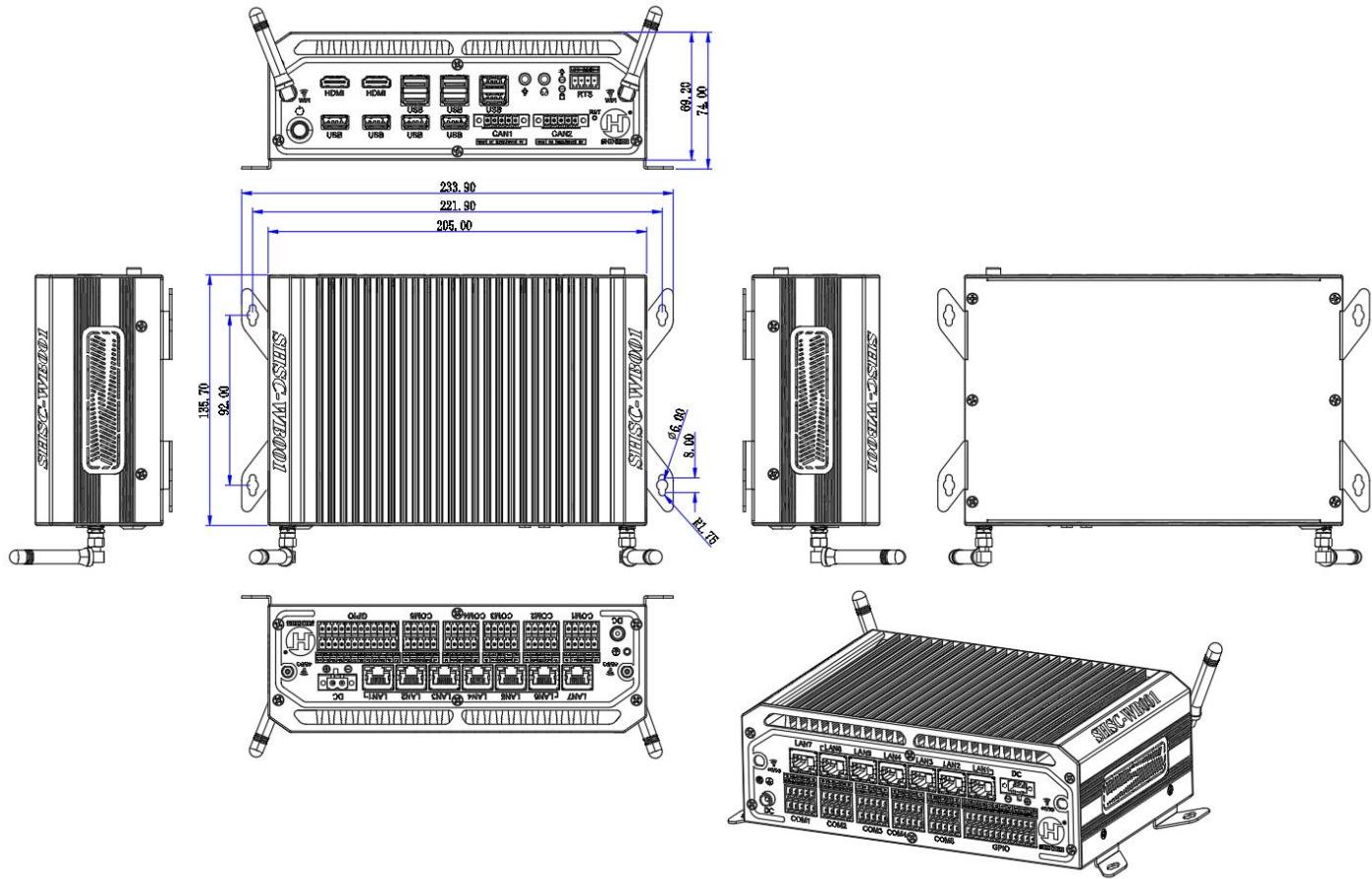
- * Maximum VA of 38.74W
- * The product is connected to an input power source not exceeding 100 VA. (PS2)
- * The unit shall be connected to a limited power source. (LPS))



1.3 Product Specifications

Material and Design	Aluminum profile plus sheet metal, fanless design
Processor	Onboard Intel 11th generation I7-1165G7 processor
RAM	1*DDR4 SO-DIMM, up to 32GB
Storage	1*M.2 M-Key 2280(NVMe x4)、1*SATA3.0
Front panel interface	<p>5*10PIN Phoenix terminal (COM1 to COM5, COM1 to COM3 are RS485, COM4 and COM5 are RS232)</p> <p>1*24PIN Phoenix terminal (24V with isolated GPIO, including 13 GPI and 10 GPO)</p> <p>1*DC、7*RJ45 LAN(LAN7 is a separate channel for RTL8111H)、 2*antenna holes, 1*2PIN Phoenix terminal (24V power supply)</p>
Rear panel interface	<p>2*5PIN Phoenix terminal (CAN1 and CAN2)</p> <p>1*RST, 1*power button, 2*antenna hole</p> <p>10*USB (4 * USB3、6* USB2)</p> <p>2*HDMI interface, support 4K</p> <p>1*4PIN Phoenix terminal RTS (switch and LED), 1*power light, 1*hard disk light</p> <p>1*LINE OUT、1*MIC IN</p>
Internal expansion	TPM2.0 is optional, not available by default
	1*M.2 E-Key (supports PCIE and USB protocols, supports WIFI module)
Working environment	<p>Working temperature: -20°C ~ +60°C; Working humidity: 5% ~ 90%</p> <p>Storage temperature: -40°C ~ +85°C; Storage humidity: 5% ~ 90%</p>
Operating system	UBUNTU 20.04
Size	Depth 135.7mm x Width 233.9mm x Height 74mm (dimensions with wall mount bracket)
Weight	Anout 1.5kg
Power Supply	24V terminal power supply
Modulation technique	<p>Bluetooth(BDR/EDR)_GFSK, π/4DQPSK, 8DPSK</p> <p>Bluetooth(BLE)_GFSK</p> <p>WIFI(802.11a/b/g/n/ac)_DSSS, OFDM</p>

Product Interface Diagram





Chapter 2: Installation Instructions

Installation instructions

Please follow the steps below to assemble your computer:

1. Refer to the user's manual to adjust all the jumper on the motherboard correctly.
2. Install other expansion cards.
3. Connect all signal lines, cables, panel control lines, and power supply.
4. Start the computer and complete the BIOS program setup.

The key components of this motherboard are all integrated circuits, and these components are easily damaged by static electricity. Therefore, please make the following preparations before formally installing the motherboard:

1. Hold the motherboard with your hand on the edge of the board, as far as possible, without touching the pins of the components and plug sockets.
2. When touching IC components (e.g. CPU, RAM, etc.), it is best to wear anti-static bracelets/gloves.
3. Before the IC components are installed, place the components in an antistatic mat or bag.
4. Make sure the power switch is in the OFF position before plugging in the power supply.

This motherboard is equipped with two SO-DIMM slots. Please note the following two points when installing the memory sticks:

1. When installing the memory sticks, align the notches of the memory sticks with the notches of the slots before inserting them firmly.
2. When selecting a memory stick, you must choose one that supports the specifications of this motherboard.

Before installing the hardware devices, please set the corresponding jumpers according to your needs according to the following table.



Tip: How to recognize the jumper, pin 1 of the interface. Observe the text marking next to the plug socket, which is indicated by a "1" or a thicker line or a triangle symbol.

Look at the pads on the back of the connector, the square pads are pin 1; all jumpers have a triangle symbol next to pin 1. The square pads are pin 1; all jumpers have a triangle symbol next to pin 1.

CMOS Content Clear/Hold Setting (BAT1)

CMOS is powered by the on-board coin cell battery. Clearing the CMOS causes the previous system settings to be permanently erased and set to the original (factory settings) system settings.

The steps:

- (1) Turn off the computer and disconnect power; momentarily short the CLR_CMOS pin
- (2) Use a jumper cap to short "JP1" pins 2 and 3 for 5~6 seconds, then restore.
- (3) Turn on the computer and press the "F2" key in the keyboard to enter the BIOS interface;
- (4) Enter the BIOS interface, press the "F9" key ---- "Enter" to reload the optimal default values;
- (5) Press "F10" key to save and exit the setup.



Chapter 3: BIOS Parameter Settings

3.1 BIOS Parameter Setting

3.1.1 Entering the BIOS System and Key Functions

1. Turn on the system power or reboot the system.
2. After powering on, when the self-test message appears on the screen, press the <F2> key to enter the BIOS, or press the <F12> key to enter the boot menu.

3.1.2 The functions of each key in the BOIS screen are as follows;

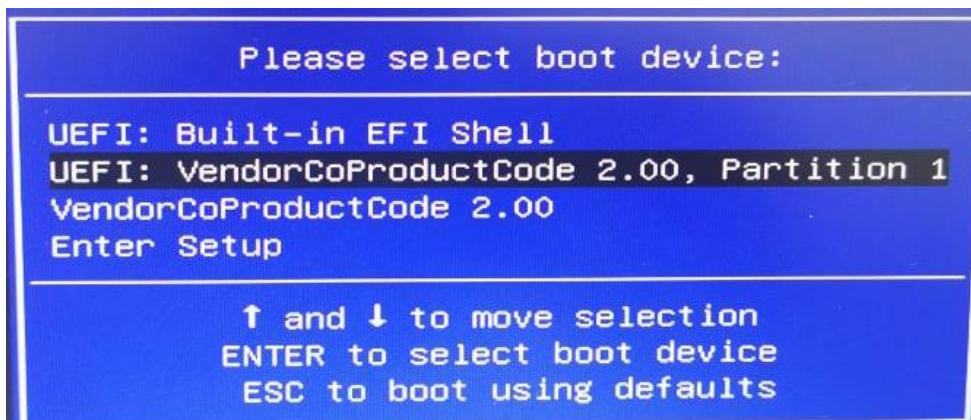
- → ← : Select menu
- ↑ ↓ : select item
- Enter : Confirm selection
- +/- : change value
- F1 : Help
- F2 : Abandon this modification and return to the last set value.
- F9 : Restore factory defaults
- F10 : Save changes and exit
- ESC : Return to the previous screen

3.1.3 Notes:

1. BIOS settings directly affect the performance of the computer and the use of its functions.
2. Setting the wrong parameters will cause damage to the computer and even prevent it from booting.
3. If the wrong settings cause the computer not to boot up, please restore the factory mode.

3.1.4 BIOS update procedure (If you need to update the BIOS, please contact our technical support staff)

1. Prepare a USB flash drive in FAT32 format.
2. Copy the EFI directory provided by our company to the root directory of the USB flash disk.
3. After booting up, press F12 to select the boot item, select boot from UEFI:USB flash drive, and enter the SHELL interface as below:



4. After entering SHELL, wait for 5 seconds and it will automatically refresh (the power cannot be cut off during the update process. If the power is cut off during the update process, the computer will not boot).

Pictures of the BIOS update process:

```

EFI Shell version 2.70 [5.12]
Current running mode 1.1.2
Device mapping table
  fso  :Removable HardDisk - Alias hd6e0b b1k0
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x4,0x0)/HD(1,MBR,0x005EC1C0,0x40,0x1DAFFC0)
  b1k0  :Removable HardDisk - Alias hd6e0b fso
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x4,0x0)/HD(1,MBR,0x005EC1C0,0x40,0x1DAFFC0)
  b1k1  :Removable BlockDevice - Alias (null)
        PciRoot(0x0)/Pci(0x14,0x0)/USB(0x4,0x0)

Press ESC in 1 seconds to skip startup.nsh, any other key to continue.
fso:\EFI\BOOT\startup.nsh> F50:
fso:\EFI\BOOT\startup.nsh> CD EFI\BOOT
fso:\EFI\BOOT\startup.nsh> Fpt -F 250.bin

Intel (R) Flash Programming Tool. Version: 11.8.50.3460
Copyright (c) 2007 - 2017, Intel Corporation. All rights reserved.

Reading HSFSTS register... Flash Descriptor: Valid

--- Flash Devices Found ---
W25Q128FV      ID:0xEF4018      Size: 16384KB (131072KB)

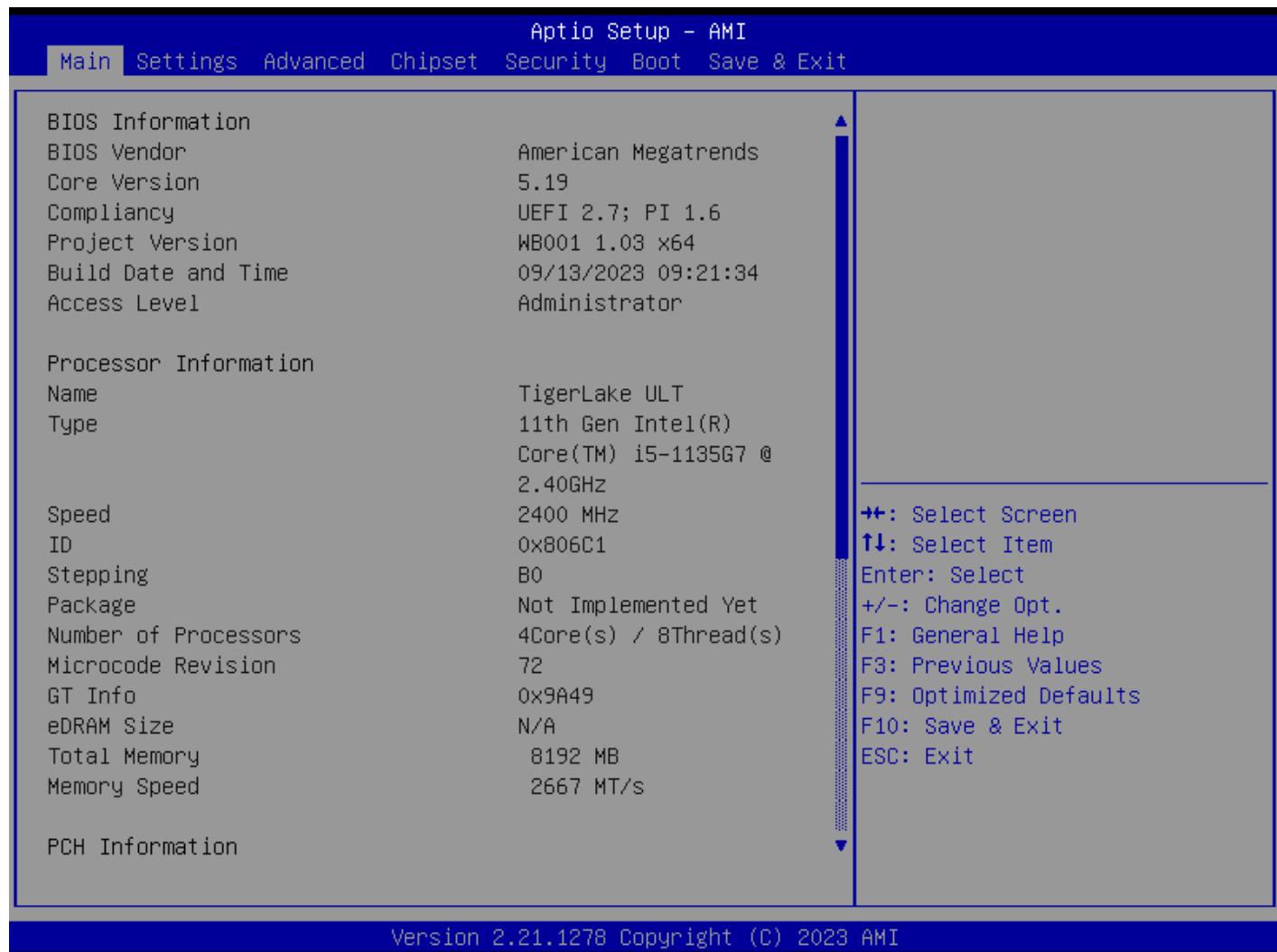
= Reading Flash [0x011EBC0] 1146KB of 16384KB - 7 percent complete.

```

5. After updating the BIOS, just reboot



3.2 Main menu



The black font part is read-only information; it contains BIOS ID, version and CPU details, including CPU manufacturer, model, frequency, L1 cache size, L2 cache size and so on.

3.2.1 System Date: Sets the system date. It is expressed in the format of month/day/year. The setting range is: Mon month (Jan.-Dec.), Date/day (01-31), Year/year (up to 2099).

3.2.2 System Time : Set the system time. It is expressed in hour/minute/second format. The setting range is: Hou hour (00-23), Minute/minute (00-59), Second/second (00-59).



3.3 Setting



BIOS LOCK: BIOS update switch

SATA MODE SELECTION: SATA working mode

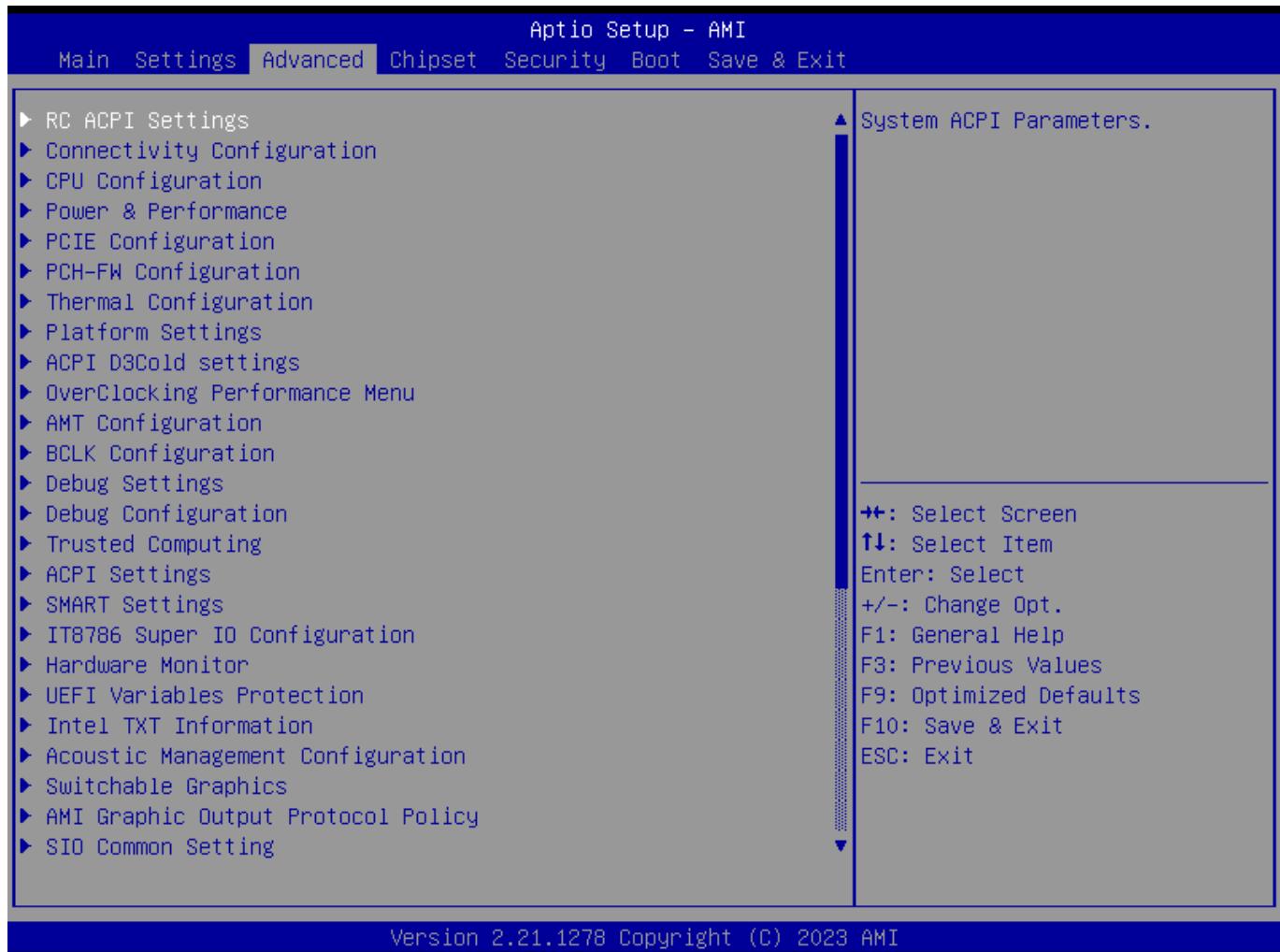
SATA CONTROLLER SPEED: SATA control options

RESTORE AC POWER LOSS: Power-on working method

RTC WAKEUP CONTROL: RTC wakeup control



3.4 Advanced setting



RC ACPI Settings : Advanced configuration and power management

CPU Configuration: fan related information and setting options

Power &Performance : Power management and performance setting options

Thermal Configuration : Temperature control options

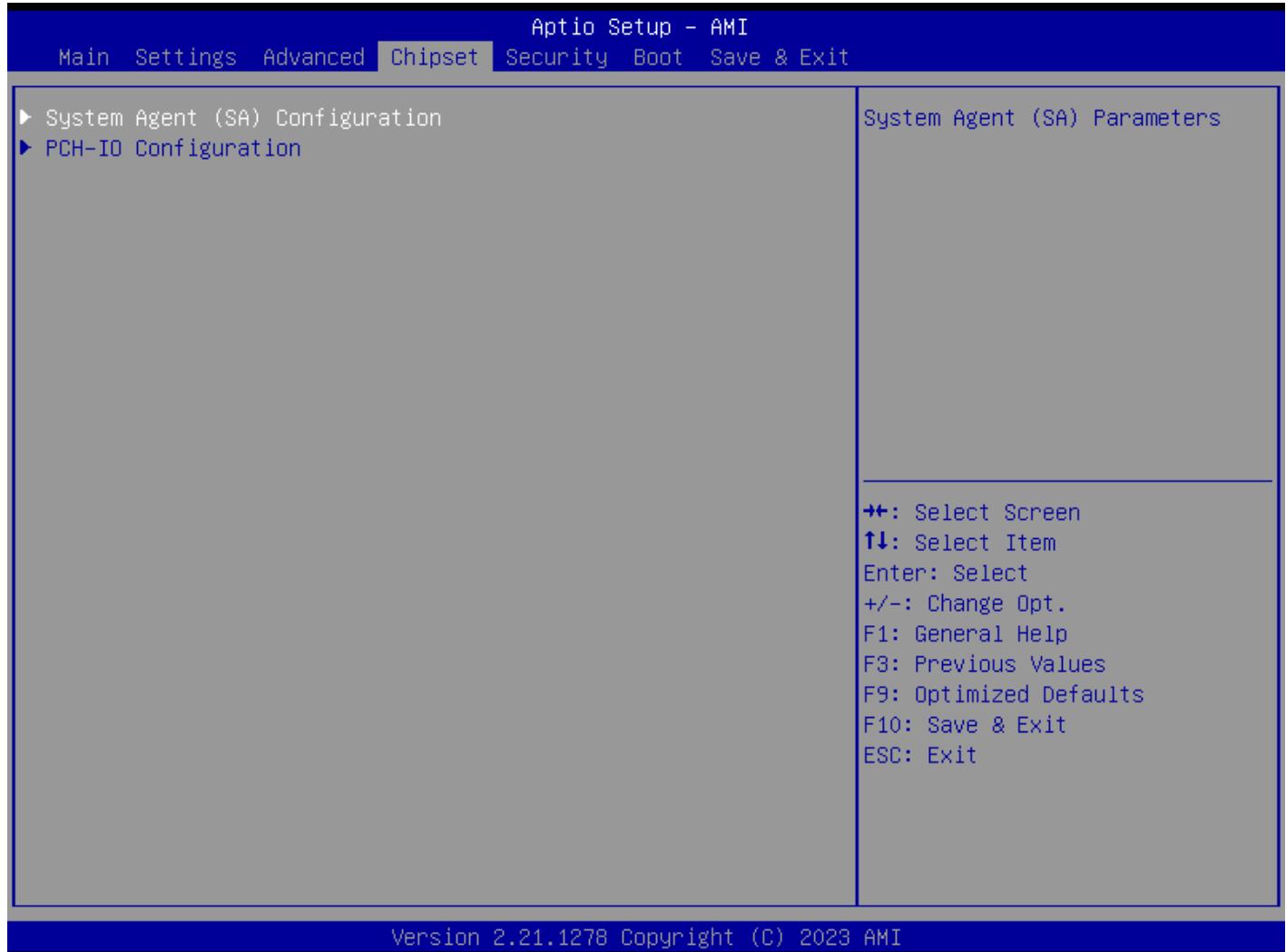
USB Configuration: USB information and control options

Hardware Monitor : Hardware detection

CSM Configuration : UEFI, PXE and other related settings



3.5 Chipset

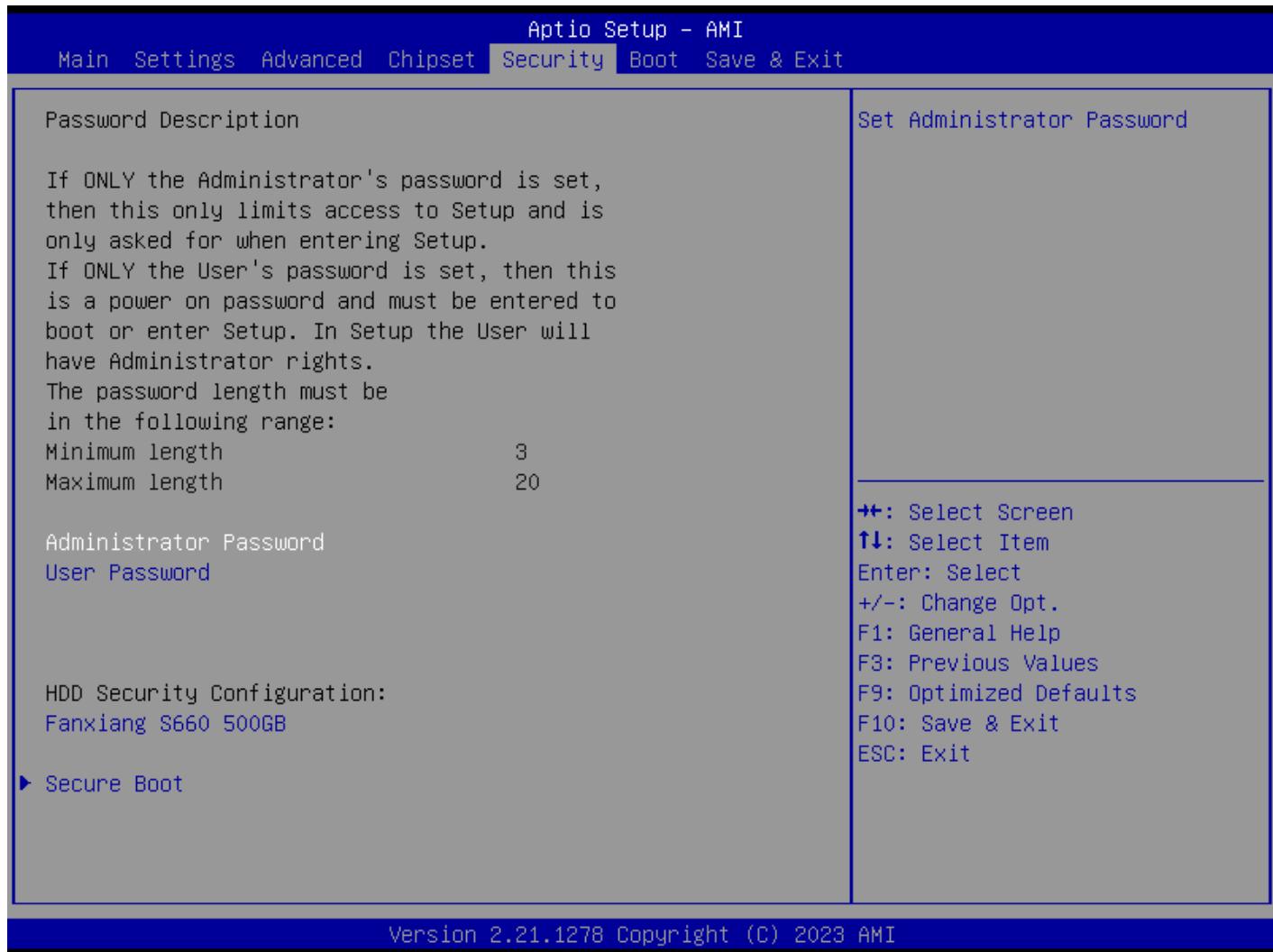


System Agent (SA) Configuration: System configuration control options

PCH-IO Configuration : bridge chip control options



3.6 Security: Security



Administrator Password; This prompt line is used to set the super user password

User Password; the prompt line is used to set the ordinary user password

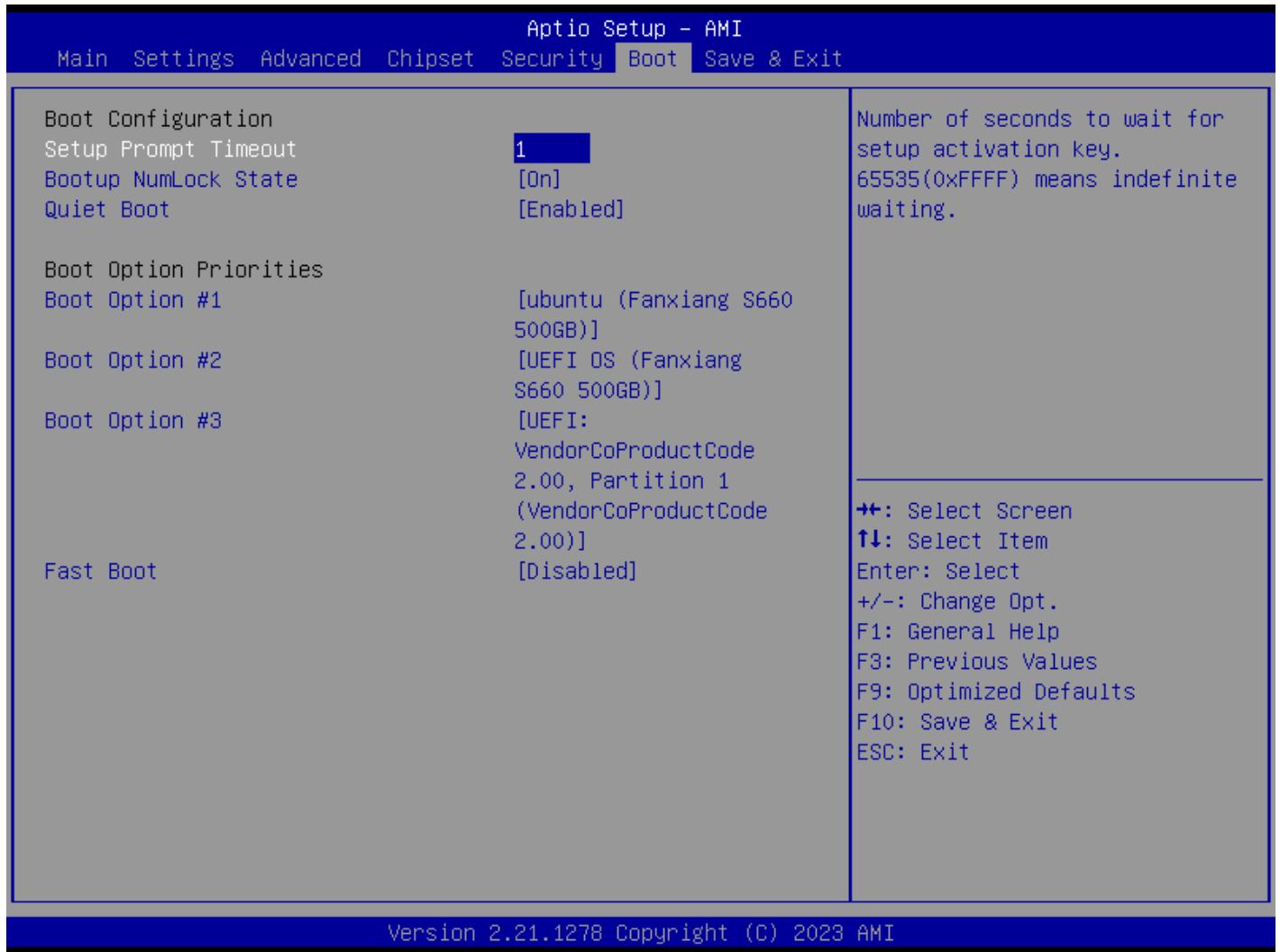
Secure Boot; secure boot settings

Tip: The minimum password length is 3 characters, and the maximum length is 20 characters.

If you forget your password, short-circuit pin JP1 for 5 seconds to clear the password.



3.7 Boot ; startup options



Boot configuration; startup option settings

Boottup Numlock state; keypad light switch option after booting

Quiet Boot ;This item allows you to display the vendor logo on the boot screen

Fast Boot; Quick boot settings

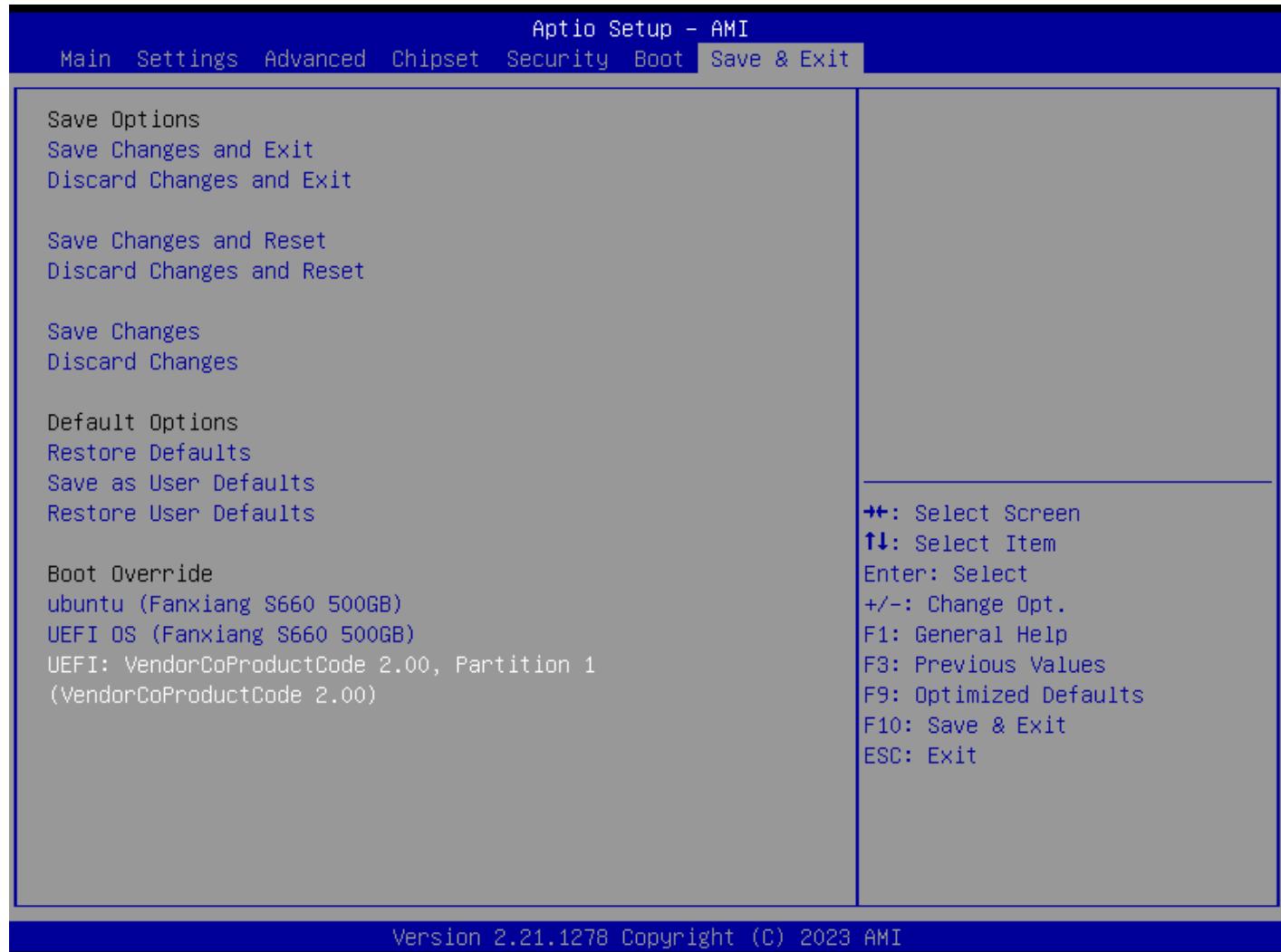
Boot Option Priorities;Boot priority options

Boot Option # 1; First startup item setting

Boot Option # 2; Second boot option settings



3.8 Save & Exit



Save Changes and Exit ; Save changes and exit

Discard Changes ; discard changes and go back to the last saved content

Save Changes and Reset; save changes and restart

Discard Changes and Reset; discard changes and restart the computer.

Save Changes; save changes Discard Changes; discard changes

Restore Defaults; If selected, the system will restore factory settings



FCC Statement

1. FCC Compliance Statement

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

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

2. FCC Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one of the following measures:

Reorient or relocate the receiving antenna.

Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from which the receiver is connected.

Consult the dealer or an experienced radio/TV technician for help.

3. FCC Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

4. FCC Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.



Appendix

Appendix I: Glossary of terms

BIOS:

Basic Input/Output System. It is the software that contains all the input/output control code interfaces in the PC. It performs hardware detection at system startup, initiates operating system operation, and provides an interface between the operating system and the hardware. BIOS is stored in a read-only memory chip.

BUS:

Bus. In a computer system, a channel for exchanging data between different components, a set of hardware lines. By BUS we usually mean the local lines inside the CPU and main memory components.

Chipset:

Chipset. An integrated chip designed to perform one or more related functions. We refer to the system-level chipset consisting of the Southbridge and Northbridge, which determines the architecture and main functions of the motherboard.

AHCI:

The standard control interface for Serial ATA, supported by Microsoft windows XP (above SP1 version) and IAA drivers.

CMOS:

Complementary Metal-Oxide Semiconductor. It is a widely used type of semiconductor. It



is characterized by high speed and low power consumption. We refer to CMOS as a portion of space reserved in the CMOS RAM on the motherboard to save the date, time, system information, and system parameter setting information, etc.

COM Serial Port:

A general-purpose serial communication interface that generally uses a standard DB9 male connector connection.

DIMM:

Dual In-line Memory Module. It is a small circuit board with a memory chipset. Provides 64bit memory bus width.

DRAM

Dynamic Random Access Memory. Is a general-purpose memory type for ordinary computers. It usually uses a transistor and a capacitor to store a single bit. With the development of technology, the types and specifications of DRAM have become more and more diversified in computer applications. For example, SDRAM, DDR SDRAM, and RDRAM are commonly used today.

LAN:

Local Area Network Interface. A computer network of interconnected computers in a small area, usually in an organization or building. A LAN generally consists of servers, workstations, and a number of communication links. A terminal can access data and equipment anywhere over the wire, and many users can share expensive equipment and resources.



LED:

Light Emitting Diode, a semiconductor device that lights up when current flows through it, often used to put a very visual representation of information, such as indicating that the power supply is on or that the hard disk drive is working.

PnP:

Plug and Play. A specification that allows a PC to automatically configure external devices to work on their own without the user having to manually operate the system. Both BIOS support for PnP and a PnP expansion card are required for this feature.

POST:

Power-On Self-Test. During boot-up, the BIOS performs a continuous test operation on the system, including testing RAM, keyboard, hard disk drive, etc. to see if it is properly connected and working properly.

PS/2:

An interface specification developed by IBM for connecting a keyboard to a mouse; PS/2 is a 6-pin DIN connector only, and can also be used to connect to other devices such as modems.

USB:

Universal Serial Bus. A hardware interface for low-speed peripheral devices, generally used for connecting keyboards, mice, etc. A PC can have up to 127 USB devices connected to it. A PC can connect up to 127 USB devices, providing a transmission bandwidth of 12Mbit/s; USB supports hot-plugging and multi-streaming, i.e., USB devices can be plugged in while the system is working, and the system can automatically recognize and allow the plugged-in device



to function properly.

DMI:

Direct Media Interface, the data transfer channel between processor CPU and IO controller (PCH, ICH).

FSB:

Front Side Bus, External Bus.

PCIE:

Peripheral Component Interconnect Express A high-speed serial differential full-duplex bus transfer specification.

PXE:

Pre-boot Execution Environment is used to run software over a network without a hard disk data PC.

S3:

Writes running data to memory and then shuts down the hard disk.

S5:

Shut down the computer, all hardware devices (including the power supply) are turned off.

Appendix 2: Common fault analysis and solutions

Fault	checking point
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Don't turn on after power on	<ol style="list-style-type: none"> 1. Please confirm whether the power cable is connected properly 2. Please confirm whether the power supply used meets the power supply requirements of the motherboard 3. Try to re-plug and unplug the memory module 4. Try to replace the memory module 5. Try to clear the motherboard CMOS according to the motherboard manual. 6. Please confirm whether there is an external card and whether it is normal after removing the external card.
Don't display after powering on	<ol style="list-style-type: none"> 1. Check whether the monitor is turned on 2. Check if the power cord is properly connected to the monitor and system unit 3. Check that the monitor cable is properly connected to the system unit and monitor 4. Check whether the display brightness control is set to dark state. You can increase the brightness through the brightness control. For more information, refer to the monitor operating instructions 5. When the monitor is in "power saving" mode, press any key on the keyboard.
BIOS Setup settings cannot be saved	<ol style="list-style-type: none"> 1. Please confirm whether the CMOS battery voltage is lower than 2.8V. If it is lower than 2.8V, please replace it with a new one. Pool, reset and save 2. The BIOS setting is incorrect. According to the key (DEL) prompted on the startup screen, in the BIOS Adjust time and date in Setup
Prompt cannot find bootable device	<ol style="list-style-type: none"> 1. Please confirm whether the hard disk power cable and data cable are connected properly. 2. Please confirm whether the hard disk is physically damaged 3. Please confirm whether the operating system is installed normally on the hard disk.
Blue screen or crash when entering the system	<ol style="list-style-type: none"> 1. Please confirm whether the memory module and external card are loose 2. Try to remove the newly installed hardware and uninstall the driver or software 3. Try to replace the memory
Entering the system is slow	<ol style="list-style-type: none"> 1. Try to use third-party software to check whether the hard disk has bad sectors. 2. Please confirm whether there is too little remaining space in the partition where the system is located. 3. Please confirm whether the CPU cooling fan is rotating normally
System automatically restarts	<ol style="list-style-type: none"> 1. Please confirm whether the CPU cooling fan is rotating normally 2. Please confirm whether the reset button of the industrial computer is accidentally triggered. 3. Please use anti-virus software to confirm whether the system is infected with viruses. 4. Please confirm whether the memory module and external card are loose 5. Please confirm whether the load capacity of the power supply used is sufficient.



	You can try to replace the power supply.
USB device cannot be detected	<ol style="list-style-type: none">1. Please confirm whether the USB device needs to be powered separately2. Please confirm whether there is poor contact in the USB interface3. Please confirm whether the USB controller is turned on in BIOS Setup