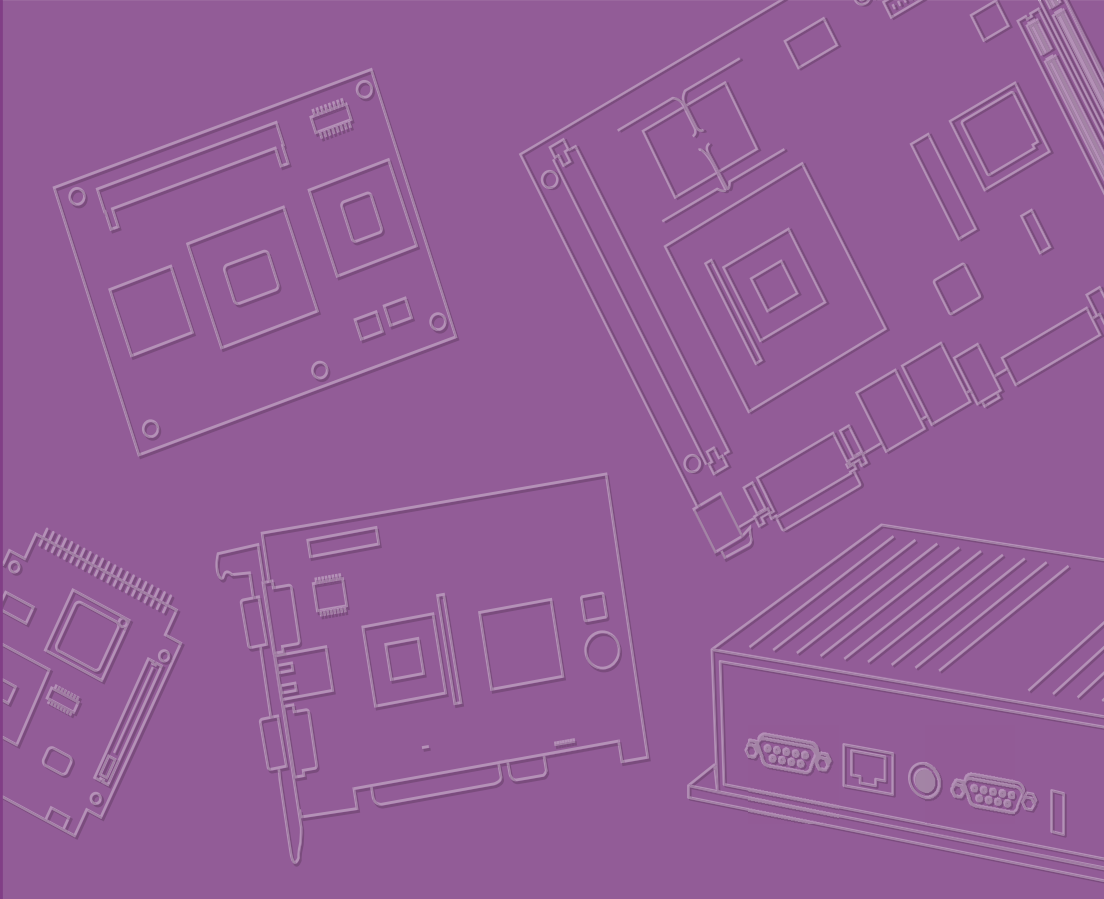




User Manual

ARK-2232

Fanless Embedded Box Computer

ADVANTECH

Enabling an Intelligent Planet

Attention!

Please note:

This package contains a hard-copy user manual in Chinese for China CCC certification purposes, and there is an English user manual included as a PDF file on the website. Please disregard the Chinese hard copy user manual if the product is not to be sold and/or installed in China.

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

FCC Class B

Note: 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 try to correct the interference by one or more 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 that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
 - Product name and serial number
 - Description of your peripheral attachments
 - Description of your software (operating system, version, application software, etc.)
 - A complete description of the problem
 - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*



Caution! *Cautions are included to help you avoid damaging hardware or losing data.*



There is a danger of a new battery exploding if it is 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.

Note! *Notes provide optional additional information.*



Packing List

Before installation, please ensure the following items have been shipped:

- 1 x ARK-2232 unit
- 1 x Registration and 2 years Warranty card
- 1 x China RoHS
- 1 x Utility CD
- 1 x Simplified Chinese manual

Ordering Information

Model Number	Description
ARK-2232L-S6A1	ARK-2232L Intel Atom E3940 1.6 GHz system

Optional Accessories

For ARK-2232

Part Number	Description
96PSA-A60W12W6	AC-to-DC Adapter, DC12V/5A 60W with lockable DC jack
MOS-1120Y-0202E	Isolated RS-232, 2-Ch, DB9, PCIe I/F
MOS-1120Y-1402E	Non-Isolated RS-232, DB37, 4-Ch, PCIe I/F
MOS-1121Y-0202E	Isolated RS-422/485, 2-Ch, DB9, PCIe I/F
MOS-1121Y-1402E	Non-Isolated RS-422/485, DB37, 4-Ch, PCIe I/F
MOS-2120-Z1101E	Giga LAN Ethernet module, 1-Ch, PCIe I/F
MOS-2220-X1101E	Parallel LPT module, 1-Ch, USB I/F
MOS-1130Y-0201E	Isolated CANBus, 2-Ch, DB9, PCIe I/F
MOS-2230-Z1201E	CANBus module, 2-Ch, USB I/F
MOS-1110Y-0101E	Isolated 16 DI/8 DO, 1-Ch, DB37, PCIe I/F
MOS-2220-Z1101E	High Speed COM USB module, 1-Ch, PCIe I/F
MOS-2110Z-1201E	USB module, 2-Ch, PCIe I/F
MOS-2230-Z1201E	CANBus module, 2-Ch, USB I/F
MIOE-PWR2-00A1E	9~36V DC-in power module
96PSA-A65W19P2-1	AC-to-DC Adapter, DC19V/3.42A 65W (for MIOe-PWR2)
96PSA-A65W19P2-2	AC-to-DC Adapter, DC19V/3.42A 65W (for MIOe-PWR2)
AMO-2201E	4x RS232/422/485+ removable 2.5" drive (2nd layer)
AMO-2202E	4x 10/100/1000Base T(X) PoE
AMO-2203E	2x isolated CAN-Bus (2nd layer)
AMO-2204E	3x GbE + iDoor (2nd layer, this iDoor support USB I/F only)
1700001524	Power cable 3-pin 183cm, USA type (for MIOe-PWR2)
170203183C	Power cable 3-pin 183cm, EU type (for MIOe-PWR2)
170203180A	Power cable 3-pin 183cm, UK type (for MIOe-PWR2)

Safety Instructions

1. Please read these safety instructions carefully.
2. Please keep this User's Manual for later reference.
3. Please disconnect this equipment from AC outlet before cleaning. Use a damp cloth. Don't use liquid or sprayed detergent for cleaning. Use moisture sheet or clothe for cleaning.
4. For pluggable equipment, the socket-outlet shall near the equipment and shall be easily accessible.
5. Please keep this equipment from humidity.
6. Lay this equipment on a reliable surface when install. A drop or fall could cause injury.
7. The openings on the enclosure are for air convection hence protecting the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source when connecting the equipment to the power outlet.
9. Place the power cord such a way that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for long time, disconnect the equipment from mains to avoid being damaged by transient over-voltage.
12. Never pour any liquid into ventilation openings; this could cause fire or electrical shock.
13. Never open the equipment. For safety reasons, only qualified service personnel should open the equipment.
14. If one of the following situations arises, get the equipment checked by service personnel:
 - The power cord or plug is damaged.
 - Liquid has penetrated into the equipment.
 - The equipment has been exposed to moisture.
 - The equipment does not work well, or you cannot get it to work according to the user's manual.
 - The equipment has been dropped and damaged.
 - The equipment has obvious signs of breakage.
15. Do not leave this equipment in an environment where the storage temperature may go below -40° C (-40° F) or above 85° C (185° F). This could damage the equipment. the equipment should be in a controlled environment.
16. CAUTION: Any unverified component could cause unexpected damage. To ensure the correct installation, please always use the components (ex. screws) provided with the accessory box.

ATTENTION: Tout composant non vérifiée pourrait causer des dommages inattendu. Pour garantir une installation correcte, s'il vous plaît utilisez toujours les composants (vis ex.) fournies avec la boîte d'accessoires.
17. CAUTION: The computer is provided with a battery-powered real-time clock circuit. There is a danger of explosion if battery is incorrectly replaced. Replace only with same or equivalent type recommended by the manufacture. Discard used batteries according to the manufacturers instructions.

ATTENTION: L'ordinateur est muni d'un circuit en temps réel de l'horloge alimentée par batterie. Il ya un danger d'explosion si la pile est remplacée de façon incorrecte. Remplacez uniquement par un type identique ou équivalent vii User Manualrecommandé par le fabricant. Jetez les piles usagées selon les instructions du fabricant.

-
18. CAUTION: Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges.
ATTENTION: Toujours débrancher complètement le cordon d'alimentation de votre châssis lorsque vous travaillez avec le matériel. Ne pas effectuer les raccordements lorsque l'appareil est sur. Composants électroniques sensibles peuvent être endommagés par les surtensions soudaines.
 19. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
 20. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.
 21. DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.
 22. The product is to be connected only to PoE networks without routing to the outside plant.
 23. This product is intended to be supplied by an UL certified (1) power supply or (2) DC source suitable for use at minimum Tma 40 degree C and output is rated (1) 12Vdc, 5A min. or (2) 9-36Vdc, 6.66-1.66A(Option), if need further assistance, please contact Advantech for further information.

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Chapter 1

General Introduction

This chapter gives background information on ARK-2232 series.

1.1 Introduction

ARK-2232 is an intelligent, modular and fanless embedded system. A fully modular design, ARK-2232 supports easy I/O switching with optional iDoor modules, wide range power board and ARK Plus expansions. ARK-2232 is targeted at factory automation, machine automation, kiosks, and self-service applications.

Rugged & Multifunctional Design

ARK-2232 embedded box PC is powered by Intel® Atom™ E3940 processor to offer high performance in low power consumption. The compact size system provides a selection of I/O ports: 2 x USB 3.0, 4 x USB 2.0, 2 x GbE, 4 x COM, 1 x mPCIe, 1 x M.2 E Key and 1 x 2.5" HDD. The default power input is 12V DC in, and it also supports an optional wide range 9~36V power module with wide temperature operation of -20 to 60C. ARK-2232 passes worldwide certification including CE/FCC, CB, UL, CCC and BSMI.

Multiple Display Support

ARK-2232 supports dual independent displays: 1 x VGA + 1 x HDMI which HDMI support 4K resolution. The graphic engine is DirectX 11.3, OpenGL 4.4, and OpenCL 2.1 Full AVC/VC1/MPEG2 HW Decode.

Built in Intelligent Management Tools - WISE-PaaS

Advantech WISE-PaaS provides a valuable suite of programmable APIs such as multi-level watchdog, hardware monitor, system restore, and other user-friendly interface. iManager is an intelligent self-management cross platform tool that monitors system status for problems and takes action if anything is abnormal. It offers a boot up guarantee in critical, low temperature environments so systems can automatically recover when voltages dip. WISE-PaaS makes the whole system more reliable and more intelligent. ARK-2232L provides easy remote management so users can monitor, configure, and control a large number of terminals to make maintenance and system recovery simpler.

1.2 Product Features

1.2.1 General

- **CPU:**
 - Intel Atom™ E3940 QC SoC 1.6GHz boost up to 1.8GHz
- **BIOS:** AMI UEFI 64Mbit
- **System Memory:** 1x DDR3L 1866MHz up to 8 GB
- **Watchdog Timer:** Single chip Watchdog 255-level interval timer, setup by software
- **I/O Interface:** 2 x RS232, 2 x RS232/422/485
- **USB:** 4 x USB 2.0, 2 x USB 3.0 compliant ports
- **Audio:** High Definition Audio (HD), Line out, Mic-in
- **Storage:** 1 x mSATA and 1 x high capacity 2.5" SATA HDD (up to 12.5mm height)
- **Expansion Interface:**
 - Supports 1 x MiniPCle with SIM holder
 - Supports 1 x M.2 NGFF 2230 E Key
 - Supports 1 x iDoor expansion (by 1st layer)
 - Support 1 x ARK Plus expansion (by 2nd layer)

1.2.2 Display

- **Controller:** Intel® HD Graphics 500
- **Resolution:**
 - VGA: Supports up to 1920 x 1200 @ 60Hz
 - HDMI: Supports up to 3840 x 2160 @ 30Hz
- **Dual Display:** VGA+HDMI

1.2.3 Ethernet

- **Chipset:**
 - LAN1 Intel i210-IT
 - LAN2 Intel i210-IT
- **Speed:** 10/100/1000 Mbps
- **Interface:** 2 x RJ45
- **Standard:** Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.3y, IEEE 802.ab.

1.3 Chipset

1.3.1 Functional Specification

1.3.1.1 Processor

Processor	Intel Atom™ E3940 QC SoC 1.6GHz boost up to 1.8GHz
Memory	Supports DDR3L 1866MHz up to 8GB 1 x 204-pin SODIMM socket type

1.3.1.2 Chipset

Internal Graphics Features	■ DirectX 11.1/12, OpenGL 4.3 ■ Display Ports VGA, HDMI (HDMI 1.4b)
Video Accelerator	■ H/W accelerated video decode ■ Video decoder: HEVC/H.264/MVC/VC-1/MPEG2 HW Decode ■ Supports DVD, Blu-ray, and HD video
SATA Interface	■ Supports several optional sections of Serial ATA II: Extensions to Serial ATA 1.0 Specification, Revision 1.0 ■ Supports SATA transfers to 300 Mbytes/sec. ■ Supports mSATA socket
USB Interface	■ USB host interface with support for 2 USB 3.0 and 4 USB 2.0 ports ■ All ports are High-Speed, Full-Speed, and Low-Speed capable ■ Supports legacy keyboard/mouse software
BIOS	■ UEFI 64Mbit

1.3.1.3 Others

Serial ports	■ COM1, COM2: Supports RS-232 ■ COM3 ~ COM4: Supports RS-232/422/485 and change mode under BIOS setting ** COM3 ~ COM4 RS-485 supports Auto flow control. COM connector: D-SUB CON. 9P
Ethernet	LAN1 Intel i210-IT, LAN2 Intel i210-IT ■ Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.3y, IEEE 802.ab. ■ Support 10/100/1000 Mbps. LAN Connectors: Phone Jack RJ45 8P 90D(F)
Audio	Audio Codec: Realtek ALC888S: ■ Compliant with HD Audio specifications ■ Supports 16/20/24-bit DAC and 16/20/24-bit ADC resolution ■ Supports: Line-out, Mic-in Audio Connectors: Ear Phone Jack * 2
Battery backup	■ BATTERY 3V/210 mAh with WIRE x 1

1.3.2 WISE-PaaS

Sequence control	Supported
Watchdog timer	Multi Level WDT Programmable 1-255 sec / min
Hardware monitor	CPU Temperature / input Current / input Voltage
Power saving	Deep sleep S5 mode
System information	Running HR / Boot record

1.4 Mechanical Specifications

1.4.1 Dimensions

Standard: 260[10.24] x 44[1.73] x 140.2[5.52] Unit: mm [Inch]

System with Optional Dual Layer: 260[10.24] x 78.6[3.09] x 140.2[5.52] Unit: mm [Inch]

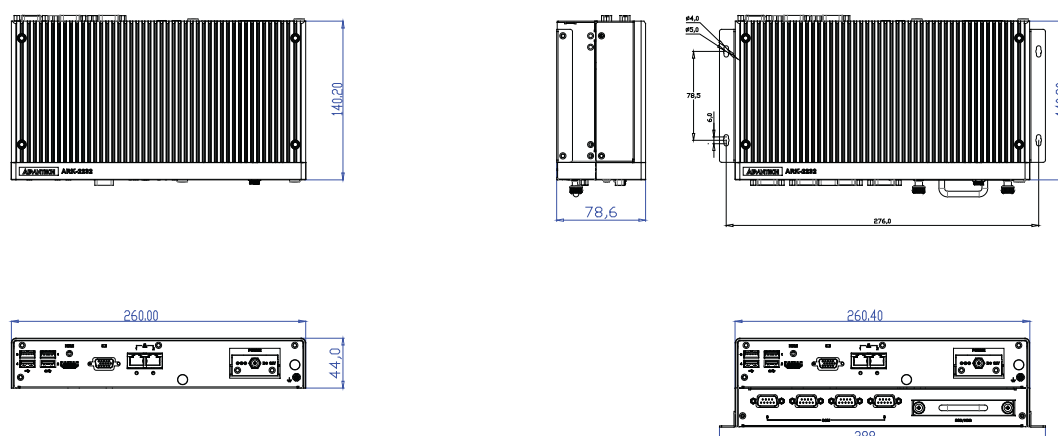


Figure 1.1 ARK-2232 Mechanical dimension drawing

1.4.2 Weight

2.9kg (6.39 lbs)

1.5 Power Requirements

1.5.1 System Power

- **Minimum power input:**
 - ARK-2232: DC 12V, 5A(Default); 9-36V DC, 6.66A-1.66A (Option by power module)

1.5.2 RTC Battery

- Lithium 3 V/210 mAH

1.6 Environment Specification

1.6.1 Operating Temperature

- With Industrial Grade SSD/mSATA: -20 ~ 60° C (-4~140° F), with air flow, speed=0.7 m/sec
- With 2.5-inch hard disk 0 to 40° C (32~104° F), with air flow, speed=0.7 m/sec

1.6.2 Relative Humidity

- 95% @ 40° C (non-condensing)

1.6.3 Storage Temperature

- -40 ~ 85° C (-40 ~ 185° F)

1.6.4 Vibration during Operation

- When the system is equipped with SSD/mSATA: 3Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1hr/axis, x,y,z 3 axes.

1.6.5 Shock during Operation

- When the system is equipped with SSD/mSATA: 30G, IEC 60068-2-27, half sine, 11 ms duration.

1.6.6 Safety

- UL, CB, CCC, BSMI

1.6.7 EMC

- CE, FCC, CCC, BSMI

Chapter 2

H/W Installation

This chapter introduces external IO and the installation of ARK-2232 hardware.

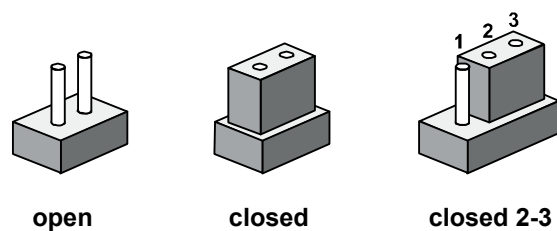
2.1 Introduction

The following sections show the internal jumpers setting and the external connectors pin assignment for application.

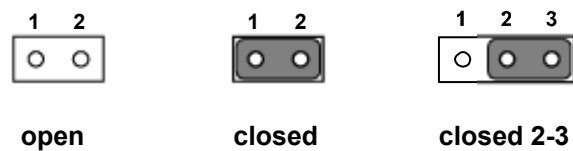
2.2 Jumpers

2.2.1 Jumper Description

You may configure ARK-2232 to match the needs of your application by setting jumpers. A jumper is a metal bridge used to close an electric circuit. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To close a jumper, you connect the pins with the clip. To open a jumper, you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2, or 2 and 3.



The jumper settings are schematically depicted in this manual as follows.



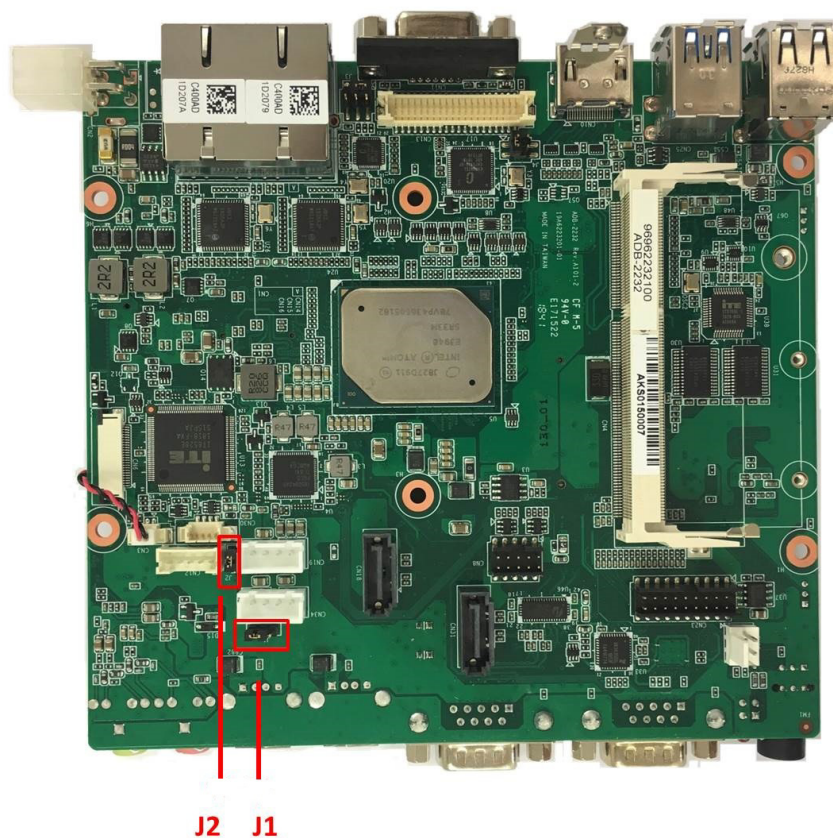
A pair of needle-nose pliers may be helpful when working with jumpers. If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any changes. Generally, you simply need a standard cable to make most connections.

2.2.2 Jumper List

Table 2.1: Jumper List of Main Board

J1	RTC Reset
J2	AT Mode Jumper
J5	RS-422/485 Terminal Resistor Jumper
CN32	mSATA & Mini PCIe Switch
CN48	M.2 SMBUS Voltage SEL

2.2.3 Jumper Location



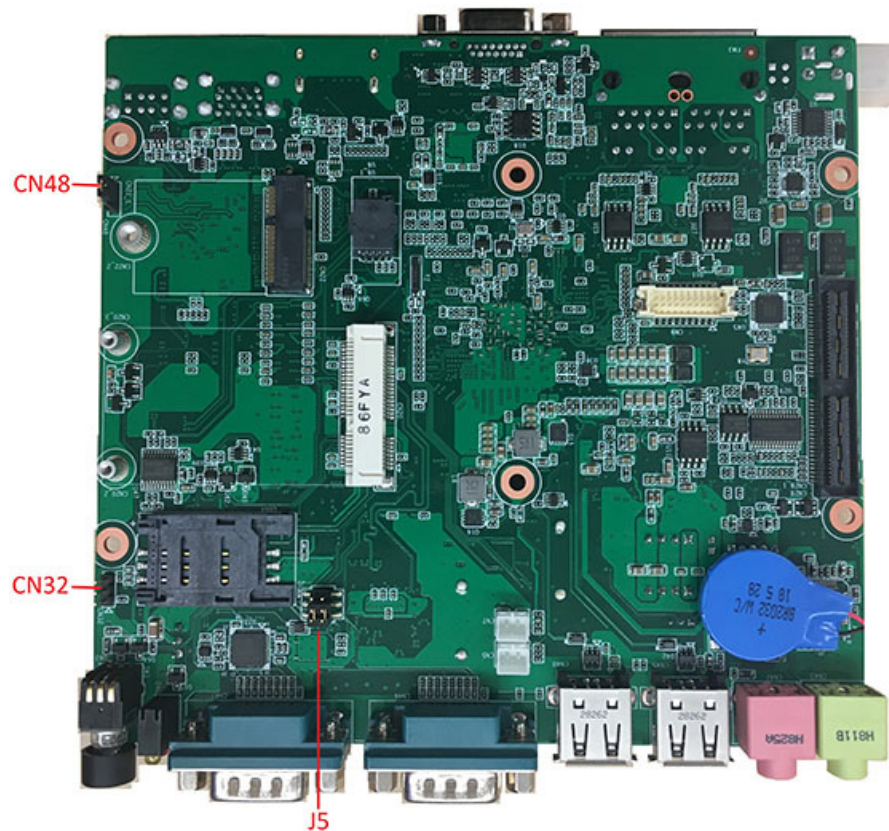
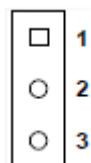


Figure 2.1 Jumper Layout

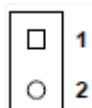
2.2.4 Jumper Setting

At Mother Board

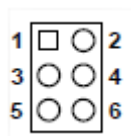
J1	RTC Reset
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)*	Normal (default)
(2-3)*	RTC Reset



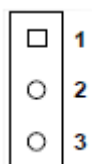
J2	AT Mode Jumper
Part Number	1653002101-02
Footprint	HD_2x1P_79_D
Description	PIN HEADER 2x1P 2.0mm 180D(M) DIP 21N12050
Setting	Function
NL	ATX Mode (default)
(1-2)*	AT Mode



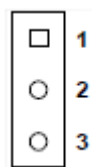
J5	RS-422/485 Terminal Resistor Jumper
Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3x2P 2.0mm 180D(M) SMD 21N22050
Setting	Function
(1-3)*	COM3 Enable
(3-5)*	COM3 Disable (default)
(2-4)*	COM4 Enable
(4-6)*	COM4 Disable (default)



CN32	mSATA & Mini PCIe Switch
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
NL	BIOS control (default)
(1-2)*	Mini PCIe
(2-3)*	mSATA



CN48	M.2 SMBUS Voltage SEL
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3x1P 2.0mm 180D(M) DIP 2000-13 WS
Setting	Function
(1-2)*	3.3V(default)
(2-3)*	1.8V



2.3 Connectors

2.3.1 ARK-2232 External I/O

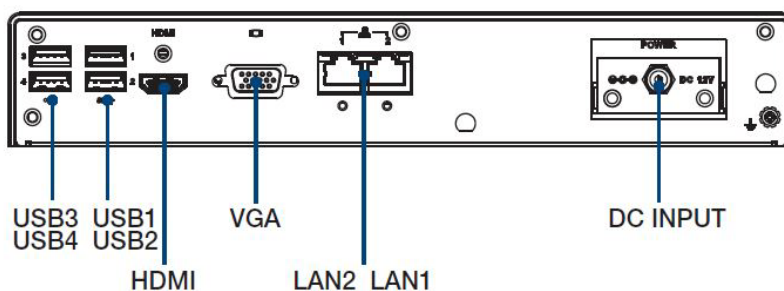


Figure 2.2 ARK-2232 Front I/O

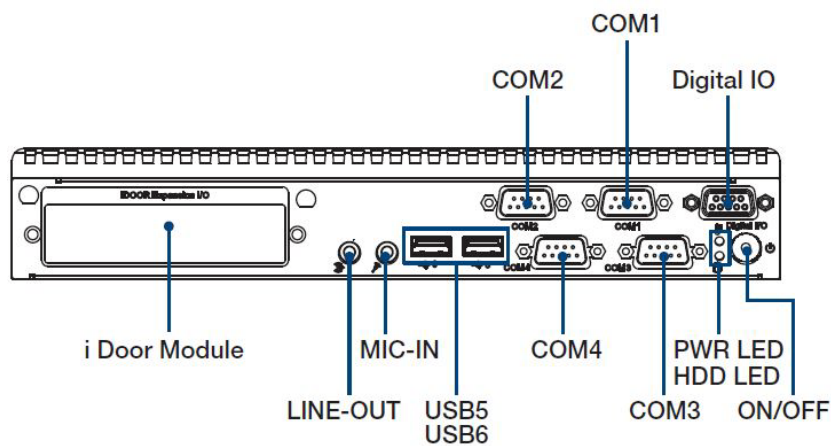


Figure 2.3 ARK-2232 Rear I/O

2.3.1.1 Power ON/OFF Button

ARK-2232 has a Power On/Off button with LED indicators on the front side that show On status (Green LED) and Off/Suspend status (Orange LED). The Power button supports dual functions: Soft Power -On/Off (Instant off or Delay 4 Seconds then off) and Suspend.



Figure 2.4 Power Button

2.3.1.2 LED Indicators

There are two LEDs on the front panel that indicate system status: The Power LED is for system power status; and HDD LED is for HDD and compact flash disk status.



Figure 2.5 LED Indicators

2.3.1.3 HDMI Connector

An integrated 19-pin receptacle connector HDMI 1.4b interface is provided. The HDMI link supports resolutions up to 3840 x 2160 @ 30 Hz.

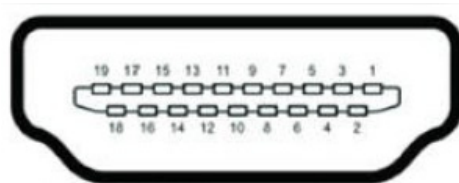


Figure 2.6 HDMI Connector

Pin	Signal Name
1	HDMI_TX2+
2	GND
3	HDMI_TX2-
4	HDMI_TX1+
5	GND
6	HDMI_TX1-
7	HDMI_TX0+
8	GND
9	HDMI_TX0-
10	HDMI_CLK+
11	GND
12	HDMI_CLK-
13	NC
14	NC
15	HDMI_DCLK

16	HDMI_DDAT
17	GND
18	+V5_HDMI-HPD
19	DDP0_HPDP

NC represents "No Connection".

2.3.1.4 VGA Connector

The ARK-2232 provides a high resolution VGA interface connected by a D-sub 15-pin connector to support a VGA CRT monitor. It supports display resolutions of up to 1920 x 1200 @ 60Hz (No hotplug support)

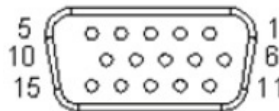


Figure 2.7 VGA Connector

Pin	Signal Name	Pin	Signal Name
1	VGA_z_R	2	VGA_z_G
3	VGA_z_B	4	VGA_z_SPC
5	GND	6	GND_RGB
7	GND_RGB	8	GND_RGB
9	+V5	10	GND
11	VGA_z_SPD	12	VGA_z_DDAT
13	VGA_z_HS	14	VGA_z_VS
15	VGA_z_DCLK		

2.3.1.5 USB 3.0 Connector

The USB port 1, 2, of ARK-2232 supports USB3.0 interface, which provide complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 3.0.

Please refer to Table. 2.8 for its pin assignments. USB 3.0 connectors contain legacy pins to interface to USB 2.0 devices, and a new set of pins for USB 3.0 connectivity (both sets reside in the same connector).



Figure 2.8 USB 3.0 Connector

Pin	Signal Name	Pin	Signal Name
1	+5V	2	USB_data-
3	USB_data+	4	GND
5	SSRX-	6	SSRX+
7	GND	8	SSTX-
9	SSTX+		

2.3.1.6 USB 2.0 Connector

ARK-2232 provides four USB 2.0 interface connectors. The USB 3, 4, 5, 6 connectors are used to connect any device that conforms to the USB interface. Most digital devices conform to this standard. The USB interface supports Plug and Play.

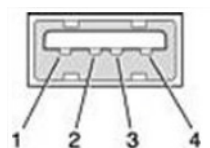


Figure 2.9 USB 2.0 Connector

Pin	Signal Name	Pin	Signal Name
1	VCC	2	USB_data-
3	USB_data+	4	GND

2.3.1.7 Ethernet Connector (LAN)

ARK-2232 is equipped with two Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. LAN1, LAN2 are all equipped with Intel i210-IT Ethernet controller. The Ethernet port provides a standard RJ-45 jack connector with LED indicators on the front side to show its Active/Link status (Green LED) and Speed status (Yellow LED).

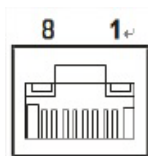


Figure 2.10 Ethernet Connector (LAN)

Pin	Signal Name
1	TX+
2	TX-
3	RX+
4	MDI2+
5	MDI2-
6	RX-
7	MDI3+
8	MDI3-

2.3.1.8 Audio Connector

ARK-2232 offers stereo audio ports by two phone jack connectors of Line_Out, Mic_In. The audio chip is controlled by ALC888S, and it's compliant with Azalea standard.

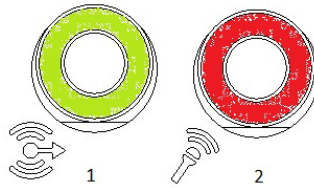


Figure 2.11 Audio Connector

Pin	Audio Signal Name
1	Line out
2	Mic in

2.3.1.9 COM Connector

ARK-2232 provides four COM ports by four D-sub 9-pin connectors. Com1/Com2 only support RS232. Com3/Com4 offers RS232/422/485 serial communication interface ports. COM3/Com4 default setting is RS-232, if you want to use RS-422/485, you can find the BIOS manual to change setting.

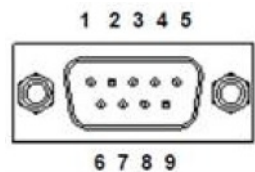


Figure 2.12 COM Connector

	RS-232	RS-422	RS-485
Pin	Signal Name	Signal Name	Signal Name
1	DCD	Tx-	DATA-
2	RxD	Tx+	DATA+
3	TxD	Rx+	NC
4	DTR	Rx-	NC
5	GND	GND	GND
6	DSR	NC	NC
7	RTS	NC	NC
8	CTS	NC	NC
9	RI	NC	NC

NC represents "No Connection".

2.3.1.10 GPIO Connector

ARK-2232 provides one 8 bit GPIO with D-sub 9-pin connector. The GPIO is programmable and input/output define by customer. Below is pin define of GPIO connector.

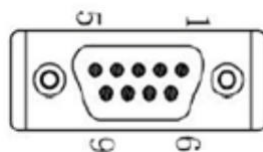


Figure 2.13 GPIO Connector

Pin	Signal Name
1	DIO bit 0
2	DIO bit 1
3	DIO bit 2
4	DIO bit 3
5	DIO bit 4
6	DIO bit 5
7	DIO bit 6
8	DIO bit 7
9	GND

2.4 Installation

2.4.1 Memory Installation

1. Unscrew the 4 screws on the top cover. (Please use the tool in the accessory box.)



2. Remove the top cover and install the memory into the memory socket.



3. Replace the top cover.

2.4.2 HDD/SSD Installation

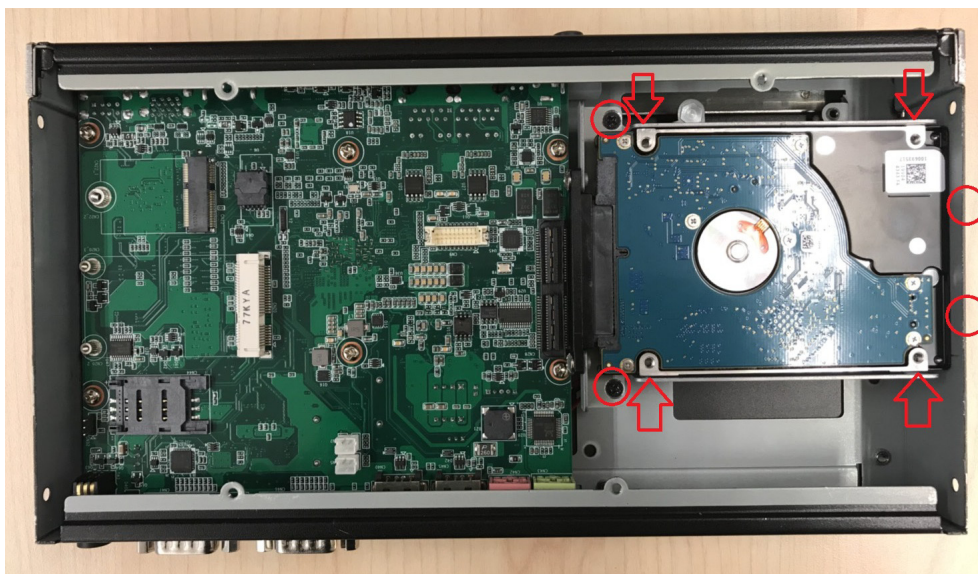
1. Unscrew the 4 screws on the bottom cover, and the 4 screws on both sides of ARK-2232.



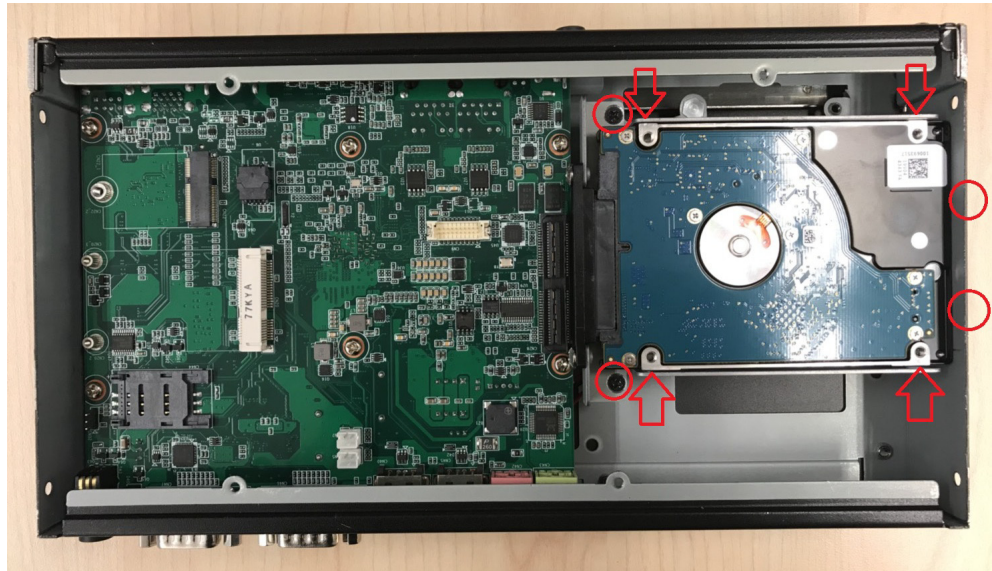
2. Unscrew the 4 screws on the HDD bay.



3. Install the HDD/SSD into the HDD bay, and fix the HDD onto the bracket.



4. Fix the 4 screws back onto the HDD bay.



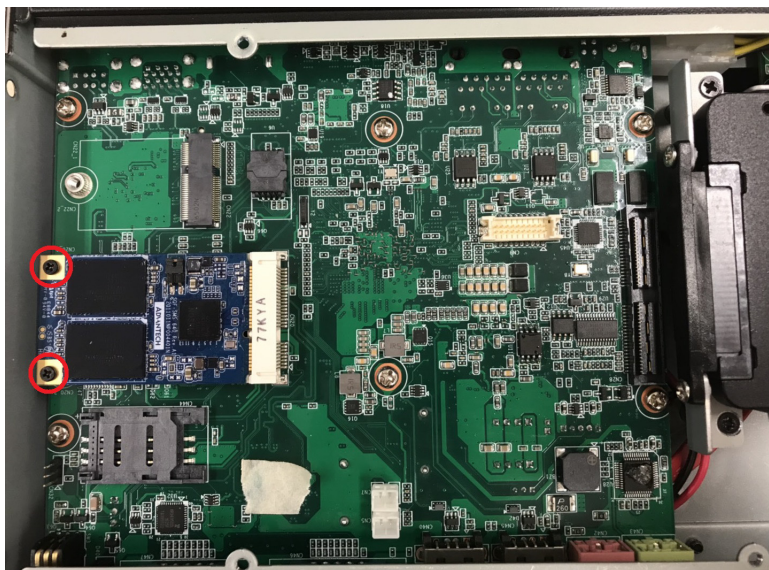
5. Replace the bottom cover and fix the 8 screws back on the system.

2.4.3 mSATA Installation

1. Unscrew the 4 screws on the bottom cover, and the 4 screws on both sides of ARK-2232.



2. Put the mSATA module onto the mSATA slot (CN20), and fasten the 2 screws back on the mSATA module.



3. Replace the bottom cover and fasten the 8 screws back onto the system.

2.4.4 Power Module (MIOe-PWR2) Installation (Option)

1. Remove the 4 screws on the top cover. (Please use the tool in the accessory box.)



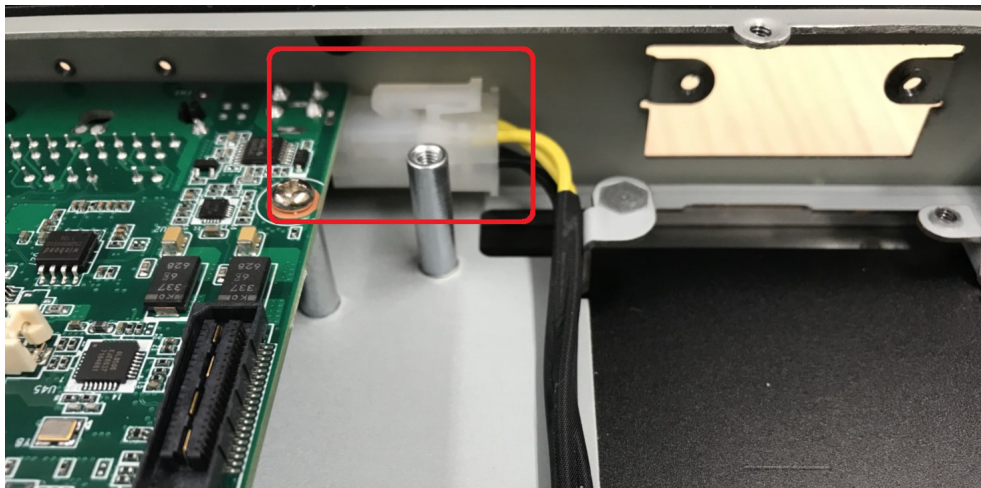
2. Remove the 2 screws on the power bracket for the original DC jack on the front panel.



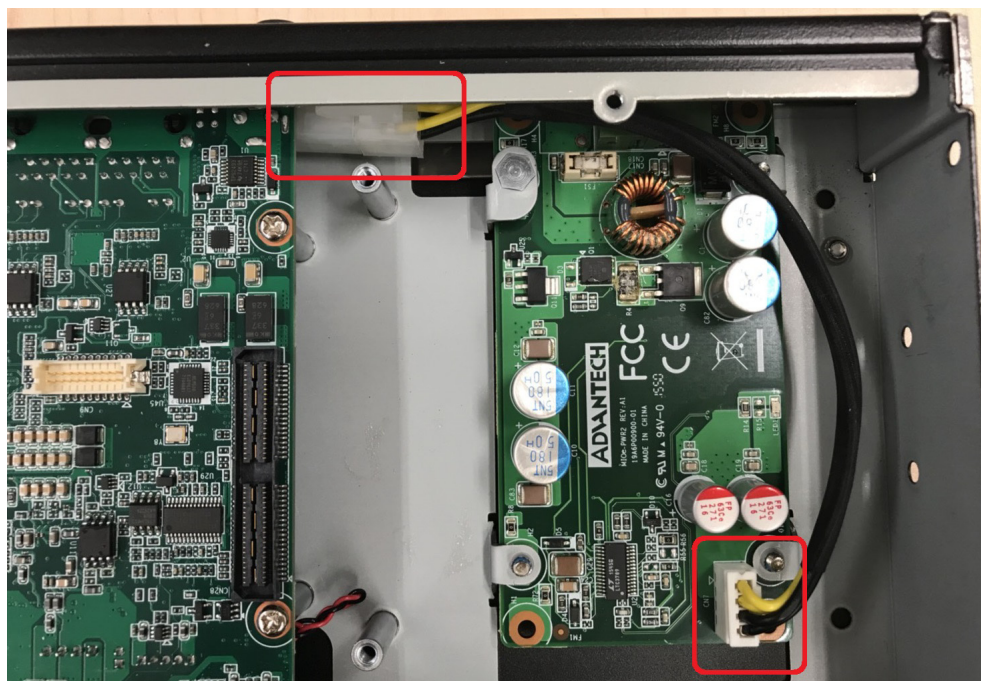
3. Unscrew the 4 screws on the bottom cover and on both sides of ARK-2232.



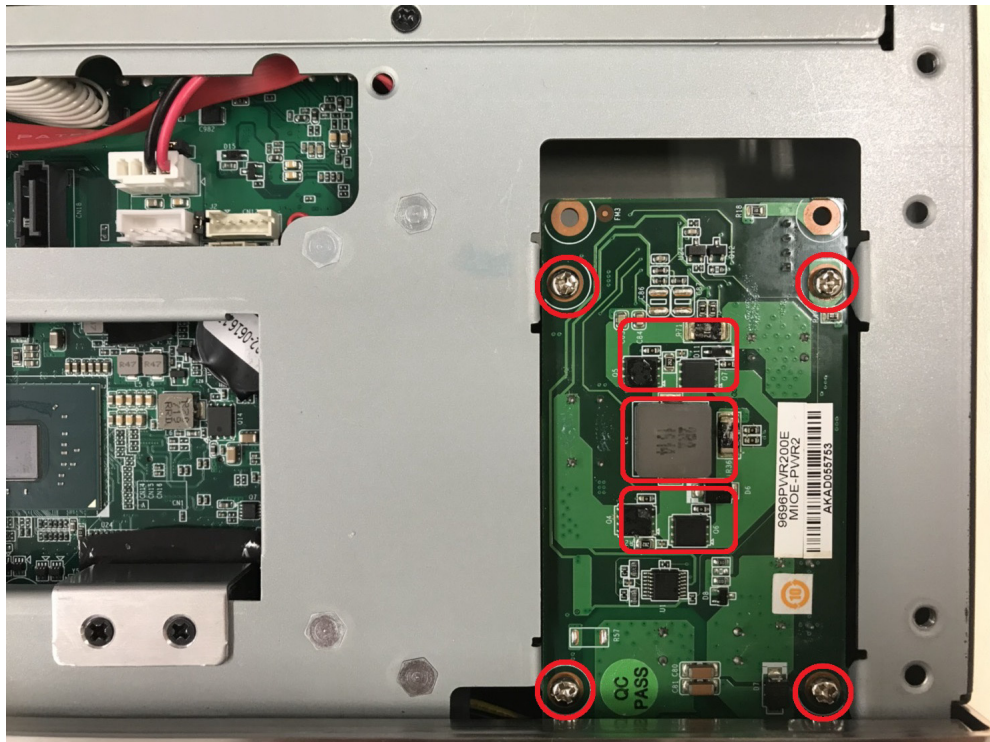
4. Remove the original internal power cable from M/B.



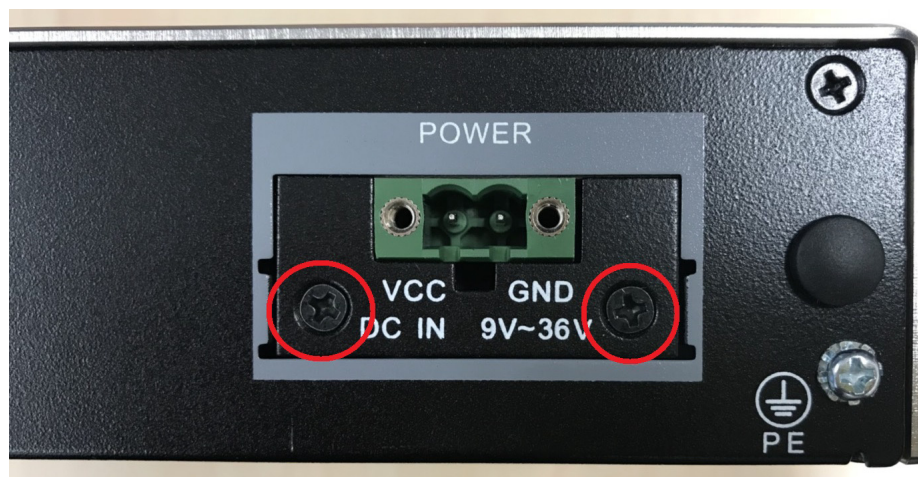
5. Link the MIOe-PWR2 internal power cable from M/B to the power board.



6. Turn to the top side, and fasten the 4 screws for the power board, and tape 3 thermal pads on the red marks.



7. Screw the new power bracket for MIOe-PWR2 on the front panel.



8. Replace the bottom cover and the 8 screws back onto the system.
9. Replace the top cover and the 4 screws.

2.4.5 Wall mount Installation (Option)

1. Unscrew the 4 screws on both sides of ARK-2232.



2. Screw wall mount brackets on both sides of ARK-2232.



Note! M3 type screws, length 5mm x 4 provided for fixing mounting kit and unit. Use suitable mounting apparatus to avoid risk of injury.



2.4.6 iDoor Module Installation (Option)

Please refer to the start up manual in the iDoor kit.

2.4.7 2nd Layer MIOe Module Installation (Option)

Please refer to the start up manual in the iDoor kit.

Chapter 3

AMI BIOS Setup

With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of ARK-2232 BIOS setup screens.



AMI BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in battery-backed CMOS so it retains the Setup information when the power is turned off.

3.1 Entering Setup

Turn on the computer and check for the patch code. If there is a number assigned to the patch code, it means that the BIOS supports your CPU. If there is no number assigned to the patch code, please contact an Advantech application engineer to obtain an up-to-date patch code file. This will ensure that your CPU's system status is valid. After ensuring that you have a number assigned to the patch code, press and you will immediately be allowed to enter Setup.

3.1.1 Main Setup

When you first enter the BIOS Setup Utility, you will encounter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab. There are two Main Setup options. They are described in this section. The Main BIOS Setup screen is shown below.



The Main BIOS setup screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured; options in blue can. The right frame displays the key legend.

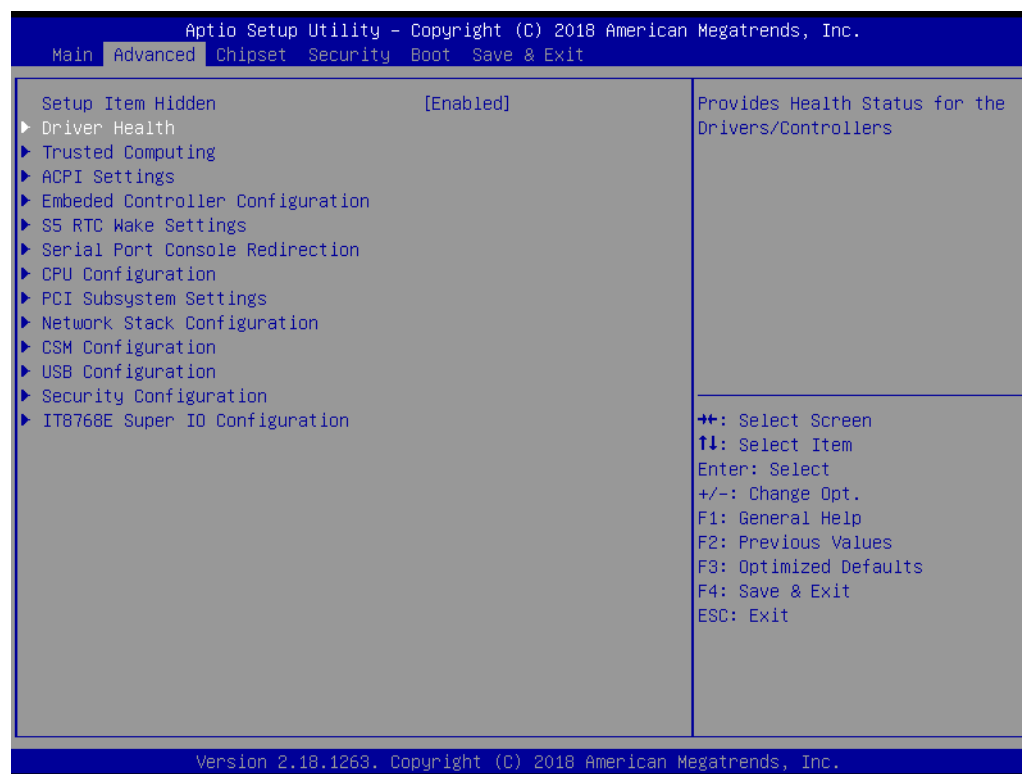
Above the key legend is an area reserved for a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

■ System time / System date

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 must be entered in HH:MM:SS format.

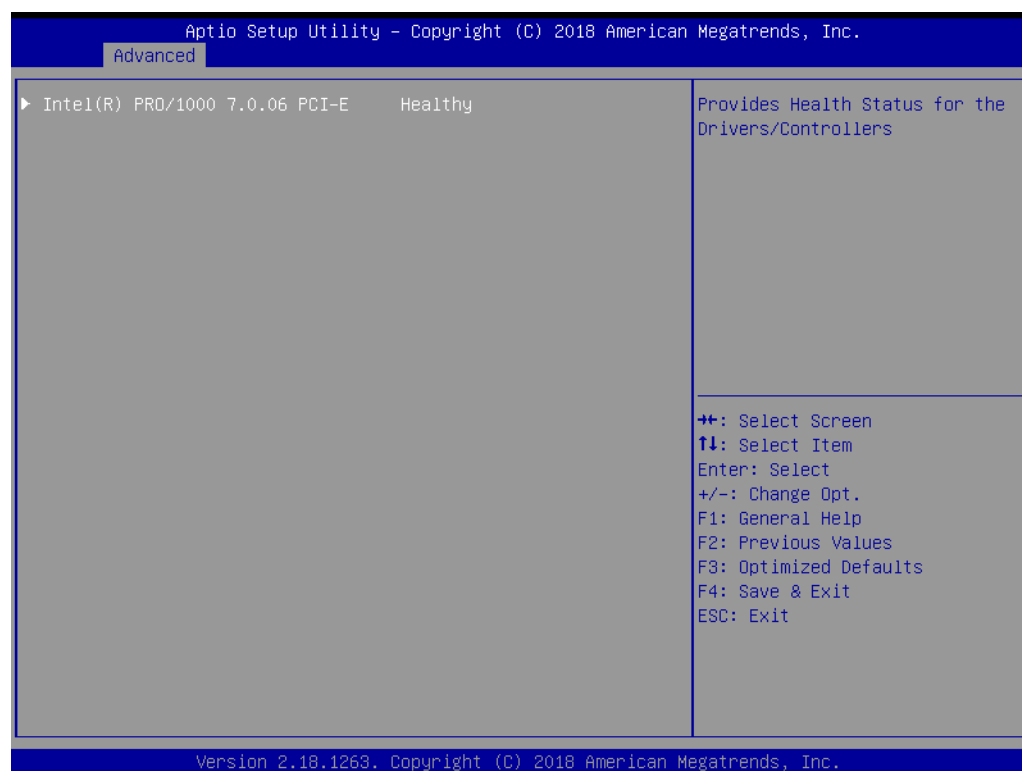
3.1.2 Advanced BIOS Features Setup

Select the Advanced tab from the ARK-2232 setup screen to enter the Advanced BIOS Setup screen. You can select any of the items in the left frame of the screen, such as CPU Configuration, to go to the sub menu for that item. You can display an Advanced BIOS Setup option by highlighting it using the <Arrow> keys. All Advanced BIOS Setup options are described in this section. The Advanced BIOS Setup screens is shown below. The sub menus are described on the following pages.



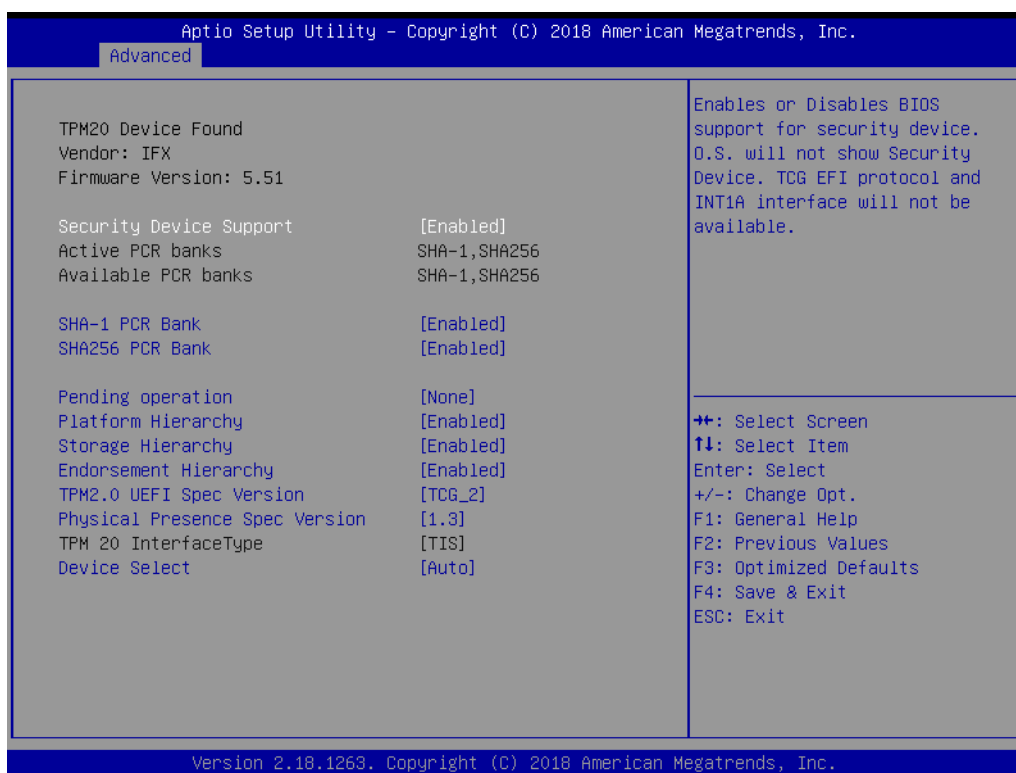
- **Setup Item Hidden**
Enable or Disable setup item.

3.1.2.1 Driver Health



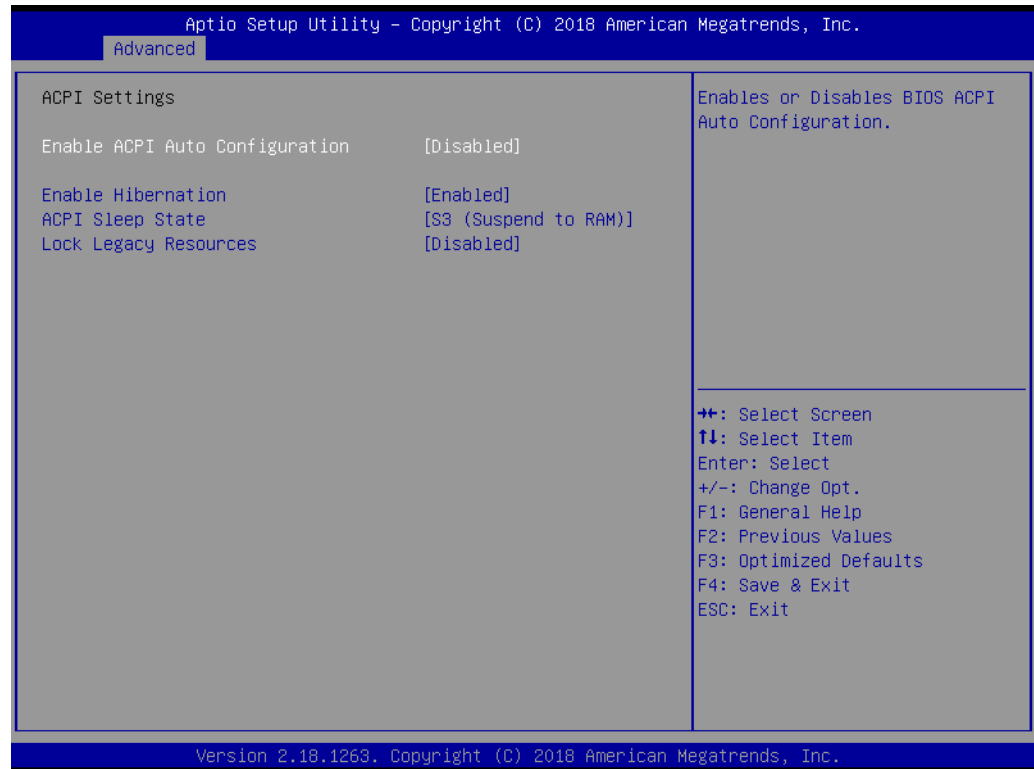
Provide Health Status for the Drivers/Controllers.

3.1.2.2 Trusted Computing



- **Security Device Support**
Enable or disable BIOS support for security device.
- **SHA-1 PCR Bank**
Enable or Disable SHA-1 PCR Bank.
- **SHA256 PCR Bank**
Enable or Disable SHA256 PCR Bank.
- **Pending operation**
Schedule an Operation for the Security Device.
- **Platform Hierarchy**
Enable or Disable Platform Hierarchy.
- **Storage Hierarchy**
Enable or Disable Storage Hierarchy.
- **Endorsement Hierarchy**
Enable or Disable Endorsement Hierarchy.
- **TPM 2.0 UEFI Spec Version**
Select the TCG2 Spec Version Support.
- **Physical Presence Spec Version**
Select to Tell O.S. to support PPI Spec Version 1.2 or 1.3.
- **Device Select**
TPM 1.2 will restrict support to TPM 1.2 devices, TPM 2.0 will restrict support to TPM 2.0 devices.

3.1.2.3 ACPI Settings



- **Enable ACPI Auto Configuration**
Enable or disable BIOS ACPI auto configuration.
- **Enable Hibernation**
Enables or Disables System ability to Hibernate (OS/S4 Sleep State). This option may be not effective with some OS.
- **ACPI Sleep State**
Select the highest ACPI sleep state the system will enter when the SUSPEND button is pressed.
- **Lock Legacy Resources**
Enables or Disables Lock of Legacy Resources

3.1.2.4 Embedded Controller Configuration



Embedded controller configuration displays all information about system Temperature/Voltage.

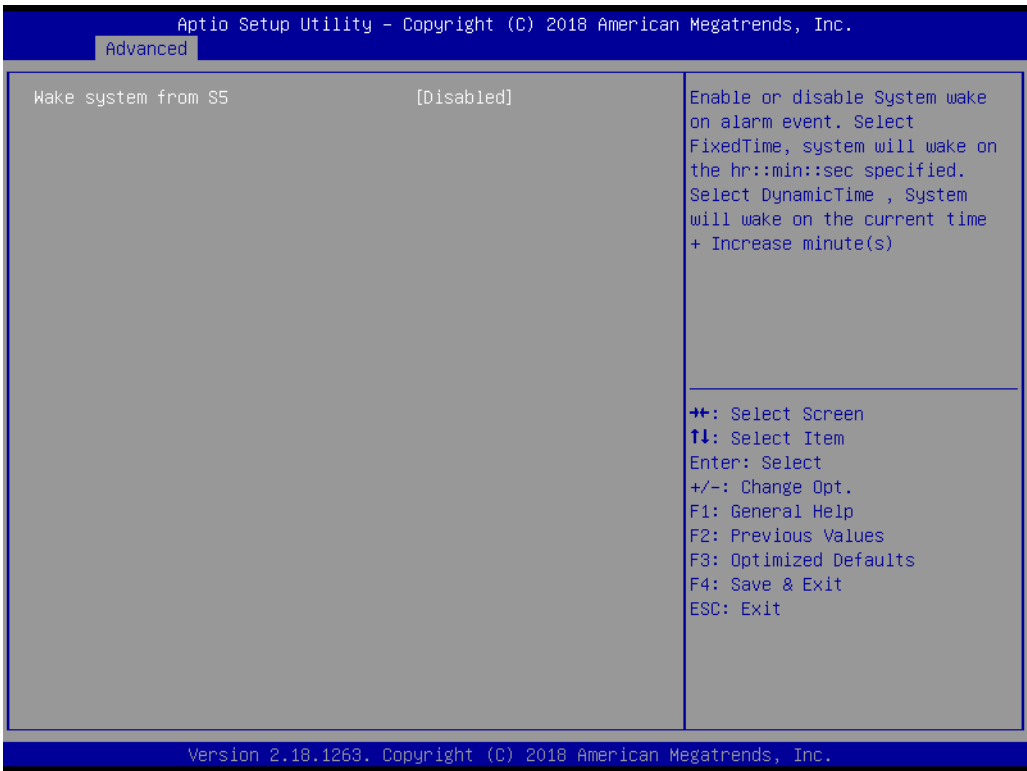
- **Backlight Enable Polarity**
Switch Backlight Enable Polarity for Native or Invert.
- **1st LVDS Backlight Control**
Switch Backlight Control to PWM or DC mode.
- **Power Saving Mode**
This item allows users to set board's power saving mode when off.
- **Watch Dog Timer**
Watch Dog Timer Configuration Page.

Watch Dog Timer Configuration



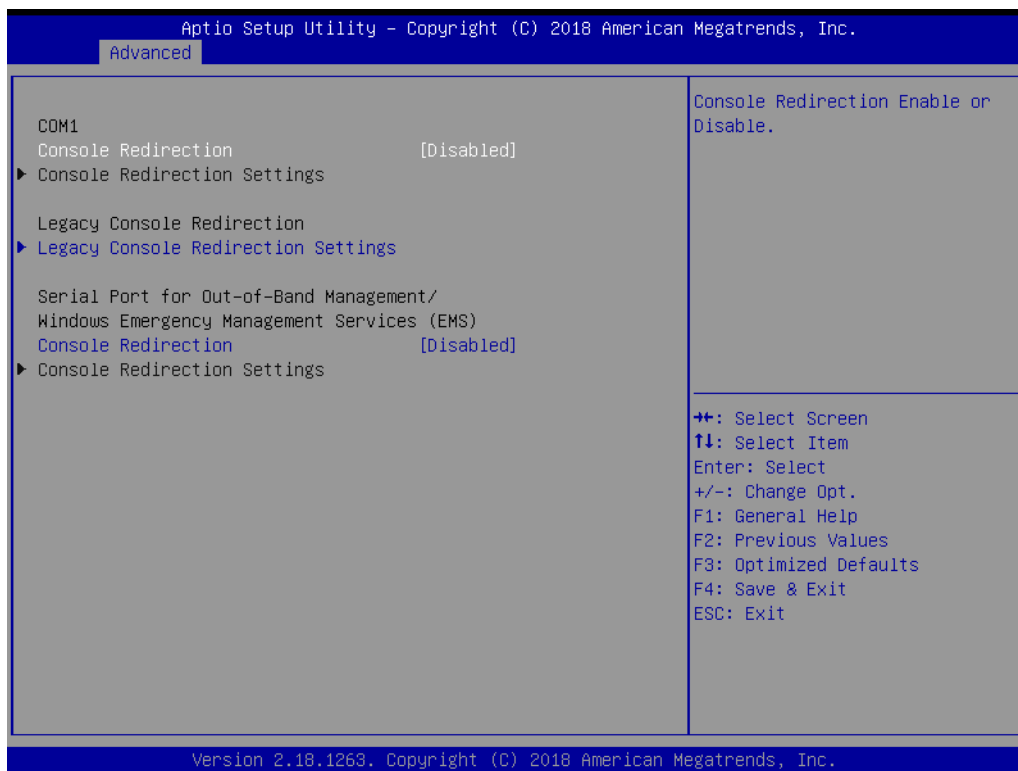
- **Watch Dog Timer**
This page displays all information about Watch Dog Timer Configuration.

3.1.2.5 S5 RTC Wake Settings



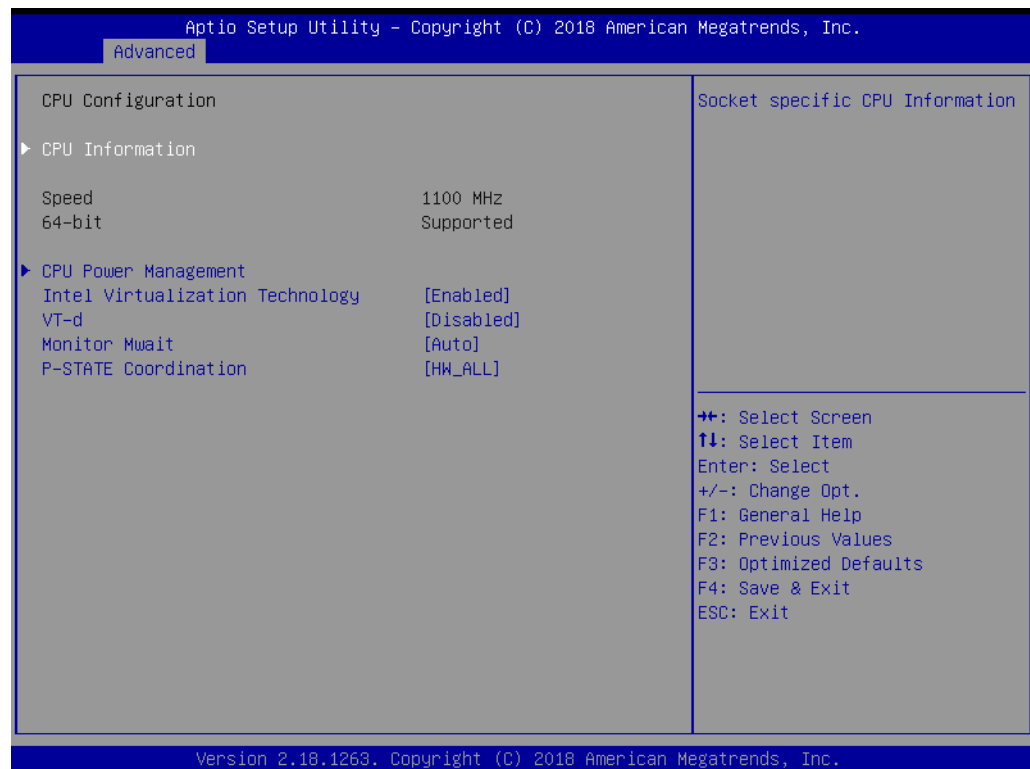
- **Wake system from S5**
Enable or disable System wake on alarm event. Select FixedTime, system will wake on the hr:min:sec specified.

3.1.2.6 Serial Port Console Redirection



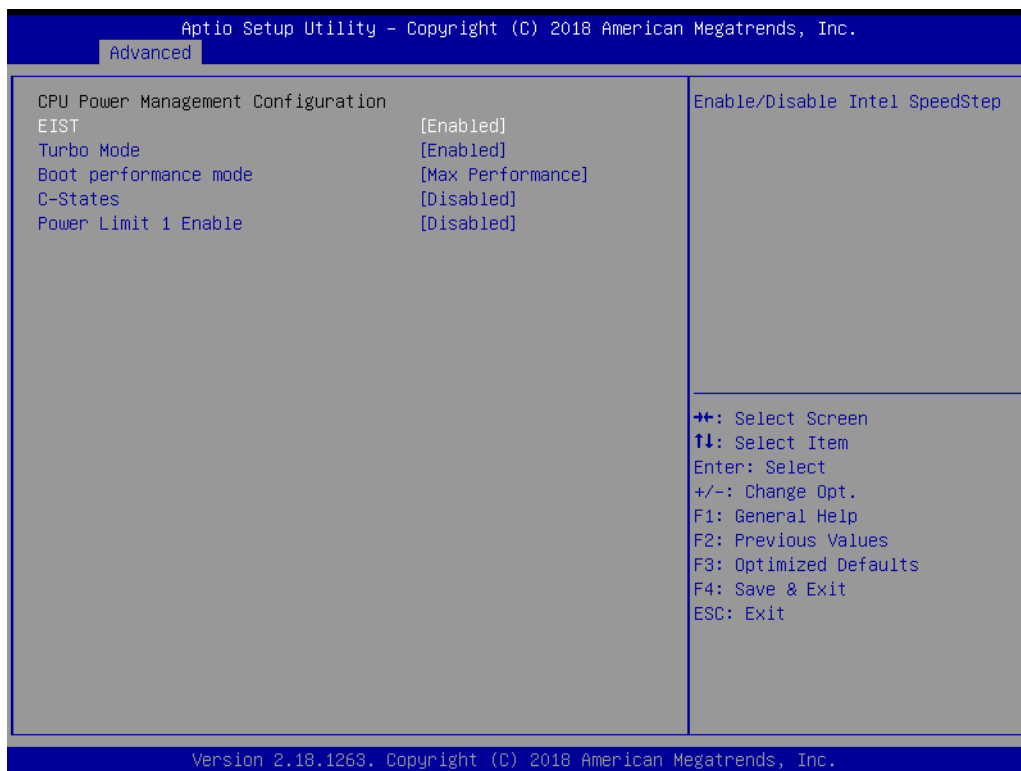
- **Console Redirection**
This item allows users to enable or disable console redirection for Microsoft Windows Emergency Management Services (EMS).
- **Console Redirection**
This item allows users to configuration console redirection detail settings.

3.1.2.7 CPU Configuration



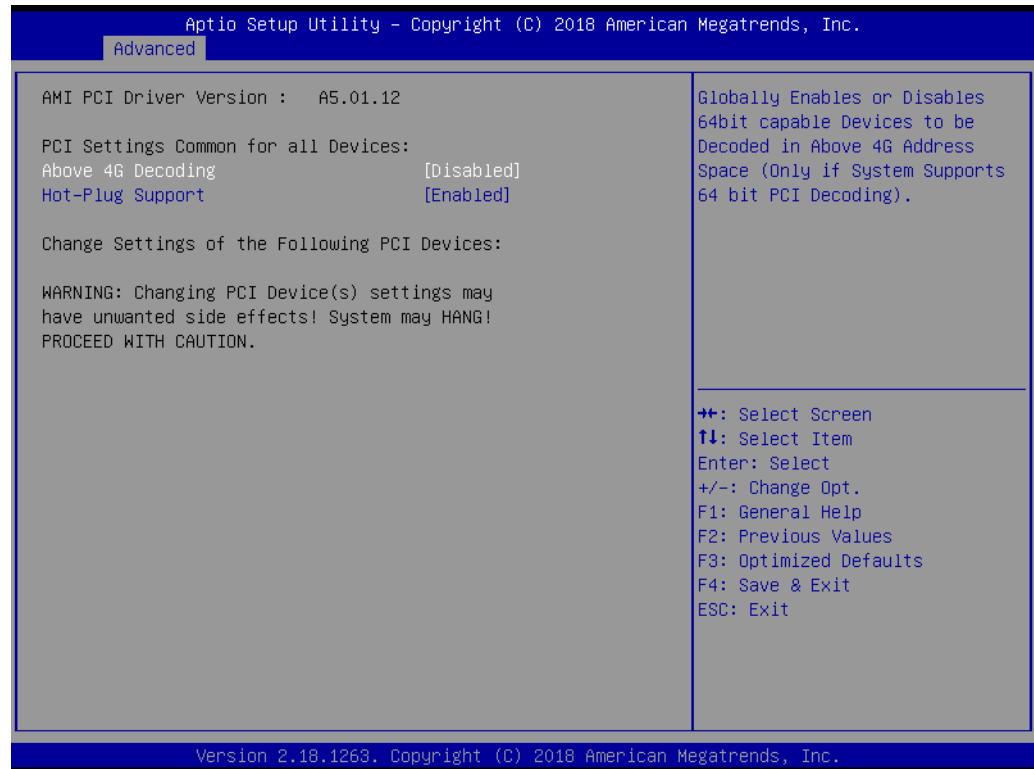
- **CPU Information**
Socket specific CPU Information
- **Intel Virtualization Technology**
When enabled, a VMM can utilize the additional hardware capabilities provided by Vanderpool Technology.
- **VT-d**
Enable/Disable CPU VT-d.
- **Monitor Mwait**
Enable/Disable Monitor Mwait.
- **P-STATE Coordination**
Change P-STATE Coordination type.

3.1.2.8 CPU Power Management



- **EIST**
Enable/Disable Intel SpeedStep.
- **Turbo mode**
Turbo Mode.
- **Boot performance mode**
Enable Max Performance mode
- **C-States**
Enable or Disable C States.
- **Power Limit 1 enable**
Enable or Disable Power Limit 1.

3.1.2.9 PCI Subsystem Settings



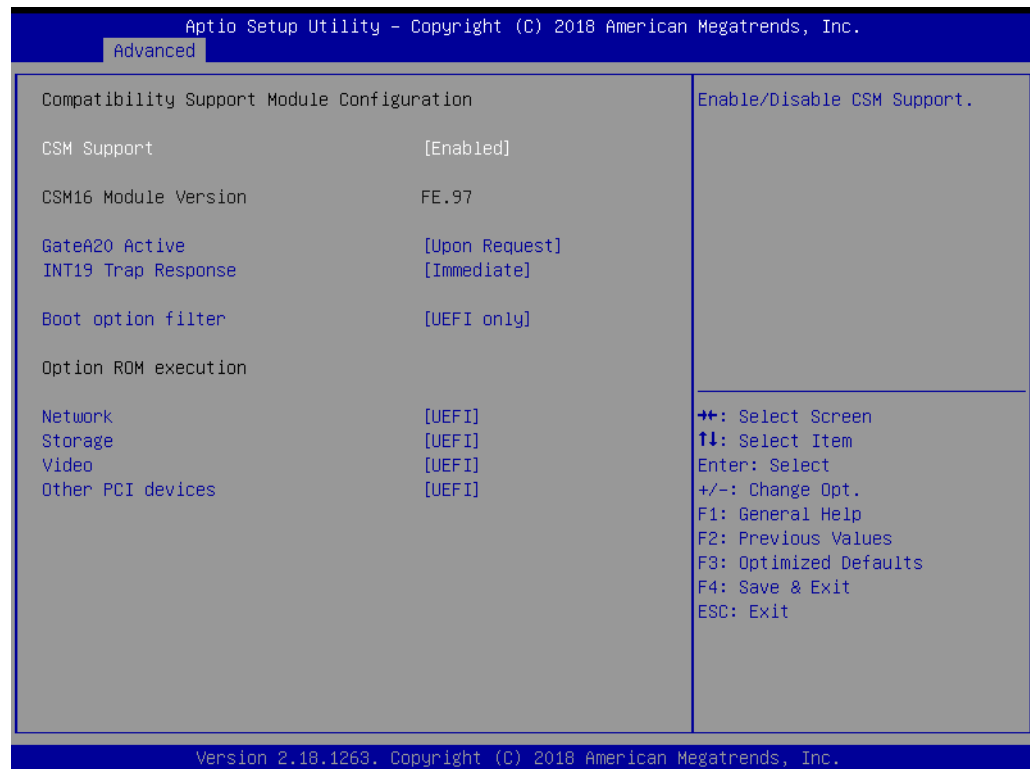
- **Above 4G Decoding**
Enable or Disable Above 4G Decoding device.
- **Hot-Plug Support**
Enable or Disable Hot-plug support

3.1.2.10 Network Stack Configuration



- **Network Stack**
Enable/Disable UEFI Network Stack.

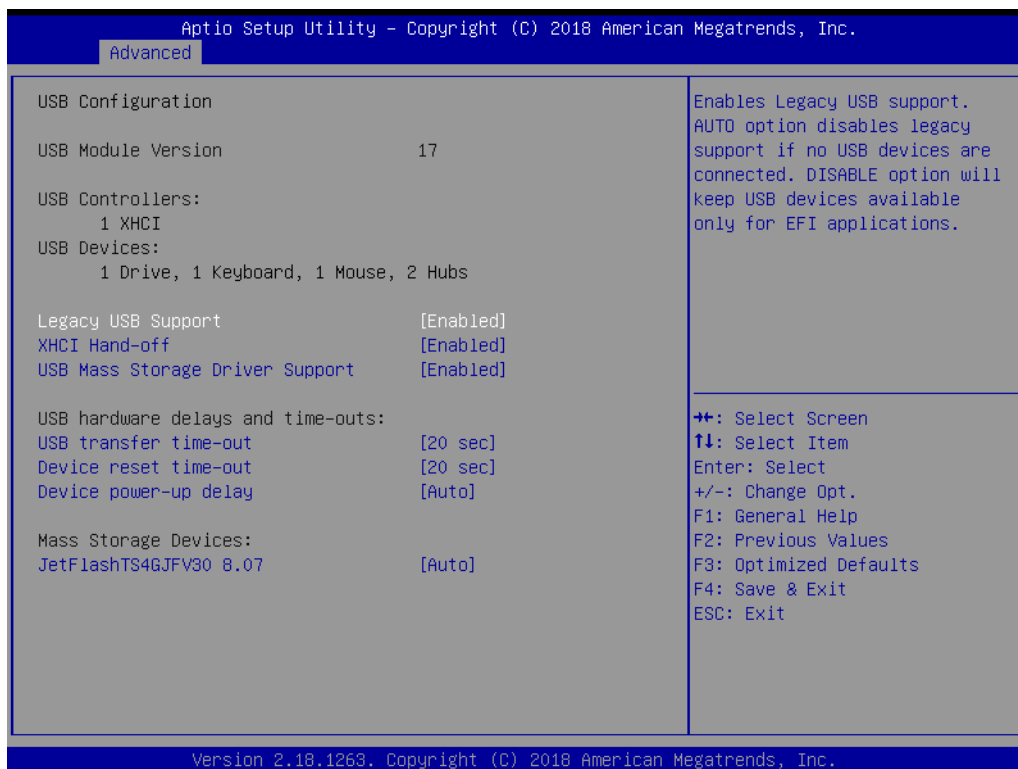
3.1.2.11 CSM Configuration



CSM Support for debug purpose

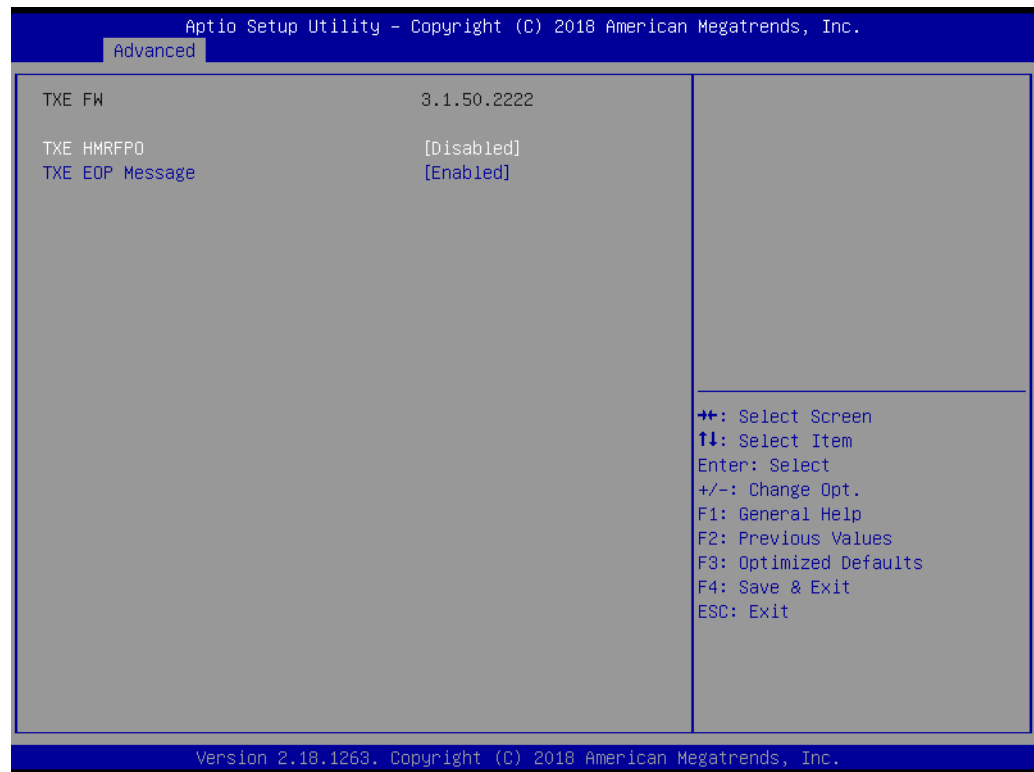
- **CSM Support**
Enable/Disable CSM Support.
- **GateA20 Active**
UPON REQUEST - GA20 can be disabled using BIOS services. ALWAYS - do not allow disabling GA20; this option is useful when any RT code is executed above 1MB.
- **INT19 Trap Response**
BIOS reaction on INT19 trapping by Option ROM: IMMEDIATE - execute the trap right away; POSTPONED - execute the trap during legacy boot.
- **Boot option filter**
This option controls Legacy/UEFI ROMs priority.
- **Network**
Controls the execution of UEFI and Legacy PXE OpROM.
- **Storage**
Controls the execution of UEFI and Legacy Storage OpROM.
- **Video**
Controls the execution of UEFI and Legacy Video OpROM.
- **Other PCI devices**
Determines OpROM execution policy for devices other than Network, Storage, or Video.

3.1.2.12 USB Configuration



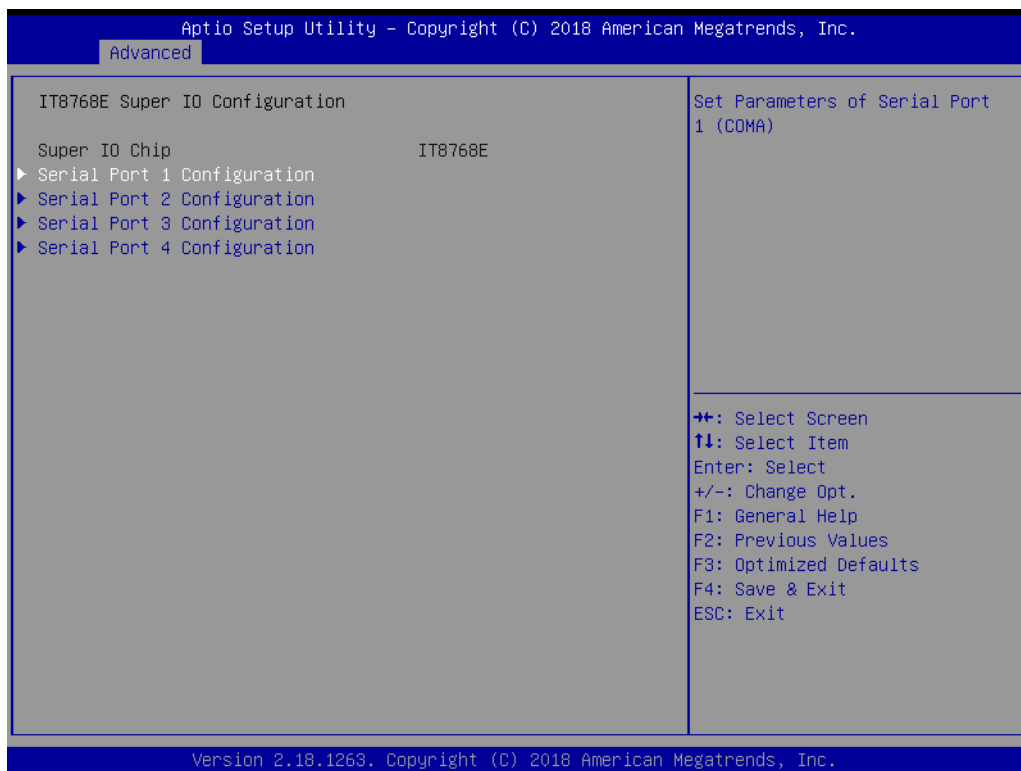
- **Legacy USB Support**
Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.
- **XHCI Hand-off**
This is a workaround for OSes without XHCI hand-off support. The XHCI ownership change should be claimed by XHCI driver.
- **USB Mass Storage Driver Support**
Enable/Disable USB Mass Storage Driver Support.
- **USB transfer time-out**
Time-out value for control, Bulk, and interrupt transfers.
- **Device reset time-out**
USB mass storage device start unit command time-out.
- **Device power-up delay**
Maximum time the device will take before it properly reports itself to the Host Controller. 'Auto' uses default value: for a Root port it is 100 ms, for a Hub port the delay is taken from Hub descriptor.

3.1.2.13 Security Configuration



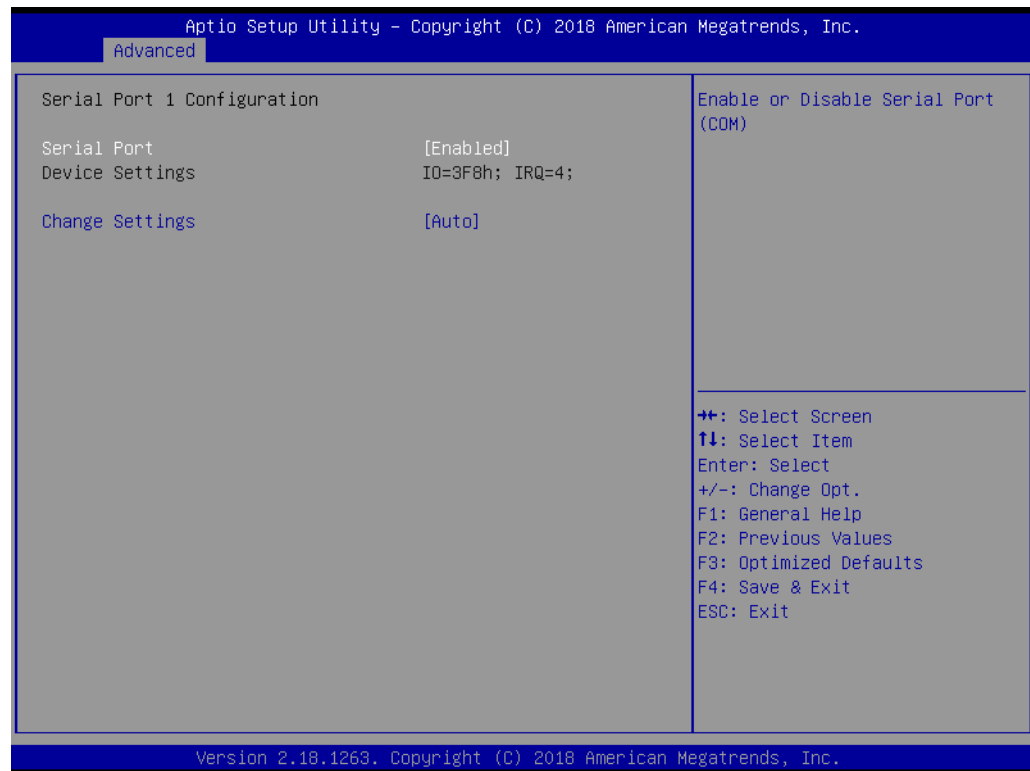
- **TXE HMRFP0 Disable**
This item allows you to enable or disable TXE HMRFP0 function
- **TXE EOP Message**
Send EOP Message Before Enter OS

3.1.2.14 IT8768E Super IO Configuration



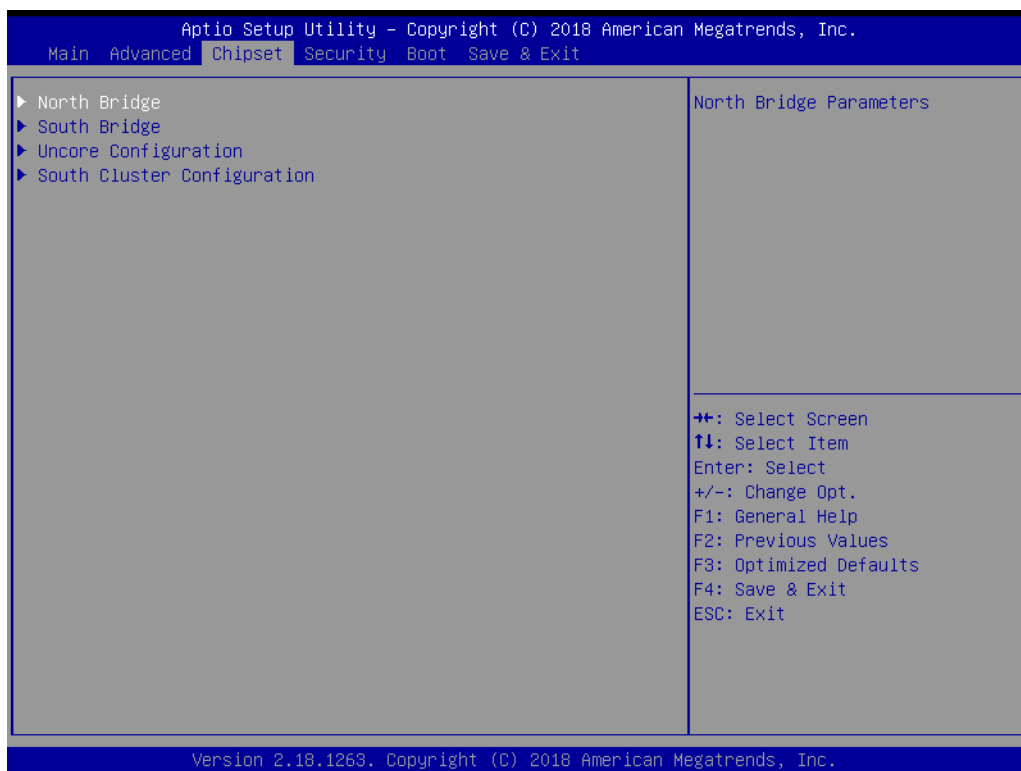
Super IO Configuration (IT8768E)

- **Serial Port 1 Configuration**
Set Parameters of Serial Port 1 (COM1).
- **Serial Port 2 Configuration**
Set Parameters of Serial Port 2 (COM2).
- **Serial Port 3 Configuration**
Set Parameters of Serial Port 3 (COM3).
- **Serial Port 4 Configuration**
Set Parameters of Serial Port 4 (COM4).



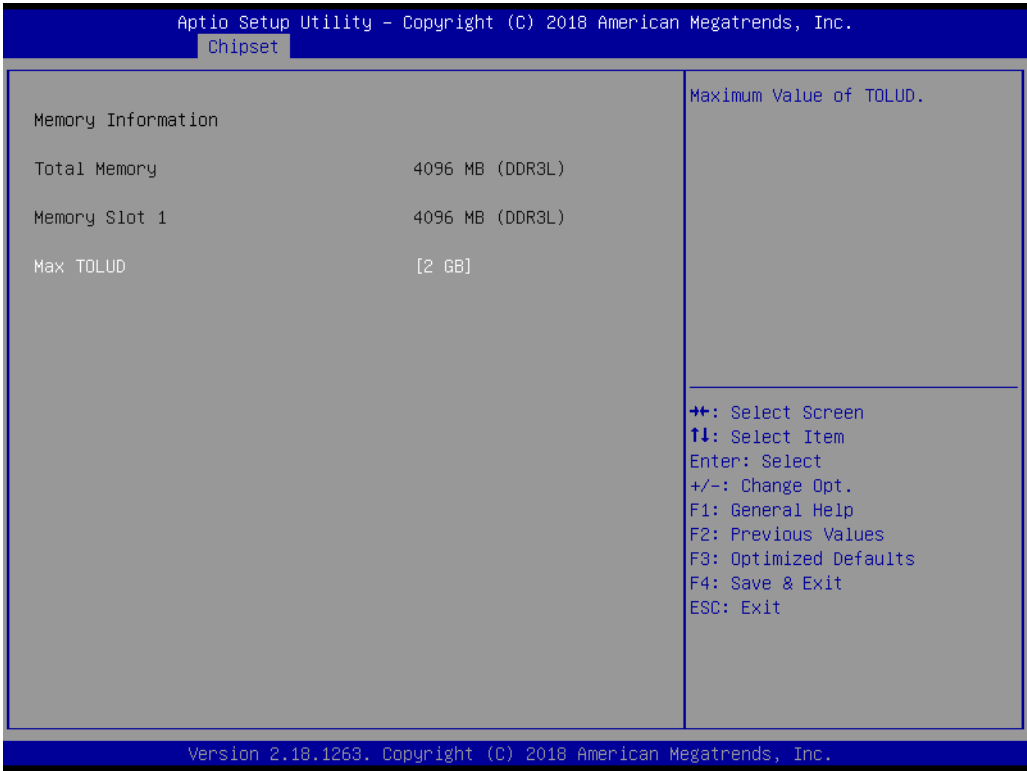
- **Serial Port**
Enable or Disable Serial Port (COM).
- **Change Settings**
Select an optimal settings for Super IO Device.
- **COM Mode**
Select communication type as RS232/RS422/RS485. (Only selectable for COM3/COM4)

3.1.3 Chipset Configuration



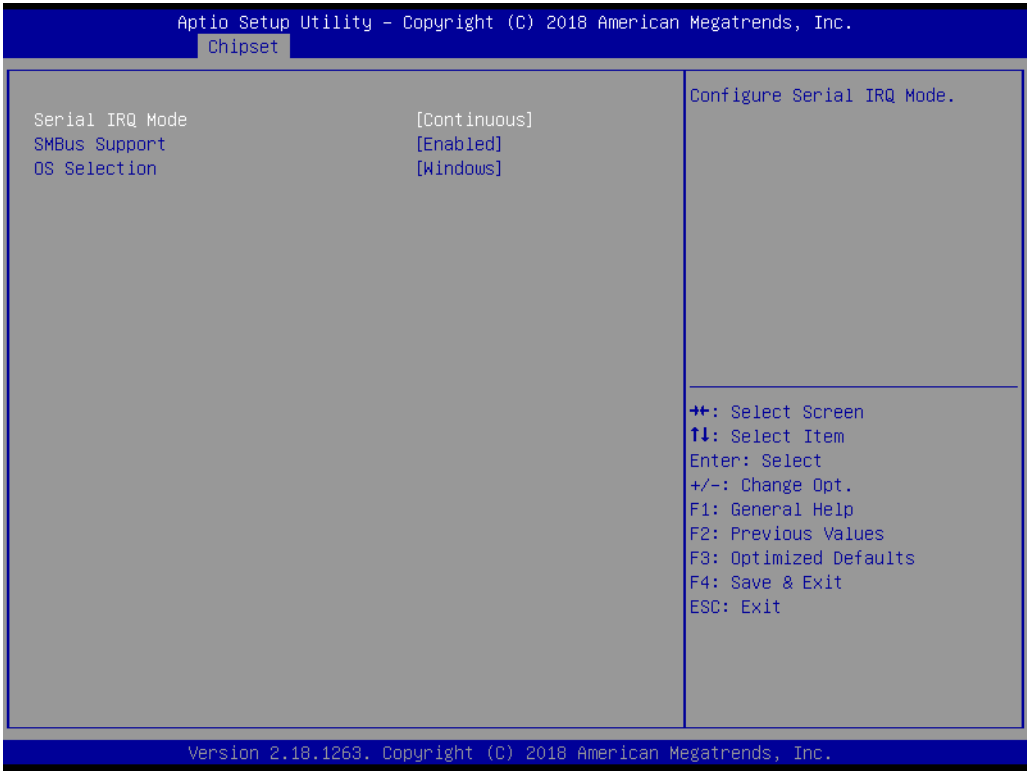
- **North Bridge**
Details for North Bridge items.
- **South Bridge**
Details for South Bridge items.
- **Uncore Configuration**
Details for Uncore Configuration.
- **South Cluster Configuration**
Details for South Cluster Configuration.

3.1.3.1 North Bridge



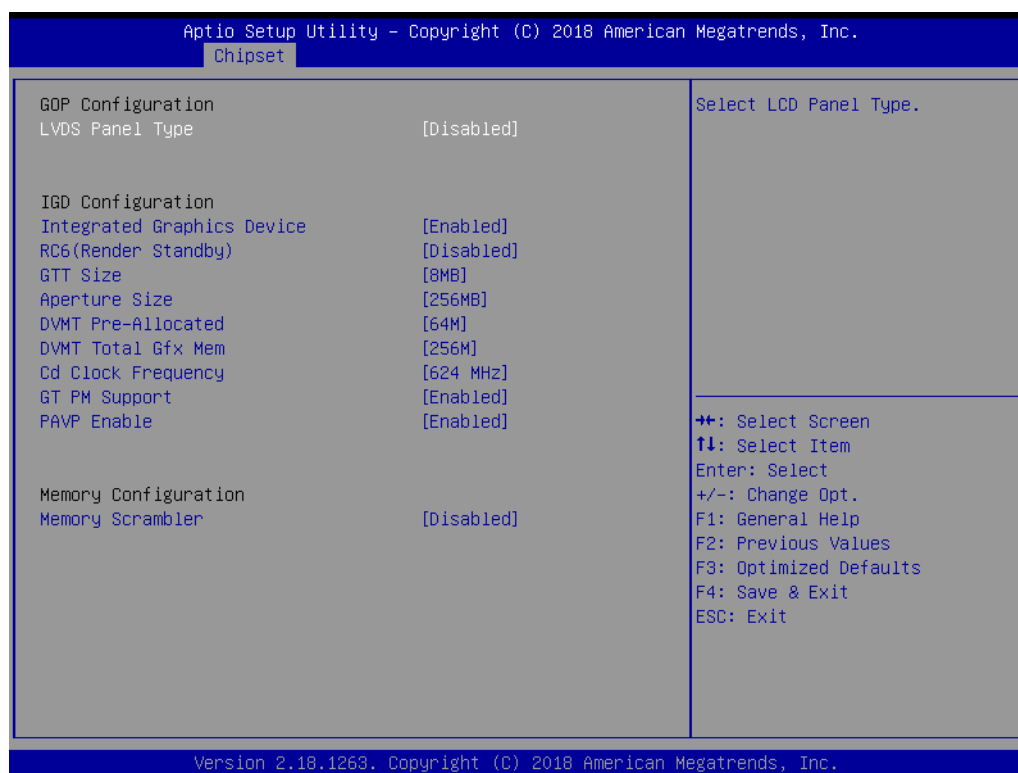
- **Max TOLUD**
Maximum Value of TOLUD.

3.1.3.2 South Bridge



- **Serial IRQ Mode**
Configure Serial IRQ Mode.
- **SMBus Support**
Enable/Disable SMBus Support.
- **OS Selection**
Select the target OS.

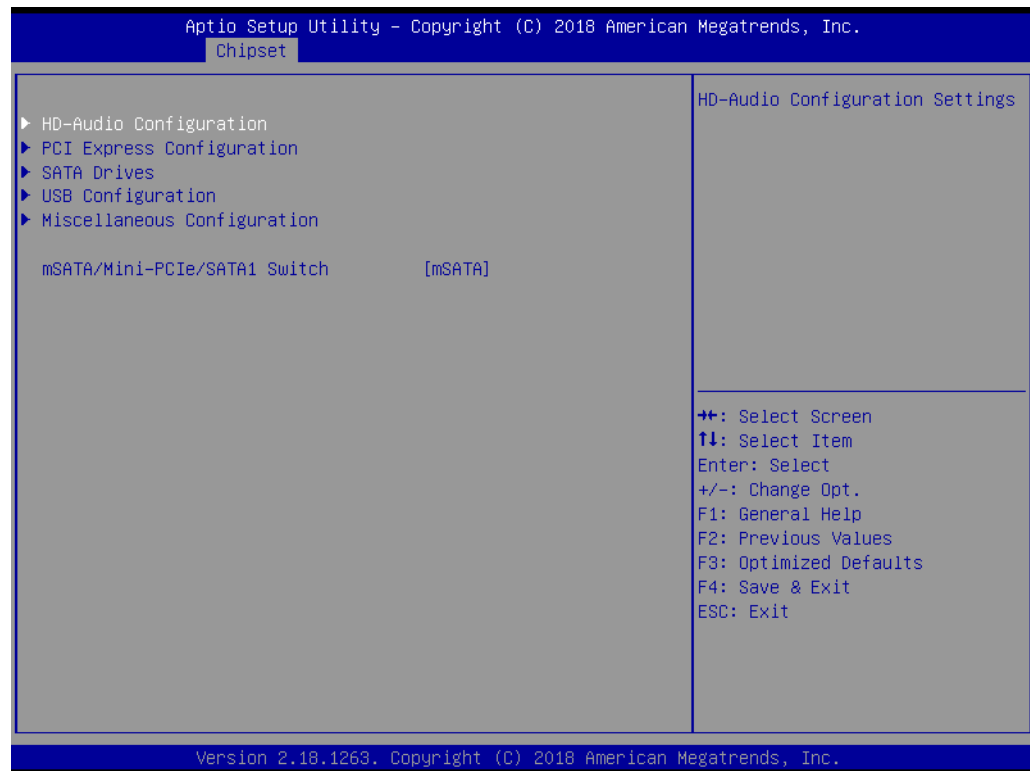
3.1.3.3 Uncore Configuration



- **LVDS Panel Type**
Select LCD Panel Type.
- **Integrated Graphics Device**
Enable: Enable Integrated Graphics Device (IGD) when selected as the Primary Video Adaptor. Disable: Always disable IGD.
- **RC6 Render Standby**
Check to enable render standby support.
- **GTT Size**
Select the GTT Size
- **Aperture Size**
Select the Aperture Size.
- **DVM T Pre-Allocated**
Select DVM T 5.0 Pre-Allocated (Fixed) Graphics Memory size used by the Internal Graphics Device.
- **DVM T Total Gfx Mem**
Select DVM T 5.0 Total Graphic Memory size used by the Internal Graphics Device.
- **Cd Clock Frequency**
Select the highest Cd Clock frequency supported by the platform.

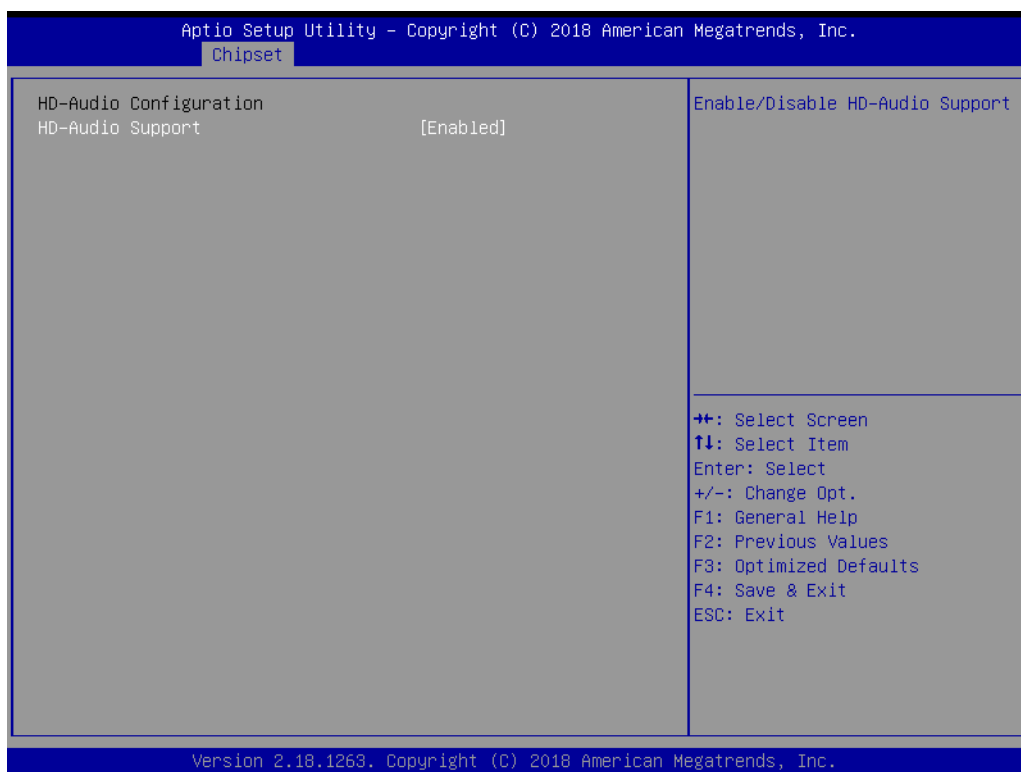
- **GT PM Support**
Enable/Disable GT PM Support.
- **PAVP Enable**
Enable/Disable PAVP.
- **Memory Scrambler**
Enable/Disable Memory Scrambler support.

3.1.3.4 South Cluster Configuration



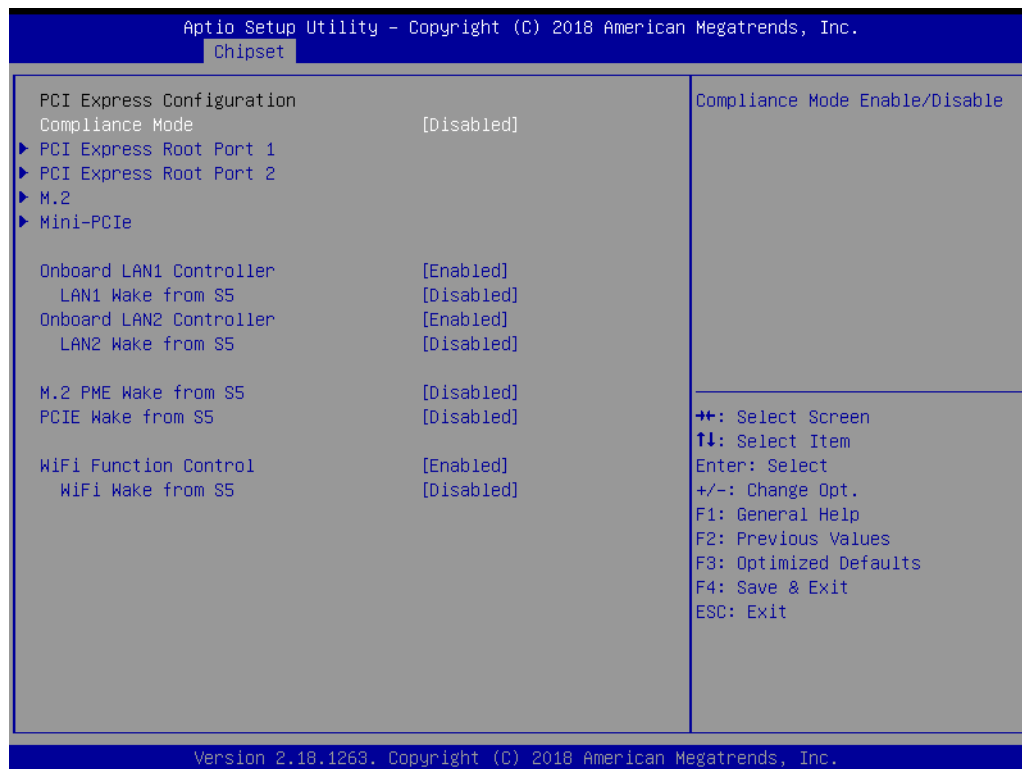
- **HD-Audio Configuration**
HD-Audio Configuration Settings.
- **PCI Express Configuration**
PCI Express Configuration Settings.
- **SATA Drives**
Press <Enter> to select the SATA Device Configuration Setup options.
- **USB Configuration**
USB Configuration Settings.
- **Miscellaneous Configuration**
Enable/Disable Misc. Features.
- **mSATA/Mini-PCIe/SATA1 Switch**
Select Disk connector type

HD-Audio Configuration

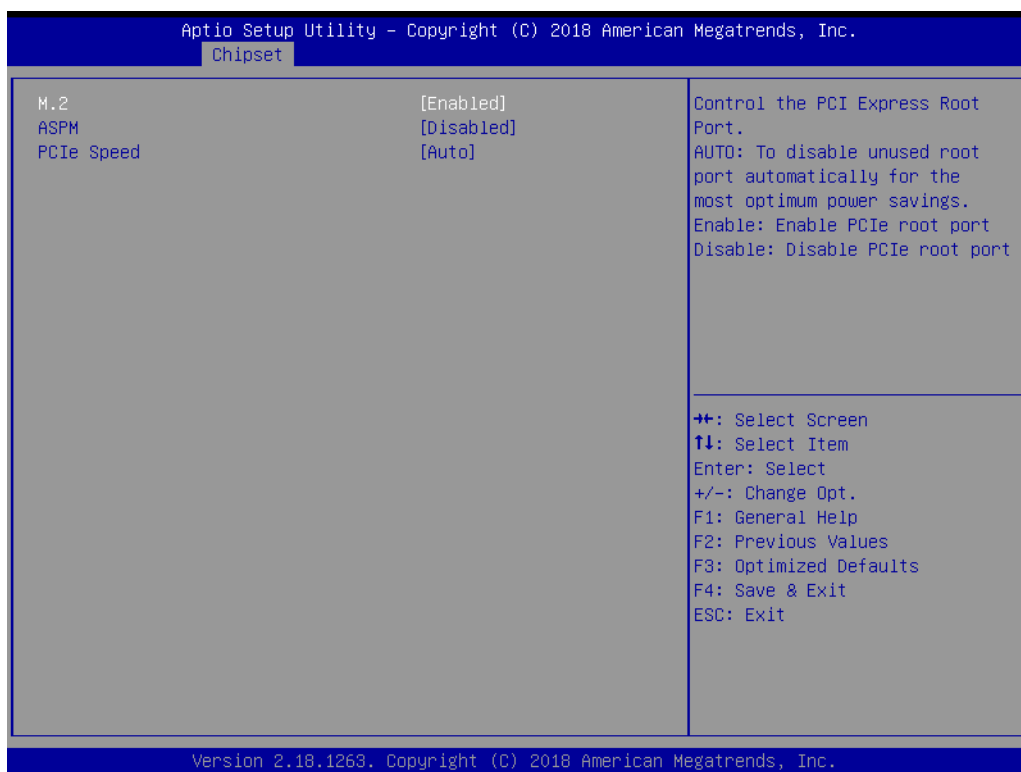


- **HD-Audio Support**
Enable/Disable HD-Audio Support.

PCI Express Configuration

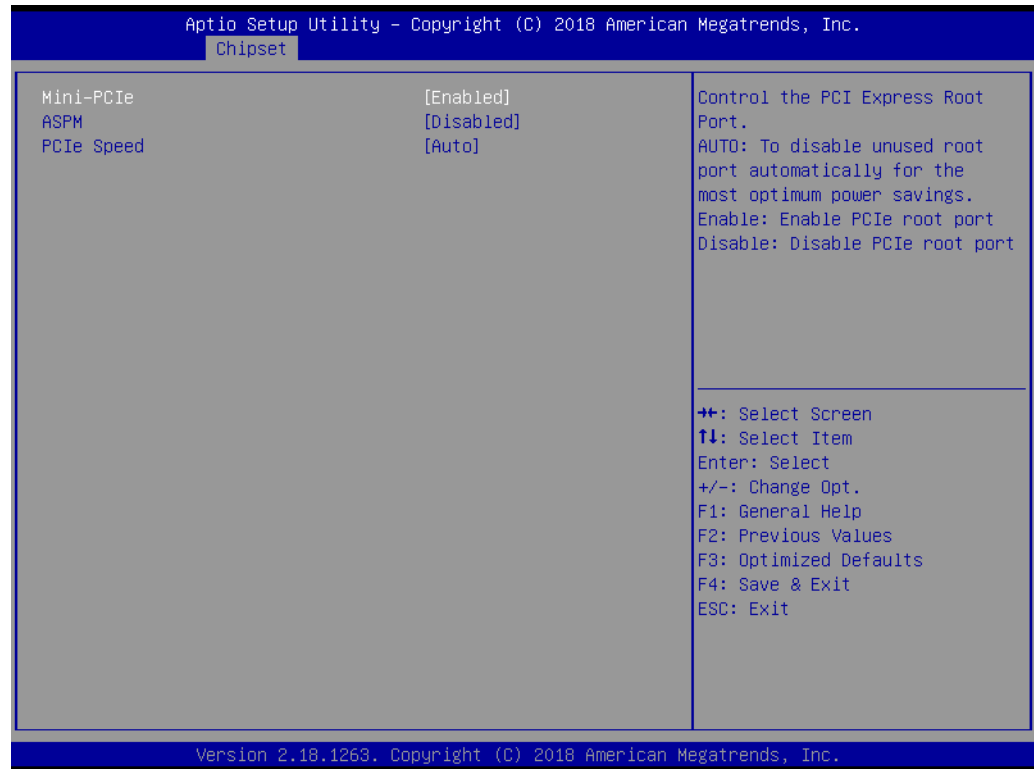


- **Compliance Mode**
Compliance Mode Enable/Disable.
- **PCI Express Root Port 1 / 2**
Control the PCI Express Root Port.
- **M.2**
Control the M.2 port
- **Mini PCIE**
Control the Mini PCIE
- **Onboard LAN1/2 Controller**
Select to Enable or Disable Onboard LAN1/2 Controller.
- **LAN Option ROM**
Enabled / Disabled Onboard LAN's PXE option ROM.
- **M.2 PME Wake from S5**
Enable or disable M.2 PME to wake the system from S5.
- **PCIe Wake from S5**
Enable or disable PCIe to wake the system from S5.
- **WiFi Function Control**
Enable or disable WiFi to wake the system from S5.

M.2

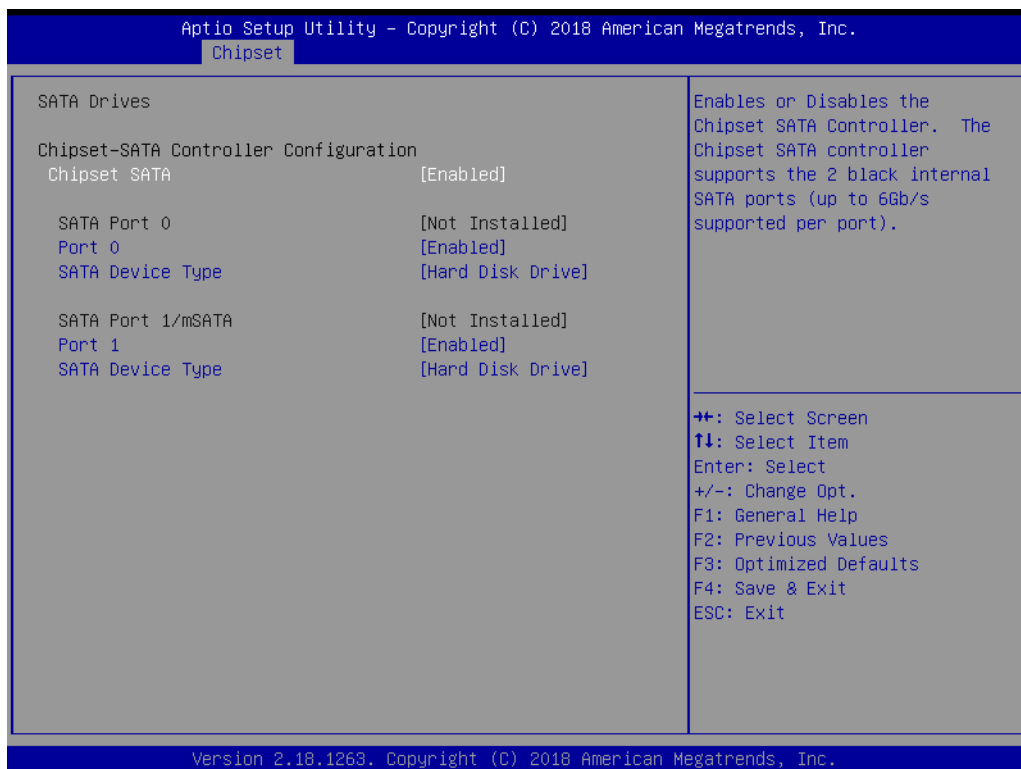
- **M.2 Control the M.2 port**
 Enable: Enable M.2 port.
 Disable: Disable M.2 root port.
- **ASPM**
 PCI Express Active State Power Management settings.
- **PCIe Speed**
 Configure PCIe Speed.

Mini PCIe



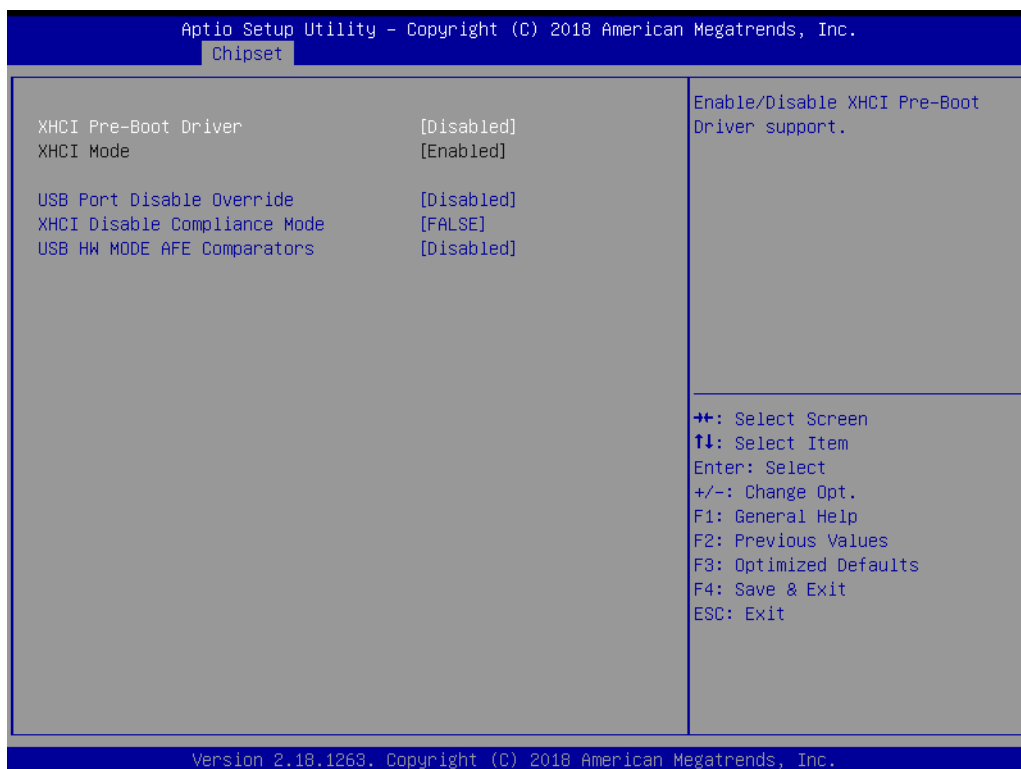
- **Mini PCIe**
Control the Mini PCIe
Enable: Enable Mini PCIe port.
Disable: Disable Mini PCIe port.
- **ASPM**
PCI Express Active State Power Management settings.
- **PCIe Speed**
Configure PCIe Speed.

SATA Drives



- **Chipset SATA**
Enable or Disable the Chipset SATA Controller.

USB Configuration



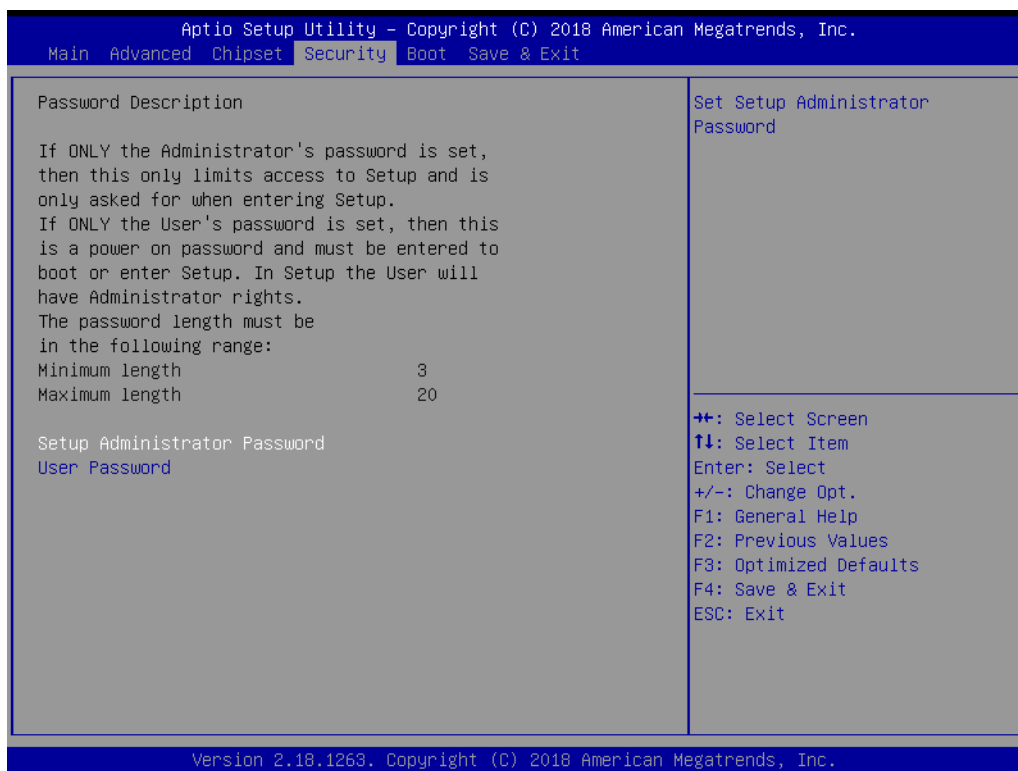
- **XHCI Pre-Boot Driver**
Enable/Disable XHCI Pre-Boot Driver Support.
- **USB Port Disable Override**
Selectively Enable/Disable corresponding USB port from reporting a Device Connection to the controller.
- **XHCI Disable Compliance Mode**
Options to disable XHCI Link Compliance Mode.
- **USB HW MODE AFE Comparators**
Enable/Disable USB HW MODE AFE Comparators.

Miscellaneous Configuration



- **Restore AC Power Loss**
Specify what state to go to when power is re-applied after a power failure (G3 state).
- **BIOS Lock**
Enable/Disable the BIOS Lock Enable feature.
- **RTC Lock**
Enable or disable bytes 38h-3Fh in the upper and lower 128-byte bank of RTC RAM lockdown.
- **Flash Protection Range Registers**
Enable or Disable Flash Protection Range Registers.
- **TCO Lock**
Enable TCO and Lock Down TCO.

3.1.4 Security

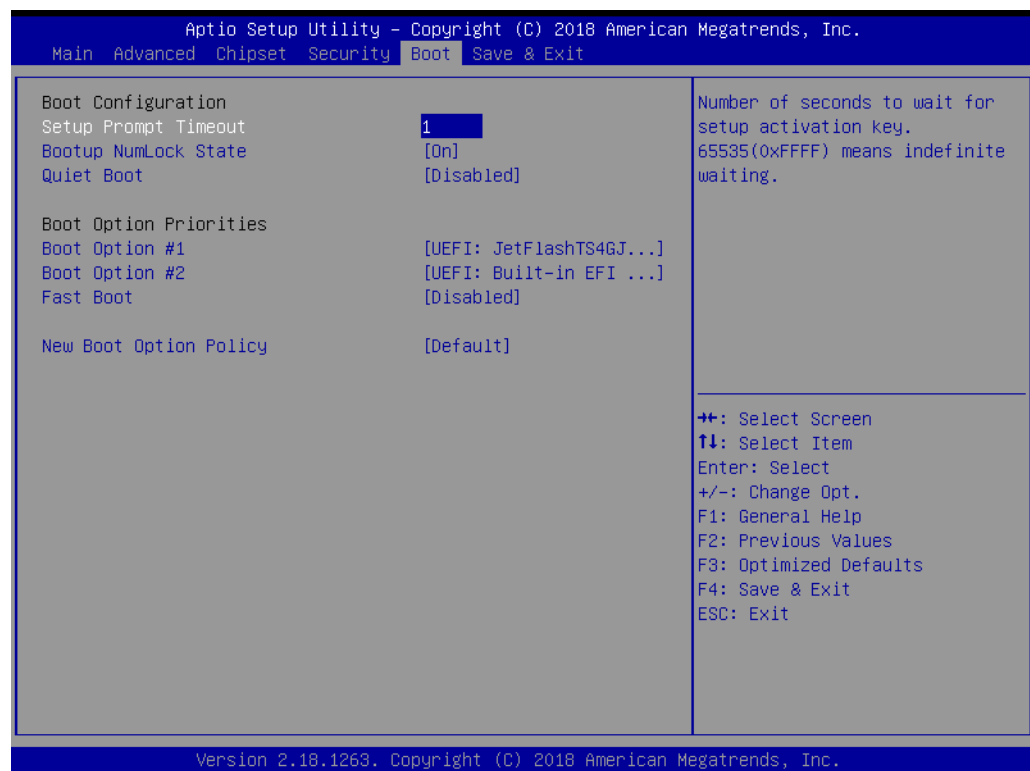


Select Security Setup from the ARK-2232 Setup main BIOS setup menu. All Security Setup options, such as password protection and virus protection are described in this section. To access the sub menu for the following items, select the item and press <Enter>:

- **Change Administrator / User Password**

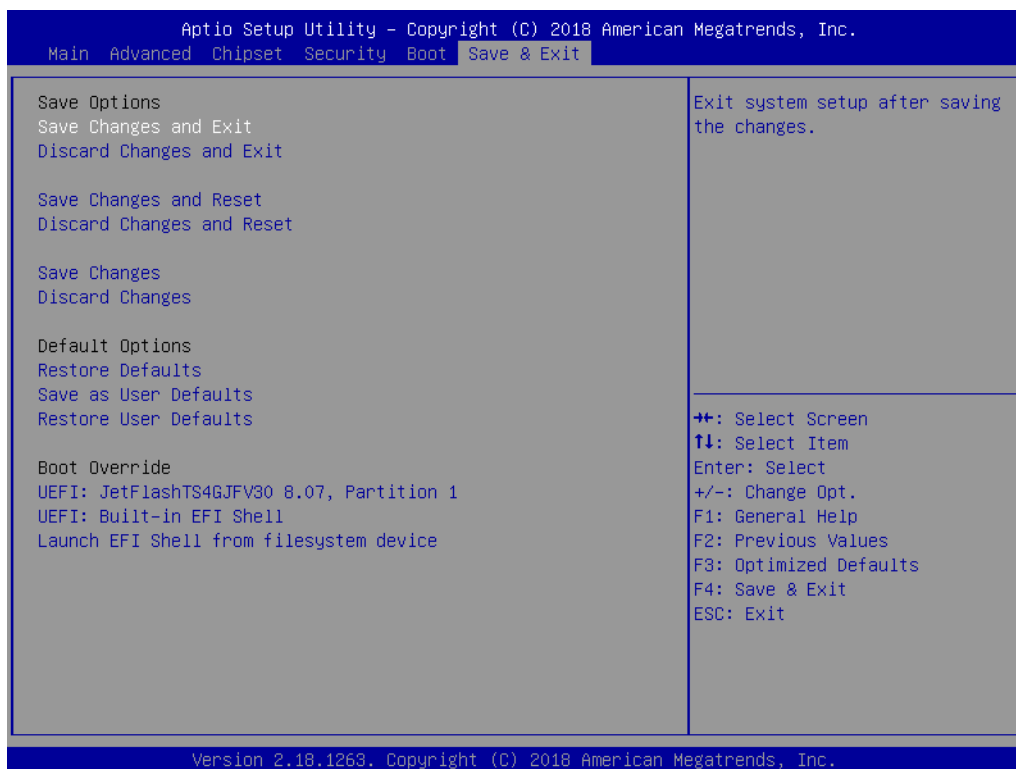
Select this option and press <ENTER> to access the sub menu, and then type in the password.

3.1.5 Boot



- **Setup Prompt Timeout**
Number of seconds that the firmware will wait before initiating the original default boot selection. A value of 0 indicates that the default boot selection is to be initiated immediately on boot. A value of 65535(0xFFFF) indicates that firmware will wait for user input before booting. This means the default boot selection is not automatically started by the firmware.
- **Bootup NumLock State**
Select the keyboard NumLock state.
- **Quiet Boot**
Enables or disables Quiet Boot option.
- **Boot Option #1/#2**
Sets the system boot order.
- **Fast Boot**
Enables or disables boot with initialization of a minimal set of devices required to launch active boot option. Has no effect for BBS boot options.
- **New Boot Option Policy**
Controls the placement of newly detected UEFI boot options.

3.1.6 Save & Exit



- **Save Changes and Exit**
This item allows you to exit system setup after saving the changes.
- **Discard Changes and Exit**
This item allows you to exit system setup without saving any changes.
- **Save Changes and Reset**
This item allows you to reset the system after saving the changes.
- **Discard Changes and Reset**
This item allows you to rest system setup without saving any changes.
- **Save Changes**
This item allows you to save changes done so far to any of the options.
- **Discard Changes**
This item allows you to discard changes done so far to any of the options.
- **Restore Defaults**
This item allows you to restore/load default values for all the options.
- **Save as User Defaults**
This item allows you to save the changes done so far as user defaults.
- **Restore User Defaults**
This item allows you to restore the user defaults to all the options.
- **Boot Override**
Boot device select can override your boot priority.

Appendix **A**

Watchdog Timer Sample Code

A.1 EC Watchdog Timer sample code

```
EC_Command_Port = 0x29Ah
EC_Data_Port = 0x299h
Write EC HW ram = 0x89
Watch dog event flag = 0x57
Watchdog reset delay time = 0x5E
Reset event = 0x04
Start WDT function = 0x28
=====
.model small
.486p
.stack 256
.data
.code
org 100h
.STARTup

mov dx, EC_Command_Port
mov al,89h          ; Write EC HW ram.
out dx,al

mov dx, EC_Command_Port
mov al, 5Fh          ; Watchdog reset delay time low byte (5Eh is high byte) index.
out dx,al

mov dx, EC_Data_Port
mov al, 30h          ;Set 3 seconds delay time.
out dx,al

mov dx, EC_Command_Port
mov al,89h          ; Write EC HW ram.
out dx,al

mov dx, EC_Command_Port
mov al, 57h          ; Watch dog event flag.
out dx,al

mov dx, EC_Data_Port
mov al, 04h          ; Reset event.
out dx,al

mov dx, EC_Command_Port
mov al,28h          ; start WDT function.
out dx,al

.exit
END
```




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