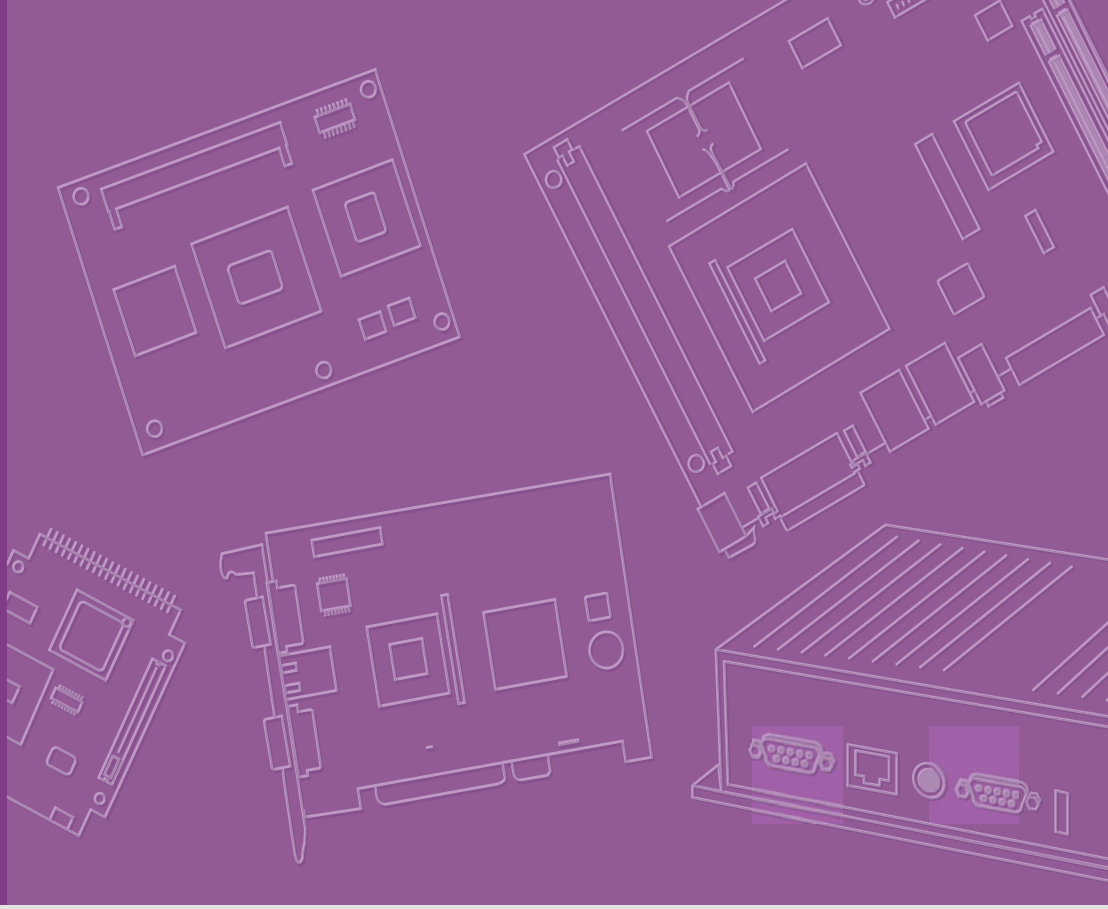

User Manual

ARK-1503

Embedded IPC

ADVANTECH

Enabling an Intelligent Planet

Attention!

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 CD. 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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Part No. 2006150300 Edition 1

Printed in Taiwan March 2011

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 A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.*

Note! *Notes provide optional additional information.*

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so 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 a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
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 -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
16. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
17. 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.
18. 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.
19. 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.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Packing list

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

- 1 x ARK-1503 Unit
- 1 x Driver CD (Drivers and Manual)
- 1 x China RoHS
- 1 x Chinese User Manual for CCC
- 1 x Warranty Card

Ordering information

Model Number	Description
ARK-1503F-D6A1E	Intel Atom D525 1.8 GHz, with DB36 LVDS interface
ARK-1503F-D4A1E	Intel Atom D425 1.8 GHz, with DB36 LVDS interface
ARK-1503P-D6A1E	Intel Atom D525 1.8 GHz, with golden finger interface for ITM-5115

Optional accessories

Part Number	Description
1757003062	AC-to-DC Adapter 100-240 V, 60W, 12 V / 5 A Power Plug, 0 ~ 40°C for Home and Office Use
1702002600	Power Cable 3-pin 180 cm, USA Type
1702002605	Power Cable 3-pin 180 cm, Europe Type
1702031801	Power Cable 3-pin 180 cm, UK Type
1700008921	Power Cable 3-pin 180 cm, PSE Mark
9666K10000E	DIN-Rail mounting kit for ARK-1000 series models
9666K10001E	VESA mounting kit for ARK-1000 series models
WIFI-105E	Wireless IEEE 802.11b/g/n, miniPCIe interface WLAN
1700001854	SMA cable 11CM for WIFI-105E WLAN module
1750003222	802.11b/g 5dBi Dipole Antenna for 968EMW0021 WLAN module
1700019110	3 m DB36 LVDS integrated cable for ITM-5115R-LA1E
ITM-5115R-LA1E	15" XGA LED Industrial Monitor with I-Panel Link
ITM-5115R-PA1E	15" XGA LED Ind. T/S Monitor plugged with ARK

Contents

Chapter 1

General Introduction

This chapter gives background information on ARK-1503 series.

1.1 Introduction

ARK-1503 Embedded IPC is an application ready system platform solution. All electronics are protected in a compact sealed aluminum case for easy integration in the Customerís own housing, or as a stand-alone application, where space is limited and the environment harsh. Besides ARK-1500 is a new model which integrate display signal into a 36pin I-Panel Link connector or a golden finger connector. These integrated interfaces contain power supply for panels, LVDS signals, Rx/Tx and USB signals for touch panels. The integrated interfaces can decrease the cables and facilitate the integration between embedded systems and panels.

ARK-1503 answers this demand by offering 4 x USB 2.0 ports, 2 x GbE LAN port , 2 x COM ports, 1 x 8-bit GPIO port and integrated display interface; packed into a small rugged unit and powered by an Intel Atom D525/D425 1.8GHz processor. ARK-1503 is also with 1 x miniPCIe interface for expansion. The ARK-1503 Compact Embedded Computer can be equipped with a solid state onboard CF card, so it easily passes 50 and 5 Grms shock and vibration tests. It also can be equipped with a 2.5î SATA HDD (9.5mm height). The system is powered by DC 12V input.

ARK-1000 can be standalone, wall-mounted, DIN-rail mounted or VESA mounted. ARK-1000 series comes in a footprint of only 230.6 x 133.0 x 44.4 mm (9.08" x 5.24" x 1.75"). The rugged cast aluminum case not only provides great protection from EMI, shock/vibration, cold and heat, but also passive cooling for quiet fanless operation.

1.2 Product Feature

1.2.1 Key features

- Extremely compact, sealed construction with fanless operation, supports Intel® Atom™ D525/D425 up to 1.8 GHz
- Support integrated LVDS interface, with LVDS / 2*USB / RS-232 signal (compliant with ITM-5115)
- Ultra slim type fanless embedded system, which supports both HDD and CF
- Easily integrated with panel

1.2.2 General

- Intel® Atom™ D525/D425, support up to 1.8 GHz
- Integrated LVDS Interface, which integrate LVDS, 2 x USB, Rx/Tx and backlight control signals
- Supports VGA and 24-bit LVDS dual display
- Supports 1 x RS-232, 1 x RS-232/422/485 and 4 x USB 2.0
- Supports 2 x 10/100/1000 LAN
- 1 x miniPCIe expansion for wireless module

1.2.3 Display

- **Chipset:** Intel® Gen 3.5 DX9, MPEG2 Decode in HW
- **Display Memory:** Optimized Shared Memory Architecture up to 224 MB system memory
- **VGA:** Supports up to 2048 x 1536 @ 60 Hz
- **LVDS:** Single channel 24-bit LVDS up to WXGA 1366 x 768
- **Dual display:** VGA+LVDS

1.2.4 Power consumption

- **Typical:** 12 W (without supplying power to panel)
- **Max.:** 17 W (without supplying power to panel)

1.3 Hardware Specification

- **CPU:** Intel® Atom™ D525/D425
- **System Chipset:** Intel® ICH8M
- **BIOS:** AMI 16Mb SPI Flash
- **System Memory:** 1 x 204-pin SODIMM DDR3 1066/1333 MHz, support up to 2 GB
- **Display:**
  - VGA: Supports up to 2048 x 1536 @ 60 Hz
  - LVDS: Single channel 24-bit LVDS up to WXGA 1366 x 768
- **HDD:** Support 1 x 2.5" SATA HDD (height: 9.5 mm)
- **SSD:** Supports Compact Flash Card TYPE I/II
- **Watchdog Timer:** 255-level timer interval, setup by software
- **I/O Interface:** 1 x RS-232, 1 x RS-232/422/485 (ARK-1503F only ; by jumper setting)
- **USB:** Up to 4 x USB 2.0 compliant ports (2 x USB 2.0 for ARK-1503P)
- **Ethernet Chipset**:
  LAN1: Intel 82567V Giga-LAN controller
  LAN2: Intel 82583V Giga-LAN controller
  - **Speed:** 10/100/1000 Mbps
  - **Interface:** 2 x RJ45 w/ LED
  - **Standard:** Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.3x, IEEE 802.3y, IEEE 802.ab
- **DIO:** 8-bit programmable DIO (ARK-1503F only)
- **Integrated LVDS Interface:** DB36 with LVDS, 2 x USB, Rx, Tx and backlight control (ARK-1503F only)
- **Audio:** 1 x Line-out (ARK-1503F only)
- **Expansion:** 1 x miniPCIe

1.4 Mechanical Specification

1.4.1 Dimensions

- 230.6 x 133.0 x 44.4 mm (9.08" x 5.24" x 1.75")

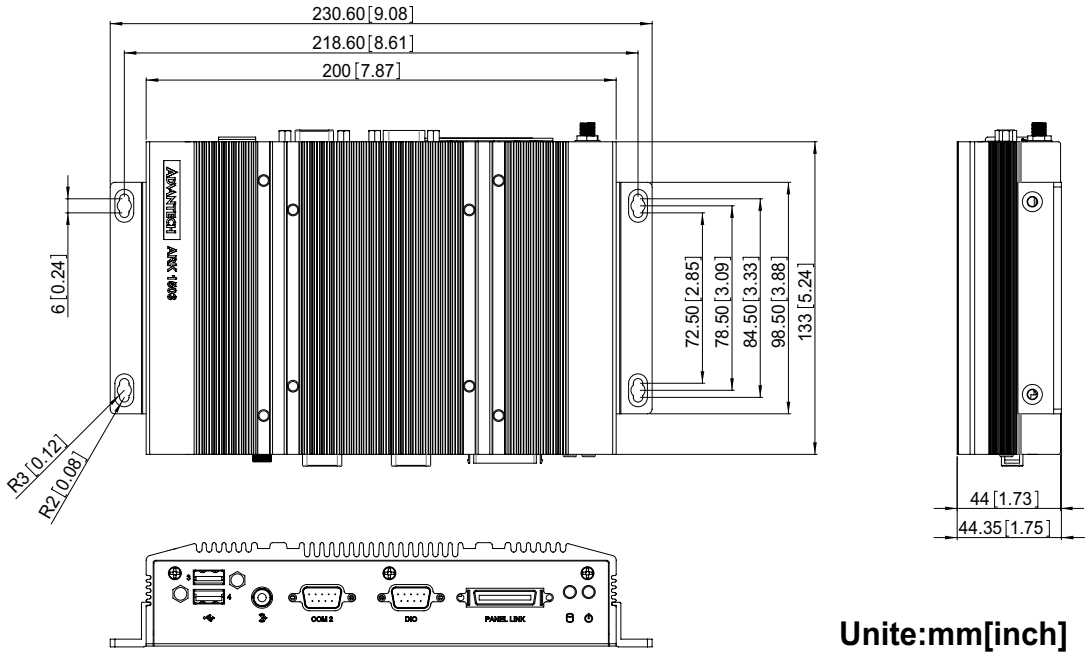


Figure 1.1 ARK-1503 Mechanical dimension drawing

1.4.2 Weight

- 1.9 kg (4.18 lbs)

1.5 Power requirement

1.5.1 System power

- **Minimum power input:** DC 12V 3A (without supplying power to panel)

1.5.2 RTC battery

- 3V/220 mAh

1.6 Environment specification

1.6.1 Operating temperature

- With Industrial Grade CompactFlash disk: -20 ~ 60° C (-4~131° F), when air flow speed = 0.7 m/sec
- With 2.5-inch extended temperature hard disk -20 to 45° C (-4~113° F), when 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 loading during operation

- With Compact Flash / 2.5" SATA SSD only: 5 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct./min, 1 hr/axis

1.6.5 Shock during operation

- With Compact Flash / 2.5" SATA SSD only: 50 G, IEC 60068-2-27, half sine, 11 ms duration

1.6.6 Safety

- CCC, BSMI, KCC

1.6.7 EMC

- CE, FCC, CCC, BSMI, KCC

Chapter 2

Hardware installation

This chapter introduces external IO and the installation of ARK-1503 Hardware.

2.1 Introduction

The following sections show the internal jumper settings and the external connectors and pins assignment for applications.

2.2 Jumpers

2.2.1 Jumper list

Table 2.1: Jumper List	
J2	COM2 Setting
J3	AT / ATX Power SEL
J4	Clear CMOS
J5	Panel Voltage SEL

2.2.2 Jumper Settings

Table 2.2: J2: COM2 RS-232/422/485 Setting	
Part Number	1653003260
Footprint	HD_3x2P_79
Description	PIN HEADER 3*2P 180D(M) 2.0mm SMD SOUARE PIN
Setting	**Function**
(1-2) (default)	RS232
(3-4)	RS485
(5-6)	RS422

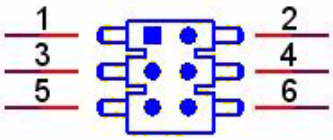


Table 2.3: J3: AT / ATX Power Setting	
Part Number	1653002101
Footprint	HD_2x1P_79_D
Description	PIN HEADER 2*1P 180D(M)SQUARE 2.0mm DIP W/O Pb
Setting	**Function**
(1-2) (default)	AT Power SEL
EMPTY	ATX Power

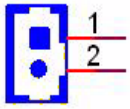


Table 2.4: J4: Clear COMS	
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2) (default)	Normal
(2-3)	Clear CMOS

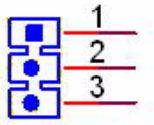
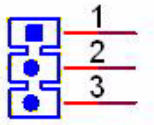
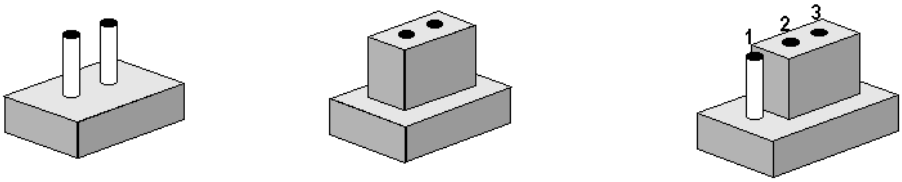


Table 2.5: J5: LVDS Panel Voltage Setting	
Part Number	1653003101
Footprint	HD_3x1P_79_D
Description	PIN HEADER 3*1P 180D(M) 2.0mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	+5V
(2-3) (default)	+3V



2.2.3 Jumper Description

Cards can be configured 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.

Warning! *To avoid damaging the computer, always turn off the power supply before setting jumpers. Clear CMOS. Before turning on the power supply, set the jumper back to 3.0 V Battery On.*

2.3 ARK-1503 I/O Indication

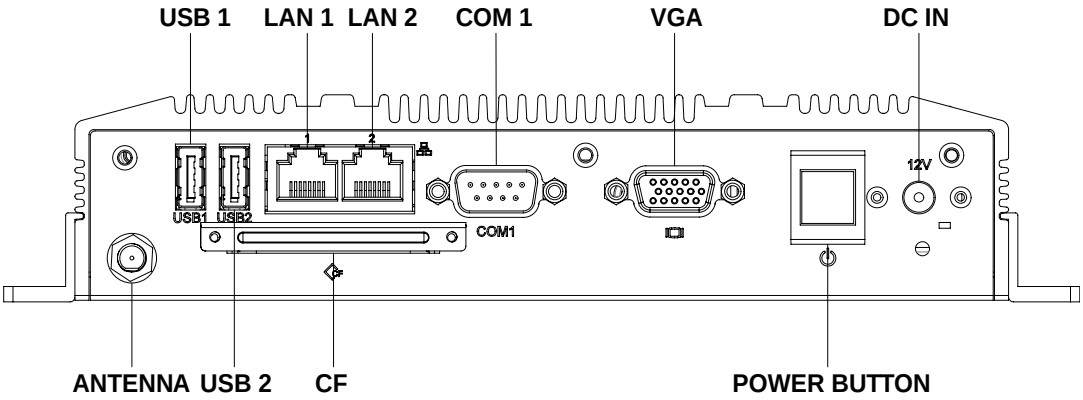


Figure 2.1 ARK-1503 Front View

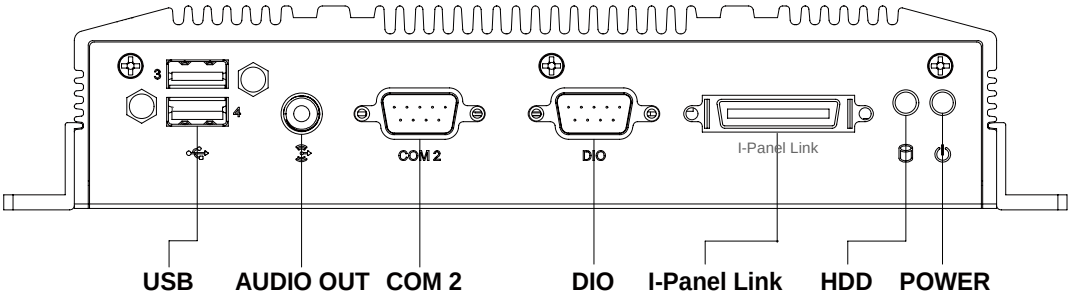


Figure 2.2 ARK-1503 Rear View

2.4 ARK-1503 external I/O connectors

2.4.1 Power ON/OFF Button

ARK-1503 comes with a Power On/Off button, that support dual function of Soft Power -On/Off (Instant off or Delay 4 Second), and Suspend.

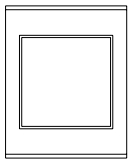


Figure 2.3 Power ON/OFF Button

2.4.2 Power Input Connector

ARK-1503 comes with a DC-Jack header that carries 12 V_{DC} external power input. The power connector can be fixed by a bracket which is in the accessary box. The bracket can avoid power connector to fall off.

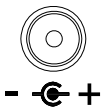


Figure 2.4 Power Input Connector

2.4.3 Ethernet Connector (LAN)

ARK-1503 provides two RJ45 LAN interface connectors, they are fully compliant with IEEE 802.3u 10/100/1000 Base-T CSMA/CD standards. LAN1 is equipped with 82567 and LAN2 is equipped with 82583V. The Ethernet ports use standard RJ-45 jack connectors with LED indicators on the front side to show Active/Link status and Speed status.

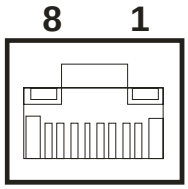


Figure 2.5 Ethernet Connector

Table 2.6: Ethernet Connector Pin Assignments

Pin	10/100/1000 BaseT Signal Name
1	TX+
2	TX-
3	RX+
4	MDI2+
5	MDI2-
6	RX-
7	MDI3+
8	MDI3-

2.4.4 VGA Connector

The ARK-1503 provides a high resolution VGA interface connected by a D-sub 15-pin connector to support a VGA CRT monitor. It supports display resolution of up to 2048 x 1536 @ 60 Hz.

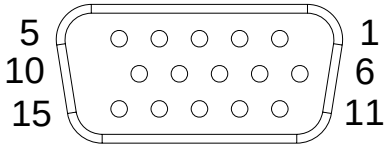


Figure 2.6 VGA Connector

Table 2.7: VGA Connector Pin Assignments

Pin	Signal Name	Pin	Signal Name
1	Red	2	Green
3	Blue	4	NC
5	GND	6	GND
7	GND	8	GND
9	NC	10	GND
11	NC	12	DDC Date
13	H-SYNC	14	V-SYNC
15	DDC Clock		

2.4.5 USB Connectors

The ARK-1503 provides up to four USB interface connectors, which give complete Plug & Play and hot swapping for up to 127 external devices. The USB interface is compliant with USB UHCI, Rev. 2.0. The USB interface supports Plug and Play, which enables you to connect or disconnect a device whenever you want, without turning off the computer.

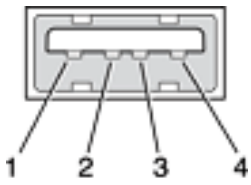


Figure 2.7 USB Connector

Table 2.8: USB Connector Pin Assignments

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

2.4.6 Audio Connector (ARK-1503F only)

ARK-1503 offers stereo audio ports by a phone jack connector of Line_Out. The audio chip controller is by ALC892 which is compliant with the Azalea standard.

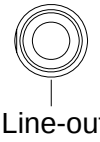


Figure 2.8 Line-out Connector

2.4.7 COM Connector

ARK-1503 provides maximum up to two D-sub 9-pin connectors, which offers RS-232/422/485 serial communication interface ports. Default setting is RS-232, if you want to use RS-422/485, you can find the jumper installation in Chapter 2.2.2.

The RS-422/485 mode of ARK-1503F COM2 can be supported via replacing the internal COM 2 cable by using the new cable (Part Number 1700001967), and adjusting the jumper inside the system. The extra cable (pn.1700001967) has been stored in the accessory box of the product carton.

ARK-1503P can only support 1 x RS-232.

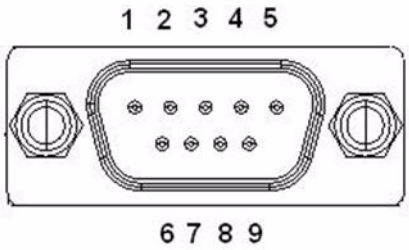


Figure 2.9 COM Port Connector

Table 2.9: COM Connector Pin Assignments

	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

2.4.8 DIO Connector (ARK-1503F only)

ARK-1503 offers an 8-bit DIO connector and one ground pin. Each bit of DIO can be set as digital input or output independently. The direction of each bit can be set by Advantech SUSI utility in Windows XP environment.

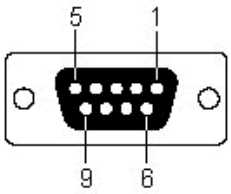


Figure 2.10 DIO Connector

Table 2.10: DIO Connector Pin Assignments	
Pin	Signal Name
1	DIO bit0
2	DIO bit1
3	DIO bit2
4	DIO bit3
5	DIO bit4
6	DIO bit5
7	DIO bit6
8	DIO bit7
9	GND

To connect with your devices, please use cable P/N: 1700012536 which is D-sub to 10-pin phoenix connector.

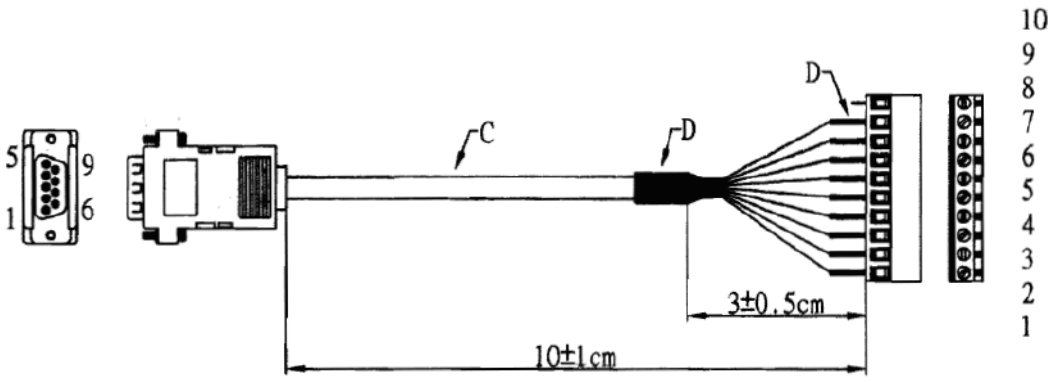


Figure 2.11 DIO Cable

Table 2.11: DIO Cable Pin Assignments		
Phenix Connector Pin	**Cable color**	**Signal Name**
1	Black	DIO bit0
2	Brown	DIO bit5
3	Red	DIO bit1
4	Orange	DIO bit6
5	Yellow	DIO bit2
6	Green	DIO bit7
7	Blue	DIO bit3
8	Purple	GND
9	Grey	DIO bit4

2.4.9 I-Panel Link (ARK-1503F only)

ARK-1503 offers a 36-pin I-Panel Link connector which is an integrated signal for panel. I-Panel integrates 12V power, LVDS signal, 2 x USB signal and Tx/Rx signal. A touch panel can easily integrate with ARK-1503 by only one cable.

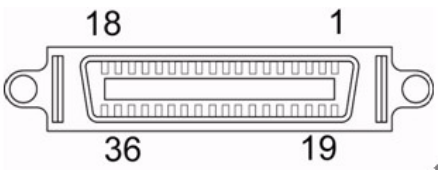


Table 2.12: I-Panel Link Pin Assignments			
Pin	**Signal Name**	**Pin**	**Signal Name**
1	+V12	2	+V12
3	GND	4	LVDSA_D0-
5	LVDSA_D0+	6	LVDSA_D1-
7	LVDSA_D1+	8	LVDSA_D2-
9	LVDSA_D2+	10	LVDSA_D3-
11	LVDSA_D3+	12	LVDSA_CLK-
13	LVDSA_CLK+	14	GND
15	COM_TX	16	COM_RX
17	LVDS Enable pin	18	SYS_ON
19	+V12	20	+V12
21	GND	22	LVDSB_D0-
23	LVDSB_D0+	24	LVDSB_D1-
25	LVDSB_D1+	26	LVDSB_D2-
27	LVDSB_D2+	28	LVDSB_D3-
29	LVDSB_D3+	30	LVDSB_CLK-
31	LVDSB_CLK+	32	GND
33	USB_P0-	34	USB_P0+
35	USB_P1-	36	USB_P1+

2.4.10 Golden Finger Interface for ITM Panels (ARK-1503P only)

ARK-1503P provides a 164 pin golden finger interface which integrate LVDS/HDMI/ Display Port/UART/USB/Audio signals. This interface is compatible with the panels of Advantech ITM series products.

Table 2.13: Golden Finger Interface for ITM Panel

Pin	Side A	Pin	Side B
1~3	Detect/Power Switch Signal	1~3	SMBus
4~10	DC Power	4~9	DC Power
11~29	LVDS	10~29	LVDS
30~44	HDMI/Display Port	30~43	HDMI/Display Port
45~49	GPIO	44~49	GPIO
50~59	USB 0/1	50~59	USB 2/3
60~64	Audio	60~66	Audio
65~79	UART1	67~75	UART2
80~81	Reserved	76~77	DC Power
82	Detect	78~82	LED Signal

2.5 Peripheral Installation

2.5.1 Compact Flash Installation

1. Unscrew the CF door screws

Figure 2.12 Unscrew the CF door screws

2. Pull the CF tray out.

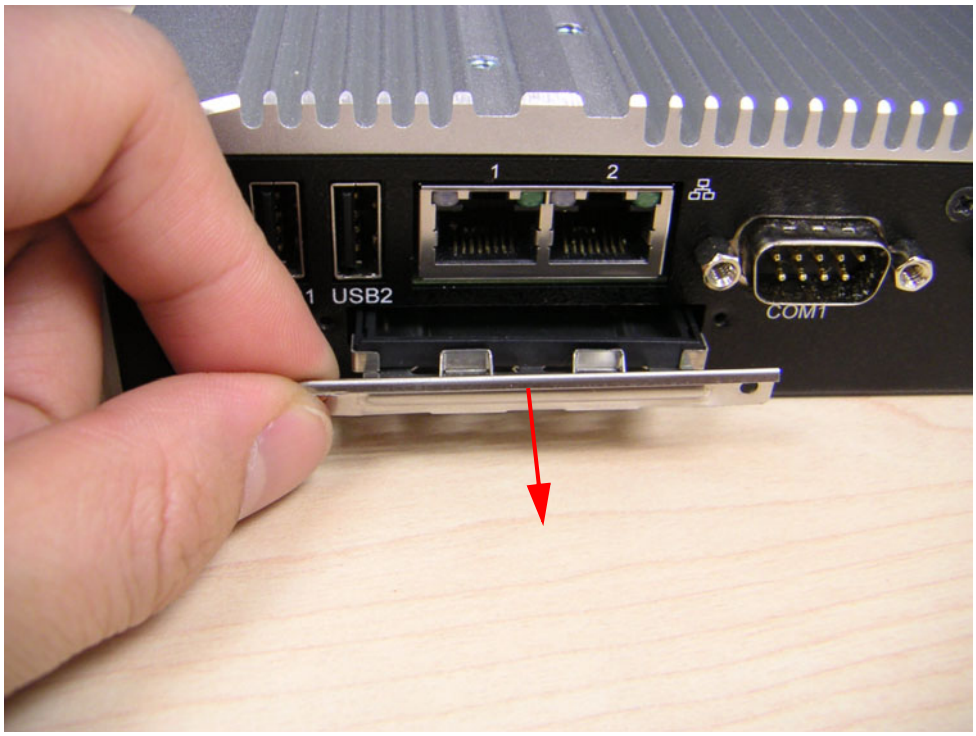


Figure 2.13 Pull the CF tray out

3. Remove the dummy CF bracket.

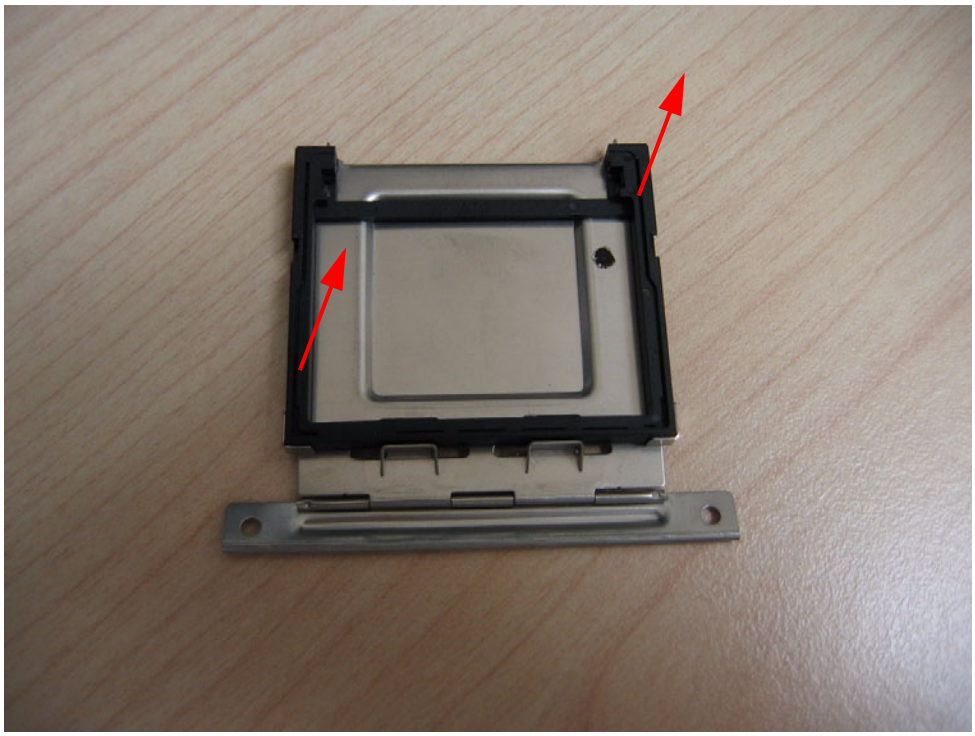


Figure 2.14 Remove the dummy CF bracket

4. Put compact flash onto the CF tray.

Figure 2.15 Put CF on to the CF tray

5. Push the CF tray back and secure with screws.

2.5.2 RAM and HDD Installation

1. Unscrew the screws of bottom cover.

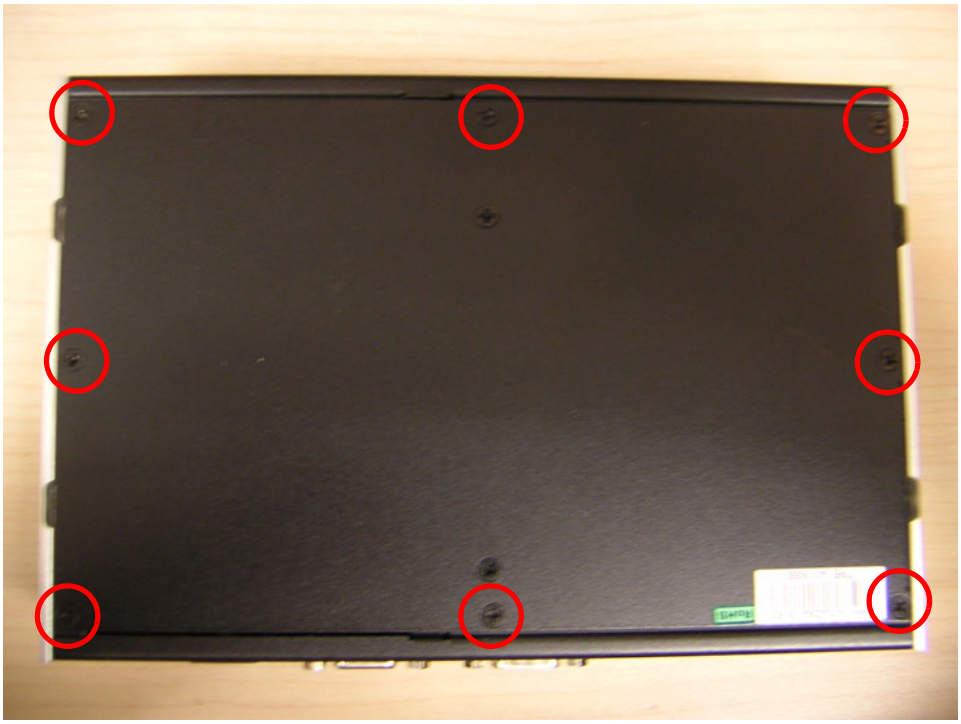


Figure 2.16 Unscrew the screws of bottom cover

2. Unscrew the screws of the right HDD bracket.

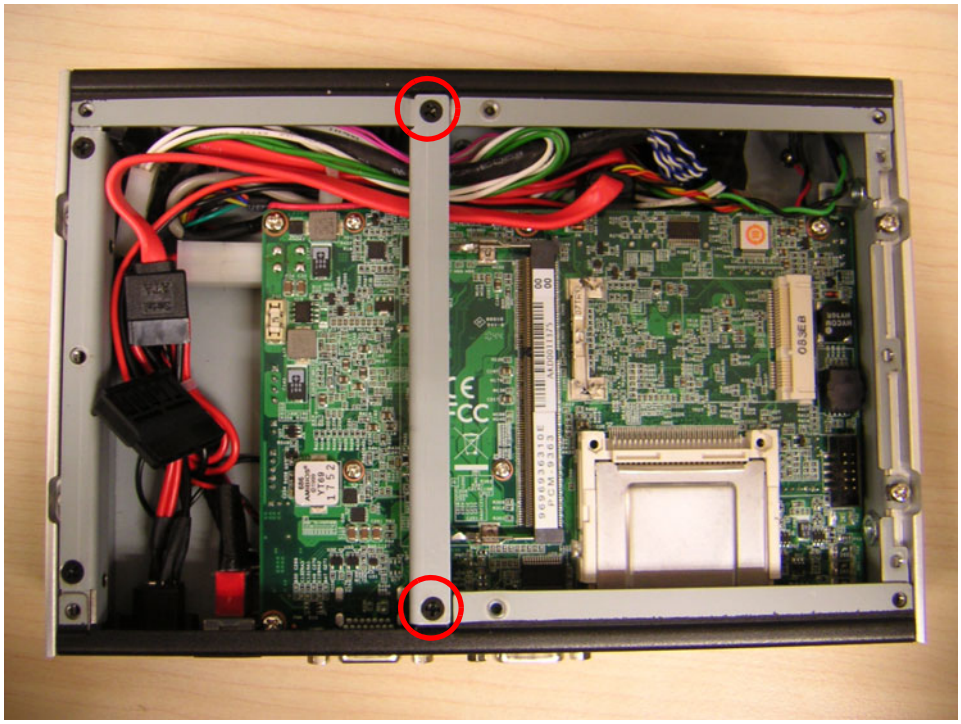


Figure 2.17 Unscrew the screws of the right HDD bracket

3. Install the RAM module into the DDR3 SO-DIMM socket at the bottom side of the main board.

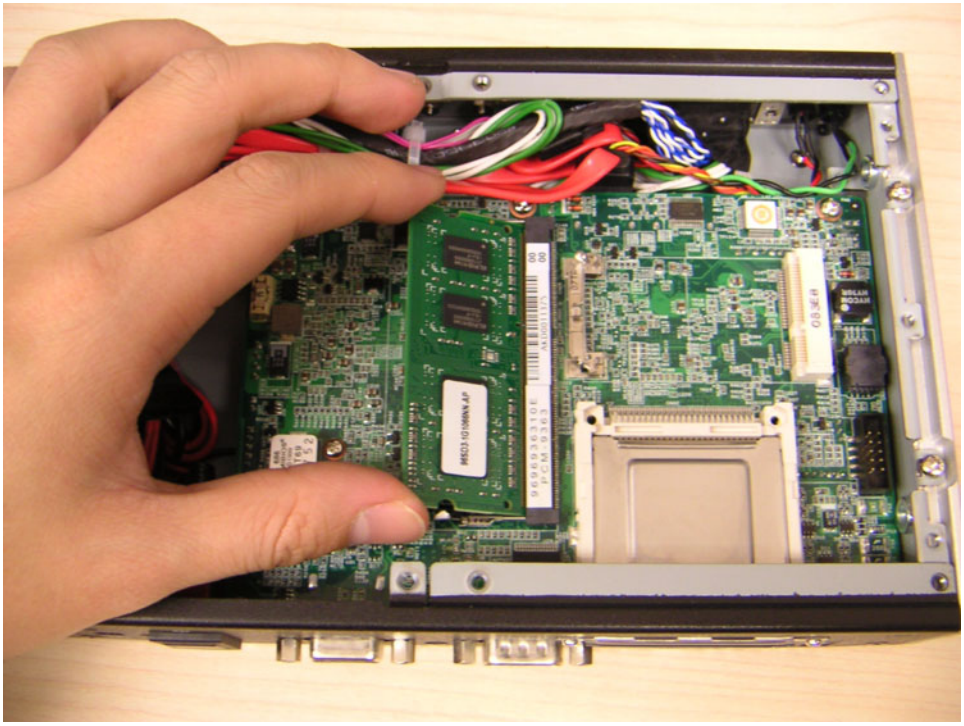


Figure 2.18 Install the RAM module

4. Unscrew the screws of the left HDD bracket.

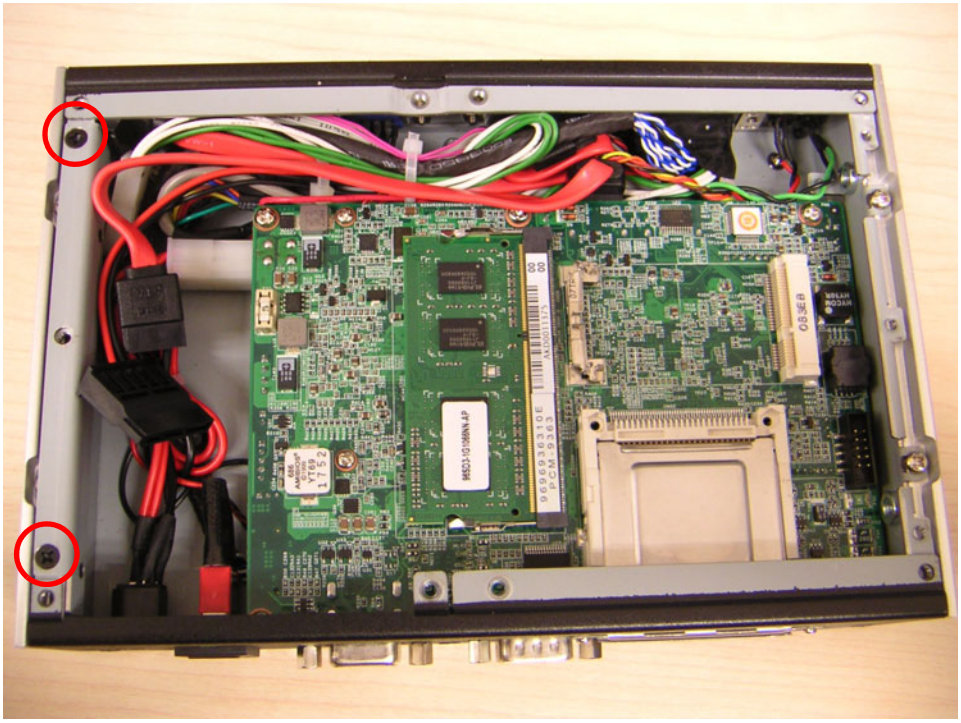


Figure 2.19 Unscrew the screws of the left HDD bracket

5. Connect the SATA HDD power and signal cables.

Figure 2.20 Connect the SATA HDD power and signal cables.

6. Put the HDD with bracket back to the bottom of ARK-1503 and secure the screws.

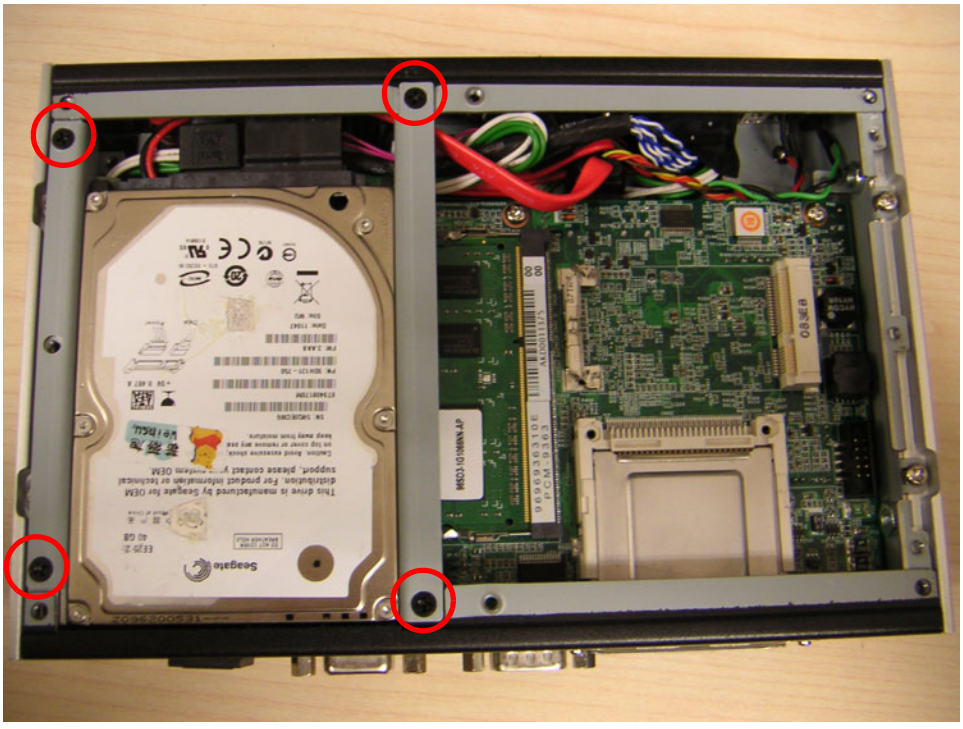


Figure 2.21 Secure HDD

7. Cover the bottom cover and secure the screws.

Chapter 3

BIOS settings

This chapter introduces how to set BIOS configuration data.

AMIBIOS has been integrated into many motherboards for over a decade. With the AMIBIOS Setup program, you can modify BIOS settings and control the various system features. This chapter describes the basic navigation of the ARK-1503 BIOS setup screens.

AMI's 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 <DEL> and you will immediately be allowed to enter setup.

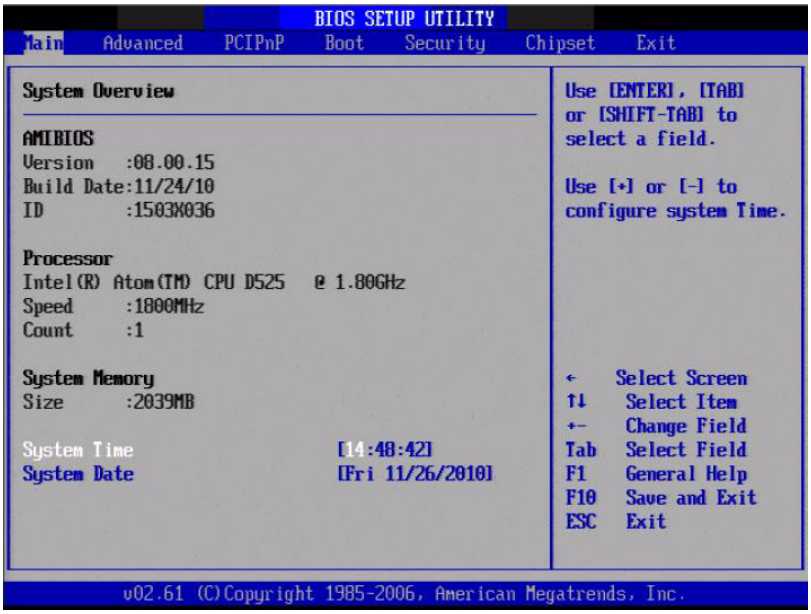


Figure 3.1 Setup program initial screen

3.1.1 Main Setup

When you first enter the BIOS Setup Utility, you will enter 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.

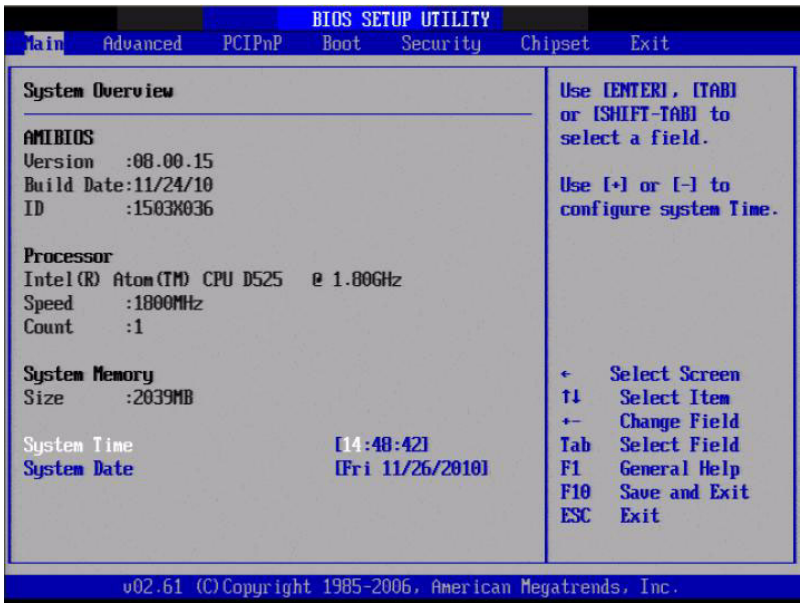


Figure 3.2 Main setup screen

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.

3.1.1.1 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-1503 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 are shown below. The sub menus are described on the following pages.

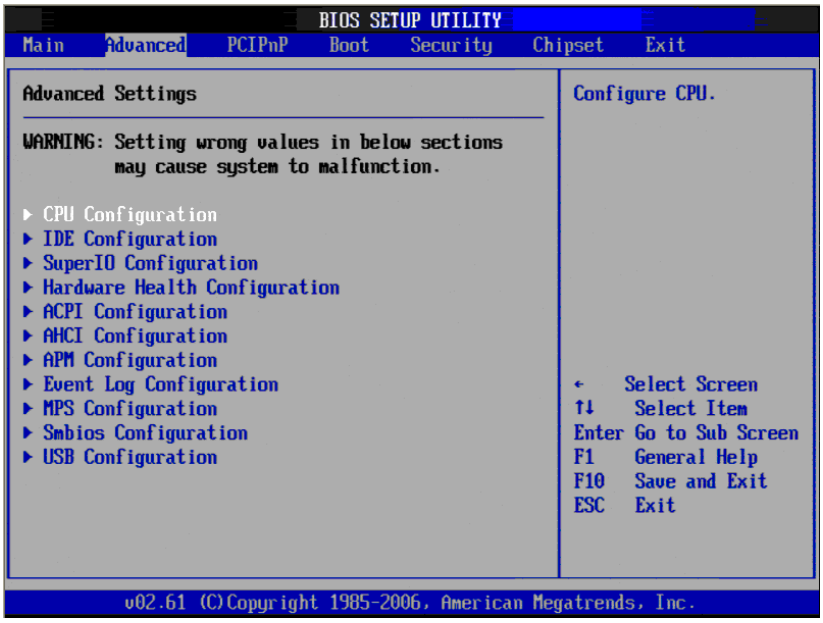


Figure 3.3 Advanced BIOS features setup screen

3.1.2.1 CPU Configuration

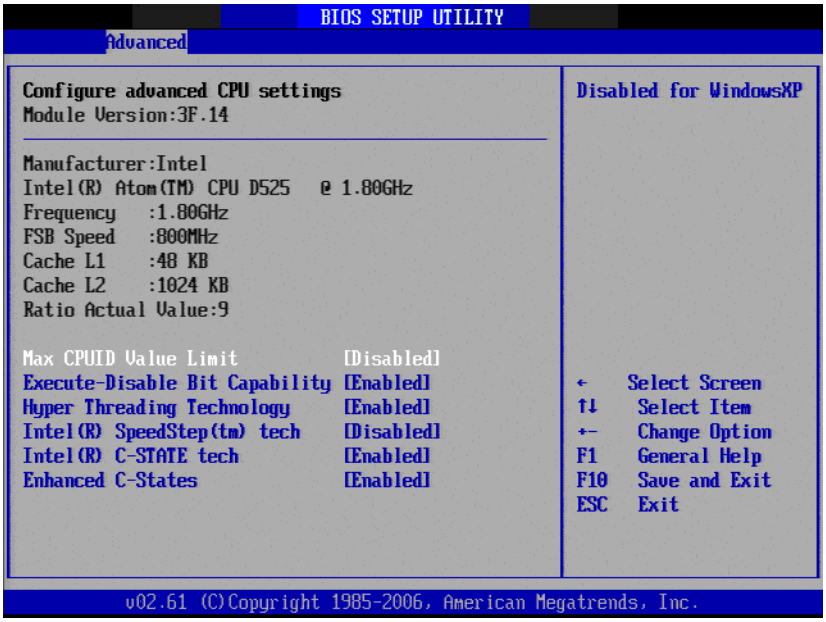


Figure 3.4 CPU Configuration Setting

- **Max CPUID Value Limit**
  This item allows you to limit CPUID maximum value.
- **Execute-Disable Bit Capability**
  This item allows you to enable or disable the No-Execution page protection technology.
- **Hyper Threading Technology**
  This item allows you to enable or disable Intel® Hyper Threading technology.
- **Intel® SpeedStep® tech**
  When set to disabled, the CPU runs at its default speed, when set to enabled, the CPU speed is controlled by the operating system.
- **Intel® C-STATE tech**
  This item allows the CPU to save more power under idle mode.
- **Enhanced C-States**
  CPU idle set to enhanced C-States, disabled by Intel® C-STATE tech item.

3.1.2.2 IDE Configuration

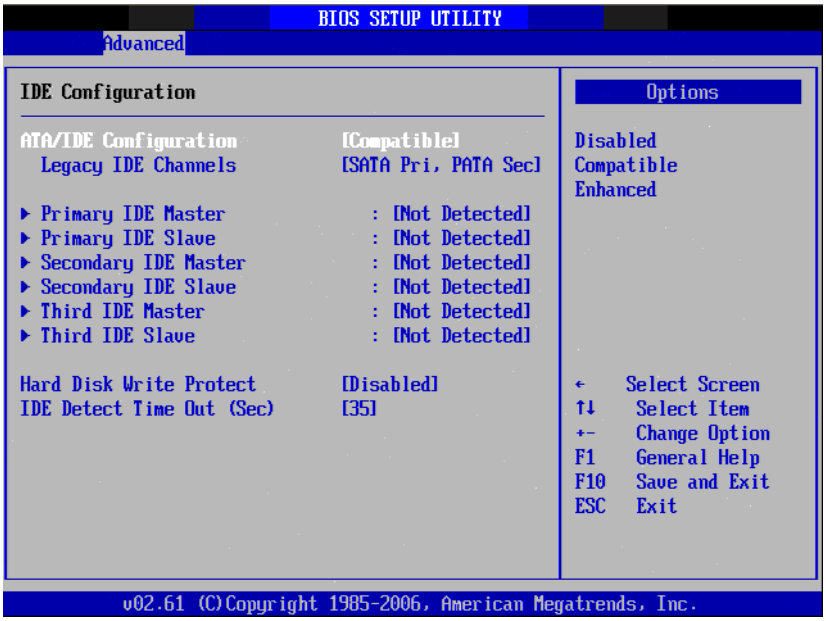


Figure 3.5 IDE Configuration

- **ATA/IDE Configuration**

  This item allows you to select Disabled / Compatible / Enhanced.

- **Legacy IDE Channels**

  When set to Enhanced mode you can select IDE or AHCI mode. When select Compatible mode you can select SATA only / SATA pri, PATA sec or PATA only.

- **Primary/Secondary/Third IDE Master/Slave**

  BIOS auto detects the presence of IDE device, and displays the status of auto detection of IDE device.

  - **Type:** Select the type of SATA driver.[Not Installed][Auto][CD/DVD][ARMD]
  - **LBA/Large Mode:** Enables or Disables the LBA mode.
  - **Block (Multi-Sector Transfer):** Enables or disables data multi-sectors transfers.
  - **PIO Mode:** Select the PIO mode.
  - **DMA Mode:** Select the DMA mode.
  - **S.M.A.R.T.:** Select the smart monitoring, analysis, and reporting technology.
  - **32Bit Data Transfer:** Enables or disables 32-bit data transfer.

- **Hard Disk Write Protect**

  Disable/Enable device write protection. This will be effective only if the device is accessed through BIOS.

- **IDE Detect Time Out (Sec)**

  This item allows you to select the time out value for detecting ATA/ATAPI device(s).

3.1.2.3 Super I/O Configuration

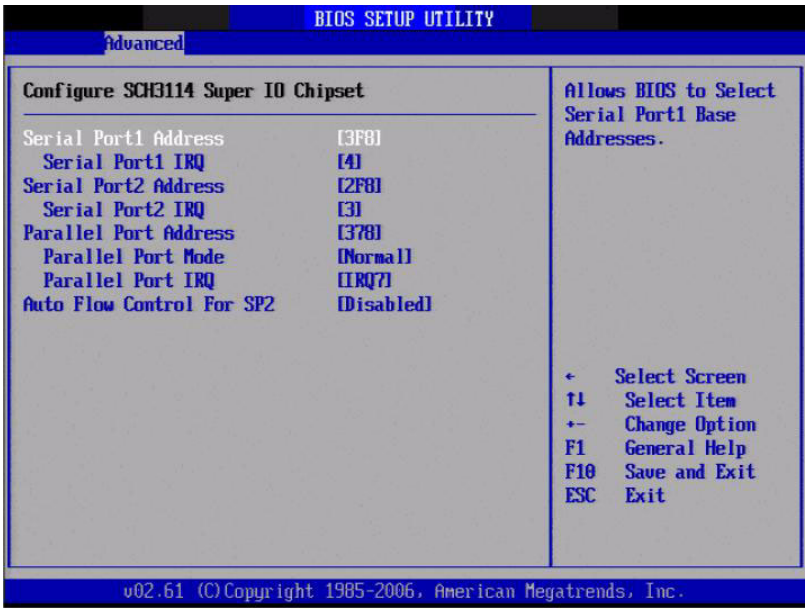


Figure 3.6 Super I/O Configuration

- **Serial Port1 / Port2 address**
  This item allows you to select serial port1 ~ port2 of base addresses.
- **Serial Port1 / Port2 IRQ**
  This item allows you to select serial port1 ~ port2 of IRQ.
- **Parallel Port Address**
  This item allows you to select parallel of base addresses.
- **Parallel Port Mode**
  This item allows you to select parallel of mode.
- **Parallel Port IRQ**
  This item allows you to select parallel of IRQ.
- **Auto Flow Control For SP2**
  This item allows you to enable or disable auto flow control function.

3.1.2.4 Hardware Health Configuration

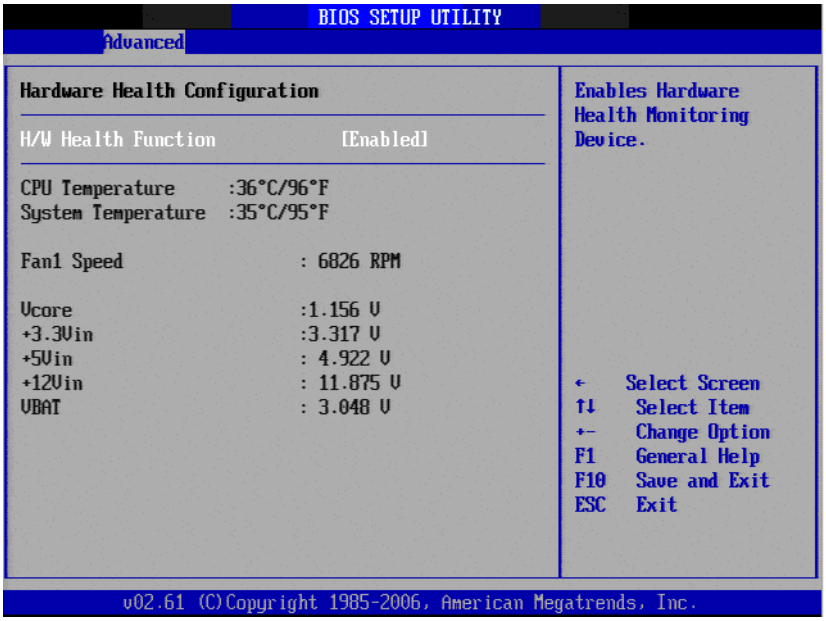


Figure 3.7 Hardware health configuration

- **H/W Health Function**
  This item allows you to control H/W monitoring.
- **Temperature & Voltage show**
  CPU/System Temperature
  Vcore / +3.3 Vin / +5 Vin / +12 Vin / VBAT
- **Fan1 Speed show**
  Display Fan1 Speed RPM.

3.1.2.5 ACPI Settings

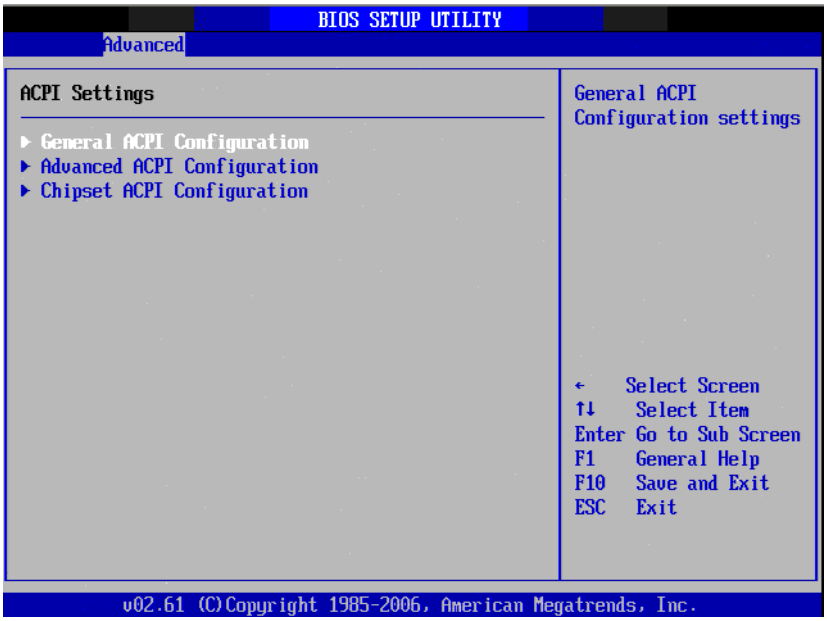


Figure 3.8 ACPI Settings

- **General ACPI Configuration**

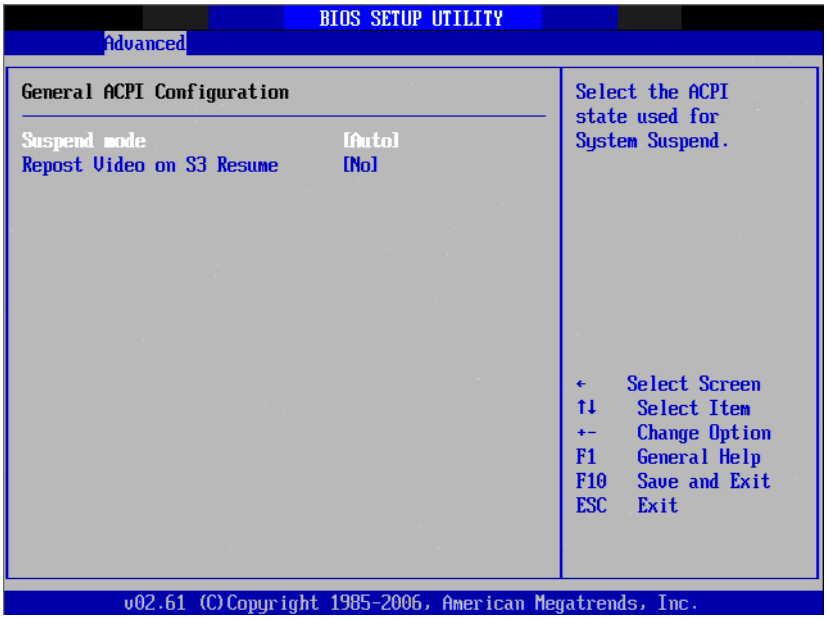


Figure 3.9 General ACPI Configuration

– **Suspend mode**
Select the ACPI state used for system suspend.

– **Report Video on S3 Resume**
This item allows you to invoke VA BIOS POST on S3/STR resume.

Advanced ACPI Configuration

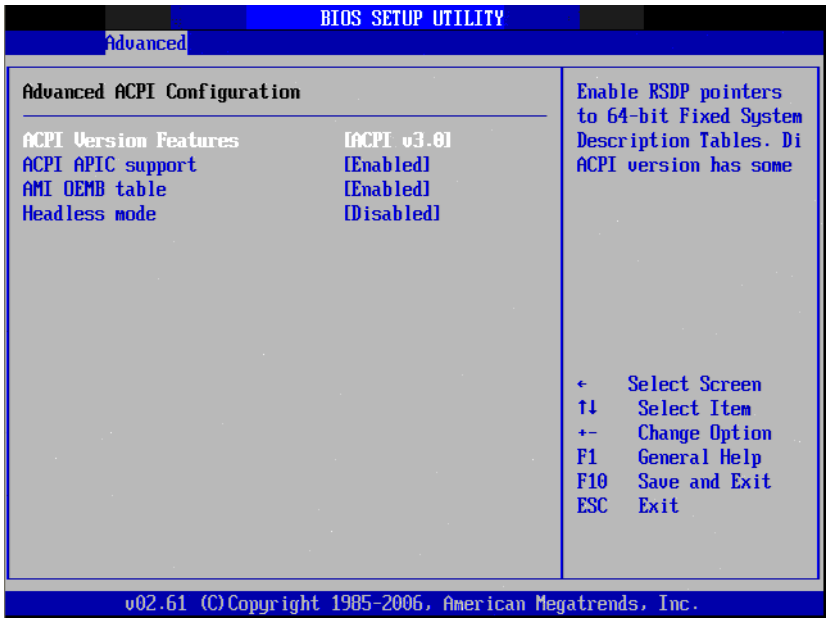


Figure 3.10 Advanced ACPI Configuration

- **ACPI Version Features**
  This item allows you to enable RSDP pointers to 64-bit fixed system description tables.
- **ACPI APIC support**
  Include APIC table pointer to RSDT pointer list.
- **AMI OEMB table**
  Include OEMB table pointer to R(x)SDT pointer lists.
- **Headless mode**
  Enable / Disable Headless operation mode through ACPI.

Chipset ACPI Configuration

Figure 3.11 Chipset ACPI Configuration

- **Energy Lake Feature**
  Allows you to configure Intel's Energy Lake power management technology.
- **APIC ACPI SCI IRQ**
  Enable/Disable APIC ACPI SCI IRQ.
- **USB Device Wakeup From S3**
  Enable/Disable USB Device Wakeup from S3.
- **High Performance Event Timer**
  Enable/Disable High performance Event timer.

3.1.2.6 AHCI Configuration

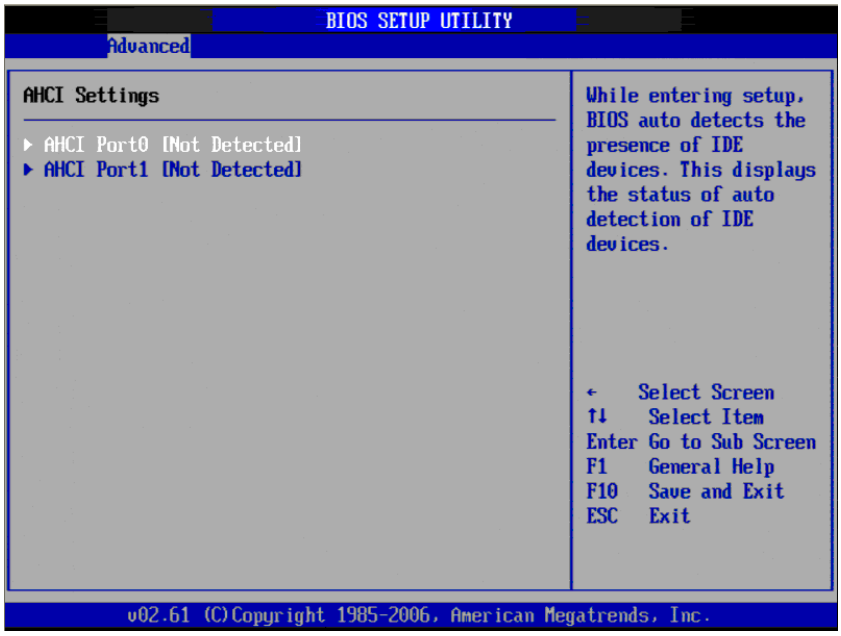


Figure 3.12 AHCI Configuration

- **AHCI Port0 / Port1**
  While entering setup, BIOS auto detects the presence of IDE devices. This displays the status of auto detection of IDE device.

3.1.2.7 APM Configuration

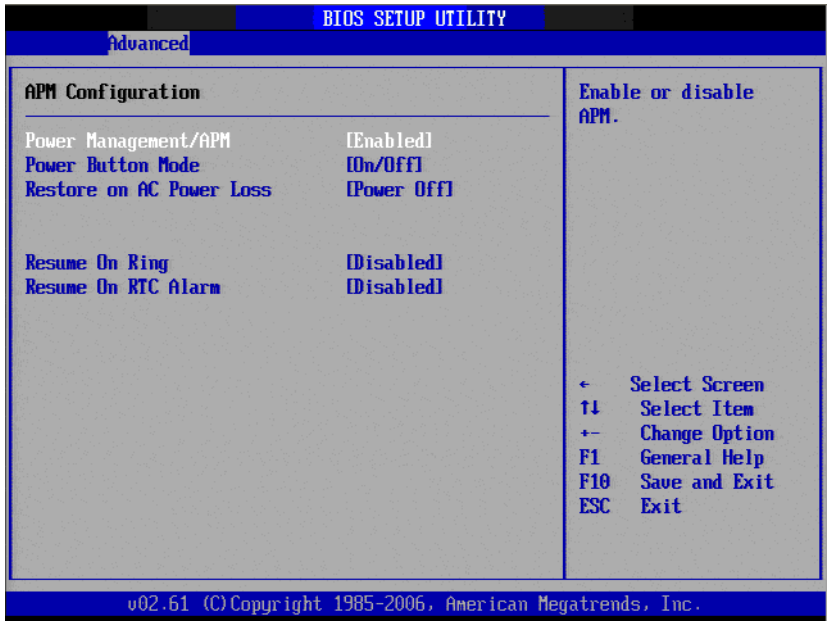


Figure 3.13 APM Configuration

- **Power Management/APM**
  Enable or disable APM.
- **Power Button Mode**
  Power on, off, or enter suspend mode when the power button is pressed. The following options are also available.
- **Restore on AC power Loss**
  Use this to set up the system response after a power failure. The "Off" setting keeps the system powered off after power failure, the “On” setting boots up the system after failure, and the "Last State" returns the system to the status just before power failure.
- **Video Power Down Mode**
  Power down video in suspend or standby mode.
- **Hard Disk Power Down Mode**
  Power down Hard Disk in suspend or standby mode.
- **Resume On Ring**
  Enable / Disable RI to generate a wake event.
- **Resume On RTC Alarm**
  Enable / Disable RTC to generate a wake event.

3.1.2.8 Event Log Configuration

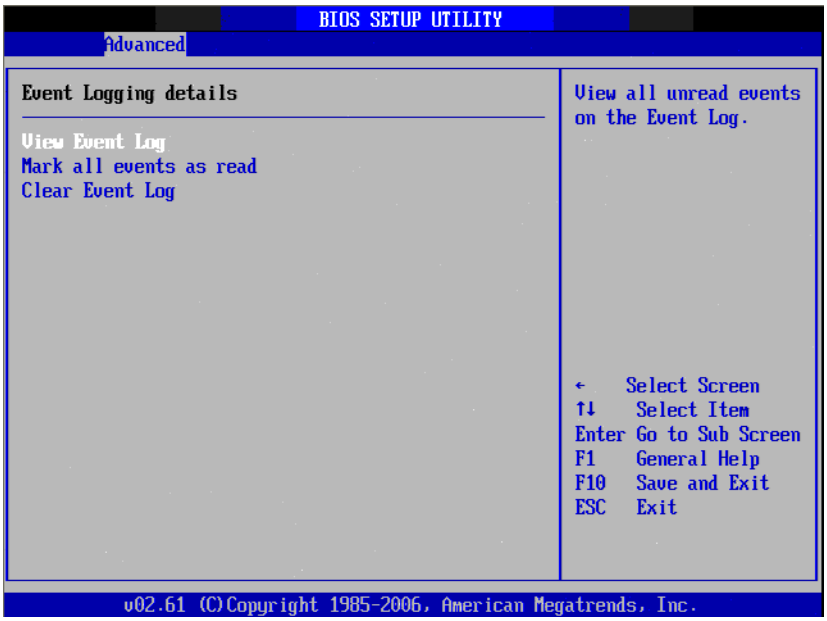


Figure 3.14 Event Log Configuration

- **View Event Log**
  View all unread events on the event Log.
- **Mark all events as read**
  Mark all unread events as read.
- **Clear Event Log**
  Discard all events in the event Log.

3.1.2.9 MPS Configuration

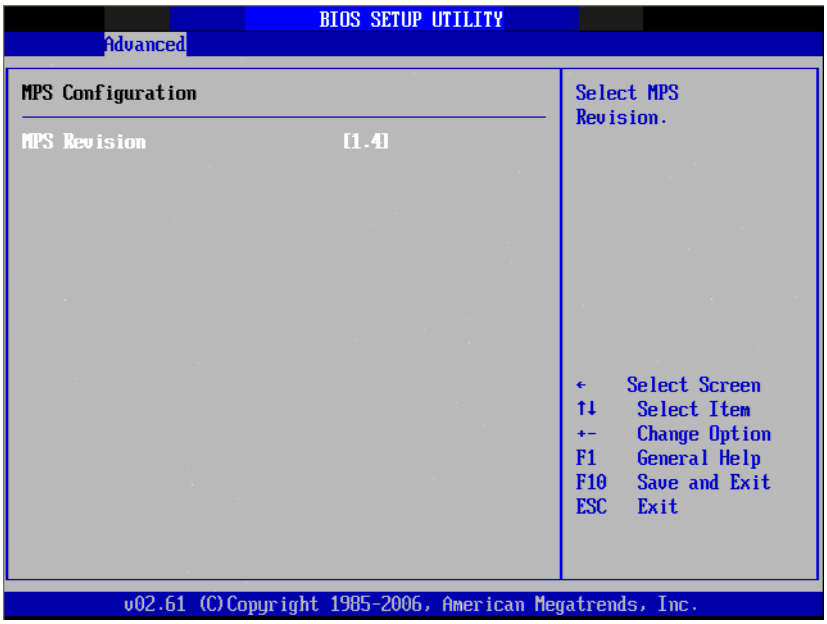


Figure 3.15 MPS Configuration

- **MPS Revision**
  This item allows you to select MPS reversion.

3.1.2.10 Smbios Configuration

Figure 3.16 Smbios Configuration

- **SMBIOS SMI Support**
  SMBIOS SMI wrapper support for PnP function 50h-54h.

3.1.2.11 USB Configuration

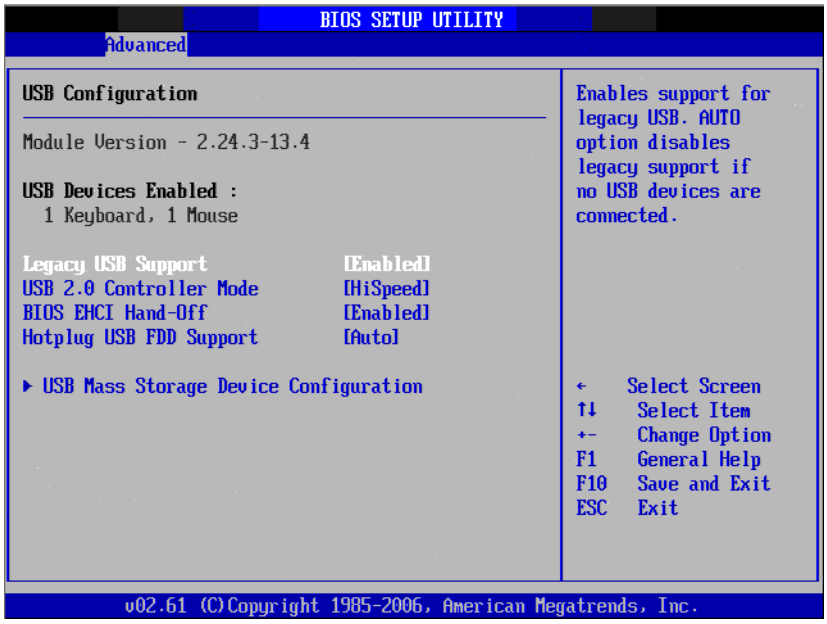


Figure 3.17 USB Configuration

- **Legacy USB Support**
  Enables support for legacy USB. Auto option disables legacy support if no USB devices are connected.
- **USB 2.0 Controller Mode**
  This item allows you to select HiSpeed(480Mbps) or FullSpeed (12Mpbs).
- **BIOS EHCI Hand-Off**

This is a workaround for OS without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.

- **Hotplug USB FDD Support**

  A dummy FDD device is created that will be associated with the hotplugged FDD later. Auto option creates this dummy device only if there is no USB FDD present.

- **USB Mass Storage Device Configuration**

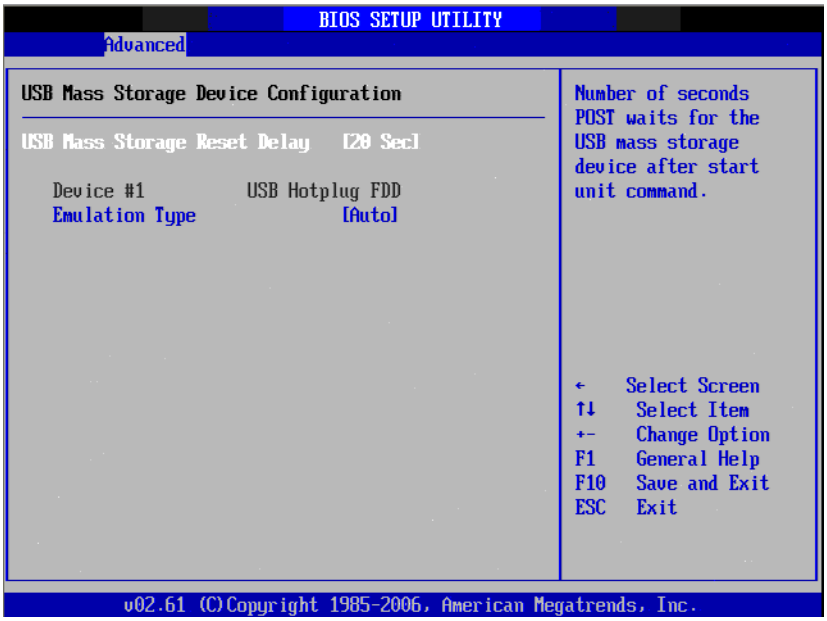


Figure 3.18 USB Mass storage Device Configuration

  - **USB Mass Storage Reset Delay**

    Number of sends POST wait for the USB mass storage device after start unit command.

  - **Emulation Type**

    If Auto, USB devices less than 530MB will be emulated as a floppy drive and the remaining as hard drive. Force FDD option can be used to force a FDD formatted drive to boot as FDD (Ex. ZIP drive).

3.1.3 Advanced PCI/PnP Settings

Select the PCI/PnP tab from the ARK-1503 setup screen to enter the Plug and Play BIOS Setup screen. You can display a Plug and Play BIOS Setup option by highlighting it using the <Arrow> keys. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

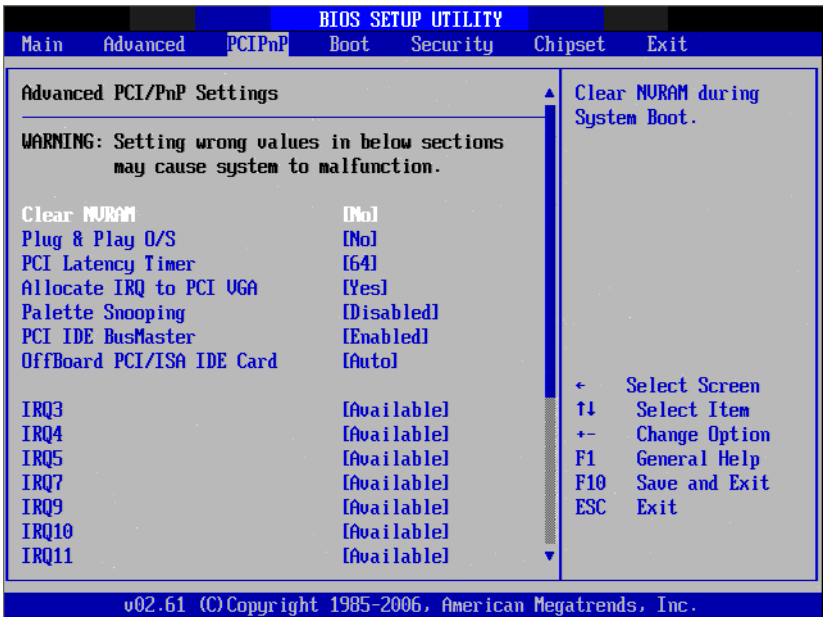


Figure 3.19 PCI/PNP Setup (top)

3.1.3.1 Clear NVRAM

Set this value to force the BIOS to clear the Non-Volatile Random Access Memory (NVRAM).The Optimal and Fail-Safe default setting is No.

3.1.3.2 Plug & Play O/S

When set to No, BIOS configures all the device in the system. When set to Yes and if you install a Plug and Play operating system, the operating system configures the Plug and Play device not required for boot.

3.1.3.3 PCI Latency Timer

Value in units of PCI clocks for PCI device latency timer register.

3.1.3.4 Allocate IRQ to PCI VGA

When set to Yes will assigns IRQ to PCI VGA card if card requests IRQ. When set to No will not assign IRQ to PCI VGA card even if card requests an IRQ.

3.1.3.5 Palette Snooping

This item is designed to solve problems caused by some non-standard VGA card.

3.1.3.6 PCI IDE BusMaster

When set to enabled BIOS uses PCI busmastering for reading/writing to IDE drives.

3.1.3.7 OffBoard PCI/ISA IDE Card

Some PCI IDE cards may require this to be set to the PCI slot number that is holding the card. When set to Auto will works for most PCI IDE cards.

3.1.3.8 IRQ3 / 4 / 5 / 7 / 9 / 10 /11

This item allows you respectively assign an interruptive type for IRQ-3, 4, 5, 7, 9, 10, 11.

3.1.3.9 DMA Channel 0 / 1 / 3 / 5 / 6 / 7

When set to Available will specify which DMA is available to be used by PCI/PnP devices. When set to Reserved will specify which DMA will be reserved for use by legacy ISA devices.

3.1.3.10 Reserved Memory Size

This item allows you to reserve the size of memory block for legacy ISA device.

3.1.4 Boot Settings

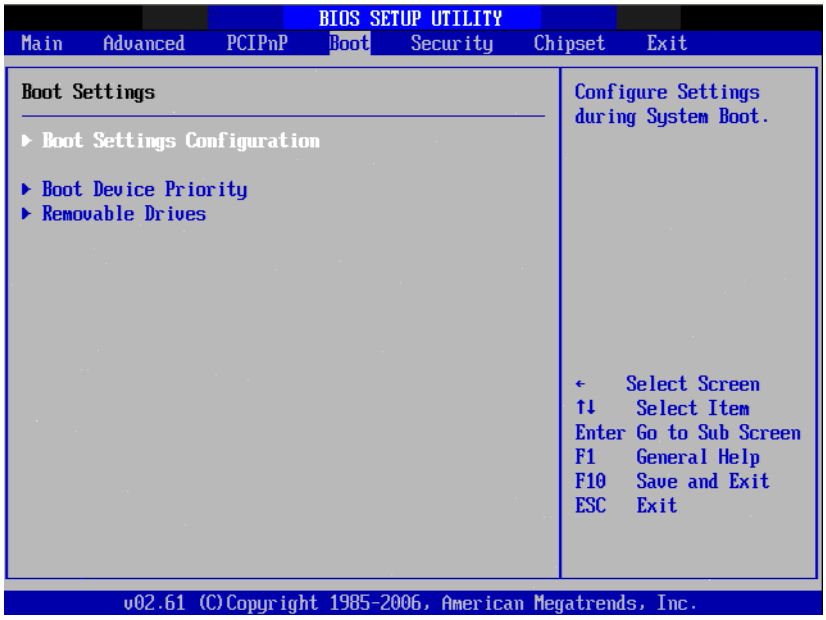


Figure 3.20 Boot Setup Utility

3.1.4.1 Boot settings Configuration

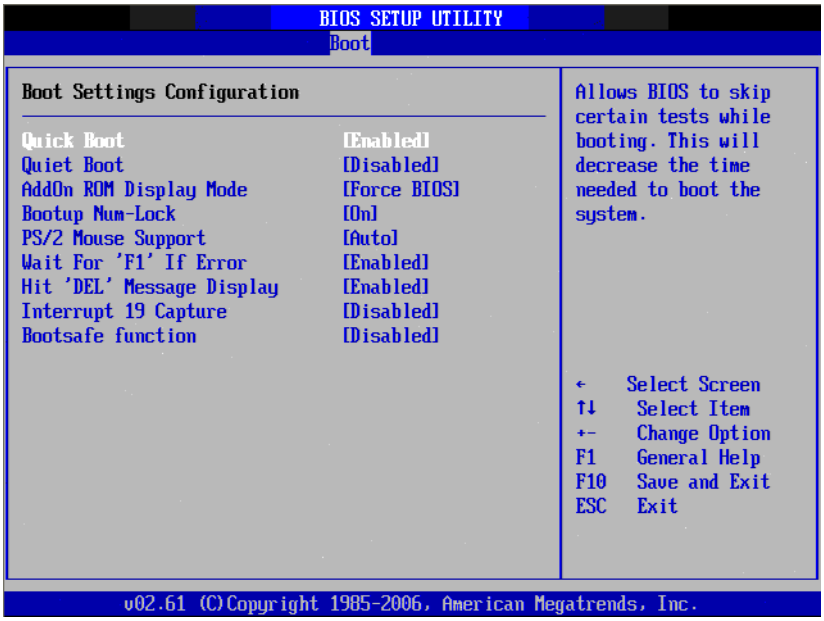


Figure 3.21 Boot Setting Configuration

- **Quick Boot**

This item allows BIOS to skip certain tests while booting. This will decrease the time needed to boot the system.

- **Quiet Boot**
  If this option is set to Disabled, the BIOS displays normal POST messages. If Enabled, an OEM Logo is shown instead of POST messages.
- **AddOn ROM Display Mode**
  Set display mode for option ROM.
- **Bootup Num-Lock**
  Select the Power-on state for Numlock.
- **PS/2 Mouse Support**
  Select support for PS/2 Mouse.
- **Wait For "F1' If Error**
  Wait for the F1 key to be pressed if an error occurs.
- **Hit "DEL' Message Display**
  Displays -Press DEL to run Setup in POST.
- **Interrupt 19 Capture**
  This item allows options for ROMs to trap interrupt 19.
- **Bootsafe function**
  This item allows you to enable or disable the bootsafe function.

3.1.5 Security Setup

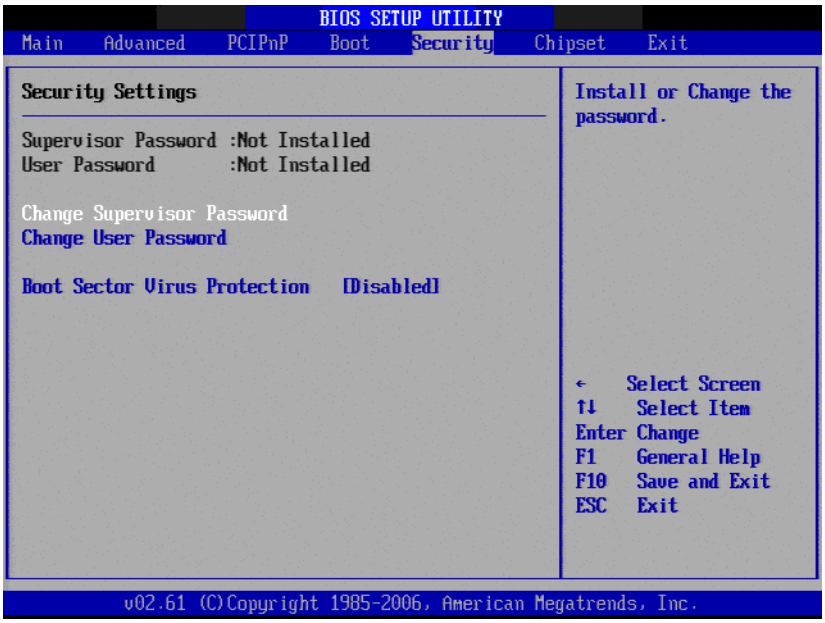


Figure 3.22 Password Configuration

Select Security Setup from the ARK-1503 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>:

3.1.5.1 Change Supervisor / User Password

- **Boot Sector Virus protection**
  The boot sector virus protection will warn if any program tries to write to the boot sector.

3.1.6 Advanced Chipset Settings

Figure 3.23 Advanced Chipset Settings

3.1.6.1 North Bridge Chipset Configuration

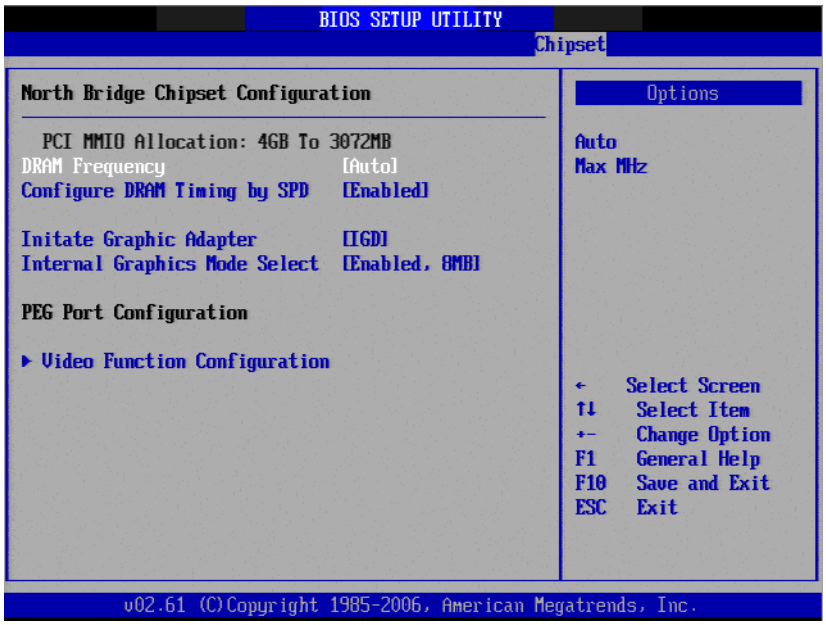


Figure 3.24 North Bridge Configuration

- **DRAM Frequency**
  This item allows you to manually change DRAM frequency.
- **Configure DRAM Timing by SPD**
  This item allows you to enables or disable detection by DRAM SPD.
- **Initate Graphic Aadapter**
  This item allows you to select which graphics controller to use as the primary boot device.
- **Internal Graphics Mode Select**
  Select the amount of system memory used by the Internal graphics device.

Video Function Configuration

Figure 3.25 Video function configuration

- **DVMT Mode Select**
  Displays the active system memory mode.
- **DVMT/FIXED Memory**
  Specify the amount of DVMT / FIXED system memory to allocate for video memory.
- **Boot Display Device**
  Select boot display device at post stage.
- **Flat Panel Type**
  This item allows you to select which panel resolution you want.
- **Spread Spectrum Clock**
  This item allows you to enable or disable the spread spectrum clock.
- **Backlight Control1/2 Type**
  This item allows you to select backlight control type.
- **Backlight 1/2 Level**
  This item allows you to select backlight level.

3.1.6.2 South Bridge Chipset Configuration

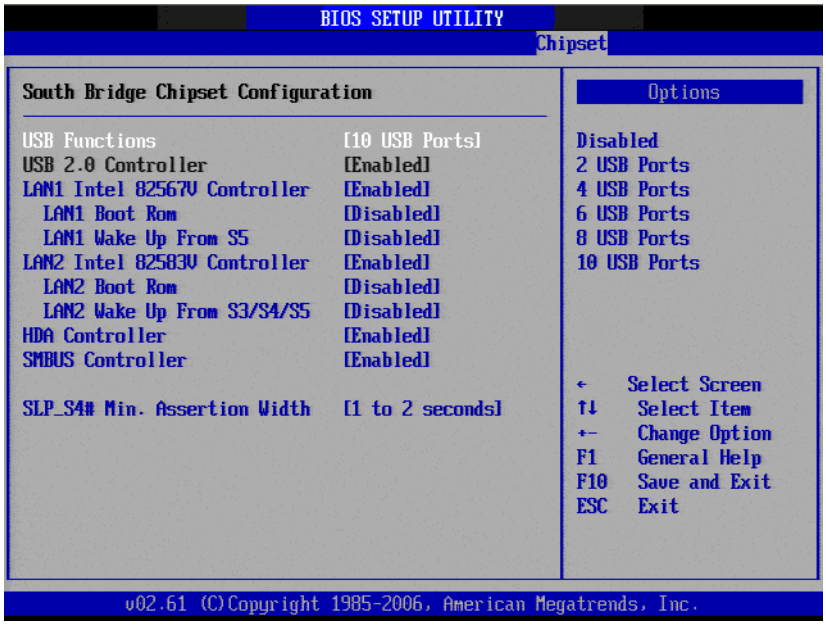


Figure 3.26 South Bridge Configuration

- **USB Functions**
  Disabled, 2 USB Ports, 4 USB Ports, 6 USB Ports or 8 USB Ports or 10 USB Ports.
- **USB 2.0 Controller**
  Enables or disables the USB 2.0 controller.
- **LAN1 Intel 82576V controller**
  Enables or disables the Intel LAN1 controller.
- **LAN1 Boot Rom**
  Enables or disables internal LAN1 boot.
- **LAN1 Wake Up From S5**
  Enables or disables LAN1 wake up from S5 function.
- **LAN2 Intel 82583V controller**
  Enables or disables the LAN2 controller.
- **LAN2 Boot Rom**
  Enables or disables LAN2 boot.
- **LAN2 Wake Up From S3/S4/S5**
  Enables or disables LAN2 wake up from S3/S4S5 function.
- **HDA Controller**
  Enables or disables the HDA controller.
- **SMBUS Controller**
  Enables or disables the SMBUS controller.
- **SLP_S4# Min. Assertion Width**
  This item allows you to set a delay of sorts.

3.1.7 Exit Option

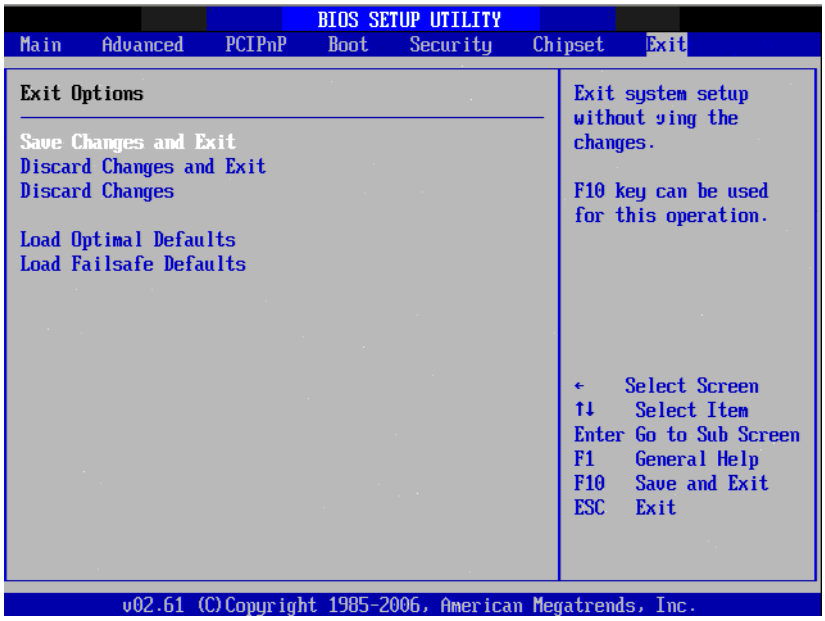


Figure 3.27 Exit Option

3.1.7.1 Save Changes and Exit

When you have completed system configuration, select this option to save your changes, exit BIOS setup and reboot the computer so the new system configuration parameters can take effect.

1. Select Exit Saving Changes from the Exit menu and press <Enter>.
   The following message appears:
   Save Configuration Changes and Exit Now?
   [Ok] [Cancel]
2. Select Ok or cancel.

3.1.7.2 Discard Changes and Exit

Select this option to quit Setup without making any permanent changes to the system configuration.

1. Select Exit Discarding Changes from the Exit menu and press <Enter>.
   The following message appears:
   Discard Changes and Exit Setup Now?
   [Ok] [Cancel]
2. Select Ok to discard changes and exit. Discard Changes
3. Select Discard Changes from the Exit menu and press <Enter>.

3.1.7.3 Load Optimal Defaults

The ARK-1503 automatically configures all setup items to optimal settings when you select this option. Optimal defaults are designed for maximum system performance, but may not work best for all computer applications. In particular, do not use the Optimal Defaults if your computer is experiencing system configuration problems. Select Load Optimal Defaults from the Exit menu and press <Enter>.

3.1.7.4 Load Fail-Safe Defaults

The ARK-1503 automatically configures all setup options to fail-safe settings when you select this option. Fail-Safe Defaults are designed for maximum system stability, but not maximum performance. Select Fail-Safe Defaults if your computer is experiencing system configuration problems.

1. Select Load Fail-Safe Defaults from the Exit menu and press <Enter>.
   The following message appears:
   Load Fail-Safe Defaults?
   [OK] [Cancel]
2. Select OK to load Fail-Safe defaults.

Appendix A

WDT & GPIO Sample Code

A.1 Watchdog Timer Sample Code

Watchdog function:

```
;The SCH3114 Runtime base I/O address is A00h
;Setting WatchDog time value location at offset 66h
;If set value "0", it is mean disable WatchDog function.
Superio_GPIO_Port = A00h
mov dx,Superio_GPIO_Port + 66h
mov al,00h
out dx,al
.model small
.486p
.stack 256
.data
SCH3114_IO EQU A00h
.code
org 100h
.STARTup
;================================================
;47H
;enable WDT function bit [0]=0Ch
;================================================
mov dx,SCH3114_IO + 47h
mov al,0Ch
out dx,al
;================================================
;65H
;bit [1:0]=Reserved
;bit [6:2]Reserve=00000
;bit [7] WDT time-out Value Units Select
;Minutes=0 (default) Seconds=1
;================================================
mov dx,SCH3114_IO + 65h ;
mov al,080h
out dx,al
;================================================
;66H
;WDT timer time-out value
;bit[7:0]=0~255
;================================================
mov dx,SCH3114_IO + 66h
mov al,01h
out dx,al
;================================================
;bit[0] status bit R/W
;WD timeout occurred =1
```

```
;WD timer counting = 0
;=====================================================
mov dx,SCH3114_IO + 68h
mov al,01h
out dx,al
.exit
END
```

A.2 GPIO Sample Code

```
;=====================================================
;       Get Number of GPIO group
;       one group mean 8 gpio pins(one GPIO Chip)
; Input:
;       ax=5E87h
;       bh=00h
; output:
;       ax=5E78         ;function success, other value means function fail
;       cl= n group of gpio
;=====================================================

;=====================================================
;       Get GPIO Config
; Input:
;       ax=5E87h
;       bh=01h
;       cl= n ; n means which group of GPIO you want to get
; output:
;       ax=5E78         ;function success, other value means function fail
;       bl= the n group of gpio config
;           bit 0 = gpio 0 , 0 => output pin; 1 => input pin
;           bit 1 = gpio 1 , 0 => output pin; 1 => input pin
;               .....
;           bit 7 = gpio 7 , 0 => output pin; 1 => input pin
;=====================================================

;=====================================================;
Set GPIO Config
; Input:
;       ax=5E87h
;       bh=02h
;       cl= n ; n means which group of GPIO you want to set
;       bl= the n group of gpio config
;           bit 0 = gpio 0 , 0 => output pin; 1 => input pin
;           bit 1 = gpio 1 , 0 => output pin; 1 => input pin
;               .....
```

```
;          bit 7 = gpio 7 , 0 => output pin; 1 => input pin
; output:
;      ax=5E78        ;function success, other value means function fail
;=======================================================

;=======================================================;
Get GPIO status
; Input:
;      ax=5E87h
;      bh=03h
;      cl= n ; n means which group of GPIO you want to get
; output:
;      ax=5E78        ;function success, other value means function fail
;      bl= the n group of gpio status
;          bit 0 = gpio 0 , 0 => Low; 1 => High
;          bit 1 = gpio 1 , 0 => Low; 1 => High
;              .....
;          bit 7 = gpio 7 , 0 => Low; 1 => High
;=======================================================

;=======================================================
;      Set GPIO status
; Input:
;      ax=5E87h
;      bh=04h
;      cl= n ; n means which group of GPIO you want to set
;      bl= the n group of gpio status
;          bit 0 = gpio 0 , 0 => Low; 1 => High
;          bit 1 = gpio 1 , 0 => Low; 1 => High
;              .....
;          bit 7 = gpio 7 , 0 => Low; 1 => High
; output:
;      ax=5E78        ;function success, other value means function fail
;=======================================================
              mov     ax,5e87h
              mov     bh,00h
              int     15h
              cmp     ax,5e78h
              je      next_test

              lea     dx, Error_Str1
              mov     ah,09h
              int     21h
              jmp     Finish_Test
next_test:
```

```
    xor     ch,ch
    push    cx              ;save NO. of GPIO chip
;1.Set GPIO 0,2,4,6 as output, GPI 1,3,5,7 as input
    mov     ax,5e87h
    mov     bx,02aah
    int     15h
;2. Set GPIO 0,2,4,6 Output Low
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,0400h
    int     15h
;3. Check GPI 1,3,5,7 value
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,03FFh
    int     15h

    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    dec     cx

    mov     al,Fail_lenght
    mul     cl
    lea     dx, Fail_Str
    add     dx,ax
    cmp     bl,00
    jne     test_result


;4. Set GPIO 0,2,4,6 Output differential
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,0411h
    int     15h
;5. Check GPI 1,3,5,7 value
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,03FFh
    int     15h

    pop     cx              ;restore  NO. of GPIO chip
```

```
    push    cx              ;save NO. of GPIO chip
    dec     cx

    mov     al,Fail_lenght
    mul     cl
    lea     dx, Fail_Str
    add     dx,ax
    cmp     bl,33h
    jne    test_result

    cmp    al,00h
    jne    test_fail
 ;4.Set GPIO 1,3,5,7 as output,GPIO 0,2,4,6 as input
    pop     cx
    push    cx
    mov     ax,5e87h
    mov     bx,0255h
    int     15h
;5. Set GPIO 1,3,5,7 Output High
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,04ffh
    int     15h
;6. Check GPIO 0,2,4,6 value
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,0300h
    int     15h

    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    dec     cx

    mov     al,Fail_lenght
    mul     cl
    lea     dx, Fail_Str
    add     dx,ax
    cmp     bl,0ffh
    jne     test_result


 ;4. Set GPIO 1,3,5,7 Output differential
    pop     cx              ;restore  NO. of GPIO chip
```

```
            push    cx              ;save NO. of GPIO chip
            mov     ax,5e87h
            mov     bx,0422h
            int     15h
        ;5. Check GPI 0,2,4,6 value
            pop     cx              ;restore  NO. of GPIO chip
            push    cx              ;save NO. of GPIO chip
            mov     ax,5e87h
            mov     bx,03FFh
            int     15h

            pop     cx              ;restore  NO. of GPIO chip
            push    cx              ;save NO. of GPIO chip
            dec     cx

            mov     al,Fail_lenght
            mul     cl
            lea     dx, Fail_Str
            add     dx,ax
            cmp     bl,33h
            jne     test_result

            pop     cx              ;restore  NO. of GPIO chip
            push    cx              ;save NO. of GPIO chip
            dec     cx
            mov     al,Success_lenght
            mul     cl
            lea     dx, Success1_Str
            add     dx,ax

        ;Do Second PCA9554 test
        ;1.Set GPIO 0,2,4,6 as output, GPI 1,3,5,7 as input

test_result:
            mov     ah,09h
            int     21h
            pop     cx
            dec     cx
            jnz     next_test
    Finish_Test:
            popa
            .exit
```

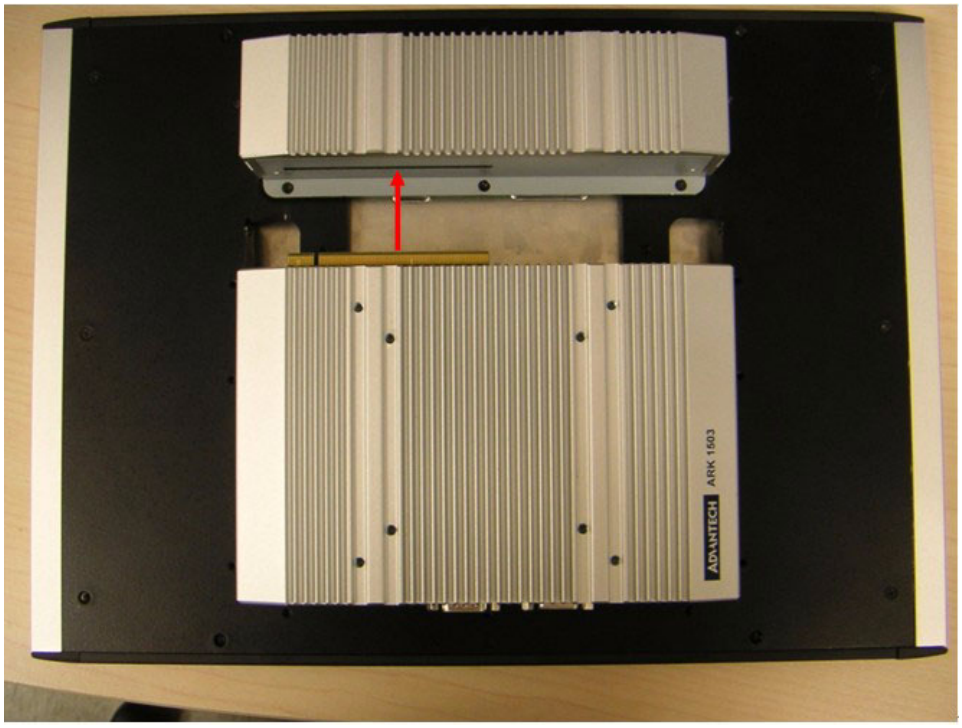
Appendix B

Installation guide of ARK-1503P Golden Finger Interface for ITM Panels

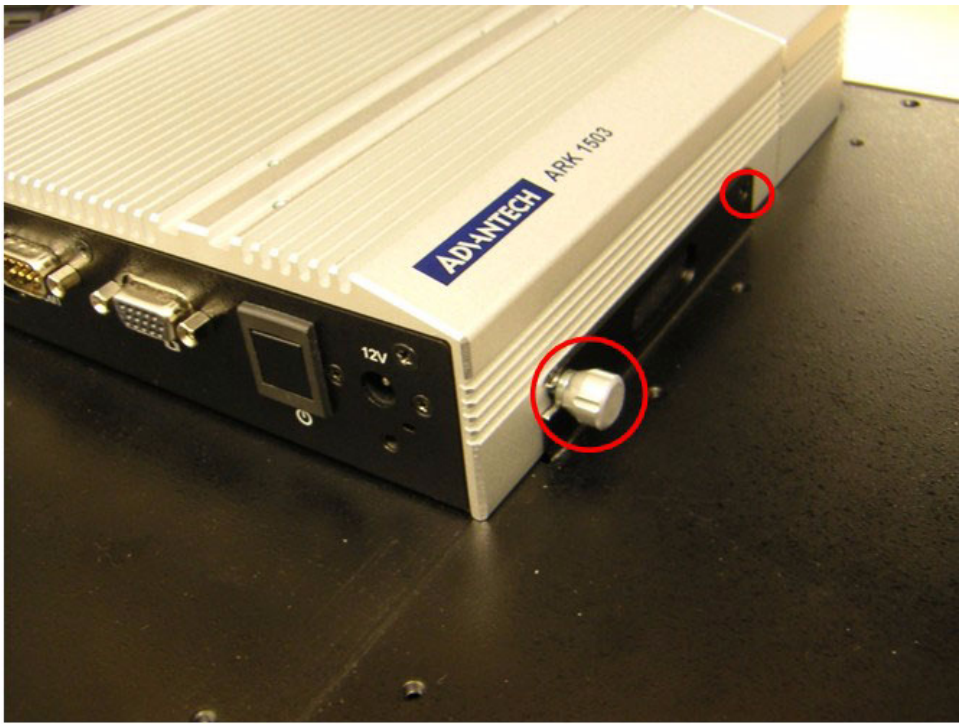
B.1 Installation guide of ARK-1503P Golden Finger Interface for ITM Panels

1. Put ARK-1503P onto the tray at the back of ITM.

2. Push ARK-1503P to connect the golden finger interfaces of ARK-1503P and ITM panel.



3. Secure the four screws between ARK-1503P and ITM panel. (The screws are in the accessory box of ITM series products.)



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