



User Manual

ARK-5260

Embedded IPC

Trusted ePlatform Services

ADVANTECH

Attention!

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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.

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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. e.g.*



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.*



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 moist sheet or cloth 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: 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. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
18. **RESTRICTED ACCESS AREA:** The equipment should only be installed in a Restricted Access Area.

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-5260 unit
- 1 x Driver/Utility CD
- 1 x Registration and 2 years Warranty card
- 1 x PS2 keyboard/mouse cable

Ordering Information

Model Number	Description
ARK-5260F-D5A1E	Intel Atom D510 1.66 G with 2 x PCI and 1 x PCIe expansion

Optional Accessories

Part Number	Description
1757003659	AC-to-DC Adapter, DC19 V/3.42 A 65 W, with Phoenix Power Plug
1700060202	PS/2 Keyboard/Mouse cable
1700001947	Power cable 2-pin 180 cm, USA
1700001948	Power cable 2-pin 180 cm, Europe
1700001949	Power cable 2-pin 180 cm, UK
1700018474	4-pin DC connector cable (compatible with 1960048412N001)
1960048412N001	4-Pin DC Bracket for ARK-5260 (compatible with 1700018474)
1757000537	AC-to-DC Adapter 4-Pin DC 19 V/6.32 A, 120 W

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Chapter 1

General Introduction

This chapter gives background information on ARK-5260.

1.1 Introduction

ARK-5260 is a powerful, robust and fanless Embedded Box Computer. All electronics are protected in a compact, sealed, aluminum case for easy embedding in the customer's own housing, or as a stand-alone application where the environment is harsh.

The ARK-5260 can be used as a standalone system or wall-mounted. The system accepts a wide range of DC power in and comes in a footprint of 137 x 189 x 221 mm. The rugged cast aluminum case not only provides great protection from EMI, shock/vibration, cold and heat, but, as we mentioned before, passive cooling for quiet fanless operation.

The ARK-5260 is equipped with Intel Atom D510 1.66 GHz, dual core processor, which is highly suitable for embedded and industrial PC applications requiring high processor performance within a limited space. Featuring two PCI and one PCIe x1 slots for application expansion and system integration, ARK-5260 also carries five USB 2.0 and two gigabit LAN ports. It can support up to 2 GB DDR2 SDRAM of main memory and two easily maintaining 2.5" SATA HDD capacity. ARK-5260 offers four serial ports, and all can support RS-232/422/485 by BIOS setting. ARK-5260 is ideal for embedded system applications such as machine automation, and industrial plant and cabinet integration.

1.2 Product Feature

1.2.1 General

- **CPU:** Intel® Atom™ Processor D510 1.66 GHz
- **System Chipset:** ICH8M
- **BIOS:** AMI 16 Mbit Flash BIOS
- **System Memory:** DDRII 667 MHz up to 2 GB
- **HDD:** Supports 2 drive bays space for SATA 2.5" HDD
- **SSD:** Supports 1 CompactFlash Card Type I/II
- **Watchdog Timer:** Single chip Watchdog 255-level interval timer, setup by software
- **I/O Interface:** 4 x RS-232/422/485
- **USB:** 5 x USB 2.0 compliant ports
- **Audio:** High Definition Audio (HD), Line-in, Line-out, Mic-in
- **DIO:** 8-bit general purpose input/output
- **Expansion Interface:** Supports maximum 15 W power for expansion

1.2.2 Display

- **Chipset:** Embedded Gen3.5+ GFX Core
- **Memory Size:** Up to 224 MB of dynamic video memory allocation
- **Resolution:**
 - VGA: Supports up to 2048 x 1536 @ 60 Hz

1.2.3 Ethernet

- **Chipset:**
 - LAN1: Intel 82567V
 - LAN2: Intel 82583V
- **Speed:** 10/100/1000 Mbps
- **Interface:** 2 x RJ45
- **Standard:** Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.ab.

1.3 Chipset

1.3.1 Functional Specification

1.3.1.1 Processor

	Intel® Atom™ Processor D510
Processor	Intel® Atom™ D510 at 1.66 GHz with 1MB L2 cache Manufacturing Technology: 45 nm

1.3.1.2 Chipset

Memory	<ul style="list-style-type: none"> ■ Intel® D510 ■ Supports DDR2 667 MHz up to 2 GB ■ SODIMM Socket: <ul style="list-style-type: none"> – 1. 200-pin SODIMM socket type *1
Graphic and Video Controllers	<p>Intel 3.5 Gen Integrated Graphic Engine + GFX core</p> <ul style="list-style-type: none"> ■ Support DVMT 4.0 ■ DirectX* 9 compliant Pixel Shader 2.0 ■ Intel® Clear Video Technology <ul style="list-style-type: none"> – MPEG2 Hardware Acceleration – ProcAmp ■ VGA: supports resolution up to 2048 x 1536 <p>VGA Connector on board: D-SUB 15P</p>
SATA & IDE Interface	<p>SB: Intel® ICH8M chip supports:</p> <ul style="list-style-type: none"> ■ Supports the Serial ATA specification Revision 1.0a ■ 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.
Audio Link	<p>SB: Intel® ICH8M chip supports:</p> <ul style="list-style-type: none"> ■ Supports HD Codec ■ Supports Link for Audio and Telephony CODECS
USB Interface	<p>SB: Intel® ICH8M chip supports:</p> <ul style="list-style-type: none"> ■ USB host interface with support for 5 USB 2.0 ports ■ Supports high-speed, full-speed, and low-speed capable ■ Supports legacy keyboard/mouse software
Power Management	<p>SB: Intel® ICH8M chip supports:</p> <ul style="list-style-type: none"> ■ Supports ACPI 3.0 ■ ACPI Power Management Logic Support ■ Power connector: Plug-In block 2P x 1 or DIN Jack 4P x1

BIOS	SB: Intel® ICH8M chip supports: <ul style="list-style-type: none"> ■ AMI 16Mb Flash BIOS via SPI
-------------	--

1.3.1.3 Others

	SMSC SCH 3106 support <ul style="list-style-type: none"> ■ Up to 4 serial ports by SMSC SCH 3106 ■ High Speed NS16C550A Compatible UARTs with Data rates to 1.5 Mbps
Serial ports	<ul style="list-style-type: none"> ■ Support IRQ Sharing among serial ports on XPE ■ COM1 ~ COM4: Supports to RS-232/422/485 and setting by BIOS setting ■ COM1 ~ COM4: RS-485 support Auto flow control <p>COM connector: D-SUB CON. 9P</p>
	LAN1 Intel 82567, LAN2 Intel 82583V <ul style="list-style-type: none"> ■ Compliant with IEEE 802.3, IEEE 802.3u, IEEE 802.ab. ■ Support 10/100/1000 Mbps
LAN	
	Audio Codec: Realtek ALC888: <ul style="list-style-type: none"> ■ Compliant with HD Audio specifications ■ Supports to 16/20/24-bit DAC and 16/20/24-bit ADC resolution ■ Support: Line-out, Line-in, Mic-in <p>Audio Connectors: Ear Phone Jack * 3</p>
Audio	
	SMSC SCH 3106 support <ul style="list-style-type: none"> ■ 10 I/O pins with one 5 V power ping and one ground pin ■ 5 V tolerance I/Os. <p>DIO Connectors:</p> <ul style="list-style-type: none"> ■ 9 pins DSUB connector
DIO	
Battery backup	<ul style="list-style-type: none"> ■ BR2032 3 V/195 mAh

1.4 Mechanical Specifications

1.4.1 Dimensions

137.0 [5.39] x 189.0 [7.44] x 221.0 [8.70] Unit: mm [Inch]

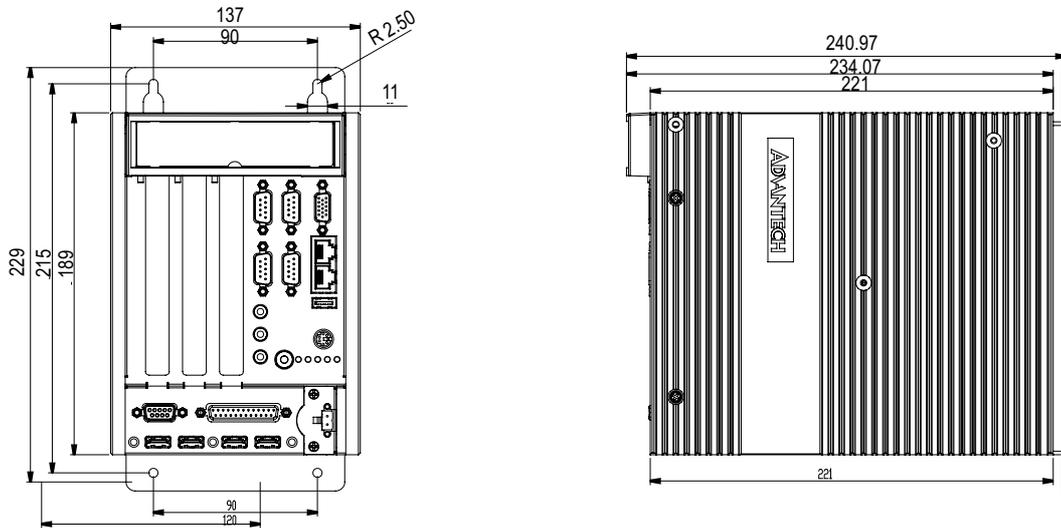


Figure 1.1 ARK-5260 Mechanical Dimension Drawing

1.4.2 Weight

4.2 kg (9.24 lbs)

1.5 Power Requirement

1.5.1 System Power

- **Minimum power input:** DC12 V - 24 V, 5 A - 2.5 A

1.5.2 RTC Battery

- BR2032 3 V/195 mAh

1.6 Environment Specification

1.6.1 Operating Temperature

- With extend temperature peripherals CompactFlash disk without PC expansion Boards: -20 ~ 55° C (-4 ~ 131° F), when air flow speed = 0.7 m/sec
- With extend temperature peripherals 2.5-inch HDD without PC expansion Boards: 0 ~ 45° C (32 ~ 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 during Operation

- When system is equipped with Compact Flash card only: 5 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct/min., 1 hr/axis, x,y,z 3 axes.
- When system is equipped with 2.5-inch HDD: 1 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct/min., 1 hr/axis, x,y,z 3 axes.

1.6.5 Shock during Operation

- When system is equipped with Compact Flash card only: 50 G, IEC 60068-2-27, half sine, 11 ms duration.
- When system is equipped with 2.5-inch: 20 G, IEC 60068-2-27, half sine, 11 ms duration.

1.6.6 Safety

- 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-5260 hardware.

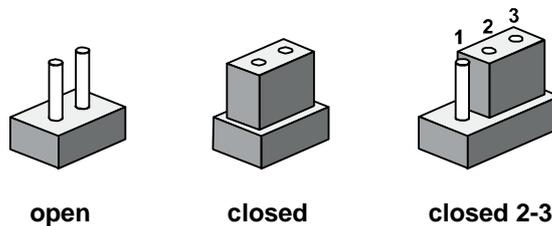
2.1 Introduction

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

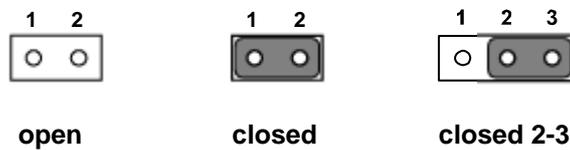
2.2 Jumpers

2.2.1 Jumper Description

You may configure the ARK-5260 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

CMOS1	COMS
JWDT1	Watchdog timer output option

2.2.2.1 Clear CMOS

ARK-5260 single board computer contains a jumper that can erase CMOS data and reset the system BIOS information. Normally this jumper should be set with pins 1-2 closed. If you want to reset the CMOS data, set CMOS1 to 2-3 closed for just a few seconds, and then move the jumper back to 1-2 closed. This procedure will reset the CMOS to its default setting.

CMOS1	Clear CMOS
Footprint	3x1 Pin
Setting	Function
(1-2)	Normal (default)
(2-3)	Clear CMOS

2.2.2.2 Watchdog Timer Output Option

The ARK-5260 contains a watchdog timer that will reset the CPU in the event the CPU stops processing. This feature means the ARK-5260 will recover from a software failure or an EMI problem. The JWDT1 jumper settings control the outcome of what the computer will do in the event the watchdog timer is tripped.

JWDT1	Watchdog Timer Output Option
Footprint	3x1 Pin
Setting	Function
(1-2)	Enable (default)
(2-3)	Disable

2.3 Connectors

2.3.1 ARK-5260 External I/O Connectors

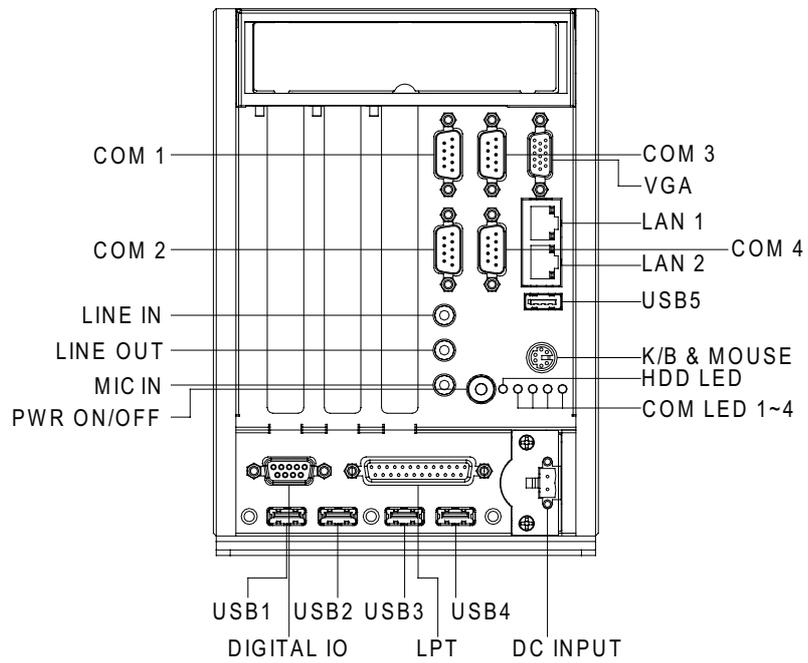


Figure 2.1 ARK-5260 front view

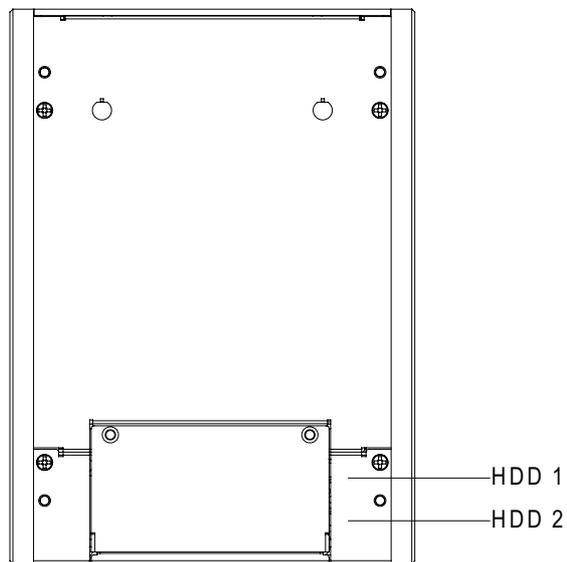


Figure 2.2 ARK-5260 rear view

2.3.1.1 COM Connector

ARK-5260 provides four 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 change the mode in BIOS setting. You can find the detail setting method in Chapter 3.

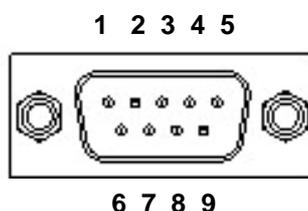


Figure 2.3 COM Port Connector

Table 2.2: 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

Note! NC represents “No Connection”.



2.3.1.2 Ethernet Connector (LAN)

ARK-5260 is equipped two Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. LAN1 is equipped with 82567V and LAN2 is equipped with 82583V. The Ethernet port provides a standard RJ-45 jack connector with LED indicators on the front side to show its Active/Link status and Speed status.

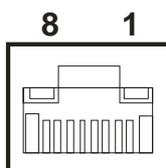


Figure 2.4 Ethernet Connector

Table 2.3: Ethernet Connector Pin Assignments

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

2.3.1.3 Audio Connector

ARK-5260 offers stereo audio ports by three phone jack connectors of Line_Out, Line_In, Mic_In. The audio chip is controlled by ALC888, and it's compliant with Aza-lea standard.



Figure 2.5 Audio Connector

Table 2.4: Audio Connector Pin Assignments

Pin	Audio Signal Name
1	Line_In
2	Line_Out
3	Mic_In

2.3.1.4 DIO Connector

ARK-5260 provides one DSUB 9-pin female connectors, which offer Digital Input/Output communication interface. If client want to use DIO, please find the Pin assignment as following.

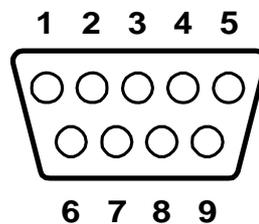


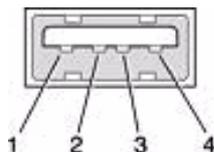
Figure 2.6 DIO Connector

Table 2.5: DIO Connector Pin Assignments

Pin	Signal Name
1	DIO bit0
2	DIO bit1
3	DIO bit2
4	DIO bit3
5	VCC
6	DIO bit4
7	DIO bit5
8	DIO bit6
9	DIO bit7

2.3.1.5 USB Connector

ARK-5260 provides five USB interface connectors, which give complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 2.0 compliant. Please refer to Table 2.7 for its pin assignments. The USB 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 without turning off computers.

**Figure 2.7 USB Connector****Table 2.6: USB Connector**

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

2.3.1.6 VGA Connector

The ARK-5260 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.

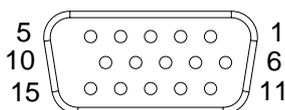
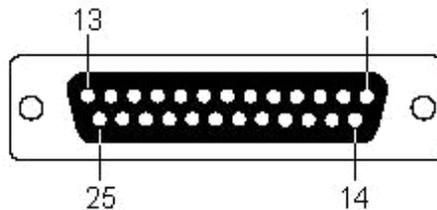
**Figure 2.8 VGA Connector**

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	NC
13	H-SYNC	14	V-SYNC
15	NC		

2.3.1.7 Parallel Port Connector (LPT)

The parallel port is normally used to connect Embedded IPC to a printer. The ARK-5260 includes a parallel port, accessed through a D-Sub 25-pin connector. Please find the pin assignment as following.

**Figure 2.9 Parallel Port Connector****Table 2.8: Parallel Port Connector Pin Assignments**

Pin	Signal Name	Pin	Signal Name
1	PIO_STB	2	LPT_AFD#
3	PIO_PD0	4	LPT_ERR#
5	PIO_PD1	6	LPT_INIT#
7	PIO_PD2	8	LPT_SLIN#
9	PIO_PD3	10	GND
11	PIO_PD4	12	GND
13	PIO_PD5	14	GND
15	PIO_PD6	16	GND
17	PIO_PD7	18	GND
19	LPT_ACK#	20	GND
21	LPT_BUSY	22	GND
23	LPT_PE	24	GND
25	LPT_SLCT		

2.3.1.8 PS/2 Keyboard and Mouse Connector

The ARK-5260 provides a PS/2 keyboard/mouse connector. A 6-pin mini-DIN connector is located on the front panel of the ARK-5260.

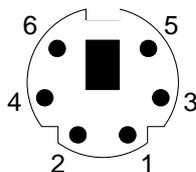


Figure 2.10 PS/2 Connector

Table 2.9: PS/2 Connector Pin Assignments

Pin	Signal Name
1	PS2_KBDAT
2	PS2_MS DAT
3	GND
4	VCC
5	PS2_KBCLK
6	PS2_MSCLK

2.3.1.9 Power Input Connector

ARK-5260 comes with a two pins header as default that carries 12 ~ 24 Vdc external power input.

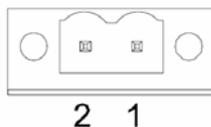


Figure 2.11 2-pins header

Table 2.10: Power Connector for Pin Header Pin Assignments

Pin	Signal Name
1	GND
2	+12 ~ 24 VDC

ARK-5260 also supports 4-pole DIN-Jack that carries external power input. Please replace the connector and bracket if client want to use 4-pole DIN-Jack.

1700018474 4-pin DC connector cable
1960048412N001 4-pin DC bracket for ARK-5260

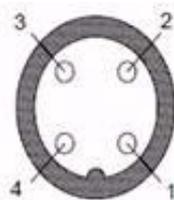


Figure 2.12 4-pole DIN-Jack

Table 2.11: Power Connector for Pin Header Pin Assignments

Pin	Signal Name
1	+12 ~ 24 VDC
2	+12 ~ 24 VDC
3	GND
4	GND

2.3.1.10 Power ON/OFF Button

ARK-5260 comes with a Power On/Off button with LED indicators on the front side to show its On status (Green LED) and Off/Suspend status (Orange LED), that support dual function of Soft Power -On/Off (Instant off or Delay 4 Second), and Suspend.



Figure 2.13 Power Button

2.3.1.11 LED Indicators

There are five LEDs on ARK-5260 front metal face plate for indicating system status: HDD LED is for HDD & compact flash disk retrieval status and the LED color is red. COM LED is used for indicating the status of data transmitting and receiving.

2.4 Installation

2.4.1 HDD Installation

1. Unscrew the HDD door screws.

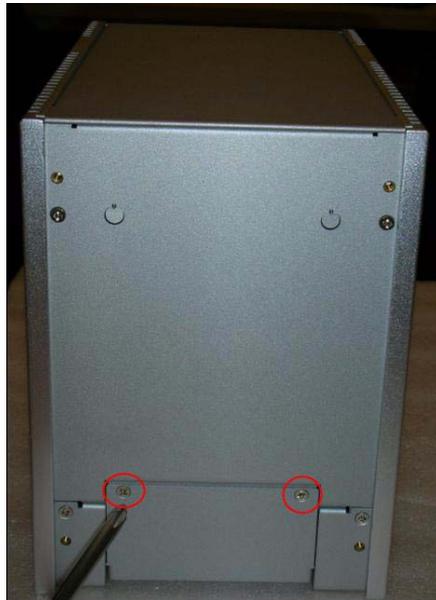


Figure 2.14 Unscrew the HDD door screws

2. Pull out the HDD bracket.



Figure 2.15 Pull out the HDD bracket

3. Assemble 2.5" SATA HDD and HDD bracket with four screws.
 - Assemble the second 2.5" SATA HDD with additional four screws on top of the first HDD.

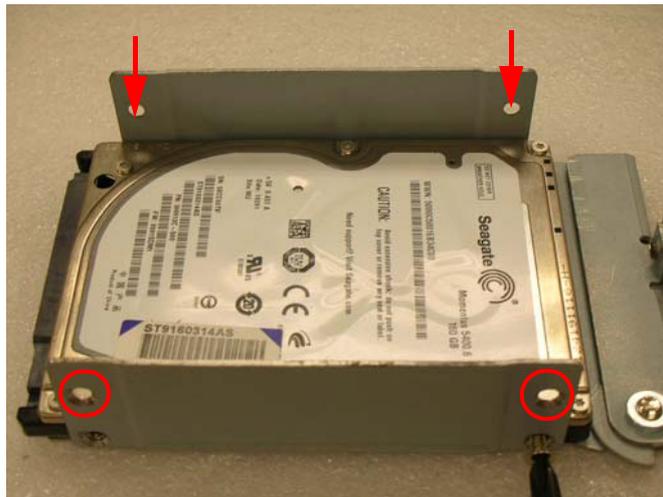


Figure 2.16 Assembly 2.5" SATA HDD and HDD bracket

4. Connect the HDD and SATA cable.
5. Insert the bracket into the HDD housing.



Figure 2.17 Insert the bracket into the HDD housing

- Secure the HDD housing with screw.



Figure 2.18 Secure the HDD housing with screw

- Replace the HDD door and secure with screws.

2.4.2 Compact Flash Card Installation

- Unscrew 2 screws and remove the top cover.

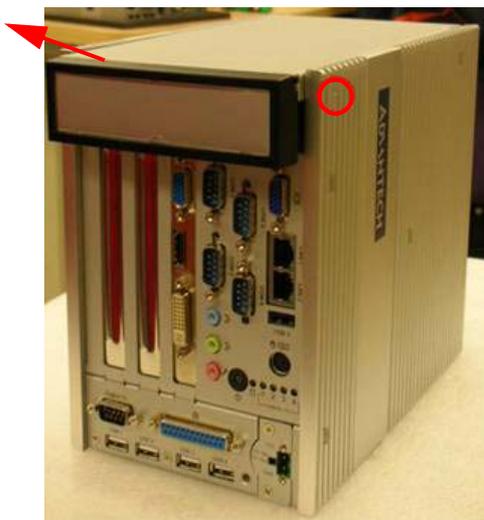


Figure 2.19 Unscrew 2 screws and remove the top cover

2. Unscrew and remove the top bracket.

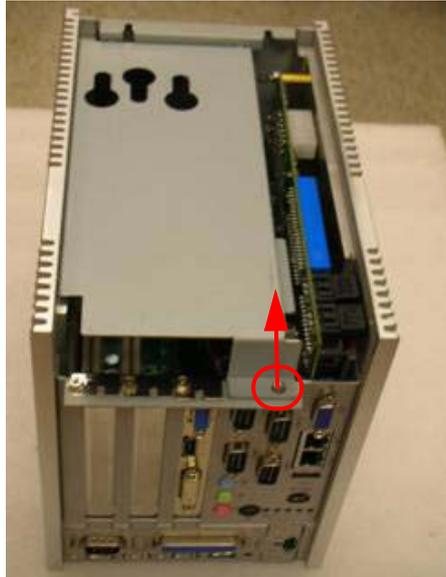


Figure 2.20 Unscrew and remove the top bracket

3. Install the CF card into the CF socket.



Figure 2.21 Install the CF card

4. Replace the top bracket and top cover and secure with screws.

2.4.3 Memory Installation

1. Refer to 2.4.2 step 1~2 to remove the top cover and top bracket.
2. Unscrew two screws from back cover.



Figure 2.22 Unscrew four screws from back cover

3. Unscrew 4 screws and remove the right side cover.



Figure 2.23 Unscrew 4 screws and remove the right side cover

4. Install the memory module into the SO-DIMM socket.



Figure 2.24 Insert the memory module into the SO-DIMM socket

5. Replace the right side cover and top cover and secure with screws

2.4.4 PCI / PClex1 Card Installation

ARK-5260 provides two PCI slots and one PClex1 slot for expansion. The procedure of installing the PCI / PClex1 expansion card into ARK-5260 is instructed below.

1. Refer to 2.4.2 step 1~2 to remove the top cover and top bracket.
2. Remove the PCI dummy bracket.
3. Insert the PCI Card and fasten the screw.

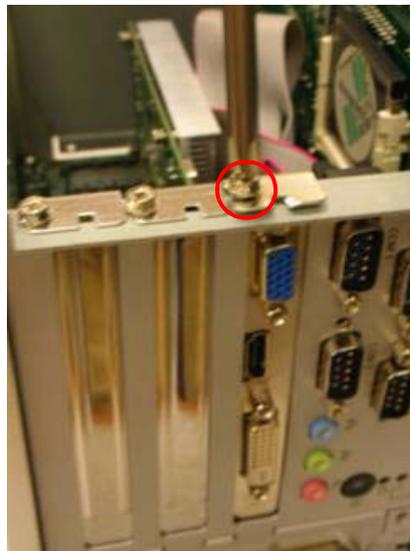


Figure 2.25 Insert the PCI Card and fasten the screw

4. Adjust the depressed rubber height on top bracket, to fit the PCI expansion card.

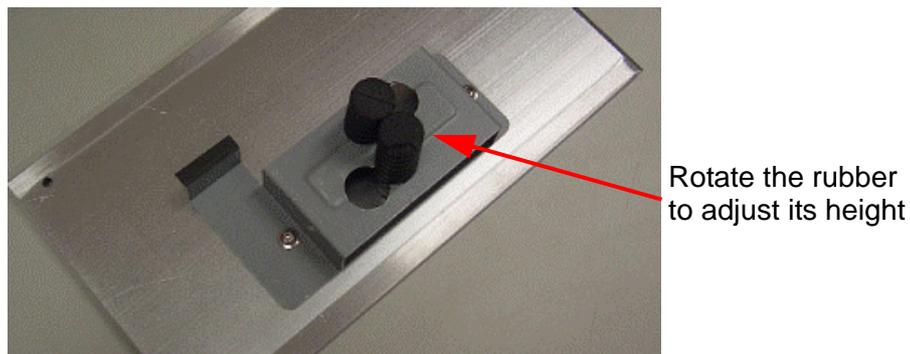


Figure 2.26 Adjust the depressed rubber height

5. Replace the top bracket and top cover and secure with screws.

Chapter 3

AMI BIOS Setup

This chapter introduces how to set BIOS configuration data.

3.1 Introduction

AMI BIOS has been integrated into many motherboards, and has been very popular for over a decade. People sometimes refer to the AMI BIOS setup menu as BIOS, BIOS setup or CMOS setup.

With the AMI BIOS Setup program, you can modify BIOS settings and control the special features of your computer. The Setup program uses a number of menus for making changes and turning special features on or off. This chapter describes the basic navigation of the ARK-5260 setup screens.

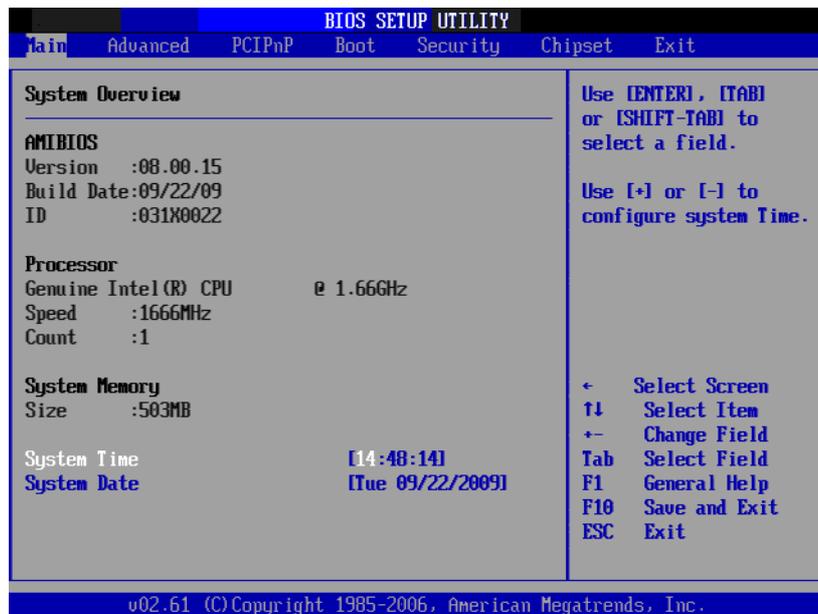


Figure 3.1 Setup Program Initial Screen

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 up CMOS and it is retained when the power is turned off.

3.2 Entering Setup

Press the "Del" key during the Power On Self Test (POST) process to enter the BIOS setup screen, otherwise the system will continue the POST process.

3.2.1 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.

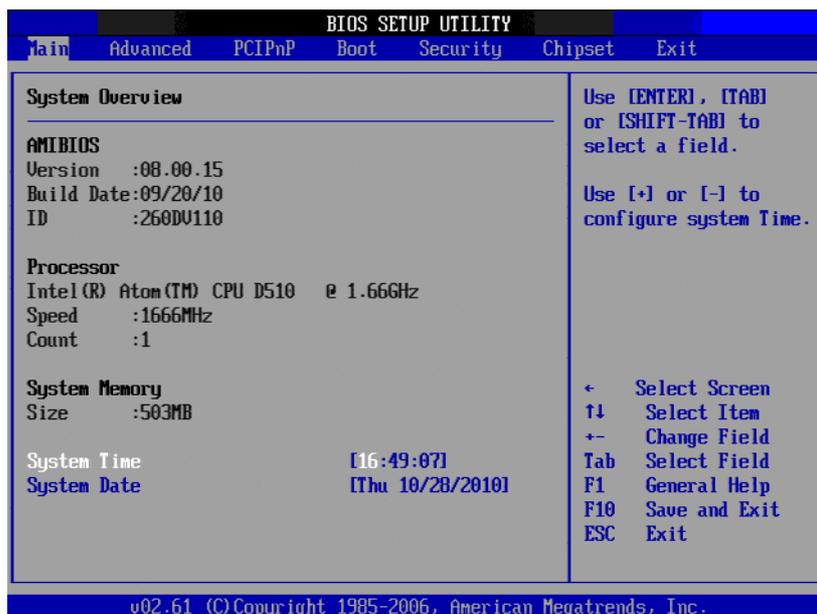


Figure 3.2 Main Setup Screen

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.

3.2.1.1 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.

3.2.2 Advanced BIOS Features Setup

Select the Advanced tab from the ARK-5260 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 screen is shown below. The sub menus are described on the following pages.

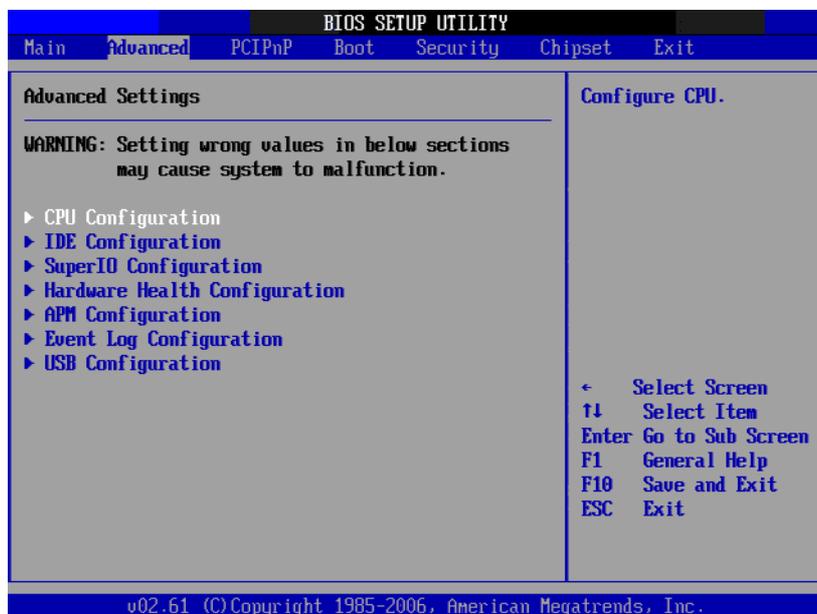


Figure 3.3 Advanced BIOS Features Setup Screen

3.2.2.1 CPU Configuration

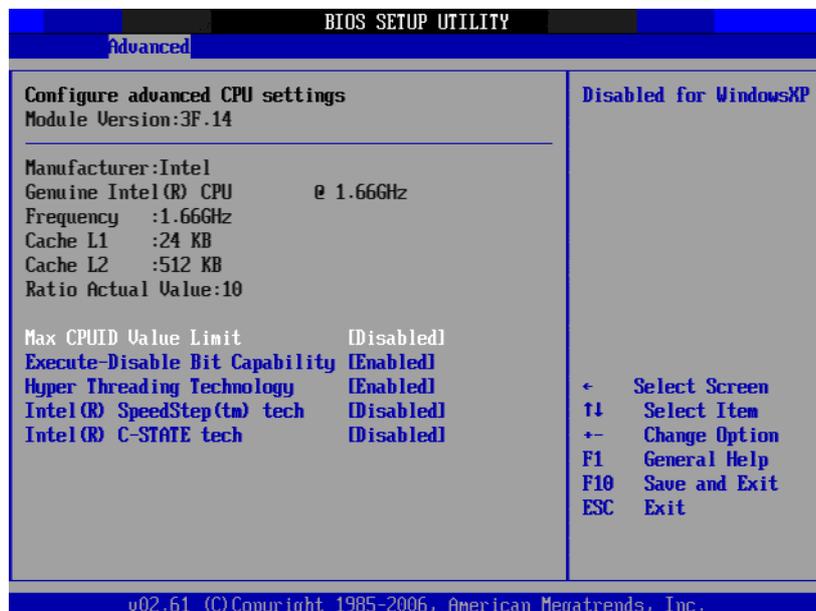


Figure 3.4 CPU Configuration Settings

- **Max CPUID Value Limit**
This is disabled for Windows XP.
- **Execute Disable Bit Capability**

This item specifies the Execute Disable Bit Feature. The settings are Enabled and Disabled. The Optimal and Fail-Safe default setting is Enabled. If Disabled is selected, the BIOS forces the XD feature flag to always return to 0.

- **Hyper-Threading Technology**

While using a CPU with Hyper-Threading technology, you can select "Enabled" to enable Hyper-Threading Technology in an OS which supports Hyper-Threading Technology or select "Disabled" for other OSs which do not support Hyper-Threading technology.

- **Intel® SpeedStep™ tech**

Intel SpeedStep Technology centralizes the control mechanism in the processor, eliminating the need for coordination with the chipset during the frequency/voltage configuration. This option is used to enable/disable the GV3 bit.

- **Intel® C-STATE tech**

Intel® CPU Enhanced Halt (C1E) function, a function to save CPU power consumption in system halt state. When enabled, the CPU speed and voltage will be reduced during system halt state to save power consumption. You may choose to enable or disable it.

3.2.2.2 IDE Configuration

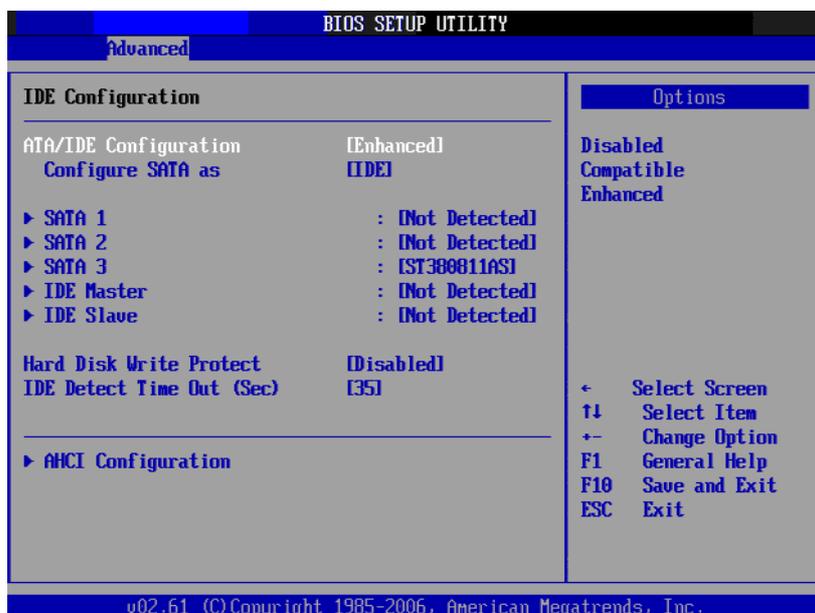


Figure 3.5 IDE Configuration

- **ATA/IDE Configuration**

This can be configured as Disabled, Compatible or Enhanced.

- **Configure SATA as**

This can be configured as IDE or AHCI.

- **SATA1/SATA2/SATA3**

While entering setup, the BIOS automatically detects the presence of SATA devices. This displays the status of SATA device auto-detection.

- **IDE Master / Slave**

While entering setup, the BIOS automatically detects the presence of IDE devices. This displays the status of IDE device auto-detection.

- **AHCI Configuration**

AHCI is a new interface specification that allows the SATA controller driver to support advanced features. While entering setup, BIOS auto detects the presence of AHCI devices. This displays the status of auto detection of AHCI devices.

3.2.2.3 Super I/O Configuration

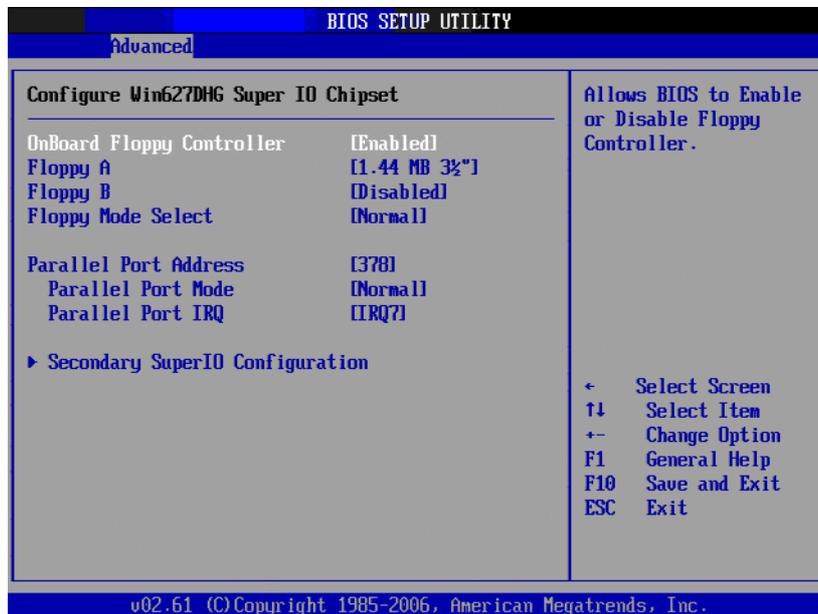


Figure 3.6 Super I/O Configuration

- **OnBoard Floppy Controller**
Enable or disable the floppy function.
- **Floppy A**
Select the type of floppy drive connected to the system. We suggest you disable the floppy if installing Windows Vista without a floppy drive.
- **Floppy B**
Select the type of floppy drive connected to the system.
- **Floppy Mode Select**
For user to set floppy mode, this must match specification of the floppy drive connected to CPU card, available options are 360 KB 5 1/4", 1.2 MB 5 1/4", 720 KB 3 1/2", 1.44 MB 3 1/2", 2.88 MB 3 1/2".
- **Parallel Port Address**
This configures parallel port base addresses. The following options are also available:
 - **Parallel Port Mode**
This option configures Parallel Port mode. Available options include Normal, Bi-directional, ECP, EPP, ECP & EPP.
 - **Parallel Port IRQ**
This option configures s Parallel Port base IRQ.

■ Secondary Super IO Configuration

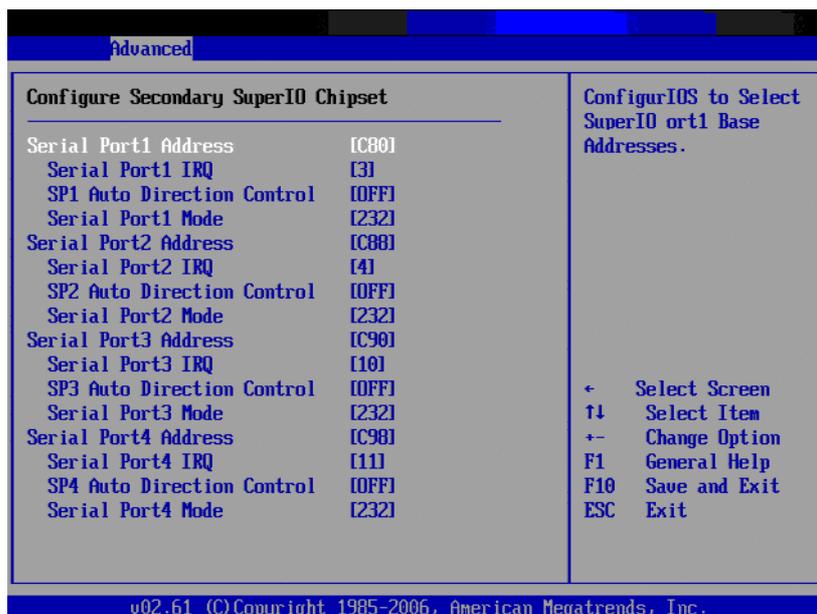


Figure 3.7 Secondary Super IO Configuration

- **Serial Port 1/2/3/4 Address**
This option configures serial port 3/4/5/6 base addresses. The following options are also available.
- **Serial Port 1/2/3/4 address**
This item allows you to select serial port1 ~ port4 of base addresses.
- **Serial Port 1/2/3/4 IRQ**
This item allows you to select serial port1 ~ port4 of IRQ.
- **Auto Flow Control Port 1/2/3/4**
This item allows you to ON or OFF auto flow control function. When OFF auto flow control is RS232.
- **Serial Port 1/2/3/4 Mode**
This item allows you to select RS232/RS422/RS485 mode.

3.2.2.4 Hardware Health Function

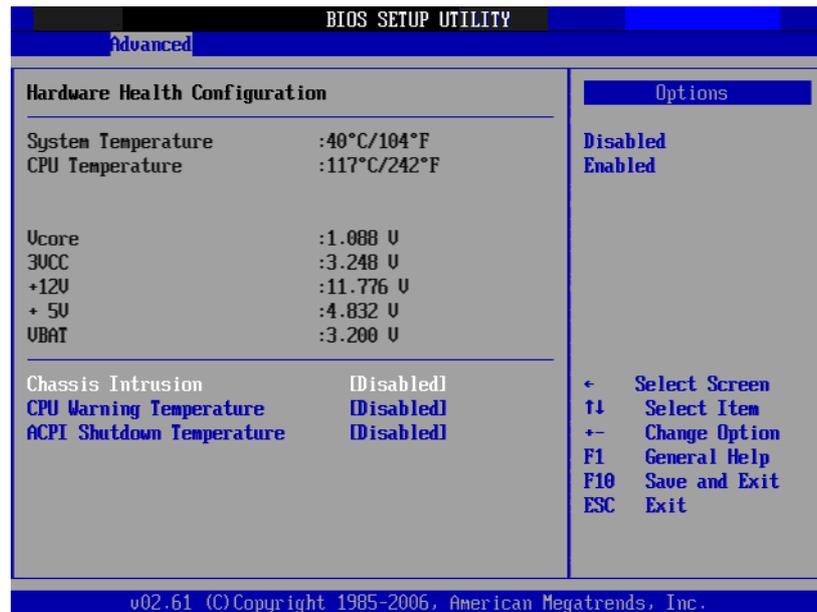


Figure 3.8 Hardware Health Configuration

- **Hardware Health Function**
Enable/Disable the onboard hardware monitor controller. If this option is enabled, the BIOS and OBS utility can get the system board's health information from hardware monitor controller.
- **Chassis Intrusion**
Enable/Disable the Chassis Intrusion monitoring function. When the case is opened, the buzzer beeps.
- **CPU Warning Temperature**
Use this to set the CPU warning temperature threshold. When the system reaches the warning temperature, the buzzer will beep.
- **ACPI Shut Down Temperature**
This option allows user to set the CPU temperature at that the system will automatically shut down for preventing CPU from over heat damage.

3.2.2.5 APM Configuration

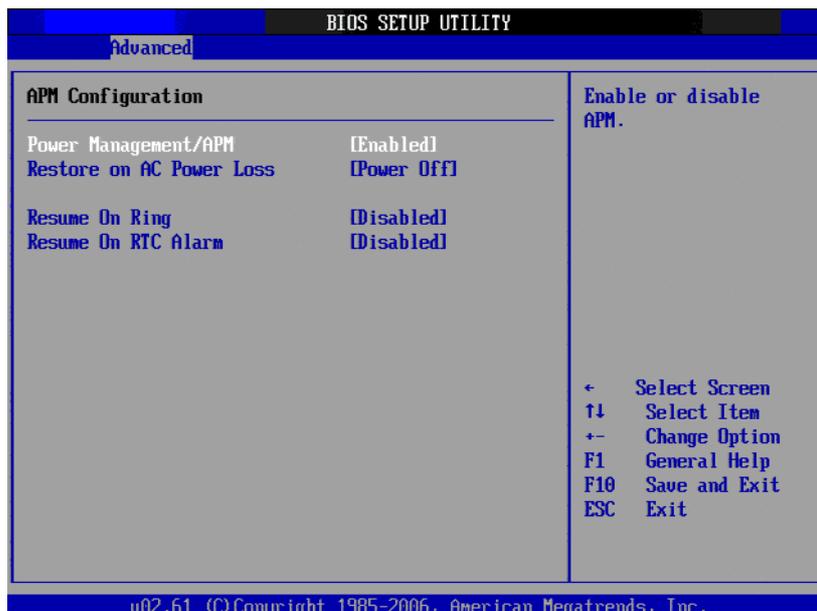


Figure 3.9 APM Configuration

- **Power Management/APM**
Enable or disable APM power management function.
- **Restore on AC Power Loss**
This option allows user to set system action when AC power restores after AC power loss. Available options include Power Off, Power On, Last Status.
- **Resume On Ring**
Disable/Enable RI wake event.
- **Resume On RTC Alarm**
Disable/Enable RTC wake event.

3.2.2.6 Event Log Configuration

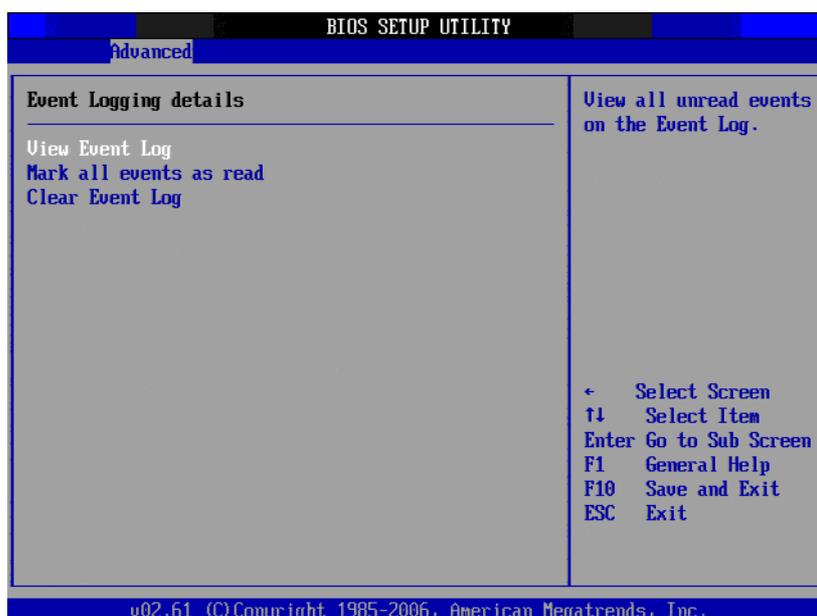


Figure 3.10 Event Log Configuration

- **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.

3.2.2.7 USB Configuration

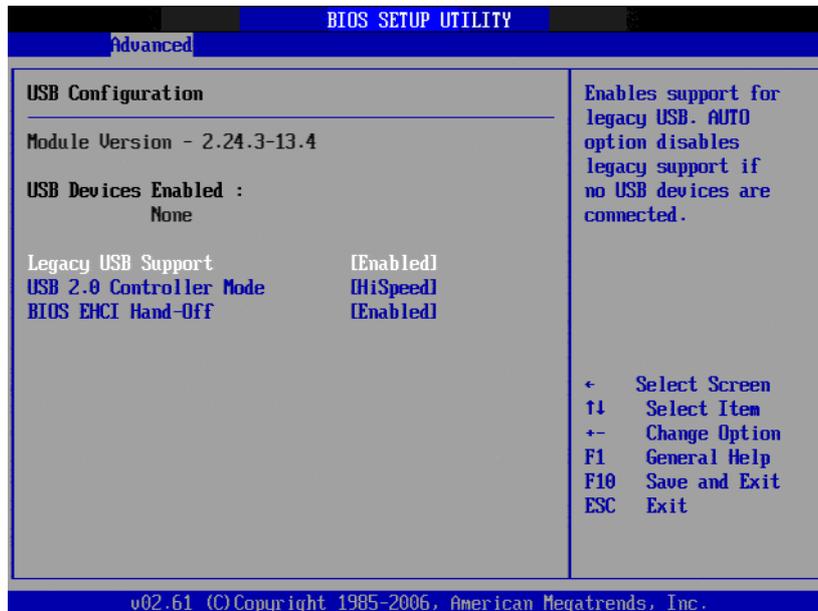


Figure 3.11 USB Configuration

- **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 (480 Mbps) or FullSpeed (12 Mbps).
- **BIOS EHCI Hand-Off**
This is a workaround for OSeS without EHCI hand-off support. The EHCI ownership change should claim by EHCI driver.

3.2.3 PCI/PnP Setup

Select the PCI/PnP tab from the ARK-5260 setup screen to enter the Plug and Play BIOS Setup screen. Highlighting a Plug and Play BIOS Setup option by using the <Arrow> keys displays a description in the righthand panel. All Plug and Play BIOS Setup options are described in this section. The Plug and Play BIOS Setup screen is shown below.

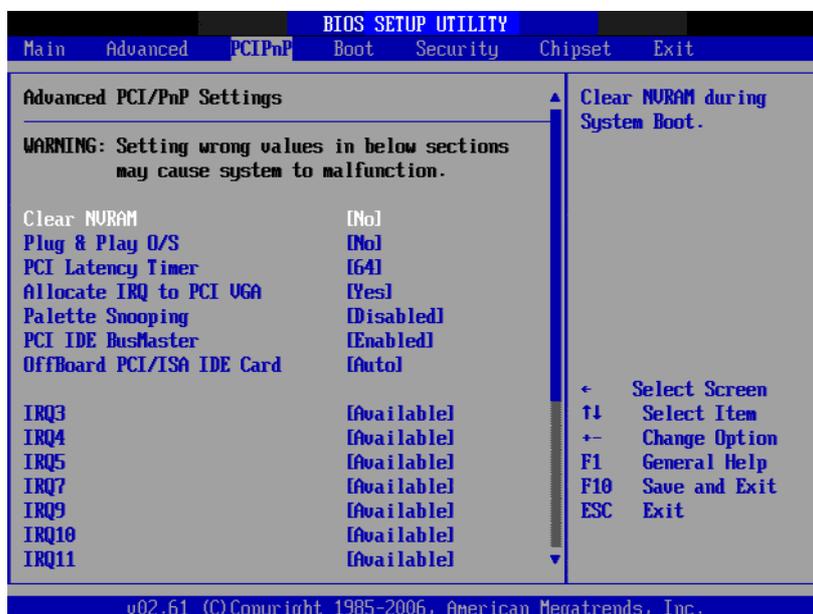


Figure 3.12 PCI/PnP Setup

3.2.3.1 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.

3.2.3.2 Plug and Play O/S

Set this value to allow the system to modify the settings for Plug and Play operating system support. The Optimal and Fail-Safe default setting is No.

3.2.3.3 PCI Latency Timer

Use this to adjust the PCI Latency Timer. This option sets the latency of all PCI devices on the PCI bus. The Optimal and Fail-Safe default setting is 64.

3.2.3.4 Allocate IRQ to PCI VGA

Set this value to allow or stop the system from giving the VGA adapter card an interrupt address. The Optimal and Fail-Safe default setting is Yes.

3.2.3.5 Palette Snooping

Set this value to allow the system to modify the Palette Snooping settings. The Optimal and Fail-Safe default setting is Enabled.

3.2.3.6 PCI IDE BusMaster

Set this value to allow or prevent the use of PCI IDE Busmastering. The Optimal and Fail-Safe default setting is enabled.

3.2.3.7 Off Board PCI/ISA IDE card

Set this value to allow an add-on PCI/ISA IDE card to be selected. The Optimal and Fail-Safe default setting is Auto.

3.2.3.8 IRQ

- **IRQ[3,4,5,7,9,10,11,14,15]**

Available: Specified IRQ is available to be used by PCI/PnP devices.

Reserved: Specified IRQ is reserved for use by Legacy ISA devices.

- **DMA Channel [0,1,3,5,6,7]**

Available: Specified DMA is available to be used by PCI/PnP devices.

Reserved: Specified DMA is reserved for use by legacy ISA devices.

Reserved Memory Size: Size of memory block to reserve for legacy ISA devices.

3.2.4 Boot Setup Utility

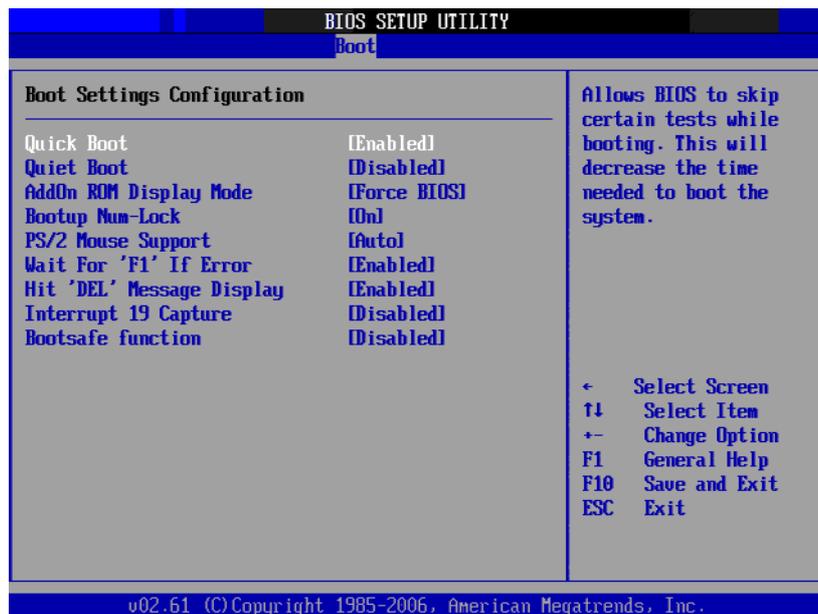


Figure 3.13 Boot Settings Configuration

The following options are available:

3.2.4.1 Quick Boot

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

3.2.4.2 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.

3.2.4.3 AddOn ROM Display Mode

This is for choosing display mode of option ROM information under DOS environment during booting up process. Available options include Force BIOS, Keep Current.

3.2.4.4 Bootup Num-Lock

Select the Power-on state for Numlock.

3.2.4.5 PS/2 Mouse Support

Enable or disable PS/2 interface mouse support. Available options include Auto, Enable, Disable.

3.2.4.6 Wait For “F1” If Error

Wait for the F1 key to be pressed if an error occurs.

3.2.4.7 Hit “DEL” Message Display

Displays “Press DEL to run Setup” in POST.

3.2.4.8 Interrupt 19 Capture

Enable or disable option ROM to trap interrupt 19.

3.2.4.9 Bootsafe function

Enable or disable Advantech proprietary Bootsafe function.

3.2.5 Security Setup

Figure 3.14 Password Configuration

Select Security Setup from the ARK-5260 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>:

3.2.5.1 Change Supervisor Password

Provides for either installing or changing the password.

3.2.5.2 Boot sector Virus protection

The boot sector virus protection will warn if any program tries to write to the boot sector.

3.2.6 Advanced Chipset Settings



Figure 3.15 Advanced Chipset Settings

3.2.6.1 North Bridge Configuration

Allows user to set graphic and memory controller configurations.

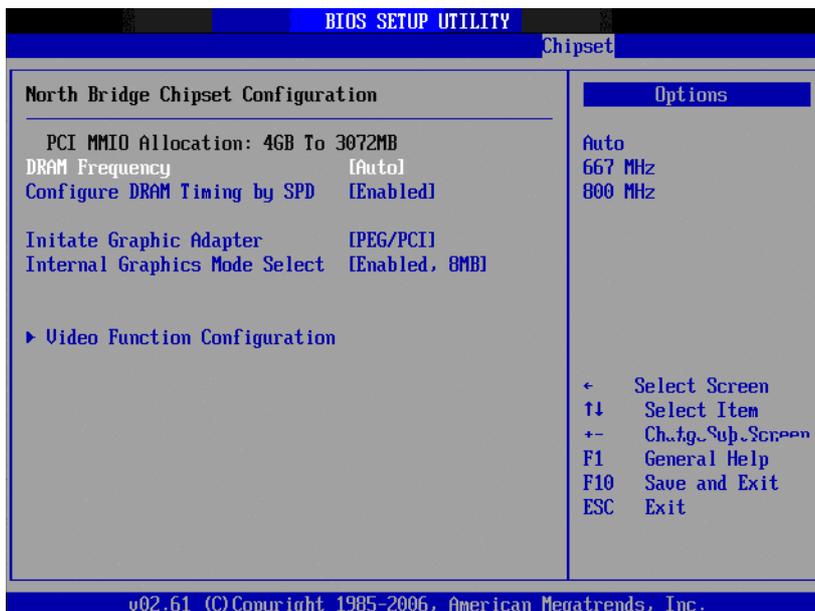


Figure 3.16 North Bridge Configuration

- **DRAM Frequency**
Allows user to set DDR2 memory operating frequency.
- **Configure DRAM Timing by SPD**
Allows user to set DRAM operating timing coefficients by SPD or Manual.
- **Initiate Graphic Adapter**
Allows user to set initial video output device. Available options include IGD, PCI/IGD.
- **Internal Graphics Mode Select**

Allows user to set graphic mode for DOS environment. Available options include Disable, Enable 4MB, Enable 8MB.

■ Video Function Configuration

This allows user to set IGD (Integrated Graphics Device) configuration.

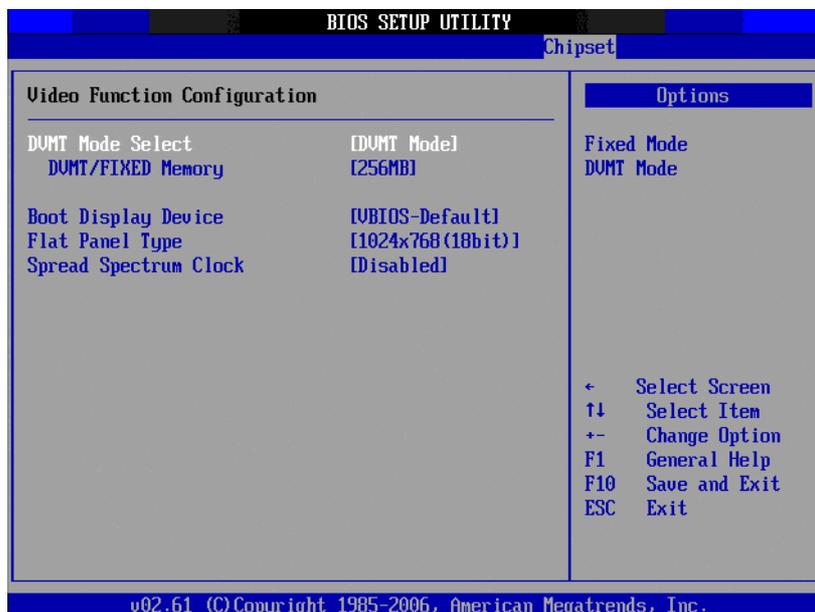


Figure 3.17 Video Function Configuration

- **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.
- **Flat Panel Type**
Allows user to set LVDS panel resolution and signal width. This should match the specification of LVDS panel connected to the CPU card.
- **Spread Spectrum**
Enable/Disable spread spectrum. Enable spread spectrum function can have better EMI compatibility but may cause some unexpected peripheral device incompatibility issue.

3.2.6.2 South Bridge Configuration

Allows user to set I/O port configurations.

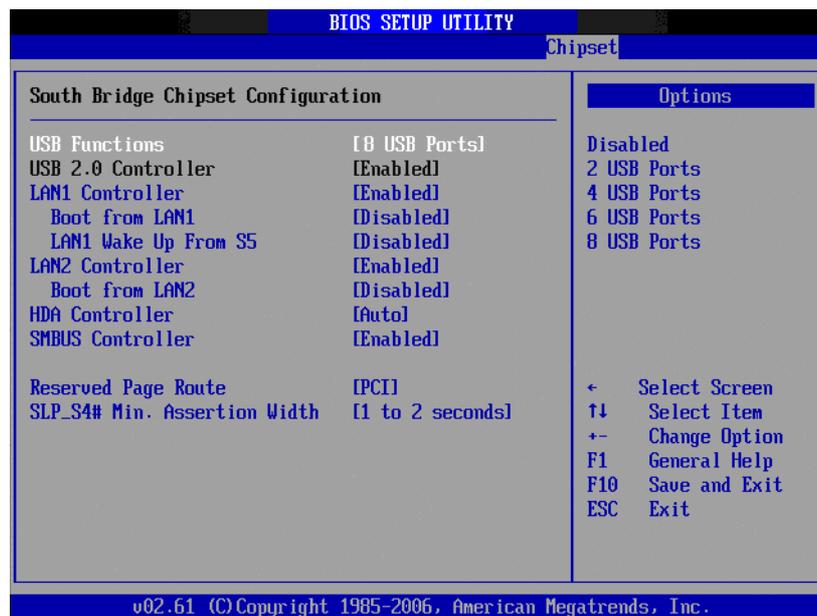


Figure 3.18 South Bridge Configuration

- **USB Functions**
Select: Disabled, 2 USB Ports, 4 USB Ports, 6 USB Ports or 8 USB Ports.
- **USB 2.0 Controller**
Enables or disables the USB 2.0 controller.
- **LAN 1/2 Controller**
Enables or disables the LAN 1/2 GbE controller(s). The options below are also available.
 - **Boot from LAN1/2**
Allows user to enable or disable the function of LAN booting from a PXE server.
 - **LAN1 Wake Up From S5:**
Enables or disables LAN1 Wake Up From S5 function.
 - **Boot from LAN 1/2:**
Enables or disables GbE LAN 1/2 boot function.
- **HDA Controller**
Enables or disables the High Definition audio controller.
- **SMBUS Controller**
Enables or disables the SMBUS controller.
- **Reserved Page Route**
Allows user to set Port 80 information output port. Available options include PCI, LPC.
- **SLP_S4# Min. Assertion Width**
This is for setting delay time between stand by power readiness and ICH SLP_S4# signal triggering. Available options include 1 to 2 seconds, 2 to 3 seconds, 3 to 4 seconds, 4 to 5 seconds.

3.2.6.3 Spread Spectrum

Enable/Disable spread spectrum. Enable spread spectrum function can have better EMI compatibility but may cause some unexpected peripheral device incompatibility issue.

3.2.7 Exit Options

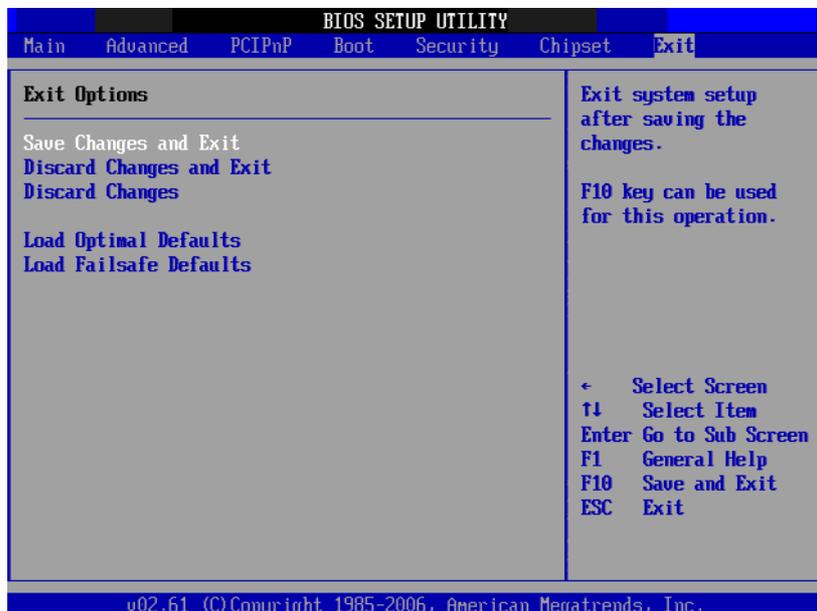


Figure 3.19 Exit Options

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

3.2.7.2 Discard Changes and Exit

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

1. Select Discard Changes and Exit 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.

3.2.7.3 Discard Changes

1. Select Discard Changes from the Exit menu and press <Enter>.

3.2.7.4 Load Optimal Defaults

The ARK-5260 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>.

3.2.7.5 Load Failsafe Defaults

The ARK-5260 automatically configures all setup options to failsafe settings when you select this option. Failsafe Defaults are designed for maximum system stability, but not maximum performance. Select Failsafe Defaults if your computer is experiencing system configuration problems.

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

Chapter 4

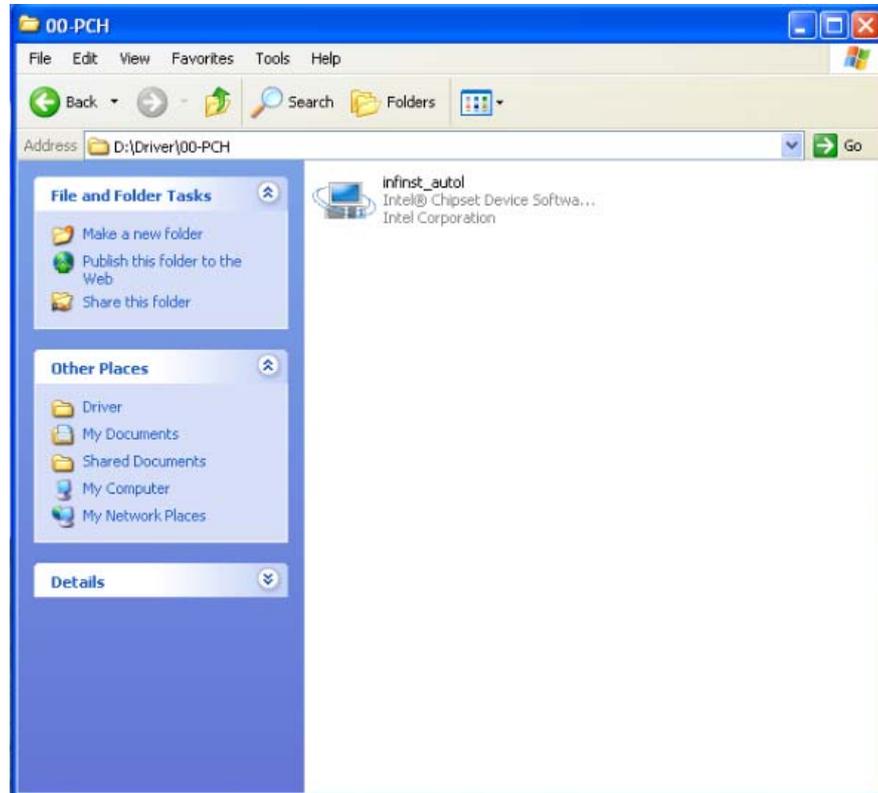
Software installation

This chapter introduces driver installation.

4.1 Driver Installation

4.1.1 Chipset driver installation

1. Change folder address to \Driver\00-PCH. And double click to execute infinst_autol.exe.



2. Click "Next" button to the next step.



3. Click "Yes" to accept License Agreement.



4. Click "Next" to exit Readme File Information window.

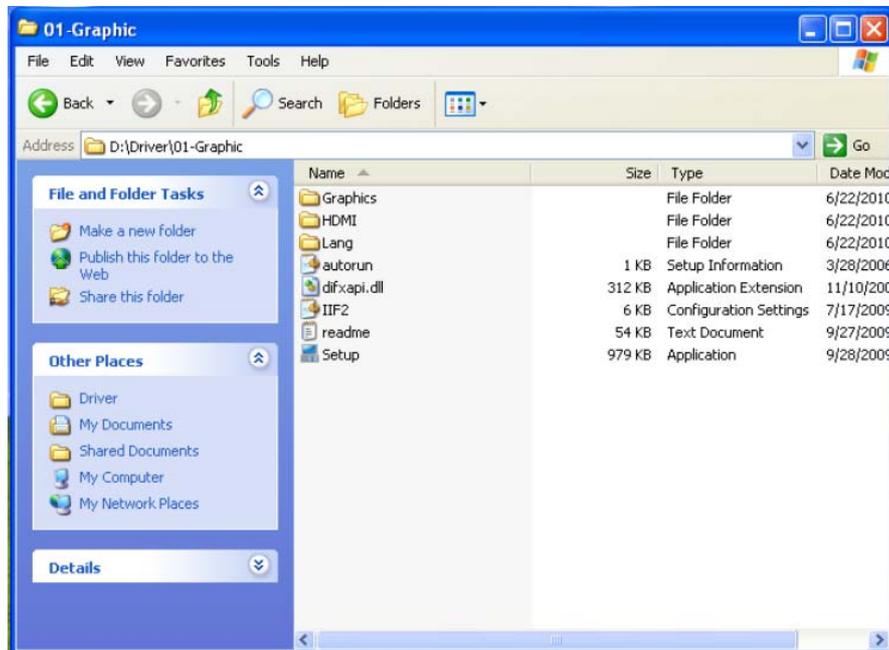


5. Select "Yes, I want to restart this computer now." and click "Finish" bottom. The computer will restart automatically. Then the driver installation is completed.



4.1.2 Graphic driver installation

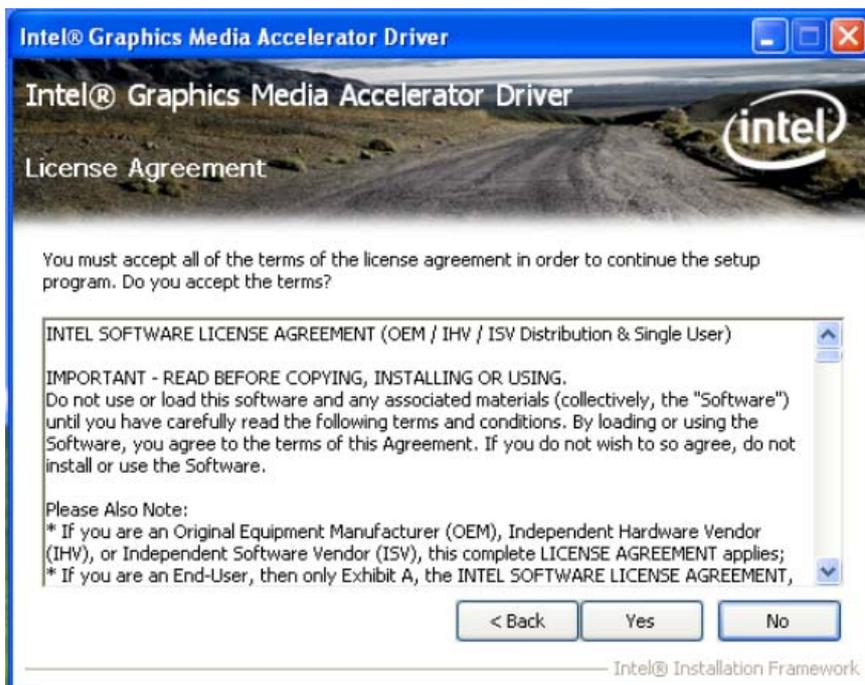
1. Change folder address to \Driver\01-Graphic. And double click to execute setup.exe



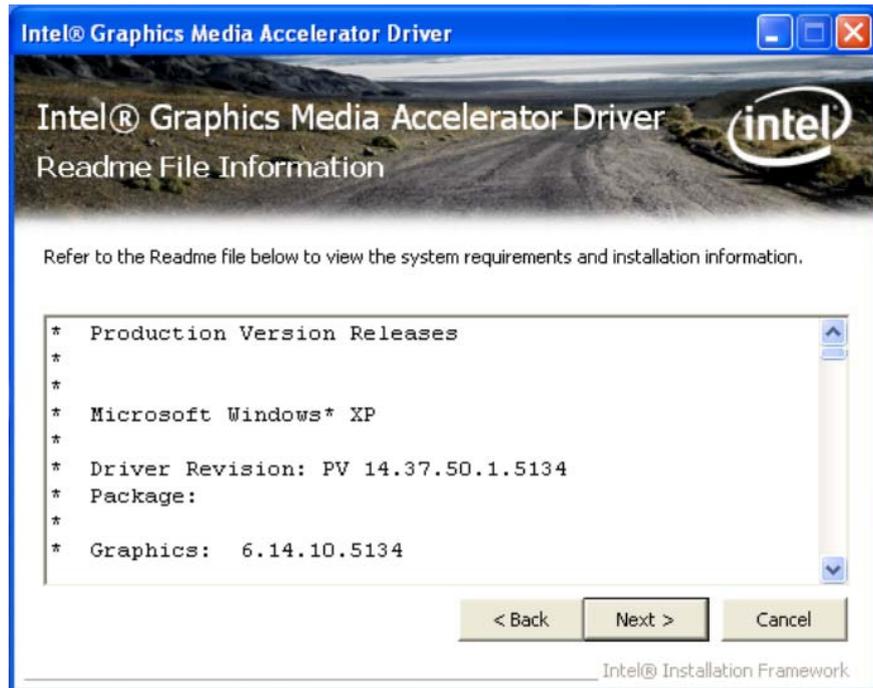
2. Click "Next" button to skip through welcome window.



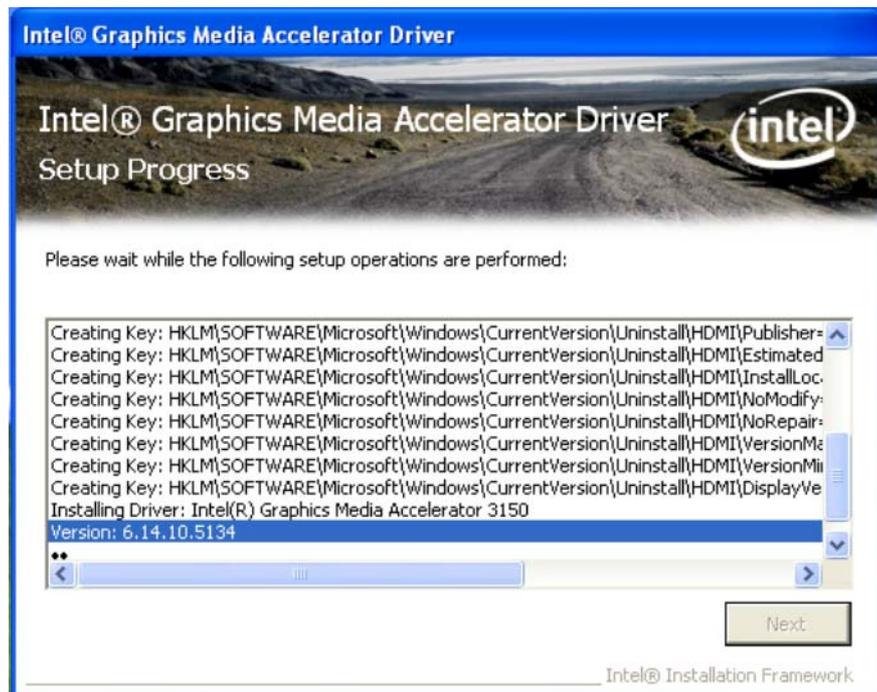
3. Click "Yes" to accept License Agreement.



4. Click "Next" to exit Readme File Information window.



5. Click "Next" button to continue.

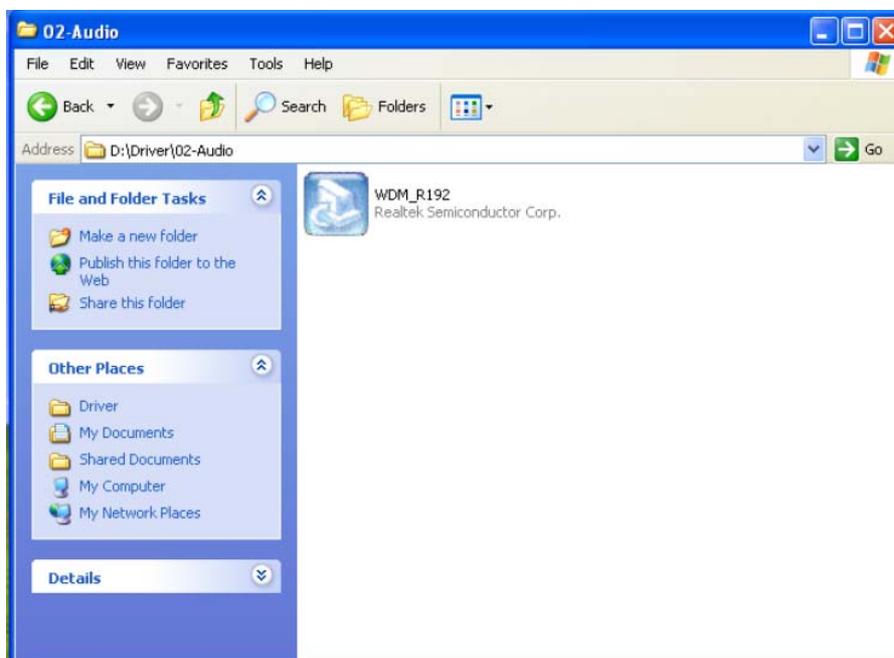


6. Select "Yes, I want to restart this computer now." and click "Finish" button. The computer will restart automatically. Then the driver installation is completed.

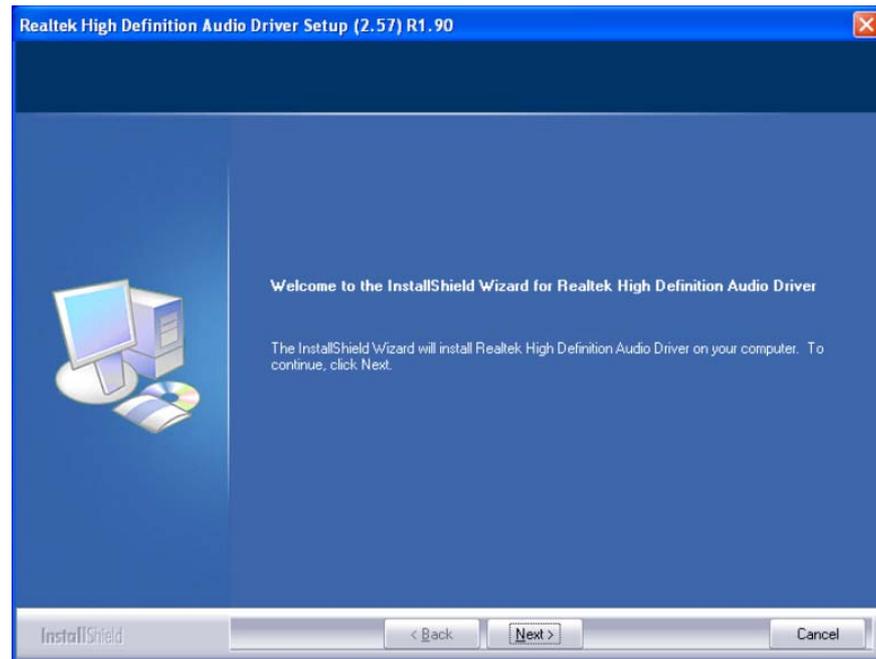


4.1.3 Audio Driver Installation

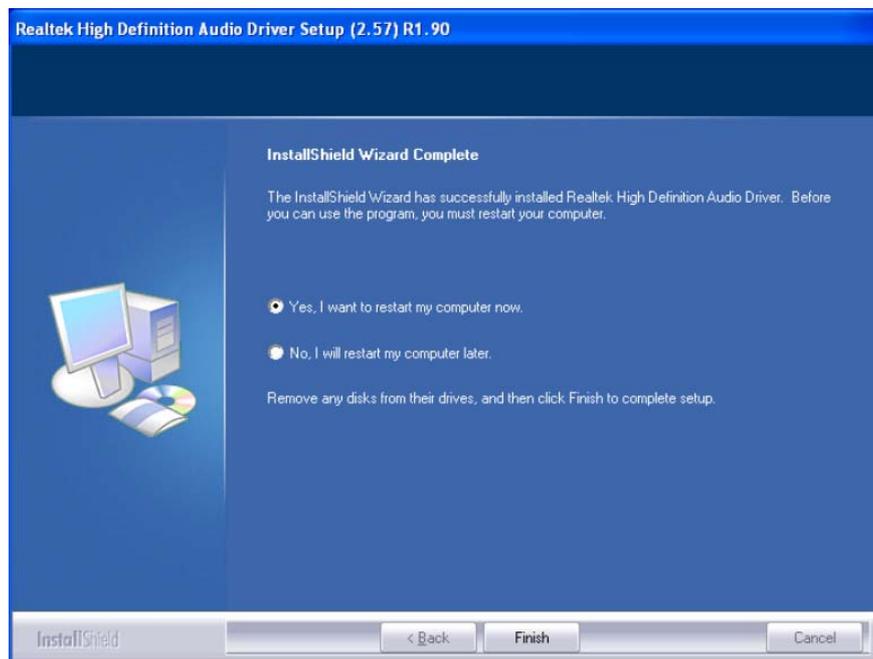
1. Change folder address to \Driver\02-Audio. And double click to execute WDM_R192.exe.



2. Click "Next" button to skip welcome message.

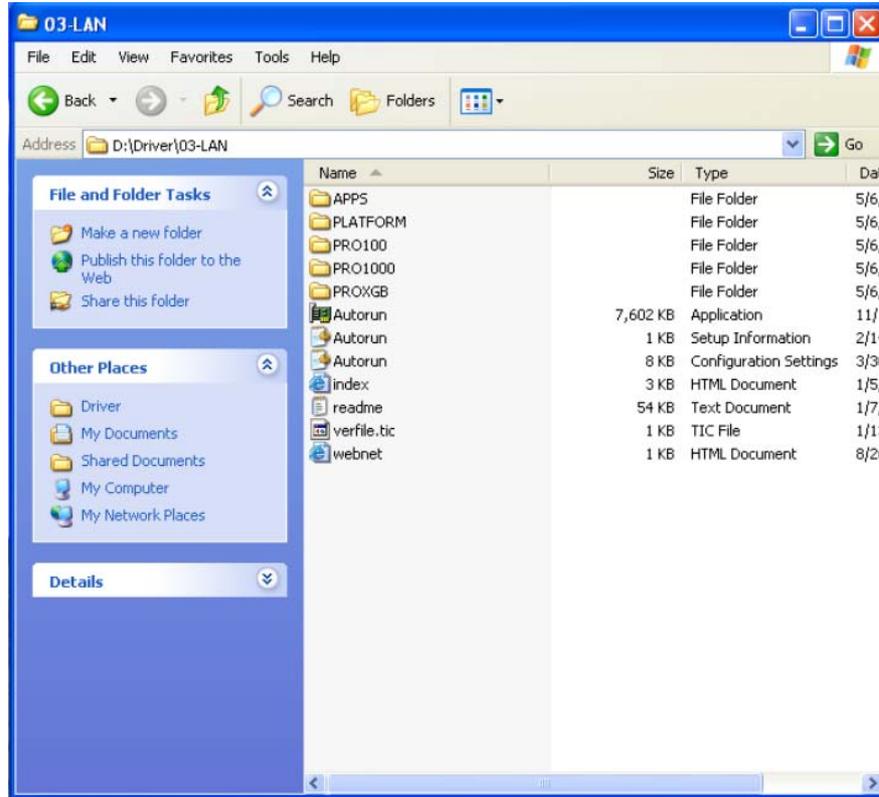


3. Select "Yes, I want to restart this computer now." and click "Finish" button. The computer will restart automatically. Then the driver installation is completed.

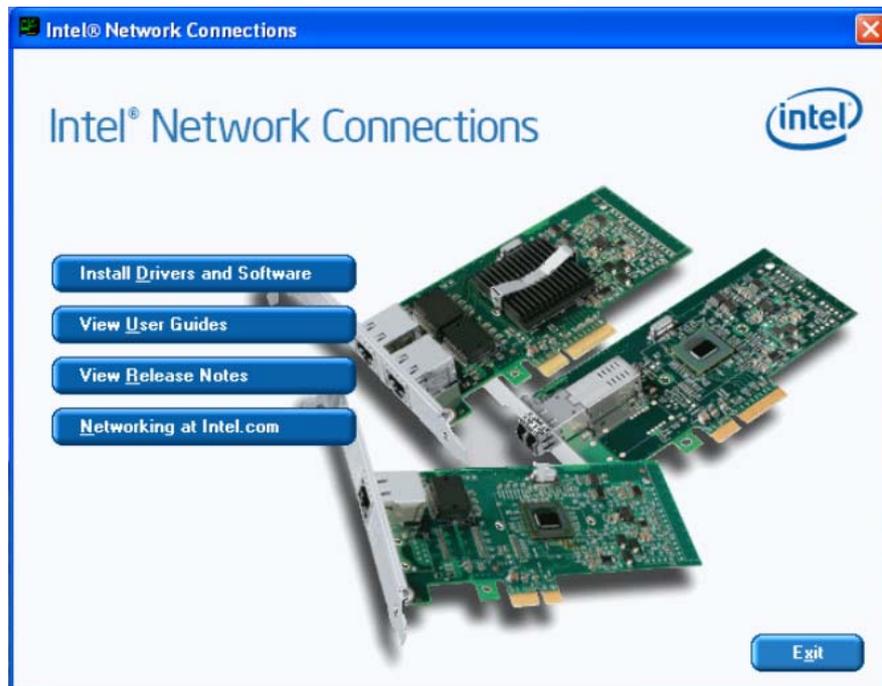


4.1.4 LAN Driver Installation

1. Change folder address to \Driver\03-LAN. And double click to execute Auto-run.exe.



2. Select "Install Drivers and Software".



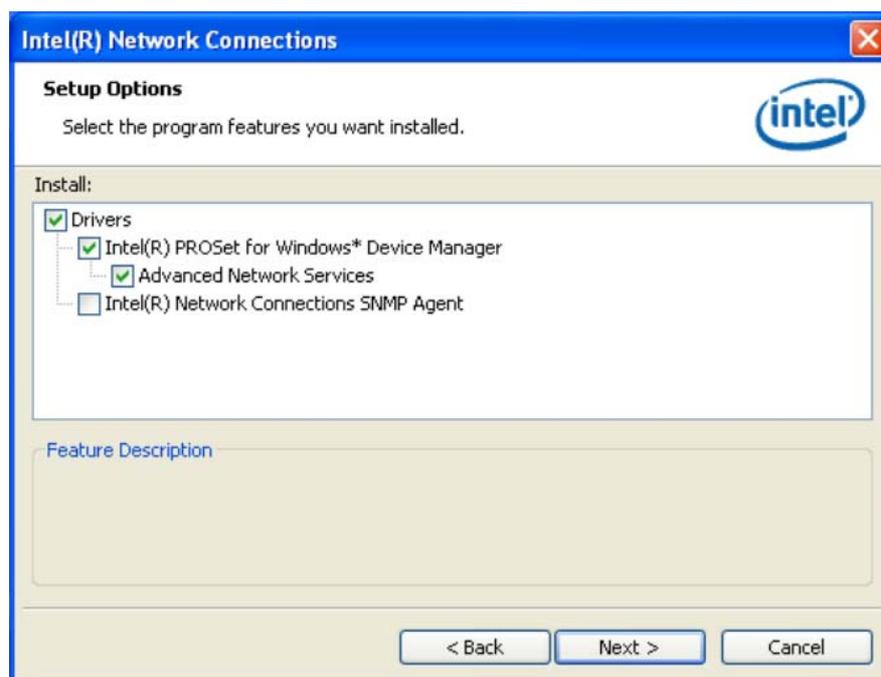
3. Click "Next" button to the next step.



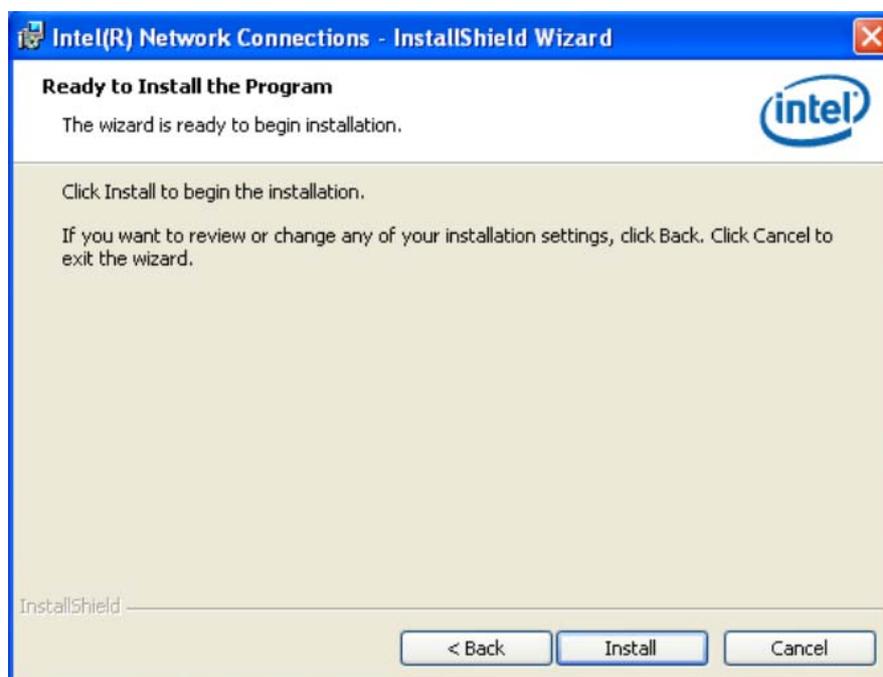
4. Select "I accept the terms in the license agreement", and click "Next" button.



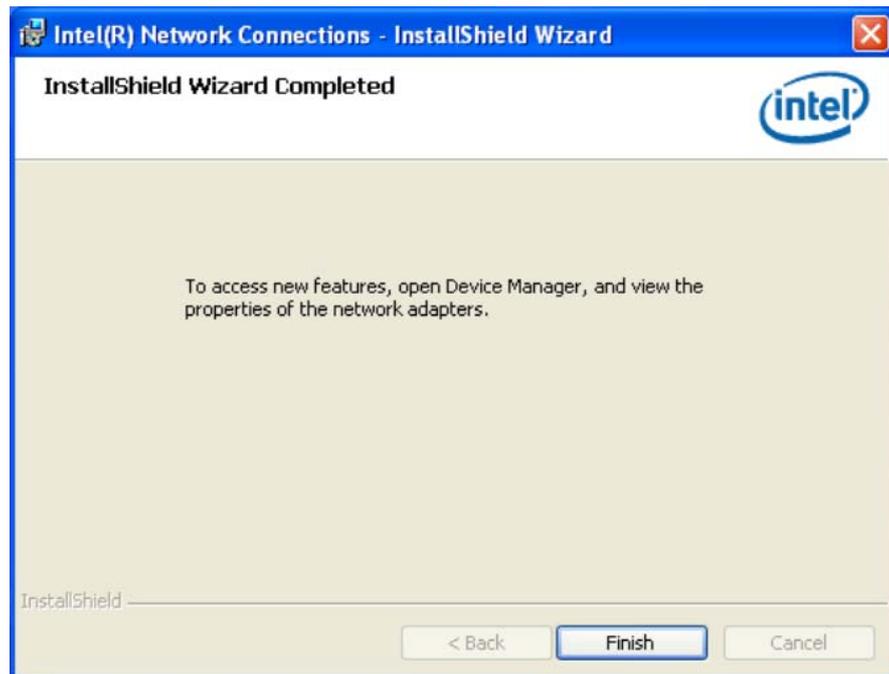
5. Select Drivers -> Intel(R) PROSet for Windows* Device Manager -> Advanced Networks Services [by default setting]. And click "Next" button to next step.



6. Click "Install" button to start Installation.



7. The network driver installation is completed. Click "Finish" button to exit Install Shield.



Appendix **A**

Programming the
Watchdog Timer

A.1 Watchdog Timer

The ARK-5260's watchdog timer can be used to monitor system software operation and take corrective action if the software fails to function after a programmed period. This section describes the operation of the watchdog timer and how to program it.

A.1.1 Watchdog Timer Overview

The watchdog timer is built into the super I/O controller W83627DHG-P. It provides the following functions for user programming:

- Can be enabled and disabled by user program.
- Timer can be set from 1 to 255 seconds or 1 to 255 minutes.
- Generates an interrupt or resets signal if the software fails to reset the timer after time-out.

A.1.2 Reset/ Interrupt Selection

The JWDT1 jumper is used to trigger system reset signal or to change GPIO14 state in the event the watchdog timer is tripped. See Chapter 1 for detailed jumper settings.

A.1.3 Programming the Watchdog Timer

The I/O port address of the watchdog timer is 2E(hex) and 2F(hex).

2E (hex) is the address port. 2F(hex) is the data port.

You must first assign the address of the register by writing an address value into address port 2E(hex), then write/read data to/from the assigned register through data port 2F (hex).

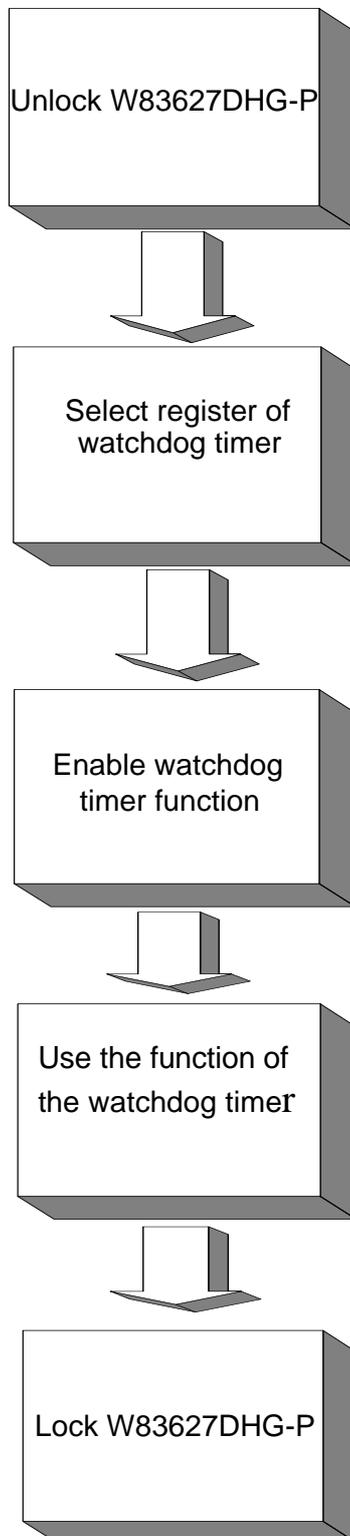


Table A.1: Watchdog Timer Registers

Address of register (2E)	Attribute	Value (2F) and description
87 (hex)	-----	Write this address to I/O address port 2E (hex) twice to unlock the W83627DHG-P
07 (hex)	write	Write 08 (hex) to select register of watchdog timer.
30 (hex)	write	Write 01 (hex) to enable the function of the watchdog timer. Disabled is set as default.
F5 (hex)	write	Set seconds or minutes as units for the timer. Write 0 to bit 3: set second as counting unit. [default]
		Write 1 to bit 3: set minute as counting unit
F6 (hex)	write	0: stop timer [default] 01~FF (hex): The amount of the count, in seconds or minutes, depends on the value set in register F5 (hex). This number decides how long the watchdog timer waits for strobe before generating an interrupt or reset signal. Writing a new value to this register can reset the timer to count with the new value.
F7 (hex)	read/write	Bit 6: Write 1 to enable keyboard to reset the timer, 0 to disable.[default] Bit 5: Write 1 to generate a timeout signal immediately and automatically return to 0. [default=0] Bit 4: Read status of watchdog timer, 1 means timer is "time out".
AA (hex)	-----	Write this address to I/O port 2E (hex) to lock the watchdog timer. ²

A.1.4 Example Program

1. Enable watchdog timer and set 10 sec. as timeout interval

```

;-----
Mov dx,2e          ; Unlock W83627DHG-P
Mov al,87h
Out dx,al
Out dx,al
;-----
Mov al,07h        ; Select registers of watchdog timer
Out dx,al
Inc dx
Mov al,08h
Out dx,al
;-----
Dec dx            ; Enable the function of watchdog timer
Mov al,30h
Out dx,al
Inc dx
Mov al,01h
Out dx,al
;-----
Dec dx            ; Set second as counting unit
Mov al,0f5h
Out dx,al
Inc dx
In al,dx
And al,not 08h
Out dx,al
;-----
Dec dx            ; Set timeout interval as 10 seconds and start counting
Mov al,0f6h
Out dx,al
Inc dx
Mov al,10
Out dx,al
;-----
Dec dx            ; lock W83627DHG-P
Mov al,0aah
Out dx,al

```

2. Enable watchdog timer and set 5 minutes as timeout interval

```

;-----
Mov dx,2eh        ; unlock W83627DHG-P
Mov al,87h
Out dx,al
Out dx,al

```

```

;-----
Mov al,07h      ; Select registers of watchdog timer
Out  dx,al
Inc  dx
Mov  al,08h
Out  dx,al
;-----
Dec dx          ; Enable the function of watchdog timer
Mov  al,30h
Out  dx,al
Inc  dx
Mov  al,01h
Out  dx,al
;-----
Dec dx          ; Set minute as counting unit
Mov  al,0f5h
Out  dx,al
Inc  dx
In   al,dx
Or  al,08h
Out  dx,al
;-----
Dec dx          ; Set timeout interval as 5 minutes and start counting
Mov  al,0f6h
Out  dx,al
Inc  dx
Mov  al,5
Out  dx,al
;-----
Dec dx          ; lock W83627DHG-P
Mov  al,0aah
Out  dx,al
3.    Enable watchdog timer to be reset by mouse
;-----
Mov dx,2eh      ; unlock W83627DHG-P
Mov al,87h
Out dx,al
Out dx,al
;-----
Mov al,07h      ; Select registers of watchdog timer
Out  dx,al
Inc  dx
Mov  al,08h
Out  dx,al
;-----

```

```

Dec dx          ; Enable the function of watchdog timer
Mov  al,30h
Out  dx,al
Inc  dx
Mov  al,01h
Out  dx,al

```

```

;-----
Dec dx          ; Enable watchdog timer to be reset by mouse
Mov  al,0f7h
Out  dx,al
Inc  dx
In   al,dx
Or  al,80h
Out  dx,al

```

```

;-----
Dec dx          ; lock W83627DHG-P
Mov  al,0aah
Out  dx,al
4.   Enable watchdog timer to be reset by keyboard

```

```

;-----
Mov dx,2eh     ; unlock W83627DHG-P
Mov al,87h
Out dx,al
Out dx,al

```

```

;-----
Mov al,07h     ; Select registers of watchdog timer
Out  dx,al
Inc  dx
Mov  al,08h
Out  dx,al

```

```

;-----
Dec dx          ; Enable the function of watchdog timer
Mov  al,30h
Out  dx,al
Inc  dx
Mov  al,01h
Out  dx,al

```

```

;-----
Dec dx          ; Enable watchdog timer to be strobed reset by keyboard
Mov  al,0f7h
Out  dx,al
Inc  dx
In   al,dx
Or  al,40h
Out  dx,al

```

```

;-----
Dec dx          ; lock W83627DHG-P
Mov   al,0aah
Out   dx,al
5.    Generate a time-out signal without timer counting
;-----

Mov dx,2eh      ; unlock W83627DHG-P
Mov al,87h
Out dx,al
Out dx,al
;-----

Mov al,07h      ; Select registers of watchdog timer
Out   dx,al
Inc   dx
Mov   al,08h
Out   dx,al
;-----

Dec dx          ; Enable the function of watchdog timer
Mov   al,30h
Out   dx,al
Inc   dx
Mov   al,01h
Out   dx,al
;-----

Dec dx          ; Generate a time-out signal
Mov   al,0f7h
Out   dx,al          ;Write 1 to bit 5 of F7 register
Inc   dx
In    al,dx
Or   al,20h
Out   dx,al
;-----

Dec dx          ; lock W83627DHG-P
Mov   al,0aah
Out   dx,al

```

Appendix **B**

Programming the
GPIO

B.1 Supported GPIO Register

Bellow are detailed description of the GPIO addresses and programming sample.

B.1.1 GPIO Registers

CRF0 (GP10-GP17 I/O selection register. Default 0xFF)

When set to '1', the respective GPIO port is programmed as an input port.

When set to '0', the respective GPIO port is programmed as an output port.

CRF1 (GP10-GP17 data register. Default 0x00)

If a port is programmed to be an output port, then its respective bit can be read/written.

If a port is programmed to be an input port, then its respective bit can only be read.

CRF2 (GP10-GP17 inversion register. Default 0x00)

When set to '1', the incoming/outgoing port value is inverted.

When set to '0', the incoming/outgoing port value is the same as in data register.

Extended Function Index Registers (EFIRs)

The EFIRs are write-only registers with port address 2Eh or 4Eh on PC/AT systems.

Extended Function Data Registers(EFDRs)

The EFDRs are read/write registers with port address 2Fh or 4Fh on PC/AT systems

B.1.2 GPIO Example Program

 Enter the extended function mode, interruptible double-write

```
MOV DX,4EH
MOV AL,87H
OUT DX,AL
OUT DX,AL
```

 Configure logical device 7(GP10~GP17), configuration register CRF0,CRF1,CRF2

```
MOV DX,4EH
MOV AL,07H ; point to Logical Device Number Reg.
OUT DX,AL
MOV DX,4FH
MOV AL,07H ; select logical device 7
OUT DX,AL ;
MOV DX,4EH
MOV AL,F0
OUT DX,AL
MOV DX,4FH
MOV AL,00H ; 01:Input 00:output for GP10~GP17
OUT DX,AL
MOV DX,4EH
MOV AL,F2H ;
OUT DX,AL
MOV DX,4FH
MOV AL,00H ;Set GPIO is normal not inverter
OUT DX,AL;
MOV DX,4EH
MOV AL,F1H
OUT DX,AL
MOV DX,4FH
MOV AL,??H ; Put the output value into AL
OUT DX,AL
```

Exit extended function mode

```
MOV DX,4EH
MOV AL,AAH
OUT DX,
```

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