User Manual

ARK-3440

Fanless Embedded Box PC

ADVANTECH
Enabling an Intelligent Planet

Copyright

The documentation and the software included with this product are copyright © 2012 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice.

No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. Information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements of the rights of third parties, which may result from its use.

Acknowledgements

Award is a trademark of Award Software International, Inc.

VIA is a trademark of VIA Technologies, Inc.

IBM, PC/AT, PS/2 and VGA are trademarks of International Business Machines Corporation.

Intel® and Pentium® are trademarks of Intel Corporation.

Microsoft Windows® is a registered trademark of Microsoft Corp.

RTL is a trademark of Realtek Semi-Conductor Co., Ltd.

ESS is a trademark of ESS Technology, Inc.

UMC is a trademark of United Microelectronics Corporation.

SMI is a trademark of Silicon Motion, Inc.

Creative is a trademark of Creative Technology LTD.

CHRONTEL is a trademark of Chrontel Inc.

All other product names or trademarks are properties of their respective owners.

For more information about this and other Advantech products, please visit our website at:

http://www.advantech.com/

http://www.advantech.com/ePlatform/

For technical support and service, please visit our support website at:

http://support.advantech.com.tw/support/

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. 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. 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.

    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.

14. 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.
15. 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.
16. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).
17. RESTRICTED ACCESS AREA: The equipment should only be installed in a Restricted Access Area.
18. 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-3440 Unit
- 1 x Rubber foot kit
- 2 x Desk/Wall mount plate
- 1 x 4-pin Phoenix DC power connector
- 1 x DVI-I to VGA adaptor
- 1 x CPU thermal grease pad
- 1 x HDD thermal pad
- 1 x Utility CD
- 1 x Registration and 2 years Warranty card

Ordering information

Model Number Description

ARK-3440F-U5A2E	Core i7-610E 2.53 GHz fanless embedded box
ARK-3440F-U4A2E	Core i5-520E 2.4 GHz fanless embedded box
ARK-3440F-U1A2E	Core i3 330E 2.13 GHz fanless embedded box

Optional accessories

Part Number	Description
1757002161	AC-to-DC Adapter, DC19 V/7.89A 150W, with Phoenix Power Plug, 0 ~ 40° C for Home and Office Use
1702002600	Power cable 3-pin 180 cm, USA type
1702002605	Power Cable 2-pin 180 cm, Europe Type
1702031801	Power Cable 2-pin 180 cm, UK Type
1700004713	Cable DVI-I to DVI and CRT
1700009398	LVDS cable for ARK-3440
1700009396	LVDS power cable for ARK-3440
1700009405	LPT cable for ARK-3440

Contents

Chapter 1

General Introduction

This chapter gives background information on the ARK-3440 series.

1.1 Introduction

ARK-3440 Box IPC is an ideal, application-ready, system platform solution. All electronics are protected in a compact sealed aluminum case for easy embedding in the customer's own housing, or as a stand-alone where space is limited and the environment is harsh.

The ARK-3440 provides system integrators with a turnkey solution and a versatile application development path without breaking the bank or missing time-to-market deadlines.

The ARK-3440 can be used as a standalone system, either wall-mounted or desktop mounted. The system accepts a wide range of power supplies (DC power in) and comes with a footprint of only 220 mm x 117 mm x 200 mm (8.66" x 4.60" x 7.87"). The rugged, cast aluminum case is sealed against dust and not only provides great protection from EMI, shock/vibration, cold and heat, but also passive cooling for super quiet, fanless operation.

The ARK-3440 offers 1 x DVI-I interface for dual display, 6 x USB 2.0 ports, 2 x Giga LAN ports, audio function, 3 x COM ports, 2 x Mini PCI sockets, and 2 x PCI/PCI Express expansion slots; all packed into a small, rugged unit and powered by an Intel® Core™ i7/i5/i3 processor. It also supports a wide range of input voltages, from 9 V_{DC} to 34 V_{DC}. The ARK-3440 IPC supports 2 x 2.5" SATA HDD and 1 x Compact Flash card for storage options; it supports diversified fields of application.

1.2 Product Features

1.2.1 General

- Intel® Mobile Core™ i7-610E 2.53 GHz / Core i5-520E 2.4 GHz / Core i3-330E 2.13 GHz
- Dual display and support for wide screen with high resolution
- Supports 2 GbE, eSATA, 6 USB 2.0 and 3 COMs
- Internal two 2.5-inch SATA HDD drive bay
- Various expansion interfaces for diverse applications
- Easy integration, easy maintenance, and wide input voltage range

1.2.2 Display

- **VGA display:** Using a DVI to VGA adapter connector
- **Dual display:** VGA + DVI-D extended by DVI-I Y-cable (Optional)
- **LVDS support:** Supports 48-bit LVDS interface (Optional)
- **HDMI display:** Supports HDMI 1.3

1.2.3 Power Consumption

- **Typical:** 38 W (CPU is Intel® Mobile Core™ i7-610E at 2.53 GHz and w/o expansion)
- **Max.:** 52.6 W (CPU is Intel® Mobile Core™ i7-610E 2.53 GHz and w/o expansion)

1.3 Hardware Specifications

- **CPU:** Intel$^®$ Core™ i7-610E 2.53 GHz / Core™ i5-520E 2.4GHz / CoreTM i3-330E 2.13 GHz

- **System Chipset:** Intel$^®$ QM57
- **BIOS:** AMI™ 64 bit, SPI
- **System Memory:** 2 x 204-pin-pin SODIMM socket, Support DDR3 1066 MHz, up to 4 GB
- **SSD:** Supports 1 x CF Card TYPE I/II
- **HDD:** Supports 2 x 2.5" SATA HDD
  - Removable HDD bay supports up to 9.5
  - Internal HDD bay supports up to 12. 8 mm height
- **I/O Interface:** 2 x RS232, 1 x RS232/422/485 (w/ auto flow control) (Optional 2 x RS-232, 1 x RS-232/422/485 by cable)
- **USB:** 6 x USB 2.0 compliant Ports
- **Audio:** Supports Line-in, Line-out, Microphone-in
- **Ethernet Chipset:** 1 x Intel$^®$ 82577 & 1 x Intel$^®$ 82583V (Gigabit LAN)
  - Speed: 10/100/1000 Mbps
  - Interface: 2 x RJ45 w/ LED
  - Standard: IEEE 802.3z/ab (1000 Mbps) or IEEE 802.3u 100 Mbps compliant
- **Expansion:**
  - PCI: 1 slot
  - PCI Express x1: 1 slot
  - Mini PCIe: 2 sockets
- **Chipset:** Integrated graphics built in PCH
- **Resolution:**
  - VGA: Supports resolutions up to 2048 x 1536 @ 60 Hz
  - DVI: Supports resolutions up to 1920 x 1200 @ 60 Hz
  - HDMI: Supports resolutions up to 1920 x 1200 @ 60 Hz
- **Dual Independent:** VGA + DVI-D (Extended by DVI-I Y-cable), VGA + HDMI, DVI + HDMI

1.4 Mechanical Specifications

1.4.1 Dimensions

Units: mm
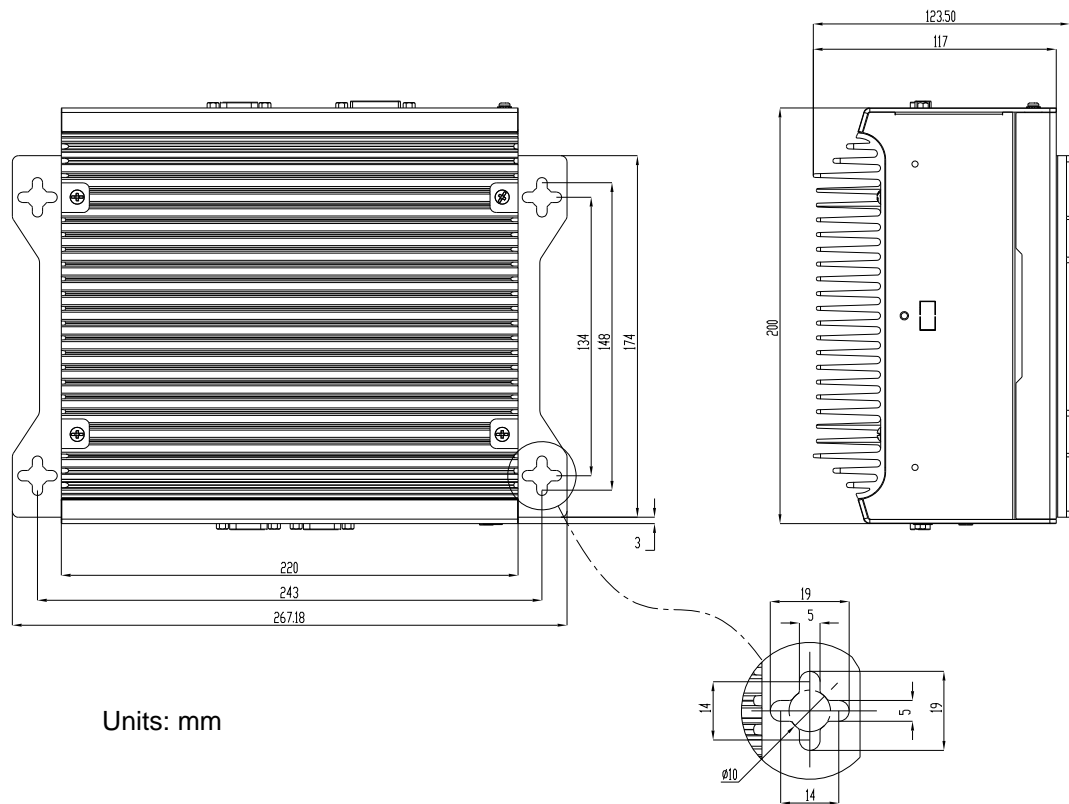
Figure 1.1 ARK-3440 Mechanical Dimensions Drawing

1.4.2 Weight

4.0 kg (8.8lb)

1.5 Power Requirements

1.5.1 System power

Minimum power input: DC 9 V ~ 34 V 9.0 A ~ 2.4 A

1.5.2 RTC battery

3 V / 195 mAH BR2032

1.6 Environmental Specifications

1.6.1 Operating temperature

- With Industrial Grade CompactFlash disk: 0 ~ 50° C, with air flow
- With 2.5" consumer grade HDD on internal HDD bay: 0 ~ 45° C, with air flow

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 CompactFlash disk: 5 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct./min, 1 hr/axis.
- With 2.5-inch hard disk: 1 Grms, IEC 60068-2-64, random, 5 ~ 500 Hz, 1 Oct./min, 1 hr/axis.

1.6.5 Shock during operation

- With CompactFlash disk: 50 G, IEC 60068-2-27, half sine, 11 ms duration
- With hard disk: 20 G, IEC 60068-2-27, half sine, 11 ms duration

1.6.6 Safety Certifications

UL, CCC, BSMI and CB

1.6.7 EMC

CE, FCC, CCC, BSMI

Chapter 2

Hardware installation

This chapter introduces external IO and the installation of ARK-3440 Hardware.

2.1 I/O Locations
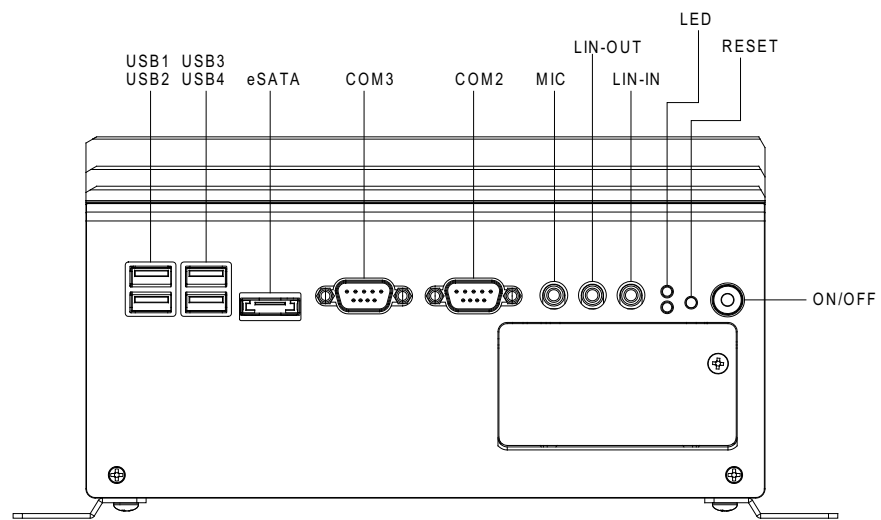
Figure 2.1 ARK-3440 Front View
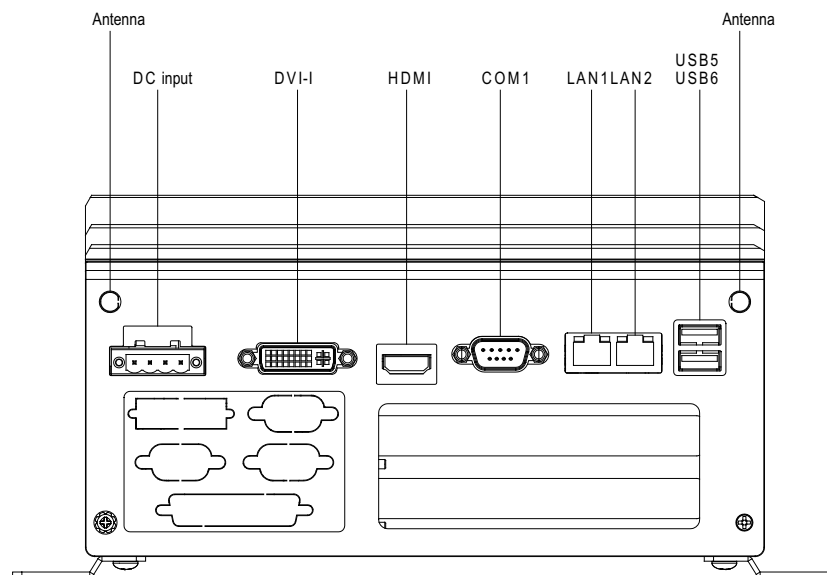
Figure 2.2 ARK-3440 Rear View

2.2 Front Panel Controls, Indicators, & Connectors

2.2.1 Power ON/OFF Button

ARK-3440 has a Power On/Off button with LED indicators on the front side that show On status (Green LED) and Off/Suspend status (Orange LED). The Power button supports dual functions: Soft Power -On/Off (Instant off or Delay 4 Seconds then off), and Suspend.
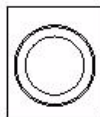
Figure 2.3 Power ON/OFF Button

2.2.2 Reset Button

ARK-3440 has a Reset button on the front panel. Press the button to activate the reset function.

Figure 2.4 Reset Button

2.2.3 LED Indicators

There are two LEDs on the front panel that indicate system status: The thermal LED is for system thermal alarm status; and HDD LED is for HDD and compact flash disk status.
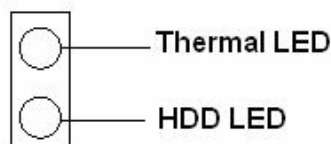
Figure 2.5 LED Indicators

2.2.4 Audio Connectors

ARK-3440 offers stereo audio ports by three phone jack connectors: Speaker Out, Line In, and Mic-In. Audio chip is ALC888, compliant with Azalea standard; the Speaker Out supports 3D surround stereo, with dual 2.2W amplifier.
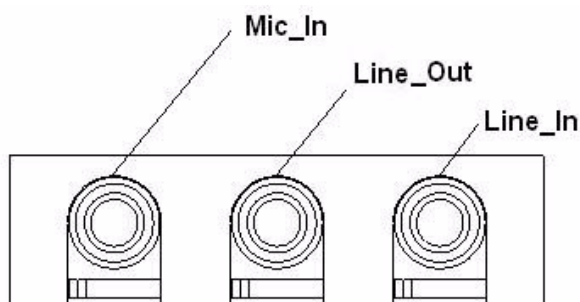
Figure 2.6 Audio jack connectors

2.2.5 COM Connector

ARK-3440 provides 6 D-sub 9-pin connectors that are serial communication interface ports. The COM1 on the rear panel supports RS-232/422/485 mode by BIOS selection; COM2 and 3 on the front panel and COM5 and 6 on the internal header only. The COM1 and COM4 default settings are RS-232; if you want to use RS-422/485, make the change in BIOS setup.
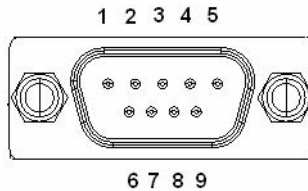
Figure 2.7 COM port connector

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

Table 2.1: COM standard serial port pin assignments

Note: NC represents "No Connection".

2.2.6 eSATA Connector

ARK-3440 has a 7-pin external connector for an eSATA device. It is fully compliant with SATA I/SATA II standards, and supports external SATA I/SATA II devices up to 300MB/sec.

Figure 2.8 eSATA connector

2.2.7 USB Connector

ARK-3440 provides six USB connectors that give complete Plug & Play and hot swapping for up to 127 external devices. The USB interface complies with USB UHCI, Rev. 2.0 compliant. The USB interface can be disabled in the system BIOS setup. Please refer to Table. 2.2 For pin assignments.

The USB connectors are used for connecting any device that conforms to the USB standard, and many recent digital devices do. The USB interface supports Plug and Play, which enables you to connect or disconnect a device whenever you want, without turning off the computer.
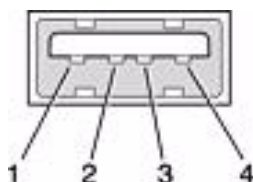
Figure 2.9 USB connector

Table 2.2: USB Connector			
Pin	**Signal name**	**Pin**	**Signal name**
1	VCC	2	USB_data-
3	USB_data+	4	GND

2.2.8 Compact Flash Card

ARK-3440 is equipped with an external CF card. You can find the installation in Chapter 2.5.

2.3 Rear Panel I/O Connectors

2.3.1 Power Input Connector

ARK-3440 comes with a two-pin header that carries 9 ~ 34 V_{DC} external power input.
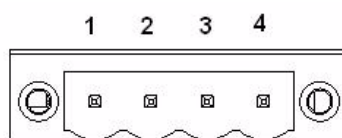
Figure 2.10 Power Input Connector

Table 2.3: Power connector pin assignments	
Pin	**Signal Name**
1	GND
2	+9 ~ 34 V_{DC}
3	+9 ~ 34 V_{DC}
4	GND

2.3.2 Digital Visual Interface Connector (DVI-I)

The ARK-3440 offers an integrated D-sub 24-pin female DVI-I Digital Visual Interface connector; it carries integrated analog and digital video signals. This supports high-speed, high-resolution digital displays and traditional analog displays.
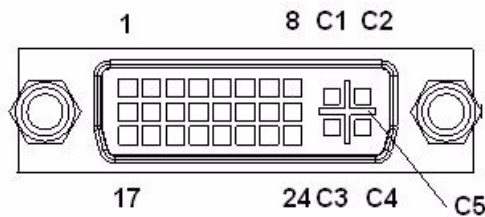
Figure 2.11 DVI-I Connector

Table 2.4: DVI-I Connector pin assignments			
Pin	**Signal Name**	**Pin**	**Signal Name**
1	TMDS Data 2-	2	TMDS Data 2+
3	TMDS Data 2/4 shield	4	TMDS Data 4-
5	TMDS Data 4+	6	DDC clock
7	DDC data	8	Analog vertical sync
9	TMDS Data 1-	10	TMDS Data 1+
11	TMDS Data 1/3 shield	12	TMDS Data 3-
13	TMDS Data 3+	14	+5 V
15	Ground	16	Hot plug detect
17	TMDS data 0-	18	TMDS data 0+
19	TMDS data 0/5 shield	20	TMDS data 5-
21	TMDS data 5+	22	TMDS clock shield
23	TMDS clock+	24	TMDS clock-
C1	Analog red	C2	Analog green
C3	Analog blue	C4	Analog horizontal sync
C5	Analog ground		

2.3.3 HDMI Connector

An integrated, 19-pin receptacle connector HDMI Type A Interface is provided. The HDMI link supports resolutions up to 1920x1200@60Hz.
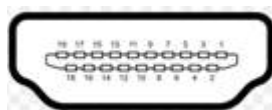
Figure 2.12 HDMI receptacle connector

Table 2.5: HDMI receptacle connector pin assignments			
Pin	**Signal Name**	**Pin**	**Signal Name**
1	TMDS Data 2+	2	TMDS Data 2 shield
3	TMDS Data 2-	4	TMDS Data 1+
5	TMDS Data 1 shield	6	TMDS Data 1-
7	TMDS Data 0+	8	TMDS Data 0 shield
9	TTMDS Data 0-	10	TMDS Clock+
11	TMDS Clock shield	12	TMDS Clock-
13	CEC	14	Reserved
15	SCL	16	SDA
17	DDC/CEC Ground	18	+5V
19	Hot Plug Detect		

2.3.4 Ethernet Connector (LAN)

ARK-3440 provides two RJ45 connectors for Gigabit LAN interfaces; the board is equipped with Intel® 82577LM and 82583V Ethernet controllers that are fully compliant with IEEE 802.3u 10/100/1000 Mbps CSMA/CD standards. The Ethernet ports provide standard RJ-45 jack connectors with LED indicators that show Active/Link status (Green LED) and Speed status (Yellow LED).
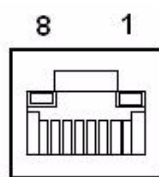
Figure 2.13 Ethernet connector

Table 2.6: RJ-45 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-

2.3.5 LVDS Connector (Optional)

The ARK-3440 supports a D-Sub 26-pin connector that carries an LVDS signal output, and can direct-connect to LVDS LCD display via external cable. The system also provides jumper JP5 on the internal motherboard for selecting the LCD signal power of 5V or 3.3V; please refer to the jumper setting table A.4. The default setting is 3.3V.
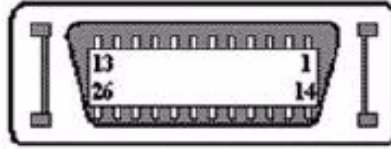
Figure 2.14 LVDS Connector (optional)

Table 2.7: LVDS Connector Pin Assignment			
Pin	**Signal Name**	**Pin**	**Signal name**
1	LVDS_CLKBP	14	LVDS_CLKBM
2	GND	15	LVDS_YAM0
3	LVDS_YAP0	16	LVDS_YAM1
4	LVDS_YAP1	17	LVDS_YAM2
5	LVDS_YAP2	18	LVDS_CLKAM
6	LVDS_CLKAP	19	GND
7	+3.3 or +5 V	20	+3.3 or +5 V
8	GND	21	LVDS_YAM3
9	LVDS_YAP3	22	LVDS_YBM0
10	LVDS_YBP0	23	LVDS_YBM1
11	LVDS_YBP1	24	LVDS_YBM2
12	LVDS_YBP2	25	LVDS_YBM3
13	LVDS_YBP3	26	GND

2.3.6 LCD Backlight On/Off control Connector (Optional)

The ARK-3440 supports a D-sub 9-pin connector which provides BKLTEN signal as well as +12 V, +5 V and Ground Pin signals that allow the user to connect these signals to an LCD inverter to implement the LCD On/Off control.

■ Provides BKLTEN signal that inverter module requires for inverter on/off control.
■ Provides +12 V, + 5 V to serve as the inverter power source. The additional VBR signal pin may be connected to the LCD inverter to allow the user to achieve brightness adjustment through customer's software utility.
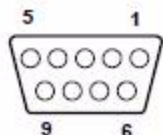
Figure 2.15 LCD Backlight connector (optional)

Table 2.8: LCD Backlight Connector Pin Assignment			
Pin	**Signal name**	**Pin**	**Signal name**
1	+12 V	6	Reserved
2	GND	7	Reserved
3	BKLTEN	8	Reserved
4	VBR	9	Reserved
5	+5 V			

2.3.7 LPT Connector (Optional)

The ARK-3440 supports one D-sub 25-pin female connector, which can serve as a printer or other communications interface port. Pin assignments are as follows.
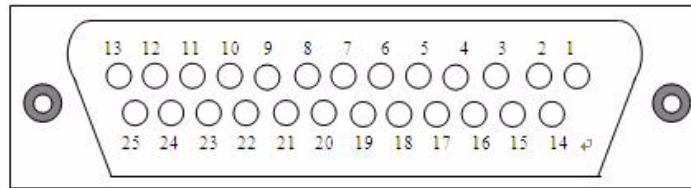
Figure 2.16 LPT Connector (optional)

Table 2.9: LPT Connector Pin Assignment			
Pin	**Signal Name**	**Pin**	**Signal name**
1	STROBE	14	ALF
2	PD0	15	ERROR
3	PD1	16	INIT
4	PD2	17	SLCTIN
5	PD3	18	GND
6	PD4	19	GND
7	PD5	20	GND
8	PD6	21	GND
9	PD7	22	GND
10	ACK	23	GND
11	BUSY	24	GND
12	PE	25	GND
13	SLCT		

2.4 Memory Installation

1. Remove the top screws and top cover.
2. Remove two screws and memory heatspreader.
3. Insert the memory module into the SODIMM socket. If only one memory module is being installed, always install it into CN12.
4. Reinstall heatspreader and top cover.
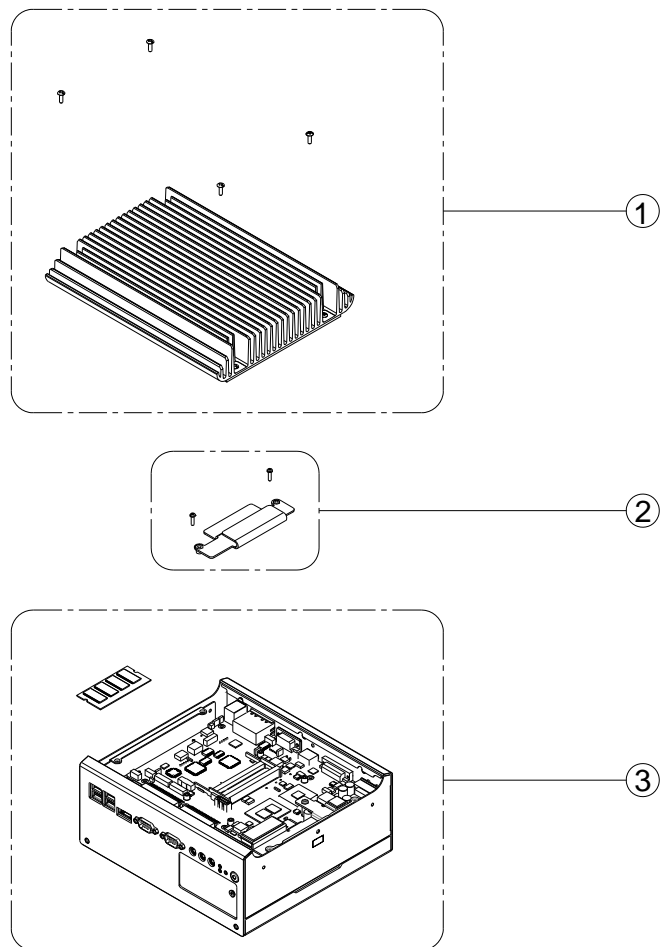
Figure 2.17 Memory Installation

2.5 Compact Flash Installation

1. Open the front CF/HDD door by loosening the door screw.
2. Insert the CF card into the CF socket, then reassemble.
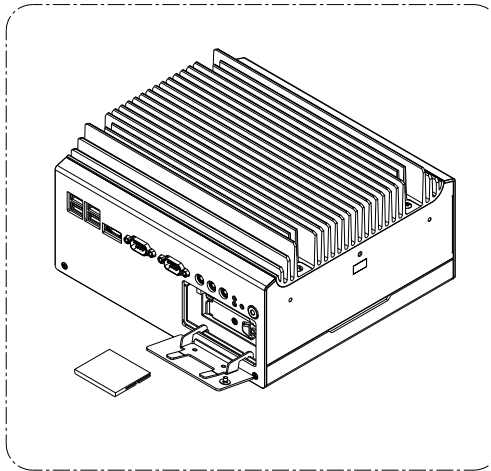
Figure 2.18 CF Card Installation

2.6 HDD Installation

2.6.1 Internal fixed HDD installation

1. Remove the bottom cover by unscrewing the 4 screws
2. Install the 2.5" SATA HDD with the 4 HDD mounting screws. Make sure the PCB side of the HDD will be facing the bottom cover.
3. Connect the SATA signal cable and power cable to the HDD.
4. Remove the protecting sheet of the HDD thermal pad, attach it onto the bottom cover.
5. Reinstall the bottom cover.
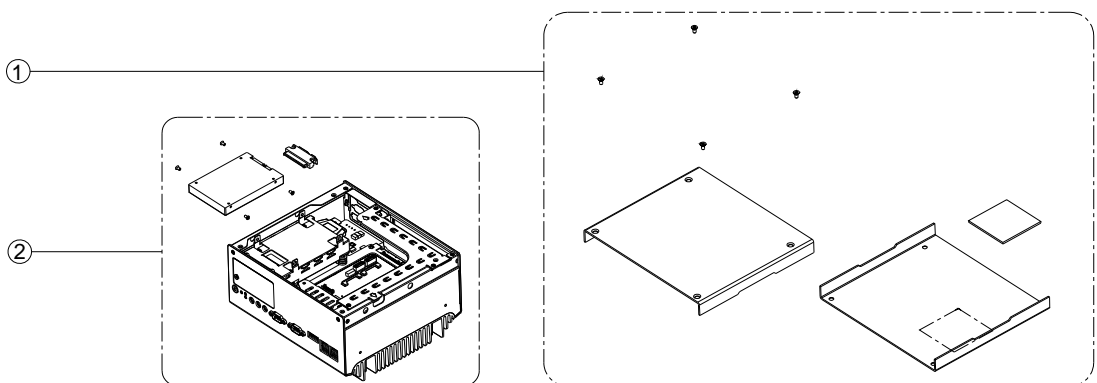
Figure 2.19 Internal Fixed HDD Installation

2.6.2 Removable 2.5" Storage Device Installation

1. It is recommended to use 2.5" SATA solid state device on the removable bay.
2. Open the front CF/HDD door by loosening the door screw.
3. Attach the 2.5" SATA storage device to the loader with 4 HDD mounting screws
4. Slide HDD loader along the rails to the end and fix the lever screw. Re-fix the front CF/HDD door.
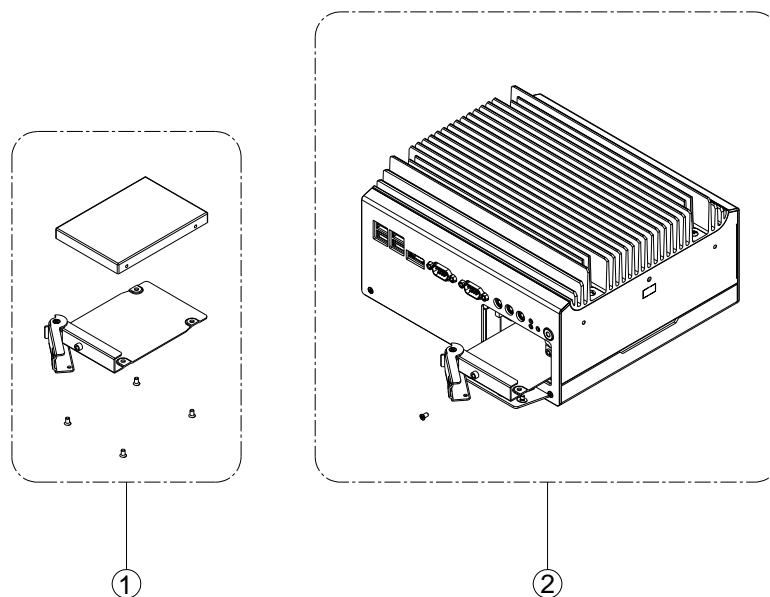
Figure 2.20 Removable 2.5" Storage Device Installation

2.7 PCI card installation

1. Remove the 4 bottom screws and the bottom cover.
2. Remove the riser card module.
3. Insert the PCI extension card into the PCI slot of the riser card module.
4. Replace the riser card module.
5. Reassemble the bottom cover.
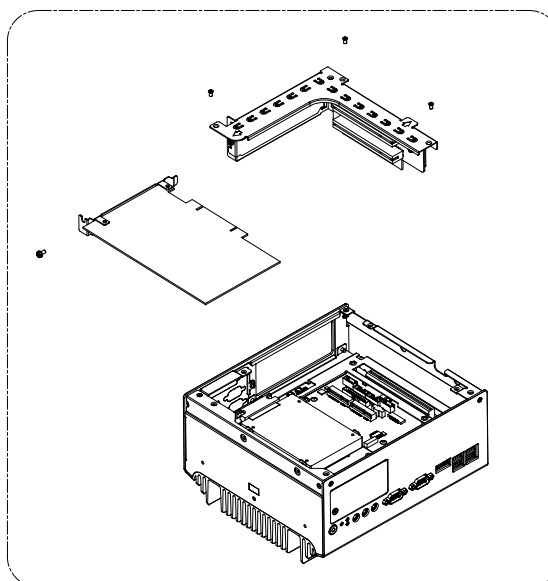
Figure 2.21 PCI Card Installation

2.8 Mini PCIe Installation

1. Open the bottom cover and remove the riser card module. (Refer Chapter 2.4)
2. Insert the Mini PCIe card into the Mini PCIe socket and latch into place.
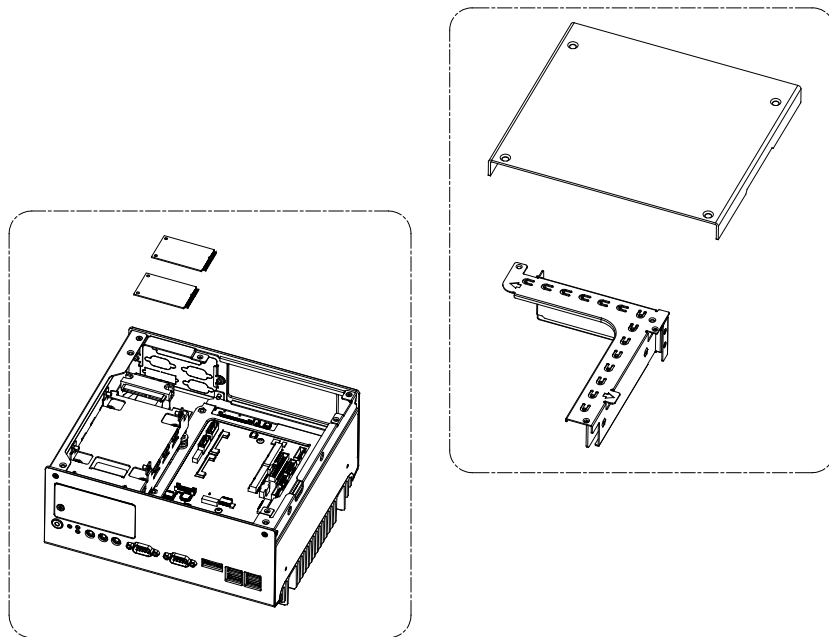
Figure 2.22 Mini PCI Card Installation

2.9 Antenna Installation

1. Remove the top heatsink by loosening the four screws. (See Section 2.4)
2. Pass the internal antenna cable jack through the antenna hole in the rear panel and fix it in place by tightening the matching nut.
3. Attach the external antenna cable, and reassemble the top heatsink.
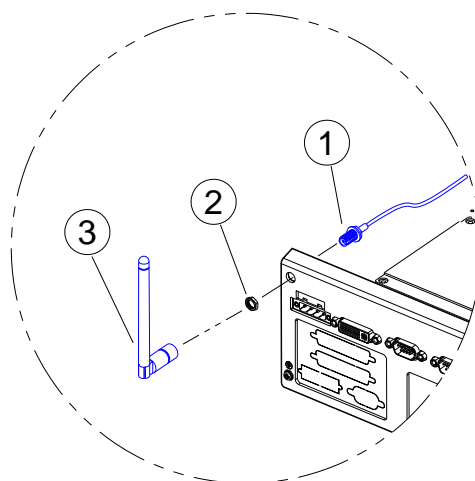
Figure 2.23 Antenna Installation

2.10 Optional Cable Installation

Open the bottom cover and follow the illustration and table below for optional cable installations and connections.

Rear View

Bottom View (Opened)
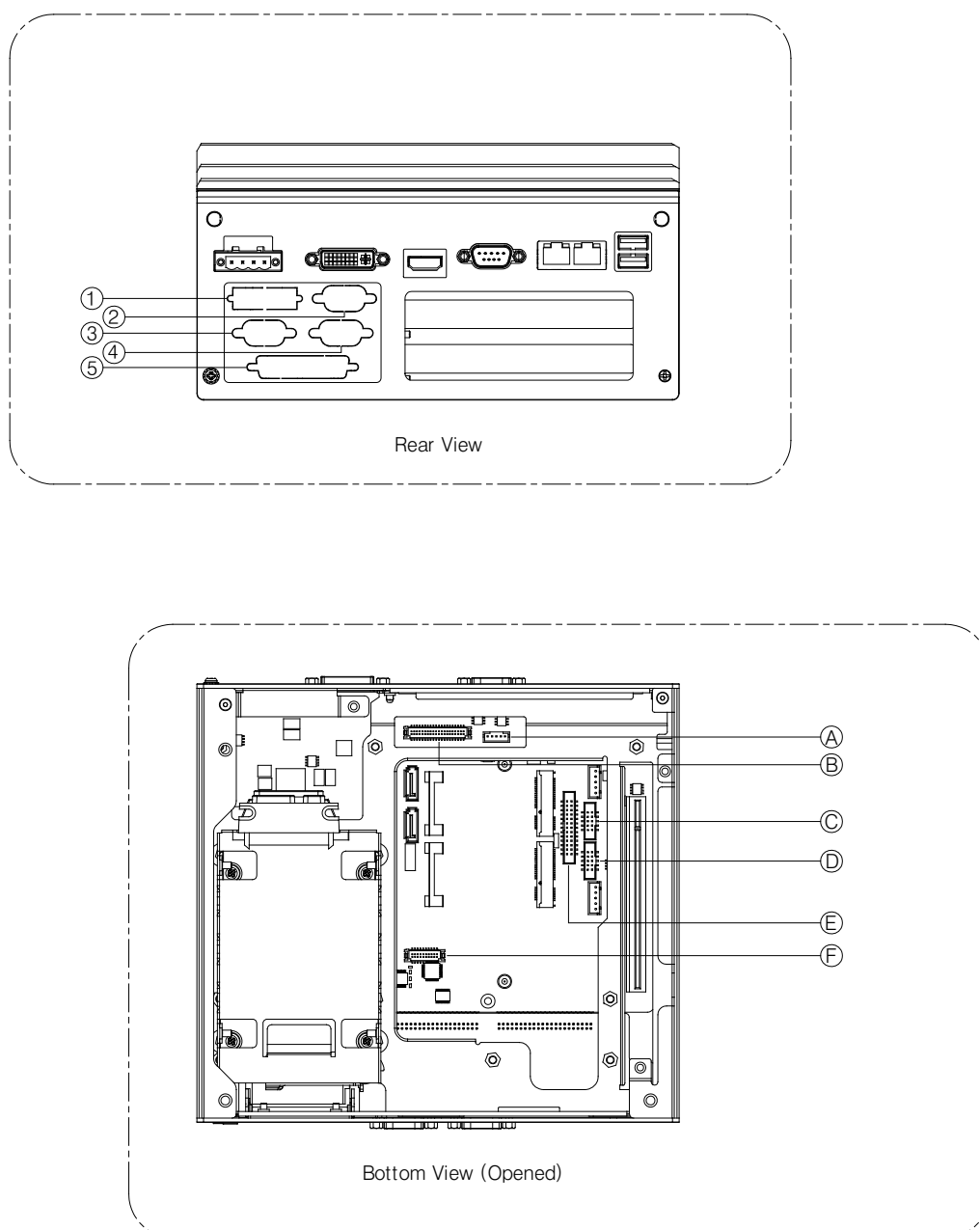
Figure 2.24 Optional Cable Installation

	Rear Panel Connector	Internal Connector
LVDS power cable (P/N:1700009396)*	1	A
LVDS cable (P/N:1700009398)	2	B
COM5 cable (P/N:1700008871)	3	C
COM6 cable (P/N:1700008871)	4	D
LPT cable (P/N:1700018187)	5	E

> **Note!** *When the LVDS panel power is provided from the system, the LVDS voltage jumper (JP5) needs to be configured.*

2.11 CPU Thermal Grease Pad

CPU thermal grease pad is one of the key components of ARK-3440 thermal design. Always use the grease pad provided by Advantech. The P/N of the grease pad is :

Part Number	Description
1990020828N001	Thermal-Pad D27*0.25 K=3 TP HW-PCM45Fϕ27*0.25

To ensure the best thermal performance, it is recommended to replace the thermal grease for CPU thermal pole each time the top cover is opened.

1. To replace the thermal grease, clean up the CPU thermal pole by using paper tissue or soft cloth. **DO NOT USE any kind of solvent to clean the thermal pole as this may damage the thermal grease inside the thermal pole.**
2. Gently remove one of the protective papers on the grease pad and apply the grease to the CPU thermal pole. Press onto the grease pad for 30 seconds, then remove the protective paper gently from the grease pad.
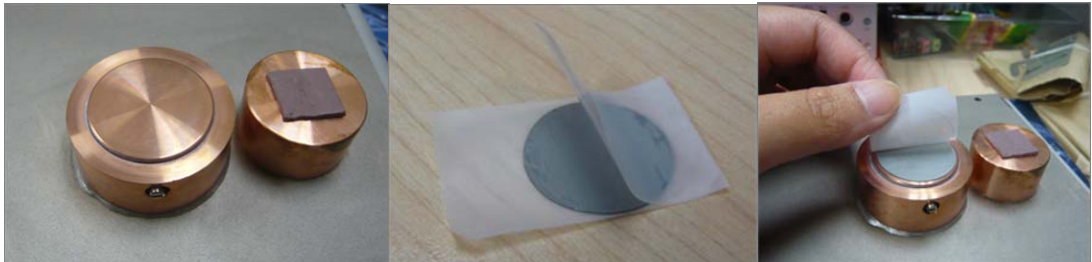
Chapter 3

BIOS settings

This chapter introduces how to set BIOS configurations.

3.1 BIOS Introduction

Advantech provides a current version of the full-featured AMI BIOS that has been integrated into many motherboards for over a decade. With the AMI BIOS Setup program, users can modify BIOS settings and control various system features. This chapter describes the basic navigation of the ARK-3440 BIOS setup screens.

```
          Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
     Main  Advanced  Chipset  Boot  Security  Save & Exit

     BIOS Information                                   Choose the system default
     BIOS Vendor                  American Megatrends   language
     Core Version                 4.6.3.7
     Project Version              1ABPZ 0.15 x64
     Bios Version                 ARK3440 V1.18
     EC Version                   0100
     Build Date                   02/23/2012 18:13:33

     Memory Information
     Total Memory                 4096 MB (DDR3 1066)

     System Language              [English]

     System Date                  [Sat 02/06/2010]      →←: Select Screen
     System Time                  [21:55:19]            ↑↓: Select Item
                                                        Enter: Select
     Access Level                 Administrator         +/-: Change Opt.
                                                        F1: General Help
                                                        F2: Previous Values
                                                        F3: Optimized Defaults
                                                        F4: Save  ESC: Exit

          Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

AMI's BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This information is stored in NVRAM area so it retains the setup information when the power is turned off.

3.2 Entering BIOS Setup

Turn on the computer and check for the "patch code". If there is a number assigned to the patch code, the on-board CPU is supported by the current BIOS. 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, to ensure the system status of CPU is valid. Then press <F2> to enter the BIOS Setup menu.

3.2.1 Main Setup

When users first enter the BIOS Setup Utility, they enter the Main setup screen. Users 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.

```
               Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
    Main  Advanced  Chipset  Boot  Security  Save & Exit

    BIOS Information                                          Choose the system default
    BIOS Vendor                   American Megatrends         language
    Core Version                  4.6.3.7
    Project Version               1ABPZ 0.15 x64
    Bios Version                  ARK3440 V1.18
    EC Version                    0100
    Build Date                    02/23/2012 18:13:33

    Memory Information
    Total Memory                  4096 MB (DDR3 1066)

    System Language               [English]

    System Date                   [Sat 02/06/2010]           →←: Select Screen
    System Time                   [21:55:19]                 ↑↓: Select Item
                                                             Enter: Select
    Access Level                  Administrator              +/-: Change Opt.
                                                             F1: General Help
                                                             F2: Previous Values
                                                             F3: Optimized Defaults
                                                             F4: Save  ESC: Exit




               Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

Figure 3.1 The Main BIOS 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.

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

3.3 Advanced BIOS Features Setup

Select the Advanced tab from the ARK-3440 setup screen to enter the Advanced BIOS Setup screen. Users can select any item in the left frame of the screen, such as PCI Configuration, to go to the sub menu for that item. Users 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 3.2 The Advanced BIOS setup screen

- ■ **Legacy OpROM Support**
- ■ Launch PXE OpROM: Enable or Disable Boot Option for Legacy Network Devices.
  Disabled [Default]
  Enabled
- ■ Launch Storage OpROM: Enable or Disable Boot Option for Legacy Mass Storage Devices with Option ROM.
  Disabled
  Enabled [Default]
- ■ PCI Subsystem Settings
  – PCI Bus Driver Version
  – PCI ROM Priority: Specifies what PCI Option ROM to launch.
  Legacy ROM
  EFI Compatible ROM [Default]

- PCI Common Settings

PCI Latency Timer: Value to be programmed into PCI Latency Timer Register.

32 PCI Bus Clocks [Default]

64 PCI Bus Clocks

96 PCI Bus Clocks

128 PCI Bus Clocks

160 PCI Bus Clocks

192 PCI Bus Clocks

224 PCI Bus Clocks

248 PCI Bus Clocks

- VGA Palette Snoop: Enables or Disables VGA Palette Register Snooping.

Disabled [Default]

Enabled

■ ACPI Settings

- Enable ACPI Auto Configuration: Enables or Disables BIOS ACPI Auto Configuration.

Disabled [Default]

Enabled

- Enable Hibernation: Enables or Disables System ability to hibernate (OS/S4 Sleep State). This option may be not effective with some OS.

Disabled [Default]

Enabled

- ACPI Sleep State: Select the highest ACPI sleep state the system will enter, when the SUSPEND button is pressed.

Suspend Disabled

S1 (CPU Stop Clock)

S3 (Suspend to RAM) [Default]

■ S5 RTC Wake Settings: Enable system to wake from S5 using RTC alarm.

Wake system with Fixed Time: Enable or disable System wake on alarm event. When enabled, System will wake on the hr:min:sec specified.

Disabled [Default]

Enabled

- Wake system with Dynamic Time: Enable or disable System wake on alarm event. When enabled, System will wake on the current time + Increase minute(s).

Disabled [Default]

Enabled

■ CPU Configuration: CPU Configuration Parameters.

```
               Aptio Setup Utility - Copyright (C) 2009 American Megatrends, Inc.
         Advanced

    CPU Configuration                                          Enable the power management
                                                               features.
    Processor Type               Intel(R) Core(TM) i7 CPU
    EMT64                        Supported
    Processor Speed              1862 MHz
    Processor Stepping           20655
    Microcode Revision           2
    Processor Cores              2
    Intel HT Technology          Supported

    Hyper-threading              [Enabled]
    Active Processor Cores       [All]
    Limit CPUID Maximum          [Disabled]
    Hardware Prefetcher          [Enabled]                      ↔: Select Screen
    Adjacent Cache Line Prefetch [Enabled]                      ↑↓: Select Item
    Intel Virtualization Technology [Disabled]                  Enter: Select
    Power Technology             [Custom]                       +/-: Change Opt.
    EIST                         [Enabled]                      F1: General Help
    P-STATE Coordination         [HW_ALL]                       F2: Previous Values
    CPU C3 Report                [Disabled]                     F3: Optimized Defaults
    CPU C6 report                [Enabled]                      F4: Save  ESC: Exit
    Package C State limit        [No Limit]




               Version 2.00.1201. Copyright (C) 2009 American Megatrends, Inc.
```

– Hyper-threading: Enabled for Windows XP and Linux (OS optimized for Hyper-Threading Technology) and Disabled for other OS (OS not optimized for Hyper-Threading Technology). When Disabled only one thread per enabled core is enabled.

Disabled

Enabled [Default]

– Active Processor Cores: Number of cores to enable in each processor package.

All [Default]

1

2

– Limit CPUID Maximum: Disabled for Windows XP.

Disabled [Default]

Enabled

– Hardware Prefetcher: To turn on/off the MLC streamer prefetcher.

Disabled

Enabled [Default]

– Adjacent Cache Line Prefetch: To turn on/off prefetching of adjacent cache lines.

Disabled

Enabled [Default]

– Intel Virtualization Technology: When enabled, a VMM can utilize the addional hardware capabilities provided by Vander pool Technology.

Disabled [Default]

Enabled

– Power Technology: Enable the power management features.

Disable

Energy Efficient

Custom [Default]

  – TDC Limit: Turbo-XE Mode Processor TDC Limit in 1/8 A granularity. 0
    means using the factory-configured value.

  – TDP Limit: Turbo-XE Mode Processor TDP Limit in 1/8 W granularity. 0
    means using the factory-configured value.

■ SATA Configuration: SATA Devices Configuration.

  SATA Mode: 1) IDE Mode. (2) AHCI Mode. (3) RAID Mode.

  Disable

  IDE Mode [Default]

  AHCI Mode

  RAID Mode

  – Serial-ATA Controller 0: Enable / Disable Serial ATA Controller 0.

  Disable

  Enhanced

  Compatible [Default]

■ Intel IGD SWSCI OpRegion: Intel IGD SWSCI OpRegion Function.

  – DVMT/FIXED Memory: Select DVMT/FIXED Mode Memory size used by
    Internal Graphics Device.

  128MB

  256MB [Default]

  Maximum

  – IGD - Boot Type: Select the Video Device which will be activated during
    POST. This has no effect if external graphics present.

  VBIOS Default

  CRT

  LVDS

  CRT + LVDS

  DVI

  HDMI

  CRT + DVI [Default]

  – LCD Panel Type: Select LCD panel used by Internal Graphics Device by
    selecting the appropriate setup item.

  VBIOS Default [Default]

  640x480   LVDS

  800x600   LVDS

  1024x768   LVDS

  1280x1024 LVDS

  1400x1050 LVDS

  1600x1200 LVDS

  1280x768   LVDS

  1680x1050 LVDS

  1920x1200 LVDS

  1600x900   LVDS

  1280x800   LVDS

  1280x600   LVDS

2048x1536 LVDS

– Panel Scaling: Select the LCD panel scaling option used by the Internal Graphics Device.

Auto [Default]

Force Scaling

Off

Maintain Aspect Ratio

– Backlight Control: Back Light Control Setting.

PWM Inverted [Default]

PWM Normal

GMBus Inverted

GMBus Normal

– BIA Control

VBIOS Default [Default]

Disabled

Level 1

Level 2

Level 3

Level 4

Level 5

– Spread Spectrum clock Chip: Hardware: Spread is controlled by chip; Software: Spread is controlled by BIOS.

Off [Default]

Hardware

Software

– ALS Support: Valid only for ACPI. Legacy = ALS Support through the IGD INT10 function. ACPI = ALS support through an ACPI ALS driver.

Enabled

Disabled [Default]

– Gfx Low Power Mode: This option is applicable for SFF only.

Enabled

Disabled [Default]

Active LFP: Select the Active LFP Configuration. No LVDS/VBIOS: does not enable LVDS. Int-LVDS: VBIOS enables LVDS driver by integrated encoder. SDVO LVDS: VBIOS enables LVDS driver by SDVO encoder. eDP / LVDS: Driven by Int-DisplayPort encoder.

No LVDS

Int-LVDS [Default]

SDVO LVDS

eDP Port-A

eDP Port-D

– Panel Color Depth: Select the LFP Panel Color Depth.

18 Bit

24 Bit

■ Intel TDT(AT-p) Configurations: Disabling TDT allows user to login to platform. This is strictly for testing only. This does not disable TDT Services in ME.

– Intel Theft Deterrence Technology Configuration: Enable/Disable TDT in BIOS for testing only.

- TDT: Enable/Disable TDT in BIOS for testing only.

Disabled [Default]

Enabled

■ Intel TXT(LT) Configuration: Intel Trusted Execution Technology

Intel TXT(LT) Support

Disabled [Default]

Enabled

■ USB Configuration: USB Configuration Parameters

- Legacy USB Support: Enables Legacy USB support. AUTO option disables legacy support if no USB devices are connected. DISABLE option will keep USB devices available only for EFI applications.

Enabled [Default]

Disabled

Auto

- EHCI Hand-off: This is a workaround for OS without EHCI hand-off support. The EHCI ownership change should be claimed by EHCI driver.

Disabled

Enabled [Default]

- Device Reset timeout: USB mass storage device Start Unit command timeout.

10 sec

20 sec [Default]

30 sec

40 sec

- Device Reset timeout: USB mass storage device Start Unit command timeout.

10 sec

20 sec [Default]

30 sec

40 sec

- USB 2.0 USB Flash Drive 0.00: Mass storage device emulation type. 'AUTO' enumerates devices according to their media format. Optical drives are emulated as 'CDROM', drives with no media will be emulated according to a drive type.

Auto [Default]

Floppy

Forced FDD

Hard Disk

CD-ROM

■ Super IO Configuration: System Super IO Chip Parameters.

- Parallel Port Configuration: Set Parameters of Parallel Port (LPT/LPTE)
- Parallel Port: Enable or Disable Parallel Port (LPT/LPTE)

Disabled

Enabled [Default]

- Change Settings: Select optimal settings for Super IO Device.

Auto [Default]

IO=378h; IRQ=5;

IO=378h; IRQ=3,4,5,6,7,10,11,12;

IO=278h; IRQ=3,4,5,6,7,10,11,12;

IO=3BCh; IRQ=3,4,5,6,7,10,11,12;

IO=378h;

IO=278h;

IO=3BCh;

  – Device Mode: Change the Printer Port mode.

STD Printer Mode [Default]

SPP Mode

EPP-1.9 and SPP Mode

EPP-1.7 and SPP Mode

ECP Mode

ECP and EPP 1.9 Mode

ECP and EPP 1.7 Mode

■ ARK-3440 FEATURES: CRB Board Parameters

  – COM1 MODE: COM SPEED RS232/422/485 MODE.

RS232 [Default]

RS422

RS485

  – COM4 MODE: COM SPEED RS232/422/485 MODE.

RS232 [Default]

RS422

RS485

  – 82577 LAN SWITCH: LAN Enable/Disable.

DISABLED

ENABLED [Default]

  – 82583 LAN SWITCH: LAN Enable/Disable.

DISABLED

ENABLED [Default]

■ Serial Port Console Redirection: Serial Port Console Redirection.

  – Console Redirection: Console Redirection Enable/Disable.

DISABLED

ENABLED [Default]

  – Terminal Type: VT-UTF8 is the preferred terminal type for out-of-band management. The next best choice is VT100+ and then VT100. See above, in Console Redirection Settings page, for more Help with Terminal Type/Emulation.

VT100

VT100+

VT-UTF8 [Default]

ANSI

3.4 Chipset BIOS Feature Setup

Select the Chipset tab from the ARK-3440 setup screen to enter the Chipset BIOS Setup screen. Users can select any item in the left frame of the screen, such as PCI Configuration, to go to the sub menu for that item. Users can display a Chipset BIOS Setup option by highlighting it using the <Arrow> keys. All Chipset BIOS Setup options are described in this section. The Chipset BIOS Setup screen is shown below. The sub menus are described on the following pages.
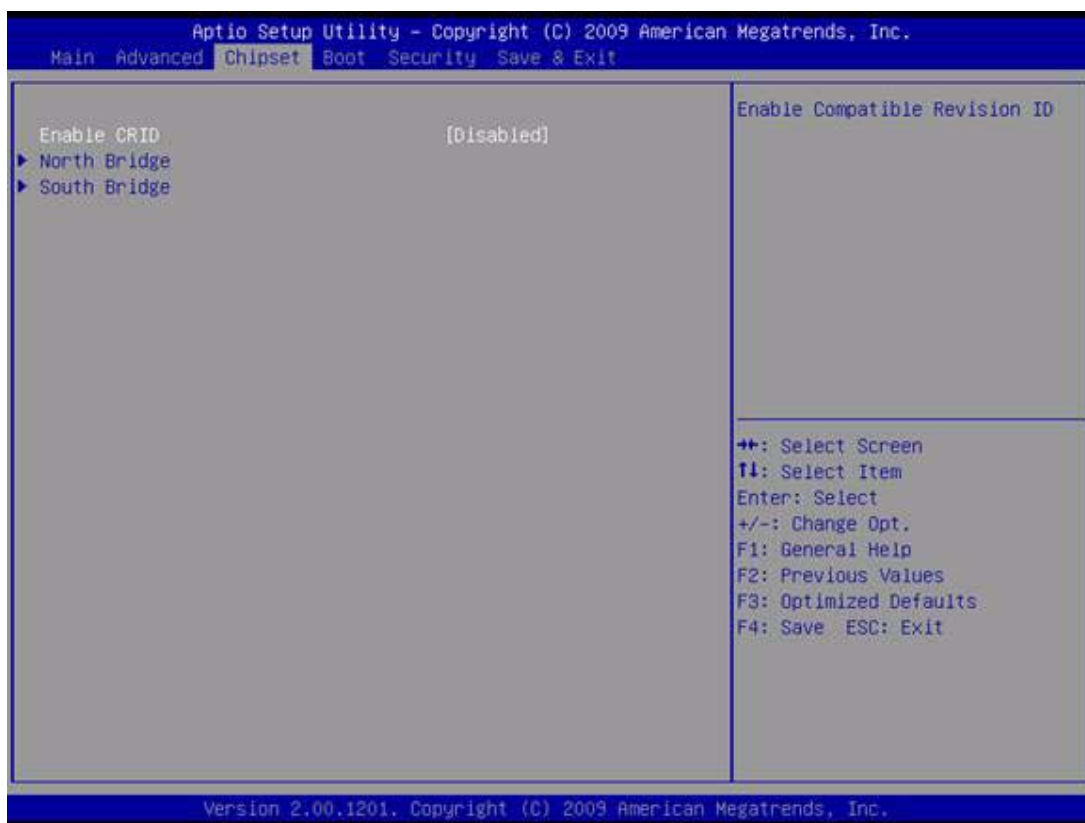
Figure 3.3 The Chipset BIOS setup screen

- Enable CRID: Enable Compatible Revision ID.
  Disabled [Default]
  Enabled
- North Bridge: North Bridge Parameters.
  – Low MMIO Align: Low MMIO resources align at 64MB/1024MB.
  64M [Default]
  1024M
  – Initate Graphic Adapter: Select which graphics controller to use as the primary boot device.
  IGD
  PCI/IGD
  PCI/PEG
  PEG/IGD [Default]
  PEG/PCI
  – VT-d: VT-d Enable/Disable.
  Disabled [Default]
  Enabled

– PCI Express Compliance Mode: PCI Express Compliance Testing Mode.

Disabled [Default]

Enabled

– PCI Express Port: PCI Express.

Disabled

Enabled

Auto [Default]

– IGD Memory: IGD Share Memory Size.

Disabled

32M [Default]

64M

128M

– PAVP Mode: Select PAVP Mode used by Internal Graphics Device.

Disabled [Default]

Enabled

– PEG Force Gen1: PCI Express Port Force Gen1.

Disabled [Default]

Enabled

■   South Bridge: South Bridge Parameters.

– SMBus Controller: SMBus Controller Help.

Disabled

Enabled [Default]

– GbE Controller: GbE Controller help.

Disabled

Enabled [Default]

– Wake on Lan from S5: Wake on Lan from S5 help.

Disabled [Default]

Enabled

– Restore AC Power Loss: Restore AC Power Loss help.

Power Off [Default]

Power On

Last State

– SLP_S4 Assertion Stretch Enable: Select a minimum assertion width of the SLP_S4# signal.

Disable

Enable [Default]

– SLP_S4 Assertion Width: SLP_S4 Assertion Width help.

1-2 Seconds

2-3 Seconds

3-4 Seconds

4-5 Seconds [Default]

– Azalia HD Audio: Enable / Disable Azalia HD Audio.

Disabled

Enabled [Default]

‒ Azalia internal HDMI codec: Enable/Disable internal HDMI codec for Azalia.

Disabled [Default]

Enabled

‒ High Precision Timer: Enable or Disable the High Precision Event Timer.

Disabled

Enabled [Default]

‒ PCI Express Ports Configuration: PCI Express Ports Configuration

‒ PCI Express Port 1: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ PCI Express Port2: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ PCI Express Port 3: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ PCI Express Port 4: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ PCI Express Port 5: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ PCI Express Port 6: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ PCI Express Port 7: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ PCI Express Port 8: Enable or Disable the PCI Express Ports in the Chipset.

Disabled

Enabled

Auto [Default]

‒ USB Configuration: USB Configuration

‒ All USB Devices: Enable / Disable All USB Devices.

Disabled

Enabled [Default]

‒ EHCI Controller 1: Enable / Disable USB 2.0 (EHCI) Support.

Disabled

Enabled [Default]

– EHCI Controller 2: Enable / Disable USB 2.0 (EHCI) Support.

Disabled

Enabled [Default]

– RMH Support: Enable / Disable RMH Support; AUTO: Only Enable RMH support on Ibex Peak B0 Stepping.

Disabled

Enabled

Auto [Default]

– USB Port 0: Enable / Disable USB Port 0.

Disabled

Enabled [Default]

– USB Port 1: Enable / Disable USB Port 1.

Disabled

Enabled [Default]

– USB Port 2: Enable / Disable USB Port 2.

Disabled

Enabled [Default]

– USB Port 3: Enable / Disable USB Port 3.

Disabled

Enabled [Default]

– USB Port 4: Enable / Disable USB Port 4.

Disabled

Enabled [Default]

– USB Port 5: Enable / Disable USB Port 5.

Disabled

Enabled [Default]

– USB Port 6: Enable / Disable USB Port 6.

Disabled

Enabled [Default]

– USB Port 7: Enable / Disable USB Port 7.

Disabled

Enabled [Default]

– USB Port 8: Enable / Disable USB Port 8.

Disabled

Enabled [Default]

– USB Port 9: Enable / Disable USB Port 9.

Disabled

Enabled [Default]

– USB Port 10: Enable / Disable USB Port 10.

Disabled

Enabled [Default]

– USB Port 11: Enable / Disable USB Port 11.

Disabled

Enabled [Default]

3.5 Boot BIOS Feature Setup

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

Figure 3.4 The Chipset BIOS setup screen

- ■ Quiet Boot: Enables/Disables Quiet Boot option.
   Disabled [Default]
   Enabled
- ■ Fast Boot: Enables/Disables boot with initialization of a minimal set of devices
   required to launch active boot option. Has no effect for BBS boot options.
   Disabled
   Enabled [Default]
- ■ Bootup NumLock State: Select the keyboard NumLock state.
   On [Default]
   Off
- ■ GateA20 Active: UPON REQUEST - GA20 can be disabled using BIOS ser-
   vices. ALWAYS - do not allow disabling GA20; this option is useful when any RT
   code is executed above 1MB.
   Upon Request [Default]
   Always

- Option ROM Messages: Set display mode for Option ROM.
  Force BIOS [Default]
  Keep Current
- Interrupt 19 Capture: Enabled: Allows Option ROMs to trap Int 19.
  Disabled [Default]
  Enabled
- Boot Option Priorities: Sets the system boot order.
- Hard Drive BBS Priorities:Sets the order of the legacy devices in this group.

3.6 Security BIOS Feature Setup

Select the BOOT tab from the ARK-3440 setup screen to enter the Security BIOS Setup screen. Users can select any item in the left frame of the screen. Users can display a Security BIOS Setup option by highlighting it using the <Arrow> keys. All Security BIOS Setup options are described in this section. The Security BIOS Setup screen is shown below. The sub menus are described on the following pages


Figure 3.5 The Security BIOS setup screen

- Administrator Password: Set up Administrator Password. When set, limits access to BIOS Setup.
- User Password: Set User Password. When set, limits machine boot and access to BIOS Setup.

3.7 Save & Exit BIOS Feature Setup

Select the BOOT tab from the ARK-3440 setup screen to enter the save BIOS Setup screen. Users can select any item in the left frame of the screen. Users can display a save BIOS Setup option by highlighting it using the <Arrow> keys. All save BIOS Setup options are described in this section. The save BIOS Setup screen is shown below. The sub menus are described on the following pages.
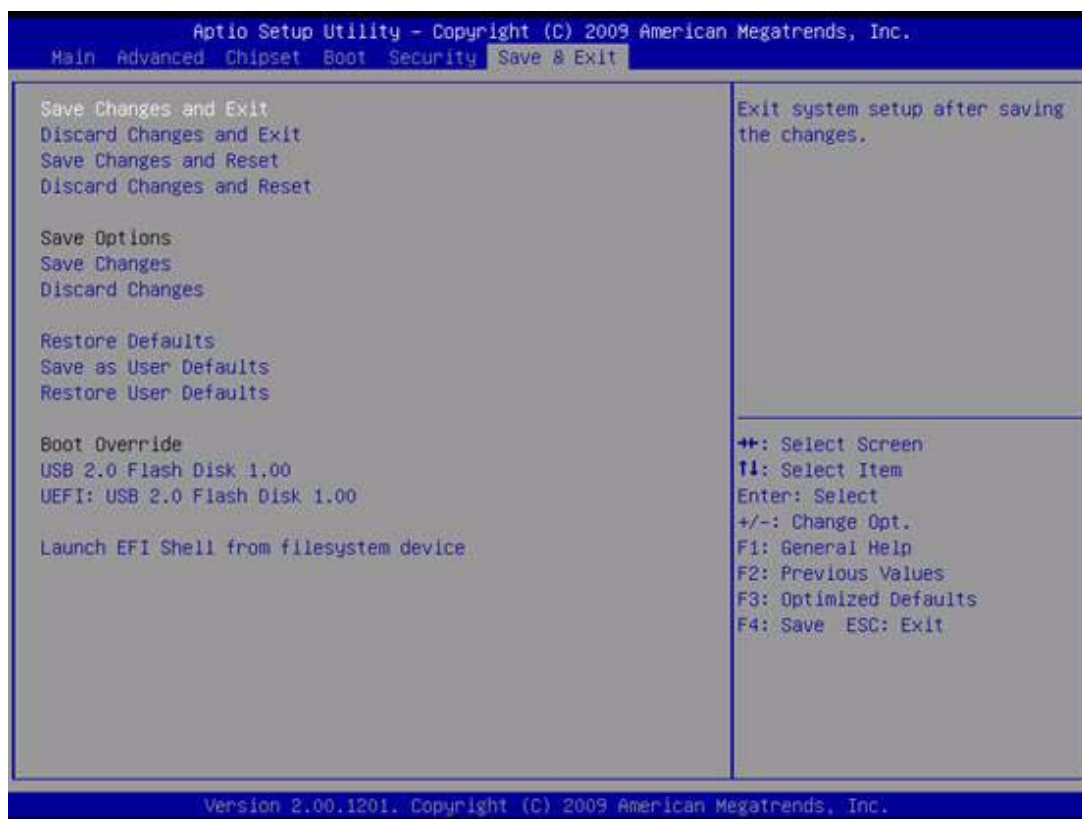
Figure 3.6 The Save & Exit BIOS setup screen

■ Save Changes and Exit: Exit system setup after saving the changes.
   Save configuration and exit?
   Yes [Default]
   No

■ Discard Changes and Exit: Exit system setup without saving any changes.
   Quit without saving?
   Yes [Default]
   No

■ Save Changes and Reset: Reset the system after saving the changes.
   Save configuration and reset?
   Yes [Default]
   No

■ Discard Changes and Reset: Reset system setup without saving any changes.
   Reset without saving?
   Yes [Default]
   No

- Save Changes: Save Changes done so far to any of the setup options.
    Save configuration?
    Yes [Default]
    No
- Discard Changes: Discard Changes done so far to any of the setup options.
    Load Previous Values?
    Yes [Default]
    No
- Restore Defaults: Restore/Load Defaults values for all the setup options.
    Load Optimized Defaults?
    Yes [Default]
    No
- Save as User Defaults: Save the changes done so far as User Defaults.
    Save configuration?
    Yes [Default]
    No
- Restore User Defaults: Restore the User Defaults to all the setup options.
    Restore User Defaults?
    Yes [Default]
    No
- Restore User Defaults: Restore the User Defaults to all the setup options.
    Restore User Defaults?
    Yes [Default]
    No

Appendix A

Function Settings

A.1 Function Setting
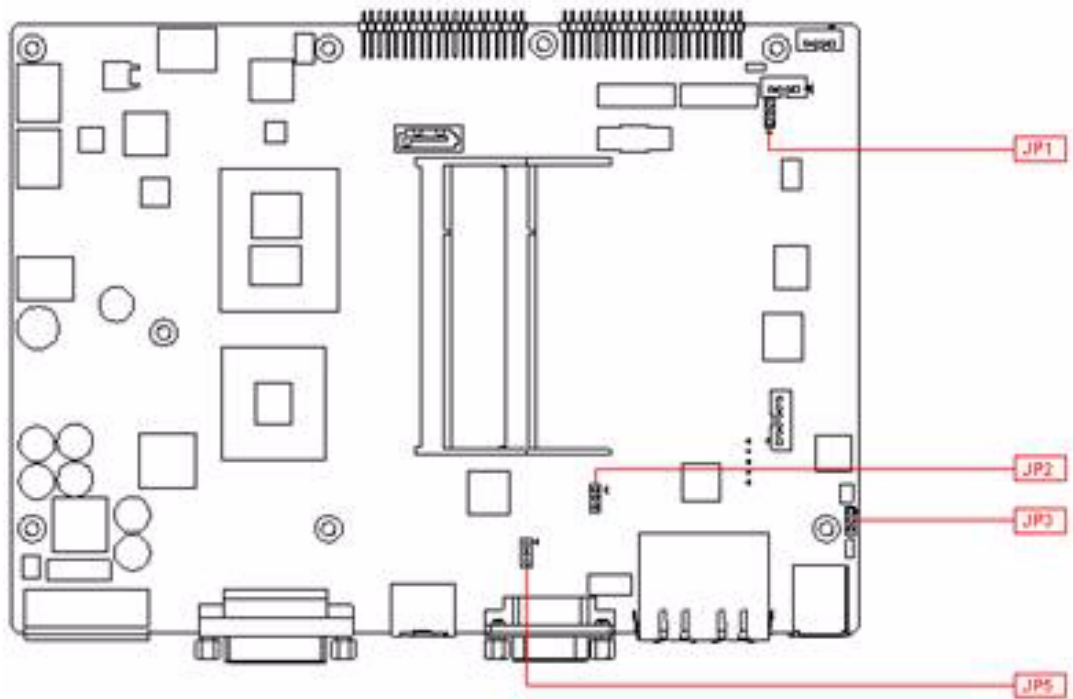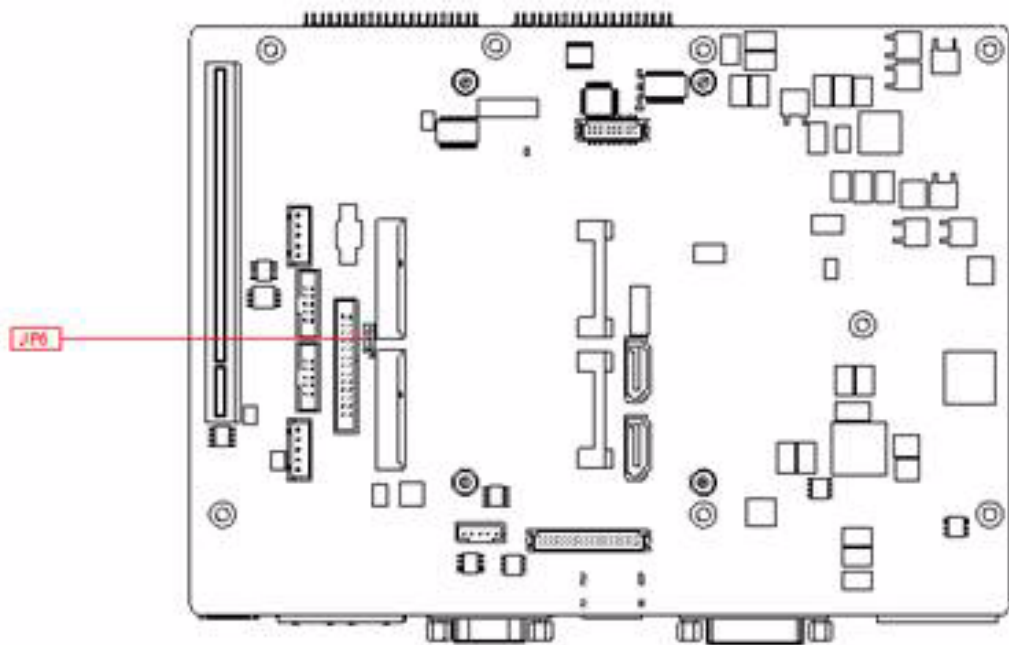

Figure A.1 Top View

Figure A.2 Bottom View

Table A.1: ATX / AT Mode switch	
JP1	**ATX / AT Mode switch**
Footprint	3x1 Pin
Setting	**Function**
(1-2)	AT
(2-3)	ATX Mode (default)

Table A.2: PCI Express mini card version select	
JP2 / JP6	**mini PCI Express mini card version select**
Footprint	3x1 Pin
Setting	**Function**
(1-2)	Ver. 1.2(default)
(2-3)	Ver. 1.1

Table A.3: Clear CMOS	
JP3	**Clear CMOS**
Footprint	3x1 Pin
Setting	**Function**
(1-2)	Normal(default)
(2-3)	Clear CMOS

Table A.4: Internal LVDS panel power select	
JP5	**Internal LVDS panel power select**
Footprint	3x1 Pin
Setting	**Function**
(1-2)	3.3V for LVDS panel power select(Default)
(2-3)	5V for LVDS panel power select

Appendix B

Display Application

B.1 Introduction

The ARK-3440 has an onboard Intel® QM57 chipset for its PCIE controller. It supports LVDS DVI and HDMI displays and conventional analog CRT monitors. The VGA controller can drive CRT displays with resolutions up to 2048 x 1536 @ 60Hz, support 48 bits LVDS display mode up to UXGA panel resolution with frequency range from 25-MHz to 112-MHz.

Figure B.1 BIOS VGA setting

B.2 LVDS

LVDS is an electrical signaling system that can run at very high speeds over inexpensive twisted-pair copper cables. It was introduced in 1994, and has since become very popular in computers, especially in very high-speed networks and computer buses.

The ARK-3440 supports up to 48-bit LVDS display mode up to UXGA panel resolution, with transmit clock frequency ranges from 25MHz to 112MHz. The default setting for "IGD - Boot Type" is "CRT + EFP". Please refer to Chapter 2/2.3.5 "LVDS Connector" for setup details.

B.3 Dual Display

A multiple monitor setup increases the net display area of a system and can be an inexpensive way of improving computer usage. Resulting display area after upgrading to a multi-monitor configuration is limited by the size, resolution, and number of monitors. The two monitors used can be of different types (CRT+EFP, CRT+LFP) and different sizes. The operating system manages the monitors' resolutions independently.

B.3.1 Display modes

■ **Clone mode**

Initially on PCs, the multiple output interface was designed to display the same image on all output interfaces (sometimes referred to as mirroring or cloning). This reflected the fact that these video cards were originally used in presentations where the user typically had his or her face to the audience with a duplicate of the projected image available to the presenter.

■ **Span mode**

Alternatively, some video cards are able to "span" the existing desktop area across two monitors rather than create additional desktop space. This is accomplished by using a resolution such as 2048x768 each monitor at 1024x768 resolutions. Each monitor needs to have the same color depth settings, and often the same refresh rate. Differing resolutions may result in issues pertaining to some screen space not being assigned to either monitor.

■ **Extended mode**

In "extended" mode, additional desktop area is created on additional monitors. Each monitor can use different settings (resolution, color, refresh rate). Macintosh computers have supported the "extended desktop" concept since the late 1980s, increasing the platform's utility for professional media and software developers such as graphic designers, video editors, and game developers.

The concept was further developed by PC manufacturers and led to the "extended" or "independent displays" mode and the "spanning" or "stretched" display mode. In both of these modes, display devices are positioned next to each other in order to create the illusion that the two displays are logically contiguous.

B.4 Display Resolution Setting

The ARK-3440 can drive CRT displays with resolutions up to 2048 x 1536@60Hz and support up to 48 bits LVDS display mode up to UXGA panel resolution with frequency range from 25MHz to 112MHz.

Appendix C

Application Notes

C.1 RS-485 Supports Auto Flow Control

ARK-3440 COM1 port connector located on the rear panel and COM4 can be configured to operate in RS-232, RS-422 or RS-485 mode by adjusting the "Onboard Serial port 3 Mode" & "Onboard Serial port 4 Mode" of "Integrated Peripherals" in the BIOS.

Refer to Chapter 3 "BIOS Operation" for details on changing this setting. The default setting for both COM1 and COM4 is RS-232.
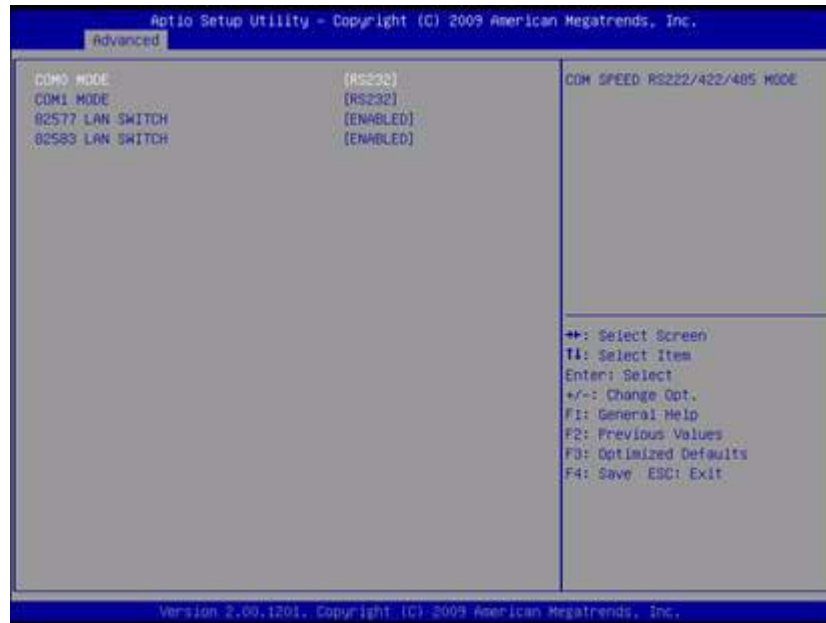

Figure C.1 BIOS COM port setting

C.1.1 Flow Control, Introduction

Consider the situation where someone is helping you harvest fruit from a tree. Your helper climbs up the tree and throws the fruit down to you. You have to put them in buckets. In the normal situation, you can easily catch the fruit, but when one bucket is full and it has to be replaced by an empty one, this action takes more time than is available between two fruit thrown by your helper.

Two different things can occur. Your helper stops until the new bucket is in position, or some fruit are damaged because they fall on the (rock hard, as it happens) ground in the small period you are not able to catch them.

You would probably prefer the first method where your helper stops for a short time. To achieve this, there will be some communication, eye-contact, a yell, or something like that to stop him/her from throwing new fruit. How simple, but is it always this simple? Consider the situation where one computer device sends information to another using a serial connection. Now and then, the receiver needs to do some other actions, to write the contents of its buffers to disk for example. In this period of time no new information can be received. Some communication back to the sender is needed to stop the flow of bytes on the line. A method must be present to tell the sender to pause. To do this, both software and hardware protocols have been defined.

C.1.2 Software Flow Control

Both software and hardware flow control need software to perform the handshaking task. This makes the term software flow control somewhat misleading. What is meant is that with hardware flow control, additional lines are present in the communication cable which signal handshaking conditions. With software flow control, which is also known as XON-XOFF flow control, bytes are sent to the sender using the standard communication lines.

Using hardware flow control requires that more lines be present between the sender and the receiver, leading to a thicker and more expensive cable. Therefore, software flow control is a good alternative if it is not needed to gain maximum performance in communications. Software flow control makes use of the data channel between the two devices, which reduces the bandwidth a bit. The reduction of bandwidth is in most cases however not so astonishing that it is a reason to not use it.

Two bytes have been predefined in the ASCII character set to be used with software flow control. These bytes are named XOFF and XON, because they can stop and restart transmitting. The byte value of XOFF is 19, it can be simulated by pressing Ctrl-S on the keyboard. XON has the value 17 assigned which is equivalent to Ctrl-Q.

Using software flow control is easy. If sending of characters must be postponed, the character XOFF is sent on the line, to restart the communication again XON is used. Sending the XOFF character only stops the communication in the direction of the device which issued the XOFF.

This method has a few disadvantages. One was already mentioned: using bytes on the communication channel takes up some bandwidth. One other reason is more severe. Handshaking is mostly used to prevent an overrun of the receiver buffer, the buffer in memory used to store the recently received bytes. If an overrun occurs, this affects the way new incoming characters on the communication channel are handled. In the worst case where software has been designed badly, these characters are thrown away without checking them. If such a character is XOFF or XON, the flow of communication can be severely damaged. The sender will continuously supply new information if the XOFF is lost, or never send new information if no XON was received.

This also holds for communication lines where signal quality is bad. What happens if the XOFF or XON message is not received clearly because of noise on the line? Special precaution is also necessary that the information sent does not contain the XON or XOFF characters as information bytes.

Therefore, serial communication using software flow control is only acceptable when communication speeds are not too high, and the probability that buffer overruns or data damage occur are minimal.

C.1.3 Hardware Flow Control

Hardware flow control is superior compared to software flow control using the XON and XOFF characters. The main problem is that an extra hardware investment is needed. Extra lines are necessary in the communication cable to carry the handshaking information.

Hardware flow control is sometimes referred to as RTS / CTS flow control. This term mentions the extra input and outputs used on the serial device to perform this type of handshaking. RTS / CTS in its original outlook is used for handshaking between a computer and a device connected to it such as a modem.

First, the computer sets its RTS line to signal the device that some information is present. The device checks if there is room to receive the information and if so, it sets the CTS line to start the transfer. When using a null modem connection, this is somewhat different. There are two ways to handle this type of handshaking in that sitiuation.

One is, where the RTS of each side is connected with the CTS side of the other. In that way, the communication protocol differs somewhat from the original one. The RTS output of computer A signals computer B that A is capable of receiving information, rather than a request for sending information as in the original configuration. This type of communication can be performed with a null modem cable for full handshaking. Although using this cable is not completely compatible with the original way hardware flow control was designed, if software is properly designed for it, it can achieve the highest possible speed because no overhead is present for requesting on the RTS line and answering on the CTS line.

In the second situation of null modem communication with hardware flow control, the software side looks quite similar to the original use of the handshaking lines. The CTS and RTS lines of one device are connected directly to each other. This means, that the request to send query answers itself. As soon as the RTS output is set, the CTS input will detect a high logical value indicating that sending of information is allowed. This implies, that information will always be sent as soon as sending is requested by a device if no further checking is present. To prevent this from happening, two other pins on the connector are used, the data set ready DSR and the data terminal ready DTR. These two lines indicate if the device attached is working properly and willing to accept data. When these lines are cross-connected (as in most null modem cables) flow control can be performed using these lines. A DTR output is set, if that computer accepts incomming characters.

C.1.4 How to Implement

Implementing proper flow control can give some headaches. The main problems are the numerous ways it can be done and especially for null modem connections, the lack of a standard way of doing. The best way to implement rigid flow control in your software is to use preprogrammed routines from a reliable source. The problems involved in the own development of communication routines is often not worth the effort compared to the relative low prices of professional communication libraries. A good library is the COMM-DRV/Lib from Willies Computer Software Co. This library supports all versions of Windows and MS-DOS. XModem, YModem and ZModem file transfer routines are provided and all source code is included. Includes also Modem handling and string handling routines.

C.2 WOL Setting

C.2.1 Introduction

Wake on LAN (WOL, sometimes WoL) is an Ethernet computer networking standard that allows a computer to be turned on or woken up remotely by a network message.

C.2.2 System Requirements - PC Compatible

Wake on LAN (WoL) support is implemented on the motherboard of a computer. Most modern motherboards with an embedded Ethernet controller support WoL without the need for an external cable. Older motherboards must have a WAKEUP-LINK header onboard and connected to the network card via a special 3-pin cable; however, systems supporting the PCI 2.2 standard coupled with a PCI 2.2 compliant network adapter typically do not require a WoL cable as the required standby power is relayed through the PCI bus.

PCI version 2.2 has PME (Power Management Events). What this means is that PCI cards can send and receive PME via the PCI socket directly, without the need for a WOL cable.

Laptops powered by the Intel 3945 chipset or newer (with explicit BIOS support) allow waking up the machine using wireless (802.11 protocol). This is called Wake on Wireless LAN (WoWLAN).

Wake on LAN must be enabled in the Power Management section of the motherboard's BIOS. It may also be necessary to configure the computer to reserve power for the network card when the system is shutdown.

In addition, in order to get WoL to work it is sometimes required to enable this feature on the card. This can be done in Microsoft Windows from the properties of the network card in the device manager, on the "Power Management" tab. Check "Allow this device to bring the computer out of standby" and then "Only allow management stations to bring the computer out of standby" to make sure it does not wake up on all network activity.

C.2.3 How WoL Works

Wake-on-LAN is not restricted to LAN (Local area network) traffic.

The general process of waking a computer up remotely over a network connection can be explained thusly:

The target computer is shut down (Sleeping, Hibernating or Soft Off, i.e. ACPI state G1 or G2), with power reserved for the network card. The network card listens for a specific packet, called the "Magic Packet." The Magic Packet is broadcast on the broadcast address for that particular subnet (or an entire LAN, though this requires special hardware and/or configuration). When the listening computer receives this packet, the network card checks the packet for the correct information. If the Magic Packet is valid, the network card turns on the computer to full power and boots the operating system.

The magic packet is sent on the data link or OSI-2 layer and broadcast to all NICs (within the network of the broadcast address). Therefore, it does not matter whether the remote host has a fixed or dynamic IP-address (OSI-3 layer).

In order for Wake on LAN to work, parts of the network interface need to stay on. This increases the standby power used by the computer. If Wake on LAN is not needed, turning it off may reduce power consumption while the computer is off but still plugged in.

C.2.4 Magic Packet

The Magic Packet is a broadcast frame containing anywhere within its payload 6 bytes of ones (resulting in hexadecimal FF FF FF FF FF FF) followed by sixteen repetitions of the target computer's MAC address.

Since the Magic Packet is only scanned for the string above, and not actually parsed by a full protocol stack, it may be sent as a broadcast packet of any network- and transport-layer protocol. It is typically sent as a UDP datagram to port 0, 7 or 9, or, in former times, as an IPX packet.

ADVANTECH

Enabling an Intelligent Planet

www.advantech.com