AR-ES6003FL

User Manual

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Manual's first edition:

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Chapter 1 System Introduction

AR-ES6003FL is a fanless embedded system that is designed for rugged environment. Without compromise the performance, it equipped with the most advanced ATOM D525 (dual cores) or D425 (single core) CPU and up to 4GB of DDR3 memory. Customers can select suitable CPU and memory size to get the best performance/price ratio. AR-ES6003FL has diverse physical interface for different peripheral, e.g. VGA port, LVDS pin header, 4 * USB 2.0 ports, 2 * USB 2.0 pin header, 4 * COM port, 2 * GB LAN ports, 2 * SATA ports, CF slot, HDD bay and Realtek audio input/output port. It is also equipped with standard PCI and PCI express and mini-PCIe slot. Users can purchase suitable add-on cards to satisfy their today and tomorrow needs.

1.1 Specifications

■ System	FANLESS embedded system
■ CPU	Intel Dual Core ATOM D525 or Single Core ATOM D425
■ Chipset	Intel ICH8M Chipset
■ Memory	2 x DDR3 SO-DIMM, up to 4GB memory
■ Ethernet	2 x RJ45 10/100/1000Mbps LAN ports
■ Serial Port	3 x RS-232 (DB9) & 1 x RS-232/422/485 (DB9)
■ USB	6 x USB 2.0 (4 x external port, 2 x pin header)
■ GPIO	8 bit digital I/O (4 x IN & 4 x OUT)
■ CF	1 x external CF socket
■ SATA	1 x 2.5” HDD bay, SATA II interface x 2
■ Video	VGA (DB15) & 18 bit LVDS (pin header)
■ Audio	Line-out & MIC connector
■ Mini-PCIe	1 x mini-PCIe slot for expansion
■ PCI & PCIe	1 x PCI slot & 1 x PCIe slot (via AR-RS21 riser card)
■ OS support	Win XP (32 bit), Win 7 (32/64 bit), Fedora 14 (32/64 bit), Ubuntu 10 (32/64 bit)

1.2 Packing List

Check if the following items are included in the package.

- AR-ES6003FL system
- Quick user manual
- CD with Driver and Manual
- SATA & SATA power cable
- 2.5” anti-shock HDD mounting kit
- AC 110V/220V universal Adapter
- USA or Europe or Japan or UK power cord
- Mounting bracket
- Screw Pack

1.3 Features

- Support Intel Atom D525 (Dual Core) and D425 (Single Core)
- 2 x DDR3 SO-DIMM, up to 4GB
- Selectable PCI & PCI Express x1 Expansion Slot
- mini-PCIe Expansion Slot
- Use JST connectors and switch to avoid cables drop
- Support Win XP, 7, Fedora 14 and Ubuntu 10

1.4 System Dissection

1.4.1 Dimensions

1.4.2 I/O Panel

CF Card
POWER INPUT
VGA
GPIO
COM4
LAN
USB
MIC
Speaker
COM2
COM1
COM3
Power Switch
WIFI

1.4.3 System Configuration

Item	Description	Quantity
1	TOP COVER(Thermal Module)	1
2	B6003	1
3	BOTTOM Cover	1
4	Wall Mount Bracket	2
5	CF BRACKET	1
6	IO PANEL	1
7	Adaptor(Terminal)	1
8	DDRIII SO-DIMM	1
9	WIFI MODULE(Optional)	1
10	WIFI ANTENNA(Optional)	2
11	HDD BRACKET	1
12	9427B-Power Board	1
13	PCI-E Bracket	1
14	PCI-E Lock	1
15	HDD Cushions	4
16	HDD Screws	4
17	AT Power Switch	1
18	Raiser Card	1

Chapter 2 Procedures of Assembly/Disassembly

2.1 SO-DIMM Installation

The following instructions will guide you to install SO-DIMM step-by-step.

2.1.1 Unfasten the screw of chassis top cover.

2.1.2 Open top cover.

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

- Align the memory module's cutout with the SO-DIMM slot notch.

- Slide the memory module into the SO-DIMM slot and finish the memory installation.

2.2 Extension PCI/PCIe Card Installation(RS21)

2.2.1 Open the top cover (the same as above steps).

2.2.2 Unfasten the screw in order to release the PCI-E bracket.

2.2.3 Push the PCI/PCIe card into PCI/PCIe slot.

2.2.4 Fixed the PCI/PCIe cards by PCI-E bracket.

- To easily fix the PCI/PCIe cards, please make sure the card bracket aligns to the PCI-E bracket. Please check the photo below.

2.2.5 Fix the PCI/PCIe cards on chassis by fastening the screw.

2.3 Extension PCIe Cards Installation(RS20)

In order to plug 2 PCI-E cards into system. The raiser card MUST be changed. Following introductions show up how to change RS-21 raiser card to RS-20 raiser card.

2.3.1 Unfasten 2 screws in order to release the RS-21 module.

2.3.2 Unfasten 2 screws to separate RS-21 and bracket.

2.3.3 Assembly the RS20 with bracket by fastening 2 screws.

2.3.4 Install the RS20 module back to system by fastening 2 screws.

2.3.5 Push the PCIe cards into PCIe slot.

2.3.6 Fixed the PCIe cards by PCI-E bracket.

- To easily fix the PCIe cards, please make sure the card bracket aligns to the PCI-E bracket. Please check the photo below.

2.3.7 Fix the PCIe cards on chassis by fastening the screw.

2.4 2.5”HDD Installation

2.4.1 Unfasten 4 screws to release the HDD bracket.

2.4.2 Take out 4 HDD screws from packing bag.

2.4.3 Assemble HDD into bracket by fastening 4 screws.

2.4.3 Fixed HDD module back to bottom cover.

2.4.4 Plug SATA cable and power cable into M/B.

2.4.5 Assemble the bottom cover back to system.

2.5 Mounting Bracket Assembly

2.5.1 Tack out the Mounting Bracket and 4 screws from packing bag.

2.5.2 Fix the Mounting Brackets on system by fastening 4 screws.

2.6 CF Card Installation

2.6.1 Unfasten the 2 screws and pull the CF bracket from I/O panel.

2.6.2 Assemble the CF card with CF bracket.

2.6.4 Finish the CF installation.

AR-B6003 Board

User Manual

Chapter 3 Mainboard Introduction

AR-B6003 is an embedded SBC that is designed for rugged environment. Without compromise the performance, it equipped with the most advanced ATOM D525 (dual cores) or D425 (single core) CPU and up to 4GB of DDR3 memory. Customers can select suitable CPU and memory size to get the best performance/price ratio. AR-B6003 has diverse physical interface for different peripheral, e.g. VGA port, LVDS pin header, 4 * USB 2.0 ports, 2 * USB 2.0 pin header, 4 * COM port, 2 * GB LAN ports, 2 * SATA ports, CF slot, and Realtek audio input/output port. It is also equipped a dedicated bus which can expand PCI and PCI express slots. Users can purchase Acrosser riser card to satisfy their today and tomorrow needs.

3.1 Specifications

- CPU Intel Dual Core ATOM D525 or Single Core ATOM D425
- Chipset Intel ICH8M Chipset
- Memory 2 x DDR3 SO-DIMM, up to 4GB memory
- Ethernet 2 x RJ45 10/100/1000Mbps LAN ports
- Serial Port 3 x RS-232 (DB9) & 1 x RS-232/422/485 (DB9)
- USB 6 x USB 2.0 (4 x external port, 2 x pin header)
- GPIO 8 bit digital I/O (4 x IN & 4 x OUT)
- CF 1 x external CF socket
- SATA 1 x 2.5” HDD bay, SATA II interface x 2
- Video VGA (DB15) & 18 bit LVDS (pin header)
- Audio Line-out & MIC connector
- Mini-PCIe 1 x mini-PCIe slot for expansion
- Expansion 1 x dedicated bus for PCI & PCIe slot
  - AR-RS20 --- 2 x PCIe slot
  - AR-RS21 --- 1 x PCI slot & 1 x PCIe slot
- OS support WIN XP, WIN 7, Fedora 14, Ubuntu 10

3.2 Package Contents

Check if the following items are included in the package.

- Quick Manual
- AR-B6003 board
- 1 x Software Utility CD

3.3 Block Diagram

Chapter 4 H/W Information

This chapter describes the installation of AR-B6003. At first, it shows the Function diagram and the layout of AR-B6003. It then describes the unpacking information which you should read carefully, as well as the jumper/switch settings for the AR-B6003 configuration.

4.1 Mainboard illustration (Top Side)

Mainboard illustration (Bottom Side)

1	***BH1*** System RTC battery socket	5	***Intel Atom Pineview D425/D525 CPU***
2	***PCIE_R1*** PCI-E & PCI riser card socket	6	***Intel ICH8M***
3	***CN_DIMM2*** 204-Pin DDR3 Socket		
4	***CN_DIMM1*** 204-Pin DDR3 Socket		

4.2 Locations of IO ports & Jumper Setting Definition (Top Side)

Locations Of IO Ports & Jumper Setting Definition (Bottom Side)

1	FPIO1 ATX Power on/off & Reset switch button connector.	14	LED1 2 in 1 LED for Power & HDD LED.	27	CF1 CF CARD SOCKET
2	SIM1 SIM card Holder	15	PWR1 Connector for 0932V power board		.
3	MINIPCIE1 Mini-PCI Express Card connector	16	CN_RS232_1 Pin Header for COM2 use RS-232 function		
4	AUDIO1 Line Out & Mic in phone jack.	17	CN_RS422_485_1 Pin Header for COM2 use RS-422/485 function		
5	CN9 RJ45 & USB 2 ports (USB0,USB1) Connector	18	LVDS1 LVDS connector		
6	CN8 RJ45 & USB 2 ports (USB2,USB3)Connector	19	LCDPWR1 For LCD Power connector		
7	SW3 For CF CARD power select and Power Mode select.	20	CN4 ATX12V Power Supply input Connector		
8	COM3_COM4 D-SUB 9 pin for COM3,COM4 RS232 connector	21	CCMOS1 CMOS Memory Clearing Header		
9	SW2 For RS-422, RS-485 function select.	22	SATA1, SATA2 SATA device connector #1, #2		
10	SW4 For RS-422,RS-485 function select.	23	SATA_PWR1, SATA_PWR2 For SATA Power Connector #1, #2		
11	GPIO_COM1 D-SUB 9 pin COM1 for RS-232, D-SUB 15 pin for External GPIO connector.	24	FP_USB1,FP_USB2 Internal USB4, USB5 connector.		
12	SW5 For RS-422, RS-485 function select.	25	BH1 CR2032 Battery Hold Connector.		
13	VGA1 D-sub 15 pin VGA connecter	26	CPUFAN1 CPU FAN connector.		

4.2.1 Connectors and Jumper settings

<table>
<tr><th colspan="2">1. FPIO1</th><th colspan="2">2. SIM1 Connector</th></tr>
<tr><td>
</td><td>FPIO1 Connector
Pin1-2 ATX Power on/off switch button
Pin5-6 System Reset switch button</td><td> </td><td>SIM Card Holder
Connects to 3.5G Cell phone SIM Card.</td></tr>
<tr><th colspan="2">3. MINIPCIE1 (Mini-PCIe Connector)</th><th colspan="2">4. AUDIO1</th></tr>
<tr><td> </td><td>Mini-PCIe x1 Connector</td><td> </td><td>Audio Jack
Lime: Line Out
Pink: Mic in</td></tr>
<tr><th colspan="2">5,6. CN8,CN9 (RJ45 x1& USB Port x2)</th><th colspan="2">7. SW3 (CF card power select and Power Mode select)</th></tr>
<tr><td> </td><td>RJ45 Ethernet Connector with 2 ports of External USB Connector</td><td>
</td><td>SW3 DIP Switch
(Default:Key1 OFF; Key2 OFF, Key3 ON; Key4 ON)
<table>
<tr><th colspan="4">SW3</th><th rowspan="2">Function</th></tr>
<tr><th>1</th><th>2</th><th>3</th><th>4</th></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>ON</td><td>9427B power board,AT mode</td></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>0932V power board,AT mode</td></tr>
<tr><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>9427B power board,ATX mode</td></tr>
<tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>0932V power board,ATX mode</td></tr>
</table></td></tr>
</table>

8. COM3_COM4 (for COM3,COM4 use)

Pin	SIGNAL
1	DCD
2	SIN
3	SOUT
4	DTR
5	GND
6	DSR
7	RTS
8	CTS
9	RI

9. SW2 (RS-422,RS-485 function select)

SW2, DIP Switch

For RS-422,RS-485 Function select(Default: All OFF For RS-232)

RS-422 setting:

1	OFF
2	ON
3	OFF
4	ON

RS-485 setting:

1	ON
2	ON
3	OFF
4	ON

10. SW4 (RS-422/485 TX Terminator resistor selection)

SW4 DIP Switch

For RS-422/485 TX Terminator resistor selection)

(Default: all OFF)

SW4				PULL-HI/LOW ohm ressitor	Teminator Resistor
1	2	3	4		
OFF	OFF	OFF	OFF	8.87K ohm	NA
ON	OFF	OFF	OFF	Not Application	
OFF	ON	OFF	OFF		
ON	ON	OFF	OFF		
OFF	OFF	ON	OFF		
ON	OFF	ON	OFF		
OFF	ON	ON	OFF	8.87K ohm	120
ON	ON	ON	OFF	Not Application	
OFF	OFF	OFF	ON		
ON	OFF	OFF	ON	618 ohm	NA
OFF	ON	OFF	ON	Not Application	
ON	ON	OFF	ON		
OFF	OFF	ON	ON		
ON	OFF	ON	ON		
OFF	ON	ON	ON		
ON	ON	ON	ON	618 ohm	120

11 GPIO_COM1 (For COM1 RS-232, External GPIO control)

GPIO Pin Define:

PIN	SIGNAL	PIN	SIGNAL
1	GPO0	**2**	GPO1
3	GPO2	**4**	GPO3
5	GND	**6**	GND
7	GND	**8**	GND
9	GND	**10**	GND
11	GPI4	**12**	GPI5
13	GPI6	**14**	GPI7
15	VCC12A		

12, SW5 (RS-422 RX terminator resistor selection)

SW5 DIP Switch

For RS-422 RX Terminator resistor selection)

(Default: all OFF)

SW5				PULL-HI/LOW ohm ressitor	Teminator Resistor
1	2	3	4		
OFF	OFF	OFF	OFF	NA	NA
ON	OFF	OFF	OFF	Not Application	
OFF	ON	OFF	OFF		
ON	ON	OFF	OFF		
OFF	OFF	ON	OFF		
ON	OFF	ON	OFF		
OFF	ON	ON	OFF	NA	120
ON	ON	ON	OFF	Not Application	
OFF	OFF	OFF	ON		
ON	OFF	OFF	ON	665 ohm	NA
OFF	ON	OFF	ON	Not Application	
ON	ON	OFF	ON		
OFF	OFF	ON	ON		
ON	OFF	ON	ON		
OFF	ON	ON	ON		
ON	ON	ON	ON	665 ohm	120

13. VGA1 (D-SUB 15 pin Connector)

VGA1

D-SUB 15 pin For CRT Monitor

14. LED1

Green: Power ON LED.

Yellow: HDD LED

15 PWR1 (For 0932V power board use only Connector)

Pin 1	**GND**
Pin 2	**PSON**
Pin 3	**5VSB**

16. CN_RS232_1
17. CN_RS422_485_1
(For COM2 Function select).

CN_RS232_1: For RS-232 Function

Pin	SIGNAL
1	DSR
2	DCD
3	RTS
4	SIN
5	CTS
6	SOUT
7	RI
8	DTR
9	NC
10	GND

CN_RS422_485_1: For RS-422,RS-485 Function

Pin	SIGNAL
1	NC
2	485_422_TX+
3	NC
4	485_422_TX-
5	422_RX2-
6	NC
7	422_RX2+
8	NC
9	NC
10	GND

18. LVDS1 (30 pin DF13 Connector).

LVDS1:

30 pin DF13 connector

Pin	Symbol	Description
1	VLED	VLED Power
3	Vss	Ground
5	VLED_EN	LED enable
7	VPWM_EN	System PWM
9	Vss	Ground
11	NC	Not connected(Reserve)
13	NC	Not connected(Reserve)
15	NC	Not connected(Reserve)
17	NC	Not connected(Reserve)
19	NC	Not connected(Reserve)
21	Vss	Ground
23	SMB DATA	SMB DATA
25	SMB CLK	SMB CLK
27	Vss	Ground
29	VDD	Power

Pin	Symbol	Description
2	VLED	VLED Power
4	Vss	Ground
6	CKIN+	LVDS receiver signal clock
8	CKIN-	LVDS receiver signal clock
10	Vss	Ground
12	RxIN2+	LVDS receiver signal channel 2
14	RxIN2-	LVDS receiver signal channel 2
16	Vss	Ground
18	RxIN1+	LVDS receiver signal channel 1
20	RxIN1-	LVDS receiver signal channel 1
22	Vss	Ground
24	RxIN0+	LVDS receiver signal channel 0
26	RxIN0-	LVDS receiver signal channel 0
28	Vss	Ground
30	VDD	Power

19.LCDPWR1 (LCD Power Connector)

Pin 1	**VCC**
Pin 2	**NC**
Pin 3	**GND**

20. CN4 (ATX12V Power Input)

21. CCMOS1.

Pins 1 and 2 opened (Default): Normal operation.

Pins 1 and 2 shorted: Clear CMOS memory.

22. SATA1, SATA2 (SATA device connector #1 and #2).

To connect SATA device:

1.Attach either end of the signal cable to the SATA connector on motherboard.

Attach the other end to the SATA device.

2. Attach the SATA power cable to the SATA device and connect the other end from the power supply.

23. SATA_PWR1, SATA_PWR2

SATA_PWR1, SATA_PWR2

SATA Device Power Connector

PIN	SIGNAL
1	+12V
2	GND
3	VCC3
4	VCC5

24. FP_USB1,FP_USB2

Pin	Pin Assignment
1	VCC5
2	Data0 -
3	Data0 +
4	Ground
5	NC

26. BH1 (CR2032 Battery Holder).

CMOS Backup Battery:

An onboard battery saves the CMOS memory to keep the BIOS information stays on even after disconnected your system with power source. Nevertheless, this backup battery exhausts after some five years.

Once the error message like "**CMOS BATTERY HAS FAILED**" or "**CMOS checksum error**" displays on monitor, this backup battery is no longer functional and has to be renewed

27. CPUFAN1 (CPU FAN connector 1).

PIN	SIGNAL
1	GND
2	+12V
3	NC

28. CF1 (CF CARD Socket).

Chapter 5 BIOS Settings

This chapter describes the BIOS menu displays and explains how to perform common tasks needed to get the system up and running. It also gives detailed explanation of the elements found in each of the BIOS menus. The following topics are covered:

- Main Setup
- Advanced Chipset Setup
- PnP/PCI Setup
- Peripherals Setup
- PC Health Setup
- Boot Setup
- Exit Setup

5.1 Main Setup

Once you enter the Award BIOS™ CMOS Setup Utility, the Main Menu will appear on the screen. Use the arrow keys to highlight the item and then use the <Pg Up> <Pg Dn> keys to select the value you want in each item.

Note: Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press the <F1> key, and it will display the relevant information.

Option	Choice	Description
Date Setup	N/A	Set the system date. Note that the 'Day' automatically changes when you set the date
Time Setup	N/A	Set the system time.
IDE Channel 0 Master	N/A	The onboard IDE provides 1 channel for CF card only. The BIOS will auto-detect the IDE type.
SATA Channel 1/2	N/A	The system provides 2 SATA hard disks or other devices.

Halt On	All Errors, No Errors, All but keyboard(Default)	Select the situation in which you want the BIOS to stop the POST process and notify you.
Base Memory	N/A	"The POST of the BIOS will determine the amount of base (or conventional) memory installed in the system. The value of the base memory is typically 512K for systems with 512K memory installed on the motherboard, or 640K for systems with 640K or more memory installed on the motherboard."
Extended Memory	N/A	"The BIOS determines how much extended memory is present during the POST. This is the amount of memory located above 1 MB in the CPU's memory address map."
Total Memory	N/A	This item displays the memory size that used.

Option	Choice	Description
IDE HDD Auto-Detection	Enter	To auto-detect the CF's size, head…. On this channel
IDE Channel 0 Master	None Auto(Default) Manual	Auto Allows BIOS to automatically detect IDE/SATA devices during POST None Select this if no IDE/SATA devices are used and the system will skip the automatic detection step and allow for faster system start up. Manual User can manually input the correct settings.
Access Mode	CHS LBA Large Auto(Default)	Use this to set the access mode for the hard drive. The four options are: CHS/LBA/Large/Auto
Capacity	N/A	Capacity of currently installed hard drive.
Cylinder	N/A	Number of cylinders
Head	N/A.	Number of heads
Precomp	N/A.	Write precomp
Landing Zone	N/A	Landing zone
Sector	N/A	Number of sectors

5.2 Advanced Chipset Setup

This section consists of configuration entries that allow you to improve your system performance, or modify some system features according to your preference. Some entries are required and reserved by the board's design.

Note: Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press the <F1> key, and it will display the relevant information.

Option	Choice	Description
Hyper-Threading Technology	Enabled(Default) Disabled	Enable the Hyper-Threading Technology
Quick Power On Self Test	Enabled(Default) Disabled	Allows the system to skip certain tests while booting. This will decrease the time needed to boot the system.
Full Screen Logo Show	Enabled Disabled(Default)	Displays the full screen logo upon BIOS booting.

APIC Mode	Enabled(Default)	Enables APIC (Advanced Programmable Interrupt Controller) functionality.
Init Display First	Onboard(Default) PEG	Auto detect VGA output from onboard or output from PCI-E add-on card when the PCI-E card installed. Incidentally,PCI slot of riser card can't install VGA card.
Boot Display	CRT(Default) LVDS+CRT	Select the CRT output when CRT is connecting with M/B. Select the LVDS+CRT output when LVDS is connecting with M/B. However CRT is connecting with M/B or not.
Panel Type	"800 x 600" "1024 x 768"	Follow LVDS resolution to choice it.
Pre-allocated Memory Size	8MB(Default) 32MB 64MB	Allow user to select the amount of system memory pre-allocated by the internal graphics device.
DVMT Mode	DVMT(Default) FIXED	This item sets the mode for dynamic video memory technology
Graphics Memory	128MB(Default) 256MB MAX	Specify the size of DVMT memory to allocate for video memory.

5.3 PnP/PCI Setup

The option configures the PCI bus system. All PCI bus system on the system use INT#, thus all installed PCI cards must be set to this value.

Note: Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press the <F1> key, and it will display the relevant information.

Option	Choice	Description
Reset Configuration Data	Enabled Disabled(Default)	Normally, you leave this field Disabled. Select Enabled to reset Extended System Configuration Data (ESCD) when you exit Setup. If you have installed a new add-on and the system reconfiguration has caused such a serious conflict, then the operating system cannot boot.
Resources Controlled By	Auto(ESCD)(Default) Manual	The Award Plug and Play BIOS has the capacity to automatically configure all of the boot and Plug and Play compatible devices. However, this capability means absolutely nothing unless you are using a Plug and Play operating system such as Windows 95. If you set this field to “manual,” then you may choose specific resources by going into each of the submenus.
IRQ Resources	N/A	When resources are controlled manually, assign a type to each system interrupt, depending on the type of the device that uses the interrupt

5.4 Peripherals Setup

This option controls the configuration of the board's chipset. Control keys for this screen are the same as for the previous screen

Note: Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press the <F1> key, and it will display the relevant information.

Option	Choice	Description
Onboard Serial Port 1	Disabled 3F8/IRQ3(Default) 2F8/IRQ3 3E8/IRQ3 2E8/IRQ3	Select an address and the corresponding interrupt for each serial port.
Onboard Serial Port 2	Disabled 3F8/IRQ4 2F8/IRQ4(Default) 3E8/IRQ4 2E8/IRQ4	Select an address and the corresponding interrupt for each serial port.
Onboard Serial Port 3	Disabled 4F8/IRQ11(Default) 4E8/IRQ11	Select an address and the corresponding interrupt for each serial port.

Onboard Serial Port 4	Disabled 4F8/IRQ10 4E8/IRQ10(Default)	Select an address and the corresponding interrupt for each serial port.
USB Device Setting	Enter	Select Enabled if your system contains a Universal Serial Bus (USB) 2.0 controller and you have USB peripherals
OnChip IDE Device	N/A	The integrated peripheral controller contains an IDE interface with support for two IDE channels.

Option	Choice	Description
USB Controller	Disabled Enabled(Default)	Enable or Disable USB1.1 Host Controller interface for Universal Serial Bus.
USB 2.0 Controller	Disabled Enabled(Default)	Enable or Disable USB2.0 Host Controller interface for Universal Serial Bus.
USB Keyboard Function	Disabled Enabled(Default)	Enable or Disable Legacy support USB keyboard.
USB Storage Function	Disabled Enabled(Default)	Enable or Disable Legacy support USB Mass Storage.

Option	Choice	Description
IDE DMA transfer access	**Disable** **Enable(Default)**	Enable or disable IDE DMA transfer access.
SATA Mode	**IDE(Default)** **AHCI**	To select SATA Mode to IDE and AHCI Mode. Select [IDE] if you want to have SATA function as IDE. Select [AHCI] for Advanced Host Controller Interface (AHCI) feature, with improved SATA performance.
LEGACY Mode Suppot	**Disable(Default)** **Enable**	Enable legacy OS support, like DOS, Windows 98. For other latest OS, suggest to select “Disable” in case that cause the performance down.
On-Chip Primary PCI IDE	**Disable** **Enable(Default)**	Enable the onboard SATA chip controller.
IDE Primary Master PIO	**Auto(Default)** **Mode 0** **Mode 1** **Mode 2** **Mode 3** **Mode 4**	Setting the IDE PIO mode.
IDE Primary Master UDMA	**Disabled** **Auto(Default)**	Setting the IDE UDMA mode.

5.5 PC Health Setup

This section shows the parameters in determining the PC Health Status. These parameters include temperatures, fan speeds, and voltages.

Note: Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press the <F1> key, and it will display the relevant information.

Option	Choice	Description
System Temperature	N/A	Show you the current system temperature.
CPU Temperature	N/A	These read-only fields show the functions of the hardware thermal sensor by CPU thermal diode that monitors the chip blocks to ensure a stable system.
CPU Core Voltage	N/A	Show you the voltage of CPU.
+12V Voltage	N/A	Show you the Input +12V voltage.
+5V Voltage	N/A	Show you the Input +5V voltage.
+3.3V Voltage	N/A	Show you the Input +3.3V voltage.

5.6 Boot setup

This option allows user to select sequence/priority of boot device(s) and Boot from LAN.

Note: Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press the <F1> key, and it will display the relevant information.

Option	Choice	Description
First Boot Device	Hard Disk CDROM(Default) USB-FDD USB-CDROM Disabled	The BIOS attempts to load the operating system from the devices in the sequence selected in these items.
Second Boot Device	Hard Disk(Default) CDROM USB-FDD USB-CDROM Disabled	The BIOS attempts to load the operating system from the devices in the sequence selected in these items.
Third Boot Device	Hard Disk CDROM USB-FDD(Default) USB-CDROM Disabled	The BIOS attempts to load the operating system from the devices in the sequence selected in these items.

Boot Other Device	Disabled Enable(Default)	The BIOS attempts to load the operating system from the devices in the sequence selected in these items.
Hard Disk Boot Priority	N/A	These fields set the Boot Priority for each Hard Disk.

This item allows you to set the priority for hard disk boot. It shows the current hard disks used in your system. Please select the priority what you need.

5.7 Exit Setup

This option is used to exit the BIOS main menu and change password.

Note: Listed at the bottom of the menu are the control keys. If you need any help with the item fields, you can press the <F1> key, and it will display the relevant information.

option	Choice	Description
Save & Exit Setup	Pressing <Enter> on this item for confirmation: **Save to CMOS and EXIT (Y/N)? Y**	Press “Y” to store the selections made in the menus in CMOS – a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS. After saving the values the system is restarted again
Load Optimized Defaults	When you press <Enter> on this item you get a confirmation dialog box with a message like this: **Load Optimized**	Press ‘Y’ to load the default values that are factory-set for optimal-performance system operations.

	Defaults (Y/N)? N	
Exit Without Saving	Pressing <Enter> on this item for confirmation: **Quit without saving (Y/N)? Y**	This allows you to exit Setup without storing any changes in CMOS. The previous selections remain in effect. This shall exit the Setup utility and restart your computer.
Set Password	Pressing <Enter> on this item for confirmation: **ENTER PASSWORD:**	When a password has been enabled, you will be prompted to enter your password every time you try to enter Setup. This prevents unauthorized persons from changing any part of your system configuration. Type the password, up to eight characters in length, and press <Enter>. The password typed now will clear any previous password from the CMOS memory. You will be asked to confirm the password. Type the password again and press <Enter>. You may also press <Esc> to abort the selection and not enter a password. To disable a password, just press <Enter> when you are prompted to enter the password. A message will confirm that the password will be disabled. Once the password is disabled, the system will boot and you can enter Setup freely.

Chapter 6 Function Description

6.1 DC Power input connection

AR-B6003 needs +12V to power the board. If you use standard ATX PSU, you need to connect COM/GND with PS_ON# signal (green wire in the ATX connector, pin 16). Else, standard ATX PSU will not generate power to 4 pin +12V connector.

Main Power Connector

+12V Power Connector

6.2 Digital Inputs

There are 4 clamped diode protection digital inputs on GPIO_COM1 connector. You can read the status of any input through the software API. These digital inputs are general purpose input. You can define their purpose for any digital input function. The detailed information please refers to Software Programming Guide for how to use the API.

Following diagrams state how to connect the digital inputs to devices on the embedded system.

6.3 Digital Outputs

There are 4 clamped diode protection digital outputs on GPIO_COM1 connector. You can control the output status of these digital outputs through the software API. The four digital outputs are capable sink maximum 500 mA current for each channel and maximum output voltage is 12V. The output reference voltage of device, please connect to GPIO #VCC12V(Pin15). These digital outputs are general purpose outputs. The detailed information please refers to Software Programming Guide for how to use the API.
Following diagrams state how to connect the digital outputs to devices on the embedded system.

GPIO Pin Define:

PIN	SIGNAL	PIN	SIGNAL
1	GPO0	2	GPO1
3	GPO2	4	GPO3
5	GND	6	GND
7	GND	8	GND
9	GND	10	GND
11	GPI4	12	GPI5
13	GPI6	14	GPI7
15	VCC12A		

6.4 Watchdog Timer

If you set a watchdog timer, you can use it to reset the system when system hangs up due to hardware issue. After you set the watchdog timer, the software shall re-set the timer to re-start a new cycle before it time-out. Please refer to Chapter 5 Software Installation and Programming Guide for how to set the watchdog timer.

6.5 RS-232 Ports

There are three RS-232 ports on the AR-B6003. The COM1/COM3/COM4 are connected through a male D-Sub 9-pin connector for serial communication. The COM2 is connected through a cable. Users need to plug into RS-232 or RS-422/485 connector. For RS-422/485, please refer to SW2, SW4 and SW5 setting. The following diagram is their pin definition and signal.

Pin number	RS-232 male
1	DCD
2	TXD
3	RXD
4	DSR
5	GND
6	DTR
7	CTS
8	RTS
9	RI

CN_RS232_1: For RS-232 Function

Pin	SIGNAL
1	DSR
2	DCD
3	RTS
4	SIN
5	CTS
6	SOUT
7	RI
8	DTR
9	NC
10	GND

CN_RS422_485_1: For RS-422, RS-485

Pin	SIGNAL
1	NC
2	485_422_TX+
3	NC
4	485_422_TX-
5	422_RX2-
6	NC
7	422_RX2+
8	NC
9	NC
10	GND

6.6 Serial ATA (SATA)

There are 2 SATA 2.5 ports on the AR-B6003. There are also two SATA power connectors for the SATA hard disks. The SATA power cable is an optional accessory. If you need a SATA power connector, please contact your Acrosser sales representative for the quotation.

6.7 USB

There are 6 USB 2.0 interfaces on the AR-B6003. Four USB connectors are located on the edge of the board. The other two USB ports are supported by two 5 pin internal connector. You need a special cable for using these two USB ports and they are optional accessories.

Chapter 7 Driver And Utility Installation

7.1 Driver CD Interface Introduction

Acrosser provides the driver CD including the drivers, utilities, applications and documents. Once putting into optical driver, it will run automatically. The driver CD will also detect the MB information to see if they are matched. The following error message appears if you get an incorrect driver CD.

7.1.1 Driver Page

Click the item, all the drivers will be selected.

Click the item, all selected items will be cancelled.

Click the “Install” icon to install the selected drivers.

Click the item to browse the CD contents.

Click the icon to close the program.

7.1.2 Utility Page

There is one utility for AR-B6003. The detailed information please refers to Software Programming Guide for how to use the API.

➢ Double click the “GPIO_Watchdog Setting Tool” to run the utility.

7.1.3 Application Page

There is one application for Acrobat reader installing.

➢ Double click the “Acrobat Reader 9.2” to install the application.

7.1.4 Document Page

This page will provide Acrosser board and system user manual. Please remember to install the Acrobat Reader before you read the manual.

- Double click the manual item to read the user manual.

➢ Please install the Acrobat Reader when you see the message.

7.2 Windows XP 32bit Driver Installation

7.2.1 Please put the driver disk to optical driver. The program will appear on the screen. Please click the “Select All” icon.

7.2.2 Click the “Install” icon to install the drivers.

7.2.3 Finish the driver installation. Please click “Yes” to restart the system.

7.3 Windows 7 32/64bit Driver Installation

7.3.1 Please put the driver disk to optical driver. Then click the “Run setup.exe” to run the install program.

7.3.2 The program will appear on the screen. Please click the "Select All" icon.

7.3.3 Click the "Install" icon to install the drivers.

7.3.4 Finish the driver installation. Please click “Yes” to restart the system.

Chapter 8 Software Installation and Programming Guide

8.1 Introduction

Overview of GPIO and Watchdog

AR-B6003 provides both a GPIO interface and a Watchdog timer. Users can use the GPIO and Watchdog APIs to configure and to access the GPIO interface and the Watchdog timer. The GPIO has four input pins and four output pins. The Watchdog timer can be set to 1~255 seconds. Setting the timer to zero disables the timer. The remaining seconds of the timer to reboot can be read from the timer.

In this GPIO and Watchdog package, on Linux and Windows platform, we provide:

1. API source code.
2. GPIO and Watchdog test utility and the utility source code.

8.2 File Descriptions

GPIO and Watchdog

On Linux platform:

1. sio_acce.c

   The source code of the Watchdog and GPIO APIs for accessing the SuperIO.
2. sio_acce.h

   This file includes the declarations of the APIs and macro definitions.
3. main.c

   The source code of the utility.
4. Makefile

On Windows platform:

1. AR-B6003.h

   The header file of the APIs and macro definition. This header file is an aggregate header which includes APIs declarations and macros for GPIO, Watchdog.
2. AR-B6003.lib

   The API library in static library format. This library is an aggregate library. It includes APIs for GPIO, Watchdog.
3. AR-B6003.dll

   The API library in dynamically linked library format. This library is an aggregate library. It includes APIs for GPIO, Watchdog.
4. errno.h

   The macro definitions of returned error code.
5. GPIO_Watchdog.cpp

   The source code of the utility.

8.3 API List and Descriptions

GPIO

1. **Syntax:**

```
i32 getInChLevel( i32 channel, u8 *val )
```

Description: Get the value of GPIO Input and put the value at *val.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Input pins to show. Users can use the macros GPI0, GPI1, GPI2, GPI3 to indicate the GPIO Input channel. For example:

```
getInChLevel( GPI2, &val);    // Indicate the GPIO Input channel 2
getInChLevel( GPI0 | GPI3, &val);    // Indicate the GPIO Input
                                     // channel 0 and channel 3
```

II. The parameter ‘val’ is an unsigned character pointer. The function puts the values of the indicated GPIO channels at the memory pointed by ‘val’. The bit 0 of *val shows the value of GPIO Input channel 0. The bit 1 of *val shows the value of GPIO Input channel 1. Other bits show the corresponding GPIO Input channels. Because there are only four channels, bit 4 ~ bit 7 of *val are always zero.

Here is an example:
If GPIO Input channel 1 and channel 3 are both 1.

```
unsigned char ch;
getInChLevel( GPI1|GPI3, &ch );
```

The returned value of variable ‘ch’ is 0xa.

Return Value: If the function gets the values successfully, it returns 0. If any error, it returns –1.

2. **Syntax:**

```
i32 setOutChLevel( i32 channel, u8 val )
```

Description: Set the value of GPIO Output according to the variable ‘val’.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Output pins to set. Users can use the macros GPO0, GPO1, GPO2, GPO3 to indicate the GPIO Output channels.

II. The parameter ‘val’ indicate the value to be set to GPIO Output channel. The acceptable values are limited to 0 and 1.

For example:

```
/* Setting the GPIO Output channel 2 to 1 */
setOutChLevel( GPO2, 1 );

/* Setting the GPIO Output channel 0 and channel 3 to 0 */
getInChLevel( GPO0 | GPO3, 0 );
```

Return Value: If the function sets the values successfully, it returns 0. If any error, it returns –1.

3. **Syntax:**

```
i32 getOutchLevel( i32 channel, u8 *val )
```

Description: Get the value of GPIO Output and put the value at *val.

Parameters:

I. The parameter ‘channel’ indicates the GPIO Output pins to show. Users can use the macros GPO0, GPO1, GPO2, GPO3 to indicate the GPIO Output channel. For example:

```
getOutChLevel( GPO2, &val);    // Indicate the GPIO Output channel 2

/* Indicate the GPIO Output channel 0 and channel 3. */
getOutChLevel( GPO0 | GPO3, &val);
```

II. The parameter ‘val’ is an unsigned character pointer. The function puts the values of the indicated GPIO channels at the memory pointed by ‘val’. The bit 0 of *val shows the value of GPIO Output channel 0. The bit 1 of *val shows the value of GPIO Output channel 1. Other bits show the corresponding GPIO Output channels. Because there are only four channels, bit 4 ~ bit 7 of *val are always zero.

Here is an example:
If GPIO Output channel 0 and channel 2 are both 1.

```
unsigned char ch;
getOutChLevel( GPO0|GPO2, &ch );
```

The returned value of variable ‘ch’ is 0x5.

Return Value: If the function gets the values successfully, it returns 0. If any error, it returns –1.

Watchdog

1. **Syntax:**

   u8 getWtdTimer(void)

   Description: This function reads the value of the watchdog time counter and returns it to the caller.
   Parameters: None.
   Return Value: This function returns the value of the time counter and returns it to the caller as an unsigned integer.

2. **Syntax:**

   void setWtdTimer(u8 val)

   Description: This function sets the watchdog timer register to the value ‘val’ and starts to count down. The value could be 0 ~ 255. The unit is second. Setting the timer register to 0 disables the watchdog function and stops the countdown.
   Parameters: The parameter ‘val’ is the value to set to watchdog timer register. The range is 0 ~ 255.
   Return Value: None.

8.4 Enable TESTSIGNING on Windows 7 X64 system

In order that the APIs works correctly on the Windows 7 X64 system, users have to enable the boot configuration test-signing option before invoking any APIs. Please follow the steps listed below to turn on the test-signing flag:

1. Invoke the 'Command Prompt' as an administrator.

2. Execute:

bcdedit.exe /set TESTSIGNING ON

```
C:\Windows\system32>bcdedit /set TESTSIGNING ON
The operation completed successfully.
```

3. Run the ‘bcdedit’ again without any option. A new item ‘testsigning’ is enabled.

```
C:\Cert>bcdedit

Windows Boot Manager
--------------------
identifier              {bootmgr}
device                  partition=C:
path                    \bootmgr
description             Windows Boot Manager
locale                  en-US
inherit                 {globalsettings}
default                 {current}
resumeobject            {bc9d3535-4ab7-11e0-9ead-dff035ce573b}
displayorder            {current}
toolsdisplayorder       {memdiag}
timeout                 30

Windows Boot Loader
-------------------
identifier              {current}
device                  partition=C:
path                    \Windows\system32\winload.exe
description             Windows 7 Ultimate
locale                  en-US
recoverysequence        {bc9d3537-4ab7-11e0-9ead-dff035ce573b}
recoveryenabled         Yes
testsigning             Yes
osdevice                partition=C:
systemroot              \Windows
resumeobject            {bf3df905-555d-11e0-9207-806e6f6e6963}
```

4. Reboot the system.

Appendix

Appendix A: BlueTooth SPEC

Standard	Bluetooth v2.0 + EDR class 1(100 meter)
Modulation	AFH (Adaptive Frequency Hopping)
Profiles provide	Serial Port, Dial Up Networking, File Transfer, Human Interface Device, Headset, Advanced Audio Distribution, Object Push, Synchronization, LAN Access, Personal Area network, Fax, Basic Imaging
Certification	Bluetooth BQB Certification
Support	up to **7** active Bluetooth devices

Appendix B: WiFi SPEC

Standard	IEEE 802.11b/g
Frequency Band	2.412GHZ ~2.484GHZ unlicensed ISM band
Data Rate	54, 48, 36, 24, 18, 11, 9, 6, 5.5, 2, 1Mbps
Transmitter Power	11g : 17dBm for OFDM mode 11b : 20dBm for CCK mode
Receive Sensitivity	Operating at 6Mbps:<-88dBm , 54Mbps:<-75dBm
Security	64/128-bit WEP, WPA, WPA2(AES/TKIP) encryption
Support	Microsoft Windows Zero Configuration to set up WiFi

Appendix C: Sierra 3.5G SPEC

The Sierra Wireless MC8790 PCI Express Mini Card is a compact, lightweight, wireless UMTS-based modem. It provides GPS, EDGE, GPRS, GSM, WCDMA, HSDPA and HSUPA connectivity for portable and handheld computers, point-of-sale devices, telemetry products and other machineto-machine and vertical applications over several radio frequency bands:

- GSM, GPRS, EDGE

850 MHz, 900 MHz, 1800 MHz, 1900 MHz

- UMTS WCDMA / HSDPA / HSUPA

800 MHz, 850 MHz, 1900 MHz, 2100 MHz

- Receive diversity:

Optimized for diversity on 800, 850, 1900 and 2100 MHz

- GPS

1575.42 MHz

The modem, based on Qualcomm MSM6290 baseband processor, supports data operation on HSDPA, HSUPA, WCDMA, EDGE, and GPRS networks.

Appendix D: Huawei 3.5G SPEC

HUAWEI EM770W HSPA PC Embedded Module is a HSPA Wireless Wide Area Network (WWAN) PC module. It is a multimode wireless terminal for business professionals. The EM770W supports the following standards:

- High Speed Packet Access (HSPA)
- Universal Mobile Telecommunications System (UMTS)
- Enhanced Data Rates for Global Evolution (EDGE)
- General Packet Radio Service (GPRS)
- Global System for Mobile Communications (GSM)

The EM770W can be connected to a PC via the Mini PCI Express interface. In the service area of the HSPA, UMTS, EDGE, GPRS or GSM network, you can surf the Internet, send messages and emails, and receive messages/emails cordlessly.