

FIR-650 Series

INTEL Processor

Embedded Board

With Ethernet, USB 2.0, Audio

User's Manual

Version 1.2

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1. Introduction

Thank you for choosing **FIR-C650** embedded board. **FIR-C650** is a factor CPU board equipped with a low power consumption and high performance VIA EDEN processor. It is designed for system manufacturers, integrators, or **VARs** who want to provide quality and reliable CPU board at a reasonable price.

註解 [RC1]: what is VARs?

FIR-C650 has a built-in the ProSavage4 AGP4X VGA controller. It is a 2D/3D graphics controller, which provides resolution up to 1920x1440, and supports both CRT and LCD. The VGA controller can share 8-32MB frame buffer of system memory.

For applications requiring a high-speed serial transmission, **FIR-C650** provides both USB 1.1 and USB 2.0. The high speed USB 2.0 host controller implements an ECHI interface that provides 480Mb/s bandwidth.

Both on-chip UARTs are compatible with the NS16C550. The parallel port and IDE interface are compatible with IBM PC/AT architecture.

FIR-C650 also has a built-in 10/100 Fast Ethernet LAN, which is a fully integrated 10BASE-T/100BASE-TX LAN controller with high performance and low power consumption features.

FIR-C650 uses the advanced VIA VT8606/VT82C686B Chipsets, which is 100% software compatible chipset with PCI 2.2 standard.

1.1 Specifications

CPU	INTEL processor
DMA channels	7
Interrupt levels	15
Chipset	VT8606
RTC	VT82C686B
Main memory	One 144-pin SODIMM socket supports 133Mhz SDRAM. The maximum memory is up to 512MB.
Ultra DMA 100 IDE interface	Up to four PCI Enhanced IDE hard drives are supported. The Ultra DMA 100 IDE can handle data transfer up to 100MB/s. Compatible with existing ATA IDE specifications is the best advantage, so there is no need to do any changes for users' current accessories.
Serial ports	Four RS-232 ports with 16C550 UART (or compatible) with 16-byte FIFO buffer. Support up to 115.2Kbps. The ports can be individually configured to COM1, COM2, COM3, COM4 or disabled.
Bi-directional parallel port	Configurable to LPT1, LPT2, LPT3 or disabled. Supports EPP/ECP/SPP.
Hardware monitor	Built-in to monitor power supply voltage and fan speed status.
USB 2.0/1.1 port	Supports 4 USB2.0 and 1 USB1.1 ports for future expansion.

Watchdog timer	Software programmable, reset generated when watchdog timer is time-out. Can use I/O Port hex 043(843) & 443 to control the watchdog.
VGA controller	Built-in ProSavage4 AGP4X 256-bit 2D/3D graphics engine. 8-32MB share Memory. Screen Resolution: up to 1920x1440.
Ethernet	Fast Ethernet controllers, IEEE 802.3u Auto-Negotiation supports 10BASE-T/100BASE-TX standard. The RJ45 connectors are located on the mounting bracket for easy connection.
Keyboard and PS/2 mouse	A 6-pin mini DIN connector is located on the mounting bracket for easy connection to a keyboard or PS/2 mouse. For alternative application, a keyboard and a PS/2 mouse pin header connector are also available on board.
Audio	AC'97 Audio CODEC
Compact flash	It can be used with a passive adapter (True IDE Mode) in a Type I/II Socket.
Power consumption	+12V @ 2.5A (max).
Operating temperature	0°-60° C

1.2 What You Have

FIR-C650's package includes the following items:

User Manual x1.

FIR-C650 Embedded Board x1.

6-pin Mini-Din converts to two 6-pin mini-Din cables for keyboard and mouse connection x1.

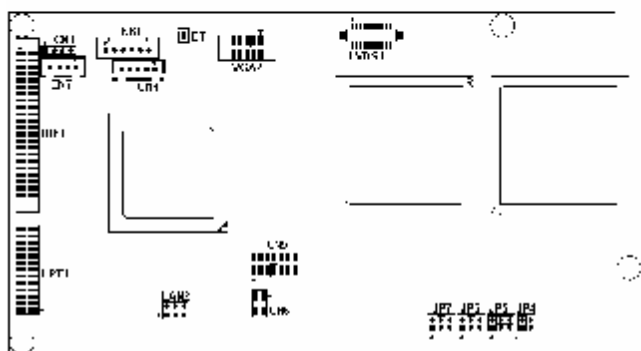
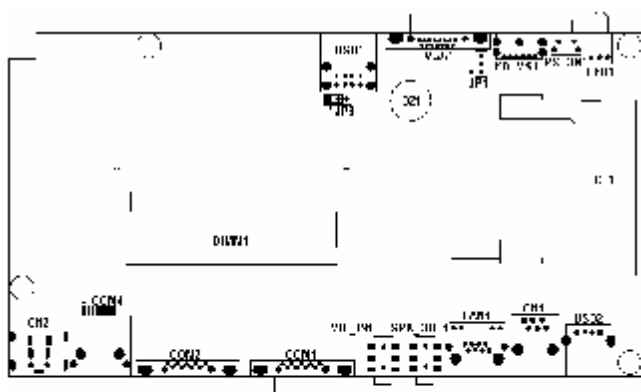
Driver CD x1.

If any of these items is missing or damaged, contact the dealer from whom you purchased this product. Save the shipping materials and carton in case you want to ship or store the product in the future.

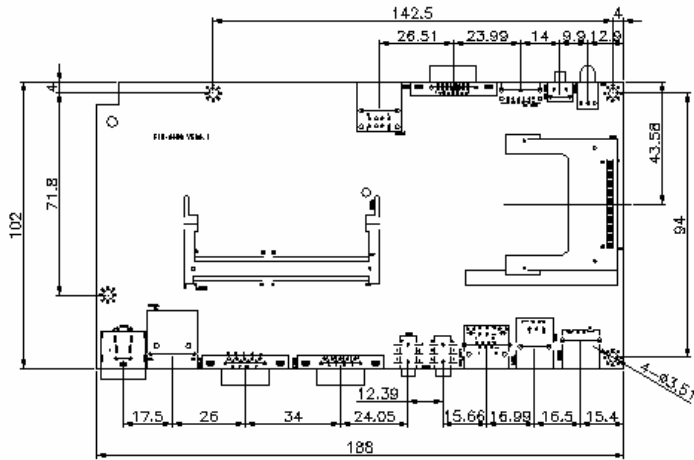
2. Installation

This chapter describes how to install **FIR-C650**. Follow the unpacking information carefully and refer to the following diagram of **FIR-C650** when necessary.

2.1 **FIR-C650'S** Layout



2.2 FIR-C650's Dimension (Unit: mm)



2.3 Unpacking Precautions

Some components of **FIR-C650** are very sensitive to static electricity and can be damaged by a sudden rush of power. To protect it from unintended damage, be sure to follow these precautions:

- Ground yourself to remove any static charge before touching **FIR-C650**. You can do it by using a wrist strap connected to the ground or by frequently touching any conducting materials connected to the ground.
- Handle your **FIR-C650** by its edges. Do not touch IC chips, leads or circuitry.
- Do not plug any connector or jumper when the power is on.

2.4 Clear CMOS Setup

To clear the CMOS Setup (for example, if you have forgotten the password, you should clear the CMOS and then re-set the password), you have to close the JP1 (2-3) for about 3 seconds, and then open it. This will put the system back to normal operation mode.

- **JP1: Clear CMOS Setup**

JP1	Description
1-2 (default) *	Keep CMOS Setup (Normal Operation)
Short 2-3	Clear CMOS Setup

Note: All shaded rows in the tables of this manual are the default settings for the **FIR-C650.*

2.5 TFT LCD Voltage Setting

- JP3: TFT LCD Voltage (5V / 3V) Setting

JP3	Description
Short 1-2	3V TFT LCD
Short 2-3	5V TFT LCD

2.6 COM4 Voltage Selection

- JP4: COM4 Voltage Selection

JP4	Description
Short 1-2	+12V
Short 3-4	+5V

2.7 COM4 Mode Selection

- JP5: COM4 Mode Selection

JP5	Description
Short 1-2	Short CTS-RTS
Short 3-5	+12 or +5V output
Short 4-6	Ground output

2.8 COM2 RI Function Setting

- JP6: COM2 RI Function Setting

JP6	Description
Short 1-2	RI is +5 Voltage output
Short 3-4	RI function
Short 5-6	RI is +12 Voltage output

2.9 COM1 RI Function Setting

- **JP7: COM1 RI Function Setting**

JP7	Description
Short 1-2	RI is +5 Voltage output
Short 3-4	RI function
Short 5-6	RI is +12 Voltage output

3. Connection

This chapter describes how to connect peripherals, switches and indicators to the **FIR-C650** board.

Label	Function
LVDS1	LVDS LCD Panel connector
VGA1	VGA connector
VGA2	VGA connector
LAN1	LAN RJ45 connector
LAN2	LAN connector
USB1	USB dual port connector
USB2	USB port connector
COM1	Serial port connectors
COM2	Serial port connectors
COM4	Serial port connectors
KB_MS1	Keyboard & Mouse connector
KB1	Internal Keyboard connector
SPK_OUT1	Speaker out connector
MIC_IN1	MIC in connector
LPT1	Parallel port connector
IDE1	Ultra ATA100 Primary IDE connectors
CF1	Compact Flash Storage Card Type II connector
PS_ON1	Power on Switch
LED1	Power LED
CN1	Digital I/O connector
CN2	+12V DC power connector
CN3	Power LED and Power button connector
CN4	LVDS back light connector
CN5	Multi-function connector
CN6	Line out connector
CN7	Power output connector

3.1 LVDS Connector

FIR-C650 can support 1 channel (18 or 24bit) LVDS panel, which can be connected to LVDS1. The pin assignments are as follows.

• LVDS1: LVDS LCD Connector

PIN	Description	PIN	Description
1	LCD Vcc (+3V or +5V)	2	LCD Vcc (+3V or +5V)
3	LVDS data0 -	4	LVDS data0 +
5	GROUND	6	GROUND
7	LVDS data1 -	8	LVDS data1 +
9	GROUND	10	GROUND
11	LVDS data2 -	12	LVDS data2 +
13	GROUND	14	GROUND
15	LVDS clock -	16	LVDS clock +
17	GROUND	18	GROUND
19	LVDS data3 -	20	LVDS data3 +

3.2 VGA Connector

• VGA1: 15-pin Female Connector

PIN	Description	PIN	Description
1	RED	2	GREEN
3	BLUE	4	NC
5	GROUND	6	GROUND
7	GROUND	8	GROUND
9	VCC / NC	10	GROUND
11	NC	12	DDC_DAT
13	HSYNC	14	VSYNC
15	DDC_CLK		

• VGA2: 10-pin male Connector

PIN	Description	PIN	Description
1	RED	6	DDC_DAT
2	GREEN	7	DDC_CLK



3	BLUE	8	GROUND
4	HSYNC	9	GROUND
5	VSYNC	10	GROUND

3.3 LAN Connectors

FIR-C650 is equipped with two 10/100Mbps Ethernet controllers, which are connected to the LAN via RJ45 connectors. The pin assignments are as follows.

- LAN1: RJ45 Connector (10/100M)

PIN	Description	PIN	Description
1	TX+	7	N/C
2	TX-	8	N/C
3	RX+	9	Speed +
4	N/C	10	Speed -
5	N/C	11	Active/LINK +
6	RX-	12	Active/LINK -

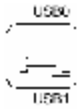
- LAN2: LAN Connector (10/100M)

PIN	Description	PIN	Description
1	TX+	2	TXC
3	TX-	4	RX+
5	RXC	6	RX-

3.4 USB Port Connectors

The **FIR-C650** is equipped with two USB (Version.2.0) ports and one USB (Version.1.1) port for the future new I/O bus expansion.

- USB1: 2 ports USB Connector (USB2.0)



PIN	Description	PIN	Description
1	VCC	5	VCC
2	DATA0-	6	DATA1-
3	DATA0+	7	DATA1+
4	GROUND	8	GROUND

- **USB2: USB Connector (USB1.1)**



PIN	Description	PIN	Description
1	VCC	2	DATA-
3	DATA+	4	GROUND

3.5 Serial Ports

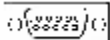
The **FIR-C650** offers three high-speed NS16C550 compatible UART with 16-byte Read/Receive FIFO serial ports.

- **COM1: D-SUB Serial Port Connector**



PIN	Description	PIN	Description
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	GROUND		

- **COM2: D-SUB Serial Port Connector**



PIN	Description	PIN	Description
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	GROUND		

- **COM4: RJ45 Serial Port Connector**



PIN	Description	PIN	Description
1	+12/+5V	2	+12/+5V or CTS
3	GROUND	4	GROUND or RTS
5	DTR	6	DSR
7	TXD	8	RXD

3.6 Keyboard/Mouse Connectors

FIR-C650 has a 6-pin DIN keyboard/mouse connector and a 5-pin keyboard connector.

- **KB_MS1: Mini-DIN Keyboard/Mouse Connector**



PIN	Description
1	KEYBOARD DATA
2	MOUSE DATA
3	GROUND
4	+5V
5	KEYBOARD CLOCK
6	MOUSE CLOCK

- **KB1: 6-pin Keyboard Connector**



PIN	Description
1	+5V
2	KEYBOARD CLOCK
3	PC KB CLOCK
4	KEYBOARD DATA
5	PC KB DATA
6	GROUND

3.7 Audio Connectors

The onboard AC'97 CODEC supports several audio functions. The audio connectors are described below.

- **SPK_OUT1: Speaker out connector**



PIN	Description	PIN	Description
1	NC	2	GROUND
3	Line Out (Left)	4	Speaker Out (Right)
5	NC	6	NC

- MIC_IN1: MIC-in connector



PIN	Description	PIN	Description
1	NC	2	GROUND
3	MIC In	4	NC
5	NC	6	NC

- CN6: Line-out connector
(1W/Channel)

PIN	Description	PIN	Description
1	LINE Out (Left)	2	GROUND
3	LINE Out (Right)	4	GROUND

3.8 Parallel Port

Usually, a printer is connected to the parallel port. **FIR-C650** includes an on-board parallel port, accessed via a 26-pin flat-cable.

- LPT1: Parallel Port Connector

PIN	Description	PIN	Description
1	STROBE#	14	AUTO FORM FEED#
2	DATA 0	15	ERROR#
3	DATA 1	16	INITIALIZE
4	DATA 2	17	LPT SELECT LN#
5	DATA 3	18	GROUND
6	DATA 4	19	GROUND
7	DATA 5	20	GROUND
8	DATA 6	21	GROUND
9	DATA 7	22	GROUND
10	ACKNOWLEDGE	23	GROUND
11	BUSY	24	GROUND
12	PAPER EMPTY	25	GROUND

13	LPT SELECT	26	NC
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3.9 PCI E-IDE Disk Drive Connector

You can attach up to four IDE (Integrated Device Electronics) devices.

- IDE1: IDE Interface Connector



PIN	Description	PIN	Description
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	GROUND	20	N/C
21	DRQ	22	GROUND
23	IOW#	24	GROUND
25	IOR#	26	GROUND
27	CHRDY	28	REV. PULL LOW
29	DACK	30	GROUND
31	INTERRUPT	32	N/C
33	SA1	34	PD66 SELECT
35	SA0	36	SA2
37	HDC CS0#	38	HDC CS1#
39	HDD ACTIVE#	40	GROUND
41	+5V	42	+5V
43	GND	44	N/C

3.10 Compact Flash Storage Card Socket

The **FIR-C650** configures Compact Flash Storage Card in IDE Mode. This type II Socket is compatible with IBM Micro Drive.

- **CF1: Compact Flash Storage Card Socket pin assignment**

PIN	Description	PIN	Description
1	GROUND	26	PULL DOWN
2	D3	27	D11
3	D4	28	D12
4	D5	29	D13
5	D6	30	D14
6	D7	31	D15
7	CS1#	32	CS3#
8	N/C	33	N/C
9	GROUND	34	IOR#
10	N/C	35	IOW#
11	N/C	36	VCC
12	N/C	37	IRQ15
13	VCC	38	VCC
14	N/C	39	MASTER/SLAVE
15	N/C	40	N/C
16	N/C	41	RESET#
17	N/C	42	IORDY
18	A2	43	N/C
19	A1	44	VCC
20	A0	45	ACTIVE#
21	D0	46	PDIAG#
22	D1	47	D8
23	D2	48	D9
24	N/C	49	D10
25	PULL DOWN	50	GROUND

3.11 Power Button Connector

- PS_ON1: Power Button Connector



PIN	Description	PIN	Description
1	GROUND	2	PS_ON
3	GROUND	4	GROUND

3.12 Power LED Connector

- LED1: Power LED Connector



PIN	Description	PIN	Description
1	+5V	2	GROUND
3	+5V Standby		

3.13 Digital I/O Connector

- CN1: Digital I/O Connector



PIN	Description	PIN	Description
1	GROUND	2	DI/O OUT0
3	DI/O IN0	4	+12V
5	DI/O OUT1	6	GROUND

3.14 +12V DC Power Connector

FIR-C650 is equipped with one power connector.

- CN2: +12V DC Power Connector



PIN	Description	PIN	Description
1	+12V	2	GROUND
3	+12V	4	GROUND


3.15 Power LED and Power button connector

•CN3: IDE LED and Reset connector

PIN	Description	PIN	Description
1	Power_on LED+	2	Power_off LED+
3	GROUND	4	Power_on button

3.16 LCD Back Light connector


•CN4: LCD Back Light connector



PIN	Description	PIN	Description
1	+12V	2	+12V
3	GROUND	4	GROUND
5	Back Light enable		

3.17 Multi-function connector

•CN5: Multi-function connector (USB2.0 and COM3)



PIN	Description	PIN	Description
1	+5V	2	+5V
3	USB-	4	USB-
5	USB+	6	USB+
7	GROUND	8	GROUND
9	DTR	10	CTS
11	RTS	12	TX
13	RX	14	DSR

3.18 Power output connector

Supply power for extension use.

•CN7: Power output connector



PIN	Description	PIN	Description
1	+5V	2	GROUND
3	GROUND	4	+12V

4. AMI BIOS Setup

4.1 Introduction

This manual discusses AMI Setup program built into the ROM BIOS. The Setup program allows users to modify the basic system configuration. This special information is then stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

4.2 Starting Setup

The AMI BIOS is immediately activated when you first power on the computer. The BIOS reads the system information contained in the CMOS and begins the process of checking out the system and configuring it. When it finishes, the BIOS will seek an operating system on one of the disks and then launch and turn control over to the operating system.

While the BIOS is in control, the Setup program can be activated in one of two ways:

1. By pressing immediately after switching the system on, or
2. by pressing the key when the following message appears briefly at the bottom of the screen during the POST.

Press DEL to enter SETUP.

If the message disappears before you respond and you still wish to enter Setup, restart the system to try again by turning it OFF then ON or pressing the "RESET" button on the system case. You may also restart by simultaneously pressing <Ctrl>, <Alt>, and <Delete> keys. If you do not press the keys at the correct time and the system

does not boot, an error message will be displayed and you will again be asked to...

PRESS F2 TO CONTINUE, DEL TO ENTER SETUP

4.3 Using Setup

In general, you use the arrow keys to highlight items, press <Enter> to select, use the PageUp and PageDown keys to change entries, press <F1> for help and press <Esc> to quit. The following table provides more detail about how to navigate in the Setup program using the keyboard.

Up arrow	Move to previous item
Down arrow	Move to next item
Left arrow	Move to the item in the left hand
Right arrow	Move to the item in the right hand
Esc key	Main Menu -- Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
PgUp key	Increase the numeric value or make changes
PgDn key	Decrease the numeric value or make changes
+ key	Increase the numeric value or make changes
- key	Decrease the numeric value or make changes
F1 key	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2 /F3 key	Change color from total 16 colors. F2 to select color forward, (Shift) F2 to select color backward
F4 key	Reserved
F5 key	Reserved
F6 key	Reserved
F7 key	Reserved
F8 key	Reserved

F9 key	Reserved
F10 key	Save all the CMOS changes, only for Main Menu

4.4 Getting Help

Press F1 to pop up a small help window that describes the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window press <Esc> or the F1 key again.

If, after making and saving system changes with Setup, you discover that your computer no longer is able to boot, the AMI BIOS supports an override to the CMOS settings which resets your system to its defaults.

The best advice is to only alter settings which you thoroughly understand. To this end, we strongly recommend that you avoid making any changes to the chipset defaults. These defaults have been carefully chosen by both AMI and your systems manufacturer to provide the absolute maximum performance and reliability. Even a seemingly small change to the chipset setup has the potential for causing you to use the override.

4.5 Main Menu

Once you enter the AMIBIOS™ CMOS Setup Utility, the Main Menu will appear on the screen. The Main Menu allows you to select from several setup functions and two exit choices. Use the arrow keys to select among the items and press <Enter> to accept and enter the sub-menu.



Note that a brief description of each highlighted selection appears at the bottom of the screen. The main menu includes the following main setup categories. Some systems may not include all entries.

Field	Description
Standard CMOS Setup	Use this menu for basic system configuration.
Advanced CMOS Setup	Use this menu to set the Advanced Features available on your system.
Advanced Chipset Setup	Use this menu to change the values in the chipset registers and optimize your system's performance.
Power Management Setup	When Disabled, SMI will not be initialized, and complete power management functionality is removed until this option is set to

	Enabled.
PCI / Plug and Play Setup	This entry appears if your system supports PnP / PCI.
Peripheral Setup	Use this menu to specify your settings for integrated peripherals.
Hardware Monitor Setup	Use this menu to monitor your hardware.
Auto-detect Hard Disks	Use this menu to specify your settings for hard disks control.
Change Supervisor Password	Use this menu to set User and Supervisor Passwords.
Auto Configuration with Optimal Settings	Use this menu to load the BIOS default values that are factory settings for optimal performance system operations. While AMI has designed the custom BIOS to maximize performance, the factory has the right to change these defaults to meet their needs.
Auto Configuration with Fail-Safe Settings	Use this menu to load the BIOS default values for the minimal/stable performance for your system to operate.
Save Settings and Exit	Save CMOS value changes to CMOS and exit setup.
Exit Without Saving	Abandon all CMOS value changes and exit setup.

4.6 Standard CMOS Setup

The items in Standard CMOS Setup Menu are divided into 10 categories. Each category includes no, one or more than one setup items. Use the arrow keys to highlight the item and then use the <PgUp> or <PgDn> keys to select the value you want in each item.

AMERICAN MEGALITHS, INC. ALL RIGHTS RESERVED	
Date (mm/dd/yyyy):	Thu 10/10/2008
Time (hh/mm/ss):	10:26:24
	Base Memory: 0 KB
	0 MB
	1RA Btk PTO 32Ki
Pri Master:	Auto
Pri Slave:	Auto
Sec Master:	Auto
Sec Slave:	Auto
Boot Sector	Virus Protection Disabled
Month: Jan - Dec	ESC:Exit 14:Sel
Day: 01 31	PgUp/PgDn:Modify
Year: 1999 2099	F2/F12:In/Out

Main Menu Selections

Item	Options	Description
Date	MM DD YYYY	Set the system date
Time	HH : MM : SS	Set the system time
IDE Primary Master	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu of detailed options
IDE Primary Slave	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu of detailed options
IDE Secondary	Options are in its sub menu	Press <Enter> to enter the sub menu of

Master	(described in Table 3)	detailed options
IDE Secondary Master	Options are in its sub menu (described in Table 3)	Press <Enter> to enter the sub menu of detailed options
Drive A Drive B	None 360K, 5.25 in 1.2M, 5.25 in 720K, 3.5 in 1.44M, 3.5 in 2.88M, 3.5 in	Select the type of floppy disk drive installed in your system
Halt On	All Errors No Errors All, but Keyboard All, but Diskette All, but Disk/Key	Select the situation in which you want the BIOS to stop the POST process and notify you
Base Memory	N/A	Displays the amount of conventional memory detected during boot up
Extended Memory	N/A	Displays the amount of extended memory detected during boot up

4.7 Advanced CMOS Setup

This section allows you to configure your system for basic operation. You have the opportunity to select the system's default speed, boot-up sequence, keyboard operation, shadowing and security.

AMIBIOS SETUP - ADVANCED CMOS SETUP
 ©1999 American Megatrends, Inc. All Rights Reserved

Quick Boot	Enabled	Available Options:
1st Boot Device	Disabled	Disabled
2nd Boot Device	IDE 0	Enabled
3rd Boot Device	CD/ROM-0	
Try Other Boot Devices	Yes	
Boot From LAN	Disabled	
S.M.A.R.T. for Hard Disks	Disabled	
BootUp More-Lock	On	
PS/2 Mouse Support	Enabled	
System Keyboard	Absent	
Primary Display	VGA/EGA	
Password Check	Setup	
Boot To OS/2	No	
L1 Cache	Enabled	
L2 Cache	Enabled	
System BIOS Cacheable	Enabled	
CC00,32k Shadow	Cached	
CC01,16k Shadow	Disabled	
CC02,16k Shadow	Disabled	
DD00,16k Shadow	Disabled	
DD01,16k Shadow	Disabled	
DD02,16k Shadow	Disabled	
DD03,16k Shadow	Disabled	
DD04,16k Shadow	Disabled	
DD05,16k Shadow	Disabled	
		F5E:Exit F7:Save
		F8:Help/Quit:Help/Quit
		F12/T:Color

Quick Boot

When set to enabled, DRAM testing function will disable.

1st /2nd /3rd Boot Device

This option sets the type of device for the first boot drives that the AMIBIOS attempts to boot from after AMIBIOS POST completes. The settings are Disabled, IDE-0, IDE-1, IDE-2, IDE-3, Floppy, ARMD-FDD, ARMD-HDD, CDROM, SCSI.

Try Other Boot Devices

Set this option to Yes to instruct AMIBIOS to attempt to boot from any other drive in the system if it cannot find a boot drive among the drives specified in the 1st Boot Device, 2nd Boot Device, 3rd Boot Device, 4th Boot Device options. The settings are Yes or No.

Boot From LAN

This option is enable boot from LAN function.

Hard Disk Access Control

This option specifies the read/write access that is set when booting from a hard disk drive. The settings are Read/Write or Read-Only.

S.M.A.R.T. for Hard Disks

Self-Monitoring, Analysis and Reporting Technology.

This option can help BIOS to warn the user of the possible device failure and give user a chance to back up the device before actual failure happens. The settings are Disabled, Enabled.

Boot Up Num-Lock

When On, this option turns off Num Lock when the system is powered on so the end user can use the arrow keys on both the numeric keypad and the keyboard.

PS/2 Mouse Support

When this option is enabled, BIOS support a PS/2-type mouse.

System Keyboard

This option does not specify if a keyboard is attached to the computer. Rather, it specifies if error messages are displayed if a keyboard is not attached. This option enables you to configure workstation with no keyboard. The settings are Absent, Present.

Primary Display

Select this option to configure the type of monitor attached to the computer. The settings are Monochrome, Color 40x25, Color 80x25, VGA/PGA/EGA ,or Not Install.

Password Check

This option enables the password check option every

time the system boots or the end user runs Setup. If always is chosen a user password prompt appears every time the computer is tuned on. If setup is chosen, the password prompt appears if BIOS is executed.

Boot To OS/2

Set this option to Enabled if running OS/2 operating system and using more than 64MB of system memory on the motherboard. The settings are YES or NO.

L1 Cache

The option enabled or disabled the internal cache memory in the processor.

L2 Cache

The option enables secondary cache memory. If Enabled is selected, external cache memory is enabled. If disabled is select, external cache memory is disabled.

System BIOS Cacheable

When this option is set to enabled, the System ROM area from F0000-FFFFF is copied (shadowed) to RAM for faster execution.

C000, 32k Shadow

When this option is set to enabled, the Video ROM area from C0000-C7FFF is copied (shadowed) to RAM for faster execution.

Disabled: The contents of the video ROM are not copied to RAM.

Cached : The contents of the video ROM area from C0000h - C7FFFh are copied from ROM to RAM and can be written to or read from cache memory. Enabled: The contents of the video ROM area from C0000h - C7FFFh are copied (shadowed) from ROM to RAM for faster execution.

C800, 16k Shadow

These options enable shadowing of the contents of the ROM area named in the option title. The settings are Enable Disable, Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.000,32k Shadow.

CC00, 16k Shadow

These options enable shadowing of the contents of the ROM area named in the option title. The settings are Enable Disable, Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.800,16k Shadow.

D000, 16k Shadow

These options enable shadowing of the contents of the ROM area named in the option title. The settings are Enable Disable, Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.C00,16k Shadow.

D400,16k Shadow

These options enable shadowing of the contents of the ROM area named in the option title. The settings are Enable Disable, Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.000,16k Shadow.

D800, 16k Shadow

These options enable shadowing of the contents of the ROM area named in the option title. The settings are Enable Disable, Cached. The ROM area that is not used by ISA adapter cards will be allocated to PCI adapter cards.400,16k Shadow.

DC00,16k Shadow

These options enable shadowing of the contents of the

ROM area named in the option title. The settings are Enable Disable, Cached. ISA adapter cards will be allocated to PCI adapter cards.800,16k Shadow.

4.8 Advanced Chipset Setup

BIOS SETUP - ADVANCED CHIPSET SETUP		Copyright American Megatrends, Inc. All Rights Reserved	
***** DRAM Timing *****		Available Options:	
Configure SDRAM Timing by SPD	Enabled	Disabled	
DRAM Frequency	133MHz	Enabled	
SDRAM CAS# Latency	3		
Memory Hole	Disabled		
DRP Aperture Size	4MB		
Spread Spectrum Control	Disabled		
USB Controller	All USB Port		
USB Device Legacy Support	All Device		
D10 Address	200		
		ESC:Exit F-8:Sel PgUp/PgDn:Modify F2/F3:Enter	

This section enables you to configure the system based on the specific features of the installed chipset. This chipset manages bus speeds and access to system memory resources, such as DRAM and the external cache. It also coordinates communications between the conventional ISA bus and the PCI bus. It must be stated that these items should never need to be altered. The default settings have been chosen because they provide the best operating conditions for your system.

DRAM Frequency

This setting decided by Memory frequency.

SDRAM CAS# Latency

This setting decided by Memory CAS latency.

AGP Aperture Size

Select the size of AGP aperture. The aperture is a portion of the PCI

Memory address space. Host cycles that hit the aperture range are

forwarded to the AGP without any translation.

USB Controller

Select enable if your system contains a USB controller and you have USB Peripherals.

USB Device Legacy support

Enable or Disable for USB device legacy support.

DIO Address

This option is select DIO address for 200,220,240,260,280.

4.9 Power Management Setup

AMIBIOS SETUP - POWER MANAGEMENT SETUP		
(C)2001 American Megatrends, Inc. All Rights Reserved		
ACPI Aware O/S	Yes	Available Options: No ► Yes
ACPI Standby State	S1/POS	
Re-Call VGA BIOS at S3 Resuming	Enabled	
Power Management/APM	Enabled	
Video Power Down Mode	Disabled	
Hard Disk Power Down Mode	Disabled	
Standby Time Out (Minute)	Disabled	
Suspend Time Out (Minute)	Disabled	
Throttle Slow Clock Ratio	50%-56.25%	
Display Activity	Ignore	
IRQ3	Monitor	
IRQ4	Monitor	
IRQ5	Ignore	
IRQ7	Monitor	
IRQ9	Ignore	
IRQ10	Ignore	
IRQ11	Ignore	
IRQ13	Ignore	
IRQ14	Monitor	ESC:Exit 1:Se1
IRQ15	Ignore	PgUp/PgDn:Modify
Power Button Function	On/Off	
Restore on AC/Power Loss	Last State	ESC:Exit 1:Se1
Resume On Ring/LAN	Disabled	PgUp/PgDn:Modify
Power Type Select	ATX	F2/F3:Color

ACPI Aware O/S

This feature is switch of ACPI function.

Configuration options: [Yes]; [No].

ACPI Standby State

This feature is switch of POS (S1) function.

Configuration options: [S1/POS].

Power Management/APM

When Disabled, SMI will not be initialized, and complete power management functionality is removed until this option is set to Enabled.

Video Power Down Mode

Video power down when system is in Suspend mode.

Video power down when system is in Standby mode.

Hard Disk Power Down Mode

Hard Disk power down when system is in Suspend mode.

Hard Disk power down when system is in Standby mode.

Suspend Time Out

If no activity occurs during this period, BIOS will adjust the power state of the system to the suspend low. The "Standby Time Out" period must expire first (if enabled) before this time out period begins.

IRQ3, 4, 5, 7, 9, 10, 11, 13, 14, 15

As Individual IRQ Wake Up Events.

Power Button Function

On/Off allows the system to switch off immediately the power button is pressed. Suspend allows the system to Suspend immediately the power button is pressed.

Resume on Ring/LAN

Allow the system to wake up in response to a Ring Indicator signal from external modem. Wake up on LAN enables remote booting of a PC via a network even if it is shut down.

Power Type Select

This option is select Power Type for AT or ATX.

4.10 PCI / Plug and Play Setup

AMIBIOS SETUP - PCI / PLUG AND PLAY SETUP		
(C)2001 American Megatrends, Inc. All Rights Reserved		
Plug and Play Aware O/S	No	Available Options: ▶ No Yes
Clear NVRAM	No	
OnChip VGA Frame Buffer Size	8MB	
PCI Latency Timer (PCI Clocks)	32	
Boot Screen Select	Auto	
TV Out Type	U.S. NTSC	
LCD Panel Type	1 800x600 TFT	
Allocate IRQ to PCI VGA	Yes	
PCI Slot1 IRQ Priority	Auto	
PCI Slot2 IRQ Priority	Auto	
PCI Slot3 IRQ Priority	Auto	
PCI Slot4 IRQ Priority	Auto	
DMA Channel 0	PnP	
DMA Channel 1	PnP	
DMA Channel 3	PnP	
DMA Channel 5	PnP	
DMA Channel 6	PnP	
DMA Channel 7	PnP	
IRQ3	PCI/PnP	
IRQ4	PCI/PnP	
IRQ5	PCI/PnP	
IRQ7	PCI/PnP	
IRQ9	PCI/PnP	
IRQ10	PCI/PnP	
IRQ11	PCI/PnP	
IRQ14	PCI/PnP	
IRQ15	PCI/PnP	
		ESC:Exit F1:Sel
		ESC:Exit F1:Sel PgUp/PgDn:Modify F2/F3:Color

Plug and Play Aware O/S

If enable, BIOS will configure only PnP ISA boot devices(i.e. all PnP ISA cards which has boot flag set). And PnP aware OS will configure all other devices. If disable, BIOS will configure all devices.

Clear NVRAM

When this option is set to Yes, system can auto clear NVRAM. The settings are Yes and No.

On Chip VGA Frame Buffer Size

This option is select frame buffer size (2~32MB) for VGA.

PCI Latency Timer (PCI Clocks)

This option specifies the latency timings(in PCI clocks) for PCI devices installed in the PCI expansion slots. The settings are 32, 64, 96, 128, 160, 192, 224, or 248.

Boot Screen Select

This option is select Boot Screen from CRT or LCD or TV out. Select CRT+LCD or CRT+TV is Boot from CRT and LCD or CRT and TV.

LCD Panel Type

This option is select LCD Panel type.

Allocate IRQ to PCI VGA

Set this option to Yes to allocate an IRQ to the VGA device on the PCI bus. The settings are Yes or No.

PCI Slot1 / Slot2 / Slot3 / Slot4 IRQ Priority

The option specify the IRQ priority for PCI device installed in the PCI expansion slot. The settings are Auto, (IRQ) 3, 4, 5, 7, 9, 10, and 11, in priority order.

DMA Channel 0, 1, 3, 5, 6, 7

The option allow you to specify the bus type used by each DMA channel. The settings are PnP or ISA/EISA.

IRQ3, 4, 5, 7, 9, 10, 11, 14, 15

The option specify the bus that the specified IRQ line is used on. The option allow you to reserve IRQs for legacy ISA adapter cards. The option determine if AMIBIOS should remove an IRQ from the pool of available IRQs passed to devices that are configurable by the system

BIOS. The available IRQ pool is determined by reading the ESCD NVRAM. If more IRQs must be removed from the pool, the end user can use the option to reserve the IRQ by assigning an ISA/EISA setting to it. Onboard I/O is configured by AMIBIOS. All IRQs used by onboard I/O are configured as PCI/PnP.

4.11 Peripheral Setup

The Peripheral Setup allows you to configure your system to most effectively save energy while operating in a manner consistent with your own style of computer use.

AMIBIOS SETUP - PERIPHERAL SETUP (C) 2001 American Megatrends, Inc. All Rights Reserved		
OnBoard Serial Port1 (IRQ4)	3F8/COM1	Available Options: Disabled ▶ 3F8/COM1 2F8/COM2 3E8/COM3 2E8/COM4
OnBoard Serial Port2 (IRQ3)	2F8/COM2	
Serial Port2 Mode	Normal	
Duplex Mode	N/A	
OnBoard Parallel Port	378	
Parallel Port Mode	Normal	
EPP Version	N/A	
Parallel Port DMA Channel	N/A	
Parallel Port IRQ	7	
OnBoard Serial Port3	3E8/COM3	
Serial Port3 IRQ	10	
OnBoard Serial Port4	2E8/COM4	
Serial Port4 IRQ	11	
OnBoard IDE	Both	
OnBoard AC'97 Audio	Enabled	

OnBoard Serial Port 1/Port 2/Port 3/Port 4

This option specifies the base I/O port address of serial port 1. The settings are Auto (AMIBIOS automatically determines the correct base I/O port address), Disabled, 3F8h, 2F8h, 2E8h, or 3E8h.

OnBoard Parallel Port

This option specifies the base I/O port address of parallel port on the motherboard. The settings are Disabled, 378h, 278h, or 3BCh.

Parallel Port Mode

This option specifies the parallel port mode. The settings are Normal, Bi-Dir, EPP, ECP. Normal: The normal parallel port mode is used. Bi-Dir :Use this setting to support bi-directional transfers on the parallel port.

EPP: The parallel port can be used with devices that adhere to the Enhanced Parallel Port(EPP) specification. EPP uses the existing parallel port signals to provide asymmetric bi-directional data transfer driven by the host device.

ECP: The parallel port can be used with devices that adhere to the Entended Capabilities Port(ECP) specification. ECP uses the DMA protocol to achieve data transfer rates up to 2.5 Megabits per second. ECP providessymmetric bi-directional communication.

EPP Version

EPP data or address read cycle 1.9 or 1.7

Parallel Port IRQ

This option specifies the IRQ used by the parallel port. The settings are Auto , (IRQ)5, (IRQ)7.

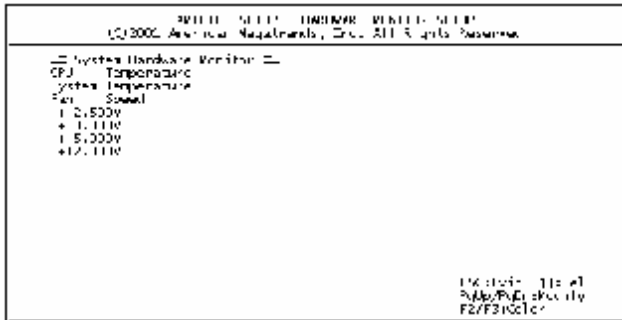
Parallel Port DMA Channel

This option is only available if the setting for the Parallel Port Mode option is ECP. This option sets the DMA channel used by the parallel port. The settings are DMA Channel 0, 1, or 3.

On Board AC'97 Audio

Enable or Disable AC'97 Audio Function.

4.12 Hardware Monitor Setup



4.13 Change Supervisor Password

You can set either supervisor or user password, or both of them. The differences between them are:

Supervisor password:

Users can change the options of the setup menus.

User password:

Users do not have the right to change the options of the setup menus. When you select

this function, the following message will appear for you to create a password.

ENTER PASSWORD:

Type a password of up to eight characters in length and press Enter. Confirm the password by entering it again and press Enter. Previous password in CMOS memory will be cleared once a new password is created. To abort, press Esc. When a password is enabled, you will be prompted to enter it every time you enter Setup. This prevents an unauthorized party from changing any part of the system configuration. You can also require BIOS to request a password every time your system is rebooted. This would prevent unauthorized use of your computer. You can determine when the password is required in the BIOS Features Setup Menu and its Security option.

PASSWORD ENABLED/DISABLED:

To disable a password, press Enter when you are prompted to enter the password. Then confirm the selection. Once the password is disabled, the system will restart and you can enter Setup freely.

Appendix A: Watchdog Timer

The Watchdog Timer is a device to ensure that standalone systems can always recover from abnormal conditions that cause the system to crash. These conditions may result from an external EMI or a software bug. When the system stops working, hardware on the board will perform hardware reset (cold boot) to bring the system back to a known state.

Three I/O ports control the operation of Watchdog Timer.

443 (hex)	Write	Set Watchdog Time period
443 (hex)	Read	Enable the Watchdog Timer
043/843 (hex)	Read	Disable the Watchdog Timer

Prior to enable the Watchdog Timer, user has to set the time-out period. The resolution of the timer is 1 second and the range of the timer is from 1 sec to 255 sec. You need to send the time-out value to the I/O port—443H, and then enable it by reading data from the same I/O port—443H. This will activate the timer that will eventually time out and reset the CPU board. To ensure that this reset condition will not occur, the Watchdog Timer must be periodically refreshed by reading the same I/O port 443H. This must be done within the time-out period that is set by the software, please refer to the example program. Finally, we have to disable the Watchdog timer by reading the I/O port—843H or 043H. Otherwise the system could reset unconditionally.

A tolerance of at least 5% must be maintained to avoid unknown routines in the operating system (DOS), such as disk I/O that can be very time-consuming. For example, if the time-out period has been set to 10 seconds, the I/O port 443H must be read within 7 seconds.

Example assembly program:

```
TIMER_PORT = 443H
TIMER_START = 443H
TIMER_STOP = 843H
;;INITIAL TIMER COUNTER

MOV DX, TIMER_PORT
MOV AL, 8 ;;8 seconds
OUT DX, AL
MOV DX, TIMER_START
IN AL, DX. ;;START COUNTER
W_LOOP:
MOV DX, TIMER_STOP
IN AL, DX
MOV DX, TIMER_START
IN AL, DX ;;RESTART COUNTER
;;ADD YOUR APPLICATION HERE

CMP EXIT_AP, 0
JNE W_LOOP
MOV DX, TIMER_STOP
IN AL, DX
;;EXIT AP
```

Appendix B: I/O Address Map

- I/O Address Map

I/O Address Map	Description
000-01F	DMA Controller #1
020-021	Interrupt Controller # 1, Master
040-05F	System Timer
060-06F	Standard 101/102 keyboard Controller
070-07F	Real time Clock, NMI Controller
080-0BF	DMA Page Register
0A0-0BF	Interrupt Controller # 2
0C0-0DF	DMA Controller # 2
0F0-0F0	Clear Math Coprocessor Busy
0F1-0F1	Reset Math Coprocessor
0F8-0FF	Math Coprocessor
170-1F7	BUS Master PCI IDE Controller
278-27F	Parallel Printer Port 2
2E8-2EF	Serial Port 4
2F8-2FF	Serial Port 2
376-376	BUS Master PCI IDE Controller
378-37F	Parallel Printer Port 1
3B0-3DF	AGP Graphic Adapter
3E8-3EF	Serial Port 3
3F0-3F7	Floppy Disk Controller
3F8-3FF	Serial Port 1
443	Watchdog timer enable
480-48F	PCI BUS
843/043	Watchdog timer disable

1st MB Memory Address Map

Memory address	Description
00000-9FFFF	SYSTEM MEMORY
A0000-BFFFF	VGA BUFFER
C0000-CFFFF	VGA BIOS
E0000-FFFFF	SYSTEM BIOS
100000	EXTEND MEMORY

IRQ Mapping Chart

IRQ0	System Timer	IRQ8	RTC CMOS clock
IRQ1	Keyboard	IRQ9	ACPI STEERING
IRQ2	IRQ Controller	IRQ10	COM3
IRQ3	COM2	IRQ11	COM4
IRQ4	COM1	IRQ12	PS/2 mouse
IRQ5	USB	IRQ13	FPU
IRQ6	FDC	IRQ14	Primary IDE
IRQ7	Printer	IRQ15	Secondary IDE

DMA Channel Assignment

Channel	Function
0	Available
1	Available
2	Floppy disk
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

Appendix C: How to use Wake-Up

Function

FIR-C650 provides two kinds of Wake-up function. This page describes how to use Modem Wake-Up and LAN Wake-Up functions. Wake-Up function only works with ATX power supply.

Wake-Up On Modem(Ring):

You must set the option **Wake-Up On LAN/Ring** of CMOS SETUP to be enabled. ATX power supply will be switched on when there is a ring signal detected on pin "RI" of serial port.

Wake-Up On LAN:

When your computer is in power-down status, you can see LAN Link/Active LED is flashing. This status indicates that the LAN chip has entered standby mode and waits for Wake-Up signal. You can use other computers to wake up yours by sending ID to it.

ID: ID is the MAC address of your system LAN. Every LAN chip has a factory-set ID, which you can find it from network information in WINDOWS.

ID's format is xxxxxxxxxxxx
Example ID: 009027388320

Appendix D: Digital I/O

FIR-C650's digital I/O supports 1-bit IN and 2-bit OUT

Digital I/O Address:

- Read port 280 : Digital Input

Bit	Value
0	0 - 1

- Write port 280 : Digital Output

Bit	Value
0 - 1	0 - 3

Digital Input specifications

Logic 0 Level : +0V

Logic 1 Level : +4V Min

Digital Output specifications:

Output Level : +0V (Software function active value 0)

Output Level : +12V (Software function active value 1)

Output Current : 700mA Max (per channel)