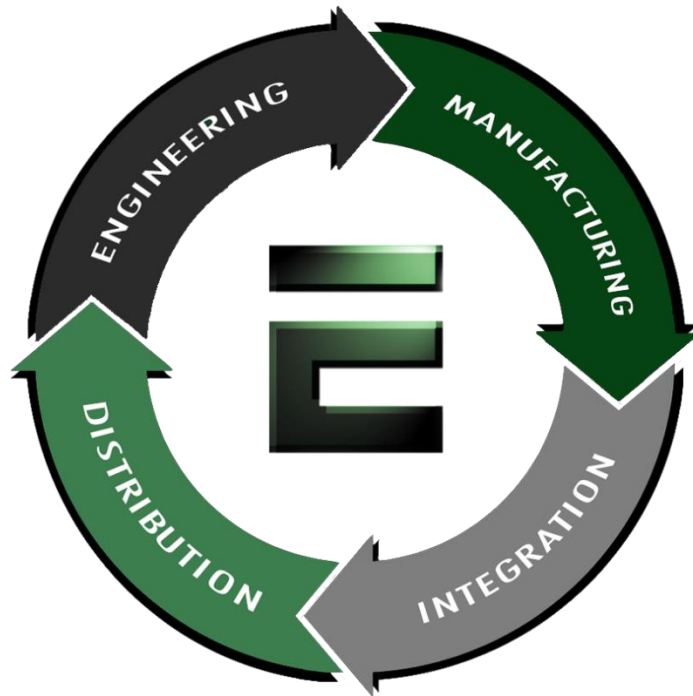**Our Products Make Your Product Better®**

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For purchase information please contact info@emacinc.com

For technical support please submit a ticket at www.emacinc.com/support

PFM-540I

AMD® Geode

LX 800 Processor

AMD LX 800 +CS 5536

RTL8139DL for 10/100Mbps

18/24-bit TFT LCD Panel

2 COM, 4 USB, 1 IrDA

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Packing List

Before you begin installing your card, please make sure that the following materials have been shipped:

- 9681540I00

  Cable Kit for PFM-540I

1701160201	VGA cable x 1
1701260201	Printer Port Cable x 1
1709100201	USB Cable x 1
1700100200	LAN Cable x 1
1700060152	Keyboard & Mouse Cable x 1
1701440350	44-pin IDE Cable x 1
1701100207	RS-232 Cable x 2
1701340703	Floppy Disk Cable x 1

- 9657666600

  Jumper Cap

- Quick Installation Guide
- Utility CD
- PFM-540I

If any of these items should be missing or damaged, please contact your distributor or sales representative immediately.

Contents

Chapter 1 General Information

Chapter 2 Quick Installation Guide

Chapter 3   Award BIOS Setup

Chapter 4   Driver Installation

Appendix A   Programming The Watchdog Timer

Appendix B   I/O Information

Appendix C   Mating Connector

Chapter

1

General Information

1.1 Introduction

We are a leading company in embedded boards manufacturing with a full range of PC/104 CPU Modules, launches an economic embedded PC/104 CPU Module-PFM-540I. Its compact size and rich functionality ensures the most cost effective and compatible module to coincide with your existing system planning devices.

PFM-540I adopts an AMD Geode LX800 processor that is more cost effective compared to other PC/104 CPU modules on the market.   This model supports DDR 333 SODIMM Memory up to 1GB (DDR 400 optional).   Although PFM-540I is a small board, it offers the full functions customers demand.   The chipset of PFM-540I deploys AMD LX800 and CS5536 that makes this board achieve high performance.   It features one 10/100Base-TX Ethernet port, four USB 2.0 ports, two serial ports, one parallel port, IR interface, watchdog timer and includes PC/104 expansion.

PFM-540I is a RoHS compliant product that is fanless and fully supports ISA and CFD.   For Operating Systems, it supports regular embedded OS, such as WinCE, and WinXP Embedded, Windows XP Professional for easy compatibility with customers' existing OS systems.

1.2 Features

- AMD Geode LX800 (500MHz) Processor
- Supports Onboard DDR SDRAM, Max. 1GB for DDR333 and 512MB for DDR400
- Supports 18/24-bit TFT LCD panel
- Supports CFD Type I, ATA-33
- Supports 4 USB 2.0 ports, 2 COM ports and 1 Parallel port
- Supports one 10/100Base-TX Ethernet
- Supports +5V/AT only
- Lead-free & ROHS Compliance

1.3 Specifications

System

- Processor   AMD Geode LX 800 (500MHz) Processor
- System Memory   200-pin Onboard DDR SDRAM SODIMM x 1, Max. 1GB for DDR333 and 512MB for DDR 400 (Please refer to the Quick Installation Guide *2.26 DDR1 SODIMM Slot* for details)
- Chipset   AMD LX 800 + CS5536
- I/O Chipset   IT8712F-A
- Ethernet   Realtek RTL8139DL, 10/100Mbps, RJ-45 x 1
- BIOS   AWARD 512KB Flash ROM
- Watchdog Timer   IT8712F-A
- RTC   IT8712F-A
- Solid Storage Disk   CompactFlash™ Type I x 1
- Expansion Interface   PC/104 x 1
- Power Requirement   +5V/AT
- Board Size   3.55"(L) x 3.775"(W) (90mm x 96mm)
- Operating Temperature 32˚F~ 140˚F (0˚C ~ 60˚C)

Display

- Chipset   AMD LX 800
- Memory   Shared system memory up to 254 MB
- Resolution   Up to 1920 x 1440 @ 32bpp for CRT

  Up to 1024 x 768 @ 24bpp for LCD
- LCD Interface   Up to 18/24-bit TTL TFT LCD

I/O

- MIO   EIDE x 1 (UDMA-33 x 1); Floppy Disk

  Drive x 1; Keyboard & Mouse x 1;

  RS-232 x 1; RS-232/422/485 x 1;

  Parallel x 1
- IDE Interface   ATA-33 x 1 channel, 44-pin header
- USB   Four USB 2.0 Ports—Two 5x2 pin

  headers support four USB ports
- IR Interface   IrDA

Chapter

2

Quick Installation Guide

Notice:
The Quick Installation Guide is derived from Chapter 2 of user manual. For other chapters and further installation instructions, please refer to the user manual CD-ROM that came with the product.

OZONE SAFE

RECYCLABLE

2.1 Safety Precautions

Warning!

Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because a sudden rush of power can damage sensitive electronic components.

Caution!

Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in the chassis

2.2 Location of Connectors and Jumpers

Component Side

Solder Side

CFD1

SODIMM1
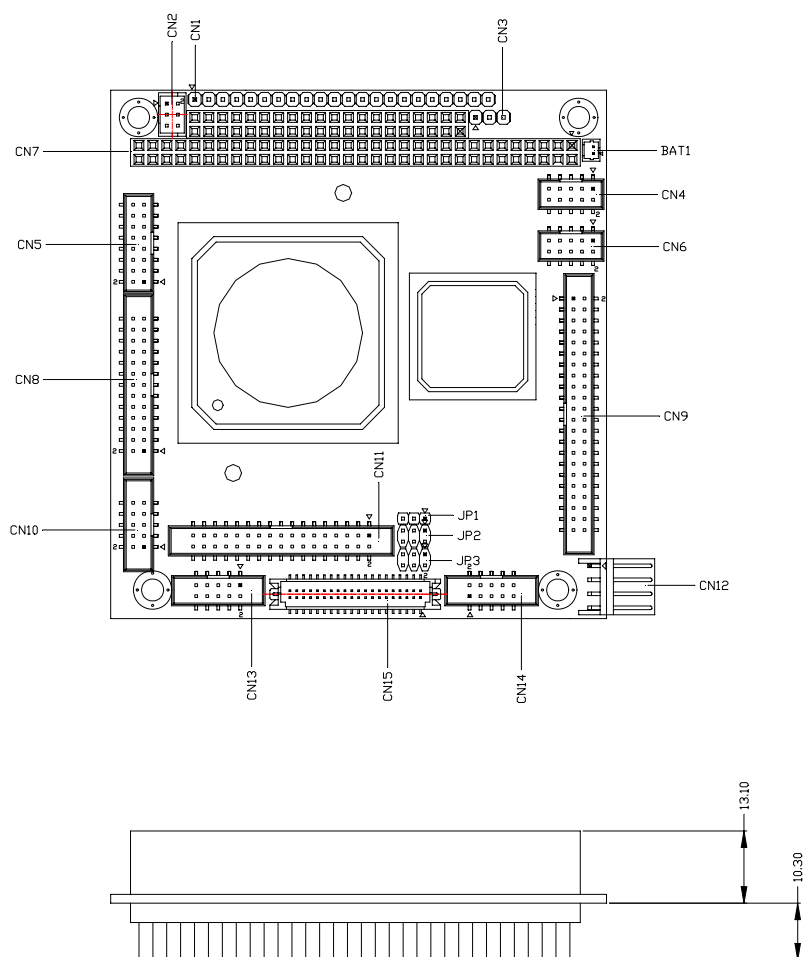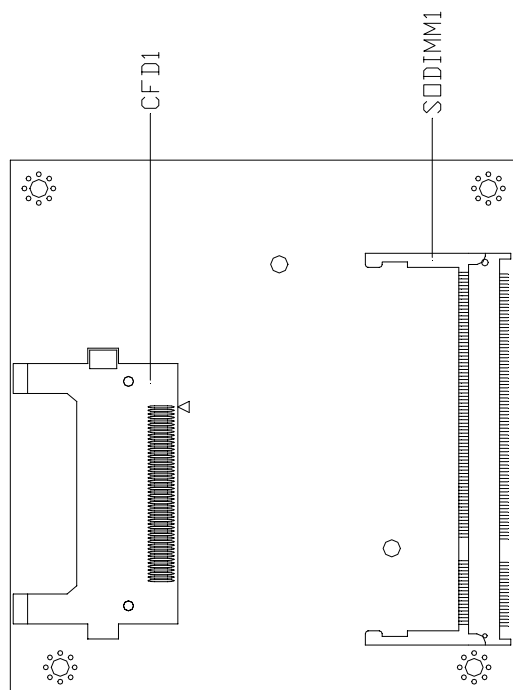
2.3 Mechanical Drawing

Component Side
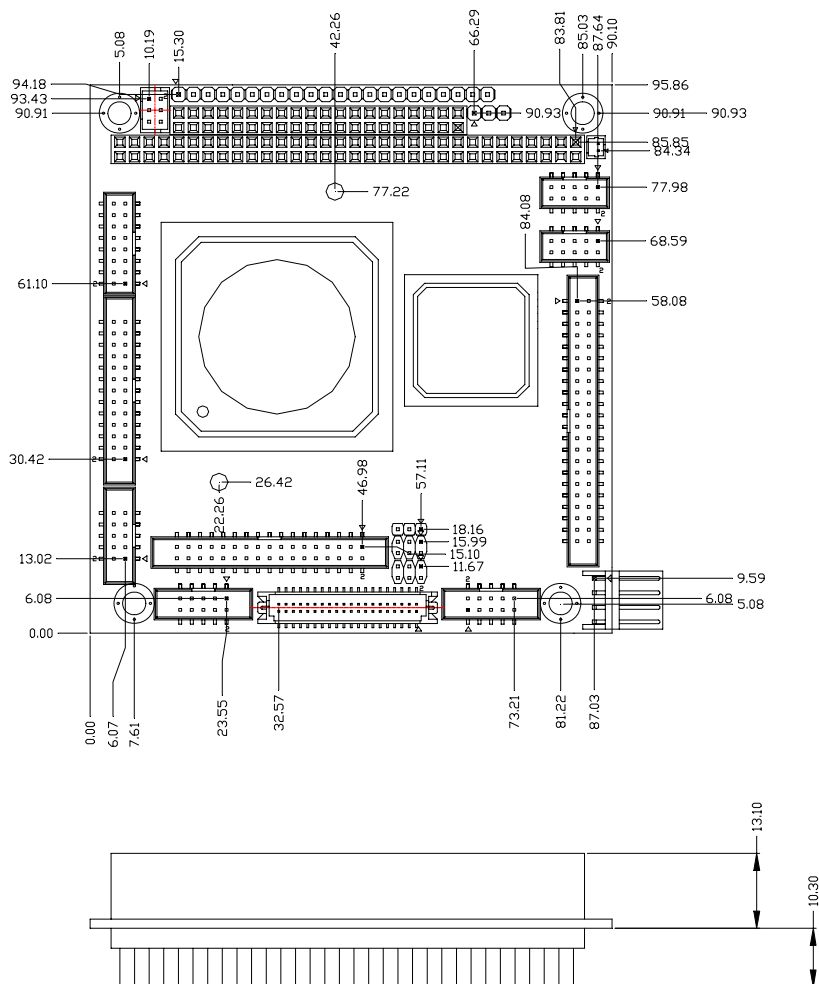
Solder Side
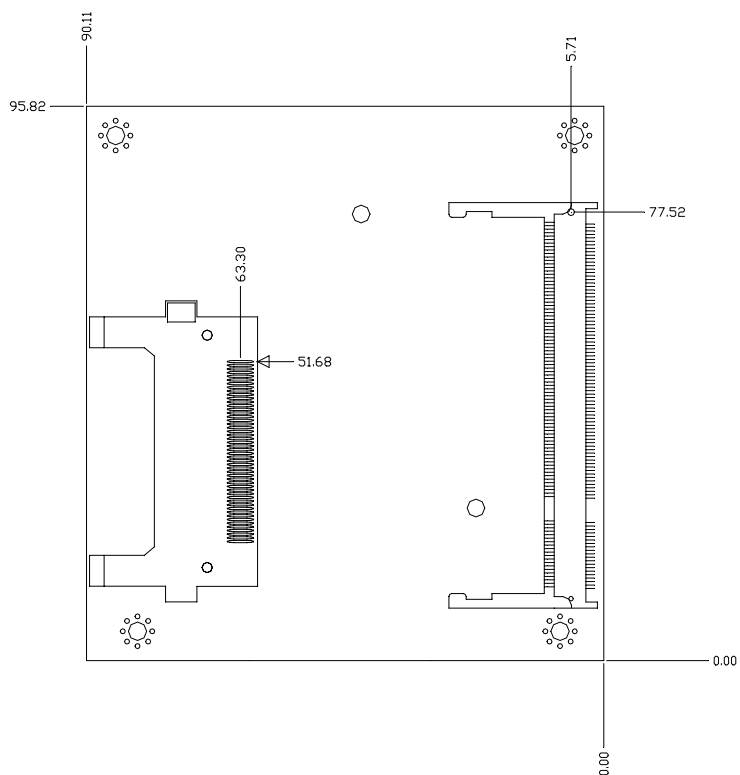
2.4 List of Jumpers

The board has a number of jumpers that allow you to configure your system to suit your application.

The table below shows the function of each of the board's jumpers:

Jumpers

Label	Function
JP1	CFD Master/Slave Selection
JP2	RS-232 Ring/5V Selection
JP3	LCD Clock Selection and Clear COMS

2.5 List of Connectors

The board has a number of connectors that allow you to configure your system to suit your application. The table below shows the function of each board's connectors:

Note: For further information about mating connectors, please refer to the appendix of manual.

Connectors

Label	Function
CN1	Front Panel Connector
CN2	PS2 Keyboard/Mouse Connector
CN3	Option Power Connector
CN4	USB Connector
CN5	VGA Display Connector
CN6	USB Connector
CN7	PC104 Connector
CN8	LPT Port Connector
CN9	IDE Connector
CN10	COM1 Connector
CN11	Floppy Connector
CN12	Power Connector
CN13	COM2 Connector
CN14	Ethernet Connector
CN15	LCD Connector
BAT1	Battery Connector

CFD1	Type1 Compact Flash Slot
SODIMM1	DDR1 SODIMM Slot

2.6 Setting Jumpers

You configure your card to match the needs of your application by setting jumpers. A jumper is the simplest kind of electric switch. It consists of two metal pins and a small metal clip (often protected by a plastic cover) that slides over the pins to connect them. To "close" a jumper you connect the pins with the clip.

To "open" a jumper you remove the clip. Sometimes a jumper will have three pins, labeled 1, 2 and 3. In this case you would connect either pins 1 and 2 or 2 and 3.

OFF   ON   ON 2-3
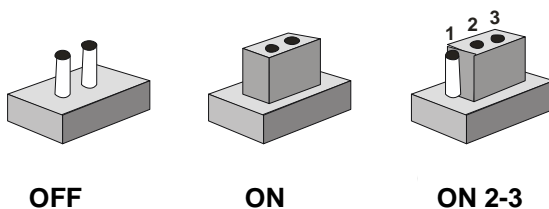
A pair of needle-nose pliers may be helpful when working with jumpers.

If you have any doubts about the best hardware configuration for your application, contact your local distributor or sales representative before you make any change.

Generally, you simply need a standard cable to make most connections.

.

2.7 CFD Master/Slave Selection (JP1)

JP1	Function
1-2	Slave
2-3	Master (Default)

2.8 RS-232 Ring/5V Selection (JP2)

JP2	Function
COM1	
1-3	+5V
3-5	Ring (Default)
COM2	
2-4	+5V
4-6	Ring (Default)

2.9 LCD Clock Selection and Clear CMOS (JP3)

JP3	Function
LCD Clock	
1-3	Normal (Default)
3-5	Reverse
CMOS	
2-4	Protected (Default)

4-6	Clear

2.10 Front Panel Connector (CN1)

Pin	Signal	Pin	Signal
1	Power LED (+)	2	Power LED (-)
3	N.C.	4	Speaker (+)
5	Speaker(-)	6	N.C.
7	IDE LED(+)	8	IDE LED(-)
9	N.C.	10	Reset(+)
11	Reset(-)	12	N.C.
13	Lan Speed LED(+)	14	Lan Speed LED(-)
15	Lan Active LED(+)	16	Lan Active LED(-)
17	N.C.	18	IrDA(+5V)
19	IrDA(N.C.)	20	IrDA(RX)
21	IrDA(GND)	22	IrDA(TX)

2.11 PS2 Keyboard/Mouse Connector (CN2)

Pin	Signal	Pin	Signal
1	KB_DATA	2	KB_CLK
3	GND	4	+5V
5	MS_DATA	6	MS_CLK

2.12 Option Power Connector (CN3)

Pin	Signal
1	-12V
2	-5V
3	GND

2.13 USB 3-4 Connector (CN4)

Pin	Signal	Pin	Signal
1	+5V	2	GND
3	USBD3-	4	GND
5	USBD3+	6	USBD4+
7	GND	8	USBD4-
9	GND	10	+5V

2.14 VGA Display Connector (CN5)

Pin	Signal	Pin	Signal
1	RED	2	+5V
3	GREEN	4	GND
5	BLUE	6	N.C.
7	N.C.	8	DDCDAT
9	GND	10	HSYNC

11	GND	12	VSYNC
13	GND	14	DDCCLK
15	GND	16	GND

2.15 USB 1-2 Connector (CN6)

Pin	Signal	Pin	Signal
1	+5V	2	GND
3	USBD1-	4	GND
5	USBD1+	6	USBD2+
7	GND	8	USBD2-
9	GND	10	+5V

2.16 PC 104 Connector (CN7)

As standard.

Note: PFM-540I does not support ISA card with DMA or Master mode in PC/104 interface.

2.17 LPT Port Connector (CN8)

Pin	Signal	Pin	Signal
1	#STROBE	2	#AFD
3	DATA0	4	#ERROR

.

5	DATA1	6	#INIT
7	DATA2	8	#SLIN
9	DATA3	10	GND
11	DATA4	12	GND
13	DATA5	14	GND
15	DATA6	16	GND
17	DATA7	18	GND
19	#ACK	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SELECT	26	N.C.

2.18 IDE Connector (CN9)

Pin	Signal	Pin	Signal
1	#RESET	2	GND
3	DATA7	4	DATA8
5	DATA6	6	DATA9
7	DATA5	8	DATA10
9	DATA4	10	DATA11
11	DATA3	12	DATA12
13	DATA2	14	DATA13
15	DATA1	16	DATA14
17	DATA0	18	DATA15

PC 104 CPU Module		PFM-540I	
19	GND	20	N.C.
21	REQ	22	GND
23	#IOW	24	GND
25	#IOR	26	GND
27	IOREADY	28	GND
29	#DACK	30	GND
31	IRQ	32	N.C.
33	ADDR1	34	DETECT
35	ADDR0	36	ADDR2
37	#CS0	38	#CS1
39	HDDLED	40	GND
41	+5V	42	+5V
43	GND	44	N.C.

Note: The IDE interface on PFM-540I only supports two IDE devices.　　If you use a CF card, there is only one IDE device usable.

2.19 COM1 Connector (CN10)

Pin	Signal	Pin	Signal
1	DCD	2	RXD
3	TXD	4	DTR
5	GND	6	DSR
7	RTS	8	CTS
9	RI/5V	10	N.C.

.

2.20 Floppy Connector (CN11)

Pin	Signal	Pin	Signal
1	GND	2	#DENSEL
3	GND	4	N.C.
5	GND	6	N.C.
7	GND	8	#INDEX
9	GND	10	#MOTOR A
11	GND	12	#DRIVE SELECT B
13	GND	14	#DRIVE SELECT A
15	GND	16	#MOTOR B
17	GND	18	#DIR
19	GND	20	#STEP
21	GND	22	#WRITE DATA
23	GND	24	#WRITE GATE
25	GND	26	#TRACK0
27	GND	28	#WRITE PROTECT
29	N.C.	30	#READ DATA
31	GND	32	#HDSEL
33	N.C.	34	#DISK CHANGE

2.21 Power Connector (CN12)

Pin	Signal	Pin	Signal
1	+5V	2	GND
3	GND	4	+12V

2.22 COM 2 Connector (CN13)

Pin	Signal	Pin	Signal
1	DCD(485/422_TX-)	2	RXD(422_RX+)
3	TXD(485/422_TX+)	4	DTR(422_RX-)
5	GND	6	DSR
7	RTS	8	CTS
9	RI/5V	10	N.C.

2.23 Ethernet Connector (CN14)

Pin	Signal	Pin	Signal
1	RX-	2	RX+
3	N.C.	4	N.C.
5	CHASSIS_GND	6	CHASSIS_GND
7	N.C.	8	N.C.
9	TX+	10	TX-

2.24 LCD Connector (CN15)

24-bit TTL

Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	GND	4	GND
5	+3.3V	6	+3.3V
7	ENBKL	8	GND
9	BLUE0	10	BLUE1
11	BLUE2	12	BLUE3
13	BLUE4	14	BLUE5
15	BLUE6	16	BLUE7
17	GREEN0	18	GREEN1
19	GREEN2	20	GREEN3
21	GREEN4	22	GREEN5
23	GREEN6	24	GREEN7
25	RED0	26	RED1
27	RED2	28	RED3
29	RED4	30	RED5
31	RED6	32	RED7
33	GND	34	GND
35	CLOCK	36	VSYNC
37	DE	38	HSYNC
39	N.C.	40	ENAVEE

18-bit TTL

Pin	Signal	Pin	Signal
1	+5V	2	+5V
3	GND	4	GND
5	+3.3V	6	+3.3V
7	ENBKL	8	GND
9	N.C	10	N.C
11	BLUE0	12	BLUE1
13	BLUE2	14	BLUE3
15	BLUE4	16	BLUE5
17	N.C	18	N.C
19	GREEN0	20	GREEN1
21	GREEN2	22	GREEN3
23	GREEN4	24	GREEN5
25	N.C	26	N.C
27	RED0	28	RED1
29	RED2	30	RED3
31	RED4	32	RED5
33	GND	34	GND
35	CLOCK	36	VSYNC
37	DE	38	HSYNC
39	N.C	40	ENAVEE

2.25 Battery Connector (BAT1)

Pin	Signal	Pin	Signal
1	+3V	2	GND

2.26 DDR1 SODIMM Slot (SODIMM1)

Standard SODIMM Slot

Note from AMD:

Memory configurations supported.   Only one DIMM or SODIMM is supported as long as the configuration requirements are met.

Devices	Max Memory[1]	Max GLIU Frequency	GLCP 4C00000Fh Upper Bits/Lower Bits	GLMC 2000001 Ah Bits【26:24】
4	512M	400MHz	**F2F100FFh/ 56960004h**	4
8	1G	400MHz	**F2F100FFh/ 56960004h**	4
4	512M	333MHz	**F2F100FFh/ 56960004h**	3
8	1G	333MHz	**F2F100FFh/ 56960004h**	3
16	2G	333MHz	**F2F100FFh/ 56960004h**	3

1: Maximum memory is assuming 1Gbit devices.

Chapter

3

Award
BIOS Setup

3.1   System Test and Initialization

These routines test and initialize board hardware. If the routines encounter an error during the tests, you will either hear a few short beeps or see an error message on the screen. There are two kinds of errors: fatal and non-fatal. The system can usually continue the boot up sequence with non-fatal errors. Non-fatal error messages usually appear on the screen along with the following instructions:

Press <F1> to RESUME

Write down the message and press the F1 key to continue the boot up sequence.

System configuration verification

These routines check the current system configuration against the values stored in the CMOS memory. If they do not match, the program outputs an error message. You will then need to run the BIOS setup program to set the configuration information in memory.

There are three situations in which you will need to change the CMOS settings:

1.   You are starting your system for the first time

2.   You have changed the hardware attached to your system

3.   The CMOS memory has lost power and the configuration information has been erased.

The PFM-540I CMOS memory has an integral lithium battery backup for data retention. However, you will need to replace the complete unit when it finally runs down.

3.2   Award BIOS Setup

Awards BIOS ROM has a built-in Setup program that allows users to modify the basic system configuration. This type of information is stored in battery-backed CMOS RAM so that it retains the Setup information when the power is turned off.

Entering Setup

Power on the computer and press <Del> immediately. This will allow you to enter Setup.
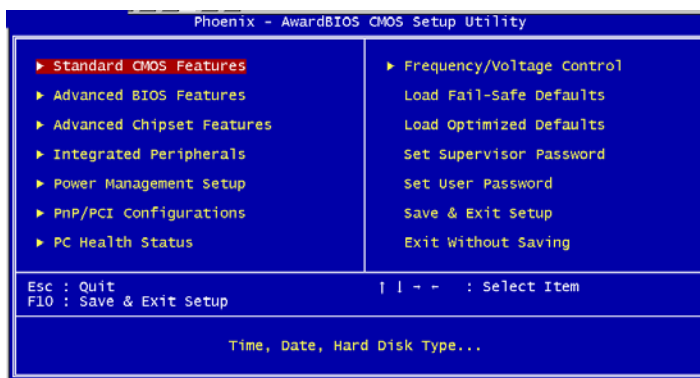
Standard CMOS Features

Use this menu for basic system configuration. (Date, time, IDE, etc.)

Advanced BIOS Features

Use this menu to set the advanced features available on your system.

Advanced Chipset Features

Use this menu to change the values in the chipset registers and optimize your system performance.

Integrated Peripherals

Use this menu to specify your settings for integrated peripherals. (Primary slave, secondary slave, keyboard, mouse etc.)

Power Management Setup

Use this menu to specify your settings for power management. (HDD power down, power on by ring, KB wake up, etc.)

PnP/PCI Configurations

This entry appears if your system supports PnP/PCI.

PC Health Status

This menu allows you to set the shutdown temperature for your system.

Frequency/Voltage Control

Use this menu to specify your settings for auto detect DIMM/PCI clock and spread spectrum.

Load Fail-Safe Defaults

Use this menu to load the BIOS default values for the minimal/stable performance for your system to operate.

Load Optimized Defaults

Use this menu to load the BIOS default values that are factory settings for optimal performance system operations. While AWARD has designated the custom BIOS to maximize performance, the factory has the right to change these defaults to meet their needs.

Set Supervisor/User Password

Use this menu to set Supervisor/User Passwords.

Save and Exit Setup

Save CMOS value changes to CMOS and exit setup.

Exit Without Saving

Abandon all CMOS value changes and exit setup.

Chapter

4

Driver Installation

4.1 Software Drivers

This chapter describes the operation and installation of the display drivers supplied on the Supporting CD-ROM that are shipped with your product. The onboard VGA adapter is based on the AMD LX VGA Flat Panel/CRT controller. This controller offers a large set of extended functions and higher resolutions. The purpose of the enclosed software drivers is to take advantage of the extended features of the AMD LX VGA Flat Panel/CRT controller.

Hardware Configuration

Some of the high-resolution drivers provided in this package will work only in certain system configurations. If a driver does not display correctly, try the following:

1. Change the display controller to CRT-only mode, rather than flat panel or simultaneous display mode. Some high-resolution drivers will display correctly only in CRT mode.

2. If a high-resolution mode does not support your system, try to use a lower-resolution mode. For example, 1024 x 768 mode will not work on some systems, but 800 x 600 mode supports the most.

4.2 Necessary to Know

The instructions in this manual assume that you understand
elementary concepts of MS-DOS and the IBM Personal Computer.
Before you attempt to install any driver from the *Supporting
CD-RO*M, you should:

● Know how to copy files from a CD-ROM to a directory on the
  hard disk

● Understand the MS-DOS directory structure
  If you are uncertain about any of these concepts, please refer
  to the DOS or OS/2 user reference guides for more
  information before you proceed with the installation.

Before you begin
The Supporting CD-ROM contains different drivers for
corresponding Windows OS, please choose the specific driver for
your Windows OS.

4.3 Installing VGA Driver

Win XP / Win XPe VGA

Place the Driver CD-ROM into your CD-ROM drive and follow the steps below to install.

1. Click on **Start** button.

2. Click on **Settings** button.

3. Click on **Control Panel** button.

4. Click on **System** button.

5. Select **Hardware** and click on **Device Manager…**.

6. Double click on **Video Controller (VGA Compatible)**.

7. Click on **Update Driver…**.

8. Click on **Next**.

9. Select **Search for a suitable driver…**, then click on **Next**.

10. Select **Specify a location**, then click on **Next**.

11. Click on **Browse**.

12. Select "l**x_win"** file from CD-ROM **(Drivers/Step 1 –**

    LX_Graphics) then click on **Open**.

13. Click on **OK**.

14. Click on **Next**.

15. Click on **Yes**.

16. Click on **Finish**.

Note: The user must install this system driver before install other device drivers.

4.4 Installing AES Driver

Win XP / Win XPe Geode LX AES Crypto

Place the Driver CD-ROM into your CD-ROM drive and follow the

steps below to install.

1. Click on **Start** button.

2. Click on **Settings** button.

3. Click on **Control Panel** button.

4. Click on **System** button.

5. Select **Hardware** and click on **Device Manager…**.

6. Double click on **Entertainment Encryption/Decryption**

Controller.

7. Click on **Update Driver…**.

8. Click on **Next**.

9. Select **Search for a suitable driver…**, then click on **Next**.

10. Select **Specify a location**, then click on **Next**.

11. Click on **Browse**.

12. Select **"GeodeLX_XP_WDM_AES_v2.01.00"** file from

    CD-ROM **(Driver/Step 2 – AES)** then click on **Open**.

13. Click on **OK**.

14. Click on **Next**.

15. Click on **Yes**.

16. Click on **Finish**.

4.5 Installing PCI to ISA Bridge Driver

Win XP / Win XPe System

Place the Driver CD-ROM into your CD-ROM drive and follow the steps below to install.

1. Click on **Start** button.

2. Click on **Settings** button.

3. Click on **Control Panel** button.

4. Click on **System** button.

5. Select **Hardware** and click on **Device Manager…**.

6. Double click on **Other PCI Bridge Device**

7. Click on **Update Driver…**.

8. Click on **Next**.

9. Select **Search for a suitable driver…**, then click on **Next**.

10. Select **Specify a location**, then click on **Next**.

11. Click on **Browse**.

12. Select "**Ite**" file from CD-ROM **(Drivers/Step 3 – PCI to ISA Bridge)** then click on **open**.

13. Click on **OK**.

14. Click on **Next**.

15. Click on **Finish**.

4.6 Installing Ethernet Driver

1. Click on the *Step 4 –Install Lan* folder.

2. Double click on the *Setup* file located in the folder.

3. Follow the instructions that the window shows.

4. The system will help you install the driver automatically.

4.7 Ethernet Software Configuration

The onboard Ethernet interface supports all major network operating systems. I/O addresses and interrupts are easily configured via the Insyde BIOS Setup. To configure the medium type, to view the current configuration, or to run diagnostics, please refer to the following instruction:

1.   Power the main board on. Ensure that the RSET8139.EXE file is located in the working drive.

2.   At the prompt, type RSET8139.EXE and press <ENTER>. The Ethernet configuration program will then be displayed.

3.   This simple screen shows all the available options for the Ethernet interface. Just highlight the option you wish to change by using the Up and DOWN keys. To change a selected item, press <ENTER>, and a screen will appear with the available options. Highlight your option and press <ENTER>. Each highlighted option has a helpful message

guide displayed at the bottom of the screen for additional
information.

4.   After you have made your selections and the configuration is
      what you want, press <ESC>. A prompt will appear asking if
      you want to save the configuration. Press "Y" if you want to
      save.

There are three very useful diagnostic functions offered in the
Ethernet Setup Menu as follows:

> 1. Run EEPROM test
>
> 2. Run Diagnostics on Board
>
> 3. Run Diagnostics on Network

Each option has its own display screen, which shows the format
and result of any diagnostic tests undertaken.

Appendix

A

Programming the Watchdog Timer

A.1 Programming

PFM-540I utilizes IT8712F-A chipset as its watchdog timer controller.

Below are the procedures to complete its configuration and the intial watchdog timer program is also attached based on which you can develop customized program to fit your application.

Configuring Sequence Description

After the hardware reset or power-on reset, the IT8712F-A enters the normal mode with all logical devices disabled except KBC. The initial state (enable bit) of this logical device (KBC) is determined by the state of pin 121 (DTR1#) at the falling edge of the system reset during power-on reset.
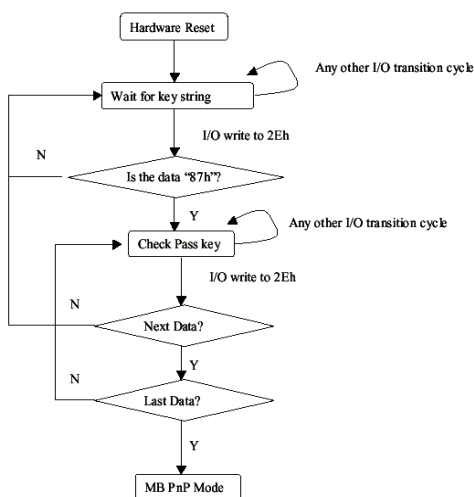
There are three steps to complete the configuration setup: (1) Enter the MB PnP Mode; (2) Modify the data of configuration registers; (3) Exit the MB PnP Mode. Undesired result may occur if the MB PnP Mode is not exited normally.

(1) Enter the MB PnP Mode

To enter the MB PnP Mode, four special I/O write operations are to be performed during Wait for Key state. To ensure the initial state of the key-check logic, it is necessary to perform four write opera-tions to the Special Address port (2EH). Two different enter keys are provided to select configuration ports (2Eh/2Fh) of the next step.

	Address Port	Data Port
87h, 01h, 55h, 55h:	2Eh	2Fh

(2) Modify the Data of the Registers

All configuration registers can be accessed after entering the MB PnP Mode. Before accessing a selected register, the content of Index 07h must be changed to the LDN to which the register belongs, except some Global registers.

(3) Exit the MB PnP Mode

Set bit 1 of the configure control register (Index=02h) to 1 to exit the MB PnP Mode.

WatchDog Timer Configuration Registers

LDN	Index	R/W	Reset	Configuration Register or Action
All	02H	W	N/A	Configure Control
07H	71H	R/W	00H	WatchDog Timer Control Register
07H	72H	R/W	00H	WatchDog Timer Configuration Register
07H	73H	R/W	00H	WatchDog Timer Time-out Value Register

Configure Control (Index=02h)

This register is write only. Its values are not sticky; that is to say, a hardware reset will automatically clear the bits, and does not require the software to clear them.

Bit	Description
7-2	Reserved
1	Returns to the Wait for Key state. This bit is used when the configuration sequence is completed
0	Resets all logical devices and restores configuration registers to their power-on states.

WatchDog Timer Control Register (Index=71h, Default=00h)

Bit	Description
7	WDT is reset upon a CIR interrupt
6	WDT is reset upon a KBC (mouse) interrupt
5	WDT is reset upon a KBC (keyboard) interrupt
4	WDT is reset upon a read or a write to the Game Port base address
3-2	Reserved
1	Force Time-out. This bit is self-clearing
0	WDT Status
	1: WDT value reaches 0.
	0: WDT value is not 0

WatchDog Timer Configuration Register (Index=72h, Default=00h)

Bit	Description
7	WDT Time-out value select
	1: Second
	0: Minute
6	WDT output through KRST (pulse) enable
5-4	Reserved
3-0	Select the interrupt level[Note] for WDT

WatchDog Timer Time-out Value Register (Index=73h, Default=00h)

Bit	Description
7-0	WDT Time-out value 7-0

A.2 IT8712F-A Watchdog Timer Initial Program

```
        .MODEL SMALL
        .CODE
Main:
        CALL Enter_Configuration_mode
        CALL Check_Chip
        mov cl, 7
        call Set_Logic_Device
        ;time setting
        mov cl, 10 ; 10 Sec
        dec al
Watch_Dog_Setting:
        ;Timer setting
        mov al, cl
        mov cl, 73h
        call Superio_Set_Reg
        ;Clear by keyboard or mouse interrupt
        mov al, 0f0h
        mov cl, 71h
        call Superio_Set_Reg
        ;unit is second.
        mov al, 0C0H
        mov cl, 72h
        call Superio_Set_Reg
```

```
; game port enable
mov cl, 9
call Set_Logic_Device


Initial_OK:
CALL Exit_Configuration_mode
MOV AH,4Ch
INT 21h


Enter_Configuration_Mode PROC NEAR
MOV SI,WORD PTR CS:[Offset Cfg_Port]


MOV DX,02Eh
MOV CX,04h
Init_1:
MOV AL,BYTE PTR CS:[SI]
OUT DX,AL
INC SI
LOOP Init_1
RET
Enter_Configuration_Mode ENDP


Exit_Configuration_Mode PROC NEAR
MOV AX,0202h
CALL Write_Configuration_Data
```

```
        RET

        Exit_Configuration_Mode ENDP


        Check_Chip PROC NEAR


        MOV AL,20h

        CALL Read_Configuration_Data

        CMP AL,87h

        JNE Not_Initial


        MOV AL,21h

        CALL Read_Configuration_Data

        CMP AL,12h

        JNE Not_Initial


Need_Initial:

        STC

        RET

Not_Initial:

        CLC

        RET

        Check_Chip ENDP

        Read_Configuration_Data PROC NEAR

        MOV DX,WORD PTR CS:[Cfg_Port+04h]

        OUT DX,AL
```

```
MOV DX,WORD PTR CS:[Cfg_Port+06h]
IN AL,DX
RET
Read_Configuration_Data ENDP


Write_Configuration_Data PROC NEAR
MOV DX,WORD PTR CS:[Cfg_Port+04h]
OUT DX,AL
XCHG AL,AH
MOV DX,WORD PTR CS:[Cfg_Port+06h]
OUT DX,AL
RET
Write_Configuration_Data ENDP


Superio_Set_Reg proc near
push ax
MOV DX,WORD PTR CS:[Cfg_Port+04h]
mov al,cl
out dx,al
pop ax
inc dx
out dx,al
ret
Superio_Set_Reg endp.Set_Logic_Device proc near
Set_Logic_Device proc near
```

```
        push ax

        push cx

        xchg al,cl

        mov cl,07h

        call Superio_Set_Reg

        pop cx

        pop ax

        ret

        Set_Logic_Device endp


        ;Select 02Eh->Index Port, 02Fh->Data Port

        Cfg_Port DB 087h,001h,055h,055h


        DW 02Eh,02Fh
```

END Main

Note: Interrupt level mapping

0Fh-Dh: not valid

0Ch: IRQ12

    .

    .

03h: IRQ3

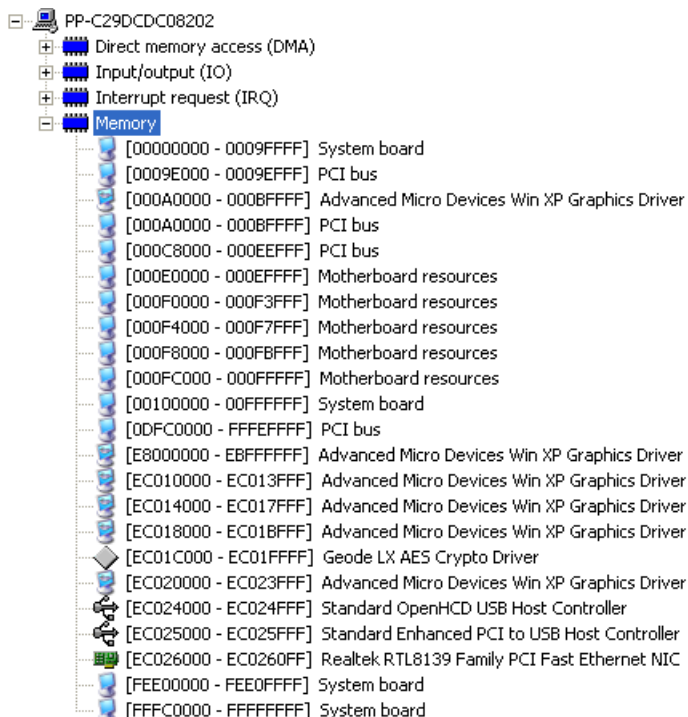02h: not valid

01h: IRQ1

00h: no interrupt selected
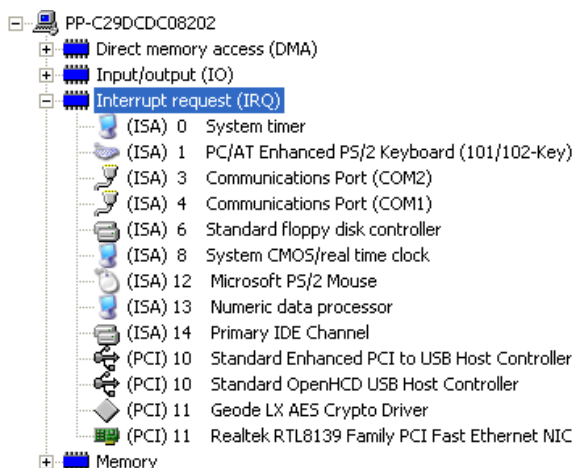
Appendix

B

I/O Information

B.1 I/O Address Map

```
PP-C29DCDC08202
├─ Direct memory access (DMA)
└─ Input/output (IO)
      [00000000 - 0000000F]  Direct memory access controller
      [00000020 - 00000021]  Programmable interrupt controller
      [00000022 - 0000003F]  PCI bus
      [00000040 - 00000043]  System timer
      [00000044 - 00000047]  PCI bus
      [0000004C - 0000006F]  PCI bus
      [00000060 - 00000060]  PC/AT Enhanced PS/2 Keyboard (101/102-Key)
      [00000061 - 00000061]  System speaker
      [00000064 - 00000064]  PC/AT Enhanced PS/2 Keyboard (101/102-Key)
      [00000070 - 00000071]  System CMOS/real time clock
      [00000072 - 0000007F]  PCI bus
      [00000081 - 00000083]  Direct memory access controller
      [00000087 - 00000087]  Direct memory access controller
      [00000089 - 0000008B]  Direct memory access controller
      [0000008F - 00000091]  Direct memory access controller
      [00000090 - 00000091]  PCI bus
      [00000093 - 0000009F]  PCI bus
      [000000A0 - 000000A1]  Programmable interrupt controller
      [000000A2 - 000000BF]  PCI bus
      [000000C0 - 000000DF]  Direct memory access controller
      [000000E0 - 000000EF]  PCI bus
      [000000F0 - 000000FF]  Numeric data processor
      [00000100 - 00000CF7]  PCI bus

      [00000170 - 00000177]  Secondary IDE Channel
      [000001F0 - 000001F7]  Primary IDE Channel
      [00000274 - 00000277]  ISAPNP Read Data Port
      [00000279 - 00000279]  ISAPNP Read Data Port
      [000002F8 - 000002FF]  Communications Port (COM2)
      [00000376 - 00000376]  Secondary IDE Channel
      [00000378 - 0000037F]  Printer Port (LPT1)
      [000003B0 - 000003BA]  Advanced Micro Devices Win XP Graphics Driver
      [000003C0 - 000003DF]  Advanced Micro Devices Win XP Graphics Driver
      [000003F0 - 000003F5]  Standard floppy disk controller
      [000003F6 - 000003F6]  Primary IDE Channel
      [000003F7 - 000003F7]  Standard floppy disk controller
      [000003F8 - 000003FF]  Communications Port (COM1)
      [00000778 - 0000077F]  Printer Port (LPT1)
      [00000A79 - 00000A79]  ISAPNP Read Data Port
      [00000D00 - 0000FFFF]  PCI bus
      [0000E000 - 0000E0FF]  Realtek RTL8139 Family PCI Fast Ethernet NIC
      [0000F000 - 0000F00F]  Standard Dual Channel PCI IDE Controller
├─ Interrupt request (IRQ)
└─ Memory
```

B.2 1ˢᵗ MB Memory Address Map

```
PP-C29DCDC08202
  Direct memory access (DMA)
  Input/output (IO)
  Interrupt request (IRQ)
  Memory
      [00000000 - 0009FFFF] System board
      [0009E000 - 0009EFFF] PCI bus
      [000A0000 - 000BFFFF] Advanced Micro Devices Win XP Graphics Driver
      [000A0000 - 000BFFFF] PCI bus
      [000C8000 - 000EEFFF] PCI bus
      [000E0000 - 000EFFFF] Motherboard resources
      [000F0000 - 000F3FFF] Motherboard resources
      [000F4000 - 000F7FFF] Motherboard resources
      [000F8000 - 000FBFFF] Motherboard resources
      [000FC000 - 000FFFFF] Motherboard resources
      [00100000 - 00FFFFFF] System board
      [0DFC0000 - FFFEFFFF] PCI bus
      [E8000000 - EBFFFFFF] Advanced Micro Devices Win XP Graphics Driver
      [EC010000 - EC013FFF] Advanced Micro Devices Win XP Graphics Driver
      [EC014000 - EC017FFF] Advanced Micro Devices Win XP Graphics Driver
      [EC018000 - EC01BFFF] Advanced Micro Devices Win XP Graphics Driver
      [EC01C000 - EC01FFFF] Geode LX AES Crypto Driver
      [EC020000 - EC023FFF] Advanced Micro Devices Win XP Graphics Driver
      [EC024000 - EC024FFF] Standard OpenHCD USB Host Controller
      [EC025000 - EC025FFF] Standard Enhanced PCI to USB Host Controller
      [EC026000 - EC0260FF] Realtek RTL8139 Family PCI Fast Ethernet NIC
      [FEE00000 - FEE0FFFF] System board
      [FFFC0000 - FFFFFFFF] System board
```

B.3 IRQ Mapping Chart

```
PP-C29DCDC08202
├─ Direct memory access (DMA)
├─ Input/output (IO)
├─ Interrupt request (IRQ)
│   ├─ (ISA)  0   System timer
│   ├─ (ISA)  1   PC/AT Enhanced PS/2 Keyboard (101/102-Key)
│   ├─ (ISA)  3   Communications Port (COM2)
│   ├─ (ISA)  4   Communications Port (COM1)
│   ├─ (ISA)  6   Standard floppy disk controller
│   ├─ (ISA)  8   System CMOS/real time clock
│   ├─ (ISA) 12   Microsoft PS/2 Mouse
│   ├─ (ISA) 13   Numeric data processor
│   ├─ (ISA) 14   Primary IDE Channel
│   ├─ (PCI) 10   Standard Enhanced PCI to USB Host Controller
│   ├─ (PCI) 10   Standard OpenHCD USB Host Controller
│   ├─ (PCI) 11   Geode LX AES Crypto Driver
│   └─ (PCI) 11   Realtek RTL8139 Family PCI Fast Ethernet NIC
└─ Memory
```

B.4 DMA Channel Assignments

```
PP-C29DCDC08202
├─ Direct memory access (DMA)
│   ├─ 2   Standard floppy disk controller
│   └─ 4   Direct memory access controller
├─ Input/output (IO)
├─ Interrupt request (IRQ)
└─ Memory
```

Appendix

C

Mating Connecotor

C.1 List of Mating Connectors and Cables

The table notes mating connectors and available cables.

Connector Label	Function	Mating Connector		Available Cable	MFG Cable P/N
		Vendor	Model no		
CN1	Front Panel Connector	Neltron	2226A-XX		N/A
CN2	PS2 Keyboard/ Mouse Connector	Neltron	2026B--XX	Keyboard & Mouse Cable	1700060152
CN3	Option Power Connector	Dupont	2541-1H		N/A
CN4	USB Connector	Neltron	2026B--XX	USB Cable	1709100201
CN5	VGA Display Connector	Neltron	2026B--XX	CRT Cable	1701160201
CN6	USB Connector	Neltron	2026B--XX	USB Cable	1709100201
CN8	LPT Port Connector	Keentop	1014 Series	Parallel Port Cable	1701260201

CN9	IDE Connector	Keentop	1014 Series	IDE Cable	1701440350
CN10	COM1 Connector	Keentop	1014 Series	Serial Port Cable	1701100207
CN11	Floppy Connector	Keentop	1014 Series	Floppy Disk Drive Cable	1701340703
CN12	Power Connector	Ever	2542H-04		N/A
CN13	COM2 Connector	Keentop	1014 Series	Serial Port Cable	1701100207
CN14	Ethernet Connector	Keentop	1014 Series	Ethernet Cable	1700100200
CN15	LCD Connector	HO TIEN	1255H		N/A
BAT1	Battery Connector	HRS	DF14-MS-1.25C		N/A