

PFM-535S

DM&P® Vortex86SX®/ Vortex86DX® SoC

Processor

CRT & TTL LCD Panel

4 COM, 4 USB, 1 EIDE, 1 CompactFlash™

Copyright Notice

This document is copyrighted, 2010. All rights are reserved. The original manufacturer reserves the right to make improvements to the products described in this manual at any time without notice.

No part of this manual may be reproduced, copied, translated, or transmitted in any form or by any means without the prior written permission of the original manufacturer. Information provided in this manual is intended to be accurate and reliable. However, the original manufacturer assumes no responsibility for its use, or for any infringements upon the rights of third parties that may result from its use.

The material in this document is for product information only and is subject to change without notice. While reasonable efforts have been made in the preparation of this document to assure its accuracy, AAEON assumes no liabilities resulting from errors or omissions in this document, or from the use of the information contained herein.

AAEON reserves the right to make changes in the product design without notice to its users.

Acknowledgments

All other products' name or trademarks are properties of their respective owners.

- Award is a trademark of Award Software International, Inc.
- CompactFlash™ is a trademark of the Compact Flash Association.
- Microsoft Windows® is a registered trademark of Microsoft Corp.
- AMD Geode® is a registered trademark of Advanced Micro Devices, Inc.
- ITE is a trademark of Integrated Technology Express, Inc.
- IBM, PC/AT, PS/2, and VGA are trademarks of International Business Machines Corporation.
- SoundBlaster is a trademark of Creative Labs, Inc.

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

Packing List

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

- Cable Kit
- Quick Installation Guide
- Utility CD
- PFM-535S w/Heatsink

Note:

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

Contents

Chapter 1 General Information

1.1 Introduction.....	1-2
1.2 Features	1-3
1.3 Specifications	1-4

Chapter 2 Quick Installation Guide

2.1 Safety Precautions	2-2
2.2 Location of Connectors and Jumpers	2-3
2.3 Mechanical Drawing	2-5
2.4 List of Jumpers	2-7
2.5 List of Connectors	2-8
2.6 Setting Jumpers	2-9
2.7 Clear CMOS (JP1)	2-10
2.8 RS-232/485 Isolation Setting (JP2).....	2-10
2.9 COM2 Ring/+5V Selection (JP3).....	2-10
2.10 COM2 RS-232/422/485 Selection (JP4)	2-10
2.11 TTL-LCD Clock Selection (JP5)	2-10
2.12 PC/104+ (PCI-104) I/O Voltage Selection (JP6).....	2-11
2.13 2P Power Connector (CN1)	2-11
2.14 Front Panel Connector (CN2)	2-11
2.15 Front Panel Connector (CN3)	2-12
2.16 JTAG Connector (CN4).....	2-12
2.17 RS -232/422/485 Serial Port Connector (CN5).....	2-12

2.18 TTL_LCD Connector (CN6)	2-13
2.19 PS/2 Keyboard/Mouse Connector (CN8).....	2-14
2.20 4P Power Connector (CN9)	2-15
2.21 EIDE Connector (IDE1).....	2-15
2.22 VGA Display Connector (VGA1)	2-16
2.23 LPT Port Connector (LPT1)	2-16
2.24 USB Connector (USB1)	2-17
2.25 USB Connector (USB2)	2-17
2.26 10/100Base -TX Ethernet Connector (LAN1)	2-18
2.27 10/100Base -TX Ethernet Connector (LAN2)	2-18

Chapter 3 AMI BIOS Setup

3.1 System Test and Initialization.	3-2
3.2 AMI BIOS Setup.....	3-3

Appendix A Programming The Watchdog Timer

A.1 Programming	A-2
-----------------------	-----

Appendix B I/O Information

B.1 I/O Address Map.....	B-2
B.2 1 st MB Memory Address Map	B-4
B.3 IRQ Mapping Chart.....	B-4
B.4 DMA Channel Assignments.....	B-5

Appendix C Mating Connectors

C.1 List of Mating Connectors and Cables.....	C-2
---	-----

Chapter

1

**General
Information**

1.1 Introduction

AAEON Technology, a leading company in embedded boards manufacturing with a full range of PC/104 CPU Modules, launches a brand new PC/104 CPU Module PFM-535S. Its compact size and rich functionality ensures the most cost effective and compatible module to coincide with your existing system planning devices.

PFM-535S adopts a DM&P[®] Vortex86SX[®]/ Vortex86DX[®] SoC Processor that are more cost effective compared to other PC/104 CPU modules on the market. Although PFM-535S is a small board, it offers the full functions customers demand. The chipset of PFM-535S deploys DM&P[®] Vortex86SX[®]/ Vortex86DX[®] SoC Processor that makes this board achieve high performance. It features two 10/100Base-TX Ethernet ports, four USB 2.0 ports, four serial ports, one parallel port, watchdog timer and includes one PC/104+ socket expansion.

1.2 Features

- Onboard DM&P[®] Vortex86SX[®] / Vortex86DX[®] SoC Processor
- Onboard DDR2 Memory 256MB
- 10/100Base-TX Ethernet x 2
- CRT & 24-bit TTL LCD
- EIDE x 1, CompactFlash[™] x 1
- USB2.0 x 4, COM x 4
- PC/104+ Expansion
- +5V Only Operation, AT Power Type

1.3 Specifications

System

- Processor Onboard DM&P[®] Vortex86SX[®]/
Vortex86DX[®] SoC Processor
- System Memory Onboard DDR2 Memory 256MB
- Chipset DM&P[®] Vortex86SX[®]/
Vortex86DX[®] SoC
- I/O Chipset DM&P[®] Vortex86SX[®]/
Vortex86DX[®] SoC
- Ethernet Vortex86SX[®] / Vortex86DX[®]
Mac Controller (LAN1), Intel[®]
82551ER (LAN2)
- BIOS AMI - 256KB Flash
- Watchdog Timer Generates a time-out system
reset
- RTC Vortex86SX[®] / Vortex86DX[®]
- Expansion Interface PC/104+
- Power Requirement +5V/ AT
- Board Size 3.55" (L) x 3.77" (W) (90mm x
96mm)
- Operating Temperature 32°F~ 140°F (0°C ~ 60°C)

Display: Supports CRT/LCD simultaneous/ dual view display

- Chipset DMP Vortex86SX[®] / Vortex86DX[®]

- Resolution Up to 1280 x 1024 for CRT
Up to 1024 x 768 for LCD

I/O

- Storage EIDE x 1 (for two devices),
CompactFlash™ x 1
- Serial Port RS-232 x 3, RS-232/422/485 x 1
- USB Four USB2.0 ports
- PS/2 Port One keyboard and one mouse support

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.



2.1 Safety Precautions

Warning!

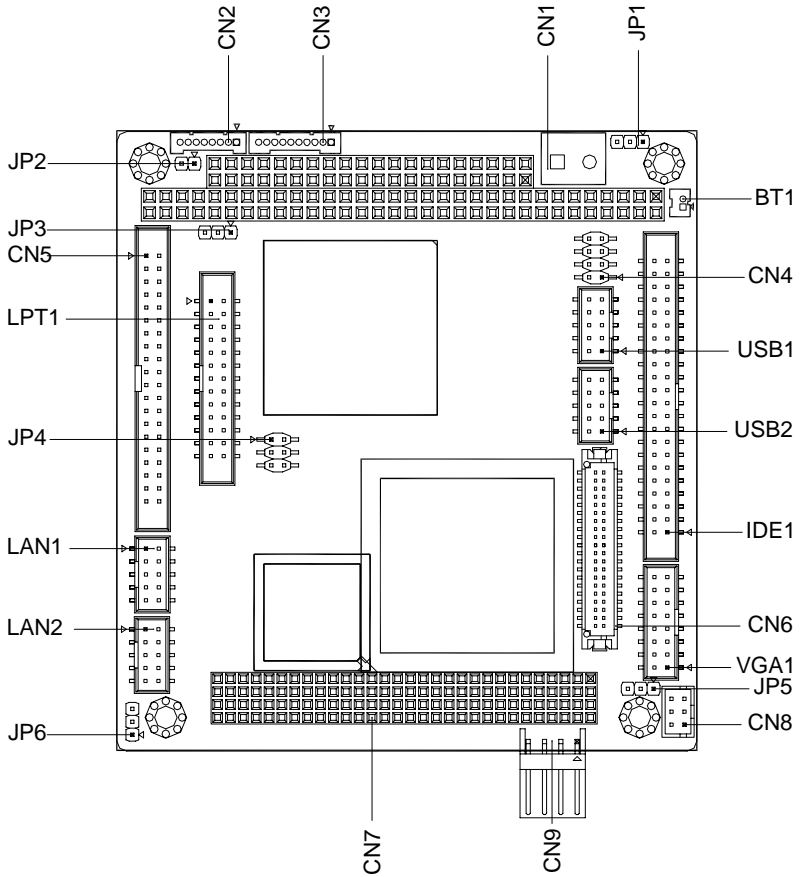
Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because a sudden rush of power can damage sensitive electronic components.

Caution!

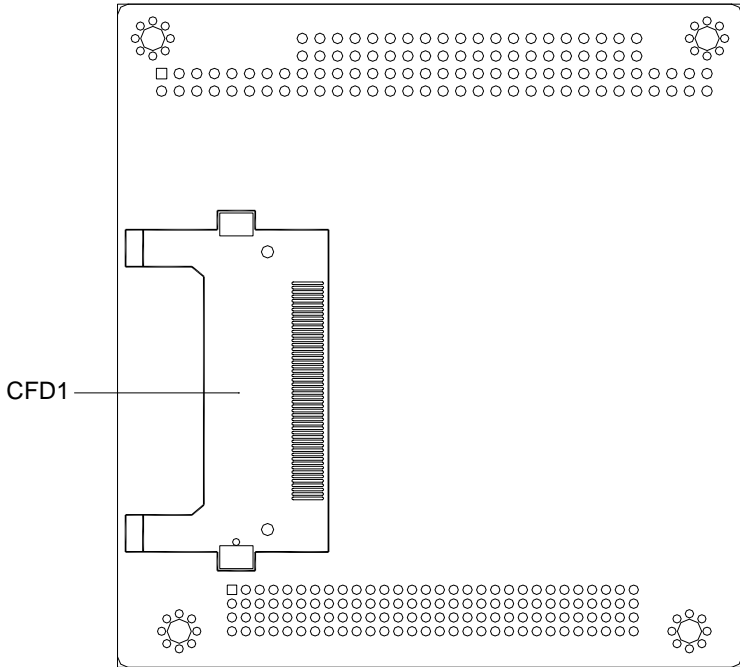
Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not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

2.2 Location of Connectors and Jumpers

Component Side

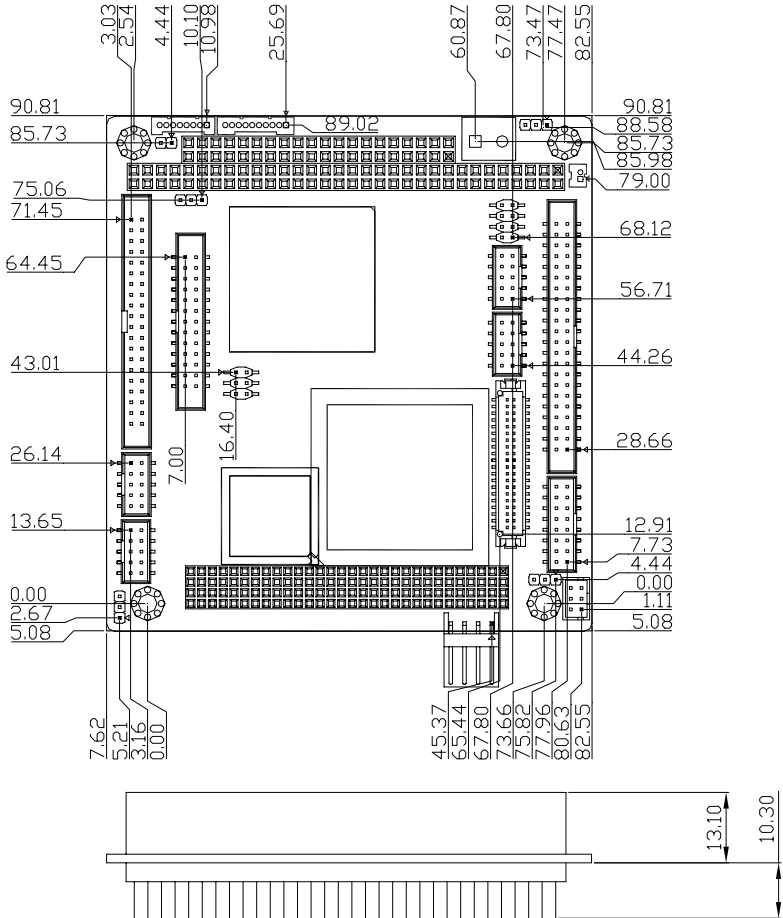


Solder Side

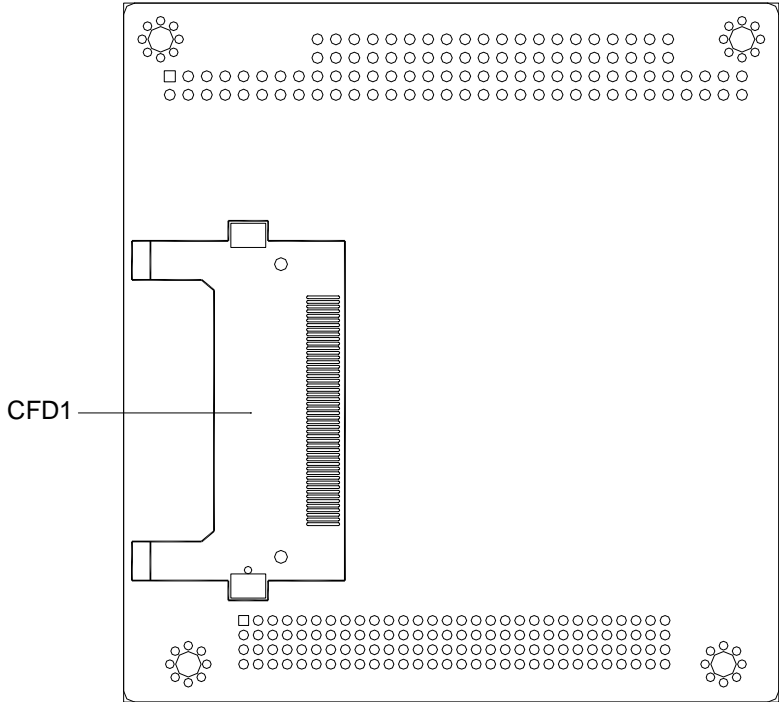


2.3 Mechanical Drawing

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	Clear CMOS
JP2	COM2 RS-232/485 Isolation setting
JP3	COM2 Ring/+5V Selection
JP4	COM2 RS-232/422/485 Selection
JP5	TTL-LCD Clock Selection
JP6	PC/104+(PCI-104) I/O Voltage Selection

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

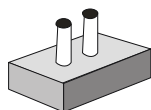
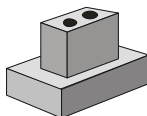
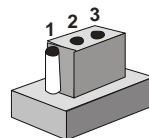
Label	Function
CN1	2P Power Connector (Options)
CN2	Front Panel Connector 8x1
CN3	Front Panel Connector 10x1
CN4	JTAG Connector
CN5	RS-232/422/485 Serial Port Connector
CN6	TTL_LCD Connector
CN7	PCI-104 Connector
CN8	PS2 Keyboard/Mouse Connector
CN9	4P Power Connector
IDE1	ATA-33 IDE Connector
VGA1	VGA Display Connector
LPT1	LPT Port Connector
USB1	USB Connector
USB2	USB Connector
LAN1	10/100Base-TX Ethernet Connector
LAN2	10/100Base-TX Ethernet Connector

PC104-1	PC/104 Connector
PC104-2	PC/104 Connector
CFD1	CompactFlash 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 Clear CMOS (JP1)

JP1	Function
1-2	Protected (Default)
2-3	Clear

2.8 RS-232/485 Isolation Setting (JP2)

JP2	Function
RS-232	OFF (Default)
RS-485	ON

2.9 COM2 Ring/+5V Selection (JP3)

JP3	Function
1-2	+5V
2-3	Ring (Default)

2.10 COM2 RS-232/422/485 Selection (JP4)

JP4	Function
1-2	RS-232 (Default)
3-4	RS-422
5-6	RS-485

2.11 TTL-LCD Clock Selection (JP5)

JP5	Function
1-2	Normal Clock (Default)

2-3	Reverse Clock
-----	---------------

2.12 PC/104+ (PCI-104) I/O Voltage Selection (JP6)

JP6	Function
1-2	+5V
2-3	+3.3V (Default)

2.13 2P Power Connector (CN1)

Pin	Signal
1	GND
2	+5V

2.14 Front Panel Connector (CN2)

Pin	Signal
1	Lan1 Speed LED(+)
2	Lan1 Speed LED(-)
3	Lan1 Active LED(+)
4	Lan1 Active LED(-)
5	Lan2 Speed LED(+)
6	Lan2 Speed LED(-)
7	Lan2 Active LED(+)
8	Lan2 Active LED(-)

2.15 Front Panel Connector (CN3)

Pin	Signal
1	N.C
2	N.C
3	External Buzzer (+)
4	External Buzzer (-)
5	IDE LED (+)
6	IDE LED (-)
7	Power LED (+)
8	Power LED (-)
9	Reset Switch (+)
10	Reset Switch (-)

2.16 JTAG Connector (CN4)

Pin	Signal	Pin	Signal
1	+5V	2	TMS
3	TCK	4	N.C
5	TDI	6	N.C
7	TDO	8	GND

2.17 RS-232/422/485 Serial Port Connector (CN5)

Pin	Signal	Pin	Signal
1	DCD#1	2	DSR#1

3	RXD1	4	RTS#1
5	TXD1	6	CTS#1
7	DTR#1	8	RI#1
9	GND	10	N.C
11	DCD#2 (422TXD-/485DATA-)	12	DSR#2
13	RXD2 (422RXD+)	14	RTS#2
15	TXD2 (422TXD+/485DATA+)	16	CTS#2
17	DTR#2(422RXD-)	18	RI#2
19	GND	20	N.C
21	DCD#3	22	DSR#3
23	RXD3	24	RTS#3
25	TXD3	26	CTS#3
27	DTR#3	28	RI#3
29	GND	30	N.C
31	DCD#4	32	DSR#4
33	RXD4	34	RTS#4
35	TXD4	36	CTS#4
37	DTR#4	38	RI#4
39	GND	40	N.C

2.18 TTL_LCD Connector (CN6)

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	DOT_CLOCK	36	VSYNC
37	DE	38	HSYNC
39	N.C	40	ENAVEE

2.19 PS/2 Keyboard/Mouse Connector (CN8)

Pin	Signal	Pin	Signal
1	KB_DATA	4	KB_CLK
2	GND	5	+5V
3	MS-DATA	6	MS_CLK

2.20 4P Power Connector (CN1)

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

2.21 EIDE Connector (IDE1)

Pin	Signal	Pin	Signal
1	IDE 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
19	GND	20	N.C
21	REQ	22	GND
23	IO WRITE	24	GND
25	IO READ	26	GND
27	IO READY	28	GND
29	DACK	30	GND

31	IRQ14	32	N.C
33	ADDR1	34	UDMA DETECT
35	ADDR0	36	ADDR2
37	CS#1	38	CS#3
39	LED	40	GND
41	+5V	42	+5V
43	GND	44	N.C

2.22 VGA Display Connector (VGA1)

Pin	Signal	Pin	Signal
1	RED	2	VGAVCC
3	GREEN	4	GND
5	BLUE	6	N.C
7	N.C	8	SDATA
9	GND	10	H
11	GND	12	V
13	GND	14	SCLK
15	GND	16	N.C

2.23 LPT Port Connector (LPT1)

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

2.24 USB Connector (USB1)

Pin	Signal	Pin	Signal
1	+5V	2	GND
3	USBD0-	4	GND
5	USBD0+	6	USBD1+
7	GND	8	USBD1-
9	GND	10	+5V

2.25 USB Connector (USB2)

Pin	Signal	Pin	Signal
1	+5V	2	GND
3	USBD2-	4	GND
5	USBD2+	6	USBD3+

7	GND	8	USBD3-
9	GND	10	+5V

2.26 10/100Base-TX Ethernet Connector (LAN1)

Pin	Signal	Pin	Signal
1	TX1+	2	TX1-
3	RX1+	4	RX1-
5	Temp_GND	6	Temp_GND
7	N.C	8	N.C
9	N.C	10	N.C

2.27 10/100Base-TX Ethernet Connector (LAN2)

Pin	Signal	Pin	Signal
1	TX2+	2	TX2-
3	RX2+	4	RX2-
5	Temp_GND	6	Temp_GND
7	N.C	8	N.C
9	N.C	10	N.C

Below Table for China RoHS Requirements

产品中有毒有害物质或元素名称及含量

AAEON Main Board/ Daughter Board/ Backplane

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板 及其电子组件	×	○	○	○	○	○
外部信号 连接器及线材	×	○	○	○	○	○
<p>O: 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T 11363-2006 标准规定的限量要求以下。</p> <p>X: 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T 11363-2006 标准规定的限量要求。</p> <p>备注: 此产品所标示之环保使用期限, 系指在一般正常使用状况下。</p>						

Chapter

3

**AMI
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-535S 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 AMI BIOS Setup

AMI's 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 immediately. This will allow you to enter Setup.

Main

Use this menu for basic system configuration. (Processor, System memory, Date, etc.)

Advanced

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

PCIPnP

This entry appears if your system supports PnP/PCI.

Boot

This menu shows boot setting configurations.

Security

Use this menu to set the password for system security.

Chipset

Use this menu to set Northbridge and Southbridge configuration.

Exit

Use this menu to load or save CMOS value and exit setup.

You can refer to the “ BIOS Item Description ” option in the CD auto-run menu for the meaning of each setting in this chapter.

Appendix

A

Programming the Watchdog Timer

A.1 Programming

There are two watchdog timers in Vortex86SX/DX CPU. One is compatible with M6117D watchdog timer and the other is new. The M6117D compatible watchdog timer is called WDT0 and new one is called WDT1.

WDT0

To access WDT0 registers, programmer can use index port 22H and data port 23H. The watchdog timer uses 32.768 kHz frequency source to count a 24-bit counter so the time range is from 30.5u sec to 512 sec with resolution 30.5u sec. When timer times out, a system reset, NMI or IRQ may happen to be decided by BIOS programming.

Index Port 37h	
Bit 7	Reserved.
Bit 6	0: Disable WDT0 1: Enable WDT0 (default)
Bit 5-0	Reserved.
Index Port 3Ch	
Bit 7	0: Read only, Watchdog timer time out event does not happen. 1: Read only, Watchdog timer time out event happens.
Bit 6	Write 1 to reset Watchdog timer.
Index Port 38h	
Bit 7-4	0000:Reserved 0101:IRQ7 1011:IRQ15 0001:IRQ3 0110:IRQ9 1100:NMI 0010:IRQ4 0111:IRQ10 1101:System reset 0011:IRQ5 1001:IRQ12 1110:Reserved 0100:IRQ6 1010:IRQ14 1111:Reserved
Bit 3-0	Reserved.

Index 3Bh, 3Ah, 39h : Counter

	3Bh	3Ah	39h
	D7.....D0	D7.....D0	D7.....D0
Counter	Most SBitLeast SBit		

Here are steps to setup watchdog timer:

1. Set Bit 6 = 0 to disable the timer.
2. Write the desired counter value to 3Bh, 3Ah, 39h.
3. Set Bit 6 = 1 to enable the timer, the counter will begin to count up.
4. When counter reaches the setting value, the time out will generate signal setting by index 38h bit[7:4]
5. BIOS can read index 3Ch Bit 7 to decide whether the Watchdog timeout event will happen or not.

To clear the watchdog timer counter:

1. Set Bit 6 = 0 to disable timer. This will also clear counter at the same time.

WDT1

WDT1 does not use index and data port to access WDT registers. It uses I/O port 68H~6DH. The time resolution of WDT1 is 30.5 u second. Here are registers information:

WDT1 Control Register

Port 68h	
Bit 7	Reserved.
Bit 6	0: Disable watchdog timer. 1: Enable watchdog timer.
Bit 5-0	Reserved.

WDT1 Signal Select Control Register

Port 69h			
Bit 7-4	0000:Reserved	0101:IRQ7	1011:IRQ15
	0001:IRQ3	0110:IRQ9	1100:NMI
	0010:IRQ4	0111:IRQ10	1101:System reset
	0011:IRQ5	1001:IRQ12	1110:Reserved
	0100:IRQ6	1010:IRQ14	1111:Reserved
Bit 3-0	Reserved.		

WDT1 Control 2 Register

Port	6Ch	6Bh	6Ah
	D7.....D0	D7.....D0	D7.....D0
Counter	Most SBit		Least SBit

Resolution is 30.5u second.

WDT1 Status Register

Port 6Dh	
Bit 7	0: WDT1 timeout event does not happen 1: WDT1 timeout event happens (write 1 to clear this flag)
Bit 6-0	Reserved.

WDT1 Reload Register

Port 67h	
Bit 7-0	Write this port to reload WDT1 internal counter. The read data is unknown.

Here are steps to setup WDT1:

1. Write time into register 6Ah-6Ch.
2. Select signal from register 69h.
3. Set register 68h bit 8 to enable WDT1.

To clear the watchdog timer counter:

1. Write any value to register 67H

WDT0 DOS Example

```
#include <stdio.h>
#include <conio.h>
void main()
{
    unsigned char c;
    unsigned int ITime;
    outp(0x22,0x13); // Lock register
    outp(0x23,0xc5); // Unlock config. register
    // 500 mini-second
    ITime = 0x20L * 500L;
    outp(0x22,0x3b);
    outp(0x23,(ITime>>16)&0xff);
    outp(0x22,0x3a);
    outp(0x23,(ITime>> 8)&0xff);
    outp(0x22,0x39);
    outp(0x23,(ITime>> 0)&0xff);
    // Reset system
    outp(0x22,0x38);
    c = inp(0x23);
    c &= 0x0f;
    c |= 0xd0; // Reset system. For example, 0x50 to trigger IRQ7
    outp(0x22,0x38);
    outp(0x23,c);
    // Enable watchdog timer
```

```
outp(0x22,0x37);
c = inp(0x23);
c |= 0x40;
outp(0x22,0x37);
outp(0x23,c);
outp(0x22,0x13); // Lock register
outp(0x23,0x00); // Lock config. register
printf("Press any key to stop trigger timer.\n");
while(!kbhit())
{
outp(0x22,0x13); // Unlock register
outp(0x23,0xc5);
outp(0x22,0x3c);
unsigned char c = inp(0x23);

outp(0x22,0x3c);
outp(0x23,c|0x40);
outp(0x22,0x13); // Lock register
outp(0x23,0x00);
}
printf("System will reboot after 500 milli-seconds.\n");
}
```

WDT1 DOS Example

```
#include <stdio.h>
#include <conio.h>
void main()
{
    unsigned char c;
    unsigned long ITime;
    // 500 mini-second
    ITime = 0x20L * 500L;
    outp(0x6c, (ITime >> 16) & 0xff);
    outp(0x6b, (ITime >> 8) & 0xff);
    outp(0x6a, (ITime >> 0) & 0xff);
    // Reset system. For example, 0x50 to trigger IRQ7
    outp(0x69, 0xd0);
    // Enable watchdog timer
    c = inp(0x68);
    c |= 0x40;
    outp(0x68, c);
    printf("Press any key to stop trigger timer.\n");
    while(!kbhit())
    outp(0x67, 0x00);
    printf("System will reboot after 500 milli-seconds.\n");
}
```


WDT0 Windows CE Example

```
#include "stdafx.h"

unsigned char inportb(int addr)
{
    __asm
    {
        push edx
        mov edx, DWORD PTR addr
        in al, dx
        and eax, 0xff
        pop edx
    }
}

void outportb(int addr, unsigned char val)
{
    __asm
    {
        push edx
        mov edx, DWORD PTR addr
        mov al, BYTE PTR val
        out dx, al
        pop edx
    }
}

void main(void)
```

```
{
unsigned char c;
unsigned int ITime;
outp(0x22,0x13); // Lock register
outp(0x23,0xc5); // Unlock config. register
// 500 mini-second
ITime = 0x20L * 500L;
outp(0x22,0x3b);
outp(0x23,(ITime>>16)&0xff);
outp(0x22,0x3a);
outp(0x23,(ITime>> 8)&0xff);
outp(0x22,0x39);
outp(0x23,(ITime>> 0)&0xff);
// Reset system
outp(0x22,0x38);
c = inp(0x23);
c &= 0x0f;
c |= 0xd0; // Reset system. For example, 0x50 to trigger IRQ7
outp(0x22,0x38);
outp(0x23,c);
// Enable watchdog timer
outp(0x22,0x37);
c = inp(0x23);
c |= 0x40;
outp(0x22,0x37);
```

```
outp(0x23,c);
outp(0x22,0x13); // Lock register
outp(0x23,0x00); // Lock config. register
printf("Press any key to stop trigger timer.\n");
while(!kbhit())
{
outp(0x22,0x13); // Unlock register
outp(0x23,0xc5);
outp(0x22,0x3c);
unsigned char c = inp(0x23);
outp(0x22,0x3c);
outp(0x23,c|0x40);
outp(0x22,0x13); // Lock register
outp(0x23,0x00);
}
printf("System will reboot after 500 milli-seconds.\n");
}
```

WDT1 Windows CE Example

```
#include "stdafx.h"
unsigned char inportb(int addr)
{
__asm
{
push edx
```

```
mov edx, DWORD PTR addr
in al, dx
and eax, 0xff
pop edx
}
}
void outportb(int addr, unsigned char val)
{
    __asm
    {
        push edx
        mov edx, DWORD PTR addr
        mov al, BYTE PTR val
        out dx, al
        pop edx
    }
}
void main(void)
{
    unsigned char c;
    unsigned long ITime;
    // 500 mini-second
    ITime = 0x20L * 500L;
    outp(0x6c, (ITime >> 16) & 0xff);
    outp(0x6b, (ITime >> 8) & 0xff);
}
```

```
outp(0x6a, (lTime >> 0) & 0xff);
// Reset system. For example, 0x50 to trigger IRQ7
outp(0x69, 0xd0);
// Enable watchdog timer
c = inp(0x68);
c |= 0x40;
outp(0x68, c);
printf("Press any key to stop trigger timer.\n");
while(!kbhit())
outp(0x67, 0x00);
printf("System will reboot after 500 milli-seconds.\n");
}
```

Appendix

B

I/O Information

B.1 I/O Address Map

Address	Description
0000h - 000Fh	DMA 8237-1
0018h - 001Fh	Empty
0020h - 0021h	PIC 8259-1
0024h - 002Dh	Empty
002Eh - 002Fh	Forward to LPC BUS
0030h - 003Fh	Empty
0040h - 0043h	Timer counter 8254
0061h	Port B + NMI control port
0062h - 0063h	8051 download 4K address counter
0064h	Keyboard status port
0065h	WatchDog0 reload counter
0066h	8051 download 8bit data port
0067h	WatchDog1 reload counter
0068h - 006Dh	WatchDog1 control register
006Eh - 006Fh	Empty
0070h - 0071h	CMOS RAM port
0072h - 0075h	MTBF counter
0076h - 0077h	Empty
0078h - 007Ch	GPIO port 0,1,2,3,4 default setup
007Dh - 007Fh	Empty
0080h - 008Fh	DMA page register
0090h - 0091h	Empty

0092h	System control register
0093h - 0097h	Empty
0098h - 009Ch	GPIO direction control
00A0h - 00A1h	PIC 8259-2
00A2h - 00BFh	Empty
00C0h - 00DFh	DMA 8237-2
00E0h - 00FFh	Empty
0100h - 0101h	GPCS1 default setting address
0170h - 0177h	IDE1 (IRQ 15)
01F0h - 01F7h	IDE0 (IRQ 14)
0278h - 027Fh	Printer port (IRQ 7, DMA 0)
02E8h - 02EFh	COM4 (IRQ 11)
02F8h - 02FFh	COM2 (IRQ 3)
0376h	IDE1 ATAPI device control write only register
03E8h - 03Efh	COM3 (IRQ 10)
03F0h - 03F7h	Floppy Disk (IRQ 6, DMA 2)
03F6h	IDE0 ATAPI device control write only register
03F8h - 03FFh	COM1 (IRQ 4)
0480h - 048Fh	DMA High page register
0490h - 0499h	Instruction counter register
04D0h - 04D1h	8259 Edge,/ level control register
0CF8h - 0CFFh	PCI configuration port
D400h - D4FFh	on board LAN
FC00h - FC05h	SPI Flash BIOS control register
FC08h - FC0Dh	External SPI BUS control register (output pin configurable GPIO3[0-3])

B.2 1st MB Memory Address Map

Memory Address	Description
0000:0000-9000:FFFF	System RAM
A000:0000-A000:FFFF	EGA/VGA Video Memory
B000:0000-B000:7FFF	MDA RAM, Hercules graphics display RAM
B000:8000-B000:FFFF	CGA display RAM
C000:0000-C000:7FFF	EGA/VGA BIOS ROM
C000:8000-C000:FFFF	Boot ROM enable.
D000:0000-D700:FFFF	Expansion ROM space.
D800:0000-DB00:FFFF	SPI FLASH Emulation Floppy A Enable
DC00:0000-DF00:FFFF	Expansion ROM space.
E000:0000-E000:FFFF	USB Legacy SCSI ROM space.
F000:0000-F000:FFFF	Motherboard BIOS

B.3 IRQ Mapping Chart

IRQ0	System Timer
IRQ1	Keyboard Controller
IRQ2	Cascade for IRQ8 - 15
IRQ3	Serial Port 2
IRQ4	Serial Port 1
IRQ5	USB / Ethernet 10/100M LAN
IRQ6	USB
IRQ7	Parallel Port
IRQ8	Real Time Clock
IRQ9	Available
IRQ10	Serial Port 3

IRQ11	Serial Port 4
IRQ12	Mouse
IRQ13	Math Coprocessor
IRQ14	Hard Disk Controller#1
IRQ15	USB

B.4 DMA Channel Assignments

DMA Channel	Function
0	Available
1	Available
3	Available
5	Available
6	Available
7	Available

Appendix

C

Mating Connector

B.1 List of Mating Connectors and Cables

The table notes mating connectors and available cables.

Connector Label	Function	Mating Connector		Available Cable	AAEON Cable P/N
		Vendor	Model no		
CN1	2P Power Connector	N/A	N/A	Power cable(option)	1702002010
CN2	Front Panel Connector	Molex	Molex 51021-0800	LAN LED Cable	1701080150
CN3	Front Panel Connector	Molex	Molex 51021-1000	Front Panel Cable	1701010150
CN4	JTAG Connector	CATCH	2.00mm Pitch 8 pins (CATCH H754-2x4 or compatible)	N/A	N/A
CN5	COM port Connector	CATCH	2.00mm Pitch 40 pins (CATCH H754-2x20 or compatible)	COM port Cable	1701400205
CN6	TTL LCD Connector	Hirose	1.25mm Pitch 40 pins (CATCH H716 or compatible)	LCD Cable	N/A
CN8	PS2 Keyboard/ Mouse Connector	CATCH	(CATCH MD-6PS or compatible)	Keyboard & Mouse Cable	1700060152
CN9	4P power Connector	Ever	2542H-04	N/A	N/A
VGA1	VGA Display Connector	CATCH	2.00mm Pitch 16 pins (CATCH H754-2x8 or	CRT Cable	1701160201

			compatible)		
IDE1	IDE Connector	CATCH	2.00mm Pitch 44 pins (CATCH H754-2x44 or compatible)	IDE Cable	1701440500
USB1	USB Connector	CATCH	2.00mm Pitch 8 pins (CATCH H754-2x4 or compatible)	USB Cable	1709100201
USB2	USB Connector	CATCH	2.00mm Pitch 8 pins (CATCH H754-2x4 or compatible)	USB Cable	1709100201
LPT1	LPT Port Connector	CATCH	2.00mm Pitch 26 pins (CATCH H754-2x13 or compatible)	Parallel Port Cable	1701260201
BAT1	Battery Connector	Molex	Molex 51021-0200	Battery CR2032	175011901C
LAN1	Ethernet Connector	CATCH	2.00mm Pitch 10 pins (CATCH H754-2x5 or compatible)	Ethernet Cable	1700100201
LAN2	Ethernet Connector	CATCH	2.00mm Pitch 10 pins (CATCH H754-2x5 or compatible)	Ethernet Cable	1700100201