

**104-1646CLD2N**  
**PC104 motherboard with**  
**CPU/memory and**  
**LVDS/VGA/DOM/LAN**  
**ports**

**Version: A0**

## **Copyright Notice**

Information offered in this manual is believed to be correct at the time of printing, and is subject to change without prior notice in order to improve reliability, design and function and does not represent a commitment on the part of the manufacturer. In no event will the manufacturer be liable for direct, indirect, special, incidental, or consequential damages arising out of improper installation and/or use, or inability to use the product or documentation.

This user manual is protected by copyright. No part of this manual may be reproduced, stored in any retrieval system, or transmitted, in any form or by any means, mechanical, electronic, photocopied, recorded or otherwise, without the prior written permission from the manufacturer.

### **Trademarks**

EVOC is a registered trademark of EVOC Intelligent Technology Co., Ltd. Other product names mentioned herein are used for identification purposes only and may be trademark and/or registered trademarks of their respective companies.

## Safety Notes

---

1. Read the instruction manual carefully before using this product;
2. Any board or card not ready to be installed shall be kept in the anti-static packaging;
3. Before taking a board or card from its anti-static packaging, put hands on a grounded metal object for a while (about 10 seconds) to eliminate static on your body;
4. While holding a board or card, it is important to wear anti-static gloves; make a habit of holding a board or card by the edge;
5. When inserting to or removing from or re-configuring boards, it is imperative to turn off the direct current power supply or disconnect the power cord from the power socket, to prevent electric shocks to users or damage to products;
6. When removing the boards or PCs, it is imperative to disconnect the DC power cord from the socket beforehand:
7. It is imperative to switch off the DC power supply, in advance of any addition or removal of boards from the PC;
8. Make sure the power supply is unplugged before connecting or disconnecting any device;
9. Have an interval of at least 30 seconds before restarting the computer, to prevent damage by excessively frequent activation or shutting-down.

# Contents

---

Chapter 1 Introduction.....	1
Overview .....	1
Ordering Information .....	1
Environment and Dimensions .....	1
Typical Power Consumption .....	2
Micro-processor.....	2
Chipset.....	2
Memory .....	2
Display Function .....	2
Network Function.....	2
Expansion Bus Connector .....	3
I/O Ports .....	3
Power Supply .....	3
Watchdog Timer .....	3
Chapter 2 Installation Instructions.....	4
Dimensions Drawing.....	4
Schematic Diagram of I/O Interfaces .....	5
Jumper Settings .....	6
Serial Port.....	7
Parallel Port .....	8
Network Connector .....	9
Display Connector.....	9
USB Connector.....	11
Multi-functional Connector .....	11

DOM SSD .....	12
IDE Connector .....	12
Power Supply Connector .....	13
PC104 Connector .....	14
Chapter 3 BIOS Setup .....	16
Appendix.....	17
Watchdog Programming Instructions.....	17
I/O Port Address Map .....	21
IRQ Interrupt Distribution Diagram.....	22

## Chapter 1

### Introduction

---

#### Overview

104-1646CLD2N is a low-power PC/104-architecture motherboard for embedded industrial computer. It offers low-power AMD LX800 CPU and 256MB DDR onboard memory. It supports VGA/LVDS/LCD display and delivers 1 x PC104 expansion port, 2 x 10/100 Mbps network port, 1 x IDE port, 1 x DOM port, 2 x serial port, 2 x USB2.0 port, 1 x multi-functional port (to link the keyboard, mouse, buzzer and reset key) and watchdog timer.

This motherboard adopts AMD high-performance Geode LX800 CPU, which the delivers 500MHz working frequency and low power consumption. The CPU does not need a fan, therefore eliminating the possibility of fan-induced faults. The motherboard features high integration and full functionality, suitable for use in various embedded systems.

#### Ordering Information

Model	Description
104-1646CLD2N	PC104 motherboard with CPU/memory and LVDS/VGA/DOM/LAN ports

#### Environment and Dimensions

Dimensions: 95.89 mm x 90.17 mm

Operating Temperature: 0°C ~ +60°C,

extendable TA: -15 degree ~ 60 degree

TB: -30 degree ~ 65 degree TC: -40 degree ~ 85 degree

Relative Humidity: 5% ~ 90%, non-condensing

### **Typical Power Consumption**

CPU: AMD LX800/500MHz      Memory: NANYA DDR 256MB

- +5V@1A +5%/-3%

### **Micro-processor**

Onboard AMD LX800 500MHz BGA481 CPU, compatible with LX700 and LX900

### **Chipset**

AMD LX800 + AMD CS5536AD

### **Memory**

Onboard 256MB DDR memory, supporting up to 2GB

### **Display Function**

Integrated with LX800, supporting VGA, 18/24-bit TFT LCD and LVDS display.

### **Network Function**

2 x 10/100Mbps Ethernet controller

## Expansion Bus Connector

1 x PC104 connector

## I/O Ports

- 2 x serial port (among them, COM2 supports selection of RS-232/RS-485 mode)
- 1 x multi-functional connector (to link the keyboard, mouse, buzzer and reset key)
- 1 x parallel port
- 1 x IDE connector
- 1 x DOM connector
- 2 x USB port

## Power Supply

+5V AT power supply

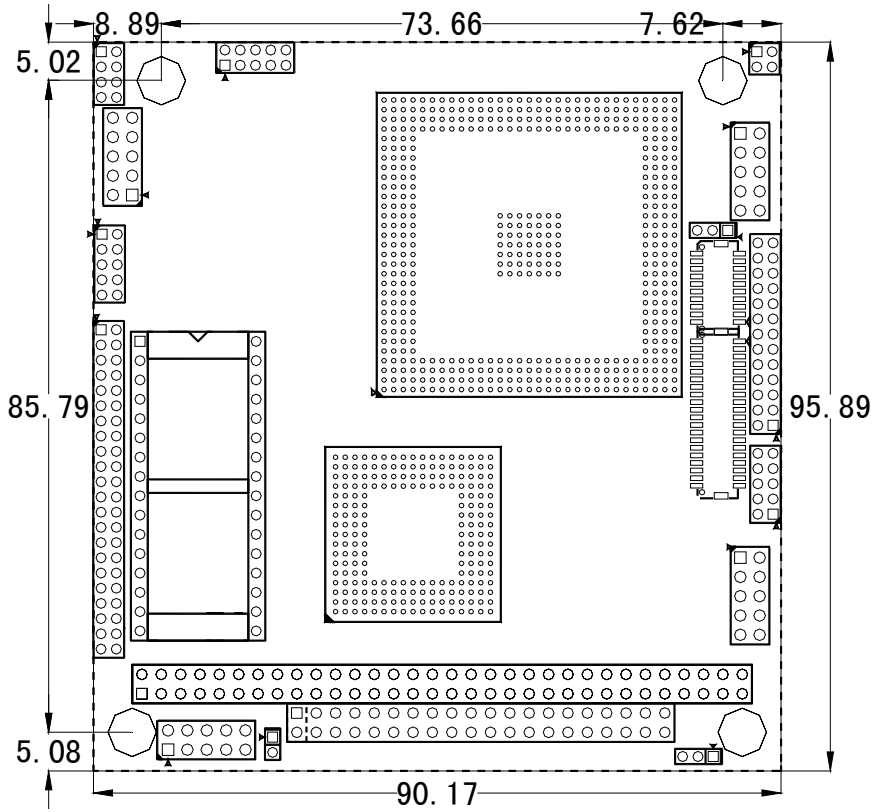
## Watchdog Timer

- Software programmable supports 1-255 sec. /min.
- System reset/interrupt
- Down Counter by the second/minute

## Chapter 2

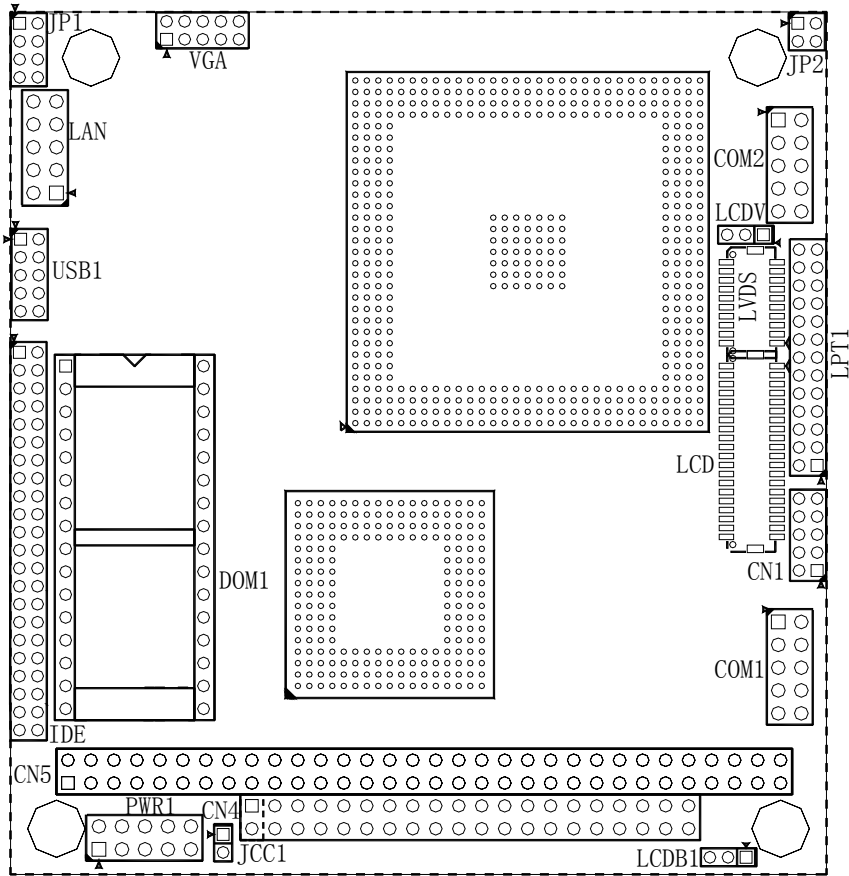
### Installation Instructions

#### Dimensions Drawing



Unit: mm

### Schematic Diagram of I/O Interfaces



## Jumper Settings

### 1. JCC1: CMOS setup

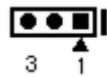


JCC1

Setting	Function
1-2 open	normal operating status (Default)
1-2 short	clearing CMOS content, all BIOS settings restored to be values set at the factory

### 2. LCDV: selecting the LCD operating voltage

The voltage of different LCD screens could vary and this board offers 2 voltage levels for choice: 3.3V and 5V. Only when the selected voltage is the same as the voltage in use, can the display be normal.



LCDV

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

### 3. LCDB1: selecting the voltage of LCD backlight



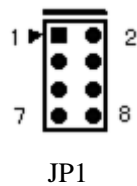
Setting	Function
1-2 short	+12V(Default)
2-3 short	+5V

#### 4. JP2: selecting COM2 RS-232/485 mode



Mode	Pin Setting	
	1-2	3-4
RS-232	ON (Default)	OFF
RS-485	OFF	ON

#### 5. JP1: DOM SSD DMA/PIO mode, master/slave selection and write-protect



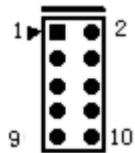
Mode	Pin Setting			
	1-2	3-4	5-6	7-8
DMA mode	ON	ON	N/A	N/A
PIO mode(default)	OFF	OFF	N/A	N/A
Master	N/A	N/A	ON	N/A
Slave(default)			OFF	
Write-protect	N/A	N/A	N/A	ON
				OFF(default)

**Note:** Unlike CF cards, one ADC supports just a set mode (PIO or DMA mode), 1-2 and 3-4 are for DMA-mode ADC (PIO mode needs disconnection of 1-2 and 3-4), and 5-6 and 7-8 are for PIO-mode ADC (DMA mode needs the disconnection of 5-6 and 7-8).

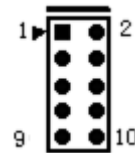
#### Serial Port

COM1 and COM2 are a set of 2 x 5-pin serial port contact pins. COM2 can be used to set up the jumper JP2 for the selection of RS-232 and

RS-485. The ports can be linked to a standard socket for further connection with the mouse, modems, digital camera and other devices that are with standard ports.



COM1

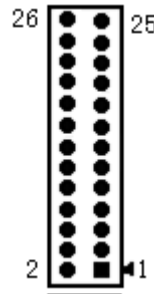


COM2

Pin	Signal	Pin	Signal
1	DCD1	2	DSR1
3	RXD1	4	RTS1
5	TXD1	6	CTS1
7	DTR1	8	RI1
9	GND	10	NC
Pin	Signal		
	RS-232	RS-485	
1	DCD2	RTX-	
2	DSR2	RTX+	
3	RXD2	/	
4	DTR2	/	
5	TXD2	/	
6	CTS2	/	
7	RTS2	/	
8	RI2	/	
9	GND	/	
10	NC	/	

### Parallel Port

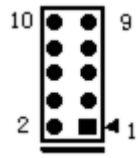
The board offers a 2 x 23-pin parallel port (LPT1) to link peripherals with parallel ports. The following table offers the pin definitions.



Pin	Signal	Pin	Signal
1	STB#	2	AFD#
3	PD0	4	ERR#
5	PD1	6	INIT#
7	PD2	8	SLIN#
9	PD3	10	GND
11	PD4	12	GND
13	PD5	14	GND
15	PD6	16	GND
17	PD7	18	GND
19	ACK#	20	GND
21	BUSY	22	GND
23	PE	24	GND
25	SLCT	26	NC

### Network Connector

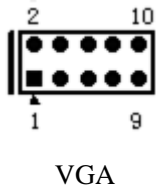
The board offers a 2 x 5-pin network contact pin, which can link two 10/100Mbps network ports with a transfer cable.



Pin	Signal	Pin	Signal
1	LAN1_TX+	2	LAN1_TX-
3	LAN1_RX+	4	NA
5	NA	6	LAN1_RX-
7	LAN2_RX+	8	LAN2_RX-
9	LAN2_TX+	10	LAN2_TX-

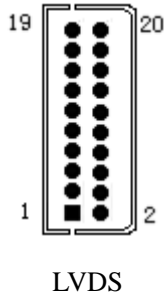
### Display Connector

#### 1. VGA connector



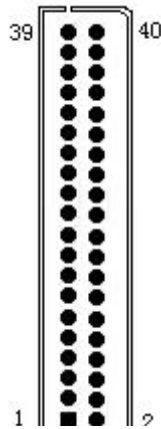
Pin	Signal	Pin	Signal
1	VSYNC	2	HSYNC
3	DDCDATA	4	Red
5	DDCCLK	6	Green
7	CRT_5V	8	Blue
9	GND	10	GND

## 2. LVDS connector



Pin	Signal	Pin	Signal
1	LVDS_D0	2	LVDS_D0-
3	GND	4	GND
5	LVDS_D1	6	LVDS_D1-
7	GND	8	GND
9	LVDS_D2	10	LVDS_D2-
11	GND	12	GND
13	CLK+	14	CLK-
15	GND	16	GND
17	LVDS_D3	18	LVDS_D3-
19	VDD	20	VDD

## 3. LCD connector

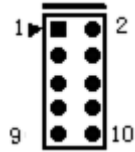


Pin	Signal	Pin	Signal
1	VDD	2	VDD
3	GND	4	ENAVEE
5	GND	6	GND
7	B1	8	B0
9	B3	10	B2
11	B5	12	B4
13	B7	14	B6
15	G1	16	G0
17	G3	18	G2
19	G5	20	G4
21	G7	22	G6

LCD

23	R1	24	R0
25	R3	26	R2
27	R5	28	R4
29	R7	30	R6
31	GND	32	GND
33	VSYNC	34	CLK
35	HSYNC	36	DE
37	GND	38	ENAVDD
39	GND	40	VCON

### USB Connector

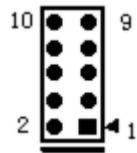


USB

Pin	Signal	Pin	Signal
1	+5VUSB1	2	+5VUSB2
3	USB1_Data-	4	USB2_Data-
5	USB1_Data+	6	USB2_Data+
7	GND	8	GND
9	NC	10	GND_CHASSIS

### Multi-functional Connector

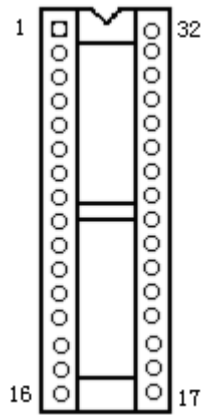
CN1 is a multi-functional 2 x 5-pin contact pin to link the keyboard, mouse, and buzzer and reset key. The following table offers the pin definitions.



CN1

Pin	Signal	Pin	Signal
1	SPEAK-	2	+5V
3	Reset	4	GND
5	Keyboard Data	6	Keyboard Clock
7	GND	8	Mouse Clock
9	+5V	10	Mouse Data

## DOM SSD

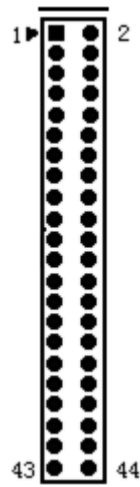


DOM1

Pin	Signal	Pin	Signal
1	RESET#	32	+5V
2	D7	31	D8
3	D6	30	D9
4	D5	29	D10
5	D4	28	D11
6	D3	27	D12
7	D2	26	D13
8	D1	25	D14
9	D0	24	D15
10	DMARQ/WP#	23	IOWR#
11	IORD#	22	DMACK/CSEL
12	IRQ	21	IOCS16
13	A1	20	ATA66_DET
14	A0	19	A2
15	CS1FX#	18	CS3FX#
16	GND	17	DASP#

## IDE Connector

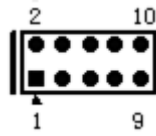
This board offers 2 x 22-pin IDE contact pin. When installing the IDE device, note that an IDE connector can link 2 IDE devices: one is the master device, and the other is the slave device. Follow the right connecting method: the primary device is connected to the end of the cable and the slave device should be connected the middle of the cable. (The first pin of IDE cable is marked red.)



IDE

Pin	Signal	Pin	Signal
1	RESET#	2	GND
3	D7	4	D8
5	D6	6	D9
7	D5	8	D10
9	D4	10	D11
11	D3	12	D12
13	D2	14	D13
15	D1	16	D14
17	D0	18	D15
19	GND	20	Key
21	DREQ	22	GND
23	IOW#	24	GND
25	IOR#	26	GND
27	IRDY	28	GND
29	DACK#	30	GND
31	IRQ	32	NC
33	DA1	34	ATA66_DET
35	DA0	36	DA2
37	CS1#	38	CS3#
39	LED#	40	GND
41	+5V	42	+5V
43	GND	44	GND

### Power Supply Connector

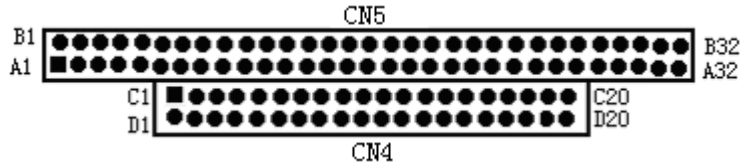


PWR1

Pin	Signal	Pin	Signal
1	GND	2	+5V
3	NC	4	+12V
5	-5V	6	-12V
7	GND	8	+5V

9	GND	10	+5V
---	-----	----	-----

### PC104 Connector



Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	IOCHCK#	B1	GND	C1	GND	D1	GND
A2	SD7	B2	RESET	C2	SBHE#	D2	MEMCS16#
A3	SD6	B3	+5V	C3	LA23	D3	IOCS16#
A4	SD5	B4	IRQ9	C4	LA22	D4	IRQ10
A5	SD4	B5	-5V	C5	LA21	D5	IRQ11
A6	SD3	B6	DRQ2	C6	LA20	D6	IRQ12
A7	SD2	B7	-12V	C7	LA19	D7	IRQ15
A8	SD1	B8	SRDY#	C8	LA18	D8	IRQ14
A9	SD0	B9	+12V	C9	LA17	D9	DACK0#
A10	IOCHRDY	B10	KEY	C10	MEMR#	D10	DRQ0
A11	AEN	B11	SMEMW#	C11	MEMW#	D11	DACK5#
A12	SA19	B12	SMEMR#	C12	SD8	D12	DRQ5
A13	SA18	B13	IOW#	C13	SD9	D13	DACK6#
A14	SA17	B14	IOR#	C14	SD10	D14	DRQ6
Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A15	SA16	B15	DACK3#	C15	SD11	D15	DACK7#
A16	SA15	B16	DRQ3	C16	SD12	D16	DRQ7
A17	SA14	B17	DACK1#	C17	SD13	D17	+5V
A18	SA13	B18	DRQ1	C18	SD14	D18	MASTER#
A19	SA12	B19	REFRESH#	C19	SD15	D19	GND
A20	SA11	B20	BCLK	C20	KEY	D20	GND

A21	SA10	B21	IRQ7				
A22	SA9	B22	IRQ6				
A23	SA8	B23	IRQ5				
A24	SA7	B24	IRQ4				
A25	SA6	B25	IRQ3				
A26	SA5	B26	DACK2#				
A27	SA4	B27	TC				
A28	SA3	B28	BALE				
A29	SA2	B29	+5V				
A30	SA1	B30	OSC				
A31	SA0	B31	GND				
A32	GND	B32	GND				

## Chapter 3

### BIOS Setup

---

For more information about BIOS setup of the motherboard, please refer to our *AMI BIOS Setup Guide*.

## Appendix

---

### Watchdog Programming Instructions

This motherboard provides a watchdog timer (WDT) which is programmable supports 1-255 sec. /min. system reset/interrupt. By programming, WDT timeout event can reset the system and generate a maskable interrupt. The following describes the WDT programming by the C programming language. Please note that before operating WDT, it is necessary to enter WDT programming mode and exit WDT after operating.

The programming for WDT should follow the following steps:

Enter WDT programming mode.

Set up the WDT working mode/start WDT/close WDT.

Exit WDT programming mode.

It is necessary to include the following files:

```
#include <stdio.h>
```

```
#include <dos.h>
```

```
#include <bios.h>
```

```
#include <stdlib.h>
```

```
#include <string.h>
```

**(1) Enter WDT programming mode, and get pm BASE. The setup of watchdog is in pm\_base+offset register.**

```
outportb(0x2e,0x55); // enter WDT programming mode and write 0x55 in  
INDEX PORT
```

```
//INDEX PORT [4e], DATA PORT[4F]
```

```

        // INDEX is read into the register, DATA writes
        data into the register
outputb(0x2e,0x07); //reg0X07, to select logic device
outputb(0x2f,0x0A); //select logic deviceA,
outputb(0x2e,0x30); //reg0x30, the device enables the register, 0=disable,
1=enable
outputb(0x2f,0x01); //enable deviceA
unsigned int base_addr;
outputb(0x2e,0x60); //reg60,get high base from this register
base_addr=inportb(0x2f); //and save to global VAR pm_Base
pm_base=base_addr;

outputb(0x2e,0x61); //reg61,get low base from this register
base_addr=inportb(0x2f); //and save to global VAR pm_Base
pm_base=pm_base<<8;

pm_base=pm_base+base_addr;

#define WRITEREG(reg,val) {tmp_reg=pm_base+reg;
outputb(tmp_reg,val);}
    
```

## (2) Set WDT on reset mode or interrupt mode:

### a. Set WDT on reset mode

```

WRITEREG(0x47,0x0c)
    /* pm_base+offset 0x47
    register 0x47
    
```

bit[0]in/out: 1=input,0=output  
 bit[1]polarity:1=invert ,0=no invert  
 bit[3:2]Alternate Function Select  
 11=WDT  
 10=Either Edge Triggered Interrupt Input  
 01=LED1  
 00=GPIO  
 bit[6:4] Reserved  
 bit[7] Output Type Select  
 1=Open Drain  
 0=Push Pull  
 \*/

**b. Set WDT on interrupt mode**

```

irq=irq<<4;
WRITEREG(0x47,0x80)    // pm_base+offset  0x47
WRITEREG(0x67,irq)    // pm_base+offset  0x47
/*
register 0x67
bit[7:4]WDT interrupt Mapping
1111=IRQ 15
.....
0011=IRQ3
0010=IRQ2
0001=IRQ1
0000=Disable
*/
    
```

And IRQ\_RESOURCE =0: No interrupt is allowed.

**(3) Set WDT on timing by the minute or by the second:**

**a. To set WDT on timing by the minute, use the following:**

Assume the WDT to be in the programming status.

```
WRITEREG(0x65,0)
    /*
    pm_base+offset  0x65
    register 0x65,Watch Dog  timeout
    bit[7]WDT timeout value Unit Select
    0=MINutes(default)
    1=Seconds
    */
```

**b. To set WDT on timing by the second, use the following:**

Assume the WDT to be in the programming status.

```
WRITEREG(0x65,0x80)
```

**(4) Start/disable WDT**

Assume the WDT to be in the programming status.

```
WRITEREG (0x66, TIME-OUT-VALUE)  ;// pm_base+offset  0x66
                                   //write in the preset time
                                   TIME-OUT-VALUE
```

Note: TIME-OUT-VALUE ranges from 1 to 255. And the timing unit is the minute or second. If TIME-OUT-VALUE is 0, WDT is disabled.

TIME-OUT-VALUE is a any value other than 0, WDT will be actuated.

**(5) Exit WDT programming mode**

```
Outportb (0x2e, 0x00);
```

## I/O Port Address Map

The diagram below shows parts of the distribution of the I/O address to the devices. Some I/O addresses are not in use or can be disabled by BIOS. Avoid the use of common I/O addresses when developing expansion boards.

Address	Device
000h-01Fh	DMA controller #1
020h-03Fh	Programmable interrupt controller #1
040h-05Fh	System timer
060h-06Fh	Standard 101/102 keyboard controller
070h-07fh	System CMOS/real time clock
080h-09Fh	DMA controller#2
0A0h-0BFh	Programmable interrupt controller #2
0C0h-0DFh	DMA controller #3
0E0h-0FFh	Numerical data processor
1F0h-1F7h	Master IDE channel
274h-279h	ISAPNP read data port
2F8h-2FFh	Serial port#2
378h-37Fh	Parallel port#1
3B0h-3DFh	VGA controller
3F0h-3F5h	Standard floppy disk controller
3F6h	Master IDE channel
3F7h	Standard floppy disk controller
3F8h-3FFh	Serial Port#1

**IRQ Interrupt Distribution Diagram**

Setting	Function
IRQ0	System timer
IRQ1	Standard 101/102 keyboard or Microsoft keyboard
IRQ2	Reserved
IRQ3	Serial port#1
IRQ4	Serial port#2
IRQ5	ISACAN1
IRQ6	Standard floppy disk controller
IRQ7	ISACAN2
IRQ8	System CMOS/real time clock
IRQ9	Microsoft ACPI-compatible system
IRQ10	Enhanced PCI-to-USB host computer controller
IRQ11	High-speed Ethernet port
IRQ12	PS/2 compatible mouse port
IRQ13	Numerical data processor
IRQ14	Master IDE
IRQ15	Reserved