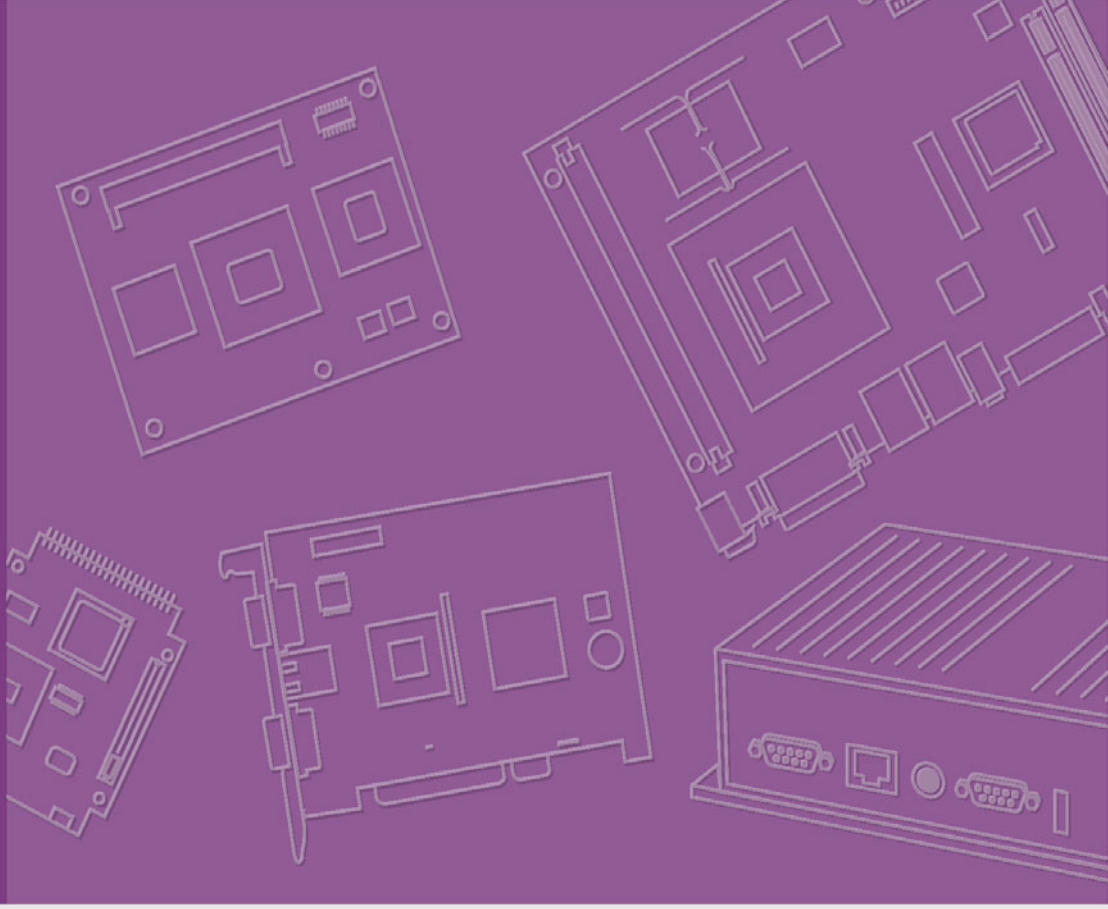

User Manual

PCM-4373

Trusted ePlatform Services

ADVANTECH

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Declaration of Conformity

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x PCM-4373 SBC
- 1 x Startup manual
- 1 x Utility CD
- 1 x mini jumper pack (PN: 9689000002)
- 1 x CABLE USB*2/10-2.0 mm 29 cm (PN: 1700001267)
- 1 x FLAT Cable 50P 20 cm 3Com & LPT 1.27 mm to D-sub (PN: 1700002034)
- 1 x Cable 20P/10P EPIC ATX POWER 10 cm (PN: 1700002055)
- 1 x Cable 2*4P/10P EPIC AT POWER 15 cm (PN: 1700003931)
- 1 x CABLE 6P-6P-6P 20 cm PS/2 KB & MOUSE 20cm (PN: 1700060202)
- 2 x CABLE SERIAL ATA 7P/7P 30 cm (PN: 1700008894)
- 1 x Audio Cable IDC-10P 2.0 mm 15 cm (PN: 1700008902)

Ordering Information

PCM-4373L-J0A1E

AMD GX3 w/ 1 LAN/LVDS/0 GPIO /4 COM/4 USB/2 SATA,

AMD Lx800 chipset, 128 KB L2 cache, 1 x 10/100 LAN, 24 bit TTL, 1 x VGA, 4 x USB2.0, 2 x RS-232, 2 x RS-232/422/485, 1 x LPT, 1 x CF, 2 x SATA, 1 x PC/104 Plus (0 ~ 60° C), passive thermal solution

PCM-4373F-J0A1E

Base PCM-4373L-J0A1E,w/2 LAN/16 GPIO/6 COM/Audio

AMD Lx800 chipset, 128 KB L2 cache, 2 x 10/100 LAN, 18 bit LVDS, 1 x VGA, 4 x USB2.0, 4 x RS-232, 2 x RS-232/422/485, 16 bit GPIO, 1 x LPT, 1 x CF, 2 x SATA, Audio, 1 x PC/104 Plus (0 ~ 60° C), passive thermal solution

Optional Accessories

1701200220	Cable for 2COM ports 20P 22 cm
1703150102	Wire BIG4P/Series ATA power 15P 10 cm module
1703040157	Wire RS-422/485 4P to D-SUB 15 cm

Contents

Chapter 1

General Introduction

This chapter gives background information on PCM-4373.

Sections include:

- Introduction
- Specifications

1.1 Introduction

- EPIC form factor (115 mm x 165 mm)
- AMD Geode™ LX800 processor, up to 500 MHz
- Total system power consumption under 10W.
- Up to 1 GB DDR SDRAM (supports FSB 266/333/400 MHz),1 x 200-pin
- Display Combination: CRT+ 18 bit LVDS or CRT+ 24bit TTL
- Dual 10/100 Mbps Ethernet
- Supports ATX/ AT power modes (5 V only bootup)
- Supports 1 x PC/104 Plus (PCI +16 bit ISA)
- Supports 4 x USB 2.0, 2 x SATA
- Supports 6 x COM (4 x RS232, 2 x RS232/422/485) or 4 x COM (2 x RS232, 2 x RS232/422/485)
- Optional 16-bit GPIO and AC97 audio supported (PCM-4373F-J0A1E)

1.2 Specifications

General

- **CPU:** AMD Geode™ LX800 processor, up to 500 MHz
- **2nd Cache Memory:** 128 KB
- **System Chipset:** AMD Geode™ LX800 + CS5536
- **BIOS:** Award 4Mb LPC BIOS
- **System Memory:** 1 x 200-pin SODIMM DDR FSB 266/333/400, up to 4GB
- **Power Management:** APM1.2, ACPI support
- **Watchdog Timer:** 255-level interval timer, setup by software, Super I/O integrated, SMSC Controller
- **Expansion Interface:** Supports 1 x PC/104 Plus (PCI +16 bit ISA)
- **Battery:** Lithium 3 V / 196 mAH

1.3 Chipset

1.3.1 Functional Specification

1.3.1.1 Processor

- Supports AMD Geode™ LX800 processor, up to 500 MHz
- 128 KB L2 cache
- Supports DDR 266, 333 and 400 MHz

1.3.1.2 Chipset (LX800)

North Bridge	
Controller Hub	AMD Geode LX800
Display	VGA TTL (24 bit) LVDS (18 bit) Choose National Semiconductor DS90CF363B (Advantech P/N#1410000626)) for 18bit single channel LVDS TTL and LVDS can display using same BIOS
Features	CRT resolutions supported: Supports up to 1920x1440x32 bpp at 85 Hz Supports up to 1600x1200x32 bpp at 100 Hz LVDS resolutions supported: Supports VGA, SVGA, XGA and Dual Pixel SXGA. TTL supported: Standard Definition (SD) resolution for Video Output Port (VOP): 720 x 482 at 59.94 Hz interlaced for NTSC 768 x 576 at 50 Hz interlaced for PAL High Definition (HD) resolution for Video Output Port (VOP): Up to 1920 x 1080 at 30 Hz interlaced (1080i HD) (74.25 MHz) Up to 1280 x 720 at 60 Hz progressive (720p HD) (74.25 MHz) Supports down to 7.652 MHz Dot Clock (320 x 240 QVGA) Hardware supported 48 x 64 32-bit cursor with alpha blending
PCI Compliant	PCI 2.2 compliant 3.3 V signaling and 3.3 V I/Os 33 MHz operation 32-bit interface Supports virtual PCI headers for GeodeLink devices
Security Block	Serial EEPROM interface for 2K bit unique ID and AES (Advanced Encryption Standard) hidden key storage (EEPROM optional inside package) Electronic Code Book (ECB) or Cipher Block Chaining (CBC)128-bit AES hardware support True random number generator (TRNG)

1.3.1.3 Chipset (CS5536)

South Bridge	
Controller Hub	AMD CS5536
Package	208-Terminal PBGA (plastic ball grid array) package with internal heatspreader
GeodeLink PCI Interface (South Bridge)	AMD Geode CS5536 supports. Provides a PCI interface for GeodeLink Devices: — PCI specification v2.2 compliant — 32-Bit, 33 MHz operation — Capable of handling in-bound transactions immediately after reset - no setup — Mapping of PCI virtual configuration space to MSR space is done completely in Virtual System Architecture (VSA) code — Serialized processor control interface
LPC (Low Pin Count) Interface	AMD Geode CS5536 supports. — Based on Intel LPC Interface specification v1.0 — Serial IRQ support — Serial DMA support (8-bit only) — Boot source typically off external LPC — Supports firmware hub protocol — External bus masters not supported
PCI Bus	PCI masters 10/100 LAN1 (RTL8100CL-LF) 10/100 LAN2 (RTL8100CL-LF)
Other Feature	4 USB 2.0 ports 2 Serial ATA (150MB/s) (Not support RAID function) Power Management LPC interface to Flash BIOS 6 COM ports, 4 x COM: RS-232; 2 x COM : RS-232/422/485 Signal (Support Auto flow control) (Support via SMSC 3114 + Fintek 81216DG) (Limitation: Under CE can support 6 COM ports but need to choose close one IRQ device)

1.3.1.4 Others (Chipset)

Display	
Chipset	AMD Geode LX800
Dual independent display	NA
Video Processor & Integrated Analog Display	AMD Geode LX800 supports. Supports video scaling, mixing and VOP Graphics/video alpha blending and color key muxing Digital VOP (SD and HD) or TFT outputs VESA 1.1, 2.0 and BT.601 24-bit (out only), BT.656 compliant Integrated Dot Clock PLL with up to 350 MHz clock Integrated 3 x 8-bit DAC with up to 350 MHz sampling
VGA	Analog CRT DAC interface support CRT resolutions supported: Supports up to 1920 x 1440 x 32 bpp at 85 Hz Supports up to 1600 x 1200 x 32 bpp at 100 Hz
LVDS	18-bit (convert from TTL via NS DS90CF363B) 18 to 68 MHz shift clock support Supports VGA, SVGA, XGA and Dual Pixel SXGA. Compatible with TIA/EIA-644 LVDS standard
TTL	It supports panels up to a 24-bit interface and up to 1600 x 1200 resolution.
Internal Graphics Features	2D Graphics Processor High performance 2D graphics controller Alpha BLT Microsoft Windows GDI GUI acceleration: — Hardware support for all Microsoft RDP codes Command buffer interface for asynchronous BLTs Second pattern channel support Hardware screen rotation New features added to the Graphics Processor include: Command buffer interface Hardware accelerated rotation BLTs Color depth conversion Paletized color Full 8x8 color pattern buffer Separate base addresses for all channels Monochrome inversion
LAN	
Chipset	LAN 1 / LAN 2: Realtek RTL8100CL-LF
IEEE Compliant	full compliance with IEEE 802.3 u 100BASE-T and IEEE 802.3 x full duplex flow control. 32-bit PCI Ethernet controller.
LAN LED	LED1: Green for 10M/100M LAN
	LED2: Off for Link, flash for active,
Disable LAN through BIOS	Yes
Wake on LAN	Yes
Boot from LAN	Yes
LED connector	Yes

Audio	
Chipset	AC97 Audio
Codec	ALC203
Rear panel output	Line-In, Line-out, Mic-In
Amplifier	NA
Hardware Monitor	
Chipset	LPC I/O for onboard alarm
	SMSC3114
Temperature	CPU Temperature
Voltage	2.5 V, Vcore, 12 V, 5 V
Super I/O	
Chipset	SMSC3114
Fan speed monitor	Yes
Temperature	Yes
Features	LPC interface 4 full function serial ports watch dog timer Hardware Monitoring – Thermal Sensing :2 external, 1 internal – (7) Voltage Monitoring Infrared port: IrDA 1.0 compliant

1.3.2 Mechanical Specification

1.3.2.1 Dimension (mm)

115 mm (L) x 165 mm (W) (4.5" x 6.5")

1.3.2.2 Height on Top (mm)

9.8 mm (Heatsink)

1.3.2.3 Height on Bottom (mm)

9.2 mm (SODIMM Socket)

1.3.2.4 Cooler Dimension (mm)

39.6 x 39.5 x 9.8 mm (Heatsink)

1.3.2.5 Weight (g) with Cooler

110 g

1.3.3 Electrical Specification

1.3.3.1 Power Supply Voltage

Power	Power Type	AT/ATX
	Power Supply Voltage	ATX: +5 V ± 5%,+5 Vsb to work (±12 V ± 5% optional for LCD inverter and add on card.) AT: +5 V ± 5% (±12 V ± 5% optional for LCD inverter and add on card.)
	Power Management	APM, ACPI
	Battery	Lithium 3 V/196 mAH

1.3.3.2 Power Supply Current

Test Conditions

:

OS - WindowsXP SP2

Add-in Card - None

CF Card - None

MiniPCI Card - None

HDD - 160GB SATA *1

BIOS - 4373V111.bin

KeyBoard/Mouse - USB or PS/2 Interface

Display - CRT

Memory 512MB

Apacer DDR 400 64MB X 8

ATX

CPU	Status	+V5	+V12	+V5SB
				0.02 A
AMD LX800	BIOS Picture	1.52 A	Unused	0.02 A
	DOS Idle	1.50 A	Unused	0.02 A
	Win Idle	1.45 A	Unused	0.02 A
	Win HCT12.0	1.72	Unused	0.02 A

+V5 maximum current: 1.85 A

AT

CPU	Status	+V5	+V12
AMD LX800	BIOS Picture	1.52 A	Unused
	DOS Idle	1.50 A	Unused
	Win Idle	1.45 A	Unused
	Win HCT12.0	1.72	Unused

+V5 maximum current: 1.9 A

1.3.3.3 RTC Battery

- Typical Voltage: 3.0 V
- Normal discharge capacity: 196 mAh3

1.3.4 Environmental Specification

1.3.4.1 Operating Temperature

The AMD® CPU LX800 is specified for proper operation temperature range of 40° C ~ +85° C.

The AMD CS5536 I/O Controller case temperature runs at a maximum of 95° C.

Operating temperature: 0 ~ 60° C (32 ~ 140° F)

1.3.4.2 Operating Humidity

Operating humidity: 0% ~ 90% relative humidity, non-condensing

1.3.4.3 Storage Temperature

Standard products (0 ~ 60° C)

Storage temperature: -20 ~ 70° C

1.3.4.4 Storage Relative Humidity

Standard products (0 ~ 60° C)

Relative humidity: 95% @ 60° C

Phoenix products (-20 ~ 80° C)

Relative humidity: 95% @ 60° C

Platinum Phoenix products (-40 ~ 85° C)

Relative humidity: 95% @ 60° C

Chapter 2

H/W installation

This chapter explains the setup procedures of the PCM-4373 hardware, including instructions on setting jumpers and connecting peripherals, switches, indicators and mechanical drawings.Be sure to read all safety precautions before you begin the installation procedure.

Sections include:

- Jumpers
- Connectors
- Mechanical

2.1 Jumpers

2.1.1 Jumper List

J1	AT Select
J2	DOTREF Select
J3	LVDS POWER Select
J4	CMOS Clear
J5	COM1 Mode Select
J6	COM2 Mode Select
J7	PCI VIO Select
J9	IrDA/COM2 Select

2.1.2 Jumper Settings

J1	**AT select**
Part Number	1653002101
Footprint	JH2X1V-2M
Description	PIN HEADER 2*1P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	AT Enable

J2	**DOTREF Select**
Part Number	1653002101
Footprint	JH2X1V-2M
Description	PIN HEADER 2*1P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	External
NL	Internal

J3	**LVDS Power Select**
Part Number	1653003101
Footprint	JH3X1V-2M
Description	PIN HEADER 3*1P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	5 V
(2-3)	3.3 V (Default)

J4	CMOS Clear
Part Number	1653003101
Footprint	JH3X1V-2M
Description	PIN HEADER 3*1P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	Disable (Default)
(2-3)	Clear

J5	COM1 Mode Select
Part Number	1653003260
Footprint	JH3X2S-2M
Description	PIN HEADER 3*2P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	232 (Default)
(3-4)	485
(5-6)	422

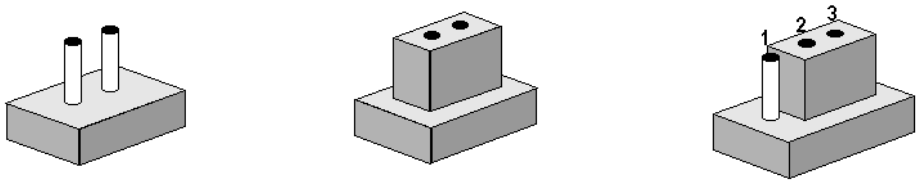
J6	COM2 Mode Select
Part Number	1653003260
Footprint	JH3X2S-2M
Description	PIN HEADER 3*2P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	232 (Default)
(3-4)	485
(5-6)	422
NL	IrDA

J7	PCI VIO Select
Part Number	1653003101
Footprint	JH3X1V-2M
Description	PIN HEADER 3*1P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	5 V (Default)
(2-3)	3.3 V

J9	IrDA/COM2 Select
Part Number	1653002101
Footprint	JH3X1V-2M
Description	PIN HEADER 3*1P 180D (M) 2.0 mm DIP SQUARE W/O Pb
Setting	**Function**
(1-2)	COM2
NL	IrDA

2.1.3 Jumper Description

Cards can be configured by setting jumpers. A jumper is a metal bridge used to close an electric circuit. 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.



The jumper settings are schematically depicted in this manual as follows.

Warning! *To avoid damaging the computer, always turn off the power supply before setting jumpers. Clear CMOS. Before turning on the power supply, set the jumper back to 3.0 V Battery On.*

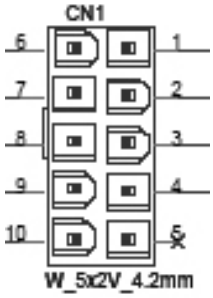
2.2 Connectors

2.2.1 Connector List

CN1	POWER connector
CN3	DDR SO-DIMM
CN5	FAN connector
CN7	GPIO1 connector
CN8	LAN1(RJ45)
CN9	LAN2(RJ45)
CN11	Compact Flash connector
CN13	HD & Power LED
CN14	Internal LVDS connector
CN16	CRT connector
CN18	USB0/1
CN19	KB/MS connector
CN20	USB2/3
CN21	COM1
CN22	AUDIO connector
CN25	PCI-104 connector
CN26	COM1 RS422/485 connector
CN30	COM2/3/4 & LPT
CN32	SATA1 connector
CN33	SATA2 connector
CN36	TTL LCD connector
CN37	SMBUS Connector
CN38	Panel Inverter Power
CN39	ATX POWER Button
CN41	COM5,6
CN43	COM2 RS422/485 connector
CN44	ISA -V5 Connector
CN46	GPIO2 Connector
CN53	BATTERY connector
CN54	IrDA Connector

2.2.2 Connector Settings

CN1: Power connectors



Main power connector, +3.3 V, +5 V, +12 V, -12 V

PCM-4373 can support both ATX and AT power supply and it can use different power cable to do the choice.

1. ATX power supply: you need to use ATX power cable (PN: 1700002055 Cable 20P/10P EPIC ATX POWER 10CM)
2. AT power supply: you need to use AT power cable (PN: 1700003931 AT Power Cable 2*4P/10P EPIC AT POWER 15cm)

CN1 connector is 10-Pin power connector and it allows you to connect to an ATX or AT power supply by different power cable.

CN1	**Power Connector**		
Part Number	1655000042		
Footprint	ATXCON-2X5-42-1		
Description	WAFER 4.2 mm 10P 180D(M) DIP 4200-WS-A1-2*5		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	SIO_PSON#	IN	+5 V
2	GND		
3	GND		
4	+V12	PWR	+12 V
5	NC	PWR	+3.3 V
6	+V5SB_ATX	PWR	+5 V
7	+V5	PWR	+5 V
8	+V5	PWR	+5 V
9	-V12	PWR	-12 V
10	GND		

CN3: DDR2 SO-DIMM

A SO-DIMM, or small outline dual in-line memory module, is a type of computer memory built using integrated circuits.PCM-4373 has 1 x 200 pin SO-DIMM and can support memory size up to 1 GB.

CN3	DDR SO-DIMM
Part Number	1651000705
Footprint	SODIMM_200P_ASOA426-EASN-4F
Description	SKT DDR2-SODIMM 200P H=9.2 SMD AS0A426-NASN-7F

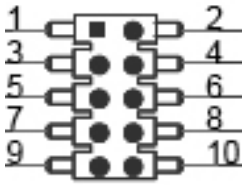
CN5: Fan connector

Provides power supply +5 V for CPU cooling fan, and fan speed detects signal input.

CN5	FAN connector		
Part Number	1655303020		
Footprint	WHL3V-2M		
Description	Wafer 2.00mm 3P 180D(M) DIP W/LOCK 22-27-2031		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	FAN0_IO	OUT	
2	+V5	PWR	+5 V
3	GND		

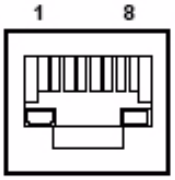
CN7: GPIO1 (General Purpose Input Output)

PCM4373 supports 16-bit GPIO via CN7 and CN46.



CN7	GPIO1 connector		
Part Number	1653000383		
Footprint	JH5X2S-2M-21N22050		
Description	PIN HEADER 5*2P 90D(M) 2.0 mm SMD WO/Pb		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+5 V	PWR	+5 V
2	GPIO4	I/O	+5 V
3	GPIO0	I/O	+5 V
4	GPIO5	I/O	+5 V
5	GPIO1	I/O	+5 V
6	GPIO6	I/O	+5 V
7	GPIO2	I/O	+5 V
8	GPIO7	I/O	+5 V
9	GPIO3	I/O	+5 V
10	GND		

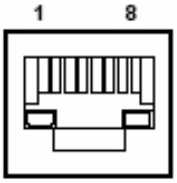
CN8: Ethernet connector



The board is equipped with 2 high performance Ethernet interface which use RJ45 connector. One is CN8 and another one is CN9.

CN8	LAN1(RJ45+1G Transformer)		
Part Number	1652000147		
Footprint	RJ45X10-LED-1AX9		
Description	Phone Jack RJ45 14P 90D (F) W/Xfam P26@P07-1AM9		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	LAN1_TX+	OUT	Analog
2	LAN1_TX-	OUT	Analog
3	LAN1_RX+	IN	Analog
4	LAN1_RX-	IN	Analog
5	+V3.3_LAN1	PWR	
6	NC		
7	NC		
8	NC		

CN9: Ethernet Connector



The board is equipped with 2 high performance Ethernet interface which use RJ45 connector. One is CN9 and another one is CN8.

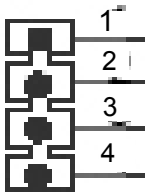
CN9	LAN2(RJ45+1G Transformer)		
Part Number	1652000174		
Footprint	RJ45+XFMR+LED		
Description	Phone Jack RJ45 14P 90D (F) W/Xfam P26@P07-1AM9		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	LAN2_TX+	OUT	Analog
2	LAN2_TX-	OUT	Analog
3	LAN2_RX+	IN	Analog
4	LAN2_RX-	IN	Analog
5	+V3.3_LAN2	PWR	
6	NC		
7	NC		
8	NC		

CN11: Compact Flash connector

The board provides a CompactFlash. card type I/II socket and the CompactFlash use master IDE channel.

CN11	Compact Flash connector
Part Number	1653002086
Footprint	SPEED_N016-0140-104
Description	CF HEADER 50P 90D (M) 1.27 mm SMD Type2 Standoff=2

CN13: HD and Power LED



CN13 is an indication LED connector for HD and power.

CN13	HD & Power LED		
Part Number	1653004101		
Footprint	JH4X1V-2M		
Description	PIN HEADER 4*1P 180D (M) SQUARE 2.0 mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+VCC_1	PWR	+5 V
2	GND		
3	+VCC_2	PWR	+5 V
4	HD_LED	OUT	+5 V

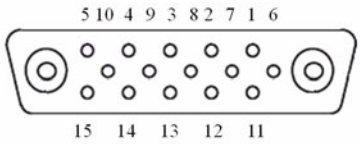
CN14: LVDS connector

CN14 is LVDS (Low Voltage Differential Signal) connector. You can connect to 18 bit LVDS LCD panel via CN14.

CN14	Internal LVDS Connector		
Part Number	1653910261		
Footprint	SPH10X2		
Description	*CONN. 20P 90D 1.25 mm SMD WO/Pb DF13-40DP-1.25 V		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND		
2	GND		
3	LVDS0_D0+	OUT	LVDS
4	NC		
5	LVDS0_D0-	OUT	LVDS
6	NC		
7	LVDS0_D1+	OUT	LVDS
8	NC		
9	LVDS0_D1-	OUT	LVDS
10	NC		
11	LVDS0_D2+	OUT	LVDS
12	NC		
13	LVDS0_D2-	OUT	LVDS
14	NC		
15	LVDS0_CLK+	OUT	LVDS
16	NC		
17	LVDS0_CLK-	OUT	LVDS
18	NC		
19	VCC_LVDSB	PWR	+5 V/+3.3 V
20	VCC_LVDSA	PWR	+5 V/+3.3 V

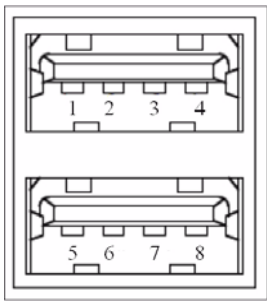
CN16: VGA connector

The DB15-pin female connector is provided for video monitors.



CN16	CRT Connector		
Part Number	1654000055		
Footprint	DBVGA-VF5MS		
Description	D-SUB Conn. 15P 90D (F) DIP 070242FR015S200ZU		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	VGA_z_R	OUT	Analog
2	VGA_z_G	OUT	Analog
3	VGA_z_B	OUT	Analog
4	NC		
5	GND	GND	
6	GND	GND	
7	GND	GND	
8	GND	GND	
9	+V5_b_VGA	PWR	+5 V
10	GND	GND	
11	NC		
12	VGA_y_DDAT	OUT	+5 V
13	VGA_y_HS	OUT	+5 V
14	VGA_y_VS	OUT	+5 V
15	VGA_y_DCLK	OUT	+5 V

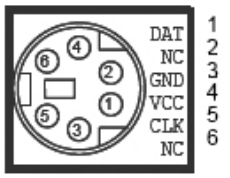
CN18: USB connectors



The board provides up to 4 x USB (Universal Serial Bus) ports. You can use it by CN18 and CN20. CN18 is a 2 x USB type A connector and CN20 is a pin header type. PCM-4373 USB ports gives complete Plug and Play, and hot attach/detach for up to 127 external devices and comply with USB specification Rev. 2.0 which supports 480Mbps transfer rate, and are fuse protected.

CN18	**USB0/1**		
Part Number	1654908100		
Footprint	USBX2-V		
Description	USB Conn. DUAL port 8P 90D (M) Black PC99		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5DUAL_USB0	PWR	+5 V
2	USB0_z_P-	I/O	
3	USB0_z_P+	I/O	
4	GND		
5	+V5DUAL_USB0	PWR	+5 V
6	USB1_z_P-	I/O	
7	USB1_z_P+	I/O	
8	GND		
9	GND		
10	GND		
11	GND		
12	GND		

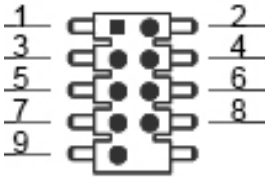
CN19: Keyboard and PS/2 mouse connector



This connector is for PS/2 keyboard and mouse. You need a one to two connector cable (Part number: 1700060202) for keyboard and mouse.

CN19	KB/MS Connector		
Part Number	1654003199		
Footprint	CONTEK_MQN3261F 1G400		
Description	MINIDIN 6P Short body W/Shielding90D (F) DIP		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	KB_z_DAT#	I/O	+5 V
2	MS_z_DAT#	I/O	+5 V
3	GND		
4	+V5DUAL_PS2	PWR	+5 V
5	KB_z_CLK#	I/O	+5 V
6	MS_z_CLK#	I/O	+5 V

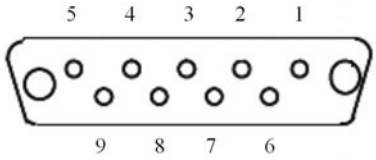
CN20: USB connectors



CN20 is a pin header type for 2 x USB 2.0 ports. PCM-4373 USB ports gives complete Plug and Play, and hot attach/detach for up to 127 external devices and comply with USB specification Rev. 2.0 which supports 480Mbps transfer rate, and are fuse protected.

CN20	USB2/3		
Part Number	1653205261		
Footprint	HD_5x2P_79_BOX_N 10		
Description	PIN HEADER 5x2P 180D (M) 2.0 mm SMD IDIOT-PROOF		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5DUAL_USB1	PWR	+5 V
2	+V5DUAL_USB1	PWR	+5 V
3	USB2_z_P-	I/O	
4	USB3_z_P-	I/O	
5	USB2_z_P+	I/O	
6	USB3_z_P+	I/O	
7	GND		
8	GND		
9	GND		

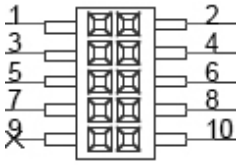
CN21: COM1 port connector for RS232



PCM-4373 provides 6 serial communication ports. CN21 is one of the serial communication ports. CN21 is 9 pin D-shell connector used for the RS 232 serial port.

CN21	**COM1**		
Part Number	1654000056		
Footprint	DBCOM-VM5MS		
Description	D-SUB CON. 9P 90D (M) DIP 070241MR009S200ZU SUYIN		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	COM0_z_DCD#	IN	+5 V
2	COM0_z_RXD	IN	+5 V
3	COM0_z_TXD	OUT	+5 V
4	COM0_z_DTR#	I/O	+5 V
5	GND		
6	COM0_z_DSR#	IN	+5 V
7	COM0_z_RTS#	I/O	+5 V
8	COM0_z_CTS#	IN	+5 V
9	COM0_z_RI	IN	+5 V

CN22: Audio interface



Audio Port Connectors

CN27 is a 5 x 2P box header and it is for audio interface.

CN22	**AUDIO connector**		
Part Number	1653205260		
Footprint	BH5x2P-S2.00		
Description	BOX HEADER SMD 5*2 180D (M) 2.0 mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	LINEOUT_R	Out	Analog
2	LINEIN_R	IN	Analog
3	AGND	GND	
4	AGND	GND	
5	LINEOUT_L	Out	Analog
6	LINEIN_L	IN	Analog
7	AGND	GND	

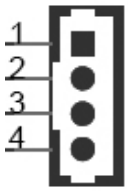
8	AGND	GND	
9	NC		
10	MIC1_L	IN	Analog

CN25: PCI-104 connector

CN25 is a PCI104 connector. PCI-104 form factor includes the PCI connector. It is intended for industrial embedded computing environments where applications depend on reliable data acquisition.

CN25	**PCI-104 Connector**
Part Number	1653130428
Footprint	PC104-PCI-PLUS
Description	PCB SKT 30*4 180D (F)PC/104+ SOLDER WO/Pb EPT

CN26: COM1 for RS422/485

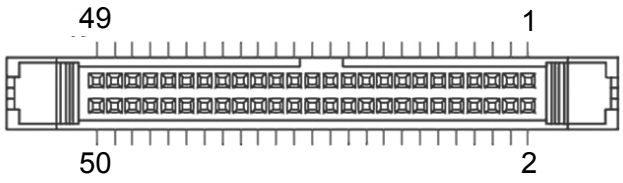


CN26 is a 1 x 4P connector for RS422/485.

CN26	**COM1 RS-422/485 connector**		
Part Number	1653004101		
Footprint	JH4X1V-2M		
Description	PIN HEADER 4*1P 180D (M) SQUARE 2.0 mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	RS422_RXD-	IN	+5 V
2	RS422_RXD+	IN	+5 V
3	RS485-422_TXD+	OUT	+5 V
4	RS485-422_TXD-	OUT	+5 V

CN30: COM port connector

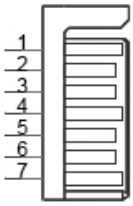
CN30 is a connector and includes COM2, COM3, COM4 and LPT signal. You can use a one to four connector cable (PN:1700002034) to connect to your device. CN30 is a 2 x 25P box header.



CN30	COM2/3/4 & LPT		
Part Number	1653001605		
Footprint	BH_25x2P_50_BOX_LOCK		
Description	BOX HEADER 25*2P 180D (M) 1.27 mm SMD CEN LINK		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	COM1_DCD#	IN	+5 V
2	COM1_DSR#	IN	+5 V
3	COM1_RXD	IN	+5 V
4	COM1_RTS#	I/O	+5 V
5	COM1_TXD	OUT	+5 V
6	COM1_CTS#	IN	+5 V
7	COM1_DTR#	I/O	+5 V
8	COM1_RI#	IN	+5 V
9	GND		
10	GND		
11	COM2_DCD#	IN	+5 V
12	COM2_DSR#	IN	+5 V
13	COM2_RXD	IN	+5 V
14	COM2_RTS#	I/O	+5 V
15	COM2_TXD	OUT	+5 V
16	COM2_CTS#	IN	+5 V
17	COM2_DTR#	I/O	+5 V
18	COM2_RI#	IN	+5 V
19	GND		
20	GND		
21	COM3_DCD#	IN	+5 V
22	COM3_DSR#	IN	+5 V
23	COM3_RXD	IN	+5 V
24	COM3_RTS#	I/O	+5 V
25	COM3_TXD	OUT	+5 V
26	COM3_CTS#	IN	+5 V
27	COM3_DTR#	I/O	+5 V
28	COM3_RI#	IN	+5 V
29	GND		
30	GND		
31	LPT_z_STB#	OUT	+5 V
32	LPT_z_AFD#	OUT	+5 V

33	LPT_z_PRD0	I/O	+5 V
34	LPT_z_ERR#	IN	+5 V
35	LPT_z_PRD1	I/O	+5 V
36	LPT_z_INIT#	OUT	+5 V
37	LPT_z_PRD2	I/O	+5 V
38	LPT_z_SLIN#	OUT	+5 V
39	LPT_z_PRD3	I/O	+5 V
40	LPT_z_PRD4	I/O	+5 V
41	LPT_z_PRD5	I/O	+5 V
42	LPT_z_PRD6	I/O	+5 V
43	LPT_z_PRD7	I/O	+5 V
44	LPT_ACK#	IN	+5 V
45	LPT_BUSY	IN	+5 V
46	LPT_PE	IN	+5 V
47	LPT_SLCT	I/O	+5 V
48	GND		
49	GND		
50	GND		

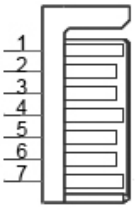
CN32: SATA Connector



PCM-4373 supports Serial ATA via two connectors (CN32 and CN33). Data transfer rates up to 150 MB/s per channel, enabling very fast data and file transfer, and independent DMA operation on two ports.

CN32	**SATA1 connector**		
Part Number	1654003639		
Footprint	SATA_7P_0-1770655-1_D		
Description	Serial ATA Con 7p 180D (M) DIP 1.27 mm 0-1770655-1		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND	GND	
2	SATA0_TX+	I/O	Analog
3	SATA0_TX-	I/O	Analog
4	GND	GND	
5	SATA0_RX-	I/O	Analog
6	SATA0_RX+	I/O	Analog
7	GND	GND	

CN33: SATA Connector

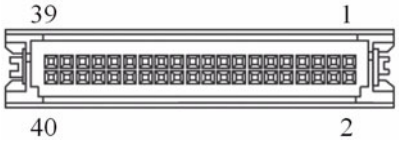


PCM-4373 supports Serial ATA via two connectors (CN32 and CN33). Data transfer rates up to 150 MB/s per channel, enabling very fast data and file transfer, and independent DMA operation on two ports.

CN33	SATA2 connector		
Part Number	1654003639		
Footprint	SATA_7P_0-1770655-1_D		
Description	Serial ATA Con 7p 180D (M) DIP 1.27 mm 0-1770655-1		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	GND	GND	
2	SATA1_TX+	I/O	Analog
3	SATA1_TX-	I/O	Analog
4	GND	GND	
5	SATA1_RX-	I/O	Analog
6	SATA1_RX+	I/O	Analog
7	GND	GND	

CN36: TTL LCD connector

CN36 is TTL LCD connector. You can connect to 24bit TTL LCD panel via CN36.



CN36	TTL LCD Connector		
Part Number	1653920200		
Footprint	SPH20X2		
Description	CONN. 40P 90D 1.25 mm SMD WO/Pb DF13-40DP-1.25 V		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+5 V_LCD	+5 V	+5 V
2	+5 V_LCD	+5 V	+5 V
3	GND		
4	GND		
5	+3.3 V_LCD	+3.3 V	+3.3 V
6	+3.3 V_LCD	+3.3 V	+3.3 V
7	GND		
8	GND		
9	FP_D0 (Bo)	OUT	TTL
10	FP_D1 (B1)	OUT	TTL

11	FP_D2 (B2)	OUT	TTL
12	FP_D3 (B3)	OUT	TTL
13	FP_D4 (B4)	OUT	TTL
14	FP_D5 (B5)	OUT	TTL
15	FP_D6 (B6)	OUT	TTL
16	FP_D7 (B7)	OUT	TTL
17	FP_D8 (G0)	OUT	TTL
18	FP_D9 (G1)	OUT	TTL
19	FP_D10 (G2)	OUT	TTL
20	FP_D11 (G3)	OUT	TTL
21	FP_D12 (G4)	OUT	TTL
22	FP_D13 (G5)	OUT	TTL
23	FP_D14 (G6)	OUT	TTL
24	FP_D15 (G7)	OUT	TTL
25	FP_D16 (R0)	OUT	TTL
26	FP_D17 (R1)	OUT	TTL
27	FP_D18 (R2)	OUT	TTL
28	FP_D19 (R3)	OUT	TTL
29	FP_D20 (R4)	OUT	TTL
30	FP_D21 (R5)	OUT	TTL
31	FP_D22 (R6)	OUT	TTL
32	FP_D23 (R7)	OUT	TTL
33	GND	OUT	TTL
34	GND	OUT	TTL
35	FP_CLK	OUT	+3.3 V
36	FP_VS	OUT	+3.3 V
37	FP_DE	OUT	+3.3 V
38	FP_HS	OUT	+3.3 V
39	PRST_LCD#	OUT	+3.3 V
40	FP_ENVEE	OUT	+3.3 V

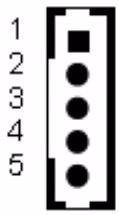
CN37: Battery Connector

CN37 is for SMBUS connection. It is a pin header type and part number is 1653002101.

CN37	**SMBUS Connector**		
Part Number	1653002101		
Footprint	JH2X1V-2M		
Description	Pin header BOX 2.0 mm 2P 180D MALE W/LOCK		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	SMB_CLK	Out	+3.3 V
2	SMB_DAT	I/O	+3.3 V

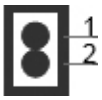
CN38: Panel Inverter Power

CN15 is a 5-pin connector. PCM-4373 can provide +5V and +12V and signal to LCD inverter board by this connector.



CN38	Panel Inverter Power		
Part Number	1655305020		
Footprint	WHL5V-2M		
Description	WAFER BOX 2.0 mm 5P 180D (M) W/LOCK		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V12_LCD	PWR	+12 V
2	GND	GND	
3	FP_ENABKL	OUT	+3.3 V
4	FP_VBR	OD	+3.3 V
5	+V5	PWR	+5 V

CN39: ATX Power button connector

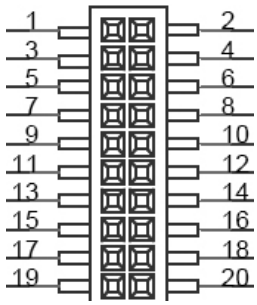


CN39 connects to power button to support to turn on/off PCM-4373. It is 2 pins wafer type.

CN39	ATX Power Button		
Part Number	1655302020		
Footprint	WHL2V-2M		
Description	WAFER BOX 2P 180D 2.0 mm MALE W/Lock		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	SB_PWRBTN#	IN	+3.3V
2	GND	GND	

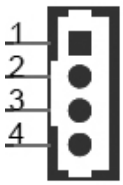
CN41: COM port connector

CN41 is a 10 x 2P box header for COM5 and COM6.



CN41	COM5,6		
Part Number	1653005261		
Footprint	HD_10x2P_79_BOX		
Description	PIN HEADER SMD 5*2P 180D (M) 2.0 mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	DCD#	IN	+5 V
2	DSR#	IN	+5 V
3	RXD#	IN	+5 V
4	RTS#	I/O	+5 V
5	TXD#	OUT	+5 V
6	CTS#	IN	+5 V
7	DTR#	I/O	+5 V
8	RI#	IN	+5 V
9	GND		
10	GND		
11	DCD#	IN	+5 V
12	DSR#	IN	+5 V
13	RXD#	IN	+5 V
14	RTS#	I/O	+5 V
15	TXD#	OUT	+5 V
16	CTS#	IN	+5 V
17	DTR#	I/O	+5 V
18	RI#	IN	+5 V
19	GND		
20	GND		

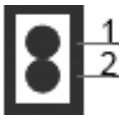
CN43: COM2 for RS422/485



CN43 is a 1 x 4P connector for RS422/485.

CN43	COM2 RS-422/485 connector		
Part Number	1653004101		
Footprint	JH4X1V-2M		
Description	PIN HEADER 4*1P 180D (M) SQUARE 2.0 mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	RS422_RXD-	IN	+5 V
2	RS422_RXD+	IN	+5 V
3	RS485-422_TXD+	OUT	+5 V
4	RS485-422_TXD-	OUT	+5 V

CN44: ISA -5V power

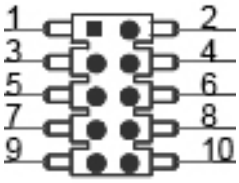


CN44 connects is for ISA -5 V power.

CN44	ISA -5V POWER		
Part Number	1653002101		
Footprint	JH2X1V-2M		
Description	PIN HEADER 2*1P 180D (M)SQUARE 2.00 mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	-V5	PWR	-5 V
2	GND		

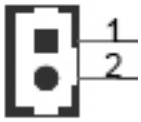
CN46: GPIO1 (General Purpose Input Output)

PCM4373 supports 16-bit GPIO via CN7 and CN46.



CN46	GPIO2 connector		
Part Number	1653000383		
Footprint	JH5X2S-2M-21N22050		
Description	PIN HEADER 5*2P 90D (M) 2.0 mm SMD WO/Pb		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+5 V	PWR	+5 V
2	GPIO12	I/O	+5 V
3	GPIO8	I/O	+5 V
4	GPIO13	I/O	+5 V
5	GPIO9	I/O	+5 V
6	GPIO14	I/O	+5 V
7	GPIO10	I/O	+5 V
8	GPIO15	I/O	+5 V
9	GPIO11	I/O	+5 V
10	GND		

CN53: Battery Connector

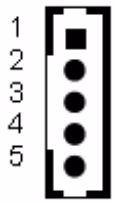


CN53 is for battery connection. It is 2 pins wafer type and part number is 1655902032.

CN53	BATTERY connector		
Part Number	1655902032		
Footprint	WHL2V-125		
Description	WAFER 2P 180D (M) 1.25 mm 53047-0210		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+VBAT	PWR	+3.3 V
2	GND	GND	

CN54: IrDA connector

CN54 is 5-pin connector for IrDA.



CN54	IrDA connector		
Part Number	1653005101		
Footprint	PH5x1P-2.00		
Description	Pin Header 5P 180D (M) 2.00 mm		
Pin	**Pin Name**	**Signal Type**	**Signal Level**
1	+V5_IrDA	PWR	+5 V
2	NC		
3	RXD	IN	+5 V
4	GND	GND	
5	TXD	OUT	+5 V

2.3 Mechanical

2.3.1 Jumper and Connector Locations

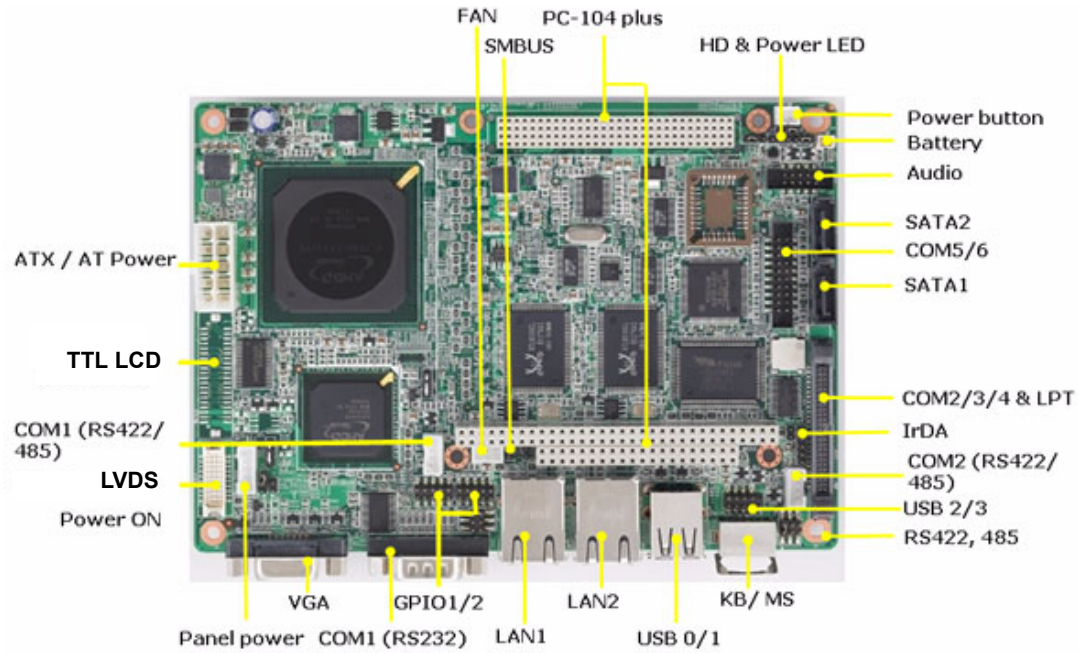


Figure 2.1 PCM-4373 board layout (Component Side)

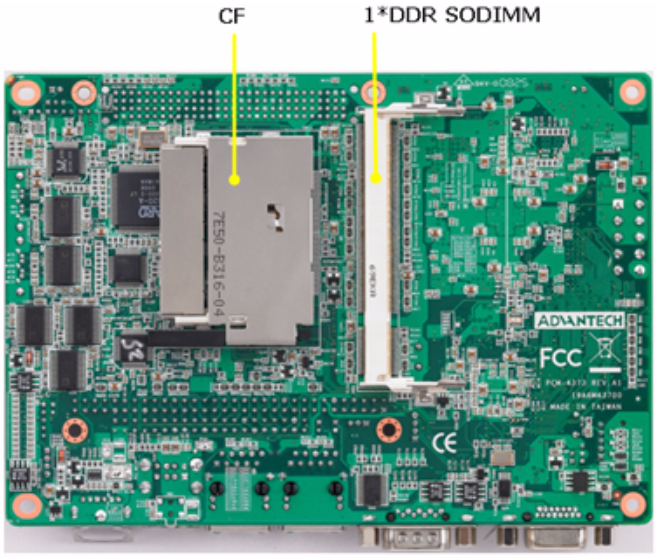


Figure 2.2 PCM-4373 board layout (Solder Side)

- **Dimension (mm):** 115 mm (W) x 165 mm (L) (4.5" x 6.5")
- **Height on Top (mm):** 17 mm (Including Heatsink)
- **Height on Bottom (mm):** 9.2 mm (SODIMM Socket)

2.3.2 Board Dimensions

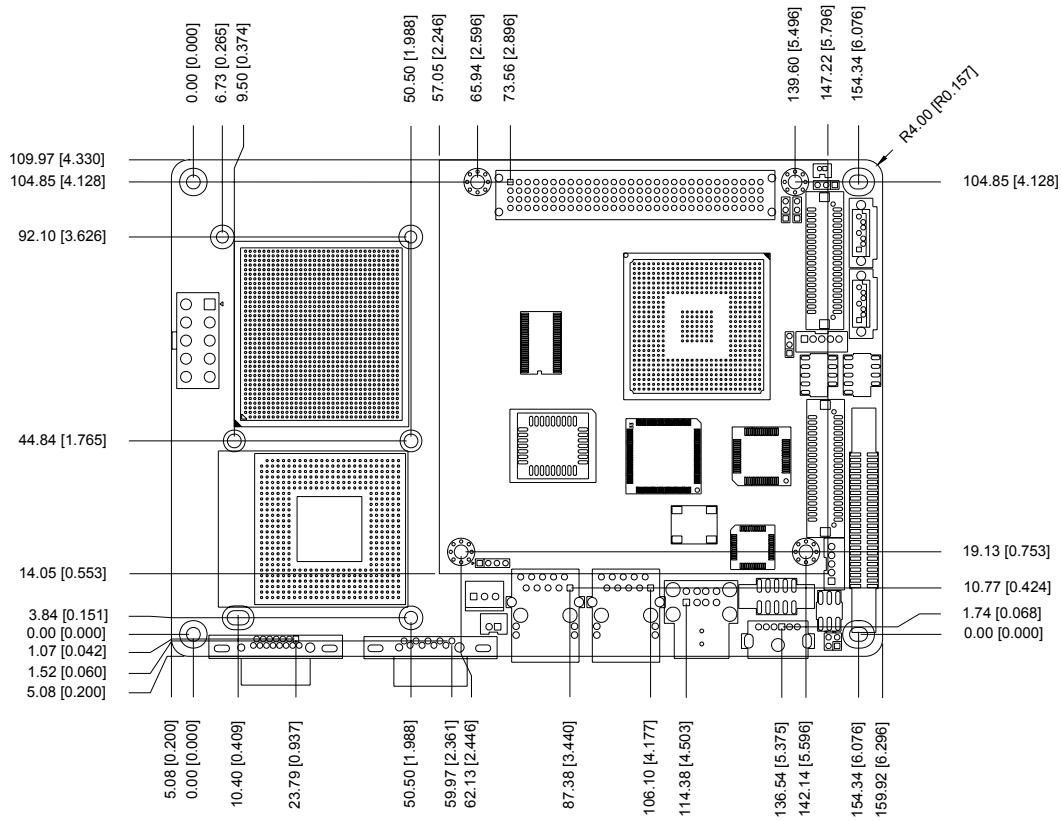


Figure 2.3 Board dimension layout (Component side)

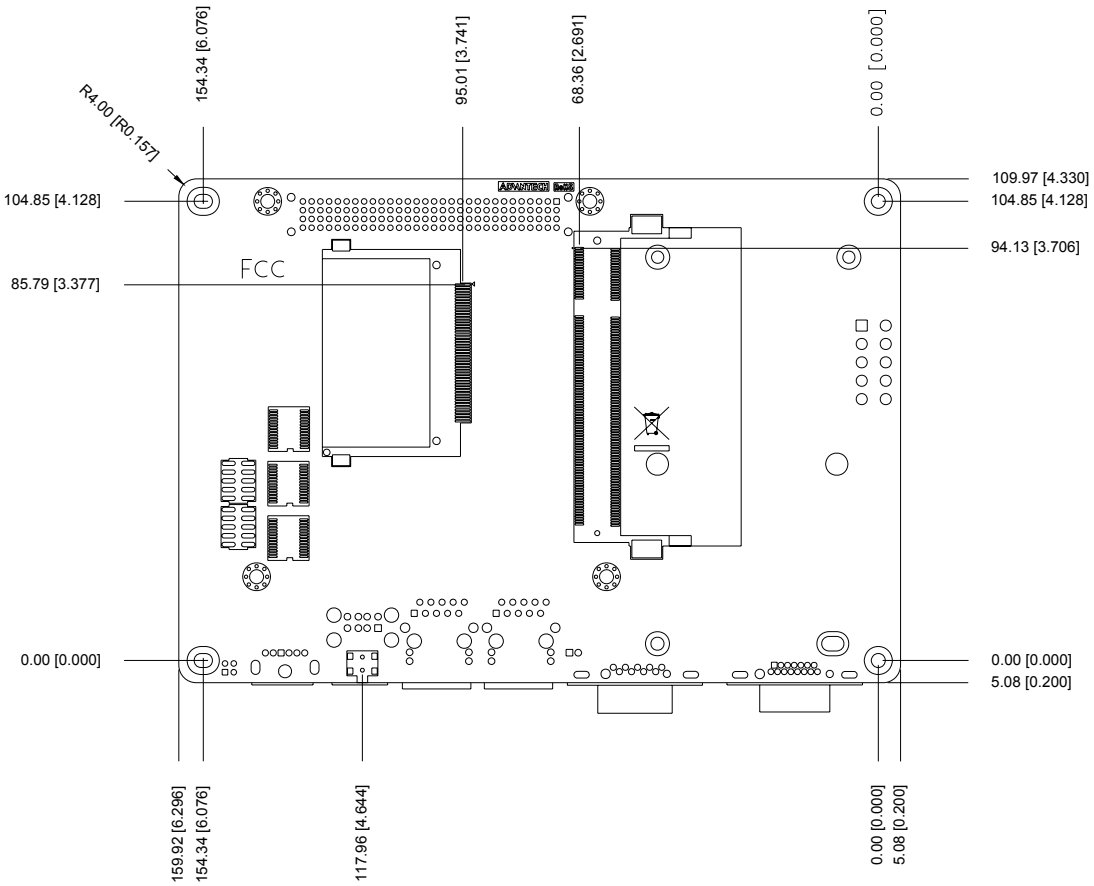


Figure 2.4 Board dimension layout (Solder side)

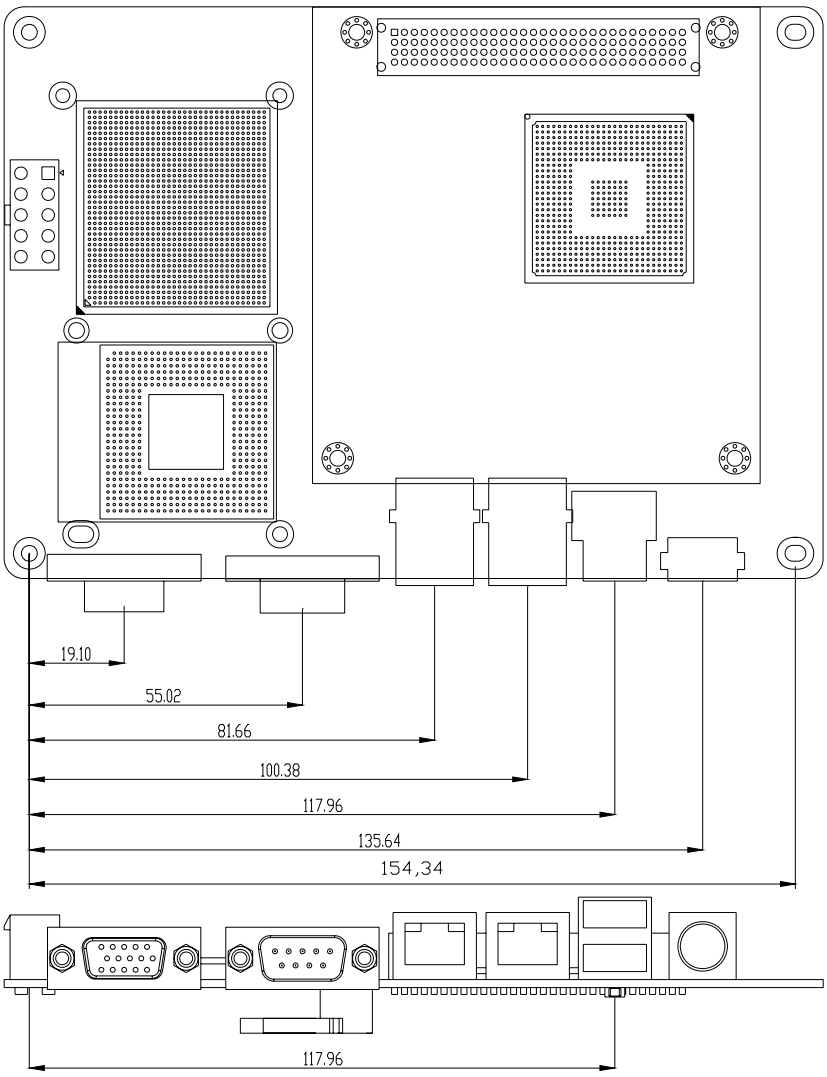


Figure 2.5 Coast line layout

Chapter 3

BIOS Operation

Sections include:

- **BIOS Introduction**
- **BIOS Setup**

3.1 BIOS Introduction

Advantech provide full-featured AwardBIOS 6.0 and delivers the superior performance, compatibility and functionality that manufactures of Industry PC and Embedded boards, it's many options and extensions let you customize your products to a wide range of designs and target markets.

The modular, adaptable AwardBIOS 6.0 supports the broadest range of third-party peripherals and all popular chipsets, plus Intel, AMD, nVidia, VIA, and compatible CPUs from 386 through Pentium and AMD Geode, K7 and K8 (including multiple processor platforms), and VIA Eden C3 and C7 CPU.

You can use Advantech's utilities to select and install features to suit your designs for customers need.

3.2 BIOS Setup

The PCM-4373 Series system has build-in AwardBIOS with a CMOS SETUP utility which allows user to configure required settings or to activate certain system features.

The CMOS SETUP saves the configuration in the CMOS RAM of the motherboard. When the power is turned off, the battery on the board supplies the necessary power to the CMOS RAM.

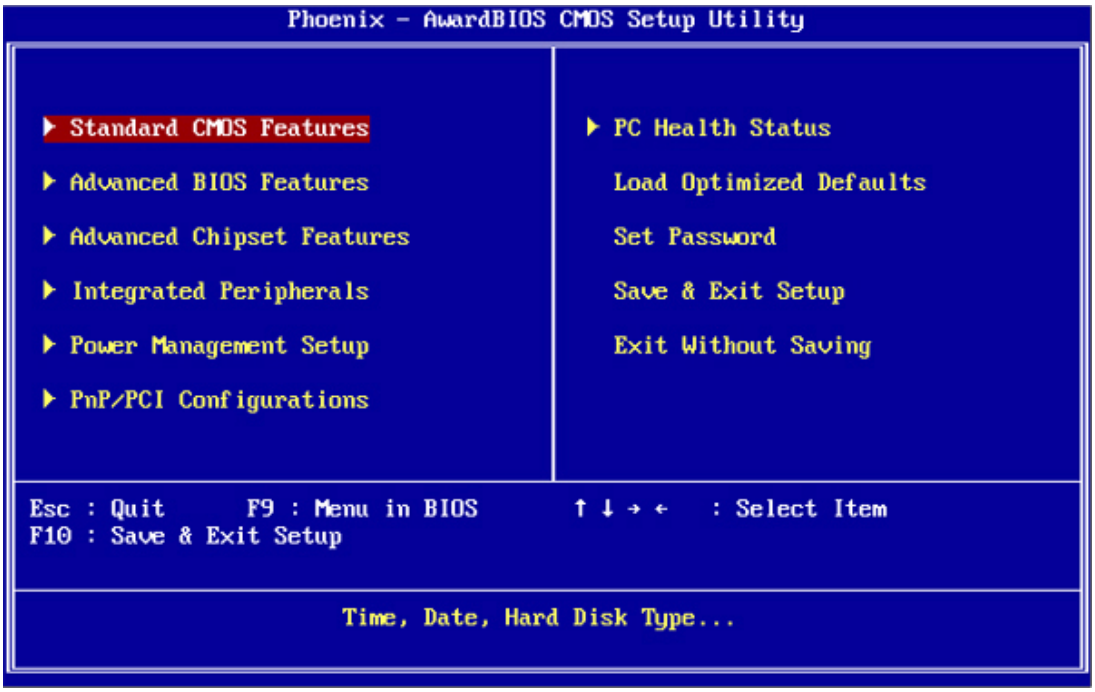
When the power is turned on, press the <Del> button during the BIOS POST (Power-On Self Test) will take you to the CMOS SETUP screen.

.

CONTROL KEYS	
< ↑ >< ↓ >< ← >< → >	Move highlight to item
<Enter>	Select Item
<Esc>	Main Menu - Quit and do not save changes into CMOS Sub Menu - Exit current page and return to Main Menu
<Page Up/+>	Increase the numeric value or make changes
<Page Down/->	Decrease the numeric value or make changes
<F1>	General help, for Setup Sub Menu
<F2>	Item Help
<F5>	Load Previous Values
<F7>	Load Optimized Defaults
<F10>	Save all CMOS changes

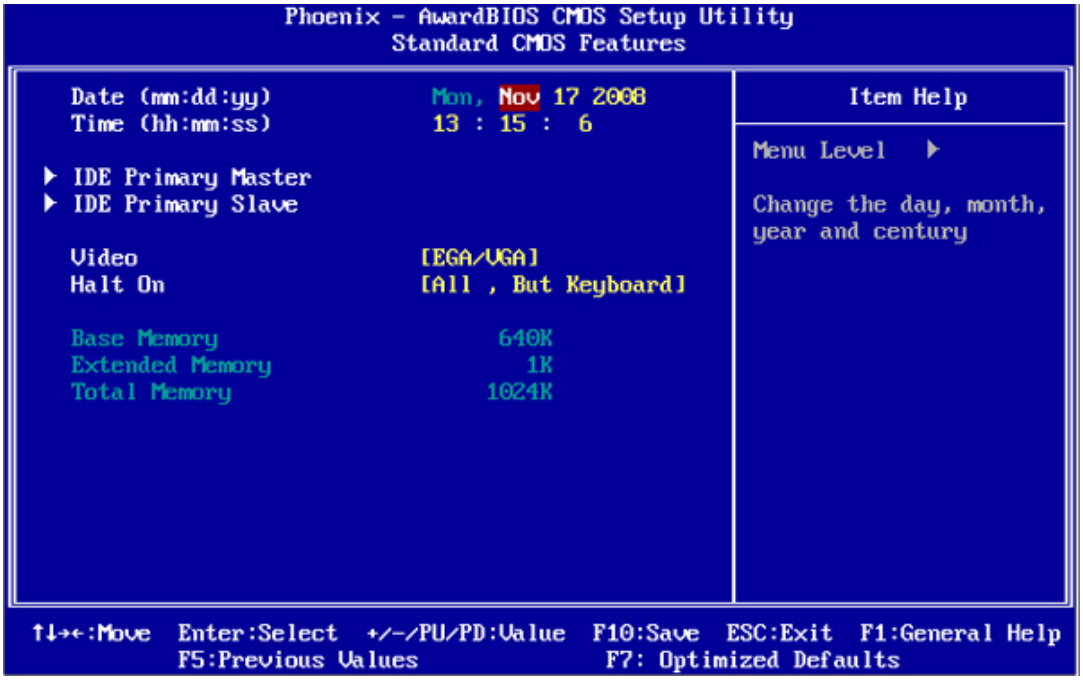
3.2.1 Main Menu

Press <Del> to enter AwardBIOS CMOS Setup Utility, the Main Menu will appear on the screen. Use arrow keys to select among the items and press <Enter> to accept or enter the sub-menu.



- **Standard CMOS Features**
  This setup page includes all the items in standard compatible BIOS.
- **Advanced BIOS Features**
  This setup page includes all the items of Award BIOS enhanced features.
- **Advanced Chipset Features**
  This setup page includes all the items of Chipset configuration features.
- **Integrated Peripherals**
  This setup page includes all onboard peripheral devices.
- **Power Management Setup**
  This setup page includes all the items of Power Management features.
- **PnP/PCI Configurations**
  This setup page includes PnP OS and PCI device configuration.
- **PC Health Status**
  This setup page includes the system auto detect CPU and system temperature, voltage, fan speed.
- **Load Optimized Defaults**
  This setup page includes Load system optimized value, and the system would be in best performance configuration.
- **Set Password**
  Establish, change or disable password.
- **Save & Exit Setup**
  Save CMOS value settings to CMOS and exit BIOS setup.
- **Exit Without Saving**
  Abandon all CMOS value changes and exit BIOS setup.

3.2.2 Standard CMOS Features



- **Date**

  The date format is <weekday>, <month>, <day>, <year>.

  Weekday From Sun to Sat, determined and display by BIOS only

  Month From Jan to Dec.

  Day From 1 to 31

  Year From 1999 through 2098

- **Time**

  The time <hour> <minute> <second>, based on 24-hour time.

- **IDE Primary Master/Slave**

  IDE HDD Auto-Detection Press "Enter" for automatic device detection.

- **Video**

  Select the default video device.

  The item can change video device to EGA/VGA, CGA 40, CGA 80 or MONO.

- **Halt on**

  The item determines whether the computer will stop if an error is detected during power up.

All Errors	Whenever the BIOS detects a non-fatal error the system will be stopped.
No Errors	The system boot will not stop for any error
All, but Keyboard	The system boot will for all errors except keyboard.

- **Base Memory**

  The POST of the BIOS will determine and display the amount of base (or conventional) memory installed in the system.

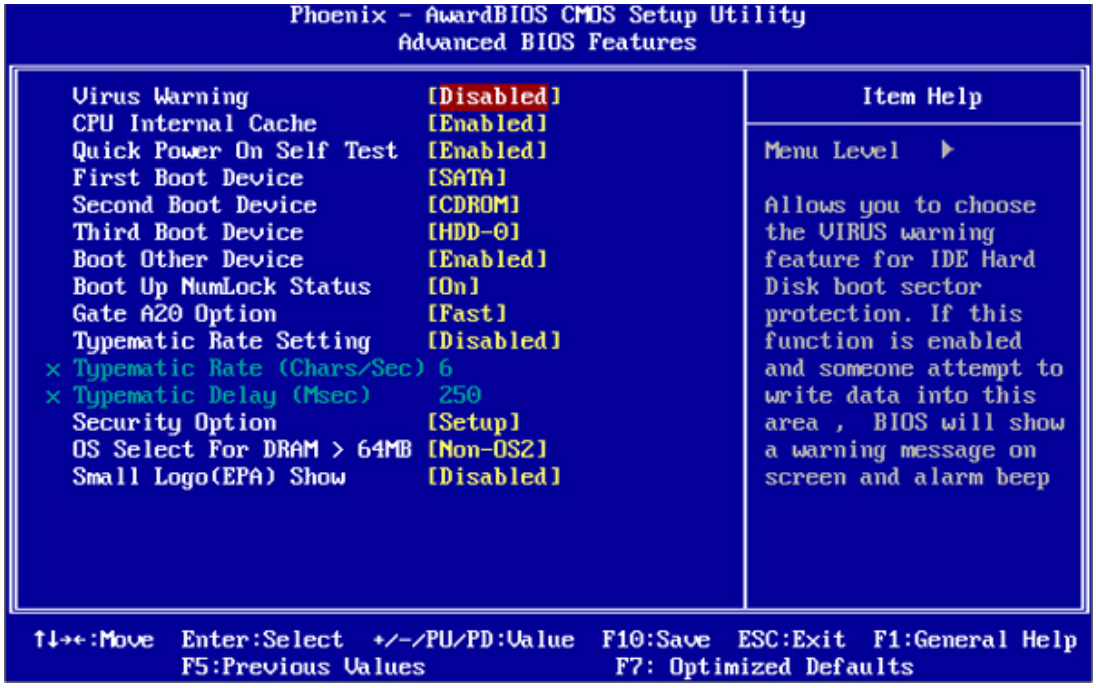
- **Extended Memory**

  The POST of the BIOS will determine and display the amount of extended memory (above 1MB in CPU's memory address map) installed in the system.

- **Total Memory**

  This item displays the total system memory size.

3.2.3 Advanced BIOS Features



- **Virus Warning [Disabled]**
  This item allows user to choose the VIRUS Warning feature for IDE Hard Disk boot sector protection.
- **CPU Internal Cache [Enabled]**
  This item allows user to enable CPU internal cache.
- **Quick Power On Self Test [Enabled]**
  This field speeds up the Power-On Self Test (POST) routine by skipping retesting a second, third and forth time. Setup setting default is enabled.
- **First / Second / Third / Other Boot Drive**

Hard Disk0/1	Assign this boot device priority to Hard Disk0 or 1.
SATA	Assign this boot device priority to SATA.
CDROM	Assign this boot device priority to CDROM.
USB-FDD	Assign this boot device priority to USB-FDD.
USB-ZIP	Assign this boot device priority to USB-ZIP.
USB-CDROM	Assign this boot device priority to USB-CDROM.
USB-HDD	Assign this boot device priority to USB-HDD.
LAN	Assign this boot device priority to LAN.
Disabled	Do not attempt to boot from this device.

- **Boot Up NumLock Status [On]**
  This item enables users to activate the Number Lock function upon system boot.
- **Gate A20 Option [Fast]**
  This item enables users to switch A20 control by port 92 or not.
- **Typematic Rate Setting [Disabled]**
  This item enables users to set the two typematic controls items.
  This field controls

– Typematic Rate (Chars/Sec)
  This item controls the speed the system registers repeated keystrokes. Eight settings are 6, 8, 10, 12, 15, 20, 24 and 30.
– Typematic Delay (Msec)
  This item sets the timeout interval before typematic auto repetition starts. Four delay rate options are 250, 500, 750 and 1000.

- **Security Option [Setup]**

  System — System boot and setup both require correct password.

  Setup — System will boot, but access to Setup requires correct password. (Default value)

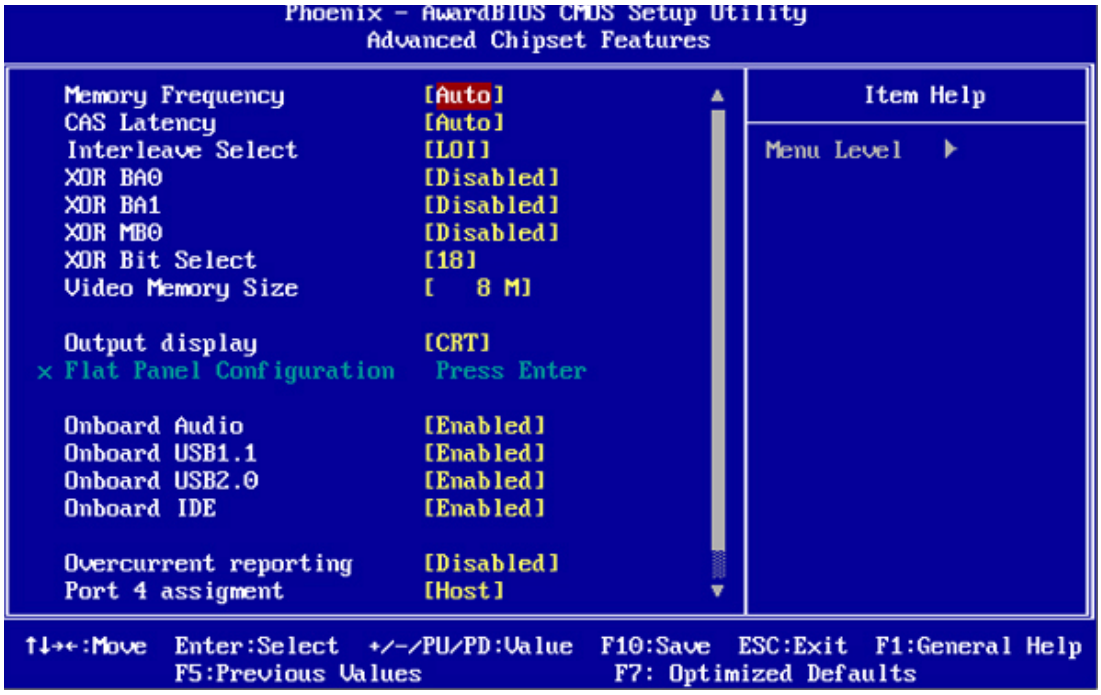
- **OS Select For DRAM > 64M [Non-OS2]**

  Select OS2 only if system is running OS/2 operation system with greater than 64MB of RAM on the system

- **Small Logo (EPA) Show [Disabled]**

  Show EPA logo during system POST stage.

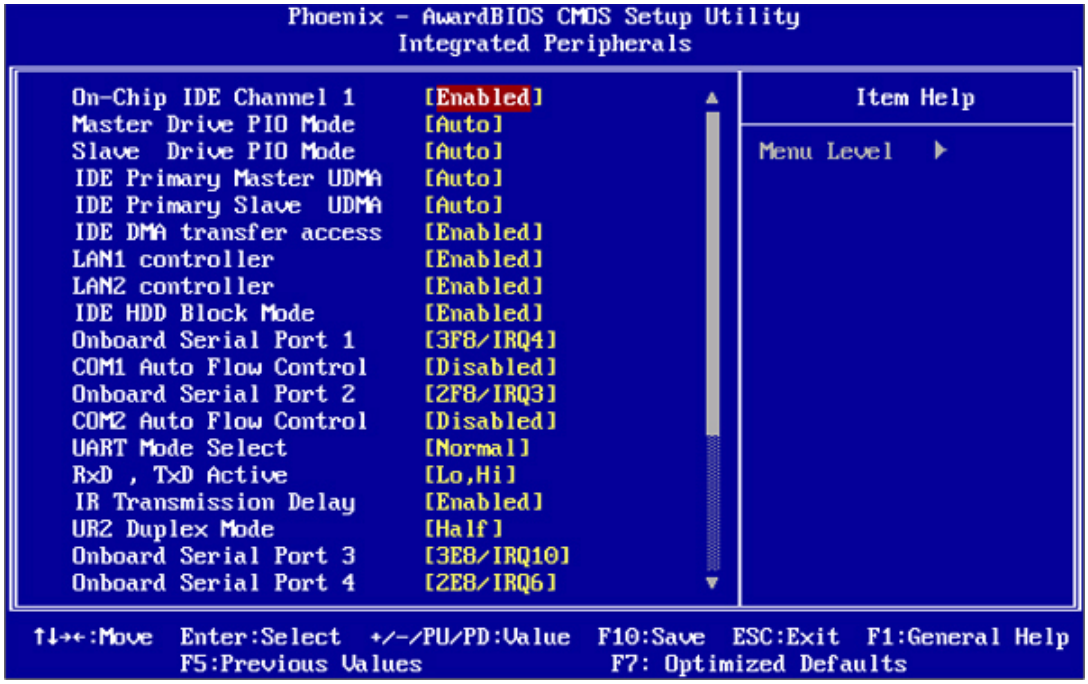
3.2.4 Advanced Chipset Features



Note! *This "Advanced Chipset Features" option controls the configuration of the board's chipset, this page depends on the particular chipset. It is strongly recommended only technical users make changes to the default settings.*

- **Memory Frequency [Auto]**
  This item enables users to set the Memory Host clock by system automatic detection or by manual.
- **CAS Latency [Auto]**
  This item allows users to set Memory delay time.
- **Interleave Select [LOI]**
  This item allows users to HOI/LOI mode.
- **XOR BA0 / XOR BA1 / XOR MB0 [Disabled]**
  This item allows users to enabled/disabled XOR BA0 / XOR BA1 / XOR MB0.
- **XOR Bit Select [18]**
  This item allows users to set XOR bit.
- **Video Memory Size [8 M]**
  This item allows user to adjust VGA share memory size for personal purpose.
- **Output Display [CRT]**
  This item allows user to choose screen display of type. Bios default value is set to "CRT"
- **Flat Panel Configuration [Press Enter] (Show Only)**
  This item is provided Flat panel function for user to adjustment.
- **Onboard Audio [Enabled]**
  This item is controller to enabled or disabled motherboard of audio device.
- **Onboard USB1.1 [Enabled]**
  This item is controller to enabled or disabled motherboard of USB1.1 device.
- **Onboard USB2.0 [Enabled]**
  This item is controller to enabled or disabled motherboard of USB2.0 device.
- **Onboard IDE [Enabled]**
  This item is controller to enabled or disabled motherboard of IDE device.
- **Overcurrent Reporting [Disabled]**
  This item is enabled or disabled that USB overcurrent report function. Bios default suggest to Disabled.
- **Port 4 assignment [Host]**
  This item allows user to changed USB port 4 of mode.
- **Memory Hole At 15M-16M [Disabled]**
  This item reserves 15MB-16MB memory address space to ISA expansion cards that specifically require the setting. Memory from 15MB-16MB will be unavailable to the system because of the expansion cards can only access memory at this area.

3.2.5 Integrated Peripherals



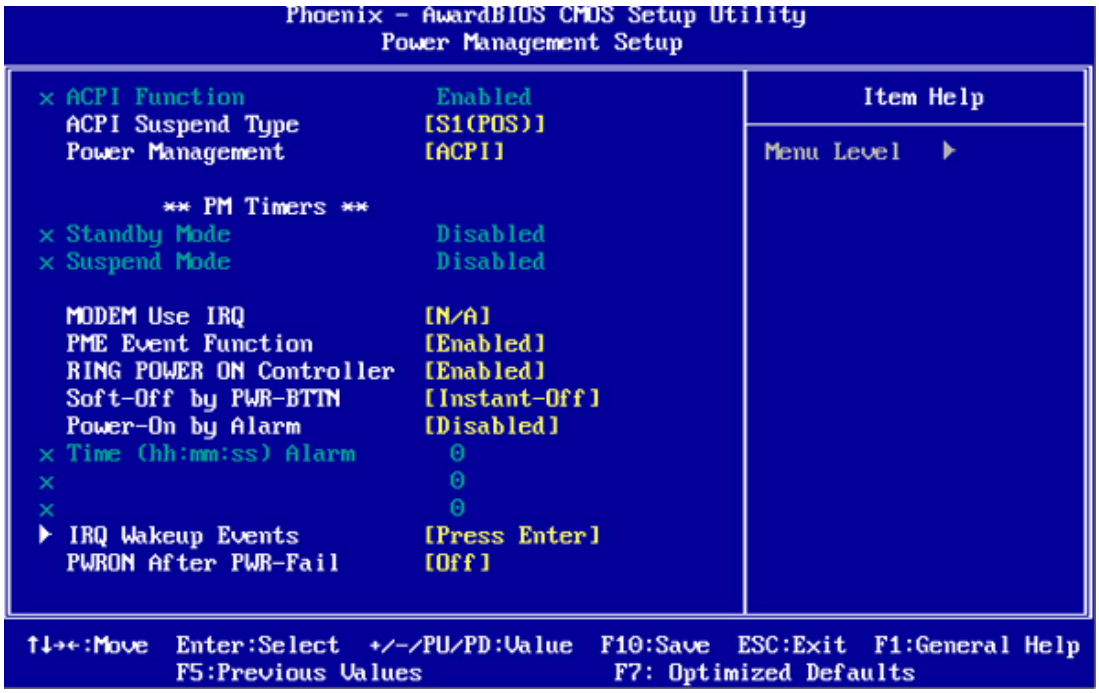
Note! *This "Integrated Peripherals" option controls the configuration of the board's chipset, includes IDE, ATA, SATA, USB, AC97, MC97 and Super IO and Sensor devices; this page is chipset dependent.*

- **On-Chip IDE Channel 1**
  This item enables chipset IDE device 1 of controller.
- **Master Drive PIO Mode [Auto]**
  This item allows user to adjust master IDE mode of type for modification purpose. Bios default value suggest to "Auto".
- **Slave Drive PIO Mode [Auto]**
  This item allows user to adjust slave IDE mode of type for modification purpose. Bios default value suggest to "Auto".
- **IDE Primary Master UDMA [Auto]**
  This item allows user to adjust primary master IDE mode of type for modification purpose. Bios default value suggest to "Auto".
- **IDE Primary Slave UDMA [Auto]**
  This item allows user to adjust primary slave IDE mode of type for modification purpose. Bios default value suggest to “Auto”.
- **IDE DMA transfer access [Enabled]**
  This item allows user to adjust IDE DMA mode. It will increase IDE Data transfer of speed. Bios default value suggest to "Enabled".
- **LAN1 Controller [Enabled]**
  This item is enabled or disabled that onboard of LAN1 controller. Bios default value suggest to "Enabled".
- **LAN2 Controller [Enabled]**
  This item is enabled or disabled that onboard of LAN2 controller. Bios default value suggest to "Enabled".

- **IDE HDD Block Mode [Enabled]**
  This item allows enabled or disabled that IDE block data transfer mode. It will speed up HDD data transfer of efficiency. Bios default value suggest to "Enabled".
- **Onboard Serial Port 1 [3F8/IRQ4]**
  This item allows user to change com 1 of address & IRQ. Bios default value suggest to "3F8/IRQ4".
- **COM1 Auto Flow Control [Disabled]**
  This item allows user to control com port of auto flow transfer. Bios default value suggest to "Disabled".
- **Onboard Serial Port 2 [2F8/IRQ3]**
  This item allows user to change com 2 of address & IRQ. Bios default value suggest to "2F8/IRQ3".
- **COM2 Auto Flow Control [Disabled]**
  This item allows user to control com port of auto flow transfer. Bios default value suggest to "Disabled".
- **UART Mode Select [Normal]**
  This item allows user to select which mode for the Onboard Serial Port.
- **RxD, TxD Active [Lo,Hi]**
  This item allows user to select RxD/TxD speed.
- **IR Transmission Delay [Enabled]**
  This item allows user to enabled/disabled for transmission stability.
- **UR2 Duplex Mode [Half]**
  This item allows you to select the IR half or full duplex function.
- **Onboard Serial Port 3 [3E8/IRQ10]**
  This item allows user to change com 3 of address. Bios default value suggest to "3E8/IRQ10".
- **Onboard Serial Port 4 [2E8/IRQ6]**
  This item allows user to change com 4 of address. Bios default value suggest to "2E8/IRQ6".
- **Onboard Parallel Port[378/IRQ7]**
  This item allows user to change parallel port of address. Bios default value suggest to "378/IRQ7".
- **Onboard Parallel Mode [Standard]**
  This item allows user to change parallel port of mode. User can choose "SPP","EPP","ECP" and "ECP+EPP". SPP(Standard Parallel Port).ECP(Extended Capabilities Port). EPP(Enhanced Parallel Port). Bios default value suggest to "Normal".
- **ECP Mode Use DMA [3]**
  This item allows user to change DMA channel for parallel port. Bios default value suggest to "3".
- **Onboard Serial Port 5 [4E8]**
  This item allows user to change com 5 of address. Bios default value suggest to "4E8".
- **Onboard Serial Port 5 use [IRQ11]**
  This item allows user to change com 5 of IRQ. Bios default value suggest to "IRQ11".

- **Onboard Serial Port 6 [4F8]**
  This item allows user to change com 6 of address. Bios default value suggest to "4F8".
- **Onboard Serial Port 6 use [IRQ5]**
  This item allows user to change com 6 of IRQ. Bios default value suggest to "IRQ5".
- **SuperIO WatchDog Control [Disabled]**
  This item allows user to enabled/disabled watch dog function.
- **SuperIO WatchDog Value [0]**
  This item allows user to set 0~255.

3.2.6 Power Management Setup



Note! *This "Power management Setup" option configure system to most effectively saving energy while still operating in a manner consistent with intended style of computer use.*

- **ACPI Function[Enabled] (Show Only)**
  This item defines the ACPI (Advanced Configuration and Power Management) feature that makes hardware status information available to the operating system, and communicate PC and system devices for improving the power management.
- **ACPI Suspend Type [S1(POS)]**
  This item show the sleep state when suspend.
- **Power Management[ACPI]**
  - Disabled
  - Legacy
    It will open two item for adjust "Standby Mode" and "Suspend Mode".
  - APM
    APM (Advanced Power Management function).
  - ACPI
    ACPI (Advanced Configuration and Power Management)
- **Standby Mode[Disabled]**
  This item allows user to select standby of time. Range from 1 sec to 120 Min.
- **Suspend Mode[Disabled]**
  This item allows user to select suspend of time. Range from 1 sec to 120 Min.
- **Modem use IRQ [N/A]**
  This item allows user to determine the IRQ which the MODEM can use.
- **PME Event Function [Enabled]**
  This item enables/disables the power on function by PME.
- **RING POWER ON Controller [Enabled]**
  This item is enables/disables the power on function by RING.
- **Soft-Off by PWR-BTTN°[Instant-Off]**
  This item allows user to define function of power button.

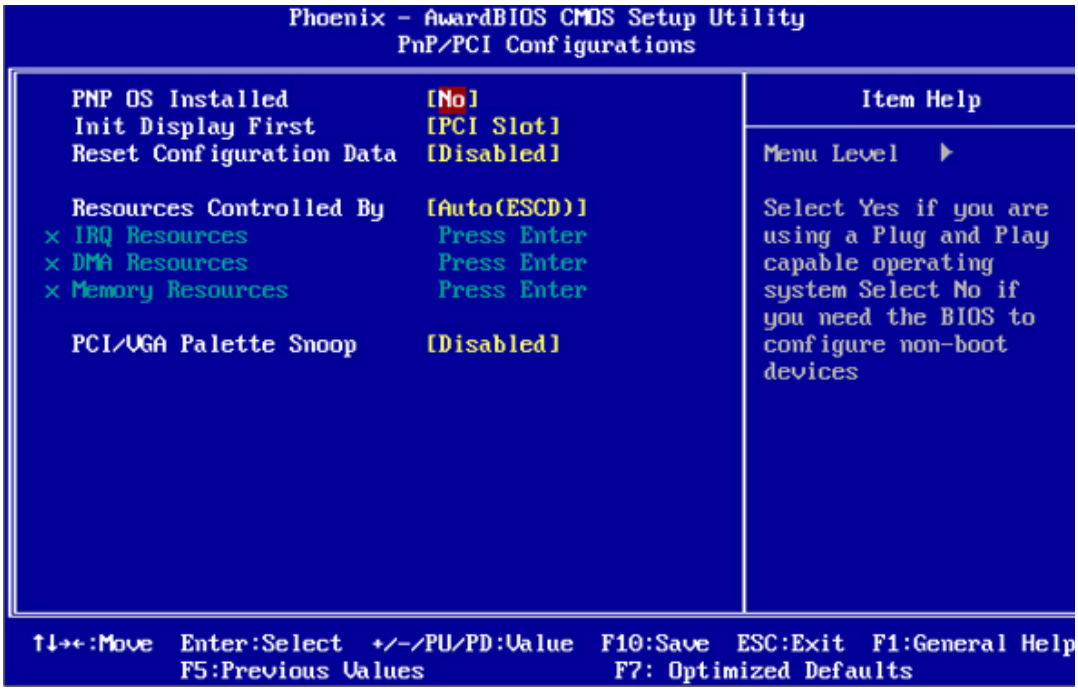
Instant-Off	Press power button then Power off instantly.
Delay 4 Sec	Press power button 4 sec. to Power off.

- **Power-On by Alarm[Disabled]**
  This item allows user to enable and key in Date/time to power on system

Disabled	Disable this function.
Enabled	Enable alarm function to power on system
Time (HH:MM:SS)Alarm	(0-23) : (0-59) : 0-59)

- **IRQ Wakeup Events[Press Enter]**
  This item allows user to control wakeup from which IRQ event.
- **PWRON After PWR-Fail[off]**
  This item allows user to enabled or disable power fail function.

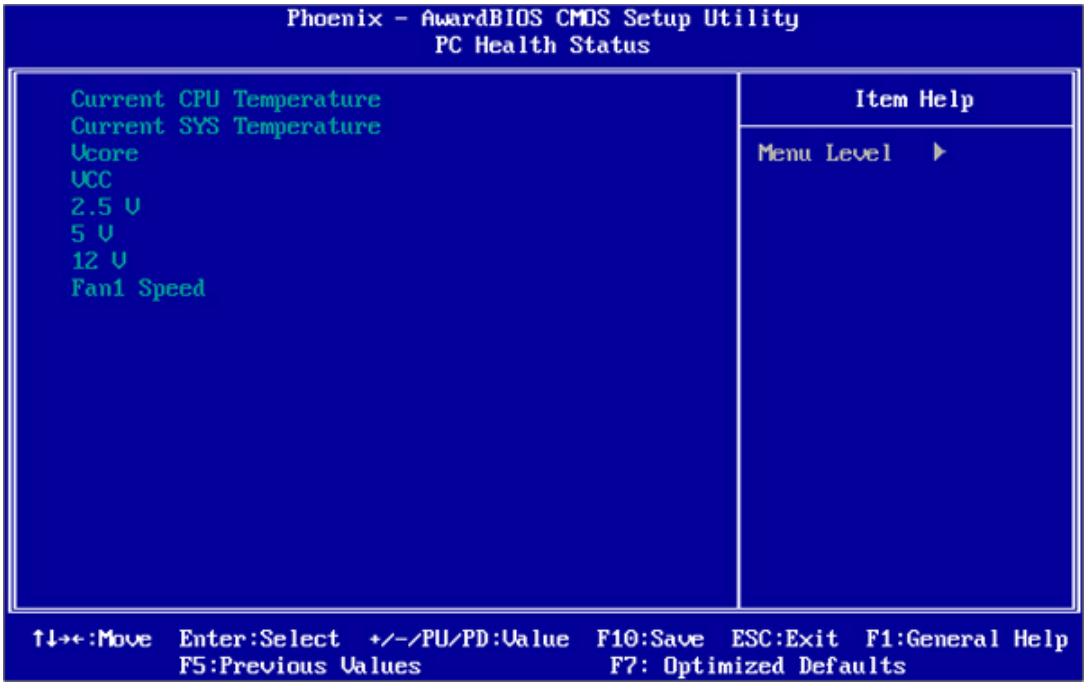
3.2.7 PnP/PCI Configurations



Note! *This "PnP/PCI Configurations" option is setting up the IRQ and DMA (both PnP and PCI bus assignments).*

- **PNP OS Installed [No]**
  This item allows user to determine PNP function install or not.
- **Init Display First °[PCI Slot]**
  This item is setting for start up Video output from Onboard or PCI device.
- **Reset Configuration Data°[Disabled]**
  This item allow user to clear any PnP configuration data stored in the BIOS.
- **Resources Controlled By[Auto (ESCD)]**
  - IRQ Resources
    This item allows you respectively assign an interruptive type for IRQ-3, 4, 5, 7, 9, 10, 11, 12, 14, and 15.
  - Memory Resources
    This item allows you respectively assign a memory block from N/A to DC00.
- **PCI VGA Palette Snoop°[Disabled]**
  The item is designed to solve problems caused by some non-standard VGA cards. A built-in VGA system does not need this function.

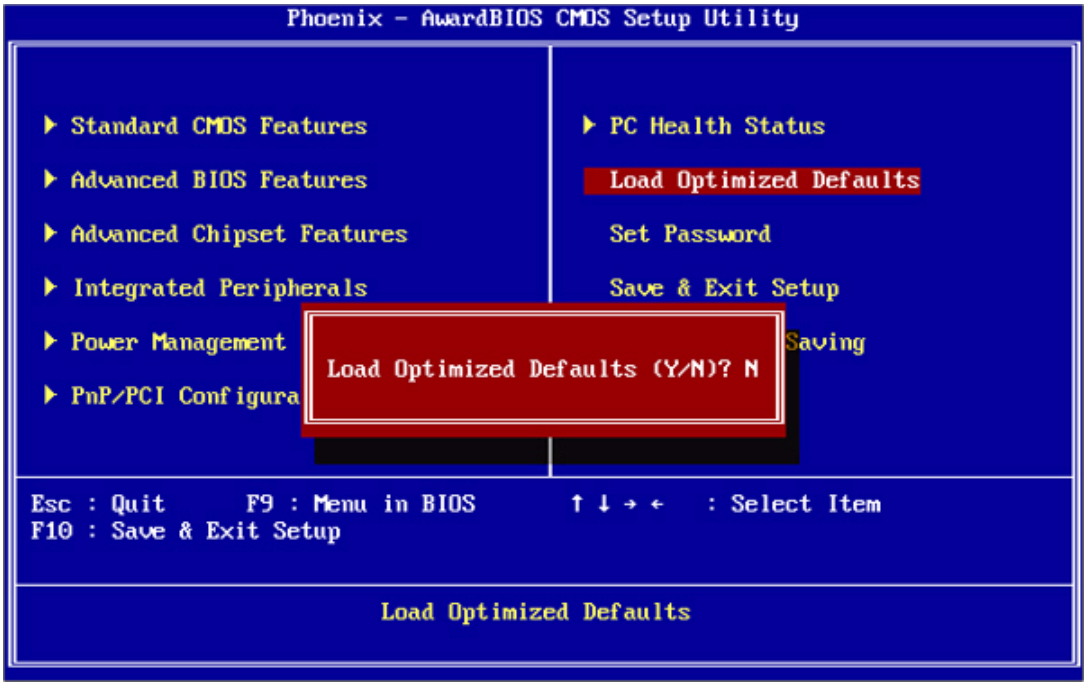
3.2.8 PC Health Status



Note! *This "PC Health Status" option controls the Thermal, FAN and Voltage status of the board. This page is chipset dependent.*

- **Current CPU/ System Temp [Show Only]**
  This item displays current system and CPU temperature.
- **Vcore/VCC/2.5V/5V/12V [Show Only]**
  This item displays current CPU and system Voltage.
- **Fan1 Speed [Show Only]**
  This item displays current Fan Speed..

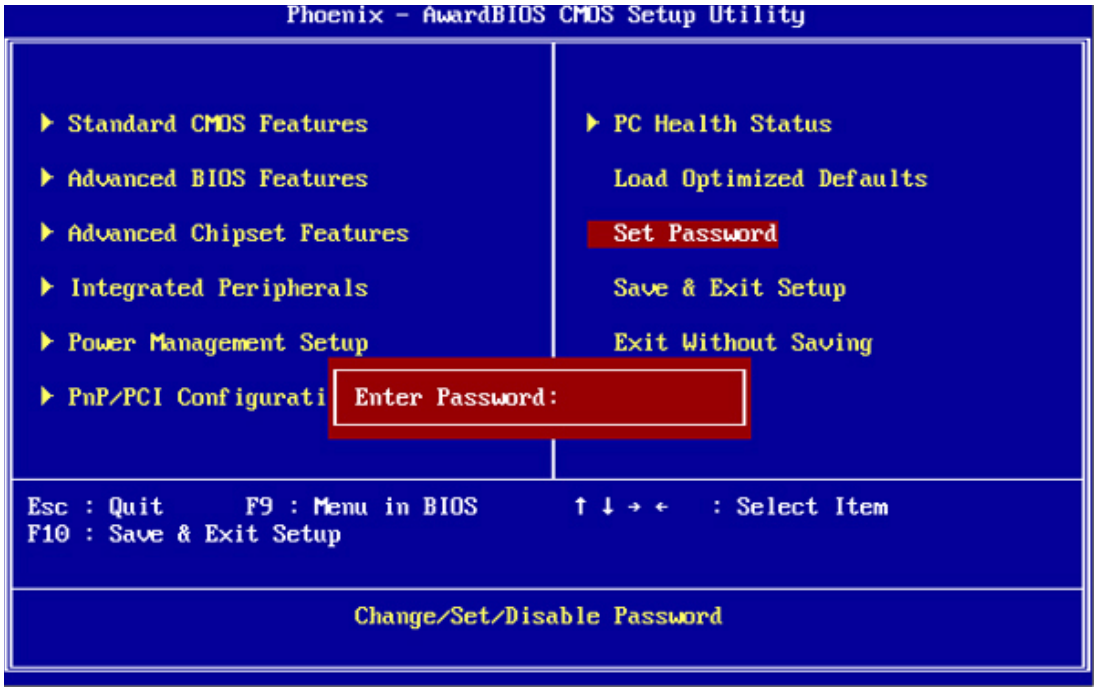
3.2.9 Load Optimized Defaults



Note! *Load Optimized Defaults loads the default system values directly from ROM. If the stored record created by the Setup program should ever become corrupted (and therefore unusable).*

These defaults will load automatically when you turn the PCM-4373 Series system on.

3.2.10 Set Password



Note! *To enable this feature, you should first go to the Advanced BIOS Features menu, choose the Security Option, and select either Setup or System, depending on which aspect you want password protected. Setup requires a password only to enter Setup. System requires the password either to enter Setup or to boot the system. A password may be at most 8 characters long.*

To Establish Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the desired password and press <Enter>.
3. At the "Confirm Password" prompt, retype the desired password, then press <Enter>.
4. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

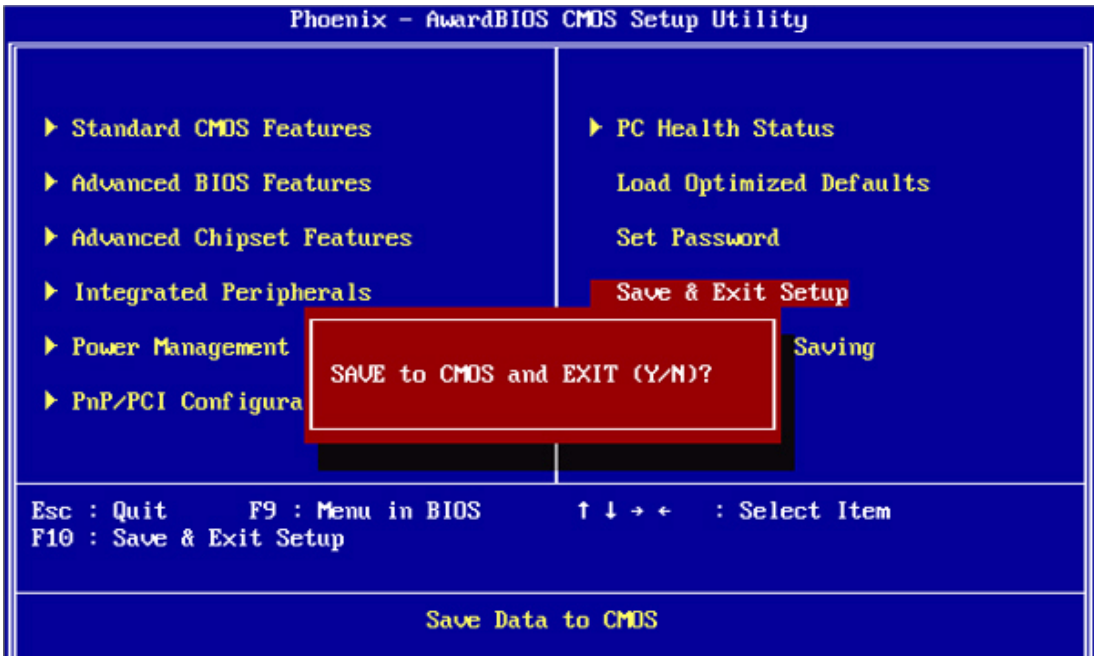
To Change Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the existing password and press <Enter>.
3. You will see "Confirm Password". Type it again, and press <Enter>.
4. Select Set Password again, and at the "Enter Password" prompt, enter the new password and press <Enter>.
5. At the "Confirm Password" prompt, retype the new password, and press <Enter>.
6. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

To Disable Password

1. Choose the Set Password option from the CMOS Setup Utility main menu and press <Enter>.
2. When you see "Enter Password", enter the existing password and press <Enter>.
3. You will see "Confirm Password". Type it again, and press <Enter>.
4. Select Set Password again, and at the "Enter Password" prompt, please don't enter anything; just press <Enter>.
5. At the "Confirm Password" prompt, again, don't type in anything; just press <Enter>.
6. Select Save to CMOS and EXIT, type <Y>, then <Enter>.

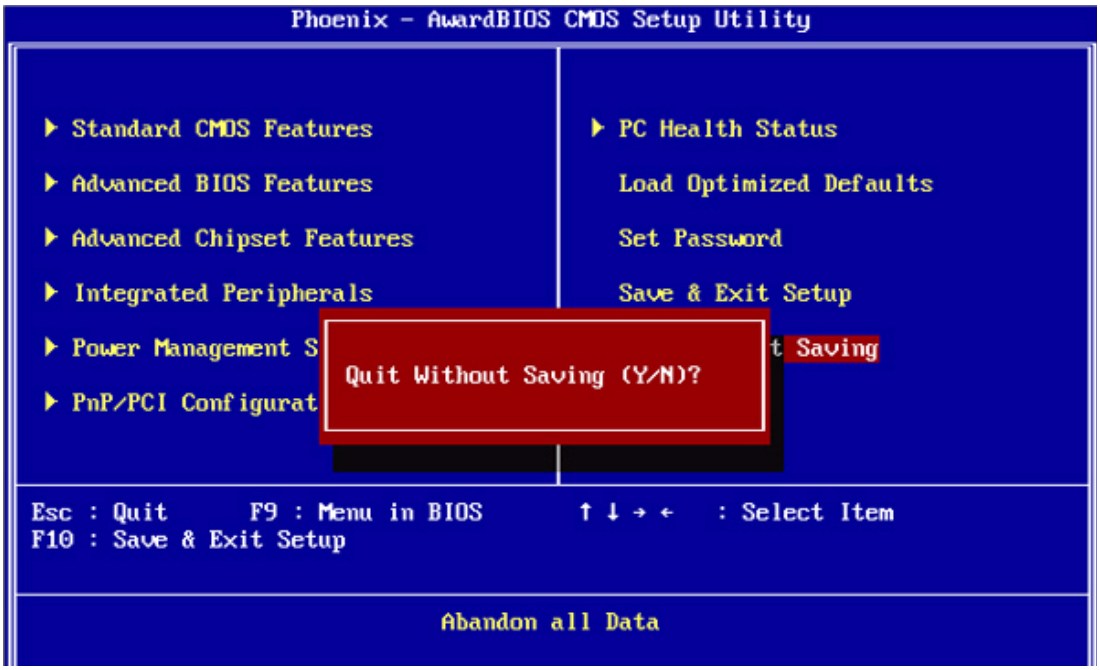
3.2.11 Save & Exit Setup



Note! *Typing "Y" will quit the BIOS Setup Utility and save user setup value to CMOS.*

Typing "N" will return to BIOS Setup Utility.

3.2.12 Quit Without Saving



Note! *Typing "Y" will quit the BIOS Setup Utility without saving to CMOS.*

Typing "N" will return to BIOS Setup Utility.

Chapter 4

S/W Installation

Sections include:

- S/W Introduction
- Driver Installation
- SUSI Application Library

4.1 S/W Introduction

The mission of Advantech Embedded Software Services is to "Enhance quality of life with Advantech platforms and Microsoft Windows® embedded technology." We enable Windows® Embedded software products on Advantech platforms to more effectively support the embedded computing community. Customers are freed from the hassle of dealing with multiple vendors (Hardware suppliers, System integrators, Embedded OS distributor) for projects. Our goal is to make Windows® Embedded Software solutions easily and widely available to the embedded computing community.

4.2 Driver Installation

4.2.1 Windows XP Professional

To install the drivers for Windows XP Professional, insert the CD into the CD-Rom, it should auto-detect the hardware platform and then pop up the "Embedded Computing Install Wizard" box; just select the drivers that you want to install then click "Install All Selected Drivers". Follow the Driver Setup Wizard instructions; click "Next" to complete the installation.

4.2.2 Other OS

To install the drivers for another Windows OS or Linux, please browse the CD and run the setup file under the appropriate folder on the CD-ROM.

4.3 SUSI Application Library

4.3.1 SUSI Introduction

To make hardware easier and convenient to access for programmers, Advantech has released a suite of API (Application Programming Interface) in the form of a program library. The program Library is called Secured and Unified Smart Interface or SUSI for short.

In modern operating systems, user space applications cannot access hardware directly. Drivers are required to access hardware. User space applications access hardware through drivers. Different operating systems usually define different interface for drivers. This means that user space applications call different functions for hardware access in different operating systems. To provide a uniform interface for accessing hardware, an abstraction layer is built on top of the drivers and SUSI is such an abstraction layer. SUSI provides a uniform API for application programmers to access the hardware functions in different Operating Systems and on different Advantech hardware platforms.

Application programmers can invoke the functions exported by SUSI instead of calling the drivers directly. The benefit of using SUSI is portability. The same set of API is defined for different Advantech hardware platforms. Also, the same set of API is implemented in different Operating Systems including Windows XP and Windows CE. This user's manual describes some sample programs and the API in SUSI. The hardware functions currently supported by SUSI can be grouped into a few categories including Watchdog, I2C, SMBus, GPIO, and VGA control. Each category of API in SUSI is briefly described below.

4.3.2 SUSI Functions

4.3.2.1 The GPIO API

General Purpose Input/Output (GPIO) is a flexible parallel interface that allows a variety of custom connections, and supports digital I/O devices.

4.3.2.2 The I2C API

I2C is a bi-directional two-wire bus that was developed by Philips for use in their televisions in the 1980s and nowadays is used in various types of embedded systems. The strict timing requirements defined in the I2C protocol has been taken care of by SUSI. Instead of asking application programmers to figure out the strict timing requirements in the I2C protocol, the I2C API in SUSI can be used to control I2C devices by invoking other function calls. SUSI provides a consistent programming interface for different Advantech boards. That means user programs using SUSI are portable among different Advantech boards as long as the boards and SUSI provide the required functionalities. Overall product development times can be greatly reduced using SUSI.

4.3.2.3 The SMBus API

The System Management Bus (SMBus) is a two-wire interface defined by Intel® Corporation in 1995. It is based on the same principles of operation of I2C and is used in personal computers and servers for low-speed system management communications. Nowadays, it can be seen in many types of embedded systems. As with other API in SUSI, the SMBus API is available on many platforms including Windows XP and Windows CE.

4.3.2.4 The VGA Control API

There are two kinds of VGA control APIs, backlight on/off control and brightness control. Backlight on/off control allows a developer to turn on or off the backlight, and to control brightness smoothly.

4.3.2.5 The Watchdog API

A watchdog timer (abbreviated as WDT) is a hardware device which triggers an action, e.g. rebooting the system, if the system does not reset the timer within a specific period of time. The WDT API in SUSI provides developers with functions such as starting the timer, resetting the timer, and setting the timeout value if the hardware requires customized timeout values.

4.3.2.6 The Hardware Monitor API

The hardware monitor (abbreviated as HWM) is a system health supervision capability achieved by placing certain I/O chips along with sensors for inspecting the target of interests for certain condition indexes, such as fan speed, temperature and voltage etc.

However, due to the inaccuracy among many commercially available hardware monitoring chips, Advantech has developed a unique scheme for hardware monitoring - achieved by using a dedicated micro-processor with algorithms specifically designed for providing accurate, real-time and reliable data content; helping protect your system in a more reliable manner

4.3.3 SUSI Installation

SUSI supports many different operating systems. Each subsection below describes how to install SUSI and related software on a specific operating system. Please refer to the subsection matching your operating system.

4.3.3.1 Windows XP

In windows XP, you can install the library, drivers and demo programs onto the platform easily using the installation tool-The SUSI Library Installer. After the installer has executed, the SUSI Library and related files for Windows XP can be found in the target installation directory. The files are listed in the following table.

Directory	Contents
\Library	■ Susi.lib Library for developing the applications on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo	■ SusiDemo.EXE Demo program on Windows XP. ■ Susi.dll Dynamic library for SUSI on Windows XP.
\Demo\SRC	Source code of the demo program on Windows XP.

The following section illustrates the installation process.

Note! *The version of the SUSI Library Installer shown on each screen shot below will depend on the particular version.*

1. Extract Susi.zip.
2. Double-click the "Setup.exe" file.

The installer searches for a previous installation of the **SUSI Library**. If it locates one, a dialog box opens asking whether you want to modify, **repair** or **remove** the software. If a previous version is located, please see the section of **[Maintenance Setup]**. If it is not located, the following screen shot opens. Click **Next**.

4.3.3.2 Windows CE

In windows CE, there are three ways to install the SUSI Library, you can install it manually or use Advantech CE-Builder to install the library or just copy the programs and the library onto a compact flash card.

Express Installation:

You can use Advantech CE-Builder to load the library into the image.

- First, you click the My Component tab.
- In this tab, you click Add New Category button to add a new category, eg. the SUSI Library.
- Then you can add a new file in this category, and upload the SUSI.dll for this category.
- After these steps, you can select the SUSI Library category you created for every project.

Manual Installation:

You can add the SUSI Library into the image by editing any bib file.

- First you open project.bib in the platform builder.
- Add this line to the MODULES section of project.bib
  Susi.dl l$(_FLATRELEASEDIR)\Susi.dll NK SH
- If you want to run the window-based demo, add following line:
  SusiTest.exe $(_FLATRELEASEDIR)\SusiTest.exe
- If you want to run the console-based demo, add following lines:
  Watchdog.exe $(_FLATRELEASEDIR)\Watchdog.exe NK S
  GPIO.exe $(_FLATRELEASEDIR)\GPIO.exe NK S
  SMBUS.exe $(_FLATRELEASEDIR)\SMBUS.exe NK S
- Place the three files into any files directory.
- Build your new Windows CE operating system.

4.3.4 SUSI Sample Programs

- Sample Programs

The sample programs demonstrate how to incorporate SUSI into your program. There are sample programs for two categories of operating system, i.e. Windows XP and Windows CE. The sample programs run in graphics mode in Windows XP and Windows CE. The sample programs are described in the subsections below.

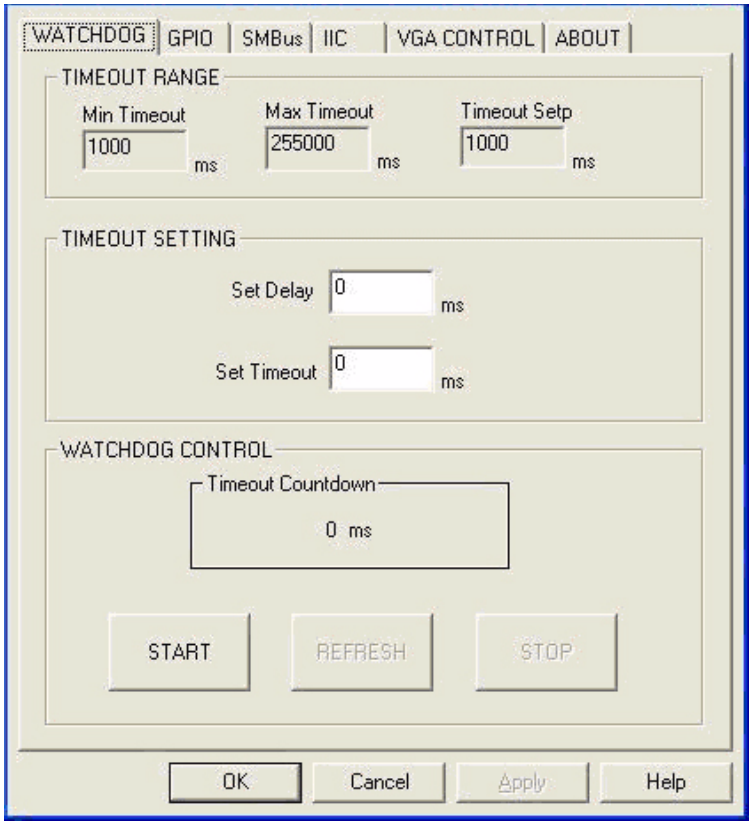
- **Windows Graphics Mode**

There are sample programs of Windows in graphics mode for two categories of operating system, i.e. Windows CE and Windows XP. Each demo application contains an executable file SusiDemo.exe, a shared library Susi.dll and source code within the release package. The files of Windows CE and Windows XP are not compatible with each other.

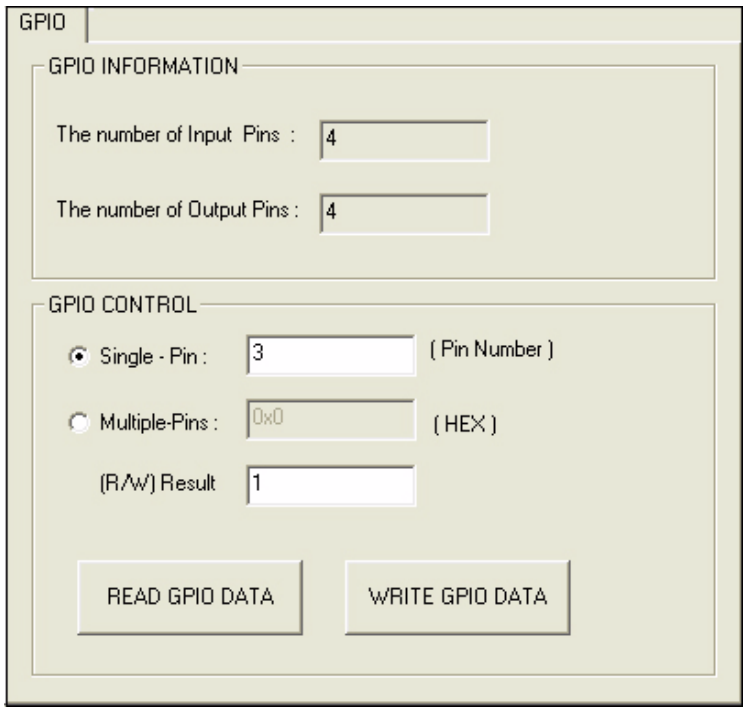
SusiDemo.exe is an executable file and it requires the shared library, Susi.dll, to demonstrate the SUSI functions. The source code of SusiDemo.exe also has two versions, i.e. Windows CE and Windows XP, and must be compiled under Microsoft Visual C++ 6.0 on Windows XP or under Microsoft Embedded Visual C++ 4.0 on Windows CE. Developers must add the header file Susi.h and library Susi.lib to their own projects when they want to develop something with SUSI.

- **SusiDemo.exe**

The SusiDemo.exe test application is an application which uses all functions of the SUSI Library. It has five major function blocks: Watchdog, GPIO, SMBus, I2C and VGA control. The following screen shot appears when you execute SusiDemo.exe. You can click function tabs to select test functions respectively. Some function tabs will not show on the test application if your platform does not support such functions. For a complete support list, please refer to Appendix A. We describe the steps to test all functions of this application.



GPIO



When the application is executed, it will display GPIO information in the GPIO INFORMATION group box. It displays the number of input pins and output pins. You can click the radio button to choose to test either the single pin function or multiple pin functions. The GPIO pin assignments of the supported platforms are located in Appendix B.

Test Read Single Input Pin

- Click the radio button- Single-Pin.
- Key in the pin number to read the value of the input pin. The Pin number starts from '0'.
- Click the READ GPIO DATA button and the status of the GPIO pin will be displayed in (R/W) Result field.

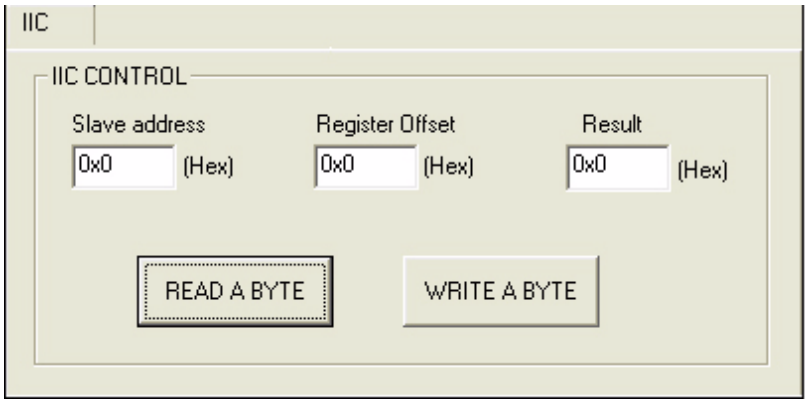
Test Read Multiple Input Pin

- Click the radio button- Multiple-Pins.
- Key in the pin number from '0x01' to '0x0F' to read the value of the input pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to read pin 0, 1, and 3, the pin numbers should be '0x0B'.
- Click READ GPIO DATA button and the statuses of the GPIO pins will be displayed in (R/W) Result field.

- **Test Write Single Output Pin**
  - Click the radio button- Single-Pin.
  - Key in the pin numbers you want to write. Pin numbers start from '0'.
  - Key in the value either '0' or '1' in (R/W) Result field to write the output pin you chose above step.
  - Click the WRITE GPIO DATA button to write the GPIO output pin.

- **Test Write Multiple Output Pins**
  - Click the radio button- Multiple-Pins.
  - Key in the pin number from '0x01' to '0x0F' to choose the multiple pin numbers to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to write pin 0, 1, and 3, the pin numbers should be '0x0B'.
  - Key in the value in (R/W) Result field from '0x01' to '0x0F' to write the value of the output pin. The pin numbers are ordered bitwise, i.e. bit 0 stands for GPIO 0, bit 1 stands for GPIO 1, etc. For example, if you want to set pin 0 and 1 high, 3 to low, the pin number should be '0x0B', and then you should key in the value '0x0A' to write.
  - Click the WRITE GPIO DATA button to write the GPIO output pins.

- **I2C**

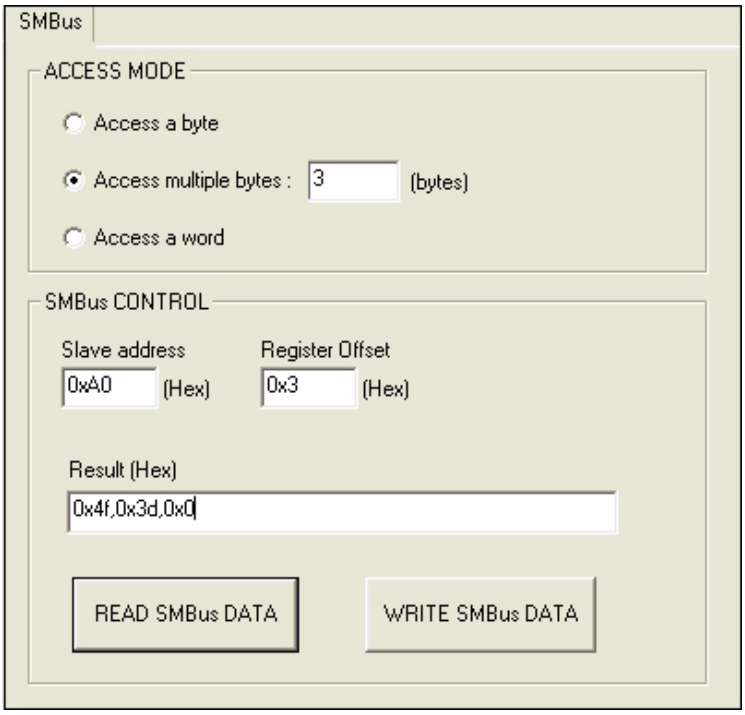


When the application is executed, you can read or write a byte of data through I2C devices. All data must be read or written in hexadecimal system.

- **Read a byte**
  - Key in the slave device address in Slave address field.
  - Key in the register offset in Register Offset field.
  - Click the READ A BYTE button and then a byte of data from the device will be shown on the Result field.

- **Write a byte**
  - Key in the slave device address in Slave address field.
  - Key in the register offset in Register Offset field.
  - Key in the desirous of data in Result field to write to the device.
  - Click the WRITE A BYTE button and then the data will be written to the device through I2C.

- **SMBus**



When the application has executed, you can click the radio button to choose to test each access mode, i.e. Access a byte, Access multiple bytes and Access a word. All data must be read or written in hexadecimal except the numbers for radio button: Access multiple bytes mode must be written in decimal. You can test the functionalities of the watchdog as follows:

- Read a byte
  - Click the radio button- Access a byte.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Click the READ SMBus DATA button and a byte of data from the device will be shown on the Result field.

- **Write a byte**
  - Click the radio button- Access a byte.
  - Key in the slave device address in Slave address field.
  - Key in the register offset in Register Offset field.
  - Key the desired data in the Result field to write to the device.
  - Click the WRITE SMBus DATA button and then the data will be written to the device through SMBus.

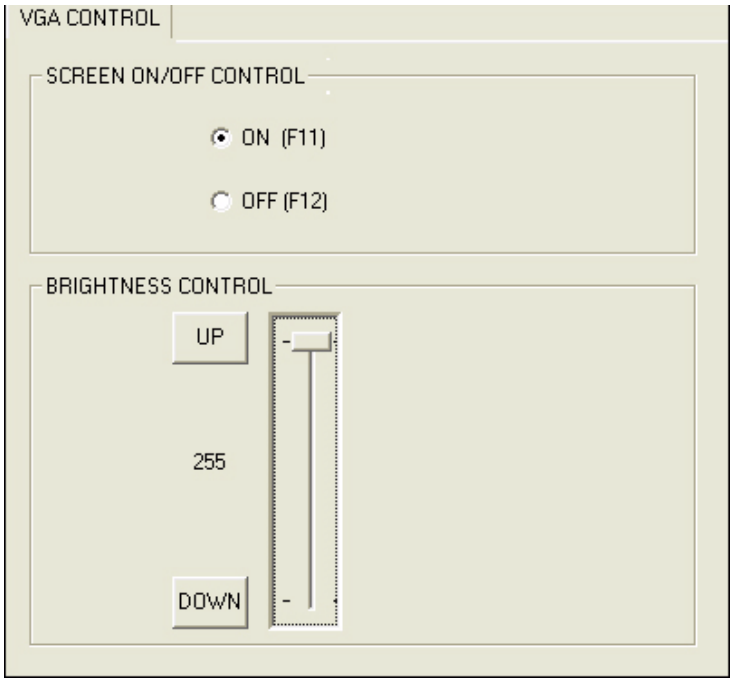
- **Read a word**
  - Click the radio button- Access a word.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Click the READ SMBus DATA button and then a word of data from the device will be shown on the Result field.

- **Write a word**
- Click the radio button- Access a word.
- Key in the slave device address in the Slave address field.
- Key in the register offset in the Register Offset field.
- Key in the desired data, such as 0x1234, in the Result field to write to the device.
- Click the WRITE SMBus DATA button and the data will be written to the device through the SMBus.

- **Read Multiple bytes**
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of radio button- Access multiple bytes. The number must be written in decimal.
  - Click the READ SMBus DATA button and then all data from the device will be divided from each other by commas and be shown in the Result field.

- **Write Multiple bytes**
  - Click the radio button- Access multiple bytes.
  - Key in the slave device address in the Slave address field.
  - Key in the register offset in the Register Offset field.
  - Key in the desired number of bytes, such as 3, in the right side field of the radio button- Access multiple bytes. The number must be written in decimal.
  - Key in all the desired data in the Result field in hexadecimal format, divided by commas, for example, 0x50,0x60,0x7A.
  - Click the WRITE SMBus DATA button and all of the data will be written to the device through the SMBus.

VGA Control



When the application is executed, it will display two blocks of VGA control functions. The application can turn on or turn off the screen shot freely, and it also can tune the brightness of the panels if your platform is being supported. You can test the functionalities of VGA control as follows:

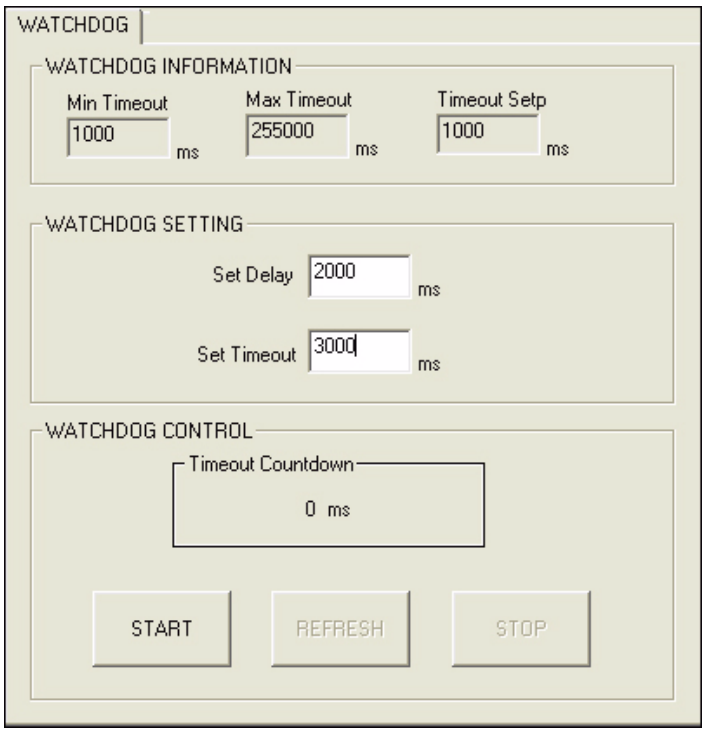
Screen on/off control

- Click the radio button ON or push the key F11 to turn on the panel screen.
- Click the radio button OFF or push the key F12 to turn off the panel screen.
- The display chip of your platform must be in the support list in Appendix A, or this function cannot work.

Brightness control

- Move the slider in increments, using either the mouse or the direction keys, or click the UP button to increase the brightness.
- Move the slider in decrements, using either the mouse or the direction keys, or click the DOWN button to decrease the brightness.

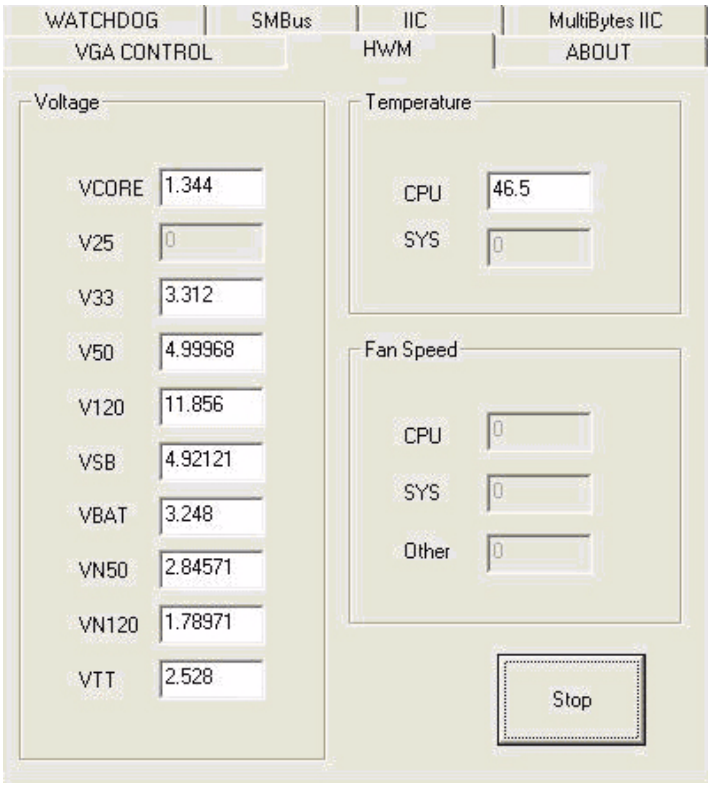
- **Watchdog**



When the application is executed, it will display watchdog information in the WATCHDOG INFORMATION group box. It displays max timeout, min timeout, and timeout steps in milliseconds. For example, a 1~255 seconds watchdog will has 255000 max timeout, 1000 min timeout, and 1000 timeout steps. You can test the functionality of the watchdog as follows

- Set the timeout value 3000 (3 sec.) in the SET TIMEOUT field and set the delay value 2000 (2 sec.) in the SET DELAY field, then click the START button. The Timeout Countdown field will countdown the watchdog timer and display 5000 (5 sec.).
- Before the timer counts down to zero, you can reset the timer by clicking the REFRESH button. After you click this button, the Timeout Countdown field will display the value of the SET TIMEOUT field.
- If you want to stop the watchdog timer, you just click the STOP button.

Hardware Monitor



CL

When the Monitor application is executed by clicking the button, hardware monitoring data values will be displayed. If certain data values are not supported by the platform, the correspondent data field will be grayed-out with a value of 0.

Chapter 5

Extension I/O Installation

Sections include:

- **SODIMM**

5.1 SODIMM

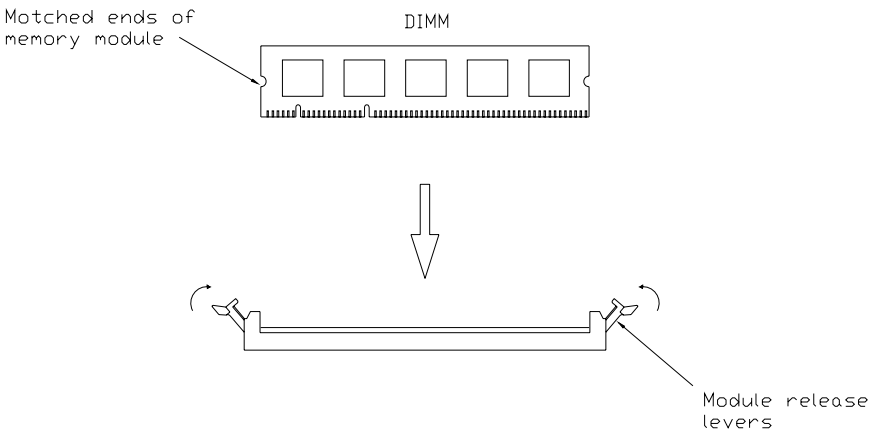


Figure 5.1 SODIMM

To add a DIMM to the single board computer, follow the steps:

1. Move the module release levers on the single board computer (one on each end of the socket) outward, away form the socket (See Figure 5.1).
2. Place the DIMM card so that the notch on the contact edge lines up with the alignment node in the DIMM socket. Insert the DIMM card into the socket.
3. Using both hands, press downward and guide the DIMM card into the socket until it snaps into place. The module release levers will return to their upright position when the DIMM card is completely seated in the socket. The pegs on the tips of the release levers should align with the notches on both ends of the DIMM card.

5.2 PC-104 Plus

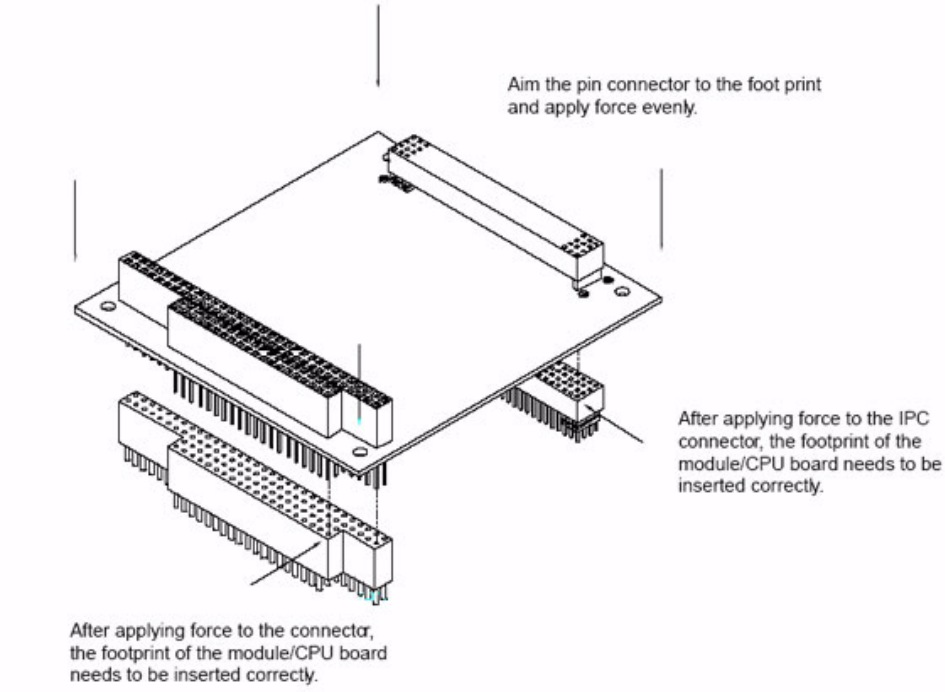


Figure 5.2 PC-104 Plus

Appendix A

Programming the GPIO & Watchdog Timer

A.1 Programming the Watchdog Timer

```
    ;The SCH3114/SCH3106 Runtime base I/O address is 800h
    ;Setting WatchDog time value location at offset 66h
    ;If set value "0", it is mean disable WatchDog function.
    Superio_GPIO_Port = 800h
    mov   dx,Superio_GPIO_Port + 66h
    mov   al,00h
    out   dx,al

model small
            .486p
            .stack 256
            .data
            SCH3114_IO   EQU   800h
            .code
            org     100h
 .STARTup
;=================================================
;47H
;enable WDT function bit [3:2]=11
;=================================================

            mov   dx,SCH3114_IO + 47h
            mov   al,0ch
            out   dx,al

;=================================================
;65H
;bit [1:0]=Reserved
;bit [6:2]Reserve=00000
;bit [7] WDT time-out Value Units Select
;Minutes=0 (default) Seconds=1
;=================================================

            mov   dx,SCH3114_IO + 65h ;
            mov   al,080h
            out   dx,al

;=================================================
;66H
;WDT timer time-out value
;bit[7:0]=0~255
;=================================================
```

```
            mov   dx,SCH3114_IO + 66h
            mov   al,01h
            out   dx,al

;=====================================================
;bit[0] status bit R/W
;WD timeout occurred =1
;WD timer counting = 0
;=====================================================

            mov   dx,SCH3114_IO + 68h
            mov   al,01h
            out   dx,al
            .exit
             END
```

A.2 GPIO Sample Code

```
;=====================================================

    NEWIODELAY Macro
            out  0ebh,al
            ENDM

;=====================================================
.model small
            .486p
            .stack 256
            .data
;=====================================================
Data Area
;=====================================================
SMBus_Port              EQU500h
    PCA9554_ID          EQU  40h
    PCA9554_ID2         EQU  4Eh
    Input_Reg           EQU  00h
    Output_Reg          EQU  01h
    Inversion_Reg       EQU  02h
    Configure_Reg       EQU  03h
;RA02    Advantech_Str       db  'Advantech Company Copyright (C) 2005 Design by Duncan',0AH,0Dh,'$'
    Advantech_Str       db  'Advantech Company Copyright (C) 2005 Design by Duncan, Modify by Steven',0AH,0Dh,'$'   ;RA02
    GX3_Fun_Str         db  'Check Philip GPIO function.',0Ah,0Dh,'$'
    Note1_Str           db  'Test Method: GPIO 0 connect to GPIO 1.',0Ah,0Dh,'$'
    Note2_Str           db  '             GPIO 2 connect to GPIO 3.',0Ah,0Dh,'$'
    Note3_Str           db  '             GPIO 4 connect to GPIO 5.',0Ah,0Dh,'$'
```

```
    Note4_Str           db  '           GPIO 6 connect to GPIO 7.',0Ah,0Dh,'$'
    Success1_Str        db  'First GPIO Chip Test success !!  ',0Ah,0Dh,'$'
    Success2_Str        db  'Second GPIO Chip Test success !! ',0Ah,0Dh,'$'
;RA02 - START
Success_lenght  EQU     ($ - offset Success1_Str) / 2
                    db  'Third GPIO Chip Test success !!  ',0Ah,0Dh,'$'
                    db  'Fouth GPIO Chip Test success !!  ',0Ah,0Dh,'$'
                    db  'Fifth GPIO Chip Test success !!  ',0Ah,0Dh,'$'
                    db  'Sixth GPIO Chip Test success !!  ',0Ah,0Dh,'$'
                    db  'Seventh GPIO Chip Test success !!',0Ah,0Dh,'$'
                    db  'Eighth GPIO Chip Test success !! ',0Ah,0Dh,'$'
;RA02 - END
    Fail_Str            db  'First GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
    Fail2_Str           db  'Second GPIO Chip Test Fail !! ',0Ah,0Dh,'$'
;RA02 - START
Fail_lenght     EQU     ($ - offset Fail_Str) / 2
                    db  'Third GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
                    db  'Fouth GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
                    db  'Fifth GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
                    db  'Sixth GPIO Chip Test Fail !!  ',0Ah,0Dh,'$'
                    db  'Seventh GPIO Chip Test Fail !!',0Ah,0Dh,'$'
                    db  'Eighth GPIO Chip Test Fail !! ',0Ah,0Dh,'$'
    Error_Str1          db  'Error !! The system has no GPIO Chip or no support INT15
hook! ',0Ah,0Dh,'$'
;RA02 - END

;=====================================================
;               Main Program Start
;=====================================================
;=====================================================
 .code
               org     100h
 .STARTup
              ;Clear Screen
               pusha
               lea     dx, Advantech_Str
               mov     ah,09h
               int     21h
               lea     dx, GX3_Fun_Str
               mov     ah,09h
               int     21h
               lea     dx, Note1_Str
               mov     ah,09h
               int     21h
               lea     dx, Note2_Str
               mov     ah,09h
```

```
            int     21h
            lea     dx, Note3_Str
            mov     ah,09h
            int     21h
            lea     dx, Note4_Str
            mov     ah,09h
            int     21h
;RA02 - START
;=====================================================
;       Get Number of GPIO group
;       one group mean 8 gpio pins(one GPIO Chip)
; Input:
;       ax=5E87h
;       bh=00h
; output:
;       ax=5E78         ;function success, other value means function fail
;       cl= n group of gpio
;=====================================================

;=====================================================
;       Get GPIO Config
; Input:
;       ax=5E87h
;       bh=01h
;       cl= n ; n means which group of GPIO you want to get
; output:
;       ax=5E78         ;function success, other value means function fail
;       bl= the n group of gpio config
;          bit 0 = gpio 0 , 0 => output pin; 1 => input pin
;          bit 1 = gpio 1 , 0 => output pin; 1 => input pin
;             .....
;          bit 7 = gpio 7 , 0 => output pin; 1 => input pin
;=====================================================

;=====================================================
;       Set GPIO Config
; Input:
;       ax=5E87h
;       bh=02h
;       cl= n ; n means which group of GPIO you want to set
;       bl= the n group of gpio config
;          bit 0 = gpio 0 , 0 => output pin; 1 => input pin
;          bit 1 = gpio 1 , 0 => output pin; 1 => input pin
;             .....
;          bit 7 = gpio 7 , 0 => output pin; 1 => input pin
```

```
; output:
;       ax=5E78         ;function success, other value means function fail
;=====================================================

;=====================================================
;       Get GPIO status
; Input:
;       ax=5E87h
;       bh=03h
;       cl= n ; n means which group of GPIO you want to get
; output:
;       ax=5E78         ;function success, other value means function fail
;       bl= the n group of gpio status
;          bit 0 = gpio 0 , 0 => Low; 1 => High
;          bit 1 = gpio 1 , 0 => Low; 1 => High
;             .....
;          bit 7 = gpio 7 , 0 => Low; 1 => High
;=====================================================

;=====================================================
;       Set GPIO status
; Input:
;       ax=5E87h
;       bh=04h
;       cl= n ; n means which group of GPIO you want to set
;       bl= the n group of gpio status
;          bit 0 = gpio 0 , 0 => Low; 1 => High
;          bit 1 = gpio 1 , 0 => Low; 1 => High
;             .....
;          bit 7 = gpio 7 , 0 => Low; 1 => High
; output:
;       ax=5E78         ;function success, other value means function fail
;=====================================================
;RA02 - END
;RA02 - START
              mov     ax,5e87h
              mov     bh,00h
              int     15h
              cmp     ax,5e78h
              je      next_test

              lea     dx, Error_Str1
              mov     ah,09h
              int     21h
              jmp     Finish_Test
```

```
next_test:
            xor     ch,ch
            push    cx              ;save NO. of GPIO chip
;RA02 - END
        ;1.Set GPIO 0,2,4,6 as output, GPI 1,3,5,7 as input
;RA02 - START
            mov     ax,5e87h
            mov     bx,02aah
            int     15h
;RA02 - END
        ;2. Set GPIO 0,2,4,6 Output Low
;RA02 - START
            pop     cx              ;restore  NO. of GPIO chip
            push    cx              ;save NO. of GPIO chip
            mov     ax,5e87h
            mov     bx,0400h
            int     15h
;RA02 - END
        ;3. Check GPI 1,3,5,7 value
;RA02 - START
            pop     cx              ;restore  NO. of GPIO chip
            push    cx              ;save NO. of GPIO chip
            mov     ax,5e87h
            mov     bx,03FFh
            int     15h

            pop     cx              ;restore  NO. of GPIO chip
            push    cx              ;save NO. of GPIO chip
            dec     cx

            mov     al,Fail_lenght
            mul     cl
            lea     dx, Fail_Str
            add     dx,ax
            cmp     bl,00
            jne     test_result


        ;4. Set GPIO 0,2,4,6 Output differential
            pop     cx              ;restore  NO. of GPIO chip
            push    cx              ;save NO. of GPIO chip
            mov     ax,5e87h
            mov     bx,0411h
            int     15h
        ;5. Check GPI 1,3,5,7 value
```

```
                pop     cx              ;restore  NO. of GPIO chip
                push    cx              ;save NO. of GPIO chip
                mov     ax,5e87h
                mov     bx,03FFh
                int     15h

                pop     cx              ;restore  NO. of GPIO chip
                push    cx              ;save NO. of GPIO chip
                dec     cx

                mov     al,Fail_lenght
                mul     cl
                lea     dx, Fail_Str
                add     dx,ax
                cmp     bl,33h
                jne    test_result

;RA02 - END


;RA02                cmp    al,00h
;RA02                jne    test_fail
        ;4.Set GPIO 1,3,5,7 as output,GPIO 0,2,4,6 as input
;RA02 - START
                pop     cx
                push    cx
                mov     ax,5e87h
                mov     bx,0255h
                int     15h
;RA02 - END
       ;4. Set GPIO 1,3,5,7 Output High
;RA02 - START
                pop     cx              ;restore  NO. of GPIO chip
                push    cx              ;save NO. of GPIO chip
                mov     ax,5e87h
                mov     bx,04ffh
                int     15h
;RA02 - END
       ;6. Check GPIO 0,2,4,6 value
;RA02 - START
                pop     cx              ;restore  NO. of GPIO chip
                push    cx              ;save NO. of GPIO chip
                mov     ax,5e87h
                mov     bx,0300h
                int     15h
```

```
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    dec     cx

    mov     al,Fail_lenght
    mul     cl
    lea     dx, Fail_Str
    add     dx,ax
    cmp     bl,0ffh
    jne     test_result


;4. Set GPIO 1,3,5,7 Output differential
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,0422h
    int     15h
;5. Check GPI 0,2,4,6 value
    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    mov     ax,5e87h
    mov     bx,03FFh
    int     15h

    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    dec     cx

    mov     al,Fail_lenght
    mul     cl
    lea     dx, Fail_Str
    add     dx,ax
    cmp     bl,33h
    jne     test_result

    pop     cx              ;restore  NO. of GPIO chip
    push    cx              ;save NO. of GPIO chip
    dec     cx
    mov     al,Success_lenght
    mul     cl
    lea     dx, Success1_Str
    add     dx,ax
```

```
            ;Do Second PCA9554 test
            ;1.Set GPIO 0,2,4,6 as output, GPI 1,3,5,7 as input

test_result:
                mov     ah,09h
                int     21h
                pop     cx
                dec     cx
                jnz     next_test
    Finish_Test:
                popa
                .exit
;[]=====================================================[]
;Input     : CL - register index
;            CH - device ID
;Output : AL - Value read
;[]=====================================================[]
Ct_I2CReadByteProcNear

                    push  cx

                    mov   dx,SMBus_Port +04h
                    inc     ch
                    mov   al,ch                 ;ID cmd(read)
                    out     dx,al
                    NEWIODELAY
                    NEWIODELAY

                    call    CT_Chk_SMBus_Ready

                    pop   ax
                    mov   dl,03h
                    out     dx,al               ;Index
                    NEWIODELAY
                    NEWIODELAY

                    mov   dl,02h
                    mov   al,48h
                    out     dx,al               ;Read data
                    NEWIODELAY
                    NEWIODELAY

                    mov   cx, 100h

                @@:
```

```
                newiodelay
                loop  short @B

                call  CT_Chk_SMBus_Ready

                mov   dl,05
                in    al,dx             ;Data0
                NEWIODELAY
                NEWIODELAY

                ret
Ct_I2CReadByteEndp
;[]=================================================[]
;Input : CL - register index
;        CH - device ID
;        AL - Value to write
;Output: none
;[]=================================================[]
Ct_I2CWriteByteProcNear

                push  ax
                push  cx

                mov   dx,SMBus_Port +04h
                mov   al,ch             ;ID cmd(Write)
                out   dx,al
                call  Delay5ms
                call  Delay5ms

                call  CT_Chk_SMBus_Ready

                pop   ax
                mov   dl,03h
                out   dx,al             ;Index
                call  Delay5ms
                call  Delay5ms

                pop   ax
                mov   dl,05
                out   dx,al             ;Data0
                call  Delay5ms
                call  Delay5ms

                mov   dl,02h
                mov   al,48h
```

```
                out   dx,al             ;write data
                call  Delay5ms
                call  Delay5ms

                mov   cx, 100h
        @@:
                newiodelay
                loop  short @B

                call  CT_Chk_SMBus_Ready

                ret
Ct_I2CWriteByteEndp
CT_Chk_SMBus_ReadyProcNear
                mov   dx,SMBus_Port + 0;status port
                clc
                mov   cx,0800h
Chk_I2c_OK:
                in    al,dx       ;get status
                NEWIODELAY
                out   dx,al       ;clear status
                NEWIODELAY

                test  al, 02H     ;termination of command ?
                jnz   short Clear_final

                and   al, NOT 40H;mask INUSE bit
                or    al,al       ;status OK ?
                jz    short Clear_final

                test  al,04h      ;device error
                jnz   short SMBus_Err

                loop  short Chk_I2c_OK
        ;SMbus error due to timeout
SMBus_Err:

                stc
                ret
Clear_final:
                clc
                ret
CT_Chk_SMBus_ReadyEndp
```

```
;=====================================================
Delay5msprocnear
                push  cx
                mov   cx, 1000
          @@:
                NEWIODELAY
                loop  short @B
                pop   cx
                ret
Delay5ms        ENDP
Phoenix_debuger  proc near
              pushf
              push cx
              push offset PhdebugRetAddr
              push cs
              push cs
              db 0EAh
              dw 0013h
              dw 0DA00h
PhdebugRetAddr:
              popf
Phoenix_debuger  endp
;=====================================================
;           Program  END
;=====================================================

      END
```

Appendix B

System Assignments

B.1 System I/O Ports

Table B.1: System I/O Ports

Addr. Range (Hex)	Device
00h-08h	DMA Controller
09h-0Eh	DMA Controller
0Fh	DMA Controller
10h-18h	No Specific Usage
19h-1Eh	No Specific Usage
1Fh	No Specific Usage
20h-21h	Interrupt Controller
2E-2F	LPC SIO
30h-3Dh	No Specific Usage
40h-42h	Timer/Counter
43h	Timer
4E-4F	LPC SIO
50h-52h	Timer/Counter
53h	RESERVED
60h	Keyboard/Mouse - Data Port
61h	Port B Control
62h-63h	No Specific Usage
64h	Keyboard/Mouse - Command/ Status
70h-71	RTC RAM Address/Data Port
72h-73h	High RTC RAM Address/Data Port
80h	Post Code Display
81h-8Fh	DMA Controller
92h	Port A Control
A0h-A1h	PIC Slave - Command/Status
B2h-B3h	Power Management
C0h-DEh	DMA Controller
170h-177h	IDE Controller
1F0h-1F7h	IDE Controller
2E8h-2EFh	UART - COM4
2F8h-2FFh	UART/IR - COM2
376h	IDE Controller
3F6h	IDE Controller
3E8h-3EFh	UART - COM3
3F8h-3FFh	UART - COM1
4D0h-4D1h	Interrupt Controller
4E8h-4EFh	UART - COM5
4F8h-4FFh	UART - COM6

* Refer to AMD CS5536 Datasheet Table 4.6.

B.2 1st MB memory map

Table B.2: 1st MB Memory Map	
Addr. Range (Hex)	**Device**
E0000h - FFFFFh	System ROM
CC000h - DFFFFh	Available
C0000h - C7FFFh	VGA BIOS
B8000h - BFFFFh	CGA/EGA/VGA text
B0000h - B7FFFh	Reserved for graphic mode usage
A0000h - AFFFFh	EGA/VGA graphics
00000h - 9FFFFh	Base memory

B.3 DMA Channel Assignments

Table B.3: DMA Channel Assignments	
Channel	**Function**
0	Available
1	Available
2	Floppy disk (8-bit transfer)
3	Available (parallel port)**
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

** Parallel port DMA default setting: DMA 3, Parallel port DMA selection: DMA 1 or 3.

B.4 Interrupt Assignments

Table B.4: Interrupt Assignments

Interrupt#	Interrupt source
IRQ0	Interval timer
IRQ1	Keyboard
IRQ2	Second 8259A
IRQ3	COM2
IRQ4	COM1
IRQ5	COM6
IRQ6	COM4
IRQ7	LPT
IRQ8	Real time clock
IRQ9	Redirected IRQ2
IRQ10	COM3
IRQ11	COM5
IRQ12	Reserved
IRQ13	Math Coprocessor
IRQ14	Fixed Disk
IRQ15	Reserved

* Refer to the table of msd.exe

Appendix C

2nd RTC

C.1 2nd RTC

A. Configuration:

1. Choose Cofing -> select IO Space
2. Type IO space is 0B00h

B. Read Data from I2C:

1. Register 04h -> Setting Address 0D1h
2. Register 03h -> Setting 2nd RTC of register, ex: 00h ~ 06h
3. Register 02h -> Write value 48h
4. Register 05h -> Read data form here
5. Register 00h -> Write value 02h

C. Write Data to I2C:

1. Register 04h -> Setting Address 0D0h
2. Register 03h -> Setting 2nd RTC of register, ex: 00h ~ 06h
3. Register 05h -> Writing user data(Means second, date, year or century)
4. Register 02h -> Write value 48h
5. Register 00h -> Write value 02h

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