SBC-6223

PICMG 1.3
Single Board Computer

User Manual

2008/2/27

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Packing List

Please check the content:

SBC-6223 single board computer	1 PC
Utility CD (including user manual)	1 PC
RAID Driver Floppy Disk	1 PC
Floppy Cable	1 PC
PS/2 Keyboard & Mouse Cable	1 PC
SATA Cable	2 PCS
DB25 & DB9 Printer & COM port Cable	1 PC
COM port Cable (A2GN only)	1 PC
USB Cable	2 PCS
Audio Cable	1 PC

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Chapter 1 Product Introduction

1.1 Product Overview

SBC-6223 is the Full-size single board computer with last Intel desktop technology with PICMG1.3 form factor. Based on Intel® Q965 and ICH8DO, the board integrates a new Core 2 Duo/Quad processor 775-pin socket, DDR2 memory socket, Intel® Graphic Media Accelerator 3000 technology, Serial ATA II with RAID function for a powerful desktop system.

Intel® LGA775 processor

The Intel® Core 2 Duo/Quad processor now comes with a new form factor with 775-pin PLGA package, for 533/800/1066MHz front-side-bus, 4MB L2 cache, and for 65nm manufacturing technology, the PLGA processor without pin header on solder side can make user installing the processor on the socket easier.

Intel® Q965 and ICH8DO chipset

The Intel Q965 integrates DDR2 533/667/800MHz for memory, and Graphic Media Accelerator (GMA) 3000 technology for new graphic engine. It can provide up to 256MB of frame buffer when you install over 1GB of system memory. The ICH8DO integrates with up to 10 USB2.0 interfaces, and serial ATA II interface with RAID function.

Flexible Extension Interface

The board provides one mini-PCI socket.

1.2 Product Specification

General Specification	
Form Factor	PICMG 1.3 full-size single board computer
CPU	Intel® Core 2 Duo Core / 2 Quad / Pentium 4 / Pentium D / Celeron D processor Package type: PLGA 775 Intel® Hyper-Threading Technology and Dual/Quad core supported
Front Side Bus	533/800/1066MHz
Memory	2 x 240-pin DIMM supports DDR2 533/667/800 up to 4GB
Chipset	Intel Q965 & ICH8DO
BIOS	Phoenix-Award v6.00PG 8Mb SPI flash BIOS
Watchdog Timer	System reset programmable watchdog timer with 1~255min.
Serial ATA	Intel® ICH8DO integrates 6 Serial ATA II interface RAID 0, 1,5,10 Intel Matrix Storage Technology supported

Multiple I/O Ports	
Chipset	Intel® 82801HDO(ICH8DO) with Winbond® W83627DHG controller
Serial Port	One RS-232 and one RS232/422/485 serial ports
GPIO	8-bit GPIO port with pin header
Hardware monitor	System temperature, voltage, fan speed, auto throttling control when CPU overheat
Floppy	1 x 34-pin FDD port, up to 2 devices
Parallel Port	One internal bi-direction parallel port with SPP/ECP/EPP mode

Keyboard / Mouse	External PS/2 keyboard and mouse port on bracket Onboard 5-pin header keyboard ports
IrDA	1 x onboard pin header IrDA port
Smart Fan	One CPU fan connector for fan speed controllable

Display	
Graphic Engine	Intel Q965 integrated GMA (Graphic Media Accelerator) 3000
Frame Buffer	Up to 256MB shard with system memory
Display Type	VGA D-sub 15-pin output

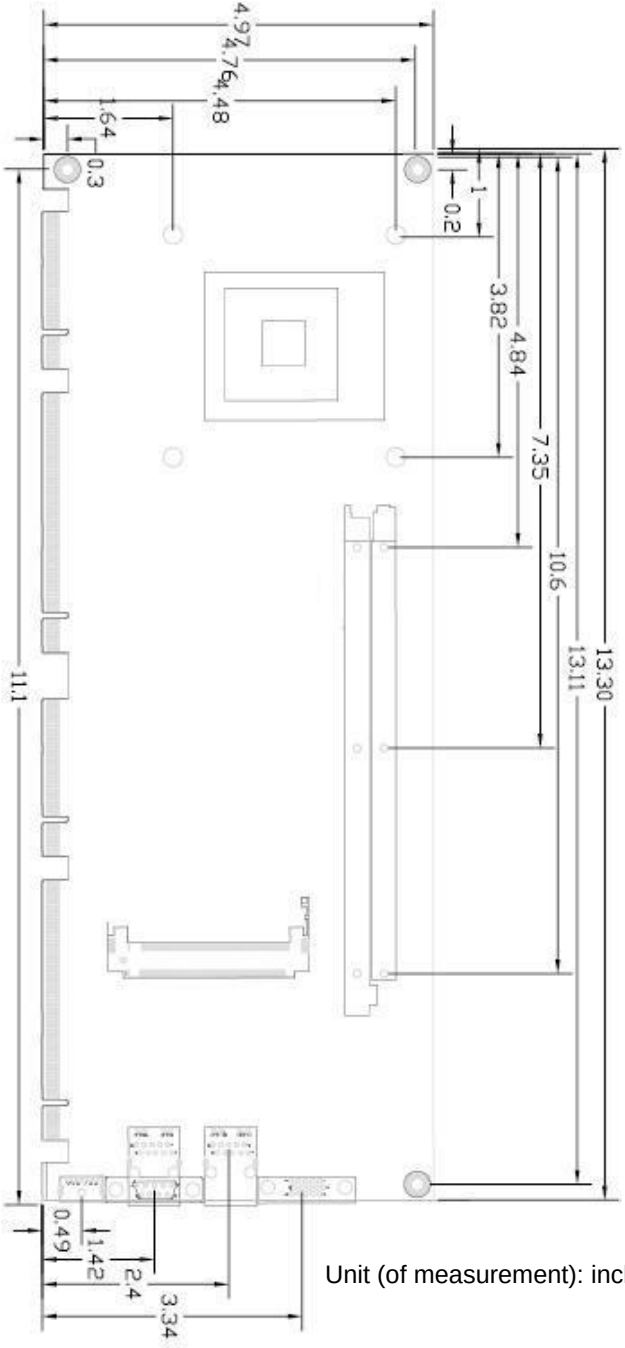
Ethernet	
Controller	One or two Intel 82573L Gigabit Ethernet controllers
Speed	10/100/1000Mbps
Connector	Two External RJ45 connectors with LED on bracket

Audio	
Codec	Intel® ICH8DO with Realtek ALC260 HD Audio Intel High Definition Audio compliance
Output	2 channels

Expansion	
Mini PCI	One Mini-PCI socket TYPE III A (32-bit, 33MHz) Power supply: +3.3V, +5V, 3VSB
PCI-Express	One X16 and one X4 or four X1 on PICMG 1.3 Interface
PCI	Four PCI bus master on PICMG 1.3 Interface

Power & Environment	
Power Requirement	+5V, +12 DC input & $5V_{SB}$
Dimension	338(L) x 122(H)mm
Temperature	Operating temperature: 0°C ~ 60°C
Humidity	0 ~ 90% relative humidity, no condensing

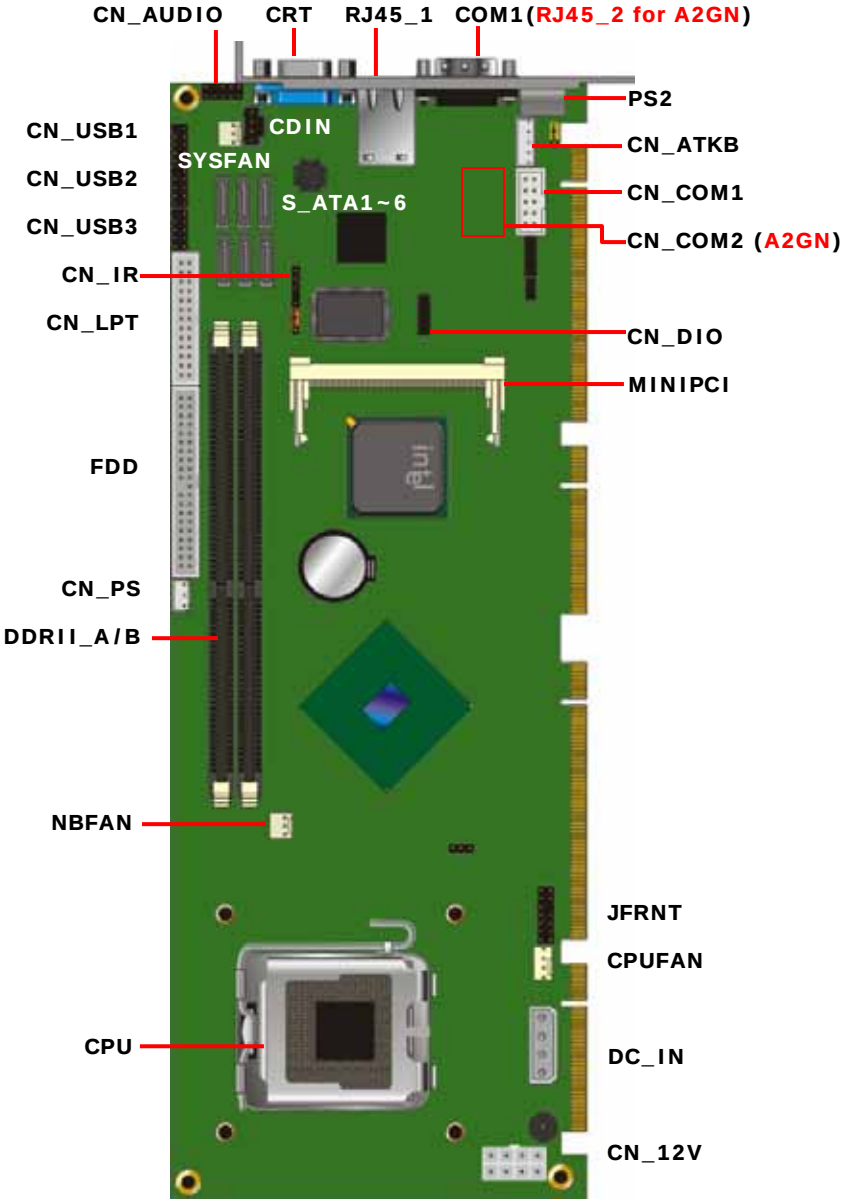
1.3 Mechanical Drawing



Unit (of measurement): inches

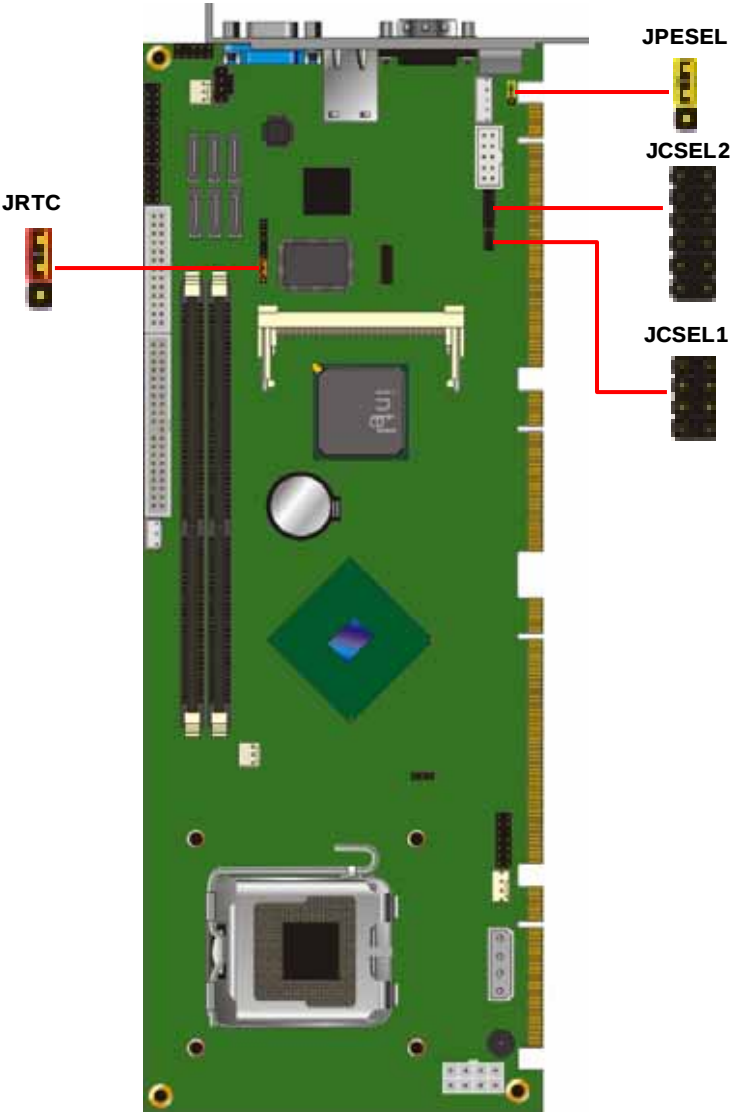
Chapter 2 Hardware Installation

2.1 Board Layout



2.2 Jumper List

Jumper	Description	Default
JRTC	CMOS Operating/Clear Setting	2-3: Normal Operation
JPESEL	For set x4 or x1 PCI-Express	2-3: x1
JCSEL1	COM2 RS232/422/485 set	1-3; 2-4; 7-9; 8-10: RS232
JCSEL2	COM2 RS232/422/485 set	1-2: RS232



2.3 Connector List

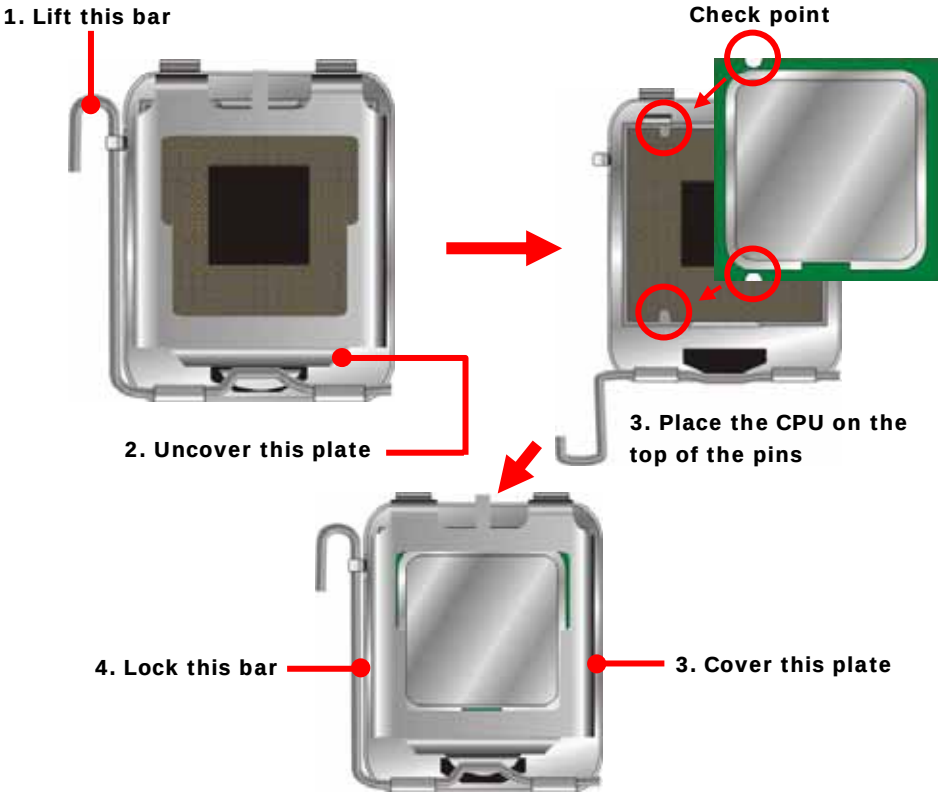
Connector	Description
CPU	LGA775 CPU socket
DDRIIA/B	240 -pin DDR2 SDRAM DIMM socket
FDD	34-pin floppy connector
CN_LPT	13 x 2-pin LPT connector
S_ATAII1/2/3/4/5/6	7-pin Serial ATA II connector
CN_12V	8-pin +12V additional power supply connector
CN_AUDIO	5 x 2-pin audio connector
CDIN	4-pin CD-ROM audio input connector
CN_PS	3-pin ATX function connector
DC_IN	4-pin power supply connector
CN_DIO	6 x 2-pin digital I/O connector
CN_USB1/2/3	10-pin USB connector
CPUFAN	4-pin CPU cooler fan connector
SYSFAN	3-pin system cooler fan connector
NBFAN	3-pin Northbridge cooler fan connector
CN_IR	5-pin IrDA connector
CN_ATKB	5-pin AT keyboard connector
JFRNT	14-pin front panel switch/indicator connector
Mini-PCI	1 x 124-pin Mini-PCI socket
CN_COM1 (A2GN)	5 x 2-pin com connector
CN_COM2	5 x 2-pin com connector
CRT	DB15 VGA connector
COM1 (AGN)	DB9 RS232 serial port
RJ45_1	One RJ45 LAN connector
RJ45_2 (A2GN)	One RJ45 LAN connector
PS2	PS/2 keyboard and mouse connector

2.4 CPU Installation

The board supports Intel Desktop Processors as:

Socket Type	LGA775
Front Side Bus	533/800/1066MHz
Generation	Intel Core 2 Duo/Quad Processors

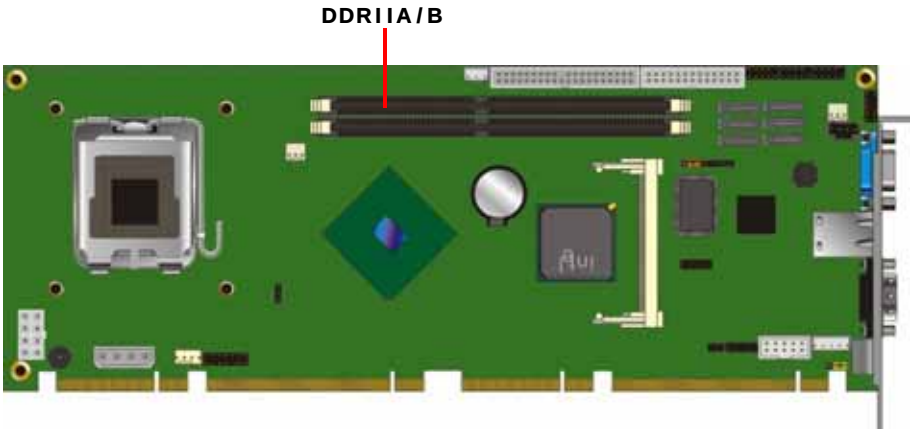
Please follow the installation steps:

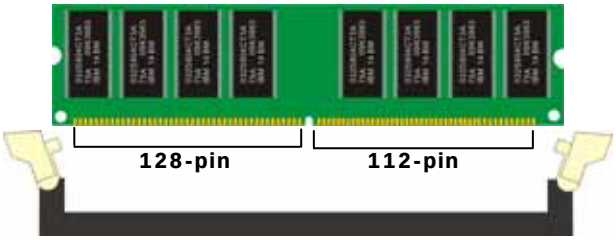


Notice: Please place the CPU on the pins tenderly to avoid bending the pins

2.5 Memory Installation

The board has two 240-pin DDR2 DIMM support up to 4GB of memory capacity. The memory frequency supports 533/667/800MHz. Only Non-ECC memory is supported.





Please check the pin number to match the socket side well before installing memory module.

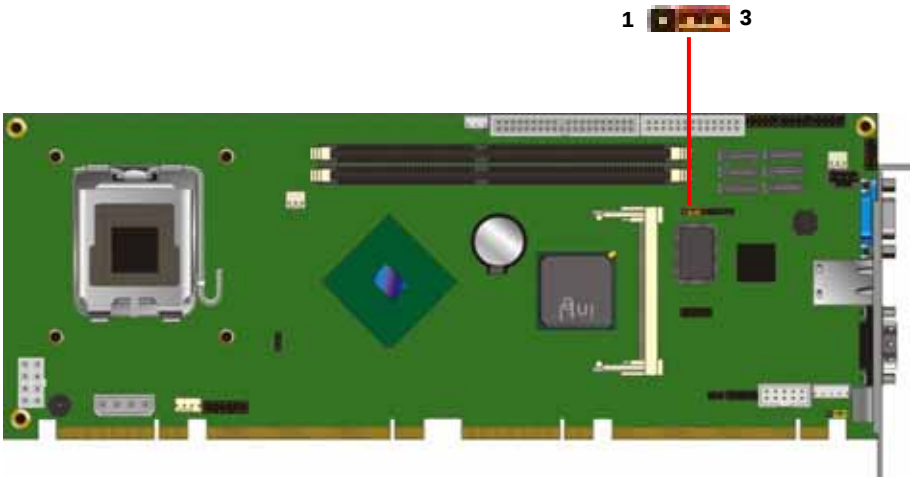
2.6 CMOS Setup

The board's data of CMOS can be setting in BIOS. If the board refuses to boot due to inappropriate CMOS settings, here is how to proceed to clear (reset) the CMOS to its default values.

Jumper: JRTC

Type: Onboard 3-pin jumper

JRTC	Mode
1-2	Clear CMOS
2-3	Normal Operation
Default setting	



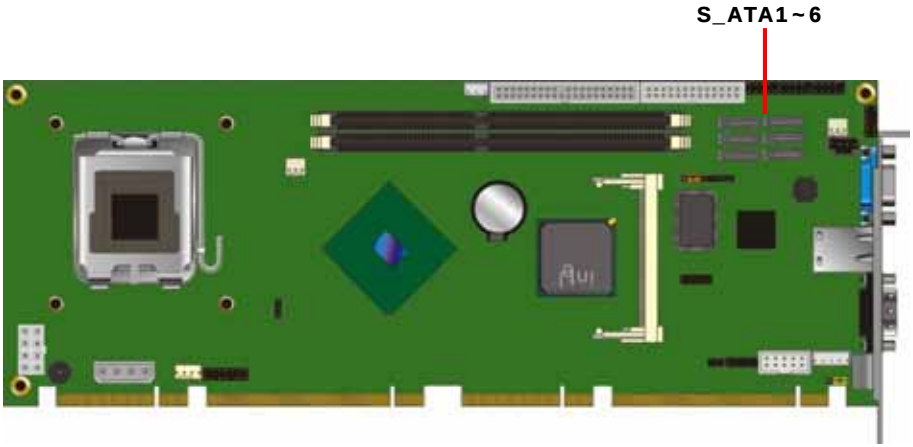
2.7 Serial ATA

The board has six Serial ATA II interfaces with RAID function, the transfer rate of the Serial ATA II can be up to 300MB/s. Please go to http://www.serialata.org/ for more about Serial ATA technology information. Based on Intel® ICH8DO, it supports **Intel® Matrix Storage Technology** with combination of RAID 0, 1, 5 and 10. The main features of RAID on ICH8DO are listed below:

1. Supports for up to RAID volumes on a single, two-hard drive RAID array.
2. Supports for two, two-hard drive RAID arrays on any of six Serial ATA ports.
3. Supports for Serial ATA ATAPI devices.
4. Supports for RAID spares and automatic rebuild.
5. Supports on RAID arrays, including NCQ and native hot plug.

For more information please visit Intel's official website.

For more about the system setup for Serial ATA, please check the chapter of SATA configuration.



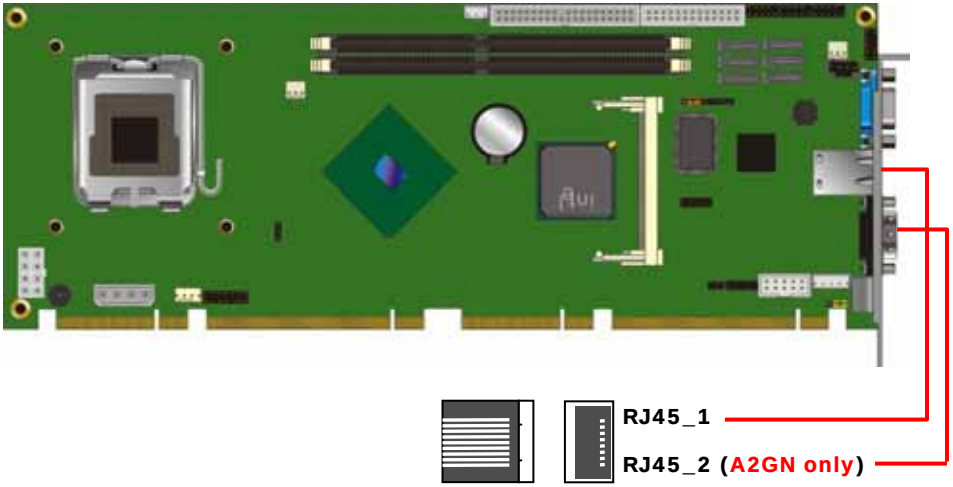
2.8 Ethernet Interface

The Intel 82573L supports triple speed of 10/100/1000Base-T, with IEEE802.3 compliance and Wake-On-LAN supported.

Connector: RJ45_1/2 (RJ45_2 for A2GN only)

Type: RJ45 connector with LED on bracket

Pin	1	2	3	4	5
Description	TRD0+	TRD0-	TRD1+	TRD2+	TRD2-
Pin	**6**	**7**	**8**	**9**	**10**
Description	TRD1-	TRD3+	TRD3-	NC	NC



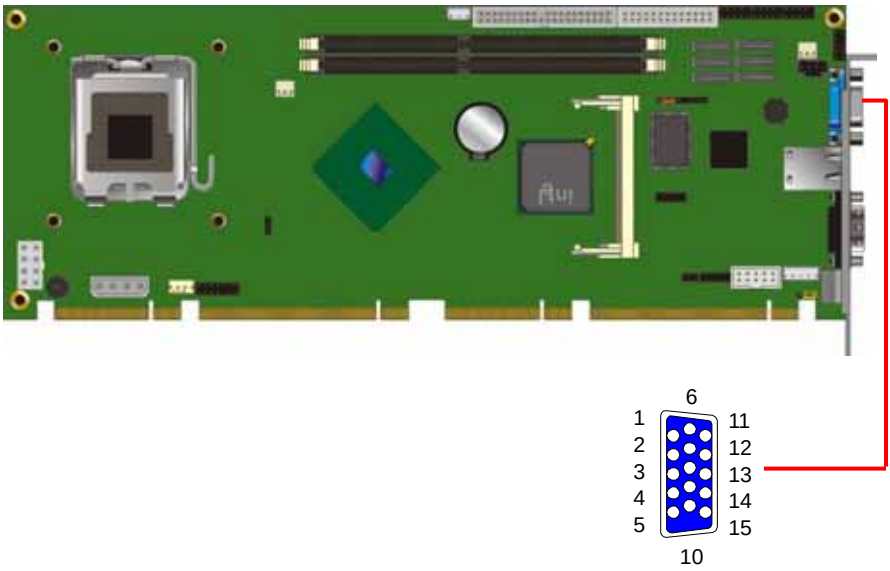
2.9 Display Interface

Based on Intel Q965 chipset with built-in graphics, the board provides one DB15 connector on real external I/O port.

Connector: CRT

Type: DR15 D-sub female connector on bracket

Pin	Description	Pin	Description	Pin	Description
1	RED	6	Ground	11	N/C
2	GREEN	7	Ground	12	DDC_DA
3	BLUE	8	Ground	13	HSYNC
4	N/C	9	+5V	14	VSYNC
5	Ground	10	Ground	15	DDC_CLK



2.10 Audio Interface

The board integrates onboard audio interface with REALTEK ALC260 codec, with Intel next generation of audio standard as High Definition Audio, it offers more vivid sound and other advantages than former HD audio compliance.

The board provides amplified speaker out and Line-in/MIC-in ports for front I/O panel through audio cable.

Connector: CN_AUDIO

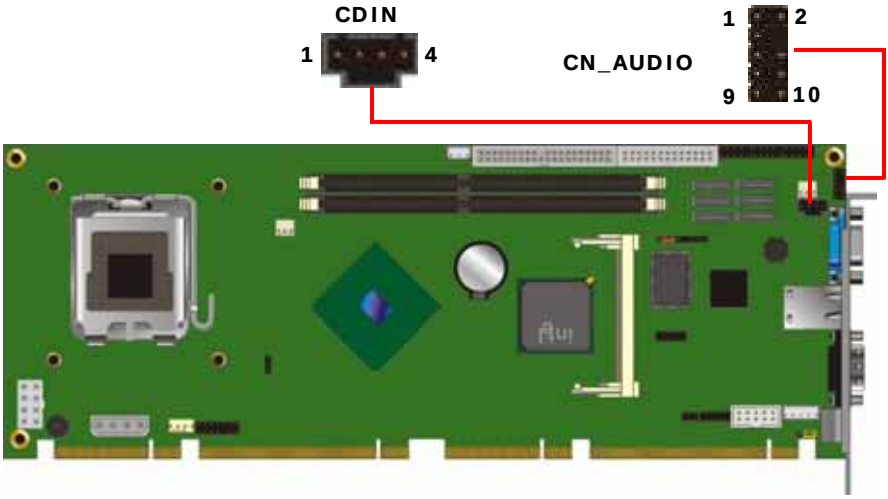
Type: 10-pin (2 x 5) header (pitch = 2.54mm)

Pin	Description	Pin	Description
1	MIC_L	2	Ground
3	MIC_R	4	ACZ_DET
5	Speaker_R	6	MIC Detect
7	SENSE	8	N/C
9	Speaker_L	10	Speaker Detect

Connector: CDIN

Type: 4-pin header (pitch = 2.54mm)

Pin	Description
1	CD – Left
2	Ground
	Ground
4	CD – Right



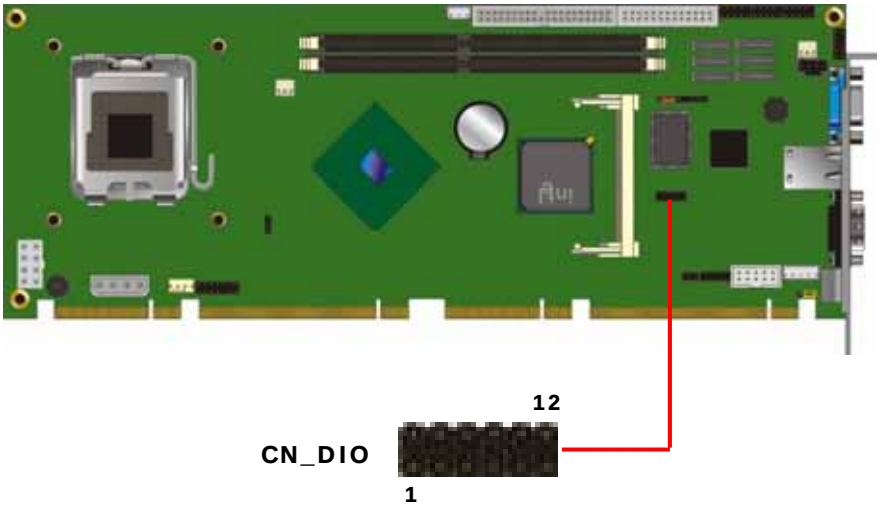
2.11 GPIO Interface

The board provides a programmable 8-bit digital I/O interface for control panel application.

Connector: CN_DIO

Type: onboard 2 x 6-pin header, pitch=2.0mm

Pin	Description	Pin	Description
1	Ground	2	Ground
3	GP10	4	GP14
5	GP11	6	GP15
7	GP12	8	GP16
9	GP13	10	GP17
11	VCC	12	+12V



2.12 USB Connector

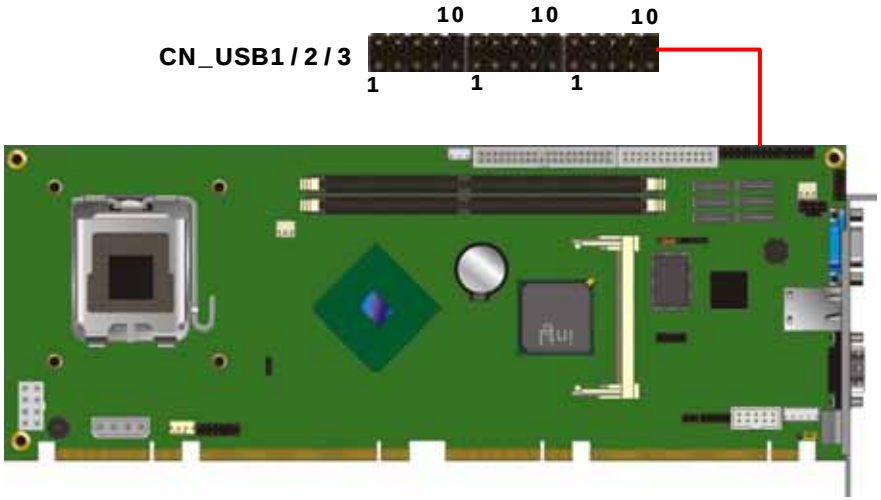
Based on Intel ICH8HDO, the board provides 10 USB2.0 ports six on board pin header for on PICMG 1.3 Interface. The USB2.0 interface provides up to 480Mbps of transferring rate.

The Intel® ICH8DO contains two Enhanced Host Controller Interfaces (EHCI) and five Universal Host Controller Interfaces (UHCI) it can determine whether your connected device is for USB1.1 or USB2.0, and changes the transfer rate automatically.

Connector: CN_USB1 / 2 / 3

Type: 10-pin (5 x 2) header for USB5/6 Ports

Pin	Description	Pin	Description
1	VCC	2	VCC
3	Data0-	4	Data1-
5	Data0+	6	Data1+
7	Ground	8	Ground
9	Ground	10	N/C



2.13 Serial Ports

The board supports one RS232 serial port (**COM1**) and one jumper selectable RS232/422/485 serial ports (**COM2**). The jumper JCSEL1 & JCSEL2 can let you configure the communicating modes for COM2.

Connector: CN_COM1/2 (CN_COM1 for A2GN only)

Type: 10-pin (5 x 2) 2.54mm x 2.54mm-pitch header for COM2

Pin	Description	Pin	Description
1	DCD/422RX-/485-	2	RXD/422RX+/485+
3	TXD/422TX+	4	DTR/422TX-
5	GND	6	DSR
7	RTS	8	CTS
9	RI	10	N/C

Connector: COM1 (AGN only)

Type: 9-pin D-sub male connector on bracket

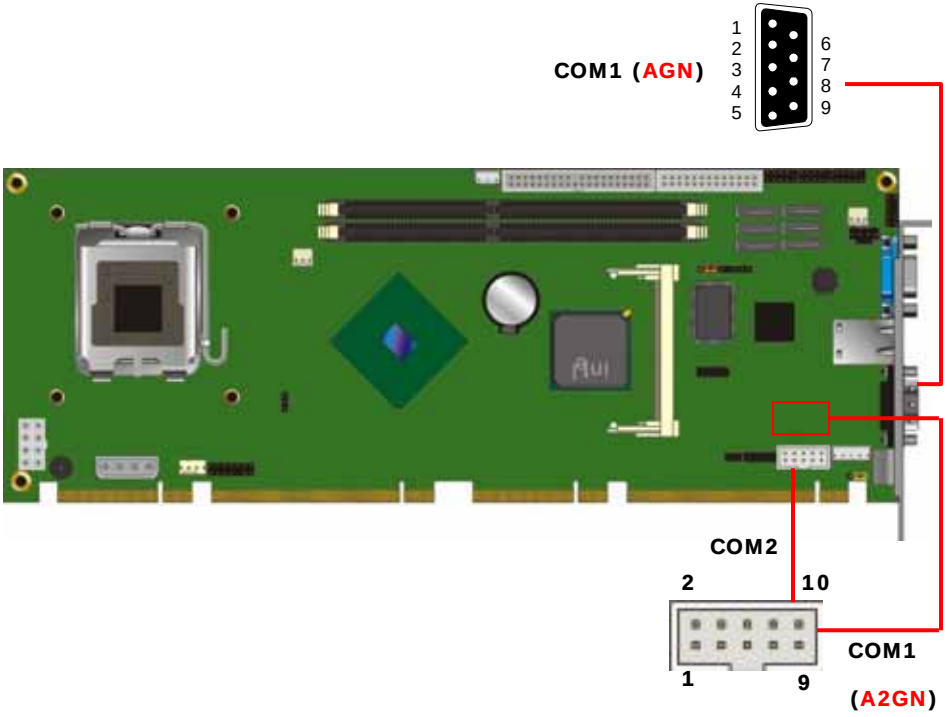
Pin	Description	Pin	Description
1	DCD	6	DSR
2	SIN	7	RTS
3	SO	8	CTS
4	DTR	9	RI
5	Ground		

Jumper: JCSEL1

Options	Settings
RS232 (Default)	1-3; 2-4; 7-9; 8-10
RS422	3-5; 4-6; 9-11; 10-12
RS485	3-5; 4-6; 9-11; 10-12
SIR	1-3; 2-4; 7-9; 8-10

Jumper: JCSEL2

Options	Settings
RS232 (Default)	1-2
RS422	5-6
RS485	3-4
SIR	1-2

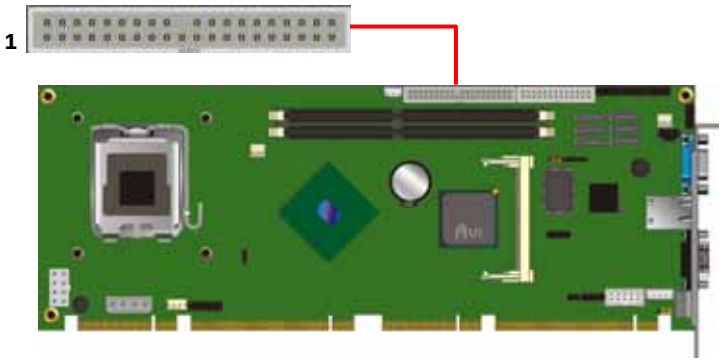


2.14 Floppy Port

Connector: FDD

Type: 34-pin (2x 17) 2.54-pitch box header

Pin	Description	Pin	Description
1	Ground	2	DRIVE DENSITY SELECT 0
3	Ground	4	DRIVE DENSITY SELECT 1
5	Ground	6	N/C
7	Ground	8	INDEX-
9	Ground	10	MOTOR ENABLE A-
11	Ground	12	DRIVER SELECT B-
13	Ground	14	DRIVER SELECT A-
15	Ground	16	MOTOR ENABLE B-
17	Ground	18	DIRECTION-
19	Ground	20	STEP-
21	Ground	22	WRITE DATA-
23	Ground	24	WRITE GATE-
25	Ground	26	TRACK 0-
27	Ground	28	WRITE PROTECT-
29	Ground	30	READ DATA-
31	Ground	32	HEAD SELECT-
33	Ground	34	DISK CHANGE-

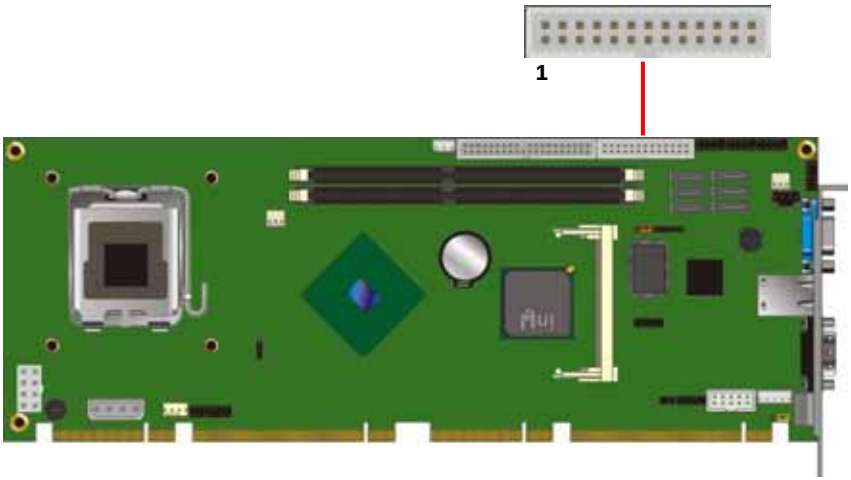


2.15 Printer Port

Connector: LPT

Type: 26-pin (2 x 13) 2.54-pitch box header

Pin	Description	Pin	Description
1	STROBE-	14	AUTO FEED-
2	D0	15	ERROR-
3	D1	16	INITIALIZE-
4	D2	17	SELECT INPUT-
5	D3	18	Ground
6	D4	19	Ground
7	D5	20	Ground
8	D6	21	Ground
9	D7	22	Ground
10	ACKNOWLEDGE-	23	Ground
11	BUSY	24	Ground
12	PAPER EMPTY	25	Ground
13	SELECT+	26	N/C

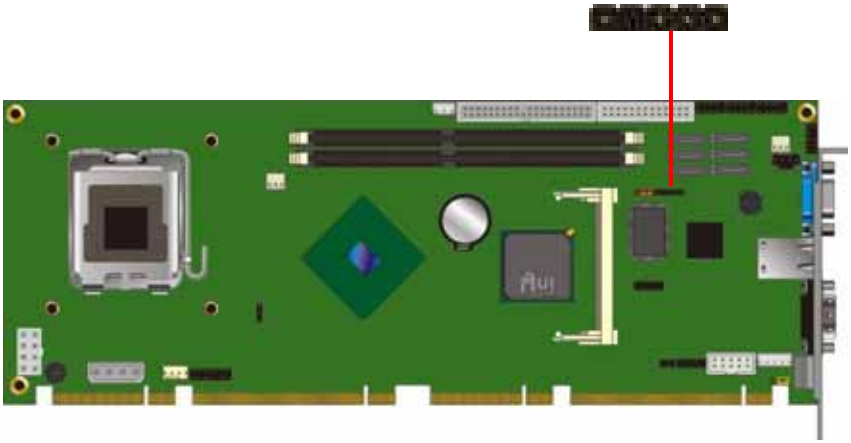


2.16 IrDA Port

Connector: CN_IR

Type: 5-pin header for SIR Port

Pin	Description
1	Vcc
2	N/C
3	IRRX
4	Ground
5	IRTX



2.17 Power & Fan Connectors

The board provides a standard ATX power supply with 4-pin ATX connector and 8-pin additional 12V connector, and the board provides one 4-pin fan connector supporting smart fan for CPU cooler and two 3-pin cooler fan connectors for system and Northbridge chip. The 8-pin CN_12V additional power connector is necessary for CPU powering.

Connector: CN_12V (Additional 12V power input)

Type: 8-pin wafer connector

Pin	Description	Pin	Description
1	GND	2	+12V
3	GND	4	+12V
5	GND	6	+12V
7	GND	8	+12V

Connector: DC_IN (5V/12V power input)

Type: 4-pin P-type wafer connector

Pin	Description	Pin	Description	Pin	Description	Pin	Description
1	+12V	2	Ground	3	Ground	4	+5V

Connector: CN_PS (ATX function control) (Reserved)

Type: 3-pin wafer connector

Pin	Description	Pin	Description	Pin	Description
1	5V Standby	2	Ground	3	Power On

Connector: **NBFAN, SYSFAN**

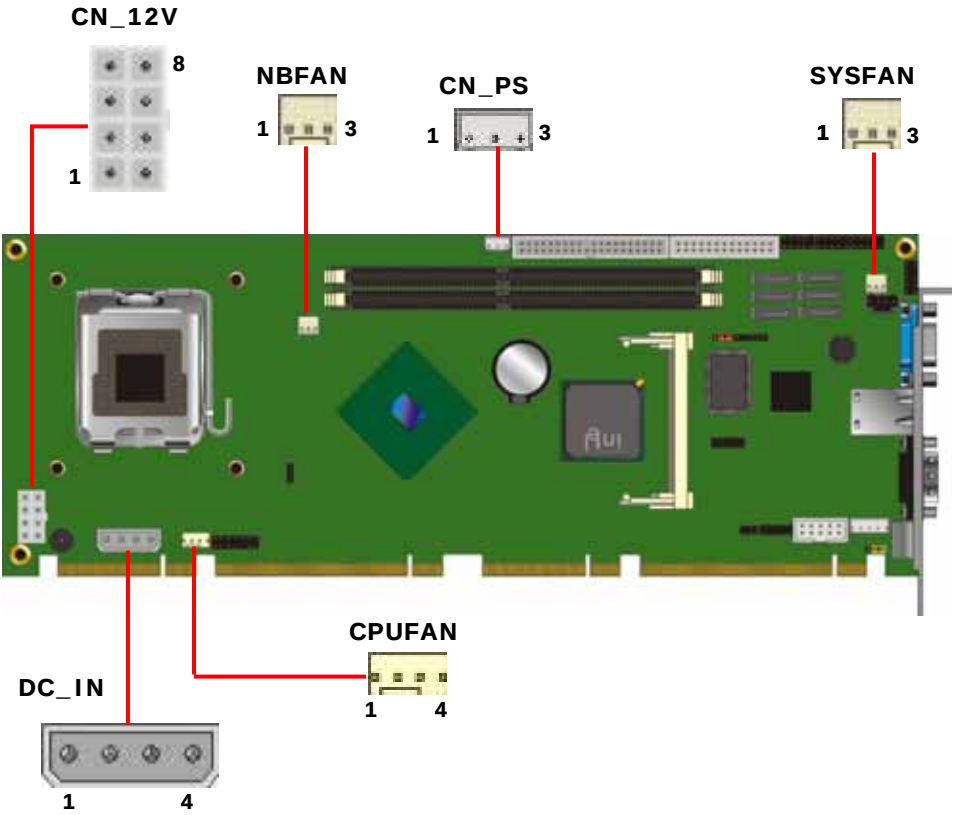
Type: 3-pin wafer connector

Pin	Description	Pin	Description	Pin	Description
1	Ground	2	+12V	3	Sense

Connector: CPUFAN

Type: 4-pin wafer connector

Pin	Description	Pin	Description
1	Ground	2	+12V
	Fan Speed Detection	4	Fan Control



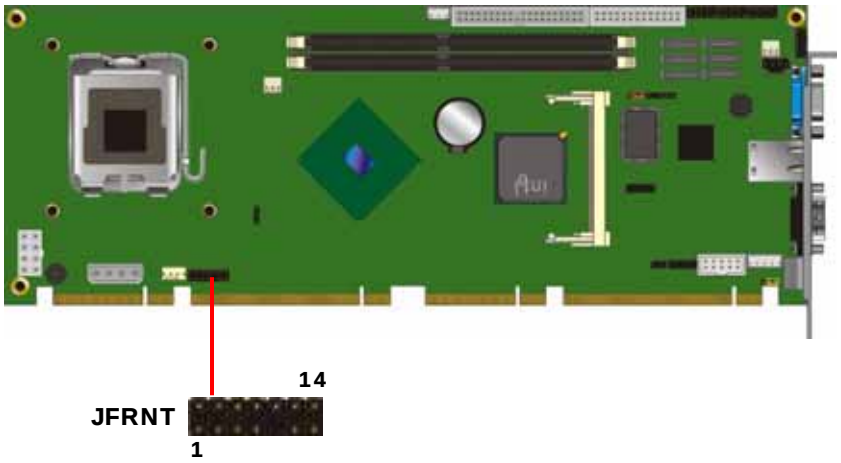
2.18 Front Panel Control

The **JFRNT** provides front control panel of the board, such as power button, reset and beeper, etc. Please check well before you connecting the cables on the chassis.

Connector: JFRNT

Type: Onboard 14-pin (2 x 7) 2.54-pitch header

Function	Signal	PIN		Signal	Function
IDE LED	HDLED+	1	2	PWDLED+	Power LED
	HDLED-	3	4	N/C	
Reset	Reset+	5	6	PWDLED-	
	Reset-	7	8	SPKIN+	Speaker
N/C		9	10	N/C	
Power Button	PWRBT+	11	12	N/C	
	PWRBT-	13	14	SPKIN-	



2.19 Keyboard & Mouse Port

Connector: CN_ATKB

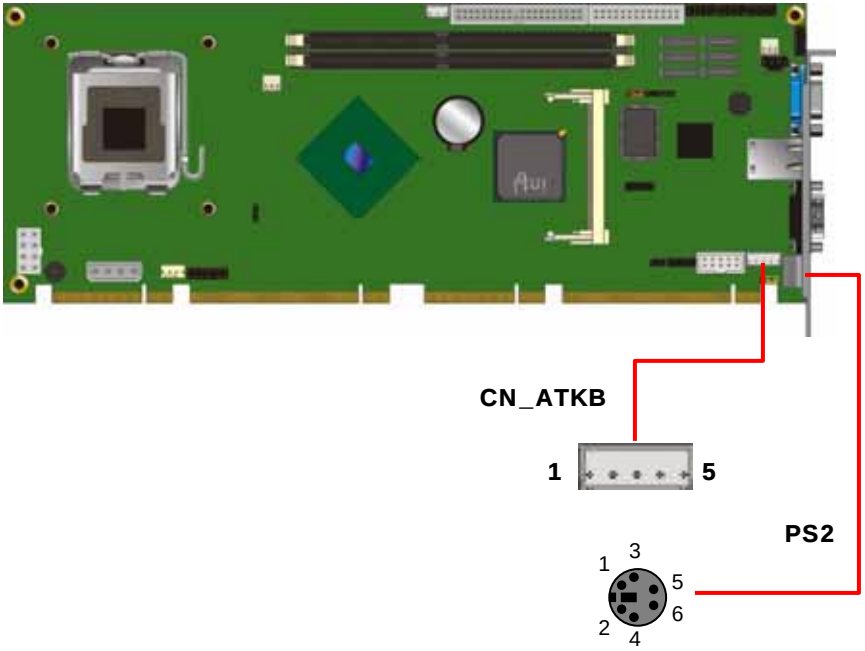
Type: 5-pin box header connector

Pin	1	2	3	4	5
Description	VCC	Ground	N/C	DATA	CLK

Connector: PS2

Type: 6-pin Mini-DIN connector on bracket

Pin	1	2	3	4	5	6
Description	KBD	MSD	Ground	VCC	KBC	MSC



Chapter 3 System Configuration

3.1 Onboard SATA RAID Setup

The board integrates Intel® ICH8DO with RAID function for Serial ATA II drives, and supports the configurations below:

RAID 0 (Stripping): Two hard drives operating as one drive for optimized data R/W performance. It needs two unused drives to build this operation.

RAID 1 (Mirroring): Copies the data from first drive to second drive for data security, and if one drive fails, the system would access the applications to the workable drive. It needs two unused drives or one used and one unused drive to build this operation. The second drive must be the same or lager size than first one.

RAID 5 (striping with parity)

A RAID 5 array contains three or more hard drives where the data is divided into manageable blocks called strips. Parity is a mathematical method for recreating data that was lost from a single drive, which increases fault-tolerance. The data and parity are striped across all the hard drives in the array. The parity is striped in a rotating sequence to reduce bottlenecks associated with the parity calculations.

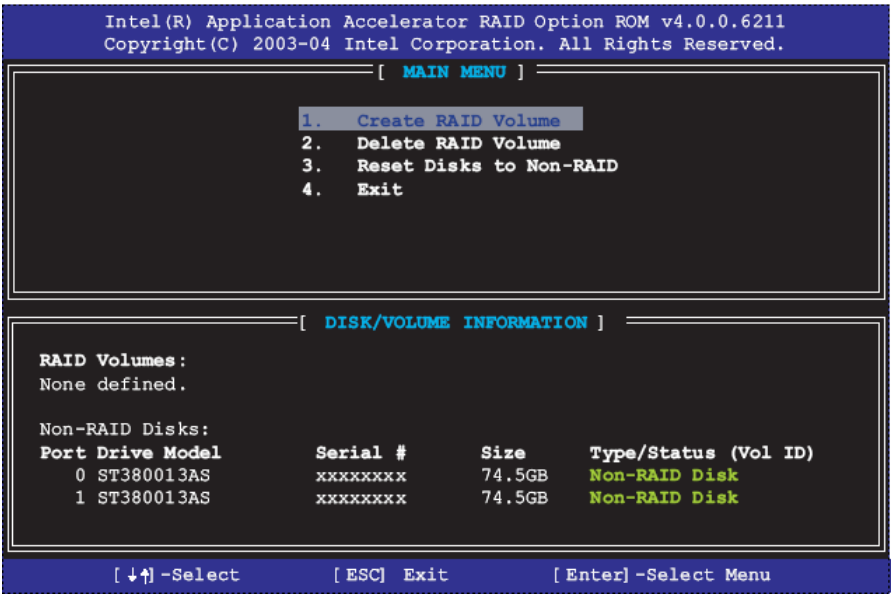
RAID 10 (RAID 0+1)

A RAID 10 array uses four hard drives to create a combination of RAID levels 0 and 1. The data is striped across a two-drive array forming the RAID 0 component. Each of the drives in the RAID 0 array is then mirrored by a RAID 1 component.

Intel Matrix Storage Technology: This technology would allow you to use **RAID 0+1** mode on only two drives (4 drives needed on traditional RAID 0+1). It will create two partitions on each hard drive to simulate **RAID 0** and **RAID 1**. It also can let you modify the partition size without re-formatted.

For more information of Intel Matrix Storage Technology, please visit Intel's website.

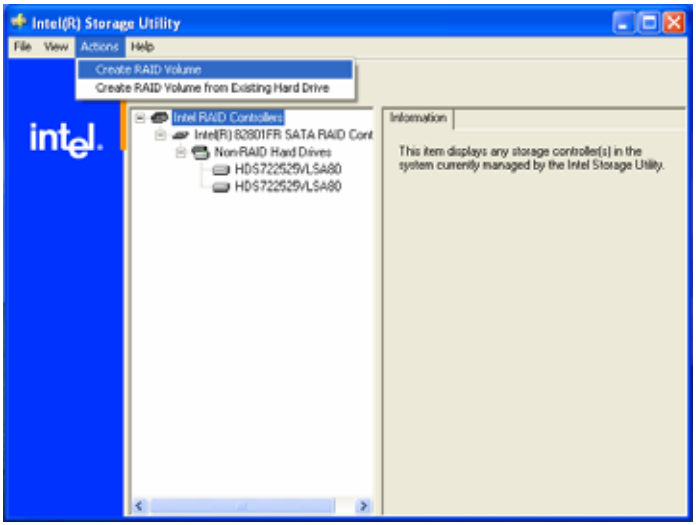
If you need to install an operation system on the RAID set, please use the driver disk attached in the package when it informs you to obtain the RAID drivers.



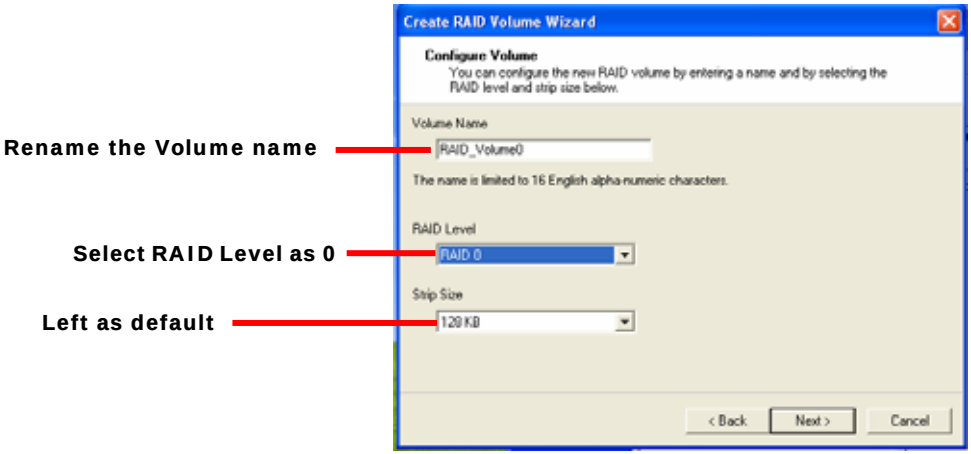
Please press **<CTRL+I>** to enter the RAID configuration menu.

You can setup the RAID under operation system for Microsoft® Windows XP SP1 or Windows 2000 SP4 version, please install the Intel® Application Accelerator Ver.4.5 later to support RAID configuration with Intel® Matrix Storage Technology.

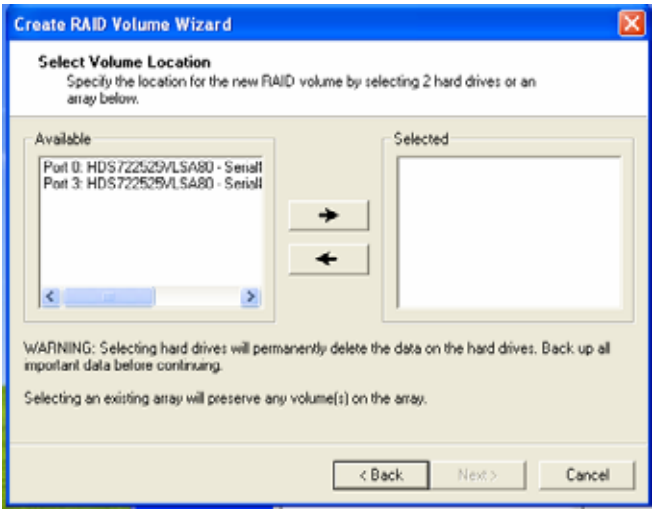
1. After installing Intel Application Accelerator, please execute Intel® Storage Utility.



2. Select Actions to Create RAID Volume

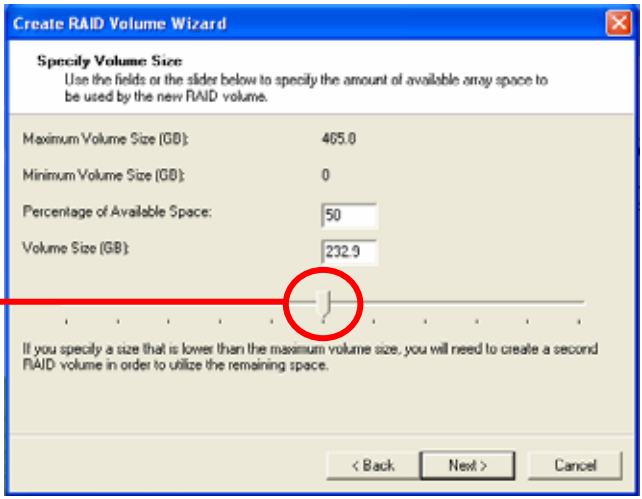


3. Please select two hard drives to prepare to set the RAID volume

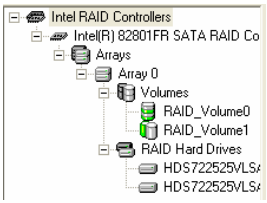


4. Specify the Volume size

Tune this bar to specify the volume size, if you specify the volume size lower than maximum, you can create a second volume for another RAID set. (Make RAID 0+1 on only two hard drives)



5. Repeat the step 1 to create second volume as RAID Level 1.



For other configuration set please click Help on tool bar.

3.2 GPIO Program Instruction

The GPIO can be programmed with the MSDOS debug program simply using IN/OUT commands. The following lines show an example how to do this.

GPIO0.....GPIO7 bit0.....bit7

-o 4E 87 ;enter configuration

-o 4E 87

-o 4E 07

-o 4F 09 ;enable GPIO function

-o 4E 30

-o 4F 02 ;enable GPIO configuration

-o 4E F0

-o 4F xx ;set GPIO as input/output; set '1' for input,'0'for output

-o 4E F1

-o 4F xx ;if set GPIO's as output,in this register its value can be set

Optional :

-o 4E F2

-o 4F xx ; Data inversion register ; '1' inverts the current valus of the bits ,'0' leaves them as they are

-o 4E 30

-o 4F 02 ; active GPIO's

For further information, please refer to Winbond W83627DHG datasheet.

3.3 Watchdog Timer Program Instruction

The watchdog timer makes the system auto-reset while it stops to work for a period. The integrated watchdog timer can be setup as system reset mode by program.

Timeout Value Range

- 1 to 255
- Second or Minute

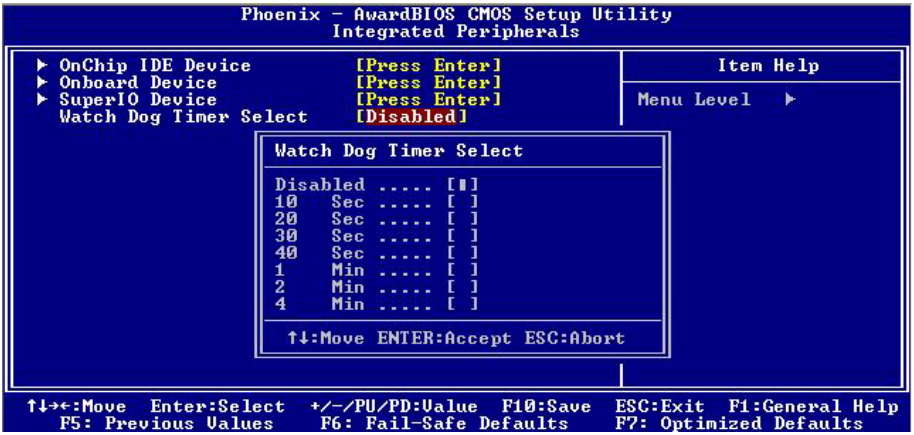
Program Sample

Watchdog timer setup as system reset with 5 second of timeout

4E, 87	
4E, 87	
4E, 07	
4F, 08	Logical Device 8
4E, 30	Activate
4F, 01	
4E, F5	Set as Second*
4F, 00	
4E, F6	Set as 5
4F, 05	

* Minute: bit 3 = 0; Second: bit 3 = 1

You can select Timer setting in the BIOS, after setting the time options, the system will reset according to the period of your selection.



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