



User's Manual

3301820

Revision History

Title	3.5" Profile 3301820 Embedded Board	
Revision Number	Description	Date of Issue
1.0	Initial release	April, 2006

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Safety Notice

Electrical shock hazards might occur while proceeding with the installation, repair and maintenance of this product. Therefore, the following precaution measures should be carefully observed:

1. All sorts of operations on this product must be carried out by certified technicians.
2. The chassis into which the embedded board and its associated backplane are installed should provide stable power supply and be properly grounded.
3. Power off the embedded board and unplug its power cord before handling.
4. When handling the embedded board, avoid touching any metal leads or connectors.
5. Please verify that the power supply is switched off before unplugging the power supply connector from the embedded board.

ESD Precautions

- „ Observe all conventional anti-ESD methods while handling the embedded board.
- „ The use of a grounded wrist strap and an anti-static work pad is recommended.
- „ Avoid dust and debris or other static-accumulating materials in your work area.

Conventions Used in This Manual



WARNING!

Warnings appear where overlooked details may cause damage to the equipment or result in personal injury. Warnings should be taken seriously. Warnings are easy to recognize. The word “warning” is written as **“WARNING,”** both capitalized and bold and is followed by the warning message.



CAUTION!

Cautionary messages should also be heeded to help you reduce the chance of losing data or damaging the system. Cautions are easy to recognize. The word “caution” is written as **“CAUTION,”** both capitalized and bold and is followed by the cautionary message.



NOTE:

These messages inform the reader of essential but non-critical information. These messages should be read carefully as any directions or instructions contained therein can help you avoid making mistakes. Notes are easy to recognize. The word “note” is written as **“NOTE,”** both capitalized and bold and is followed by the cautionary message.

Lists

Bulleted Lists: Bulleted lists are statements of non-sequential facts that can be read in any order. Each statement is preceded by a square or round black dot.

Numbered Lists: Numbered lists describe sequential steps you should follow in order.

Software Updates

Please contact your system vendor for the latest software or BIOS updates. **NOTE** that the BIOS version and associated drivers installed on your system should provide the complete functionality listed in the Datasheet/User Manual.

We provide special revisions for various application purposes. Therefore, DO NOT upgrade your BIOS unless you fully understand what a revision will do.

Problems that occur during the updating process may cause unrecoverable errors and system down time. Always consult qualified technicians before proceeding with any upgrade.

Chapter

1

Introduction

Product Overview

1.1 General Information

The 3301820 is a highly-integrated embedded computer specifically optimized for multi-media applications requiring minimum installation space. The 3301820 is particularly suitable for low power and fan-less applications. The 3301820 supports a full range of functionality for an AT/ATX-compatible industrial computer in a space-saving 3.5" profile. The 3301820 is equipped with a low-power consumption and high performance AMD Geode LX800 processor on board. It also contains a DDR SO-DIMM socket that supports up to 1GB memory in size.

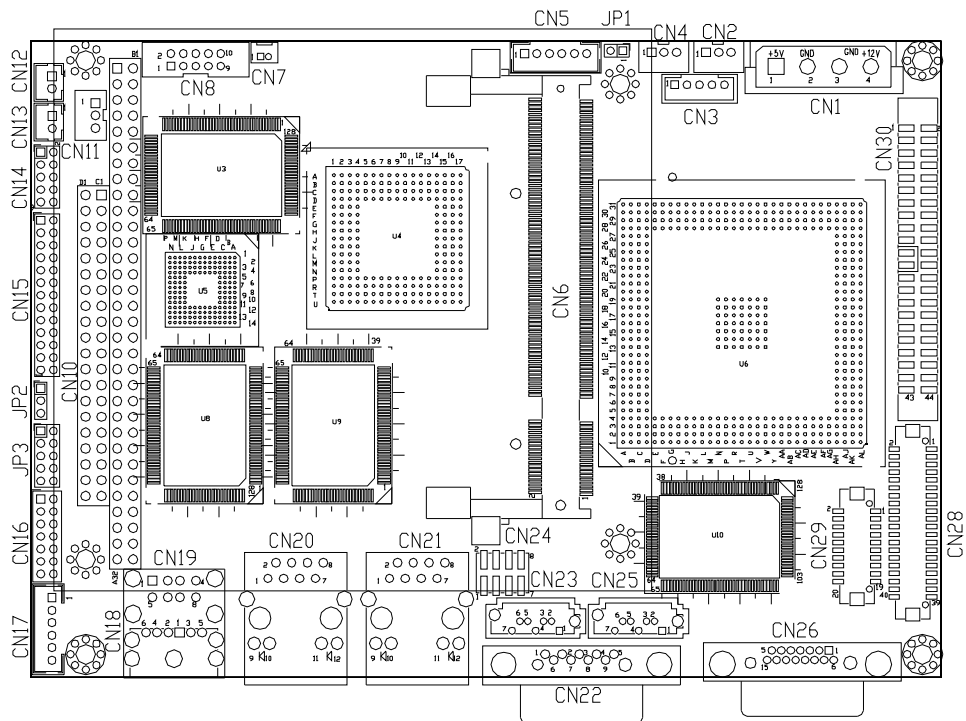


Figure 1-1 3301820 Board Layout

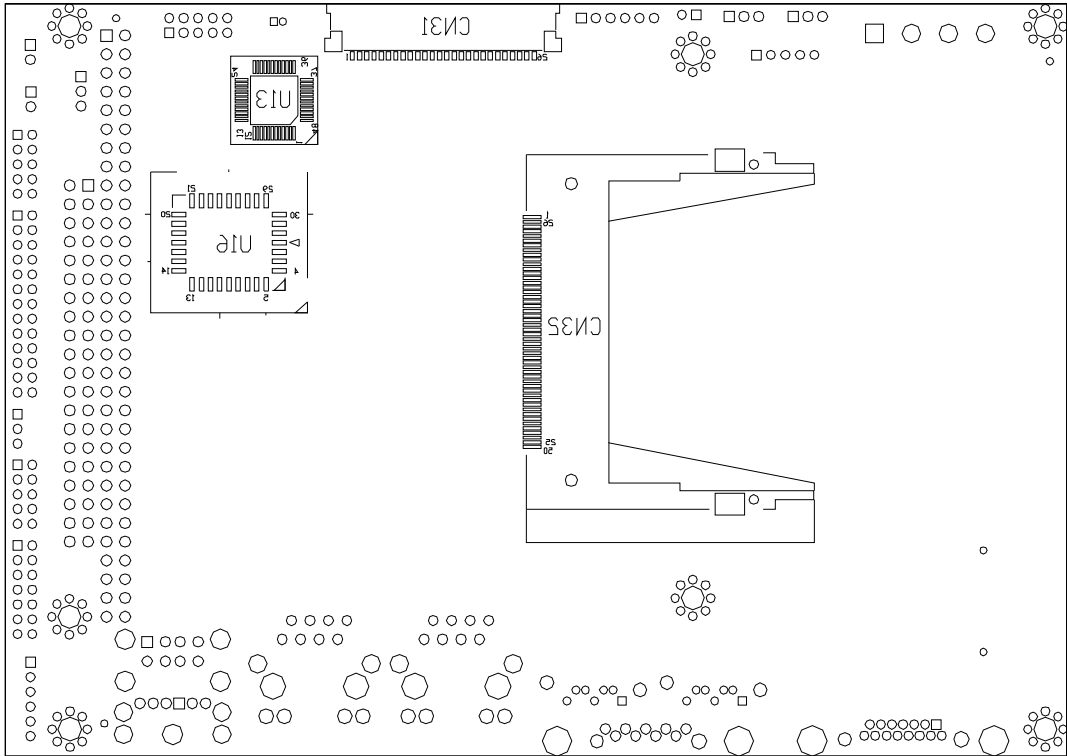


Figure 1-2 3301820 Board Layout (Soldering Side)

Connectivity

The 3301820 provides the following interface connections:

Label	Function
CN1	4P power connector
CN2	3-pin PS-ON/ATX feature connector
CN3	5-pin Inverter control
CN4	3-pin CPU fan connector
CN5	6-pin External LED connector (to chassis LED control PCB)
CN6	200-pin DDR SO-DIMM socket
CN7	2-pin connector to the external Lithium 3V coin cell battery-
CN8	10-pin audio connector (to the external adapter cable kit which should provide phone jacks for Line_out, Line_in, and MIC_in connectivity)
CN9	Not implemented
CN10	PC/104 connector (104-pin ISA bus)
CN11	3-pin external VCC (supplementary for PC/104) power connector
CN12	2-pin Reset button switch (to the chassis front panel)
CN13	2-pin Power switch button (to the chassis front panel)
CN14	10-pin general purpose I/Os connector
CN15	26-pin parallel port pin header
CN16	14-pin internal serial port pin header (COM2/COM3)
CN17	6-pin keyboard/mouse connector (a 6-pin-to-PS/2 adapter cable is required)
CN18	Not implemented
CN19	External USB2.0 connector (2 ports)
CN20	10/100BaseT Ethernet port
CN21	10/100BaseT Ethernet port
CN22	External D-SUB 9 serial port connector (COM1)
CN23	Serial ATA connector
CN24	8-pin internal USB header (an adapter cable required)
CN25	Serial ATA connector

CN26	D-SUB 15-pin VGA connector
CN27	Not implemented
CN28	24-bit TFT LCD connector (DF13-40P-1.25V)
CN29	LCD panel single-channel 18-bit LVDS/TTL connector, 20 (2x10) pin header 1.25mm (DF13-20P-1.25V)
CN30	Primary IDE bus connector (44-pin 2.0mm)
CN31	FDC flat type floppy port (one floppy drive only)
CN32	Compact flash storage card socket

The 3301820 is built around an AMD Geode™ chipset which features highest performance per watt, an embedded graphics controller, and full set of functionality through the companion Geode CS5536 Southbridge. The 3301820 enables simultaneous dual-display operations by the 32-bit processing power, the 9GB/s bandwidth GeodeLink internal links, and the integrated FPU's operating enhanced Intel MMX and 3Dnow! technologies.

The built-in graphics controller supports both a CRT and an 18-bit LCD display simultaneously. It offers the resolutions of LCD screen up to 1920 x 1440 (CRT), and 1620 x 1200 (TFT) pixels, with 18-bit DSTN/TFT flat panel interface. The 3301820's high efficiency design enables its use in a variety of multimedia applications combining the powerful Geode x86 engine, application-specific system-level peripherals, multi-input video processor, video input/output ports, core logic, and a Super I/O block. In addition, the architecture features advanced display interface support for audio, AC'97.

Other distinguished features include: PCI extension bus, USB interface, power management ACPI 1.0 compliance, long-term support, and built-in OS integration.

With a specially designed aluminum heatsink, this board can operate without a cooling fan at temperatures up to 60° C (140°F) and typically consumes low power watts while supporting numerous peripherals.

The embedded support for different OSes is revealed through the table of model options below:

Table 1-1 Models with Embedded OS Images

Part No.	Description
3301820A	3.5" SBC with AMD LX 800 processor, Audio, CRT, LCD/LVDS, dual Ethernet, and SATA connectors.
3301820E	3.5" SBC with AMD LX 800 processor, 256MB DDR SO-DIMM memory, audio, CRT, LCD/LVDS, dual Ethernet, SATA, IFM 512MB and Windows® XP embedded image.
3301820B	3.5" SBC with AMD LX 800 processor, 256MB DDR SO-DIMM memory, audio, CRT, LCD/LVDS, dual Ethernet, SATA, IFM 32MB and Windows® CE 5.0 image.
3301820D	3.5" SBC with AMD LX 800 processor, 256MB DDR SO-DIMM memory, audio, CRT, LCD/LVDS, dual Ethernet, SATA, IFM 512MB and Windows® XP embedded image and thin client package.
3301820C	3.5" SBC with AMD LX 800 processor, 256MB DDR SO-DIMM memory, audio, CRT, LCD/LVDS, dual Ethernet, SATA, IFM 64MB and Windows® CE 5.0 image and thin client package.

For a more updated information of supported OSes, please check on GAI website or contact our technical support.

OS Packages:

A. Windows XPE SP2 (350MB image size stored in a 512MB CF card)

1. Advance Set Top Box:

The package includes the components required to create the advanced Set-Top Box (ASTB). The package provides the functionality of the basic set-top box and also supports DVD playback, DVR, Web browsing, networking, universal serial bus (USB), terminal services, and Windows Media Player.

2. Internet Explorer.

3. Net Framework 1.1.
4. EWF (Enhanced Write Filter).
5. CMD - Windows Command Processor.
6. Device Manager and Task Manager.
7. Video / audio and other board chipset drivers.
8. PS/2 keyboard / mouse drivers.
9. IDE Compact Flash/HDD/Flash Disk/CD-ROM support

B. Windows CE 5.0 (around 22Mbyte, CF must > 32Mbyte)

1. Enterprise Web Pad (provides the starting point for a range of Web Pad-based devices.)
2. IE 6.0, Media Player, Excel Viewer, Image Viewer, PDF viewer, PowerPoint viewer, Word viewer, and WordPad.
3. Support hive-based registry.
4. SIP (Software-based Input Panel): SIP for Large Screens.
5. Microsoft Foundation Classes (MFC).
6. NET Compact Framework 2.0.
7. Standard SDK for Windows CE.
8. Transaction-Safe FAT File System (TFAT).
9. PCL Printer Driver.
10. Devices drivers: IDE, CF card, CD-ROM, USB host, USB keyboard/ mouse /storage, Ethernet, and serial ports.

1.2 3301820 Board Overview

Component Side

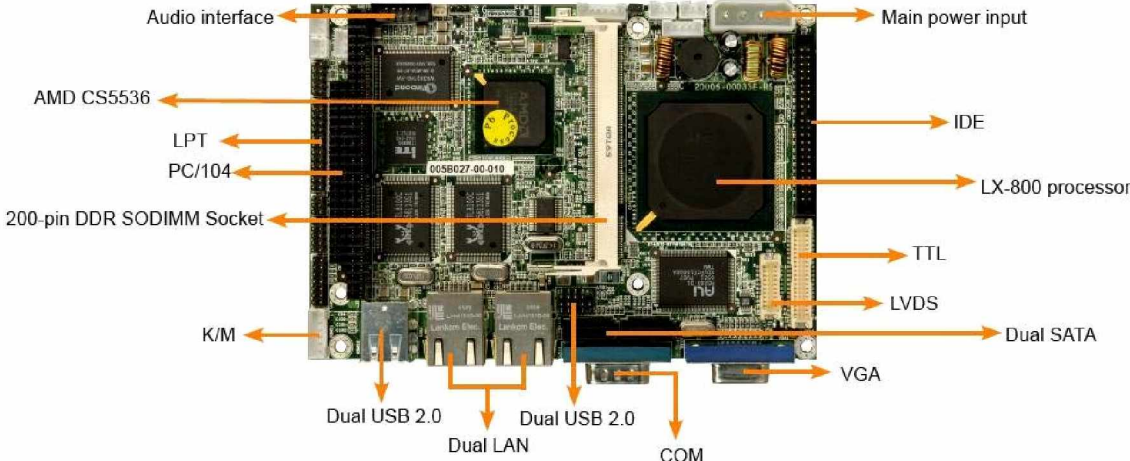


Figure 1-3 3301820 Board Overview

Soldering Side

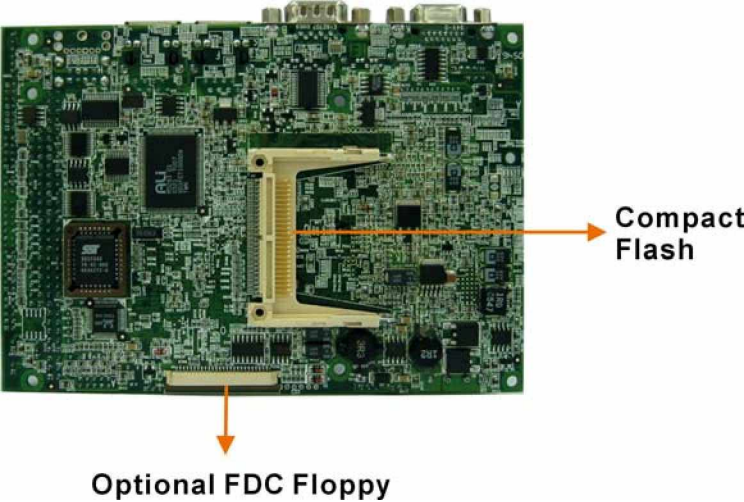


Figure 1-4 3301820 Board Overview

1.3 Technical Specifications

Table 1-2 Technical Specifications

CPU	<ul style="list-style-type: none"> Embedded AMD Geode LX800@0.9W processor at 500MHz frequency
Chipset	<ul style="list-style-type: none"> Geode CS5536AD as Southbridge
Memory	<ul style="list-style-type: none"> One 64-bit 333/400MHz 200-pin SODIMM socket that supports DDR memory up to 1GB
Display Controller	<ul style="list-style-type: none"> 24-bit TTL/single-channel 18-bit DST/NTFT flat panel interface Support for all resolutions up to 1024X768 pixels Hardware Suspend/Standby control
10/100Mbps Realtek8100C Ethernet Controller	<ul style="list-style-type: none"> IEEE 802.3 10/100M Base-T standard auto-sensing interface to 10Mbps or 100Mbps networks through an onboard RJ-45 connector.
BIOS	<ul style="list-style-type: none"> Award 512KB Flash memory
Compact Flash Disk	<ul style="list-style-type: none"> Runs in true IDE mode that simulates the operation of a physical IDE hard drive. It can be used with a passive adapter in a Type II socket in DMA mode.
IDE Interface	<ul style="list-style-type: none"> Supports one ATA33 IDE channel with the connectivity to two hard disk drives
FDD Interface	<ul style="list-style-type: none"> Supports one optional floppy disk drive, 3.5" (1.44MB) by a 26-pin FPC connector cable.
Serial Ports	<ul style="list-style-type: none"> Two RS-232 ports with 16C550 UART (or compatible) with 16-byte FIFO buffer. COM3 supports RS-422/485 through jumper setting.
Parallel Port	<ul style="list-style-type: none"> One parallel port supports SPP/EPP/ECP mode
Audio Connector	<ul style="list-style-type: none"> One 2x5 pin header supports AC'97 2.3 Line-in, Line-out, and Mic-in signals.
USB Interface	<ul style="list-style-type: none"> Four (4) USB ports, Two external and two internal via pin header;

	<ul style="list-style-type: none"> • USB 2.0 compliant.
Watchdog Timer	<ul style="list-style-type: none"> • Can be Set to 1 to 255 seconds period. Reset or NMI will be generated when CPU does not periodically trigger the timer.
PC/104 Interface	<ul style="list-style-type: none"> • Direct ISA DMA mode operation.
Power Supply	<ul style="list-style-type: none"> • +5V: 1.2A typical, CPU w/ 1x1GB DDR 400MHz memory module.
Hardware Monitor	<ul style="list-style-type: none"> • System voltage detection • CPU temperature detection
Operating Temperature	<ul style="list-style-type: none"> • 0° to 60°C
Form Factors	<ul style="list-style-type: none"> • 5.75"(L) x 4"(W) x 1"(H)
AC '97 interface	<ul style="list-style-type: none"> • Provides 10 Pin Audio header. • 16-bit, full-duplex AC'97 Rev. 2.3 compatible six-channel audio CODEC designed for PC multimedia systems. <ul style="list-style-type: none"> ■ Meets Microsoft WHQL/WLP 2.0 audio requirements ■ 16-bit Stereo full-duplex CODEC with 48KHz sampling rate ■ Compliant with AC'97 Rev 2.3 specifications <ul style="list-style-type: none"> ➢ Front-Out, MIC-In and LINE-In pin header ➢ 14.318MHz => 24.576MHz PLL to eliminate crystal ➢ 12.288MHz BITCLK input ➢ Interrupt capability

Packing List

- 2xSATA cables
- 1xAudio adapter cable
- 1x4P-to-SATA power adapter cable
- 1xIDE flat cable 44p/40p/40p
- 1xsecond serial port (COM2) cable
- 1xKeyboard/ PS2 mouse cable
- 1xMini jumper pack
- 1xDriver and Utility CD
- 1xQIG (Quick Installation Guide)

System Monitoring

The 3301820 is capable of self-monitoring various aspects of its operating status:

- z Vcore voltage, +3.3V, +5V, and +2.5V
- z RPM of cooling fans (not implemented with this model)
- z CPU temperatures (by the corresponding embedded sensors)

Chapter

2

Functional Description

This chapter provides a functional description of the 3301820 embedded board designed for the integration into a compact size chassis. This chapter includes information about main processors, interface connectors, implementation options, and signal description.

2.1 CPU, Memory, and LX Chipsets

CPU

The 3301820 comes with a soldered low power AMD Geode LX-800 processor. The AMD Geode design integrates high-performance graphics controller, VGA and Flat Panel display interfaces, with the burst and concurrent GeodeLink pipelining capability for fast data distribution among CPU, DRAM, and PCI buses. CPU and the major functionalities are provided in a single processor package. The CPU is accompanied by the Geode CS5536AD Southbridge featuring full-featured interfaces with integrated UltraDMA-33 IDE, USB, and a complete power management feature set. The CS5536AD also provides hardware monitoring and super I/O functions (floppy disk drive and serial/parallel ports).

The CPU is passively cooled over a heatsink made in aluminum alloy and is ideal for small form factor computing applications with its low power consumption and minimum heat dissipation.

Shown below are some of the key features of the AMD Geode LX processor:

- „ x86/x87 compatible core.
- „ LX-800 with a processor frequency up to 500MHz.
- „ 64K I/64K D L1 cache & 128K L2 cache.
- „ Split I/D cache / TLB (Translation Look-aside Buffer).
- „ 64-bit DDR memory up to 400MHz (LX 800).
- „ Integrated FPU that supports the Intel MMX and AMD 3DNow! Technology instruction sets.
- „ 9GB/s internal GeodeLink Interface Unit (GLIU).
- „ High-resolution CRT and TFT outputs (simultaneous operation)
- „ Support for High Definition (HD) and standard Definition (SD) standards.
- „ 0.13 micron process.
- „ GeodeLink active hardware power management.
- „ Hardware support for standard ACPI software power management.

- „ Low power I/O.
- „ Wakeup on LAN.

Memory

The 3301820 provides one (1) 200-pin DDR SODIMM socket without ECC support for building a buffer size up to 1GB. The memory is automatically identified. The memory interface supports DDR SODIMM modules at up to 400MHz frequency.

VGA/LCD Interface

Chipset: AMD Geode LX- series CPU with integrated Graphics 2D/Video Accelerator
Interface: High-resolution CRT and TFT outputs (simultaneous operation)—Support for High Definition (HD) and Standard Definition (SD) standards—Support 1920x1440 in CRT mode and 1600x1200 in TFT mode

Audio

The AC'97 capabilities are provided by a Realtek ALC203 chip supporting digital audio outputs. The onboard ALC203 is a 20-bit DAC and 18-bit ADC supporting full-duplex AC'97 2.3 compatible stereo audio CODEC for multimedia, including host/soft audio based designs. It provides two pairs of stereo outputs with independent volume controls, a mono output, multiple stereo and mono inputs, along with flexible mixing, gain, and mute functions.

Block Diagram

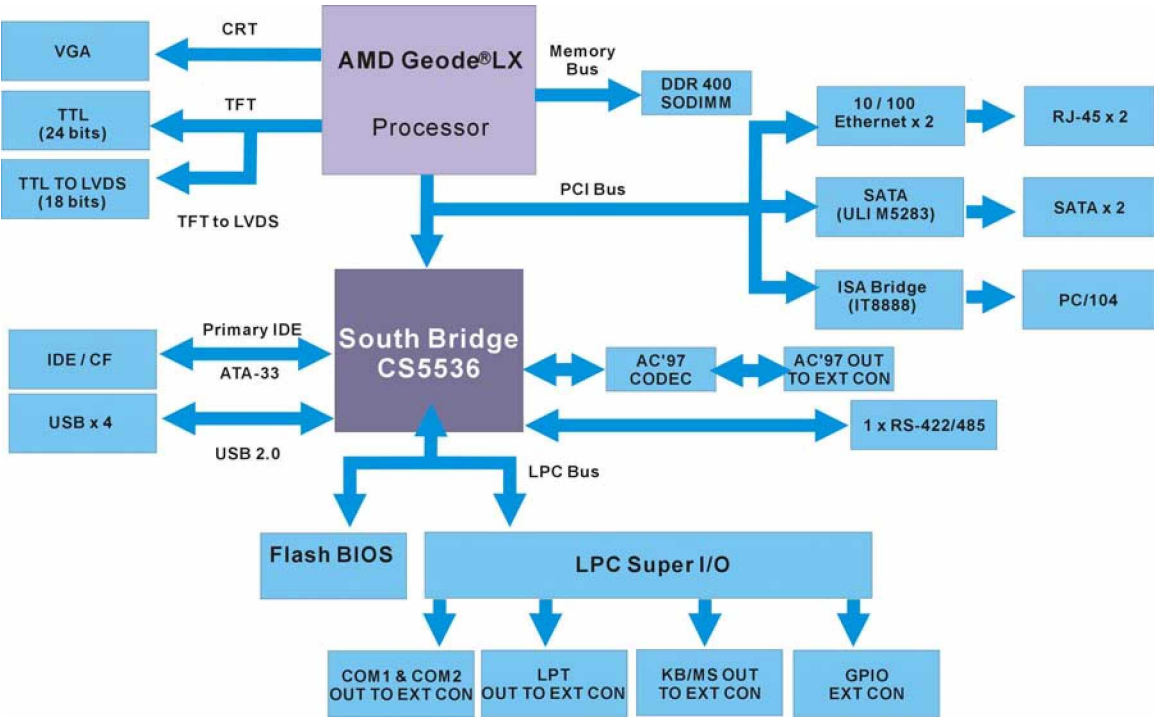


Figure 2-1 System Block Diagram

Important Features

Major functionalities provided by the 3301820 are listed below:

Table 2-1 Important Features

„	RoHS compliance.
„	AMD long term support product; embedded AMD processor.
„	PC/104 PCI-to-ISA extension slot for stack-up configurations
„	CF II socket (CF card behaves as an IDE boot device if no HDD is applied).
„	Embedded Graphics Controller with the support for VGA-interface and LVDS displays (simultaneous operation).
„	Supports one 18-/24-bit TFT, and with up to 1920 x 1440 resolutions
„	Aluminum alloy heatsink for optimum heat dissipation in fan-less installations.
„	Supports 18-bit LVDS and/or 24-bit TFT LCD interface
„	System Memory: one 200-pin SODIMM socket for 64-bit, 400MHz memory modules ranging from 64MB to 1GB in size.
„	64KB I/ 64KB D L1 cache and 128KB L2 cache for fast I/O turnarounds
„	Two serial ports, COM1 and COM2 for RS-232, COM3 for RS-422/485
„	USB compliant with the USB rev. 2.0 standard
„	System Chipset: AMD Geode LX-800 + Geode CS5536AD Southbridge
„	Hardware Monitor: built-in to monitor CPU Vcore, VCC, CPU/System fan speed, and temperature detection functionalities.
„	PXE LAN support with ATX power supply
„	Realtek® 8100C: Supports 10/100BaseT Ethernet, IEEE 802.3U compatible full duplex flow control
„	Audio: ALC203 AC'97 2.3 CODEC
„	Watchdog Timer: 1-255 SEC W83627EHF
„	Operating temperature: 0 to 60°C

„ Humidity: 0 to 95% relative humidity

„ Power consumption: +5V @1.2A (AMD Geode LX-800with DDR400 1GB memory)

2.2 External Interfaces

For the locations of external interfaces, please refer to the diagram below:

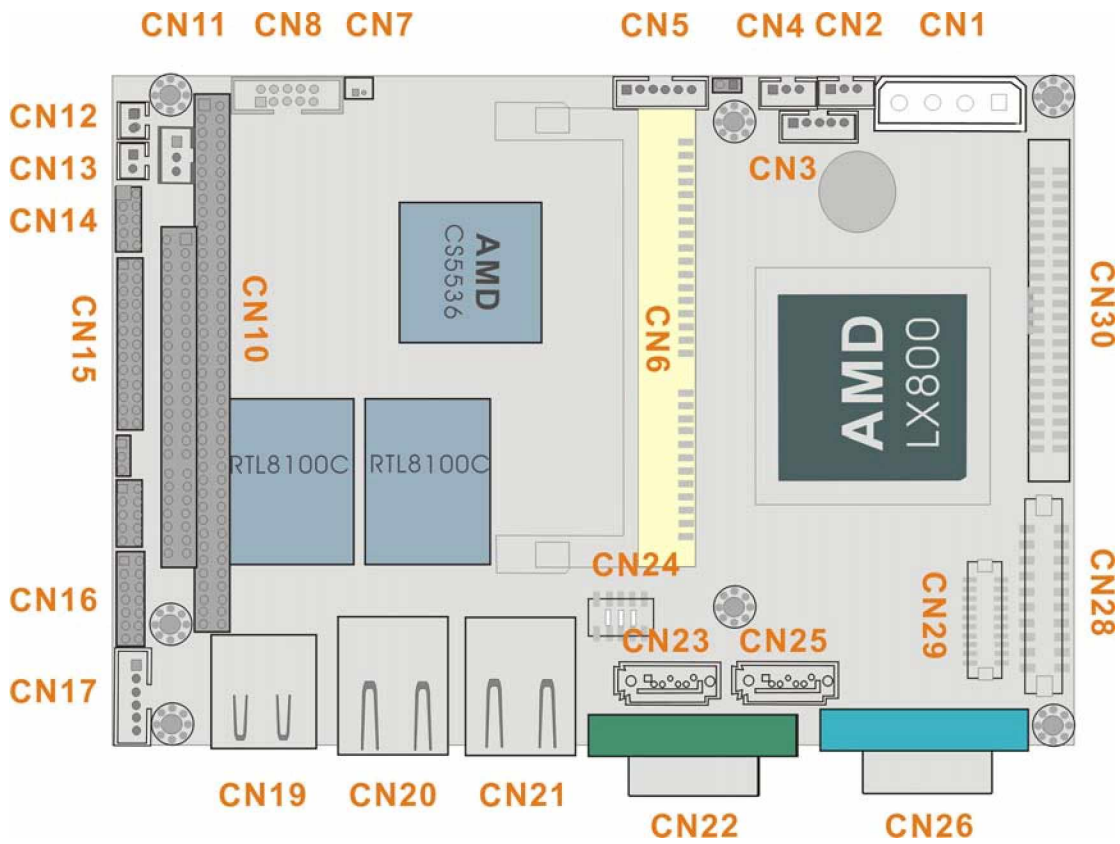


Figure 2-2 External Interfaces (Component Side)

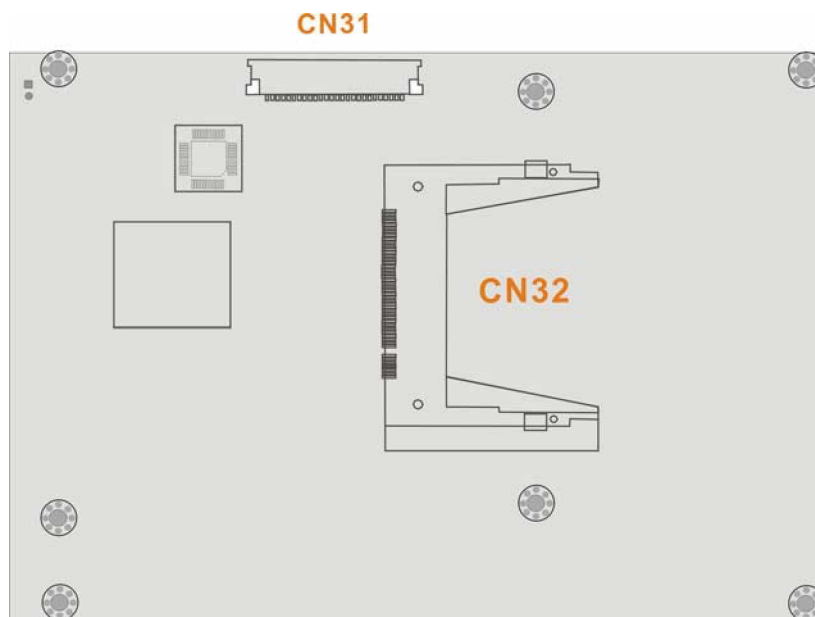


Figure 2-3 External Interfaces (Soldering Side)

**NOTE:**

1. The configuration options through jumper settings will be discussed in **Chapter 3: Installation**.
2. On the solder side, there are a CFII card socket and a FPC floppy connector.

Shown below is a diagram indicating the locations of configuration jumpers.

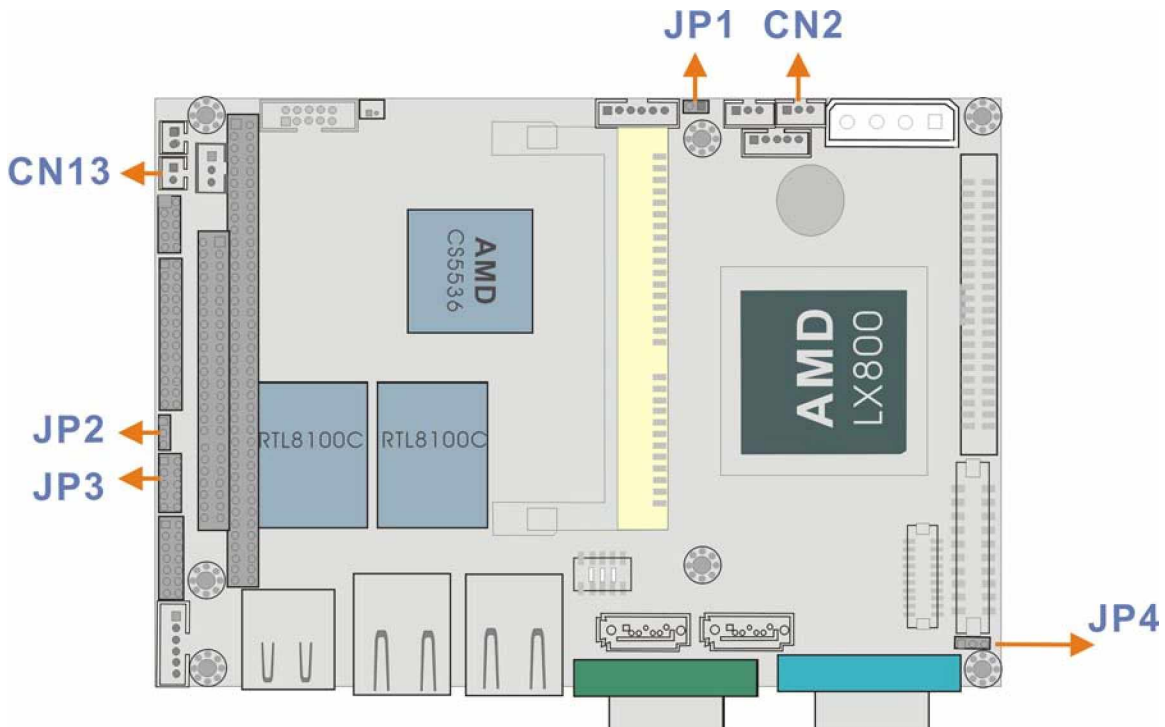


Figure 2-4 Locations of Configuration Jumpers

**NOTE:**

1. Only configuration jumpers are shown in the diagram above.
2. For more configuration details on jumper settings, please refer to **Chapter 3 Installation**.

Table 2-2 Interface Connectors

	Function
CN1	4P power connector
CN2	3-pin PS-ON/ATX feature connector

**WARNING!**

A 20-pin-to-4P+3-pin adapter cable comes as an option for configurations using ATX power supply. This adapter cable is different from the similar cables provided with the previous models. The “Ground” pin is removed from the 3-pin header of this cable; and, if a cable of the previous design is connected to CN2, serious damage to the embedded board will occur.

CN3	5-pin Inverter control
CN4	3-pin CPU fan connector
CN5	5-pin External LED connector (to chassis LED controller board)
CN6	200-pin DDR SO-DIMM socket
CN7	2-pin connector to the external Lithium 3V coin cell battery-
CN8	10-pin audio connector (to the external adapter cable kit which should provide phone jacks for Line_out, Line_in, and MIC_in connectivity)
CN9	Not implemented.
CN10	PC/104 connector (104-pin ISA bus)
CN11	3-pin external -VCC power connector . It is a peripheral power connector, provides a -5V and -12V sources as -VCC voltage that are supplementary to the PC/104 (CN10) connector.
CN12	2-pin Reset button switch (to the chassis front panel)
CN13	2-pin Power switch button (to the chassis front panel)
CN14	10-pin general purpose I/Os connector
CN15	26-pin parallel port pin header

CN16	14-pin 2.0mm internal serial port pin header (COM2 and COM3)
CN17	6-pin keyboard/mouse connector (a 6-pin-to-PS/2 adapter cable is required)
CN18	Not implemented
CN19	External USB2.0 connector (2 ports)
CN20	10/100BaseT Ethernet port
CN21	10/100BaseT Ethernet port
CN22	External D-SUB 9 serial port connector (COM1)
CN23	Serial ATA connector
CN24	8-pin internal 2.0mm USB header (2 ports; an adapter cable is required)
CN25	Serial ATA connector
CN26	D-SUB 15-pin VGA connector
CN27	Not implemented
CN28	24-bit TFT LCD connector (DF13-40P-1.25V)
CN29	LCD panel single-channel 18-bit LVDS/TTL connector, 20 (2x10) pin header 1.25mm (DF13-20P-1.25V)
CN30	Primary IDE bus connector (44-pin 2.0mm)
CN31	FPC flat type floppy port (one floppy drive only)
CN32	Compact flash storage card socket

2.2.1 Internal Connectors

1. CN1: Power 4P Connector

The 3301820-R10 is equipped with an onboard external power connector, CN1. You can connect power directly to CN1 or mount a PC/104 compact-size power supply module on top of the board through the PC/104 interface.

Table 2-3 CN1: Power 4P Connector

PIN	DESCRIPTION
1	+5V
2	GND
3	GND
4	+12V

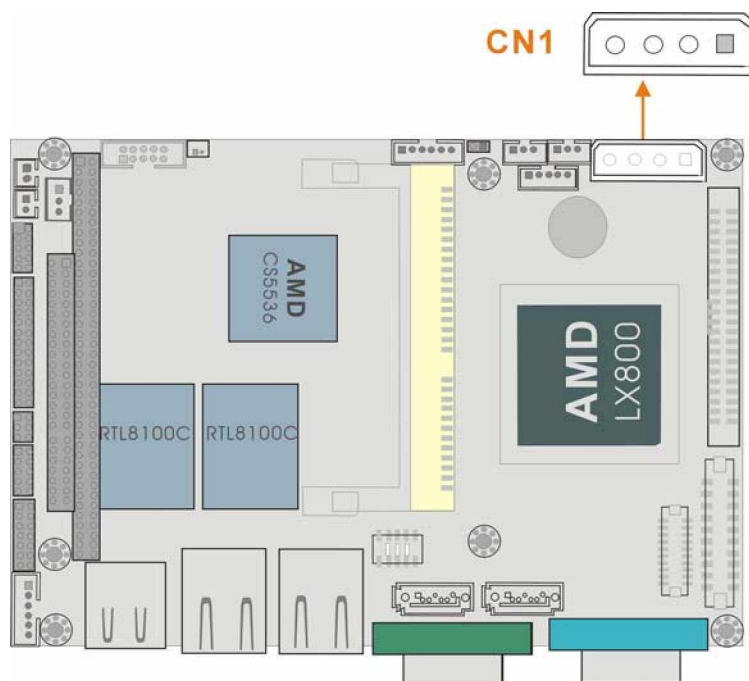


Figure 2-5 Power 4P Connector

2. CN2: SBVCC ATX Power Feature Connector

1x3 2mm connector.

Using CN2 as a Power Feature Connector:

The SBVCC connector can support an advanced soft power switch function. If an ATX power supply is used, connect an ATX-to-4P power cable between the SBVCC connector and ATX power source. Also connect a power on/off switch to the ATX ON/OFF switch previously mentioned. Note that your ATX power supply should provide a 10mA load on the 5V source standby lead for this function to take effect.

GAI provides an ATX-to-4P adapter cable that comes with a 20-pin ATX connector, a 3-pin connector to the SBVCC (CN2) connector, and a 4P power connector. **This board uses an adapter cable different from that provided with the previous models**, please refer to **Appendix B** for more information.

Table 2-4 CN2 SBVCC: ATX Power Feature Pinouts

PCB rev. 1.0		PCB rev. 1.1	
PIN	DESCRIPTION	PIN	DESCRIPTION
1	5VSB	1	5VSB
2	+5V	2	N/C
3	PS_ON#	3	PS_ON#

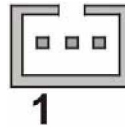


Figure 2-6 CN2 SBVCC ATX Power Feature

3. CN3: IVTC LCD Panel Inverter Backlight Control Connector

This connector comes as a 1x5 pin 2mm connector.

Table 2-5 CN3 IVTC Inverter Control Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	LCD_ADJ	2	GND
3	+12V	4	GND
5	VEEON		

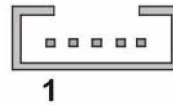


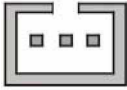
Figure 2-7 Inverter Backlight Control

4. CN4: CPU Fan Connector

FAN1 provides access to a +5V power source and a sensor pin for connecting a cooling fan.

Table 2-6 CN4 Fan Connector

PIN	DESCRIPTION
1	Fan Speed Detect
2	+5V
3	GND

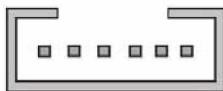
**1****Figure 2-8 CN4 Fan Connector**

5. CN5: Power and HDD LED Connector

This port provides the connectivity to the power and hard drive activity LEDs on the chassis front panel (may be so through an LED controller board on the chassis). An adapter cable is required.

Table 2-7 CN5 Pinouts

PIN	DESCRIPTION
1	VCC5
2	GROUND
3	POWER LED+
4	POWER LED-(GND)
5	HDD LED+
6	HDD LED-

**1****Figure 2-9 CN5 Power and HDD LED Connector**

6. CN6: DDR 200-pin SODIMM Socket

This socket receives a DDR 333/400MHz SODIMM module.

7. CN7: Battery Connector

This 2-pin header connects to an externally mounted 3V, Lithium, cell coin battery (VARTA CR2032). The life expectancy of the battery is approximately 7 years. Depending on the working condition, the life expectancy may be shorter.

Replacing a battery is not a user operation.

If the battery starts to weaken and loses voltage, contact your vendor or GAI for a replacement module. Dispose of the used battery properly. You may contact your local waste disposal agency for disposal instructions. Do not dispose of a used battery with normal household waste.



WARNING!

1. Keep a used battery away from children.
 2. Danger of explosion if the battery is incorrectly replaced. Only certified module from GAI can be used as a replacement.
 3. Do not expose the battery to excessive heat or fire.
 4. If the battery shows signs of leakage, contact your local vendor immediately.
-

8. CN8: 2x5 2.0mm Audio Pin Header

This port connects to AC'97 compatible audio devices through an adapter cable, e.g., that features a 10-pin header to audio phone jacks on a slot bracket.

Table 2-8 CN8 Audio Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	LINE OUT R	2	LINE IN R
3	GROUND	4	GROUND
5	LINE OUT L	6	LINE IN L
7	GROUND	8	GROUND
9	MIC IN	10	N/C

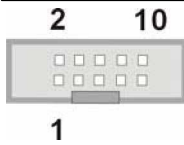


Figure 2-10 CN8 Audio Port

9. **CN9:** - functionality not implemented

10. CN10: PC/104 (104-pin ISA bus) Connector

The 3301820 features a PC/104 expansion bus that let you attach any kind of PC/104 modules. The PC/104 bus has already become the industrial embedded PC bus standard, so you can easily install over thousands of PC/104 modules from hundreds of vendors in the world. There are two PC-104 connectors on this board: PC/104-64 and PC/104-40.

A -5V/-12V (-VCC) connector is provided to supply -VCC voltage that is routed through the PC/104 64-pin connector.

Table 2-9 PC/104-64 Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	IOCHECK#	33	GROUND
2	SD7	34	IRSTDRV
3	SD6	35	VCC
4	SD5	36	IRQ9
5	SD4	37	-5V
6	SD3	38	DRQ2
7	SD2	39	-12V
8	SD1	40	ZWS
9	SD0	41	+12V
10	IOCHRDY	42	GROUND
11	AEN	43	SMEMW#
12	LA19	44	SMEMR#
13	LA18	45	IOW#
14	LA17	46	IOR#
15	SA16	47	DACK3#
16	SA15	48	DRQ3
17	SA14	49	DACK1#
18	SA13	50	DRQ1
19	SA12	51	REFRESH#
20	SA11	52	SYSCLK
21	SA10	53	IRQ7
22	SA9	54	N/C
23	SA8	55	IRQ5

24	SA7	56	IRQ4
25	SA6	57	IRQ3
26	SA5	58	DACK2
27	SA4	59	TC
28	SA3	60	BALE
29	SA2	61	VCC
30	SA1	62	OSC
31	SA0	63	GROUND
32	GROUND	64	GROUND

Table 2-10 PC/104-40 Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GROUND	21	GROUND
2	MCS16#	22	SBHE#
3	IOCS16#	23	LA23
4	IRQ10	24	LA22
5	IRQ11	25	LA21
6	IRQ12	26	LA20
7	IRQ15	27	LA19
8	IRQ14	28	LA18
9	DACK0#	29	LA17
10	DRQ0	30	MEMR#
11	DACK5#	31	MEMW#
12	DRQ5	32	SD8
13	DACK6#	33	SD9
14	DRQ6	34	SD10
15	DACK7#	35	SD11
16	DRQ7	36	SD12
17	VCC	37	SD13
18	MASTER#	38	SD14
19	GROUND	39	SD15
20	GROUND	40	GROUND

11. CN11: External –VCC Power Connector

Table 2-11 CN11 -VCC PC/104 Supplementary Power

PIN	DESCRIPTION
1	-5V
2	GND
3	-12V



Figure 2-11 CN11 –VCC Power

12. CN12: Reset Button Connector

This connector connects to an externally implemented reset button through an adapter cable.

Table 2-12 CN12 Reset Button Connector Pinouts

PIN	DESCRIPTION
1	RST_SW
2	GND

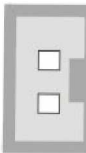


Figure 2-12 CN12 Reset Button Connector

13. CN13: AT Power ON/OFF Button Connector

This connector is used to connect a chassis power On/Off button using an adapter cable.

This connector is closely related to JP1 configuration. The use of this connector is briefed as follows:

1. Using **ATX** power: CN13 connects to a power switch, and the JP1 jumper should be left open.
2. Using **AT** power: The pins on JP1 are shorted by a jumper cap. The reason why JP1 should be shorted is because the AMD Southbridge is designed without the consideration for a power button signal and the shorted JP1 provides a hardware feedback to initiate the system.

Table 2-13 CN13 Power ON/OFF Button Connector Pinouts

PIN	DESCRIPTION
1	PWR_BTN#
2	GND



Figure 2-13 CN13 Power ON/OFF Button Connector

14. CN14: Digital I/O Connector

This Digital I/O port is managed through AMD CS5536AD Southbridge. The first table below shows the CN14 port pinouts. The second table shows the Digital I/O port assembly codes.

Table 2-14 CN14 Digital I/O Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GND	2	+5V
3	DIO_OUT0	4	DIO_OUT1
5	DIO_OUT2	6	DIO_OUT3

7	DIO_IN0	8	DIO_IN1
9	DIO_IN2	10	DIO_IN3

Table 2-15 Digital Input/Output Definition Options

I/O Address	DESCRIPTION
6F08	<p>Reads DIO port data, and returns AL DIO input data. The boot-up default input correspondence is DIO –DI3 => Bit0 – Bit3.</p> <p><i>Configuration example:</i></p> <pre>MOV AX, 6F08h INT 15h</pre> <p>When executed, the AL contents include DIO input data. Masking required on user applications for those non-input bits.</p>
6F09	<p>Outputs data to DIO port. The BL contents include output data. The boot-up default correspondence is DO0 – DO3 => Bit4 – Bit7.</p> <p><i>Configuration example:</i></p> <pre>MOV AX, 6F09h MOV BL, 10h INT 15h</pre> <p>If set as the boot-up default, DO0 =1, DO1 – DO3 = 0</p>
6F0A	<p>Defines DIO port (8 bits) as input or output. Each of 8 bits in the BL register represents one DIO signal.</p> <p>If set to “1,” the DIO becomes input signal. If set to “0,” the DIO port carries output signal. If the boot-up default is set to 0Fh, with 4 inputs and 4 outputs.</p> <p><i>Configuration example:</i></p> <pre>Move AX, 6F0Ah MOV BL, 00h INT 15h</pre> <p>When executed, 8 DIO signals become output signals.</p>

15. CN15: Parallel Port Connector

2x13 pin header 2mm connector

CN15 is an IEEE1284 compatible interface. Usually, the parallel port connects to a printer. This port is provided as a 26-pin 2.0mm pin header.

An adapter cable is required (2x13 pin header-to-parallel D-SUB w/ screws for securing to a chassis panel)

Table 2-16 CN15 Parallel Port Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	STROBE#	2	AUTO FORM FEED#
3	DATA0	4	ERROR#
5	DATA1	6	INITIALIZE
7	DATA2	8	PRINTER SELECT LN#
9	DATA3	10	GROUND
11	DATA4	12	GROUND
13	DATA5	14	GROUND
15	DATA6	16	GROUND
17	DATA7	18	GROUND
19	ACK-	20	GROUND
21	BUSY	22	GROUND
23	PAPER EMPTY	24	GROUND
25	PRINTER SELECT	26	N/C

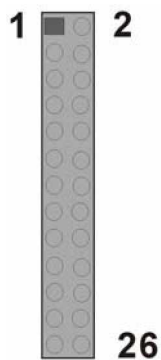


Figure 2-14 CN15 Parallel Port

16. CN16: COM2 RS-232/422/485 Serial Port Header

Table 2-17 CN16: 14 (2x7) Pin 2.0mm Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD	2	DSR
3	RXD	4	RTS
5	TXD	6	CTS
7	DTR	8	RI/Vout
9	GND	10	GND
11	TXD485+	12	TXD485-
13	RXD485+	14	RXD485-

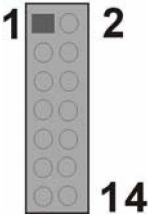


Figure 2-15 COM2 Connector

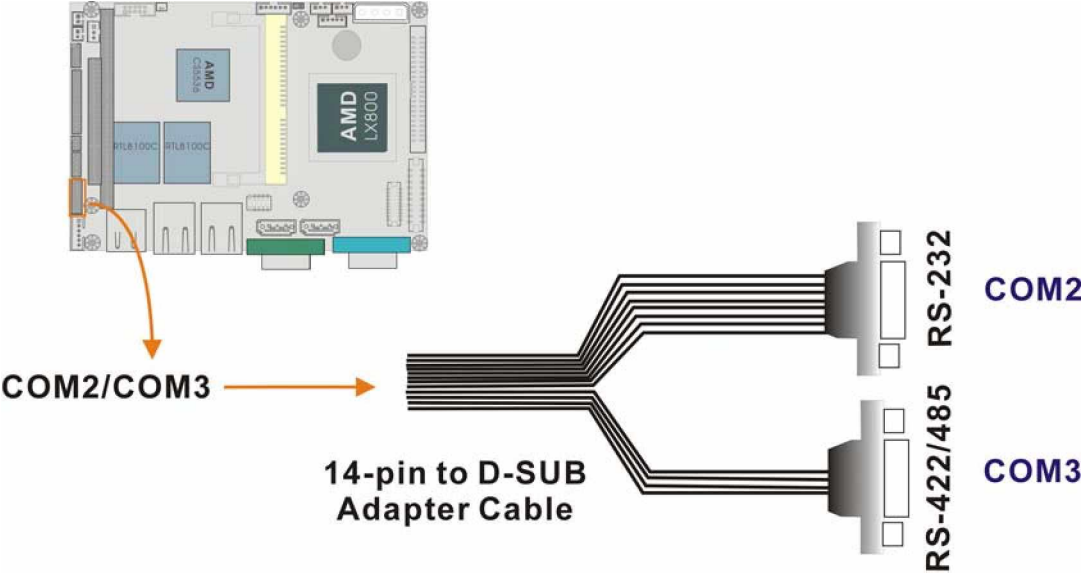


Figure 2-16 COM2 & COM3 Adapter Cable

**NOTE:**

1. If you want to use the RS485 mode, just connect to TXD485-, TXD485+. If you want to use the RS422, please connect to TXD485-, TXD485+, RXD485-, and RXD485+.
2. Please refer to **Chapter 3** for details on serial port operation modes.

17. CN17: Keyboard/Mouse Pin Header

This port connects to a PS/2 keyboard or mouse using a 6-pin-to-PS/2 adapter cable. An adapter cable, 6-pin-to-two PS/2, is required.

Table 2-18 CN17 Keyboard/Mouse Header Pinouts

PIN	DESCRIPTION
1	+5V
2	MS_DATA
3	MS_CLK
4	KB_DATA
5	KB_CLK
6	GND

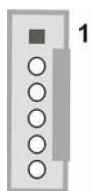


Figure 2-17 CN17 Keyboard/Mouse Pin Header

18. CN18:

This functionality is not implemented.

19. CN19, CN20, CN21, CN22, and CN26: Front Panel Connectors

These are front panel connectors. Please refer to the next section for details.

20. CN23 & CN25: Serial ATA Disk Drive Connectors

These 7-pin standard Serial ATA ports connect to SATA I-compatible hard disk drives. SATA drives are managed by the ALi chipset onboard.

Table 2-19 Serial ATA Port Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GND	2	STXP
3	STXN	4	GND
5	SRXN	6	SRXP
7	GND		

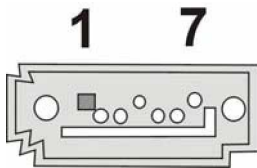


Figure 2-18 CN23 & CN25 Serial ATA Port

21. CN24: Internal USB Header (Two Ports)

USB2/3: 2x4 8-pin Header.

This header provides the connectivity to additional USB devices through an adapter cable. Various adapters may come with USB ports on a slot bracket or ports that can be attached to D-SUB openings on a chassis.

Table 2-20 CN24 USB Port Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	+5V	8	GND
2	USBDT2N	7	USBDT3P
3	USBDT2P	6	USBDT3N
4	GND	5	+5V

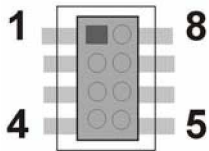


Figure 2-19 CN24 USB Port


22. CN27: Not Implemented

23. CN28: Flat Panel Display Connector

TFT LCD (24-bit one channel; DF13-40DP-1.25V)

Table 2-21 CN28 Flat Panel Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
2	LCD5V	1	LCD5V
4	GROUND	3	GROUND
6	LCD3V	5	LCD3V
8	GROUND	7	N/C
10	B1	9	B0
12	B3	11	B2
14	B5	13	B4
16	B7	15	B6
18	G1	17	G0
20	G3	19	G2
22	G5	21	G4
24	G7	23	G6
26	R1	25	R0
28	R3	27	R2
30	R5	29	R4
32	R7	31	R6
34	GROUND	33	GROUND
36	FPVS	35	FPCLK
38	FPHS	37	FPDEN
40	ENVEE	39	N/C



NOTE:
Pins 1, 2, 5, and 6 on PCB version 1.1 are changed to LCD_VCC.

The supplied voltage (3.3V and 5V) can be selected via JP4.

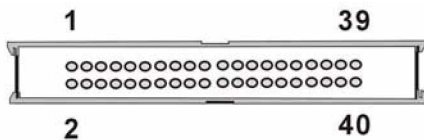



Figure 2-20 CN28 TFT Panel Display Connector

24. CN29: LVDS Panel Display Connector

LVDS LCD (18-bit) 2x15 pin header 1.25mm (DF13-20DP-1.25V)

Table 2-22 CN29 LVDS Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
2	GND	1	GND
4	LVD0-	3	LVD0+
6	LVD1-	5	LVD1+
8	LVD2-	7	LVD2+
10	LVDCK-	9	LVDCK+
12	N/C	11	N/C
14	GROUND	13	GROUND
16	N/C	15	N/C
18	LVD_VCC5	17	LVD_VCC5
20	LVD_VCC3	19	LVD_VCC3



NOTE:
Pins 17, 18, 19, and 24 on PCB revision 1.1 are changed to LCD_VCC.
The supplied voltage can be selected via JP4.

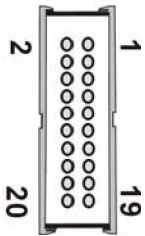


Figure 2-21 CN29 LVDS Panel Display Connector

25. CN30: IDE Connector

One IDE connector can connect to one (1) IDE cable, and the single IDE cable can then connect to two IDE devices. An optional IDE adapter cable from GAI is available.

Table 2-23 CN30 IDE Connector Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	RESET#	2	GROUND
3	DATA 7	4	DATA 8
5	DATA 6	6	DATA 9
7	DATA 5	8	DATA 10
9	DATA 4	10	DATA 11
11	DATA 3	12	DATA 12
13	DATA 2	14	DATA 13
15	DATA 1	16	DATA 14
17	DATA 0	18	DATA 15
19	SIGNAL GND	20	(KEY)
21	HDD 0	22	GROUND
23	IO WRITE	24	GROUND
25	IO READ	26	GROUND
27	HD READY	28	N/C
29	HDACK 0	30	GROUND
31	IRQ14	32	N/C
33	ADDR 1	34	N/C
35	ADDR 0	36	ADDR 2
37	HDD SELECT 0	38	HDD SELECT 1
39	IDE ACTIVE#	40	GROUND
41	VCC	42	VCC
43	GROUND	44	N/C

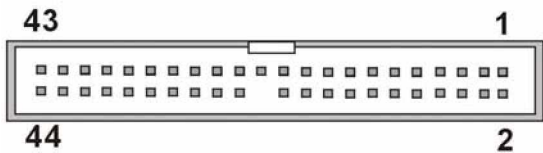


Figure 2-22 CN30 IDE Connector

26. CN31: Optional Floppy Connector (On the Soldering Side)

A 26-pin FPC connector cable is required for connecting to the optional floppy port. You can connect one (1) 3.5"(1.44 MB) drive to this port.

Table 2-24 CN31: Optional Floppy Connector

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VCC	14	STEP#
2	INDEX#	15	GROUND
3	VCC	16	WDATA#
4	DISKSEL0#	17	GROUND
5	VCC	18	WGATE#
6	DSKCHG#	19	GROUND
7	N/C	20	TRAK0#
8	N/C	21	GROUND
9	N/C	22	WRTPRT#
10	MTR0#	23	GROUND
11	N/C	24	RDATA#
12	DIR#	25	GROUND
13	N/C	26	HDSEL#




Figure 2-23

CN31 Floppy Port

27. CN32: Compact Flash Connector)

The CN32 socket allows you to attach a Compact Flash Disk that occupies the secondary IDE channel. The CN32 socket supports both the TYPE II and TYPE I modules.

Table 2-25 CN32 Compact Flash Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	GROUND	26	VCC-IN CHECK1
2	DATA3	27	DATA11
3	DATA4	28	DATA12
4	DATA5	29	DATA13
5	DATA6	30	DATA14
6	DATA7	31	DATA15
7	HDC_CS0#	32	HDC_CS1
8	N/C	33	N/C
9	GROUND	34	IOR#
10	N/C	35	IOW#
11	N/C	36	VCC_COM
12	N/C	37	IRQ15
13	VCC_COM	38	VCC_COM
14	N/C	39	CSEL
15	N/C	40	N/C
16	N/C	41	HDD_RESET
17	N/C	42	IORDY
18	SA2	43	SDREQ
19	SA1	44	SDACK#
20	SA0	45	HDD_ACTIVE#
21	DATA0	46	PDIAG
22	DATA1	47	DATA8
23	DATA2	48	DATA9
24	N/C	49	DATA10
25	VCC-IN CHECK2	50	GROUND

2.2.2 Front Panel Connectors

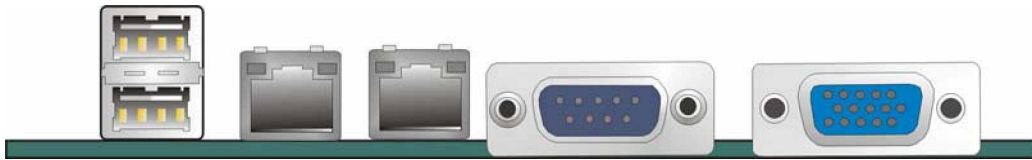


Figure 2-24 Front Panel Connectors

CN19: USB Combo Connector (2 Ports)

The combo connector provides two USB ports. These two USB ports connect to USB2.0 devices.

CN20 & CN21: 10/100BaseT Ethernet (RJ-45) Ports

These RJ-45 connectors provide 10/100BaseT Ethernet connection to a local or internet network. Refer to the table below for the Ethernet port LED indication.

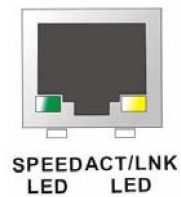


Figure 2-25 10/100BaseT Ethernet (RJ-45) Port

Table 2-26 Ethernet Port Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	TX-	5	N/C
2	N/C	6	RX-
3	TX-	7	N/C
4	RX+	8	N/C

Ethernet Port LED Indicators

Table 2-27 Ethernet Port LED Indications

SPEED LED		LINK LED	
Status	Description	Status	Description
GREEN	ON: 100MB OFF: 10MB	YELLOW	ON: Linked Flashing: Activity

CN22: Serial Port COM1

This serial port is defined as COM1 and provides serial connection in the RS-232 mode.

Table 2-28 Serial Port COM1 Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI/Vout
5	GND		

CN26: VGA Port

This 15-pin D-SUB VGA port connects to a CRT or LCD display monitor.

Table 2-29 VGA Port Pinouts

PIN	DESCRIPTION	PIN	DESCRIPTION
1	VGA_R	9	N/C
2	VGA_G	10	GND
3	VGA_B	11	N/C
4	N/C	12	SSDA
5	GND	13	VGA_HS
6	GND	14	VGA_VS
7	GND	15	SSCL
8	GND		

Chapter

3

Installation

3.1 Considerations Prior to Installation

Preparing Your Embedded Board

The embedded board contains numerous delicate electronic circuits and components, which can become damaged as a result of electrostatic discharge (ESD). Thus, prior to installation, please follow the instructions below:

1. Please turn off the computer and unplug its power cord.
2. When handling the board, avoid touching any metal leads or connectors.
3. It is best to wear an electrostatic discharge (ESD) cuff when handling electronic components (CPU, RAM).
4. Prior to installing the electronic components, please have these items on top of an anti-static pad or within an electrostatic shielding container.
5. Please verify that the power supply is switched off before unplugging the power supply connector from the motherboard.

Installation Notices

1. Prior to installation, please do not remove the stickers on the system board. These stickers are required for warranty validation.
2. Prior to the installation of the system board or any hardware, please first carefully read the information in the provided manual.
3. Before using the product, please verify that all cables and power connectors are connected.
4. To prevent damage to the PCB board, please do not allow screws to come in contact with the PCB circuit, connector pins, or its components.
5. Please make sure there are no leftover screws or metal components placed on the PCB board or within the computer casing.
6. Please do not place the computer system on an uneven surface.
7. Turning on the computer power during the installation process can lead to damage to system components as well as physical harm to the user.
8. If you are uncertain about any installation steps or have a problem related to the use of the product, please consult a certified computer technician.

Airflow Consideration

Although the embedded board can operate without active cooling, it is still necessary to install the board in a chassis with ventilation holes on the sides allowing airflow to travel through the heatsink surface. In a system with an individual power supply unit, the cooling fan of a power supply can also help generate airflow through the board surface.

Unpacking Precautions

Some components on the 3301820 are very sensitive to static electric charges and can be damaged by a sudden rush of power. To protect it from unintended damage, be sure to follow these precautions:

- z Ground yourself to remove any static charge before touching your PCB. You can do so by using a grounded wrist strap at all times or by frequently touching any conducting materials that is connected to the ground.
- z Handle your PCB by its edges. Do not touch IC chips, leads or circuitry if not necessary.
- z Do not plug or unplug any connector or jumper while the power is on.
- z Do not place a PCB on top of an anti-static bag. Only the inside of the bag is safe from static discharge.

Memory Module

DDR 333/400, 256MB, 512MB, or 1GB, 200-pin DDR SODIMM modules recommended.

3.2 Mechanical Diagrams

- TBD -

Figure 3-1 Board Dimensions and Mounting Hole Locations



NOTE:

Use the mounting holes on the four corners of the PCB for securing within a chassis.
Holes in the middle of the board are used for securing a heatsink.

3.3 Jumper Settings



NOTE:

A jumper is a metal bridge that is used to close an electrical 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/SHORT a jumper means connecting the pins of the jumper with the plastic clip and to OPEN a jumper means removing the plastic clip from a jumper.

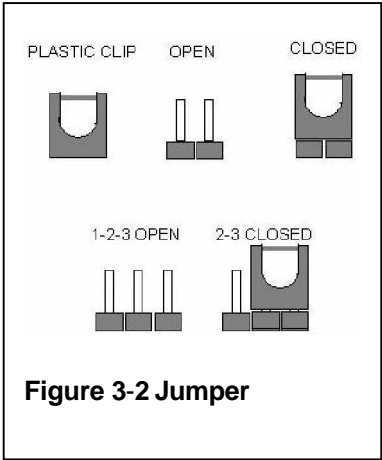


Figure 3-2 Jumper

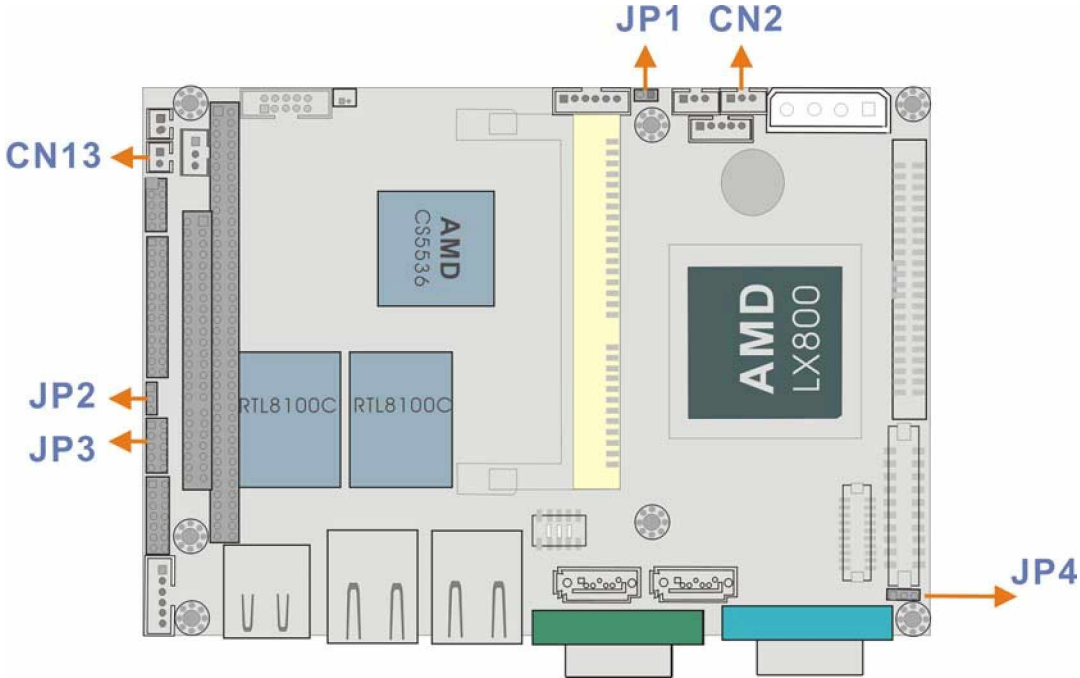


Figure 3-3 Locations of Configuration Jumpers

**NOTE:**

The 3301820 SBC does not provide the “Clear CMOS” configuration jumper. If your SBC fails to boot due to improper BIOS settings, you can reset the CMOS contents by disconnecting the CN7 battery connector temporarily. Use a small-size needle nose plier to carefully disconnect the connector.

JP1 (AT/ATX Mode Selector)

This jumper block controls the way you connect to a power supply

The CN13 connector is used to connect a chassis power On/Off button using an adapter cable.

The CN13 connector is configured through the JP1 jumper. The use of this connector is briefed as follows:

1. Using **ATX** power: CN13 connects to an externally implemented power switch, and the JP1 jumper should be left open.
2. Using **AT** power: The pins on JP1 are shorted by a jumper cap. The reason why JP1 should be shorted is because the AMD Southbridge is designed without the consideration for a power button signal and the shorted JP1 provides a hardware feedback to initiate the system. The power on/off function is then managed by the AT power switch button. **On PCB revision 1.1, the Pin2 “+5V” is changed to N/C.**

JP1 Pin Configuration

Table 3-1 JP1 Pin Configuration

JP1	Power Mode Selector
1	AUTO_SW#
2	PWRBTN#

JP2: COM3 Serial Port Operation Mode Selector

This jumper block allows you to select an operation mode for the COM3 serial port (Default: 1-2).

Table 3-2 JP2 Pinouts

PIN COMBINATION	DESCRIPTION
1-2	RS-422 (default)
2-3	RS-485

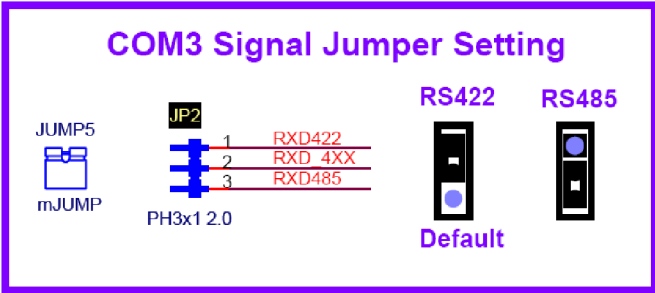


Figure 3-4 JP2 Pinouts

JP3: COM1 and COM2 Ports Power Selector

Table 3-3 JP3 COM2 Signal Selector

COM1 Pin-9 Signal Selection		COM2 Pin-9 Signal Selection	
PIN COMBINATION	DESCRIPTION	PIN COMBINATION	DESCRIPTION
1-3	12V	2-4	12V
3-5	5V	4-6	5V
5-7	5V	6-8	5V
7-9	RI1	8-10	RI2

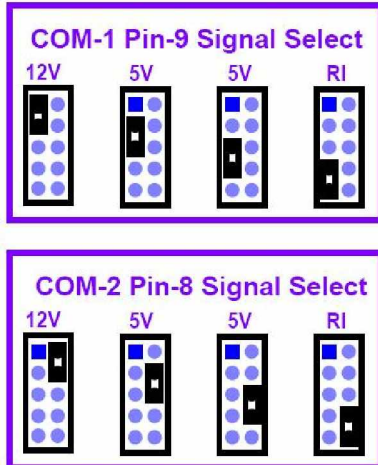


Figure 3-5 JP3 Pin Configurations

JP4: LCD Voltage Selector

Table 3-4 JP4 LCD Voltage Selector Pin Combinations

PIN COMBINATION	DESCRIPTION
1-2	LCD_VCC = 3.3V (default)
2-3	LCD_VCC = 5V

3.4 Installation

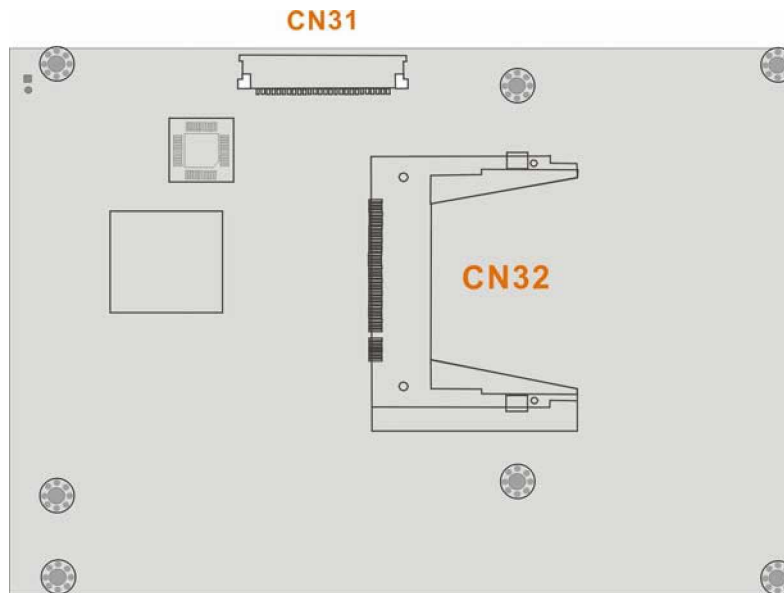


Figure 3-6 Soldering Side Sockets

IDE Disk Drive and CDROM Connector

The 3301820 provides 1 IDE channel which allows the connection to two Enhanced Integrated Device Electronics hard disk drives or CD/DVD-ROM. The IDE controller is attached to a PCI interface. The advanced IDE controller supports PIO mode 3, mode 4 and up to UDMA/33 in transfer speed.

Connecting Hard Disk Drives

IDE bus devices are daisy-chained using a standard 44-pin IDE cable. Connection is made by connecting one end of the cable to the CN30 IDE connector. The connector has a keyed pin which prevents you from inserting the connector in a wrong direction. The read wire corresponds to pin 1 on the connector.

Plug the other end of the cable into the Enhanced IDE hard drive, with pin 1 on the cable corresponding to pin 1 on the hard drive.

Note that when connecting two IDE disk drives you will have to configure one as the master and the other the slave. The configuration is done by setting the jumpers on the disk drives.

Optional Floppy Drive Connector (CN31)

This connector provides access to one (1) externally mounted floppy drive (3.5"-profile, 1.44 MB type floppy drive).

A 26-pin FPC connector cable is required for the connection to floppy drives. The cable should come with a 26-pin FPC-cable connector and floppy disk drive connector on the other end.

Connecting the Floppy Drive

1. Plug the 26-pin FPC-cable connector into CN31. Make sure that the red wire corresponds to pin one on the connector.
2. Attach the appropriate connector on the other end of the cable to the floppy drive. You can use only one connector in the set.

Compact Flash Disk

When appropriately formatted, a compact Flash disk can serve as a bootable hard drive in applications where installation space is limited. The Compact Flash card occupies a secondary IDE channel. Configuration options can be found through the BIOS configuration utility.

Parallel Port Connector (CN15)

Parallel port connects to a printer. The 3301820 comes with a multi-mode (ECP/EPP/SPP) parallel port. The CN15 parallel port interface features a 26-pin flat-cable connector that requires an adapter cable if a traditional DB-25 connector is preferred. The parallel interface can be re-assigned to LPT2 or LPT3 through the BIOS configuration utility.

The default interrupt channel is IRQ7. Select ECP or EPP DMA mode using the BIOS configuration utility.

Audio Interface

Audio Connector

AC'97 Audio signals are interfaced through a 10-pin flat-cable connector. These signals include

Microphone line-in, line-in stereo, and line-out stereo. An audio 10-pin-to-phone-jack adapter kit is required.

COM Port Connectors [COM1(CN22), COM2/COM3(CN16)]

The 3301820 provides two serial ports (COM1 & COM2: RS-232; COM3: RS-422/485) interfaced through one DB-9 connector (COM1) and one 14-pin male header. These serial ports facilitate the connection to serial devices or a communication network, e.g., terminal console.

LCD Panel Connection (CN26, CN28, and CN29)

The PCI SVGA interface on the 3301820 connects conventional CRT displays and flat panel displays including passive LCD and active LCD displays. There are three (3) connectors onboard for the connection to the three (3) display types:

1. CRT VGA monitors
2. TFT flat panel displays
3. LVDS type LCD panels

One CRT display connector (CN26) is provided as a 15-pin, female D-SUB to connect conventional CRT displays. Pin assignments can be found in ***Chapter 2 Functional Description***.

Flat Panel Display Connector (CN28):

CN28 is a 40-pin connector, Hirose DF13A-40DP-1.25V, which can support a 24-bit LCD panel. A bias control signal, ENVEE, active high on CN28, controls the LCD bias voltage. The LCD bias voltage shall not be applied until the +5V or +3.3V logical supply and panel video signals become stable. When powered on, the control signal remains low until receiving the flat panel signals. CN28 connects up to 24-bit TFT LCD.

LVDS Connector (CN29):

CN29 is a 20-pin connector, Hirose DF13A-20DP-1.25V. The CN29 connects an 18-bit LCD panel.

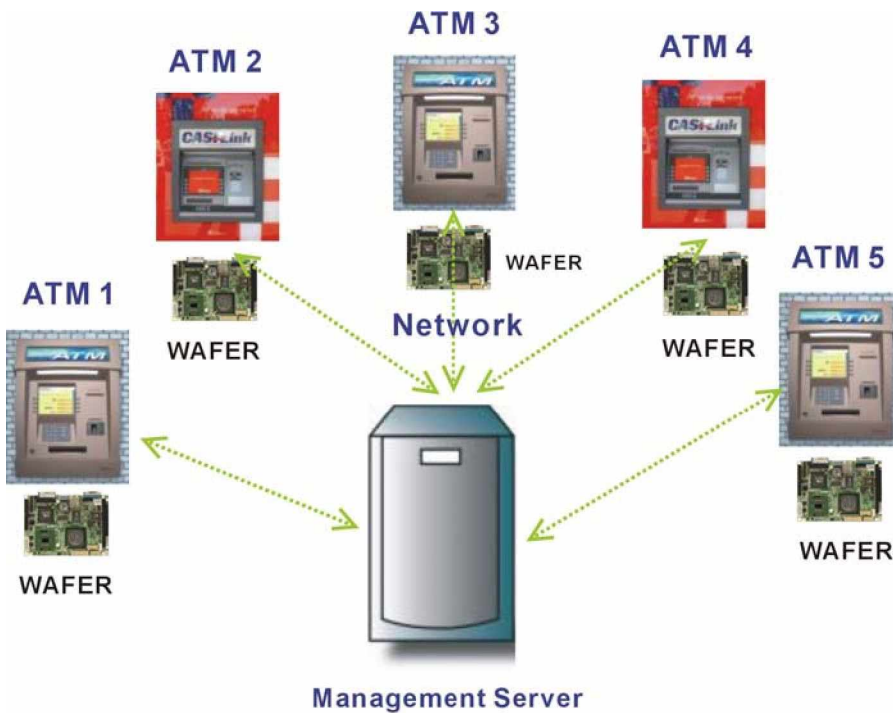
Adapter cables are required for connecting the display connectors.

Ethernet Connection (CN20 & CN21)

The onboard 32-bit PCI-bus Ethernet interface is fully compliant with IEEE 802.3U 10/100Mbps CSMA/CD standards. The 10/100BaseT connector connections are made via standard RJ-45 connectors on the front edge.

PXE: Pre-Boot Execution Environment

PXE is an open industry standard developed by a number of software and hardware vendors. The BIOS PXE feature allows a workstation to boot from a server on a network by receiving a pre-OS agent prior to booting the operating system on the local hard drive.



PXE for Remote and Central Management

Figure 3-7 PXE Central Management

USB Connection (CN24 and CN19)

The combo USB header (CN24) provides the connectivity of up to two (2) USB (Universal Serial Bus) ports. The USB interface features complete Plug and Play, and hot attach/detach for up to 127 external devices, compliance with USB specification Rev. 1.1. An adapter 8-pin-to-USB cable is required for connecting to CN24. The USB interface is accessed through two 4 x 2-pin

connectors, USB01. The adapter cable has one (1) 4x2-pin connector on one end and a standard USB connector on the other.

Accessories Included in Kit

GAI provides the following cables to facilitate connections to your peripheral devices. For more information on the locations of the connectors, please refer to **Chapter 2**. Cables not included in kit are the user supplied items and should be separately purchased.

Table 3-5 Cables and Accessories Included in Kit

No.	Type
1	IDE flat cable 44p/44p
2	SATA cable
1	SATA power cable
1	PS/2 KB/MS cable
1	Audio adapter cable
1	COM2 serial port cable (RS-232/422/485 compatible)

Chapter

4

Award BIOS Setup

Introduction

A licensed copy of Phoenix Award BIOS is preprogrammed into the ROM BIOS. The BIOS setup program allows users to modify the basic system configuration. This chapter describes how to access the BIOS setup program and the configuration options you may change.

1.1.1 Starting Setup

The Phoenix Award BIOS is activated when you turn on the computer. The setup program can be activated in one of two ways.

1. Press the **DELETE** key as soon as the system is turned on or
2. Press the **DELETE** key when the “**Press Del to enter SETUP**” message appears on the screen.

If the message disappears before you respond, you must restart your computer and try again.

1.1.2 Using Setup

Use the arrow keys to highlight items, press **ENTER** to select, use the PageUp and PageDown keys to change entries, press **F1** for help and press **Esc** to quit. Navigation keys are shown in.

Key	Function
Up arrow	Move to the item above
Down arrow	Move to the item below
Left arrow	Move to the item on the left hand side
Right arrow	Move to the item on the right hand side
+ / Page up	Increase the numeric value or make changes
- / Page down	Decrease the numeric value or make changes
Esc	Main Menu – Quit and not save changes into CMOS Status Page Setup Menu and Option Page Setup Menu -- Exit current page and return to Main Menu
F1	General help, only for Status Page Setup Menu and Option Page Setup Menu
F2	Item help
F5	Previous values for the page menu items
F6	Fail-safe defaults for the current page menu items
F7	Optimized defaults for the current page menu items

F9	Menu in BIOS
F10	Save changes and Exit BIOS

Table 4-1: BIOS Navigation Keys

1.1.3 Getting Help

When you press **F1** a small help window describing the appropriate keys to use and the possible selections for the highlighted item appears. To exit the Help Window press **Esc** or the **F1** key again.

1.1.4 Unable to Reboot After Configuration Changes

If you are unable to boot your computer after you have made changes to the system configuration, you must restore the CMOS defaults. Use the jumper described in **Chapter** Error! Reference source not found., **Section** Error! Reference source not found..

1.1.5 Main BIOS Menu

Once the BIOS opens, the main menu in Error! Reference source not found. appears.



NOTE:

The following sections will completely describe the menus listed below and the configuration options available to users.

The following menu options are seen in Error! Reference source not found..

1. **Standard CMOS Features:** Changes the basic system configuration.
2. **Advanced BIOS Features:** Changes the advanced system settings.
3. **Advanced Chipset Features:** Changes the chipset configuration features
4. **Integrated Peripherals:** Changes the settings for integrated peripherals
5. **Power Management Setup:** Allows you to configure power saving options
6. **PCIPnP Configurations:** Changes the advanced PCI/PnP Settings
7. **PC Health Status:** Menu that monitors essential system parameters

The following user configurable options are also available in the BIOS Main Menu

Load Fail-Safe Defaults

This option allows you to load failsafe default values for each of the parameters on the Setup menus. **F6 key can be used for this operation on any page.**

Load Optimized Defaults

This option allows you to load optimal default values for each of the parameters on the Setup menus. **F7 key can be used for this operation on any page.**

Set Supervisor Password

By default no **Supervisor Password** is set. If you wish to install a supervisor password, select this field and enter the password. After this option has been selected, a red dialogue box with “**Enter Password:** ” will appear. You will be asked to confirm your password. Retype the original password into the “**Confirm Password:** ” dialogue box and press enter.

Change User Password

By default no **User Password** is set. If you wish to install a user password, select this field and enter the password. After this option has been selected, A red dialogue box with “**Enter Password:** ” will appear. You will be asked to confirm your password. Retype the original password into the “**Confirm Password:** ” dialogue box and press enter.

Save & Exit Setup

If you have finished making the configuration changes and wish to save them and exit the BIOS menus, select this option.

Exit Without Saving

If you have finished making configuration changes but do not want to save them and you want to exit the BIOS menus, select this option.

Standard CMOS Features

When you enter the **Standard CMOS Features** BIOS menu Error! Reference source not found. appears. The **Standard CMOS Features** menu allows you to set basic BIOS configuration options.

The **Standard CMOS Features** menu allows you to set both the date and the time field:

1. **Date [mm:dd:yy]:** Allows you to set the system date.

2. **Time [Day hh/mm/ss]:** Allows you to set the system time.

IDE Master and IDE Slave

When entering setup, BIOS auto detects the presence of IDE devices. This displays the status of the auto detected IDE devices. The following IDE devices will be detected and are shown in the **Standard CMOS Features** menu:

1. Primary IDE Master
2. Primary IDE Slave
3. Secondary IDE Master
4. Secondary IDE Slave

The IDE Configuration menu (Error! Reference source not found.) allows you to set or change the configurations for the IDE devices installed in the system. If an IDE device is detected, and one of the above listed four BIOS configuration options are selected, the IDE configuration options shown in **Section 1.1.6** appear.






Drive A [1.44M, 3.5in]

The **Drive A** configuration option determines the type of floppy drive installed in the system. The floppy drive configuration options are listed below.

1. None
2. 1.44M, 3.5 in (DEFAULT)

Halt On

The **Halt On** category allows users to determine whether the computer will stop if an error is detected during power up.

- | | | | |
|---|--------------------------|-----------|--|
|  | All Errors | (DEFAULT) | Whenever BIOS detects a non-fatal error the system will be stopped and you will be prompted. |
|  | No Errors | | The system boot will not be stopped for any errors that may be detected |
|  | All, But Keyboard | | The system boot will not stop for a keyboard error; it will stop for all other errors. |
|  | All, But Diskette | | The system boot will not stop for a disk error; it will stop for all other errors. |
|  | All, But Disk/Key | | The system boot will not stop for a keyboard |

or a disk error; it will stop for all other errors.

Base Memory:

The **Base Memory** is NOT user configurable. The POST will determine the amount of base (or conventional) memory is installed in the system. The value of the base memory is typically 512K for systems with 512K memory installed on the CPU card or 640K for systems with 640K or more memory installed on the motherboard.

Extended Memory

The **Extended Memory** is NOT user configurable. The BIOS determines how much extended memory is present during the POST. This is the amount of memory above 1MB located in the memory address map of the CPU.

Total Memory

The **Total Memory** is NOT user configurable.

1.1.6 IDE Channel Master

The **IDE Channel Master** menu (Error! Reference source not found.) allows you to set or change the configurations for the master and slave IDE devices for both channel 0 and channel 1.

↑ **IDE HDD Auto-Detection [Press Enter]**

Selecting **IDE HDD Auto-Detection** option and pressing the “**ENTER**” key will enable the BIOS to automatically detect the HDD type. Do not set this option manually.

↑ **IDE Channel 0/1 Master/Slave [Auto]**

The **IDE Channel** option allows you to activate or deactivate the following drive channels:


1. Channel 0 Master
2. Channel 0 Slave

- | | | |
|---|-----------------------|--|
| ↑ | None | If you have no drives connected to the IDE channel select this option. Once set, this IDE channel will become inaccessible and any drives attached to it undetected. |
| ↑ | Auto (DEFAULT) | Setting this option allows the device to be automatically detected by the BIOS |
| ↑ | Manual | Selecting this option allows you to manually configure the device on the IDE channel in BIOS. |

↑ **Access Mode [Auto]**

The **Access Mode** option allows you to determine the hard disk BIOS translation modes. Most systems now use hard drives with large capacities and therefore either the LBA translation mode or auto should be selected.

- | | | |
|---|--------------|--|
| ↑ | CHS | Select this mode if the HDD capacity is less than 504MB. |
| ↑ | LBA | Select this mode if the HDD capacity is more than 8.4GB. |
| ↑ | Large | This mode is an extended ECHS mode and while it supports HDDs larger than 504MB, it is not |

 **Auto** (DEFAULT) recommended.
If you are unsure of what access mode to set, select this option

Capacity

The **Capacity** specification tells the user the storage capacity of the HDD installed in the system.

Cylinder

The **Cylinder** specification tells the user how many cylinders (tracks) are on the HDD installed in the system.

Head

The **Head** specification tells the user how many logical heads are on the HDD installed in the system.

Precomp

The **Precomp** specification tells the user on what track the write pre-compensation begins.

Landing Zone

The **Landing Zone** specification tells the user where the disk head will park itself after the system powers off.

Sector

The **Sector** specification tells the user how many logical sectors the HDD has been divided into.

Advanced BIOS Features

The **Advanced BIOS Features** menu (Error! Reference source not found.) allows you to access CPU and peripheral device configuration options.



Once the **Advanced BIOS Features** menu is selected, two menu options and a host of configuration options are available. The two menu options are:

1. CPU Feature
2. Hard Disk Boot Priority

To access these menus, use the arrow keys to select the menu option and press the “ENTER” button. The menu will appear. The menus are discussed fully in **Section 1.1.7 : CPU Feature** and **Section** Error! Reference source not found.: Error! Reference source not found. below.

Virus Warning [Disabled]

When this item is enabled, the BIOS will monitor the boot sector and partition table of the HDD for any attempt at modification. If an attempt is made, the BIOS will halt the system and an error message will appear. Afterwards, if necessary, you will be able to run an anti-virus program to locate and remove the problem before any damage is done.

- | | |
|---|---|
|  Enabled | Activates automatically when the system boots up causing a warning message to appear when anything attempts to access the boot sector or HDD partition table. |
|  Disabled (Default) | No warning message will appear when anything attempts to access the boot sector or HDD partition table. |





NOTE:

Many disk diagnostic programs can cause the above warning message to appear when the program attempts to access the boot sector table. If you will be running such a program, it is recommended that you first disable the virus protection function before hand.

CPU Internal (L1 & L2) Cache [Enabled]

The **CPU L1 & L2 Cache** option allows users to select whether the CPU primary cache (L1) and secondary cache (L2) will be turned on or off.

- | | |
|--|--|
|  Enabled (DEFAULT) | The L1 and L2 CPU caches are both turned on |
|  Disabled | The L1 and L2 CPU caches are both turned off |

Boot From LAN Control

This allows you to utilize the boot-from-LAN feature. The associated hardware should also be prepared for utilizing this feature, e.g., several hundreds of mA standby voltage from the power supply.

SATA Boot ROM Control

When enabled, the ALi or ULi SATA ROM management utility will provide the access to RAID configuration utility during the POST stage and allow you to boot from SATA disk drives. You may refer to **Appendix C** for more details.

Boot Device

There are three **Boot Device** configuration options. They are:

1. **First Boot Device** [DEFAULT: Floppy]
2. **Second Boot Device** [DEFAULT: Hard Disk]
3. **Third Boot Device** [DEFAULT: LS120]

The **Boot Device** configuration options allow you to select the order of devices the computer will boot from. Using the default values, the system will first look for a FDD to boot from. If it cannot find an FDD it will use an HDD to boot from. If both a FDD and a HDD are unavailable then the system will boot from a LS120 (Super Disk) drive.

Boot Device configuration options are:

1. Floppy
2. LS120
3. HDD-0
4. SCSI
5. CDROM
6. HDD-1
7. ZIP100
8. USB-FDD
9. USB-ZIP
10. USB-CDROM
11. USB-HDD
12. LAN
13. Disabled

Boot Other Device [Enabled]

The **Boot Other Device** option determines whether the SBC will use a second or third boot device if the first boot device is not found.

- Enabled** (DEFAULT) The system will look for second and third boot devices if the first one is not found.
- Disabled** The system will not look for second and third boot device if the first one is not found.

Swap Floppy Drive [Disabled]

This option should not avail because FPC interface only allows the connection to one floppy drive.

Boot Up Floppy Seek [Enabled]

During the POST, BIOS will determine if the floppy disk drive installed has 40 or 80 tracks. 360K FDDs have 40 tracks while 760K, 1.2M and 1.44M FDDs all have 80 tracks

- Enabled** BIOS searches for a FDD to determine if it has 40 or 80 tracks. Note that BIOS cannot tell the difference between 720K, 1.2M or 1.44M drives as they all have 80 tracks.
- Disabled** (DEFAULT) BIOS will not search for the type of FDD drive by track number. Note that there will not be any warning message if the drive installed is 360K.

Boot Up Numlock Status [On]

The **Boot Up Numlock Status** option allows you to determine the default state of the numeric keypad.

- Off** The keys on the keypad will be arrow keys
- On** (DEFAULT) The keys on the keypad will be number keys









Typematic Rate Setting [Disabled]

Disabling the **Typematic Rate Setting** configuration option only allows one character to appear onto the screen if a key is continuously held down. In other words, the BIOS will only report the key is down. When this option is enabled, the BIOS will report as before, but it will then wait a moment, and, if the key is still down, it will begin to report that the key has been depressed repeatedly. Such a feature would be used to accelerate cursor movements with the arrow keys.

- Disabled** (DEFAULT) Disables the typematic rate
- Enabled** Enables the typematic rate

x Typematic Rate (Chars/sec) [6]

The **Typematic Rate** can only be configured if the **Typematic Rate Setting** is Enabled. The **Typematic Rate** configuration field determines the rate keys are accelerated.





 6	(DEFAULT)	6 characters per second
 8		8 characters per second
 10		10 characters per second
 12		12 characters per second
 15		15 characters per second
 20		20 characters per second
 24		24 characters per second
 30		30 characters per second

Gate A20 Option

This option determines the Gate A20 control options. This option only avails in older, DOS, or 16-/32-bit operating systems. For systems running newer, protected or real mode, operating systems, this option should never be changed.



x Typematic Delay (Msec) [250]

The **Typematic Delay** can only be configured if the **Typematic Rate Setting** is enabled. The **Typematic Delay** configuration field allows you to select the delay between when the key was first depressed and when the acceleration begins.

 250	(DEFAULT)	250 milliseconds
 500		500 milliseconds
 750		750 milliseconds
 1000		1000 milliseconds

Security Option [Setup]

The **Security Option** configuration option allows you to limit access to the system and Setup or just to the Setup.



 Setup	(DEFAULT)	The system will not boot and access to Setup will be denied if the correct password is not entered at the prompt.
 System		The system will boot, but access to Setup will be denied if the correct password is not entered at the prompt.

**NOTE:**

To disable security, select the password setting in the **Main Menu**. When asked to enter a password, do not type anything, press, “**ENTER**” and the security is disabled. Once the security is disabled, the system will boot and you can enter Setup freely.

OS Select For DRAM > 64MB [Non-OS2]

The **OS Select For DRAM > 64MB** option allows you to specify the operating system you are using. This option only applies when using IBM OS2 operating system.

-  **Enabled** Only select this if you are using the OS/2 operating system
-  **Disabled** (DEFAULT) If you are not using the OS/2 operating system then disable this function.

Video BIOS Shadow [Enabled]



When enabled, the video BIOS is copied to the system RAM for quicker access. Shadowing boosts BIOS turnaround speed for that BIOS is accessed by CPU through the memory bus rather than the original 8-bit X bus.

C8000-CBFFF to DC000-DFFFF Shadow [Disabled]

When enabled, this setting avails adapter ROM shadowing for the located 16K block of memory. It is designed to speed up the access to BIOS code in adapters, e.g., a network expansion card, using this memory space from slow ROM into faster RAM.

Small Logo (EPA) Show [Disabled]

The **Small Logo (EPA) Show** option determines if the Environmental Protection Agency (EPA) logo will appear during the system boot-up process. If it is enabled then the boot up process may be delayed.

-  **Enabled** EPA logo will appear during the boot up process.
-  **Disabled** (DEFAULT) EPA logo will not appear during the boot up process.

Delay For HDD (Secs) [3]

A large number can be applied for slowly-initiated (longer spin-up time) hard drives depending on the specifications provided by your hard drive vendors.

Cyrix 6x86/MII CPPUID [Enabled]

This option determines whether to use the function of controlling or accessing the Cyrix 6x86/MII CPU ID.

Advanced Chipset Features

1.1.7 CPU Feature

The **CPU Feature** menu (Error! Reference source not found.) shows CPU configuration options.

CPU Frequency [500 MHz]

This option allows you to change the CPU FSB frequency. Setting this value too high may damage your embedded board.

Memory Frequency [333 MHz]

This option allows you to manually change the operating frequency of your system memory. Setting this value too high may damage your embedded board.

CAS Latency [Auto]

This controls the time delay (in clock cycles - CLKs) that passes before the SDRAM starts to carry out a read command after receiving it. This also determines the number of CLKs for the completion of the first part of a burst transfer. In other words, the lower the latency, the faster the transaction.

Note that some SDRAM modules may not be able to handle the lower latency and will become unstable and lose data.

Interleave Select [LOI]

The **Interleave Select** BIOS feature controls the timing for reading the next bank of data when the DRAM interleave or SDRAM bank interleave is enabled. The lower the option, the faster the DRAM modules can interleave and as the result, the better performance.

Video Memory Size [8 M]

This option selects the size of the graphics aperture. The aperture is a portion of the PCI memory address range dedicated as graphics memory address space. Host cycles that hit the aperture range are forwarded to the graphics controller without need for translation. This size also determines the maximum amount of system RAM that can be allocated to the graphics card for texture storage.

Output Display [Panel & CRT]

This option allows you to select either one of the display types (Flat Panel & CRT) or both of the display types connected to the embedded board.

Flat Panel Configuration [Press Enter]

The **Flat Panel** configuration provides access to fine-tune the flat panel display characteristics.

The options include:

1. LVDS, TFT, or auto-detect the LCD display connection.
2. Resolutions ranging from 320x420 to 1600x1200 pixels.
3. 9-24 bits, 1 ppc or 18, 24 bits, 2ppc.
4. Refresh Rate ranging from 60 to 100Hz.
5. HSYNC Polarity value to High or Low.
6. VSYNC Polarity value to High or Low.
7. SHFCLK Active Period time to Active Only or Free running.
8. LP Active Period time to Active Only or Free Running.

Onboard Audio [Enabled]

The **Onboard Audio** configuration option enables or disables the Realtek AC'97 CODEC onboard.

Integrated Peripherals

The **Integrated Peripherals** menu (Error! Reference source not found.) allows you to change the configuration option for peripheral devices.

The **Integrated Peripherals** menu (Error! Reference source not found.) has three options listed below:

1. Master Drive PIO Mode
2. Slave Drive PIO Mode
3. IDE Primary Master UDMA
4. IDE Primary Slave UDMA
5. IDE DMA transfer access
6. IDE HDD Block Mode
7. Onboard FDC Controller
8. Onboard Serial Port 1
9. Onboard Serial Port 2
10. Onboard Serial Port 3
11. Onboard Parallel Port
12. Parallel Port Mode

Select the menu you wish to configure.


1.1.8 OnChip IDE Device

The **OnChip IDE Device** menu (Error! Reference source not found.) allows you to change the IDE device configurations. This item is always enabled.

Master/Slave Drive PIO Mode [Auto]

PIO means Programmed Input/Output. Instead of constantly issuing BIOS commands to facilitate I/O transfers to and from the hard disk drives, the PIO mode allows the BIOS to issue I/O requests and let CPU and IDE controller to fulfill the requests. Four modes from 0 to 4 are supported.

1. IDE Primary Master PIO
2. IDE Primary Slave PIO
3. IDE Secondary Master PIO
4. IDE Secondary Slave PIO

 **Auto** (DEFAULT) Allows the computer to select the correct mode


 **0** PIO mode 0 selected with a maximum transfer rate of 3.3MBps

- | | |
|---|--|
| 1 | PIO mode 1 selected with a maximum transfer rate of 5.2MBps |
| 2 | PIO mode 2 selected with a maximum transfer rate of 8.3MBps |
| 3 | PIO mode 3 selected with a maximum transfer rate of 11.1MBps |
| 4 | PIO mode 4 selected with a maximum transfer rate of 16.6MBps |

IDE Primary Master/Slave UDMA [Auto]

The Ultra DMA (UDMA) mode for the following HDDs can all be selected.


1. IDE Primary Master UDMA
2. IDE Primary Slave UDMA
3. IDE Secondary Master UDMA
4. IDE Secondary Slave UDMA


 **Auto** (DEFAULT) Allows the computer to select the correct UDMA

 **Disabled** Disables the UDMA for the HDD device

IDE DMA transfer access [Enabled]

The **IDE DMA transfer access** option allows you to determine whether or not the IDE device installed in the system will have a DMA device.


 **Disabled** The IDE HDD installed in the system will not have DMA transfer access

 **Enabled** (DEFAULT) The IDE HDD installed in the system will have DMA transfer access

IDE HDD Block Mode [Enabled]

The **IDE HDD Block Mode** option should only be enabled if your IDE HDD device supports block mode. Please refer to the documentation that came with your IDE HDD device to check the compatibility.

 **Disabled** The BIOS will not detect block data transfers.

 **Enabled** (DEFAULT) The optimal number of block read/writes per sector the drive can support will be automatically detected.

Onboard FDC Controller [Enabled]

The **Onboard FDC Controller** option allows you to enable or disable the Floppy Drive controller. .

↑ Onboard Serial Port # [Auto]

These options are used to select the port address for specific on-board serial port. The options are 3F8H, 2F8H, 3E8H, 2E8H, Auto and Disable. Port 1 is COM1, Port 2 is Com2 and so on. The operating mode of COM2/COM3 can be selected through jumpers on the embedded board.

↑ Onboard Parallel Port [378/IRQ7]

These options are used to select the port address for specific on-board serial port. The options are 378/IRQ7, 278/IRQ5, 3BC/IRQ7, and Disable.

↑ **SPP** (DEFAULT) The parallel port will operate in the standard parallel port (SPP) mode. This parallel port mode will work with most parallel port devices but is slow.

↑ **EPP** The parallel port will operate in the enhanced parallel port mode (EPP). The EPP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the SPP mode.

↑ **ECP** The parallel port will operate in the extended capabilities port (ECP) mode. The ECP mode supports bi-directional communication between the system and the parallel port device and the transmission rates between the two are much faster than the SPP mode.

↑ **ECP+EPP** The parallel port will be compatible with both ECP and EPP devices

↑ **Normal**

↑ Parallel Port Mode [SPP]

These options are used to select the parallel port operating mode. The options are SPP, EPP, ECP, ECP+EPP, and Normal. Two specific options avail when either of the ECP or EPP modes is selected: **EPP Mode Select** and **ECP Mode Use DMA**.

If the **EPP mode** is selected in the **Parallel Port Mode** configuration option, you will be able to configure the **EPP Mode Select** option. The EPP parallel port mode has two standards, EPP 1.7 and EP 1.9. This selection allows you to choose the standard the parallel port will operate in.

Please refer to the parallel device that your system will be connected to and select the EPP mode accordingly.

- ↑ **EPP1.9** EPP 1.9 is selected as the EPP standard
- ↑ **EPP1.7** (DEFAULT) EPP 1.7 is selected as the EPP standard

↑ x **ECP Mode Use DMA [3]**

If the **ECP mode** is selected in the **Parallel Port Mode** configuration option, you will be able to configure the **ECP Mode Use DMA** option. This option determines the DMA channel the parallel port uses when it is in the ECP mode.

- ↑ 1 Parallel port uses DMA Channel 1 in the ECP mode
- ↑ 3 (DEFAULT) Parallel port uses DMA Channel 3 in the ECP mode

Power Management Setup

The **Power Management Setup** menu (Error! Reference source not found.) allows you to set the power management and saving features in the BIOS.

⌄ Power management [APM]

The **Power management** option allows you to enable/disable or select one of the following management modes.

⌄ Disabled		The ACPI function is enabled
⌄ Legacy		The Legacy mode allows you to manually define the PM Timers features including Standby Mode, Suspend Mode, and the Soft-off button operations.
⌄ APM	(DEFAULT)	When selected, the APM management is automatically applied and the other configurable option is setting the power button soft-off mode.
⌄ ACPI		Enables the ACPI power management mode. Currently only the S1(POS) mode is supported on this board.

⌄ APM Mode

APM is briefed from Advanced Power Management. The energy-saving standby mode is initiated in the following ways:

- Time-out period specified in the BIOS Setup Utility
 - Commands from the operating system, such as the Suspend menu item in your operating system
 - In standby mode, the SBC reduces power consumption by using the SMM capabilities. Reducing power to or turning off Video Electronics Standards Association (VESA) Display Power Management Signaling (DPMS)-compliant monitors and spinning down hard disks.

One noticeable point is that the operating system must support an APM driver for the power-management features to work.

ACPI Mode

ACPI stands for Advanced Configuration and Power Interface

Under Advanced Configuration and Power Interface (ACPI

ACPI enables the direct control by the operating system over the power management and Plug and Play functions of a computer. ACPI requires an ACPI-aware operating system, such as Windows NT 4.0, Windows 98 SE, Windows 2000, and later.

ACPI features include:

- Plug and Play and Advanced Power Management (APM) functionality as here contained in the BIOS Setup Utility.
- Power management control of individual devices, add-in boards (some add-in boards may require an ACPI-aware driver), video displays, and hard disk drives.
- Features that enables a system to be held in a power-saving mode consuming less than 30-watt computer operation in the Power On Suspend sleeping state, and less than five-watt operation in the Suspend to Disk sleeping state.
- A soft-off feature that enables the operating system to turn off the computer.

Legacy Mode

When set to Legacy, you can manually configure the parameters of the following two power-saving modes:

Standby Mode

Defines the continuous idle time before the system enters Standby Mode. If any item defined is enabled & active Standby timer will be reloaded. The standby mode turns screen and hard drives off. The time span configurable ranges from 1 second to 120 minutes.

Suspend Mode

Defines the timeout before the system enters the Suspend Mode. The suspend mode powers down the system and keeps a trickle of power. If an interrupt to RTC reaches, the system wakes up. The time span configurable ranges from 1 second to 120 minutes.

Soft –Off by PWR-BTTN [Instant-Off]

The **Soft –Off by PWR-BTTN** option allows you to define how the system responds when the power button is pushed. You may choose to allow the system to be either turned off completely or enter into a suspend mode.

- ⌵ **Instant-Off** (DEFAULT) The system will be turned off as soon as the power button is pressed.
- ⌵ **Delay 4 Sec** The power button must be pressed for more than four seconds before it is turned off. If it is pressed for less than four seconds the system will enter a suspend state.

PnP/PCI Configurations

The **PnP/PCI Configurations** menu (Error! Reference source not found.) allows you to set the plug and play, and PCI options.

⌵ **PNP OS Installed [No]**

The **PNP OS Installed** option allows you to determine whether or not installing a PNP(Plug & Play)-aware OS onto your system. If set to Yes, your OS should have the control over all devices installed. If set to NO, your BIOS has the control instead. For integrations involving some legacy ISA devices, it is recommended to turn it off.

⌵ **Reset Configuration Data [Disabled]**

The **Reset Configuration Data** option allows you to reset the Extended System Configuration Data (ESCD) when you exit setup if you have problems booting the system up after you have installed a new add-on.

- ⌵ **Disabled** (DEFAULT) ESCD will not be reconfigured
- ⌵ **Enabled** ESCD will be reconfigured after you exit setup

⌵ **Resources Controlled By [Auto (ESCD)]**

The **Resources Controlled By** option gives you the option of manually configuring all the boot and plug and play devices, or allowing BIOS to configure these devices automatically. If you allow BIOS to configure it automatically you will not be able to select the IRQs, DMA and memory base address fields because BIOS will automatically assign them.

- ⌵ **Auto(ESCD)** (DEFAULT) BIOS automatically configures plug and play devices as well as boot devices.
- ⌵ **Manual** You manually configure the plug and play devices and any other boot devices

↑ x IRQ Resources [Press Enter]

If you select manual in the **Resources Controlled By** option then you will be able to configure the **IRQ Resources**. To do this, select **IRQ Resources** and press **ENTER**. A new menu will appear. (See Error! Reference source not found.)

The menu will have the following 12 BIOS configuration options:

1. IRQ-3 assigned to
2. IRQ-4 assigned to
3. IRQ-5 assigned to
4. IRQ-6 assigned to
5. IRQ-7 assigned to
6. IRQ-8 assigned to
7. IRQ-9 assigned to
8. IRQ-10 assigned to
9. IRQ-11 assigned to
10. IRQ-12 assigned to
11. IRQ-13 assigned to
12. IRQ-14 assigned to
13. IRQ-15 assigned to

The above options all have the same default and the same options. These are listed below.

- ↑ **PCI Device** (DEFAULT) The IRQ is assigned to legacy ISA for devices compliant with the original PC AT bus specification, PCI/ISA PNP for devices compliant with the Plug and Play standard whether designed for PCI or ISA bus architecture.
- ↑ **Reserved** The IRQ is reserved by BIOS



↑ Memory Resources [Press Enter]

This option allows you to appoint low memory for non-PNP legacy devices. Choices are: Reserved Memory Base and Reserved Memory Length. The memory Base options are NA, C800, CC00, D000, D400, D800, and DC00. The Memory Length options are 8K, 16K, 32K, and 64K.

↑ PCI/VGA Palette Snoop [Disabled]

The **PCI/VGA Palette Snoop** option allows you determine whether or not some special VGA cards, high-end hardware MPEG decoders and other similar devices are allowed to look at the VGA

palette on the video card so these devices can determine what colors are in use. This option is only *very rarely* needed. It should be left at "Disabled" unless a video device specifically requires the setting enabled upon installation.

-  **Disabled** (DEFAULT) Does not allow the graphics devices to examine the VGA palette on the graphics card
-  **Enabled** Does allow the graphics devices to examine the VGA palette on the graphics card

PC Health Status

The **PC Health Status** menu (Error! Reference source not found.) is a passive menu where you cannot alter any BIOS configurations. This menu shows system operating parameters that are essential to the stable operation of your system.

The following system parameters are monitored by the **PC Health Status** menu (Error! Reference source not found.).

CPU Warning Temperature

This item provides access to setup a temperature threshold on the detected CPU temperature. If the threshold is violated, the onboard beeper will be sounded to warn the user an abnormal thermal condition has occurred, e.g., a cooling fan failure or abnormal rise of ambient temperature. CPU may then generate an idle command to slow down the work speed so that the chip temperature can be reduced.

Current CPU Temperature, Current Fan Speed, Vcore, VccMem, +3.3V, +5V, +12V, VBAT(V), and 5VSB(V)

These are the automatically detected values shown for system monitoring.

Shutdown Temperature [Disabled]

When a preset threshold is violated, system will commence an automatic shutdown to protect the hardware from overheating. The configurable options are: [Disabled], [60°C/140°F], [65°C/149°F], [70°C/158°F], [75°C/167°F].

Appendix

A

Watchdog Timer



NOTE:

The following discussion applies to DOS environment. It is recommended you contact GAI support or visit our website for specific drivers for more sophisticated operating systems, e.g., Windows and Linux.

The Watchdog Timer is provided to ensure that standalone systems can always recover from catastrophic conditions that cause the CPU to crash. This condition may have occurred by external EMI or a software bug. When the CPU stops working correctly, Watchdog Timer will either perform a hardware reset (cold boot) or a Non-Maskable Interrupt (NMI) to bring the system back to a known state.

A BIOS function call (INT 15H) is used to control the Watchdog Timer:

INT 15H:

AH – 6FH
<u>Sub-function:</u>
AL – 2: Set the Watchdog Timer's period
BL : Time-out value(Its unit--second is dependent on the item "Watchdog Timer unit select" in CMOS setup).

You have to call sub-function 2 to set the time-out period of Watchdog Timer first. If the time-out value is not zero, the Watchdog Timer will start counting down. While the timer value reaches zero, the system will reset. To ensure that this reset condition does not occur, calling sub-function 2 must periodically refresh the Watchdog Timer. However, the Watchdog timer will be disabled if you set the time-out value to be zero.

A tolerance of at least 10% must be maintained to avoid unknown routines within the operating system (DOS), such as disk I/O that can be very time-consuming.

**NOTE:**

When exiting a program it is necessary to disable the Watchdog Timer, otherwise the system will reset.

Example program:

```

; INITIAL TIMER PERIOD COUNTER
;
W_LOOP:

    MOV    AX, 6F02H    ;setting the time-out value
    MOV    BL, 30      ;time-out value is 48 seconds
    INT    15H

;
; ADD YOUR APPLICATION PROGRAM HERE
;
    CMP    EXIT_AP, 1    ;is your application over?
    JNE    W_LOOP      ;No, restart your application

    MOV    AX, 6F02H    ;disable Watchdog Timer
    MOV    BL, 0        ;
    INT    15H

;
; EXIT ;

```

Appendix

B

Connecting ATX Power Supply

The following notes show how to connect ATX Power Supply to the embedded board.

1. Using ATX Power Switch

- Step 1.** Disconnect the AC cord of the Power Supply from the AC source to prevent sudden electric surge to the board.
- Step 2.** Properly configure the JP1 jumper. Remove the jumper cap from JP1 and CN2.

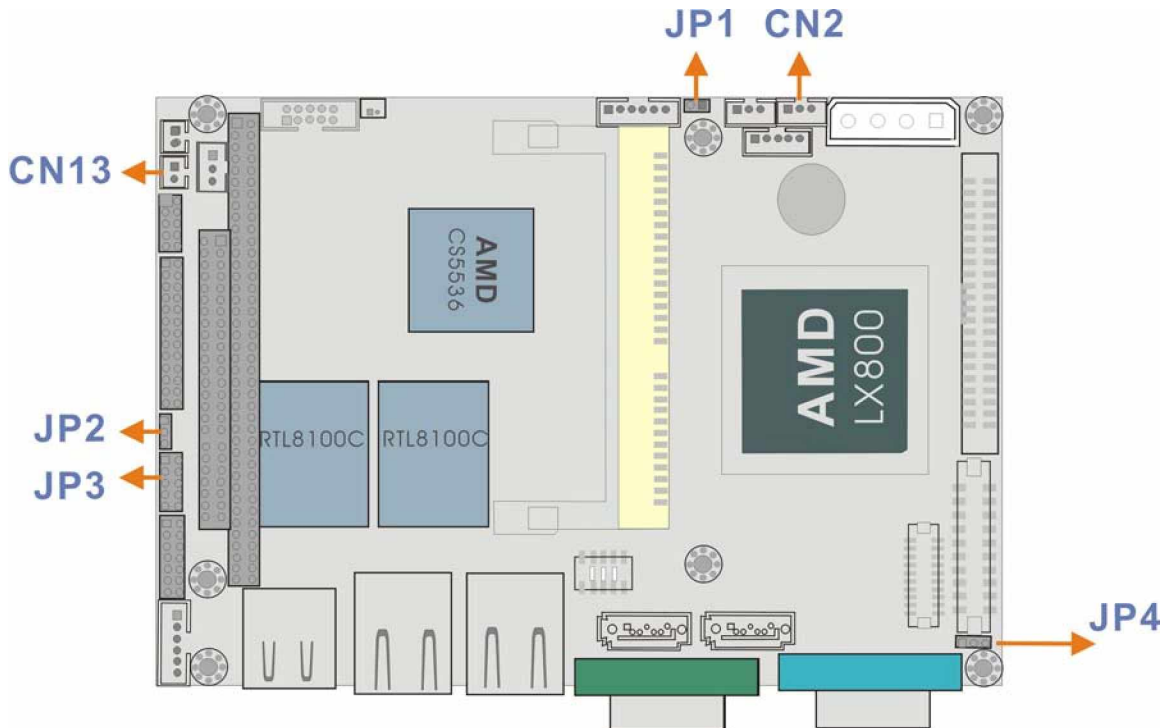


Figure B-1 ATX Power Connection



WARNING!

The new power adapter cable for the 3301820 has its “Ground” pin removed from the 3-pin ATX feature connector. If you connect the power feature connector cable previously provided by GAI, you will destroy the 3301820 board.

There is no such concern for PCB revision 1.1.

- Step 3.** Connect an ATX power button switch (see the diagram above) to the ATX

ON/OFF switch connector (power button). And connect the power cable from 20-pin ATX power supply to the CN1 4P and the CN2 SBVCC ATX feature connectors. The connection can be done using GAI's adapter (ATX-to-4P) cable.

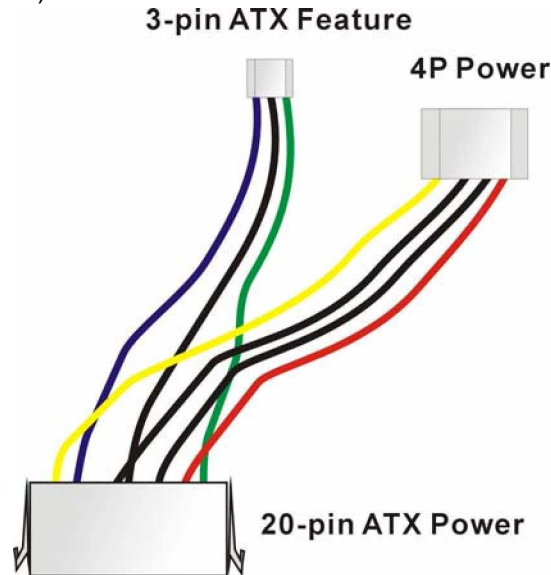


Figure B-2 ATX Power Adapter Cable

- Step 4.** Connect CN13 to a power button switch.
- Step 5.** To turn on the system press the button once. To turn off the power supply press the ATX power switch button for about 4 seconds.

2. Using AT Power Supply

The connection to an AT power supply is as simple as connecting a 4P power connector to CN1. Power on or off is controlled by the power switch on the AT power supply. Let the jumper caps stay on JP1 and CN2.

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Appendix

C

ALi[®] RAID for SATA

1. Introduction

The ALi M5283 is a highly integrated disk drive controller that is capable of managing Parallel-ATA and Serial-ATA interface hard disk drives. The ALi controller supports PATA UDMA transfer mode up to mode 6 and SATA 1.0 disk drives. The ALi M5283 also comes with cost-effective RAID functionalities that can be used to increase data read/write speed and to provide protection to data by distributing mirrored duplicates of data onto two disk drives (RAID1).



CAUTION!

You must properly configure the associated BIOS settings before the Ctrl+A key combination can take effect. Please refer to **Chapter 4 Award BIOS Setup**, the discussions of the associated configurations for more details. SATA disk drive support must be initiated under the following two BIOS sub-menus.

1. **Boot -> Onboard SATA ROM**
2. **Chipset -> Southbridge Chipset Configuration**

You will not be able to access the ALi configuration utility unless you have properly initiated the SATA disk drive support in the Award BIOS configuration utility.



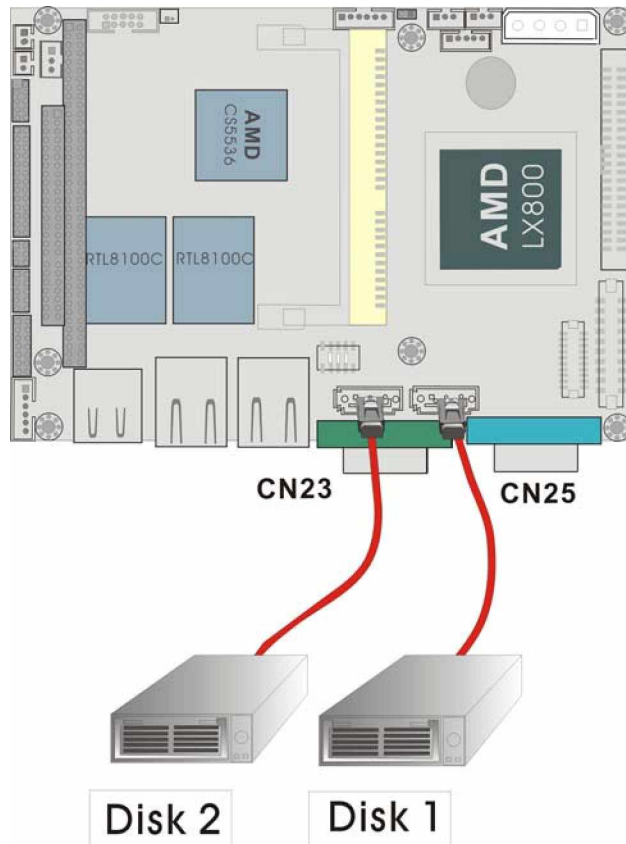
CAUTION!

A configured RAID volume (which may consist of multiple hard drives) appears to an operating system as a contiguous storage space. Your operating system will not be able to distinguish the physical disk drives contained in a RAID configuration.

Precautions:

1. One key benefit a RAID configuration brings you is that a single hard drive can fail within a RAID array without damaging your data. With RAID1 array, you can replace a failed drive and restore your RAID configuration.

However, if you replace the wrong drive when you are trying to remove a failed one, irrecoverable data loss will occur! It is therefore strongly recommended to mark the physical connections of all of your SATA disk drives. If a drive member of a RAID array should fail, you will then be able to correctly locate a failed drive.



For example, you may specify the drive locations by attaching stickers to the drive bays. You need a reminder if the cabling does not match the physical locations of hard drives.

2. It is also crucial that you do not accidentally disconnect the SATA drive cables. Carefully route your cables within the chassis to avoid system down time.

2. Features and Benefits

- „ Supports RAID levels 0, 1, and JBOD.
- „ Supports the connectivity to two disk drives.
- „ The supported Operating Systems include: Windows 98/Me, Windows 2000, and Windows XP.
- „ Windows-based software for RAID management.

3. SATA-ALi RAID Driver



CAUTION!

Because of the inherent limitations by system chipset, the ALi M5283 SATA and RAID controller is implemented as a device that requires you to provide device driver during the Windows installation process. To successfully install the device driver, please carefully read the following instructions.

The ALi driver is especially required if SATA drives are the only hard disk drives in your system. Otherwise the Windows installation program may fail to locate your hard drives whether you configure your SATA disk drives into RAID volumes or use them as individual disk drives.

The system BIOS can identify SATA disk drives, but cannot control their operation. The separately installed driver therefore is necessary.

ALi SATA Controller Driver Installation Steps

- During Windows XP Installation

- Step 1.** Enable SATA ROM using the BIOS configuration utility. The SATA ROM option is provided in the ALi BIOS menu.
- Step 2.** Locate the ALi installation driver folder within the Utility CD that came with your motherboard.
- Step 3.** Copy files under a sub-directory named "SATA50XX" (taking Windows XP installation as the example) to the root directory of floppy diskette (labeled driver diskette). The file names are listed below:
- „ disk1
 - „ 5283096D.bin
 - „ txtsetup.oem
- Also copy the OS option directory "win98_me", "win_nt", or "win_xp", and related driver files in each directory.

- Step 4.** Boot from Windows installation CD-ROM (this requires you to set CD-ROM as the 1st Boot Device), when the Windows XP Setup blue screen appears and prompts users to Press F6 if you need to install third-party SCSI or RAID driver, please press the F6 key.
- Step 5.** The setup program will continue, later when the setup program prompts users to specify additional adapters, please press the S key.
- Step 6.** Then the setup program will prompt user to insert the driver diskette. Please insert the driver diskette your prepared previously, and then press ENTER to continue.
- Step 7.** The follow-up window will list out the installation choices, please select ALi SATA/RAID Controller for Windows XP and press ENTER to continue.
- Step 8.** The follow-up window will list out the devices to be installed, in which selected ALi controller(s) should be included.
- Step 9.** Repeat **step 5**, but select ALi ATA/RAID Controller at **step 7**. If both controllers are installed, go to next step.
- Step 10.** If users want to install other devices, please operate at this time. If all devices have been successfully installed, please go to next step.
- Step 11.** Press Enter to continue Windows XP setup.

Installation Steps under Existing Windows XP

After Windows XP is started, Windows system will automatically find the newly installed adapter and prompt user to install its driver. Please follow these steps to install the driver:

- Step1.** When the Found New Hardware Wizard windows appear (Mass Storage Controller), select Install from a list or specify location (Advanced) and click Next to continue.
- Step 2.** In the follow-up window, please select "Don't search, I will choose the driver to install", then click Next to continue.
- Step 3.** In the follow-up window, please select SCSI and RAID controllers, and then click Next

to continue.

- Step 4.** In the follow-up window, click Have Disk..., then insert the driver diskette and type in the driver location: e.g., a CD-ROM, then click OK to continue.
- Step 5.** In the follow-up window, select ALi SATA/RAID Controller, then click Next to continue.
- Step 6.** Confirm the follow-up windows and click the Finish button to continue.
- Step 7.** Please "confirm" the Digital Signature Not Found window when it appears, when finished, please restart the computer.
- Step 8.** Repeat step 1, but select ALi ATA/RAID Controller at step 4.

4. Accessing the ALi RAID Utility

If the SATA ROM configuration options in system BIOS have been properly configured, the RAID BIOS version and disk drive information should appear after system POST screen.

The BIOS disk drive information should look like the following:

```
ALi RAID BIOS V1.XX  
(c) ALi Corporation 2005, All Rights Reserved.  
Identifying IDE drives...
```

```
Channel 1 Master: Maxtor xxxxxx  
Channel 2 Master: Maxtor xxxxxx
```

```
Press Ctrl-A to enter ALi RAID BIOS setup utility
```

To enter the RAID configuration utility, press 'Ctrl' and 'A' keys simultaneously.

1. RAID BIOS Setup Menu:

The Serial ATA RAID volume may be configured using the RAID Configuration utility stored within the ALi RAID controller ROM. The BIOS configuration screen is divided into three major functional areas: Main Functional Menu, Drive Selection Menu, and a list for the configured RAID arrays.

```

RAID BIOS Setup Utility (c) 2003 ALi Corporation   www.ali.com.tw

Create RAID 0 Striping for Performance
Create RAID 1 Mirroring for Reliability Select
Create JBOD for integrated Capacity
Stripe Size
Delete RAID Setting & Partition           64K
Delete All RAID Setting & Partition
Rebuild RAID Array
Select Boot Drive

SPACE : Select
↑↓    : Moving Cursor
ENTER : Select & Finish
ESC   : Exit

-----Drive Model----- Mode -----Capacity-----RAID Array/Type-----
Channel 1 Master: WDC WD360GD-00P  SATA1      37019MB
Channel 2 Master: Maxtor 6Y200M0   SATA1      203928MB

-----Capacity-----RAID Type-----Stripe Size-----RAID Name-----
RAID Array A   :
RAID Array B   :
RAID Array C   :

```

2. RAID Options:

2.1 Create RAID0 Striping for Performance

Step 1. To create a RAID0 array, use your arrow keys to highlight and press Enter to activate this item. An 'S' flashing character will appear at the Drive Selection Menu where you can choose the member drives to be included in the RAID0 array.

Step 2. Use the Space key to select members of the RAID0 RAID configuration. The flashing cursor should change to a lower case 's' character once any of the connected disk drives has been selected. Follow the same method to select another member drive.

- Step 3.** You should then be prompted by a “Create RAID0(Y/N)” confirm box.
- Step 4.** Press Y and then some necessary information will be written to the selected disk drives.



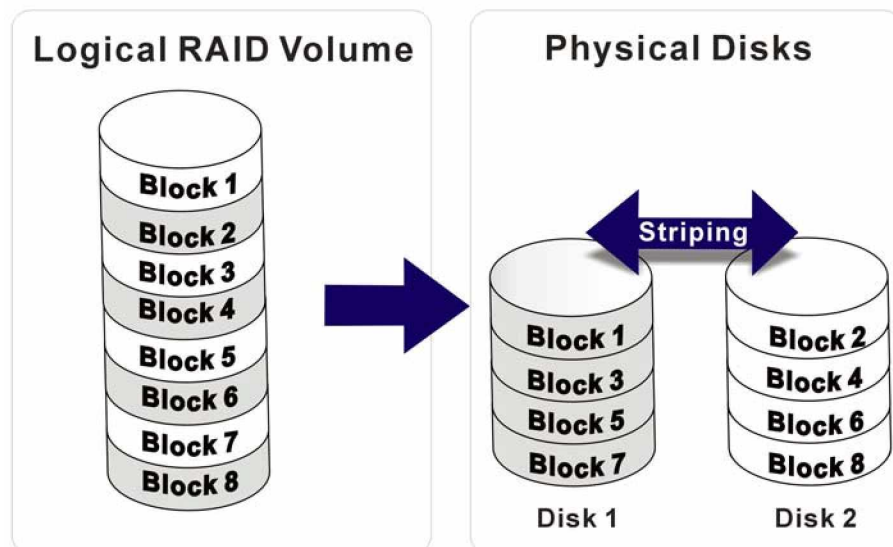
WARNING!

All data previously stored on the member drives of a RAID configuration will be destroyed during the RAID initialization process. If you use “used” drives to create a RAID array, make you have moved or backed up your data before creating a RAID array out of these disk drives.

-
- Step 5.** Next you will be prompted to enter a nickname for the created array. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array.
- Step 6.** Once an array is successfully created, it will be listed in the list of the configured arrays.

**NOTE:**

1. To reduce the chance of losing data, ALi imposed certain limitations on the RAID configuration options. For example, Parallel-ATA drives connected on the same IDE channel cannot be selected as the members of a RAID0 array. Mixing Parallel- and Serial-ATA disk drives in a RAID0 array should also be avoided.
2. Always use disk drives of the same capacity to create a RAID array. The excessive capacity of a larger disk drive cannot be utilized because data stripes are equally distributed across all members of a RAID array. The operational concept is diagrammed below.



2.2 Create RAID1 Mirroring for Reliability

- Step 1.** To create a RAID1 array, use your arrow keys to highlight and press Enter to activate this item. An 'M' flashing character will appear at the Drive Selection Menu where you can choose the member drives to be included in the RAID1 array.
- Step 2.** Use the Space key to select members of the RAID1 RAID configuration. The flashing cursor should change to a lower case 'm' character once any of the connected disk drives has been selected. Follow the same method to select another member drive.
- Step 3.** You should then be prompted by a "Create RAID1(Y/N)" confirm box.
- Step 4.** Press Y and then some necessary information will be written to the selected disk drives.



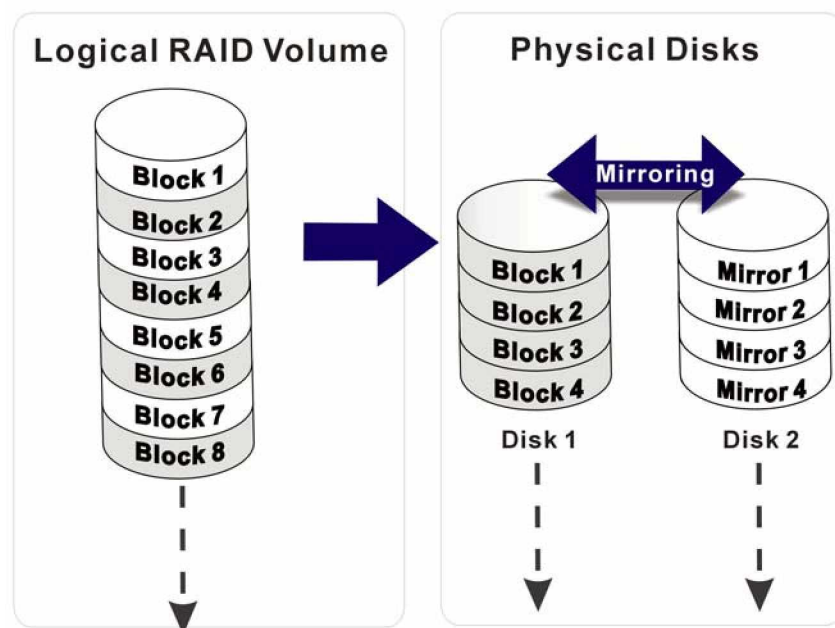
WARNING!

All data previously stored on the member drives of a RAID configuration will be destroyed during the RAID initialization process. If you use "used" drives to create a RAID array, make you have moved or backed up your data before creating a RAID array out of these disk drives.

-
- Step 5.** Next you will be prompted to provide a nickname for the created array. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array.
- Step 6.** Once an array is successfully created, it will be listed in the list of the configured arrays.
- Step 7.** Lastly a prompt will require you to proceed with drive copy. The Source and Destination drives will be indicated as "M" and "m" in the Drive Selection Menu.

**NOTE:**

1. To reduce the chance of losing data, ALi imposed limitations on the RAID configuration options. For example, Parallel-ATA drives connected on the same IDE channel cannot be selected as the members of a RAID1 array. Mixing Parallel- and Serial-ATA disk drives in a RAID1 array should also be avoided.
2. Always use disk drives of the same capacity to create a RAID array. The excessive capacity of a larger disk drive cannot be utilized because data mirrors are equally distributed across corresponding members of drive pairs within a RAID array. The operational concept is diagrammed below.



2.3 Create JBOD for Integrated Capacity

Step 1. JBOD stands for “Just a Bunch of Drives.” JBOD provides neither performance gains nor data redundancy. To create a JBOD array, use your arrow keys to highlight and press Enter to activate this item. A ‘J’

flashing character will appear at the Drive Selection Menu where you can choose the member drives to be included in the JBOD.

- Step 2.** Use the Space key to select members of the JBOD configuration. The flashing cursor should change to a lower case 'j' character once any of the connected disk drives has been selected. Follow the same method to select another member drive. The maximum number of member drives in a JBOD is four and the minimum is two.
- Step 3.** You should then be prompted by a "Create RAID1(Y/N)" confirm box.
- Step 4.** Press Y and then some necessary information will be written to the selected disk drives.



WARNING!

All data previously stored on the member drives of a RAID configuration will be destroyed during the RAID initialization process. If you use "used" drives to create a RAID array, make you have moved or backed up your data before creating a RAID array out of these disk drives.

-
- Step 5.** Next you will be prompted to provide a nickname for the created array. Upper and lower case alphabetic, numeric, space, and underscore characters are all applicable for naming an array.
 - Step 6.** Once an array is successfully created, it will be listed in the list of the configured arrays.

**NOTE:**

To reduce the chance of losing data, ALi imposed limitations on the RAID configuration options. For example, Parallel-ATA drives connected on the same IDE channel cannot be selected as the members of a RAID1 array. Mixing Parallel- and Serial-ATA disk drives in a RAID1 array should also be avoided.

2.4 Stripe Size

The change to stripe size takes effect on RAID0 arrays. Configurable options are: 64K (default), 32K, 16K, 8K, and 4K. If you can be certain that your I/Os to the hard drives are small and randomly occurred, you can select a small stripe size. If your I/Os are mostly large and come in sequential orders, e.g., A/V playback and editing applications, choose a larger stripe size.

The default value, 64K, should be appropriate for most applications.

2.5 Delete RAID Setting & Partition

Step 1. To delete an existing RAID configuration, use your arrow keys to highlight and press Enter to activate this item. An 'E' flashing character will appear at the Drive Selection Menu where you can choose the member drives to be removed from an existing configuration.

Step 2. You should then be prompted by "Data on RAID drives will be erased (Y/N)?".

Step 3. Press Y and then the RAID configuration will be invalidated.



WARNING!

If you delete a RAID configuration, all data previously stored on the member drives of the RAID configuration will be destroyed.

2.6 Delete All RAID Setting & Partition

Step 1. To delete all existing RAID configurations, use your arrow keys to highlight and press Enter to activate this item.

Step 2. You should then be prompted by "Data on RAID drives will be erased (Y/N)?".

Step 3. Press Y and then all existing RAID configurations will be invalidated.



WARNING!

If you delete a RAID configuration, all data previously stored on the member drives of the RAID configuration will be destroyed.

2.7 Rebuild RAID Array

This function allows you to rebuild a RAID array if a member of a RAID configuration should fail. Neither RAID0 nor JBOD provides data redundancy. Therefore, this option only applies to RAID1 arrays. This item takes effect when a member of a RAID1 configuration has failed.

- Step 1.** To delete all existing RAID configurations, use your arrow keys to highlight and press Enter to activate this item.
- Step 2.** An "R" flashing character should appear at the list of existing arrays.
- Step 3.** The source and destination drives will be displayed.
- Step 4.** Press Y to begin the rebuild process.
- Step 5.** During the rebuild process, the rebuild progress will be indicated by a status bar. Rebuild consumes considerable system resources and the time required for rebuilding a RAID array may vary depending on the size of stored data, disk drive capacity, and drive performance.

2.8 Select Boot Drive

- Step 1.** To select a Boot drive, use your arrow keys to highlight and press Enter to activate this item.
- Step 2.** An "A" flashing character should appear at the Drive Selection Menu.
- Step 3.** Press Enter or the Space key to finish the configuration.

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Global American Inc.

Address: 17 Hampshire Drive
Hudson, NH 03051

TEL: Toll Free (U.S. Only) 800-833-8999
(603)886-3900

FAX: (603)886-4545

Website: <http://www.globalamericaninc.com>

E-Mail: salesinfo@globalamericaninc.com

