



**NM46X
USER MANUAL**

**Arima Computer Corp.
Building Your Competitive Advantage**

TABLE OF CONTENTS:

LEGAL DISCLAIMER.....	4
COPYRIGHT NOTICE.....	4
TECHNICAL SUPPORT.....	5
ABOUT THIS USER GUIDE.....	5
SAFETY INSTRUCTION.....	6
CHAPTER 1. GETTING STARTED.....	7
1.1 CONGRATULATIONS.....	7
1.2 UNPACKING.....	7
1.2.1 <i>Quick Installation Guide.....</i>	<i>8</i>
1.3 FEATURES HIGHLIGHT.....	9
1.4 MOTHERBOARD SPECIFICATION.....	10
1.5 MOTHERBOARD LAYOUT [MAJOR COMPONENTS].....	12
CHAPTER 2. HARDWARE INSTALLATION.....	13
2.1 MOUNTING THE MOTHERBOARD.....	13
2.2 BLOCK DIAGRAM.....	14
2.3 INSTALLING THE PROCESSOR.....	15
2.4 INSTALLING THE MEMORY.....	19
2.4.1 <i>DIMM Combination.....</i>	<i>19</i>
2.4.2 <i>Installing DIMM modules.....</i>	<i>21</i>
2.5 JUMPERS CONFIGURATION.....	23
2.5.1 <i>Clear CMOS header.....</i>	<i>23</i>
2.5.2 <i>Enable onboard VGA header.....</i>	<i>24</i>
2.5.3 <i>PCI-X Frequency Setting.....</i>	<i>25</i>
2.5.4 <i>Onboard Buzzer.....</i>	<i>27</i>
2.5.5 <i>Vitesse VSC7250 Setting.....</i>	<i>28</i>
2.5.6 <i>LED Backplane PIN Header.....</i>	<i>29</i>
2.6 POWER SUPPLY.....	31
2.6.1 <i>ATX 24-pin power connector and CPU 8/4-pin connector.....</i>	<i>31</i>
2.7 CABLES & CONNECTORS.....	33
2.7.1 <i>Front Panel Connectors.....</i>	<i>33</i>
2.7.2 <i>Slim Floppy disk drive connector.....</i>	<i>35</i>
2.7.3 <i>IDE connectors.....</i>	<i>37</i>
2.7.4 <i>Rear Panel I/O ports.....</i>	<i>38</i>
2.7.5 <i>Back Panel LAN LED.....</i>	<i>39</i>
2.7.6 <i>Front USB Connector.....</i>	<i>40</i>
2.7.7 <i>Front Panel Serial Port Connector.....</i>	<i>41</i>
CHAPTER 3. BIOS SETUP.....	42
3.1 ENTERING BIOS SETUP.....	42
3.2 USING SETUP.....	43
3.3 TROUBLESHOOTING.....	44
3.4 MAIN MENU:.....	45
3.5 ADVANCED MENU:.....	46
3.5.1 <i>Hammer Configuration Sub-Menu.....</i>	<i>47</i>
3.5.2 <i>Integrated Devices Sub-Menu.....</i>	<i>48</i>

3.5.3 IDE Configuration Sub-Menu.....	49
3.5.4 I/O Device Configuration Sub-Menu	51
3.5.5 Console Redirection Sub-Menu.....	53
3.6 SECURITY MENU:.....	54
3.7 POWER MENU:	55
3.8 BOOT MENU:	56
3.9 SERVER MENU:	57
3.10 EXIT MENU:	58
APPENDIX I: GLOSSARY.....	59

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Technical Support

If a problem arises with your system during installation or operation and is unable to be resolved from the user manual, consult the following list of resources for help:

- ✓ Contact the place of purchase for help. This is the recommended solution as they can provide the quickest assistance.
- ✓ Visit Arima Computer Corp. website for up to the minute FAQ, guides and updates. The website can be found at: <http://www.arima.com.tw/server>
- ✓ Or contact our support staff at: server@arima.com.tw

About this User Guide

This manual contains some special icons that accompany special sections that are meant to help you along in the installation process. The special sections contain useful and/or critical information that you should know. Watch for these icons as you read through the manual.

Type of icons:	Description:
NOTE 	This icon indicates useful and timely information that will aid you in the setup.
WARNING 	This icon indicates information on dangerous and/or costly behavior to avoid.

Safety Instruction

- ✓ Keep this manual for future reference.
- ✓ Keep the equipments in a safe, cool, dry place.
- ✓ Perform the installation on a dry, flat surface.
- ✓ Ground yourself by touching a plugged-in power supply, which displaces static electricity.
- ✓ Adjust the power source to the proper voltage before connecting the equipment to the power outlet.
- ✓ Place the power cord in such a manner as to ensure that no one can step on it or trip over it.
- ✓ Always unplug the power cord when performing installation.
- ✓ Do not have liquid nearby as electrical shock can occur if liquid spills onto the equipment.
- ✓ Operating temperature: 10°C to 35°C or 50°F to 95°F.
- ✓ Pay attention to the warnings in the installation instructions when appropriate.
- ✓ In the following cases, do not try to fix the problem yourself, contact a party in Technical Support
 - The power cord or plug is damaged.
 - Liquid has been spilled onto the equipment.
 - Obvious sign of damage can be detected on the equipment.



**Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer.
Dispose of used batteries according to the manufacturer's instructions.**

Chapter 1. Getting Started

1.1 Congratulations

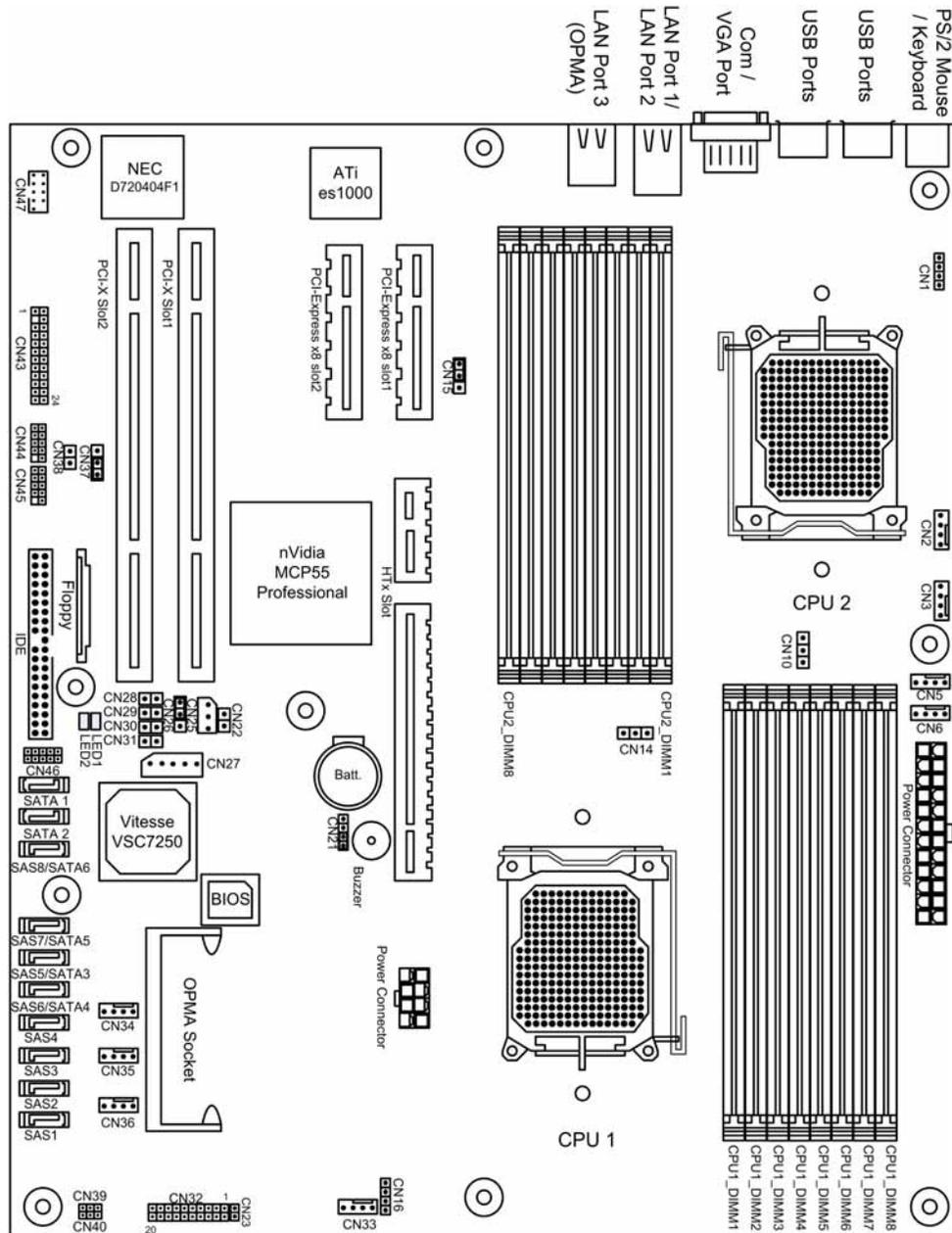
You have in possession one of the most powerful and versatile 2-way AMD Opteron processor solutions, the NM46X. Powered by cutting edge nVIDIA MCP55 Professional chipset, NM46X efficiently utilizes the combined strength of 2000MT/s HyperTransport, two PCI-X slots, Integrated Serial Attached SCSI , and SATAII controllers, to name just a few. NM46X supports independent buses for PCI-X slot as well, providing the most efficient bus management to date. It provides versatility, performance, value and dependability for today's computing environment. In just a couple of pages, a detailed specification will provide you with a comprehensive view of the capabilities of NM46X. Thank you for purchasing Arima Computer Corp. family of products.

1.2 Unpacking

Arima Computer Corp. provides a number of accessories for your convenience. Below is a checklist of the things that are included in this purchase:

- 1 x I/O shield
- 1 x IDE cable
- 1 x slim type FDD cable
- 2 x SATA cables
- 1 x SATA power cord
- 1 x Spare jumper
- 2 x Retention module
- 1 x Driver CD
- 1 x Quick Installation Guide

1.2.1 Quick Installation Guide



CN37 Clear CMOS Select Jumper

1-2	2-3
Clear CMOS	Normal (default)

CN15 On-Board VGA Select Jumper

1-2	2-3
VGA Enabled (default)	VGA Disabled

CN26 PCI-X Slot Clock Select Jumper

1-2	2-3
100 MHz Enabled	133 MHz Enabled (default)

CN28, 29, 30, 31 PCI-X Frequency Selection

Short	Description
CN28	PCI-X 66 MHz Enabled
CN29	PCI 66 MHz Enabled
CN29, CN30	PCI 33 MHz Enabled
CN31	uPD720404 Disabled

CN21 Speaker Header

Pin	Description
1	Speaker
2	Buzzer
3	N/A
4	Speaker Power

LAN Connector Indicator Light

Indication	Meaning
Activity LED flashing	Data activity
Link LED lighting up	Connected to network

Recommended Memory Configurations

1 DIMM	H1 Bank: Slot 7	
2 DIMMs	H1 Bank: Slot 7, 8	
4 DIMMs	Single Processor	H1 Bank: Slot 5, 6, 7, 8
	Dual Processor	H1 Bank: Slot 7, 8 H2 Bank: Slot 7, 8
6 DIMMs	H1 Slot 5, 6, 7, 8 H2 Slot 7, 8	
8 DIMMs	H1 Slot 5, 6, 7, 8 H2 Slot 5, 6, 7, 8	
16 DIMMs	H1 Slot 1, 2, 3, 4, 5, 6, 7, 8	
	H2 Slot 1, 2, 3, 4, 5, 6, 7, 8	

*LAN Port 3 is for OPMA only.

The Latest BIOS, Manual, Memory AVL, Drivers and Utility can be downloaded from

<http://www.arima.com.tw/server>

CN47 COM2 Header

Pin	Description	Pin	Description
1	SP_DCD2	2	SP_DSR2
3	SP_RXD2	4	SP_RTS2
5	SP_TXD2	6	SP_CTS2
7	SP_DTR2	8	SP_RI2
9	GND	10	N/A

CN44 / CN45 USB Header

Pin	Description	Pin	Description
1	USB_FNTPNL_1_0 PWR	2	USB_FNTPNL_1_0 PWR
3	USB_N0/N6	4	USB_N1/N7
5	USB_P0/P6	6	USB_P1/P7
7	GND	8	GND
9		10	N/A

CN43

Front Panel

Power LED Anode	1	2	5VSB
Key	3	4	Cooling Fault LED Anode
Power LED Cathode	5	6	Cooling Fault LED Cathode
HDD Activity LED Anode	7	8	System Fault LED Anode
HDD Activity LED Cathode	9	10	System Fault LED Cathode
Power Switch	11	12	NIC#1 Activity LED Anode
Power Switch (GND)	13	14	NIC#1 Activity LED Cathode
Reset Switch	15	16	SMBus GDA
Reset Switch (GND)	17	18	SMBus SCL
ACPI Sleep Switch	19	20	Chassis Intrusion
ACPI Sleep Switch (GND)	21	22	NIC#2 Activity LED Anode
NMI to CPU Switch	23	24	NIC#2 Activity LED Cathode

CN32 LED Backplane PIN Header

Pin	Description	Pin	Description
1	N/A	2	FP SMBDAT
3	FP_ALERT	4	GND
5	SW_N	6	FP SMBCLK
7	FP_ID_LED_N	8	SAS0 SATA_LED
9	SAS-LINK-LED1	10	SAS-LINK-LED2
11	SAS-LINK-LED3	12	GND
13	SAS-ERROR-LED0	14	SAS-ERROR-LED1
15	SAS-ERROR-LED2	16	SAS-ERROR-LED3
17	SAS-LINK-LED7	18	SAS-ERROR-LED4
19	SAS-LINK-LED6	20	SAS-ERROR-LED5

CN23 Vitesse VSC7250 Selection

	Short	Open
SAS1 to SAS8 HDD	Disabled	Enabled



Rev. 1.06

S1535370G00001

1.3 Features Highlight

CPU:

- ✓ Supports up to two AMD Opteron 2000 series processors
- ✓ Support dual core Opteron processor

CHIPSET:

- ✓ nVIDIA MCP55 Professional

SYSTEM MEMORY:

- ✓ 16x 240-pin 1.8-Volt DDR2 DIMM sockets

EXPANSION SLOTS:

- ✓ One HTX slot for riser only, two PCI-Express x8 slots, two PCI-X 133/100MHz slots.

STORAGE:

- ✓ Total support of hard disk formats from SATA II, SATA/SAS, and to ATA.

INTEGRATED LAN CONTROLLER:

- ✓ Dual IEEE 802.3 nVIDIA MACs for 1000BASE-T/100BASE-T/10BASE-T Gigabit/Fast Ethernet/Ethernet with TCP offload Engine (TOE)

SYSTEM MANAGEMENT:

- ✓ Arima SmartWatch server management application
- ✓ OPMA connector

1.4 Motherboard Specification

Processors

- ✓ Dual socket F (1207)
- ✓ Support up to two AMD Opteron 2000 series processors with 68/95/120 Wattage
- ✓ Support dual core Opteron processor
- ✓ Support 2000MT/s Hyper Transport
- ✓ Support PowerNow, Virtualization, Security

Chipsets

- ✓ nVIDIA MCP55 Professional
- ✓ NEC uPD720404 PCI-E to PCI-X bridge
- ✓ Winbond Super I/O W83627EHG chip
- ✓ Analog Devices ADM1026 Hardware Monitor chip

Memory

- ✓ 16x 240-pin 1.8-Volt DDR2 DIMM sockets
- ✓ DIMM sockets voltage from 12V
- ✓ Dual channel memory bus
- ✓ Two-way interleaved memory banks (pair of DIMMs required)
- ✓ Support DDR2-667/533/400 memory
- ✓ Support Registered ECC type memory modules only
- ✓ Support up to 64GB
- ✓ Support Chipkill, Parity, On-line spare

BIOS

- ✓ 4Mb Phoenix BIOS
- ✓ Legacy USB support
- ✓ MP 1.1 & 1.4 compliant
- ✓ SMBIOS 2.3.3 and DMI 2.0 compliant
- ✓ Soft Power-down
- ✓ Multiple boot support (with BIOS Boot Specification v3.1 (BBS) support)

Expansion Slots

- ✓ 1 x HTX slot (Riser only)
Connected to processor
- ✓ 2 x PCI-E x8 slot
Connected to nVIDIA MCP55
- ✓ 2 x PCI-X 133/100MHz slots (optional)
Connected to NEC uPD720404

Integrated Gigabit Ethernet

- ✓ Dual IEEE 802.3 nVIDIA MACs for 1000BASE-T/100BASE-T/10BASE-T Gigabit/Fast Ethernet/Ethernet with TCP Offload Engine (TOE)
- ✓ Two Marvell 88E1116 gigabit PHY
- ✓ PXE option ROM solution
- ✓ nVIDIA Firewall
- ✓ Front panel LED output

Integrated Graphics Controller

- ✓ ATI ES1000 PCI graphics controller
- ✓ 32MB video memory

Integrated Serial Attached SCSI Controller (Optional)

- ✓ Vitesse VSC7250 PCI-E x8 SAS controller

- ✓ Eight-lane PCI Express interface
- ✓ Support up to eight internal SAS/SATA drives
- ✓ Support software HostRAID 0,1,10
- ✓ Provides two LED signals for each SAS port to indicate drive activity and faults

Integrated SATAII

- ✓ Independent DMA operation on 6 ports
- ✓ nVIDIA MediaShield™ RAID with support for RAID 0, RAID 1, RAID 0+1, RAID 5 and JBOD
- ✓ DMA Transfers up to 3Gb/s
- ✓ Provides two LED signals for each SATAII port to indicate drive activity and faults

Integrated ATA

- ✓ Provides one PCI bus master channel for up to two enhanced IDE devices
- ✓ Support for ATA 133/100/66/33 IDE drives and ATAPI compliant devices

Integrated USB 2.0

- ✓ Eight USB 2.0 ports (4 rear panel connectors and 2 headers)
- ✓ Header supports up to 2 USB devices
- ✓ 1 USB port for OPMA

Super I/O

- ✓ Winbond Super I/O W83627 EHG chip
- ✓ One slim type floppy connector supports two drives
- ✓ PS/2 mouse and PS/2 keyboard rear panel connectors
- ✓ Two 9-pin serial ports (one rear, one header)

Rear Panel I/O

- ✓ Stacked PS/2 mouse and PS/2 keyboard rear panel connectors
- ✓ Four USB 2.0 connectors
- ✓ One 9-pin serial connector
- ✓ DB15 Video connector
- ✓ Three RJ-45 connectors with LEDs

System Management

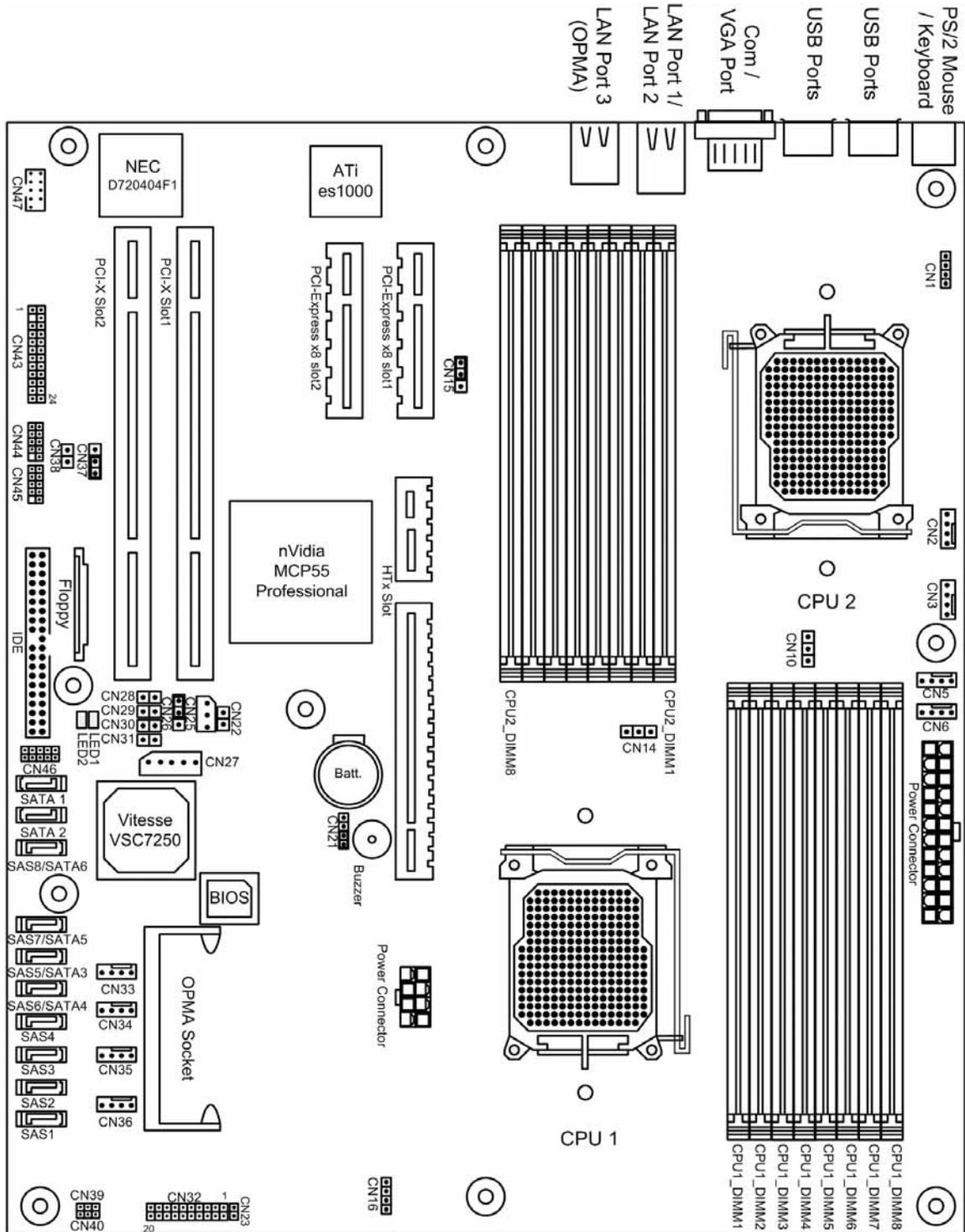
- ✓ Arima SmartWatch server management application
- ✓ OPMA connector

Form Factor

- ✓ SSI form factor with size: 12" X 13" (8 layers)
- ✓ EPS 12V power connectors (24pin + 8pin)

1.5 Motherboard Layout [Major Components]

The following diagram indicates all the major components of the motherboard.



Chapter 2. Hardware Installation

2.1 Mounting the Motherboard

The NM46X conforms to the SSI form factor. Before continuing on with installation, please confirm that your chassis supports a standard SSI motherboard. If you are unsure, contact your dealer for more information.

Precautions:

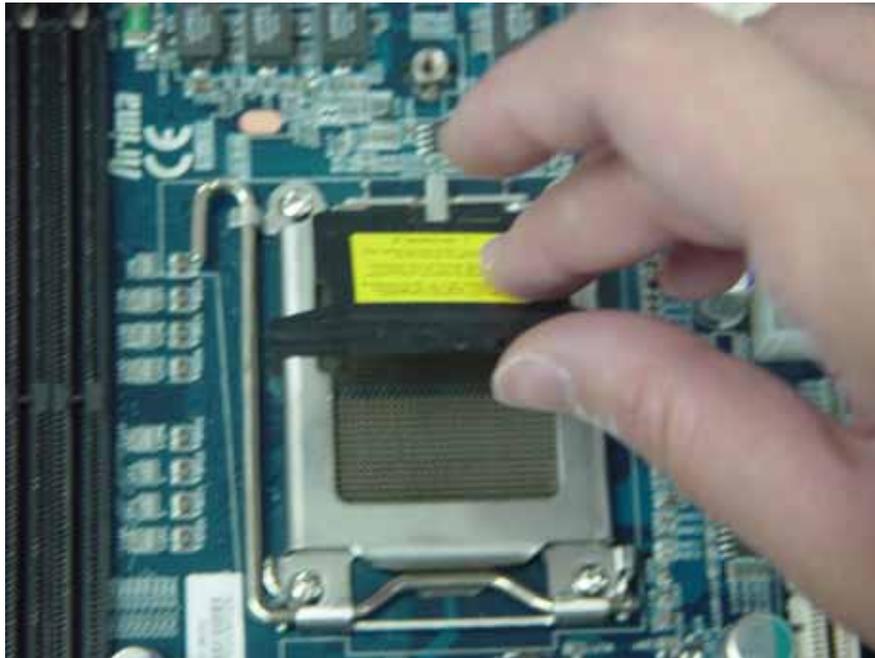
- ✓ Static electricity can damage components on your motherboard. Before touching the motherboard, discharge any static build-up in yourself by touching a grounded object.
- ✓ Disconnect your computer from any power supply if disassembly is needed.
- ✓ Try to avoid touching the surface or back of the motherboard, for chips and other components on the motherboard are very fragile.
- ✓ Before the motherboard is ready for immediate installation, place the motherboard on the Mylar Sheet (antistatic bag) in which the board was shipping in.
- ✓ Before installing, inspect the motherboard for any possible flaws.

2.3 Installing the Processor

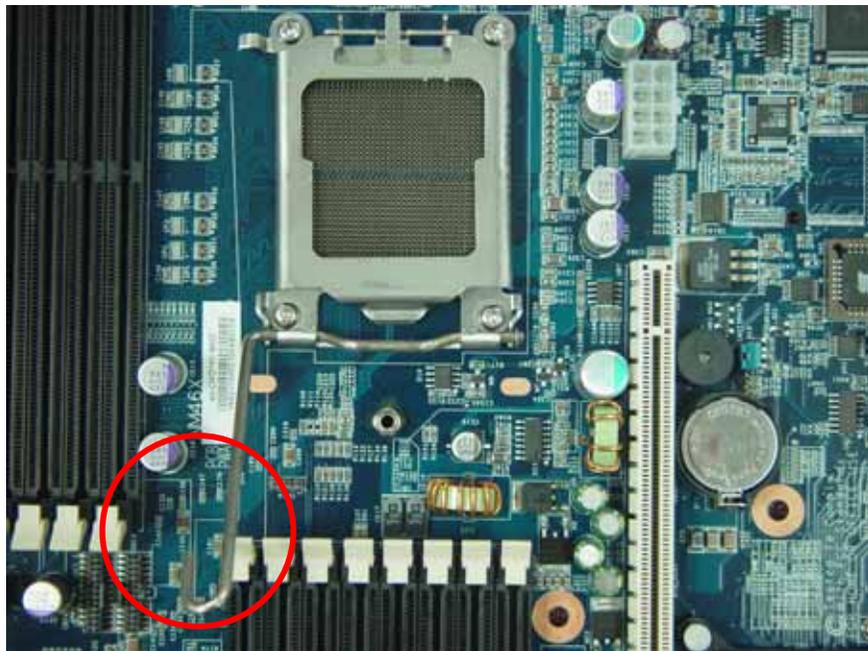
Procedure:

First read the instructions that came with the CPU. Follow the procedures below step by step.

1. Locate the processor socket on the motherboard and carefully remove the protective cover.



2. Pull the lever out of its locked position and let it spring into its open position.



3. Now that the lever is in its unlocked position, lift up the metal cover to reveal the CPU socket.



4. Place the CPU into the socket with the arrows pointing to the bottom right of the socket as shown (there are two gaps on both sides of the CPU, make sure they fit perfectly into the socket. If it is placed correctly, the CPU pins should be able to fit into the socket perfectly).



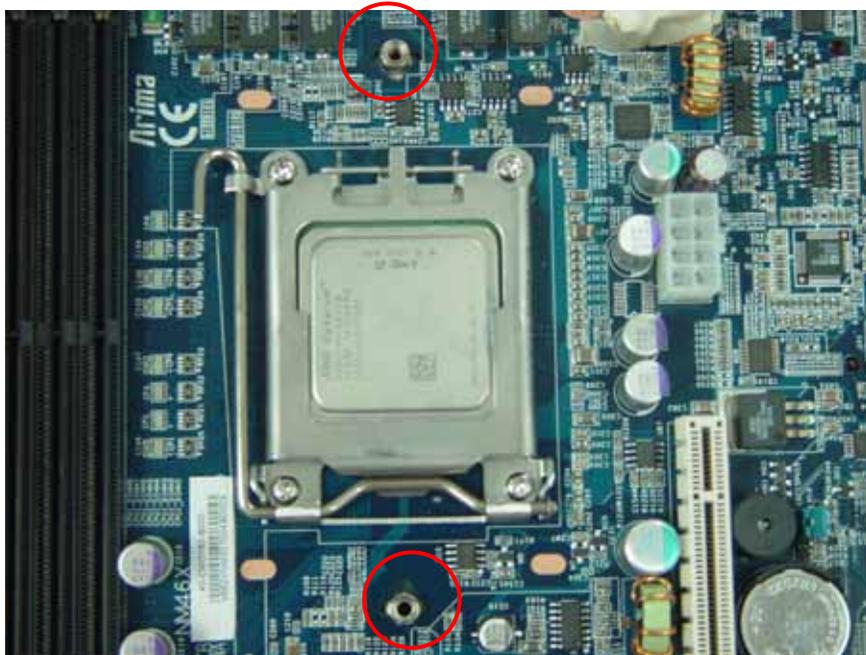
The CPU will not fit if the orientation is wrong. Do not try to force the CPU into the socket; it could result in irreparable damage to the CPU.



5. Close the metal cover and return the lever into its original locked position.



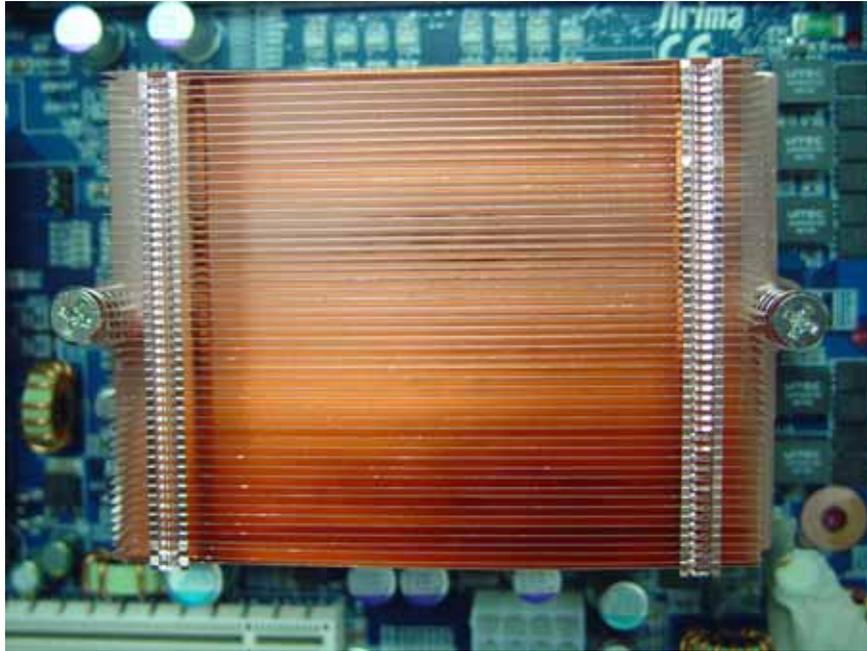
6. Now, rest the motherboard into the chassis, align the two holes of the backplate with the two bolts of the chassis.





We do not recommend you to apply thermal compound at this point of the installation. The heatsink provided along with your CPU already has thermal grease on the bottom for your convenience. Do not apply more thermal grease if it is already present. Too much thermal grease will spill onto the CPU circuit and damage the CPU.

7. First align the two pegs with the two mounting holes on the motherboard. After you have made sure that the pegs are in their proper positions, lock the pegs into the mounting holes.



To remove the heatsink, gently turn the pegs until they loosen themselves from the mounting holes. Gently pull up the heatsink, to prevent any damage to the CPU.

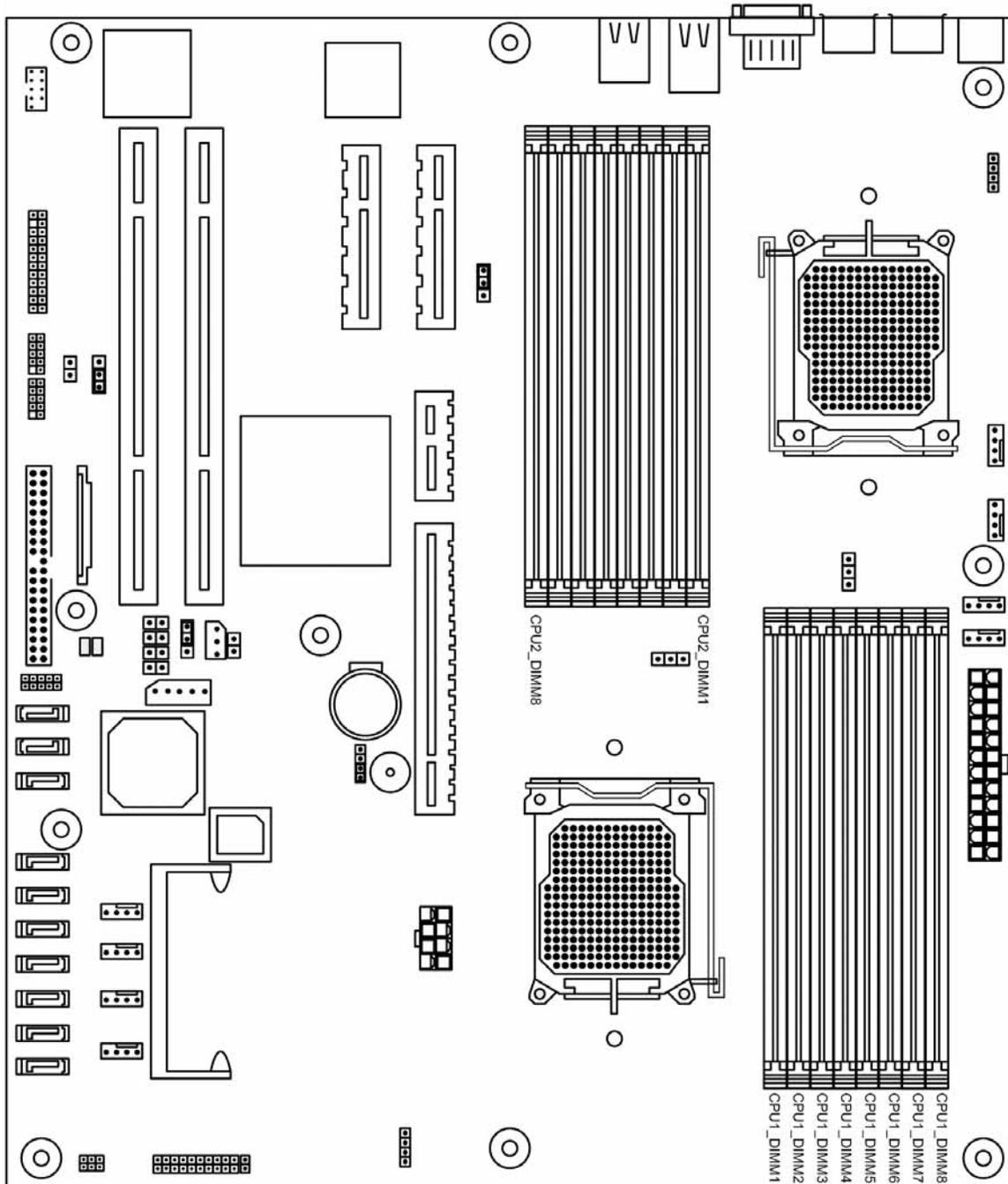


Heatsink not included in the package.

2.4 Installing the Memory

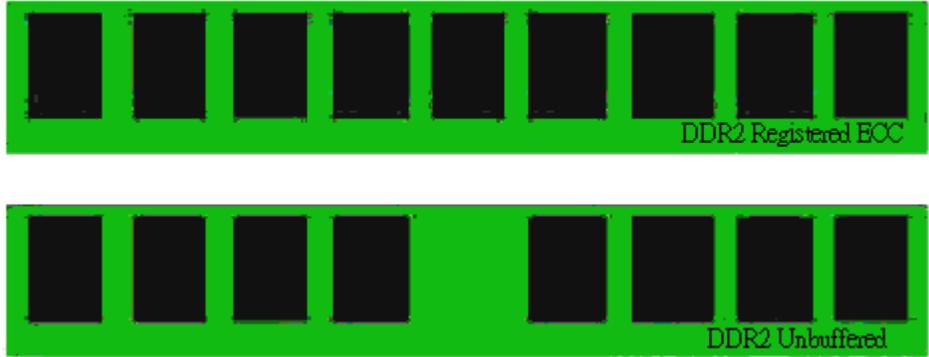
2.4.1 DIMM Combination

The diagram below shows the 16 DIMM slots from 1 to 8 for both CPU1 and CPU2.



Types of memory supported:

There are 16 DIMM sockets for 240-pin 1.8-Volt DDR2 DIMMs (WILL ONLY SUPPORT Registered ECC type memory module). Please note the diagrams below to identify if your DIMM memories are ECC or non-ECC.



Before installing your memory sticks, please ensure that the memory sticks you have are compatible with the NM46X. The NM46X will only support DDR2-667/533/400 modules. Please study the table below for memory module specification of the NM46X.

Key Notes:

- ✓ DDR2 Memory Modules Supported: 256MB – 4GB (Registered ECC Only)
- ✓ Installed memory will all be automatically detected (No jumpers or settings are needed)
- ✓ NM46X supports up to 64GB in total
- ✓ Unbuffered memory is NOT supported

1 DIMM	H1 Bank: Slot 7	
2 DIMMs	H1 Bank: Slot 7, 8	
4 DIMMs	Single Processor	H1 Bank: Slot 5, 6, 7, 8
	Dual Processor	H1 Bank: Slot 7, 8 H2 Bank: Slot 7, 8
6 DIMMs	H1 Slot 5, 6, 7, 8 H2 Slot 7, 8	
8 DIMMs	H1 Slot 5, 6, 7, 8 H2 Slot 5, 6, 7, 8	
16 DIMMs	H1 Slot 1, 2, 3, 4, 5, 6, 7, 8 H2 Slot 1, 2, 3, 4, 5, 6, 7, 8	



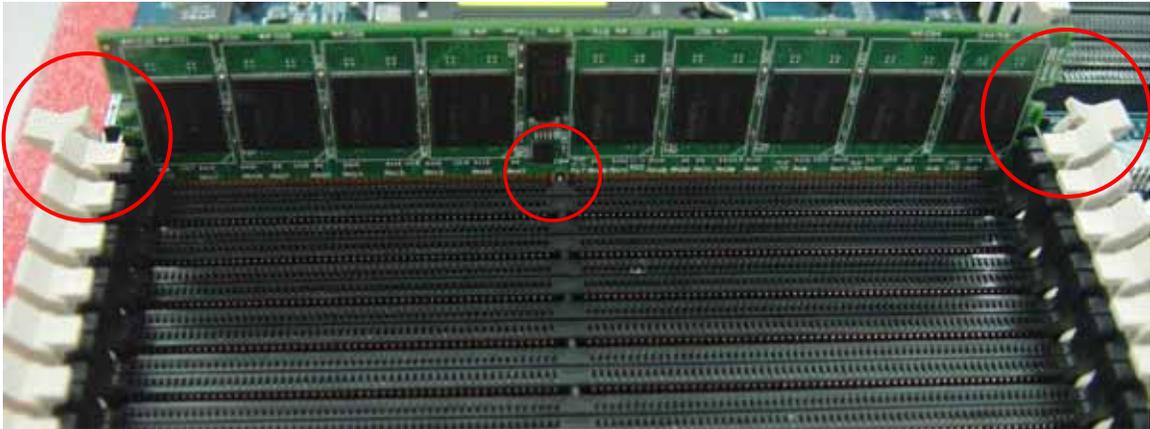
Any configuration other than the recommended is not guaranteed to work. Please refrain from using those configurations, as we cannot provide technical support on them.

2.4.2 Installing DIMM modules

1. Open up the brackets on the sides by flicking them to the sides:



2. Line up the memory with socket. Make sure the gap fits into the socket.



3. Push the memory stick down until the brackets on the sides snap to secure the memory module in place. Make sure the brackets are locked into the memory module.





These pictures only show the procedures for the installation of one memory module. Please refer to section 2.4.1 to make sure the memory module combination is qualified for the motherboard.

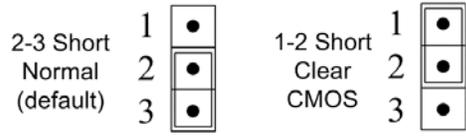
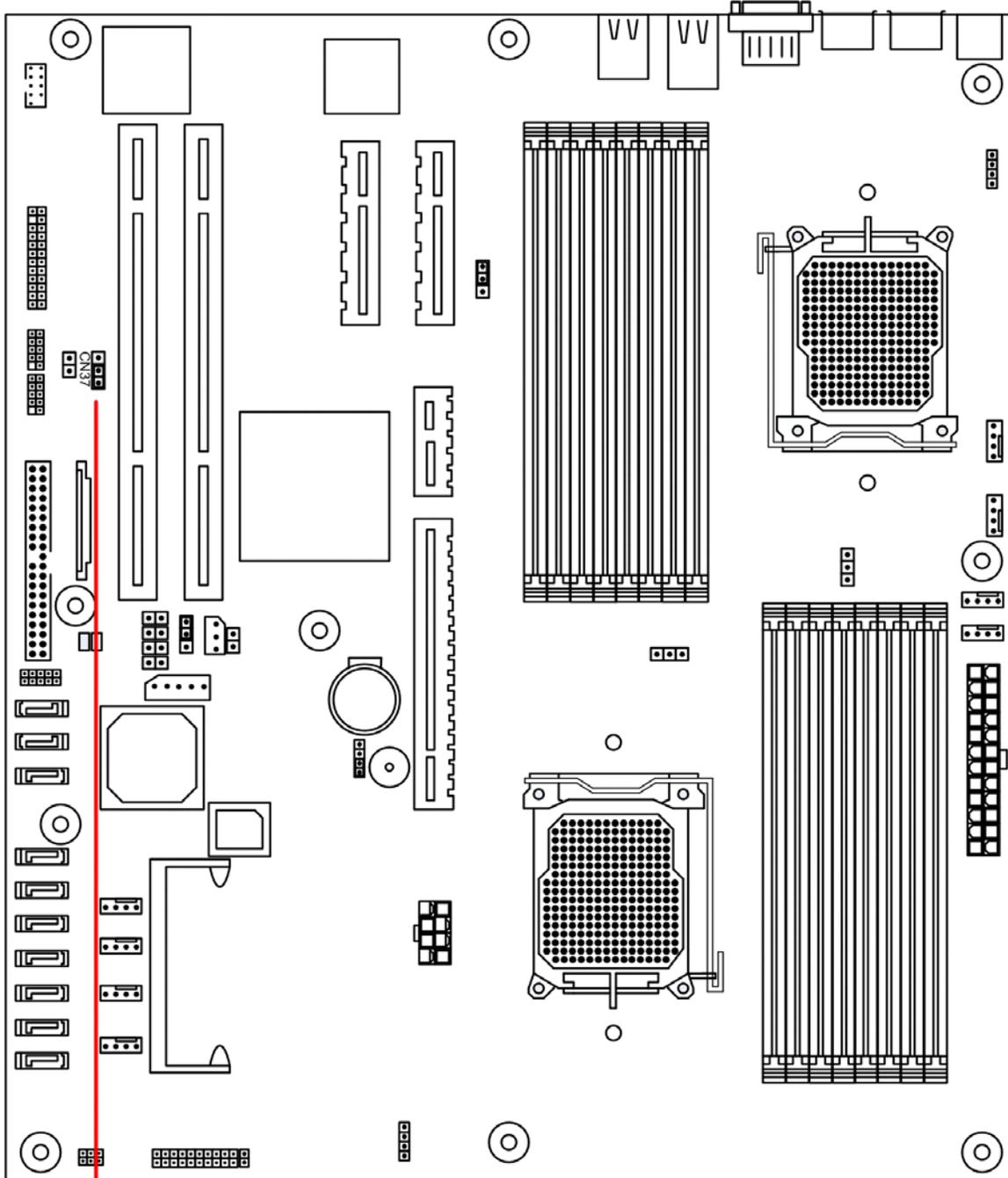
2.5 Jumpers Configuration

2.5.1 Clear CMOS header

Header CN37 controls CMOS setting. Position your motherboard as it appears in the following diagram.

To clear CMOS:

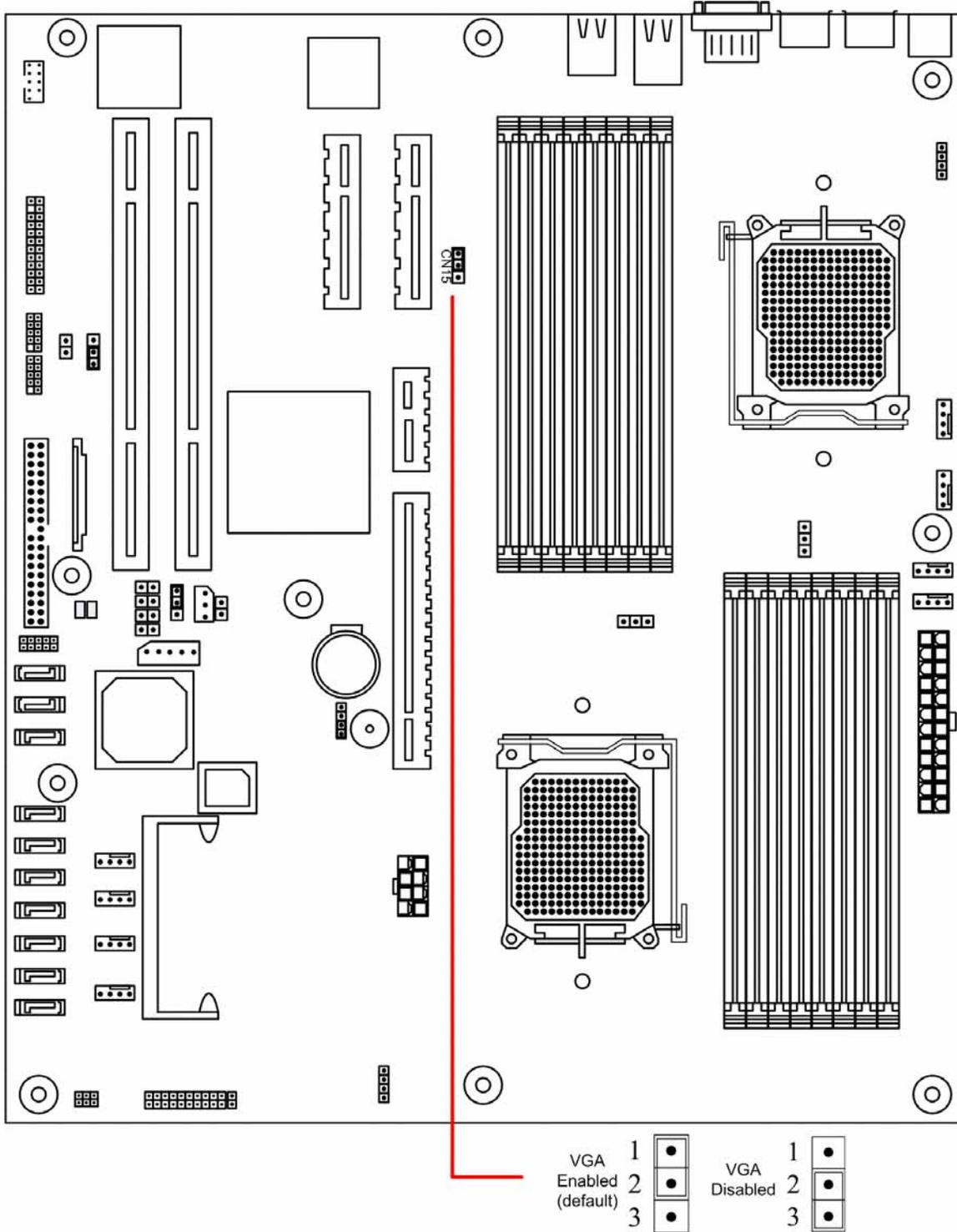
1. Turn off the system, and make sure the standby power on the power supply has been turned off too.
2. Short pin 1 and pin 2 using a jumper for a few seconds, and switch back to pin 2 and pin 3 (as default).
3. Turn on the system and reconfigure the BIOS.



2.5.2 Enable onboard VGA header

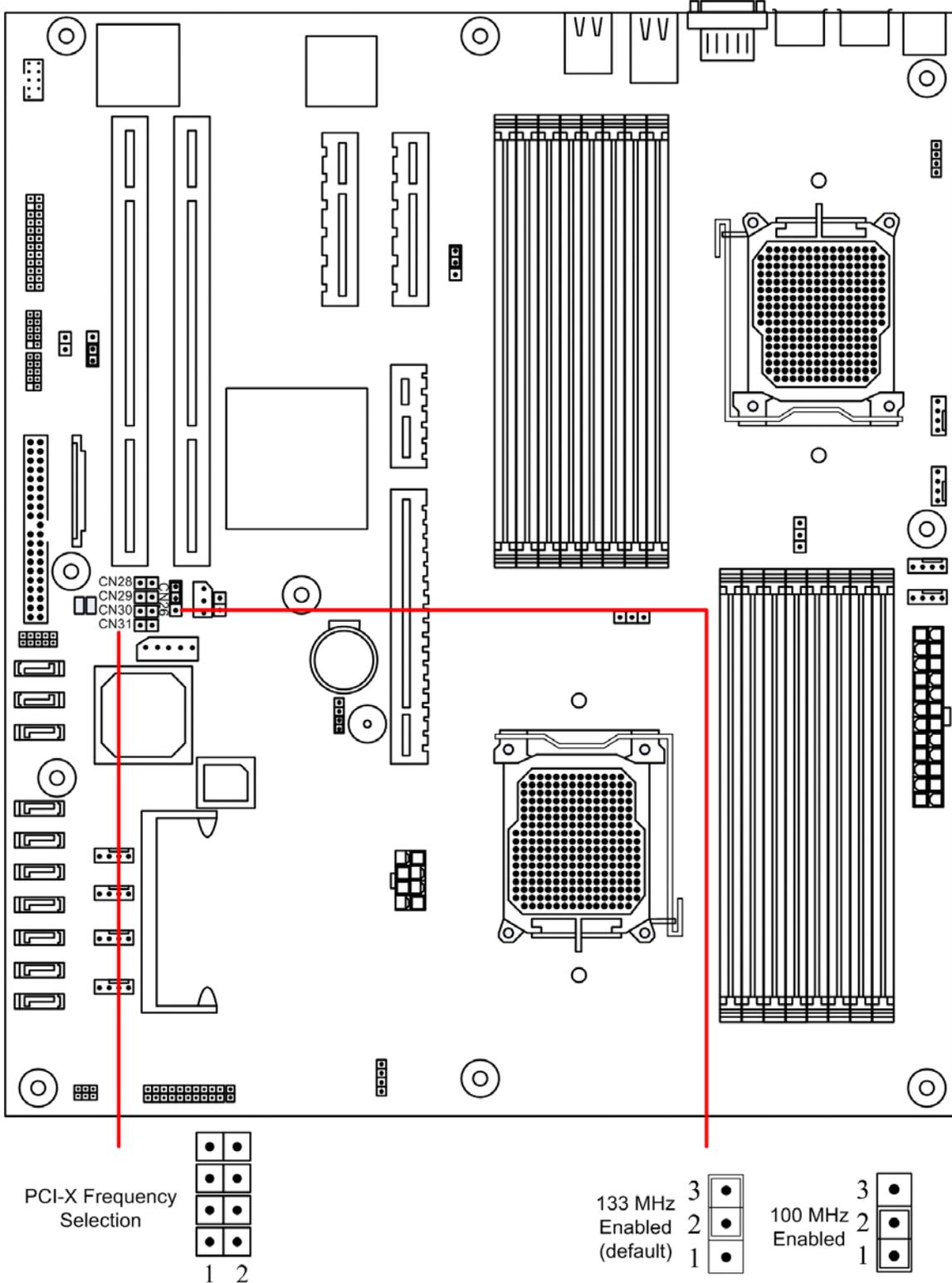
Header CN15 controls the onboard VGA setting.

CN15 has the default set as enabled where pin 1 and pin 2 are short, and switch the jumper to pin 2 and pin 3 will disable onboard VGA. Refer to the following diagram for CN15 location:



2.5.3 PCI-X Frequency Setting

The default frequency setting of PCI-X Slot is 133MHz where pin 2 and pin 3 on header CN26 are shorted. Switch to pin 1 and pin 2 will change the frequency to 100MHz.

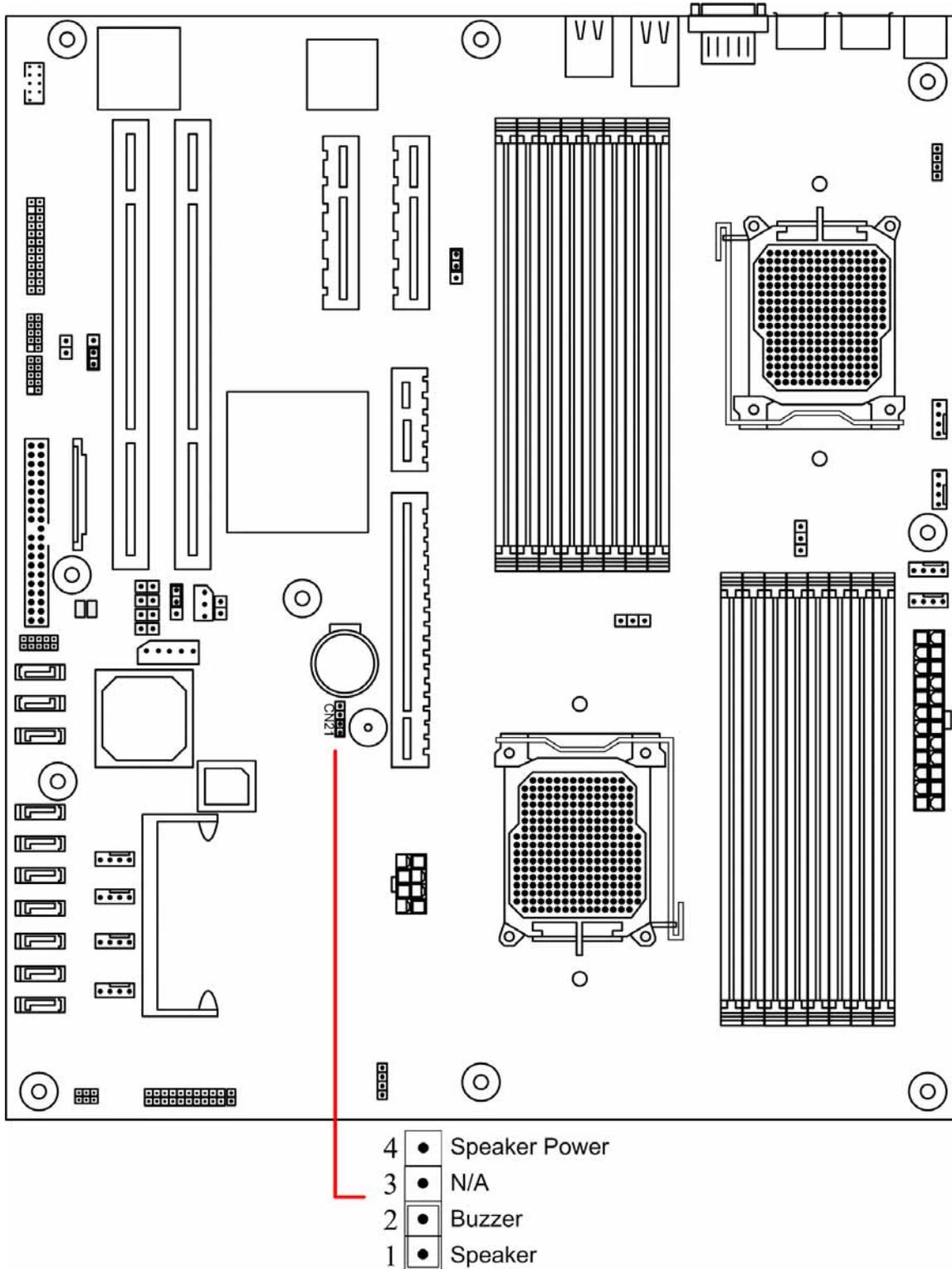


Please refer to the following table for the frequency selections for PCI-X Slot. Short the header CN28, CN29 or CN30 to change the frequency or the header CN31 to disable the uPD720404.

Short	Description
CN28	PCI-X 66 MHz Enabled
CN29	PCI 66 MHz Enabled
CN29, CN30	PCI 33 MHz Enabled
CN31	uPD720404 Disabled

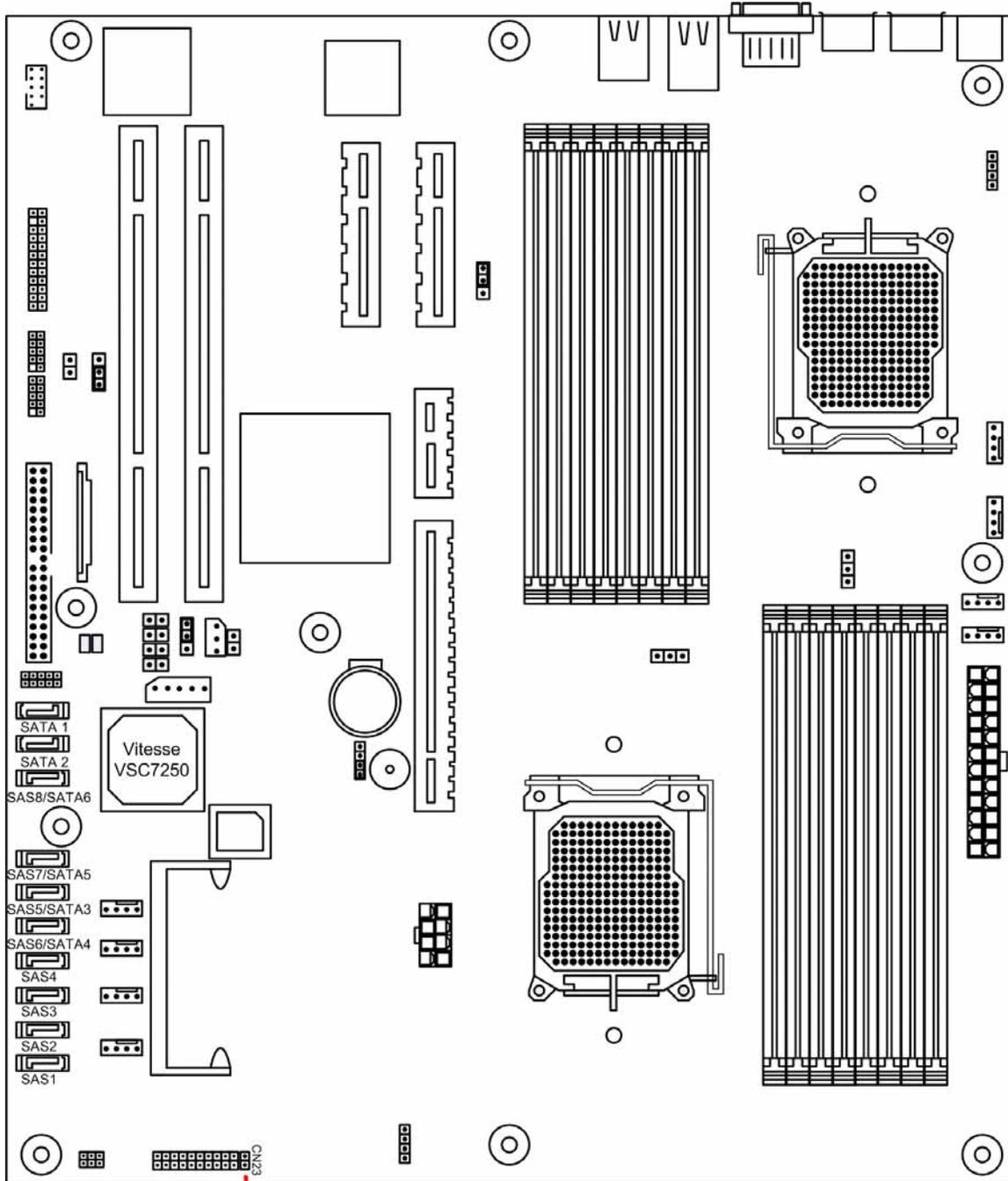
2.5.4 Onboard Buzzer

Header CN21 setting controls the on and off state of the onboard buzzer. Set jumper on 1-2 to enable the buzzer.



2.5.5 Vitesse VSC7250 Setting

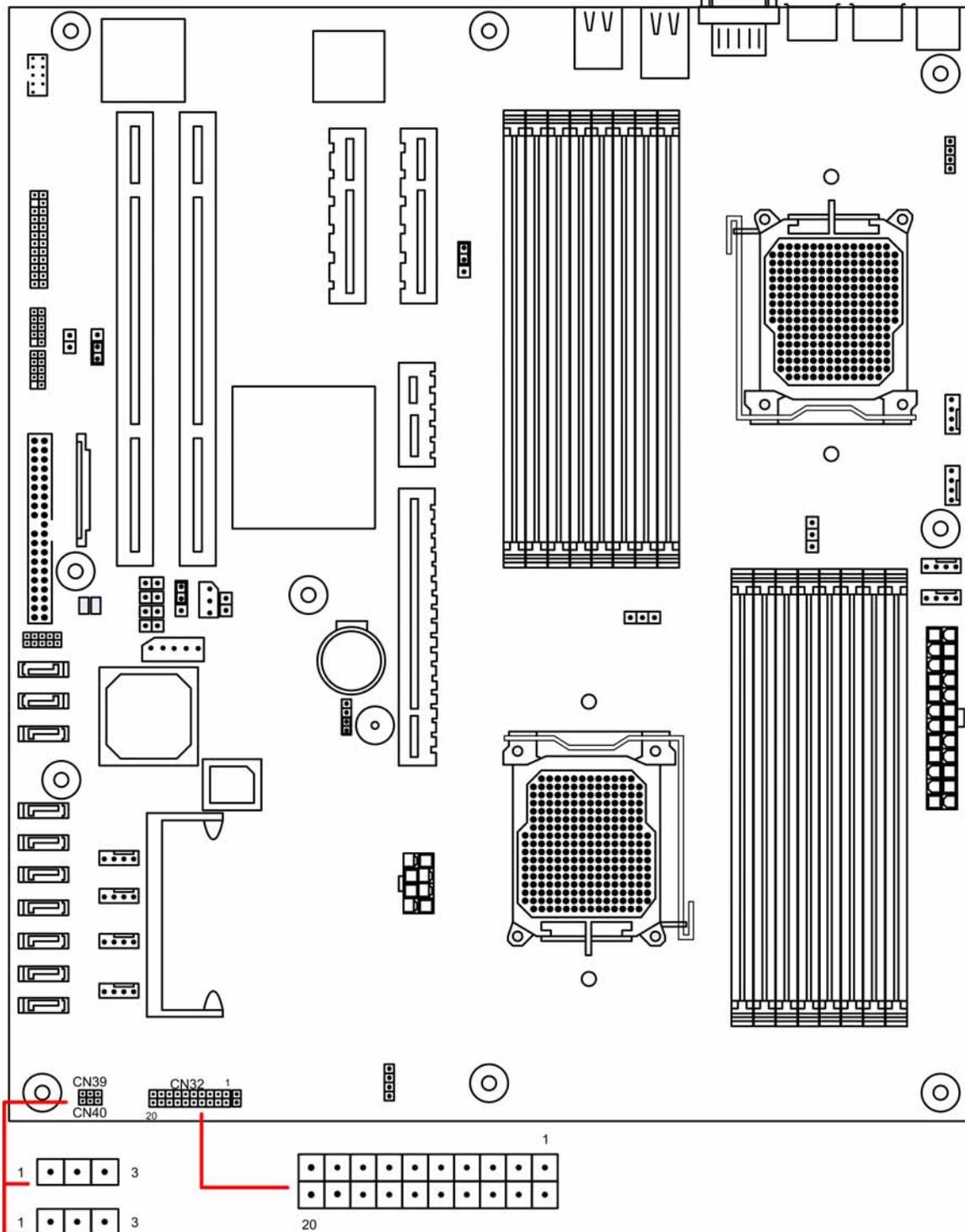
Header CN23 controls the functionality of the onboard SAS ports. SAS ports can be enabled or disabled by setting the jumper by the given configuration below. Refer to the diagram below for the locations of the headers.



Vitesse VSC7250 Enabled	1		Vitesse VSC7250 Disabled	1	
	2			2	

2.5.6 LED Backplane PIN Header

Header CN32, CN39, and CN40 contain the pin header of the led for SAS and SATA on the backplane.



The Pin Headers are listed in the following tables below.

CN 32 LED Backplane PIN Header

Pin	Description	Pin	Description
1	N/A	2	FP_SMBDAT
3	FP_ALERT	4	GND
5	SW_N	6	FP_SMBCLK
7	FP_ID_LED_N	8	SAS0_SATA_LED
9	SAS-LINK-LED1	10	SAS-LINK-LED2
11	SAS-LINK-LED3	12	GND
13	SAS-ERROR-LED0	14	SAS-ERROR-LED1
15	SAS-ERROR-LED2	16	SAS-ERROR-LED3
17	SAS-LINK-LED7	18	SAS-ERROR-LED4
19	SAS-LINK-LED6	20	SAS-ERROR-LED5

CN 39 LED Backplane PIN Header

Pin	Description
1	SAS-LINK-LED4
2	GND
3	SAS-LINK-LED5

CN 40 LED Backplane PIN Header

Pin	Description
1	SAS-ERROR-LED7
2	GND
3	SAS-ERROR-LED6

2.6 Power Supply

2.6.1 ATX 24-pin power connector and CPU 8/4-pin connector

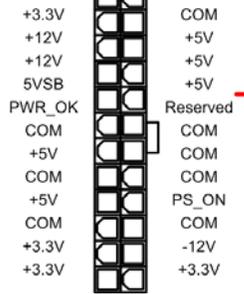
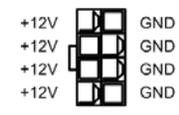
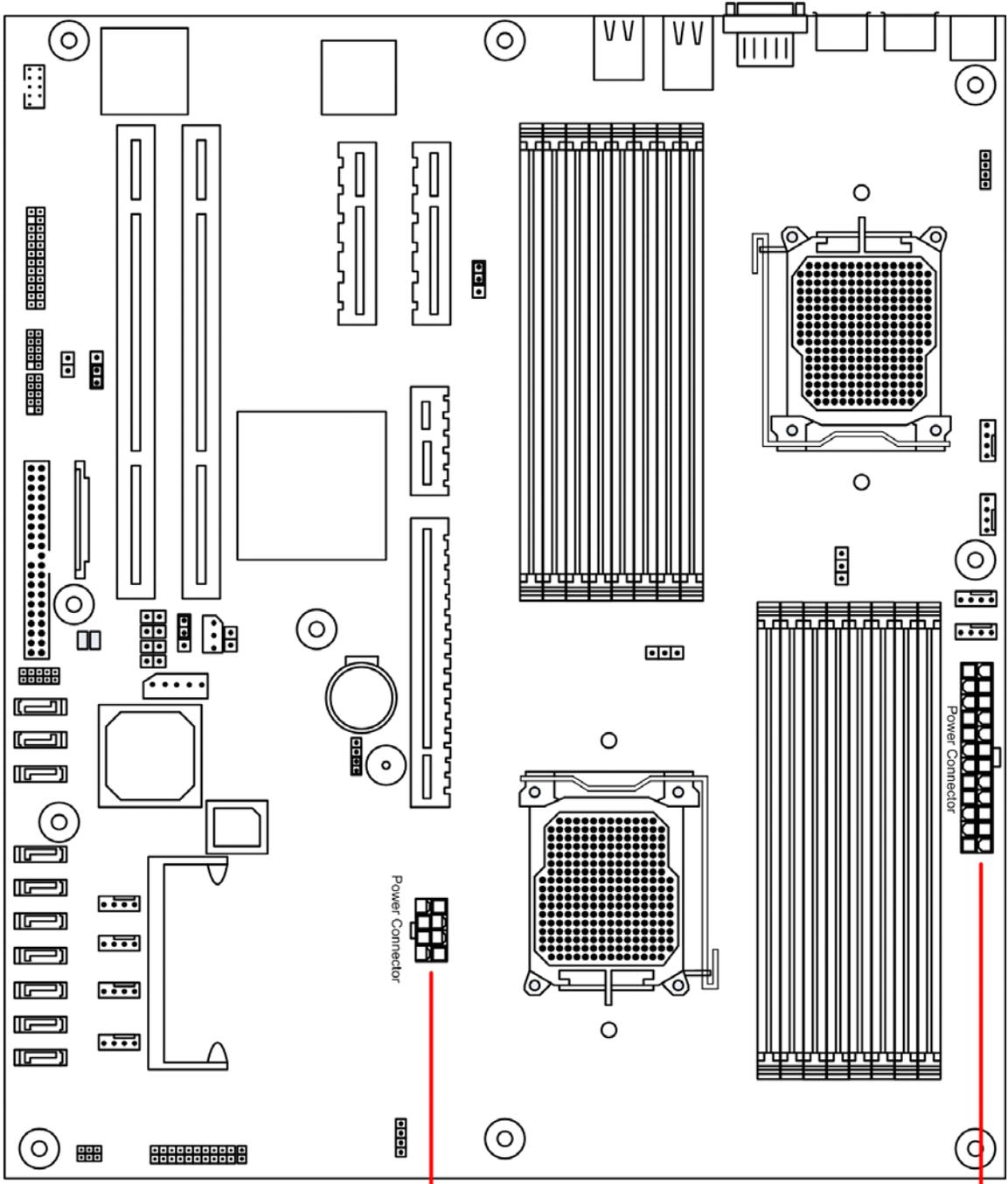
There is one 24-pin power input connection and a 8/4-pin power input connection on the motherboard. The 24-pin power connection is used to connect to the power supply, while the 8/4-pin power connection is used to power up the CPU. BOTH must be connected in order for the system to boot up. Make sure the plugs are inserted into the connectors properly, to prevent any damage.

Please make sure your power supply can support at least 2 amps standby power for the Advanced Configuration and Power Interface (ACPI) functions.



Make sure the AC adapter is not plugged into the wall outlet during installation. The electric current could damage the motherboard.

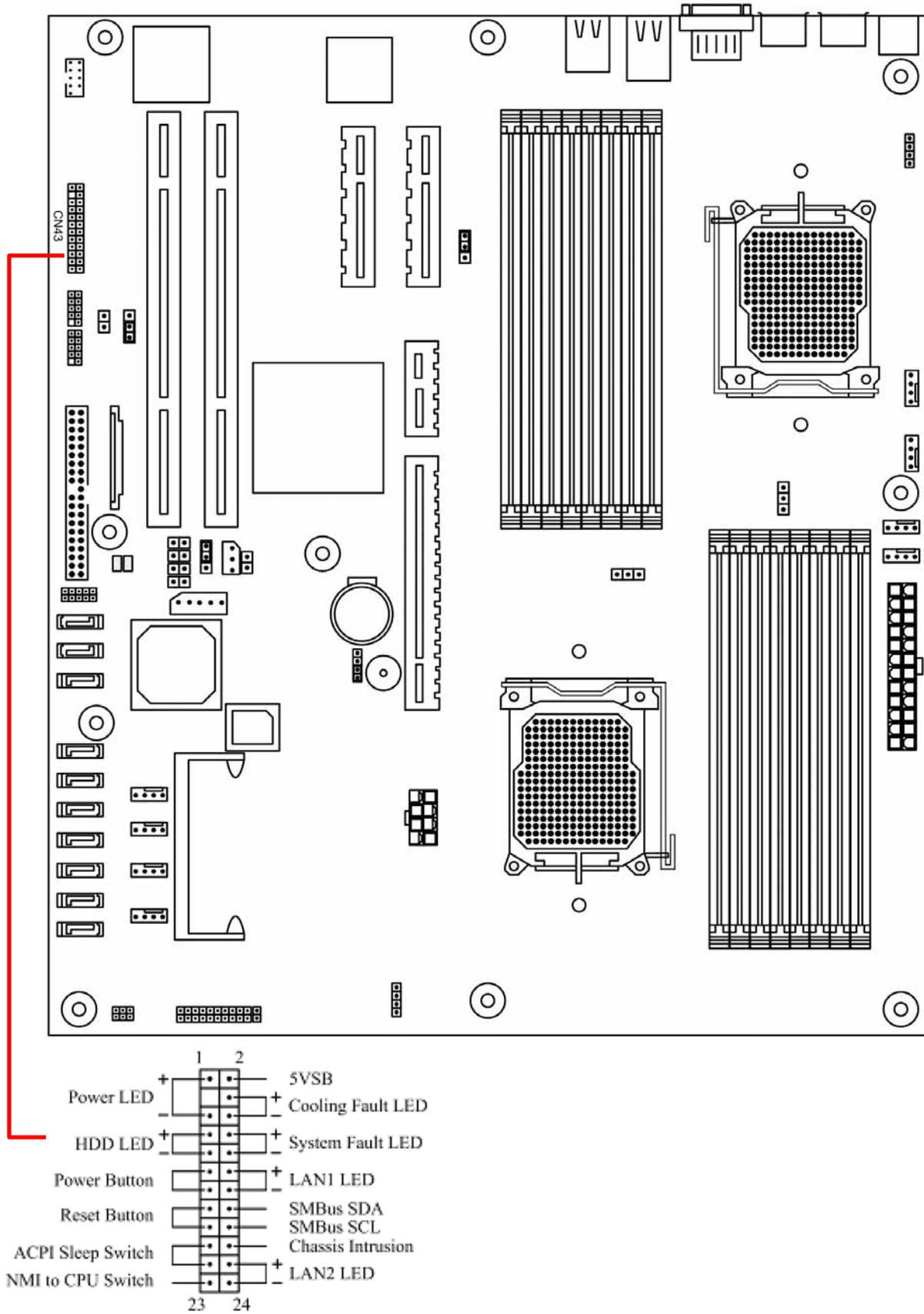
Refer to the following diagram below for the connector locations.



2.7 Cables & Connectors

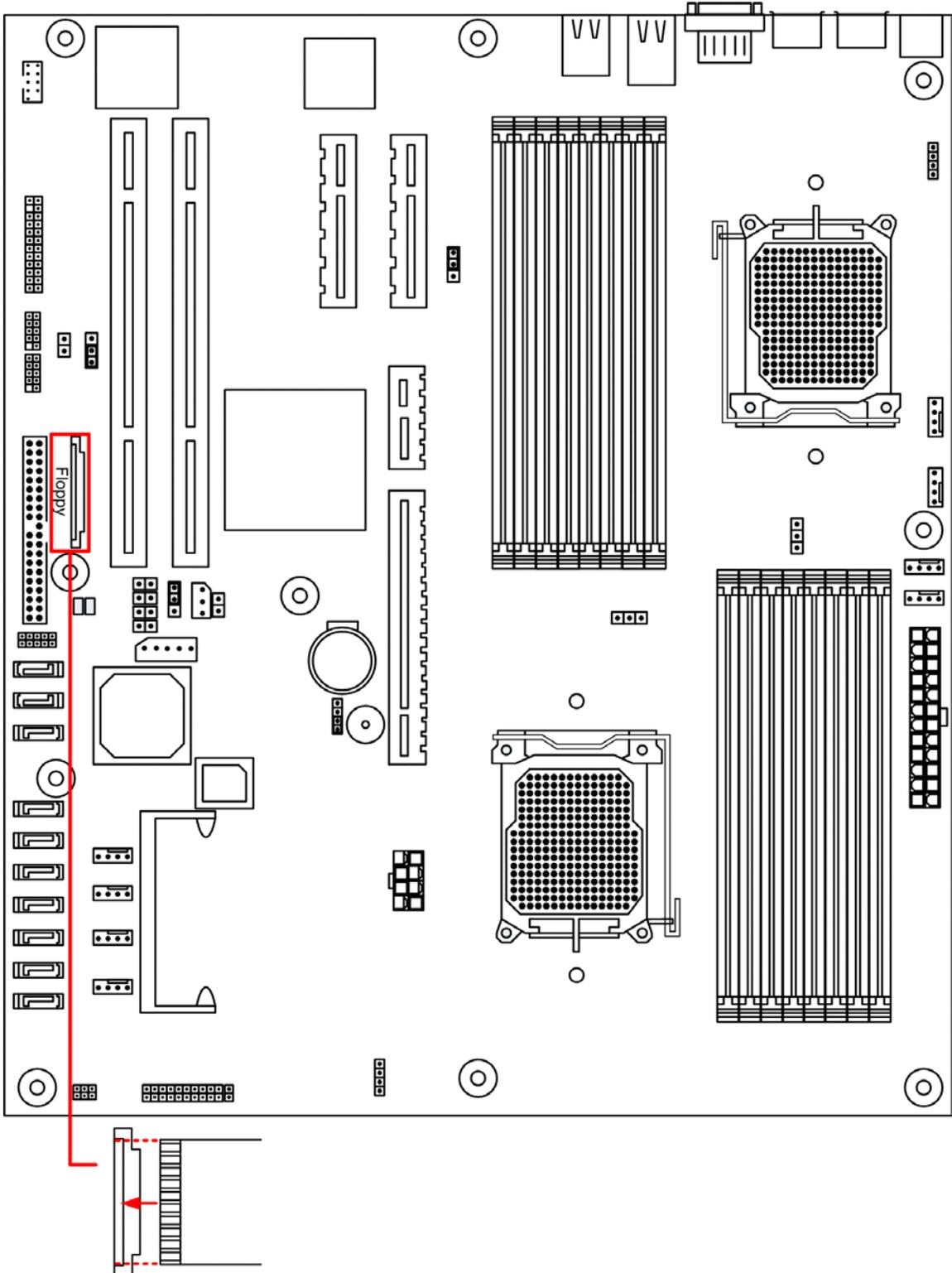
2.7.1 Front Panel Connectors

Power LED:	This 3-pin connector attaches to the power LED.
HDD Activity LED:	This 2-pin connector attaches to the LED of the hard disk. The LED lights up when HDD is active.
Power Switch:	This 2-pin connector attaches to the power button of the system.
Reset Switch:	This 2-pin connector attaches to the case-mounted reset switch for rebooting your computer without turning on/off your power switch.
ACPI Sleep Switch:	This 2-pin connector connects to the switch that can take the system into standby mode when pressed.
NMI to CPU Switch:	This 1-pin connector connects to the switch that sends Non-Maskable Interrupt to the CPU. User can customize the button to perform a particular function.
5 VSB:	This connector provides the user with power to any extra devices that uses 5 volt power.
Cooling Fault LED:	This connector connects to the LED that lights up when a problem arises with cooling system.
System Fault LED:	This connector connects to the LED that lights up when a problem arises with the system.
NIC#1 Activity LED:	This connector connects to the LED that lights up when there is activity on Gbe 1.
SMBus SDA:	A private bus to BMC chip for serial data, for use with BMC only.
SMBus SCL:	A private bus to BMC chip for serial clock, for use with BMC only.
Chassis Intrusion:	This connects to the mechanical switch that indicates whether the chassis had been opened. User can activate it if desired.
NIC#2 Activity LED:	This connector connects to the LED that lights up when there is activity on Gbe 2.



2.7.2 Slim Floppy disk drive connector

The following diagram indicates the location of the slim floppy drive connector:



To install the floppy drive, first refer to the instructions that come with the floppy drive. Then follow the instructions here.

First pull out the latch of the connector, and turn the cable to the side with the pins. Match that side with the connector and plug it in (as shown in the diagram). Push the latch connector back to the original position, and make sure it's correctly installed.

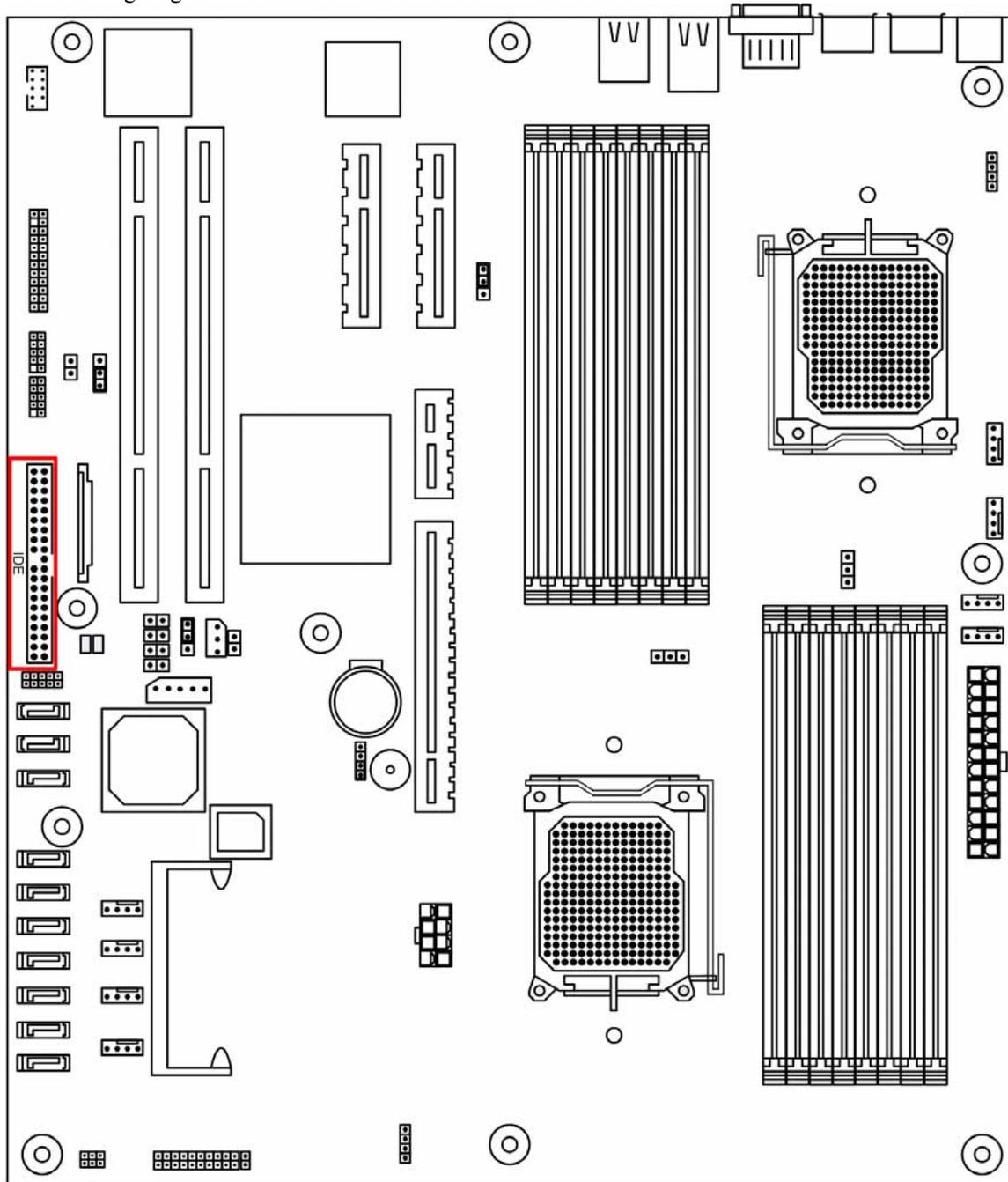
For the slim floppy drive, the motherboard supports only one floppy connector. Below are some symptoms of incorrectly installed floppy drive. Wrong installation should not cause severe damage but it may cause your system to freeze or crash when trying to read and/or write to the floppy diskette.

Diagnosing an incorrectly installed floppy drive

Drive is not automatically detected.	Usually caused by faulty cables, cables put in backwards or a bad floppy drive or motherboard. Try another floppy drive to verify the problem if the cable is properly installed or try replacing the actual cable. Also check to see if the onboard floppy controller is enabled in the BIOS setup.
Drive Fail message at boot-up.	The cable, floppy drive or motherboard may be faulty. Try another drive or cable to verify.
Drive does not power on.	Check power cable and cabling. Maybe a bad power supply or drive cable problem.
Drive activity light is constantly on.	Usually signifies that the cable on the drive is on backwards, which is a common issue. Reverse the cable on the floppy drive end and try again.

2.7.3 IDE connectors

The following diagram indicates the location of the IDE connector:



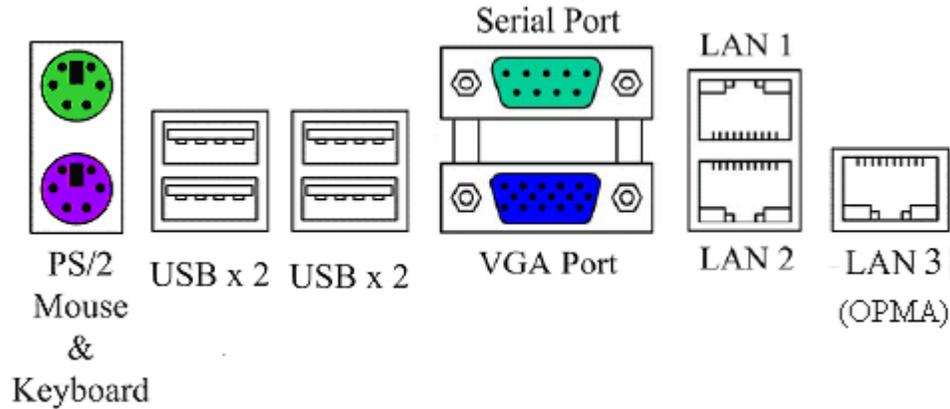
Read the instructions that come with the IDE drive and then consult the instructions here. For Parallel ATA, installing IDE drives has become simpler over the years. The cables are now “keyed” to guide the user to the correct installation configuration. Each IDE connector can support two IDE drives.



Remember to set BIOS to match the configuration that you implement here. Go to Advanced Menu section of BIOS for detail.

2.7.4 Rear Panel I/O ports

The following illustration displays the motherboard I/O port array.



Type of Port	Function
PS/2 Mouse connector	The system will direct IRQ12 to the PS/2 mouse if one is detected. If not detected, IRQ12 can be used for expansion slot.
PS/2 Keyboard connector	This connection is for a standard keyboard using a PS/2 plug (mini DIN). This connector will not allow standard AT size (large DIN) keyboard plugs. You may use a DIN to mini DIN adapter on standard AT keyboards.
USB Ports	Four external USB 2.0 ports that allow simultaneous connections of 2 USB devices.
Serial Port connector (9-pin male)	This serial port can be used for pointing devices or other serial devices. See BIOS setup.
VGA connector (15-pin female)	The VGA port connects display devices such as a monitor. See the BIOS setup.
Gigabit Ethernet Port 1 & 2	These ports are RJ-45. The motherboard uses the ServerWorks HT2000 integrated dual channel Gigabit Ethernet.
Ethernet Port 3 (OPMA)	This port is RJ-45. This port is ONLY for OPMA, not for regular network.

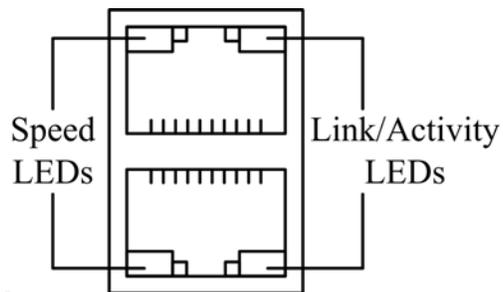
2.7.5 Back Panel LAN LED

Back Panel LAN LED:

The table below will allow the user to monitor LAN activities from the back of the system.

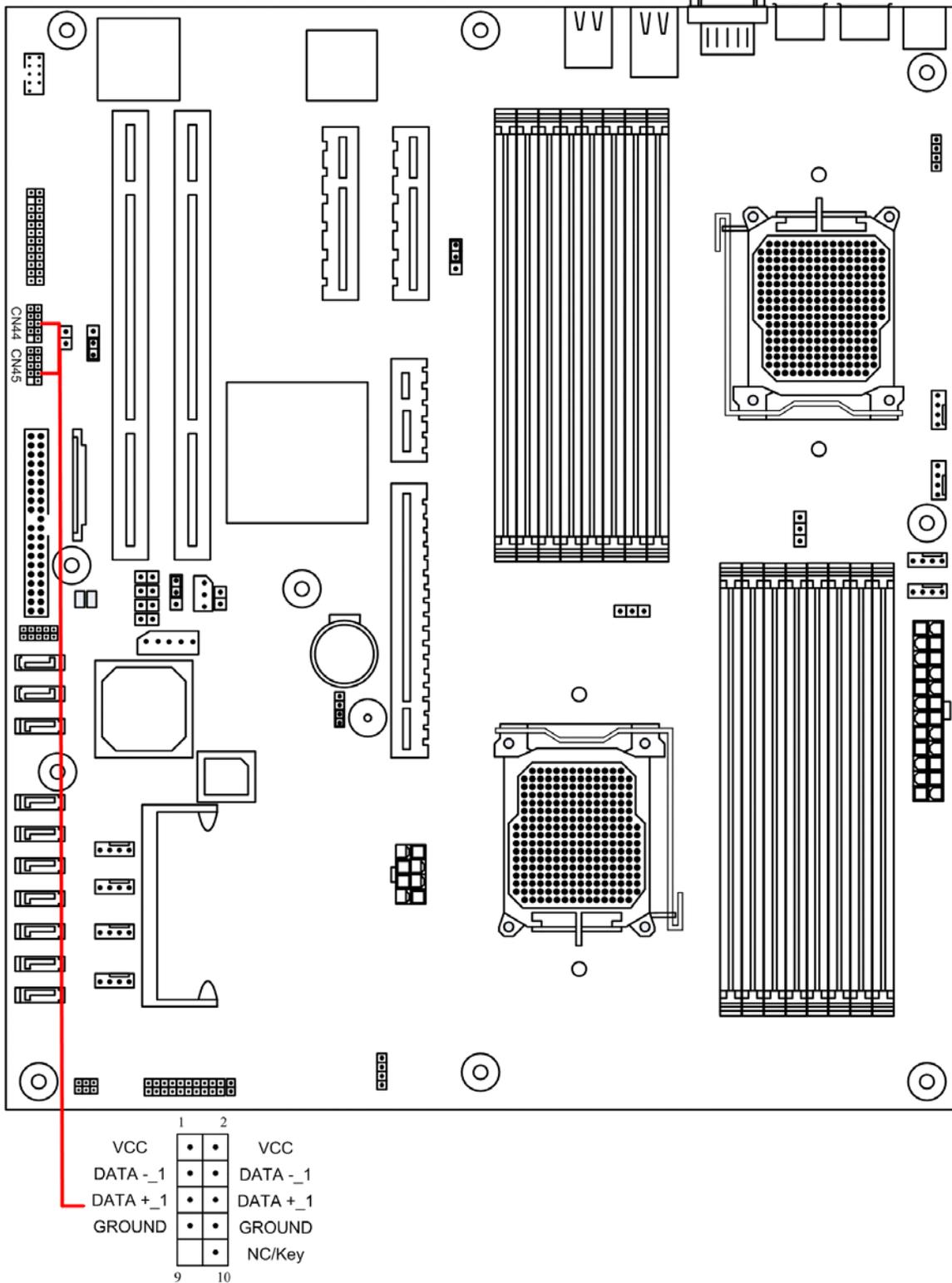
RJ-45 connectors LEDs

	State of Link	Link/Activity LED (Green)	Speed LED (Green/Orange)
	No link	OFF	OFF
	Link @ 10Mbps	On/Blink	OFF
	Link @ 100Mbps	On/Blink	ON (Green)
	Link @ 1000Mbps	On/Blink	ON (Orange)
	Activity	BLINK	ON



2.7.6 Front USB Connector

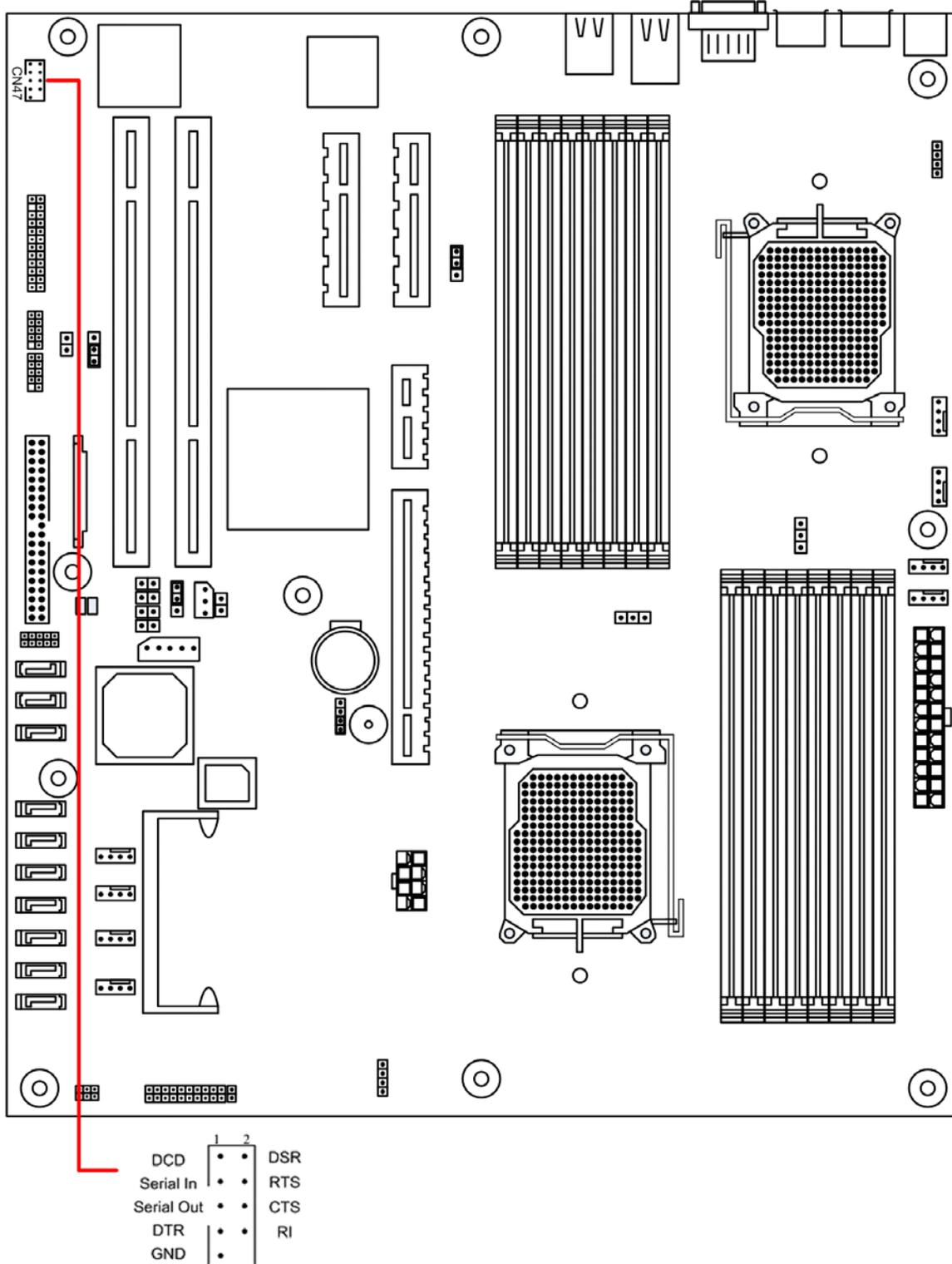
Header CN44 and CN45 control two front USB connections. To activate the front USBs, connect the USB wires to CN44 or CN45. Refer to the following diagram for the location of CN44 and CN45.



2.7.7 Front Panel Serial Port Connector

Header CN47 controls the activation of front panel serial port. In the specification, front panel serial port is COM2, the back panel is COM1.

Refer to the following diagram for location and orientation of CN47.



Chapter 3. BIOS Setup

This chapter discusses the PhoenixBIOS setup program built into the ROM BIOS.

BIOS is the basic input/output system, the firmware on the motherboard that enables the hardware to interact with the software. The setup program allows the users to modify the basic system configurations according to their needs. The configuration is then stored in a battery-backed NVRAM so that it retains the configuration even when the power is turned off. The PhoenixBIOS installed in the motherboard's ROM is a custom version of an industry standard BIOS.

The rest of the chapter will list all the menus and sub-menus in the BIOS. Along with them, you can also find the list of varieties for any configurable item in the BIOS.

3.1 Entering BIOS Setup

The PhoenixBIOS is activated when the system powers on. The BIOS reads the system information contained in the CMOS and begins the process of checking the system and configuring it. After finishing configuring the whole system, BIOS will seek an OS on disk and turn over control of the system to the OS found.

While BIOS is in control, the Setup menu can be accessed by pressing the <F2> key when the following message appears briefly at the bottom of the screen during Power On Self Test: "Press <F2> to enter SETUP."

3.2 Using Setup

The following table provides details about how to navigate the Setup program using keyboard.

KEY	FUNCTION
Up Arrow ↑	Move to the previous item.
Down Arrow ↓	Move to the next item.
Left Arrow ←	Move to the previous menu.
Right Arrow →	Move to the next menu.
Esc	In the sub-menu: Exit the sub-menu. In the main menu: Exit without saving.
Enter	Select the item. A pop-up window will appear to allow setting of the item's value. If the item has a ► in front of it, it means that the item leads to a sub-menu. Pressing <Enter> will take you to the sub-menu.
+	Increase the numeric value or goes to the previous setting value.
-	Decrease the numeric value or goes to the next setting value.
F1	General help on setup navigation keys. Press <F1> key to pop up a small help window that describe the appropriate keys to use and the possible selections for the highlighted item. To exit the Help Window, press <ESC> key or <F1> key again.
F9	Setup Defaults.
F10	Save and Exit.

3.3 Troubleshooting

In case the system cannot be booted after some changes in BIOS, use the clear CMOS jumper setting to reset the BIOS to default (See Page 23). To avoid such problem, configure only the items that you thoroughly understand and refrain from modifying the advanced settings.

3.4 Main Menu:

Phoenix TrustedCore(tm) Setup Utility	
Main	Advanced Security Power Boot Server Exit
System Time: [13:20:41] System Date: [07/19/2006] BIOS Date 07/17/06 BIOS Version: NM46X V051 NFORCE ► Floppy Configuration System Memory: 633 KB Extended Memory: 4095 MB	Item Specific Help <Tab>, <Shift Tab>, or <Enter> selects field.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

The following table shows the items that you can customize on the Main menu page:

Item	Options	Description
System Time	No options.	Shows the time of the day in the format of Hour/Min/Sec.
System Date	No options.	Shows the date in the format of MM/DD/YYYY.
BIOS Date	No options.	Shows the release date of the BIOS.
BIOS Version	No options.	Version of the BIOS.
Floppy Configuration	Legacy Diskette A Disabled 360 Kb 5 1/4" 1.2 MB 5 1/4" 720 Kb 3 1/2" 1.44/1.25 MB 3 1/2" 2.88 MB 3 1/2" Floppy Check Disabled Enabled	Selects floppy type. Note that 1.25 MB 3 1/2" references a 1024 byte/sector Japanese media format. The 1.25 MB, 3 1/2" diskette requires a 3-Mode floppy-disk drive. Enabled verifies floppy type on boot; disabled speeds boot.
System Memory	No options.	This item is not configurable to user.
Extended Memory	No options.	This item is not configurable to user.

3.5 Advanced Menu:

Phoenix TrustedCore(tm) Setup Utility						
Main	Advanced	Security	Power	Boot	Server	Exit
Reset Configuration Data: [No] QuickBoot Mode: [Enabled] Summary screen: [Disabled]					Item Specific Help	
<ul style="list-style-type: none"> ▶ Hammer Configuration ▶ Integrated Devices ▶ IDE Configuration ▶ I/O Device Configuration ▶ Console Redirection IOMMU: [Disabled] DRAM Bank Interleave [Disabled]					Select 'Yes' if you want to clear the Extended System Configuration Data (ESCD) area.	
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit						

The following table shows the items that you can customize on the Advanced menu page:

Item	Options	Description
Reset Configuration Data	No Yes	Select 'Yes' if you want to clear the Extended System Configuration Data (ESCD) area.
QuickBoot Mode	Disabled Enabled	Allows the system to skip certain tests while booting. This will decrease the time needed to boot the system.
Summary screen	Disabled Enabled	Display system configuration boot.
IOMMU	Disabled Enabled	Enable \ Disable IOMMU
DRAM Bank Interleave	Disabled Auto	Interleave memory blocks across the DRAM chip selects. Auto will set this enabled when possible.

3.5.1 Hammer Configuration Sub-Menu

The Hammer Configuration sub-menu is shown in following figure:

Phoenix TrustedCore(tm) Setup Utility	
Advanced	
Hammer Configuration	Item Specific Help
HT-LDT Frequency: [1000Mhz] <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">200Mhz 400Mhz 600Mhz 800Mhz 1000Mhz</div>	Set frequency of HT links for coherent and non-coherent.

3.5.2 Integrated Devices Sub-Menu

The Integrated Devices sub-menu should look like following:

Phoenix TrustedCore(tm) Setup Utility	
Advanced	
Integrated Devices	Item Specific Help
USB Control [USB1.1+USB2] USB BIOS Legacy Support: [Enabled] MAC 1 LAN: [Enabled] MAC 1 LAN Bridge: [Enabled] MAC 2 LAN: [E MAC 2 LAN Bridge: [E Disabled SATA1 Controller: [E USB1.1 SATA2 Controller: [E USB1.1+USB2 SATA3 Controller: [E ► NV RAID Configuration	Enable/Disable USB Controllers.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

Following figure shows the NV RAID Configuration sub-menu:

Phoenix TrustedCore(tm) Setup Utility	
Advanced	
NV RAID Configuration	Item Specific Help
NV RAID Configuration: [Disabled]	Enabled/Disable Nvidia RAID control. SATA controller must be enabled for RAID feature to function. Enabling Master SATA0 Secondary requires enabling Secondary SATA Channel. Both options are listed in Integrated Devices.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

3.5.3 IDE Configuration Sub-Menu

The IDE Configuration sub-menu looks like the following:

Phoenix TrustedCore(tm) Setup Utility Advanced	
IDE Configuration	Item Specific Help
<ul style="list-style-type: none"> ▶ Primary Master [Maxtor 6L100P0-(PM)] ▶ Primary Slave [None] 	
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit	

Primary Master/Primary Slave sub-menu:

Phoenix TrustedCore(tm) Setup Utility Advanced	
Primary Master [Maxtor 6L100P0-(PM)]	Item Specific Help
Type: [Auto] Multi-Sector Transfers: [16 Sectors] LBA Mode Control: [Enabled] 32 Bit I/O: [Disabled] Transfer Mode: [FPIO 4 / DMA 2] Ultra DMA Mode: [Mode 2]	User = you enter parameters of hard-disk drive installed at this connection. Auto = autotypes hard-disk drive installed here. CD-ROM = a CD-ROM drive is installed here. ATAPI Removable = removable disk drive is installed here.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit	

The table below is a list of items that you can customize in the Primary Master/Primary Slave options under IDE Configuration sub-menu.

Item	Options	Description
Type	Auto None CD-ROM ATAPI Removable IDE Removable Other ATAPI User	User = you enter parameters of hard-disk drive installed at this connection. Auto = autotypes hard-disk drive installed here. CD-ROM = a CD-ROM drive is installed here. ATAPI Removable = removable disk drive is installed here.
Multi-Sector Transfers	Disabled 2 Sectors 4 Sectors 8 Sectors 16 Sectors	Specify the number of sectors per block for multiple sector transfers. 'MAX' refers to the size the disk returns when queried.
LBA Mode Control	Disabled Enabled	Enabling LBA causes Logical Block Addressing to be used in place of Cylinders, Heads & Sectors.
32 Bit I/O	Disabled Enabled	This setting enables or disables 32 bit IDE data transfers.
Transfer Mode	Standard Fast PIO 1 Fast PIO 2 Fast PIO 3 Fast PIO 4 FPIO 3/DMA 1 FPIO 4/DMA 2	Select the method for moving data to/from the drive. Autotype the drive to select the optimum transfer mode.
Ultra DMA Mode	Disabled Mode 0 Mode 1 Mode 2 Mode 3 Mode 4 Mode 5 Mode 6	Selects the Ultra DMA mode used for moving data to/from the drive. Autotype the drive to select the optimum transfer mode.

3.5.4 I/O Device Configuration Sub-Menu

The I/O Device Configuration sub-menu looks like the following:

Phoenix TrustedCore(tm) Setup Utility Advanced	
I/O Device Configuration	Item Specific Help
Serial port A: [Enabled] Base I/O address: [3F8] Interrupt: [IRQ 4] Serial port B: [Disabled] Floppy disk controller: [Enabled] Base I/O address: [Primary]	Configure serial port A using options: [Disabled] No configuration [Enabled] User configuration [Auto] BIOS or OS chooses configuration (OS Controlled) Displayed when controlled by OS
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

The following table shows the items that you can customize on the I/O Device Configuration sub-menu page:

Item	Options	Description
Serial port A	Disabled Enabled Auto	Disabled - No configuration. Enabled - User configuration. Auto - BIOS or OS chooses configuration.
Base I/O address	3F8 2F8 3E8 2E8	Set the base I/O address for serial port A.
Interrupt	IRQ 3 IRQ 4	Set the interrupt for serial port A.
Serial port B	Disabled Enabled Auto	Disabled - No configuration. Enabled - User configuration. Auto - BIOS or OS chooses configuration.
Floppy disk controller	Disabled Enabled Auto	Disabled – No configuration. Enabled – User configuration. Auto – BIOS or OS chooses configuration.
Base I/O address	Primary Secondary	Set the base I/O address for the floppy disk controller using options: Primary Secondary

3.5.5 Console Redirection Sub-Menu

The Console Redirection sub-menu looks like the following:

Phoenix TrustedCore(tm) Setup Utility	
Advanced	
Console Redirection	Item Specific Help
Com Port Address [Disabled] Baud Rate [19.2K] Console Type [PC ANSI] Flow Control [CTS/RTS] Console connection: [Direct] Continue C.R. after POST: [Off]	If enabled, it will use a port on the motherboard.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

The following table shows the items that you can customize on the Console Redirection sub-menu page:

Item	Options	Description
Com Port Address	Disabled On board COM A On board COM B	If enabled, it will use a port on the motherboard.
Baud Rate	300 1200 2400 9600 19.2K 38.4K 57.6K 115.2K	Enables the specified baud rate.
Console Type	VT100 VT100, 8BIT PC ANSI, 7BIT PC ANSI VT100+ VT UTF8 ASCII	Enables the specified console type.
Flow Control	None XON/XOFF CTS/RTS	Enables Flow Control
Console connection	Direct Via modem	Indicate whether the console is connected directly to the system or a modem is used to connect.
Continue C.R. after POST	Off On	Enables Console Redirection after OS has loaded.

3.6 Security Menu:

The Security Menu is shown as the following figure:

Phoenix TrustedCore(tm) Setup Utility						
Main	Advanced	Security	Power	Boot	Server	Exit
Supervisor Password Is: Clear User Password Is: Clear Set Supervisor Password [Enter] Set User Password [Enter] Boot-time Diagnostic Screen: [Enabled]					Item Specific Help	
					Display the diagnostic screen during boot	
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit						

The following table shows the items that you can customize on the Security Menu page:

Item	Options	Description
Set Supervisor Password	No options.	Enter Current Password. Enter New Password. Confirm New Password.
Set User Password	No options.	Enter New Password. Confirm New Password.
Boot-time Diagnostic Screen	Disabled Enabled	Display the diagnostic screen during boot.

3.7 Power Menu:

The Power Menu is shown as following figure:

Phoenix TrustedCore(tm) Setup Utility						
Main	Advanced	Security	Power	Boot	Server	Exit
Enable Multimedia Timer [Yes] AC Recovery: [Disabled]				Item Specific Help Enable/Disable Multimedia Timer support.		
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit						

The following table shows the items that you can customize on the Power Menu:

Item	Options	Description
Enable Multimedia Timer	No Yes	Enable/Disable Multimedia Timer support.
AC Recovery	Disabled Enabled	Disabled – when power is applied, the system will boot to the G0 state. Enabled – when power is applied, the system will boot to the G2:S5 state.

3.8 Boot Menu:

All the possible devices that you can boot from are automatically detected and listed on the page. The first device listed is the first boot device. In the example shown below, the Floppy Drive is the first boot device, followed by the Maxtor 6L100P0-(PM) hard drive.

Phoenix TrustedCore(tm) Setup Utility	
Main	Advanced
Security	Power Boot
Server	Exit
<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;"> <p>Boot priority order:</p> <ul style="list-style-type: none"> 1: Legacy Floppy Drives 2: IDE 0: Maxtor 6L100P0-(PM) 3: 4: 5: 6: 7: 8: <p>Excluded from boot order:</p> <ul style="list-style-type: none"> : PCI BEV: NVIDIA Boot Agent 232.0529 : PCI BEV: 2-NVIDIA Boot Agent 232.05 : Legacy Network Card : Bootable Add-in Cards </div> <div style="width: 35%; border-left: 1px solid black; padding-left: 5px;"> <p style="text-align: center;">Item Specific Help</p> <p>Keys used to view or configure devices: Up and Down arrows select a device. <+> and <-> moves the device up or down. <f> and <r> specifies the device fixed or removable. <x> exclude or include the device to boot. <Shift + 1> enables or disables a device. <1 - 4> Loads default boot sequence.</p> </div> </div>	
<p>F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit</p>	

3.9 Server Menu:

Phoenix TrustedCore(tm) Setup Utility	
Main Advanced Security Power Boot Server Exit	
<ul style="list-style-type: none"> ▶ Hardware Monitor ▶ IPMI 	<p style="text-align: center;">Item Specific Help</p> <p>Show hardware monitor Current state.</p>
<p>F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ▶ Sub-Menu F10 Save and Exit</p>	

Item	Options	Description
Hardware Monitor	No options.	Shows all the hardware monitor's current state.
IPMI	No options.	Shows the information about IPMI.

3.10 Exit Menu:

Phoenix TrustedCore(tm) Setup Utility	
Main	Advanced Security Power Boot Server Exit
Exit Saving Changes [Enter] Exit Discarding Changes [Enter] Load Setup Defaults [Enter] Discard Changes [Enter] Save Changes [Enter]	Item Specific Help Exit System Setup and save your changes to CMOS.
F1 Help ↑↓ Select Item -/+ Change Values F9 Setup Defaults Esc Exit Select Menu Enter Select ► Sub-Menu F10 Save and Exit	

APPENDIX I: Glossary

ACPI (Advanced Configuration and Power Interface): a power management specification that allows the operating system to control the amount of power distributed to the computer's devices. Devices not in use can be turned off, reducing unnecessary power expenditure.

AGP (Accelerated Graphics Port): a PCI-based interface which was designed specifically for demands of 3D graphics applications. The 32-bit AGP channel directly links the graphics controller to the main memory. While the channel runs only at 66 MHz, it supports data transmission during both the rising and falling ends of the clock cycle, yielding an effective speed of 133 MHz.

ATAPI (AT Attachment Packet Interface): also known as IDE or ATA; a drive implementation that includes the disk controller on the device itself. It allows CD-ROMs and tape drives to be configured as master or slave devices, just like HDDs.

ATX: the form factor designed to replace the AT form factor. It improves on the AT design by rotating the board 90 degrees, so that the IDE connectors are closer to the drive bays, and the CPU is closer to the power supply and cooling fan. The keyboard, mouse, USB, serial, and parallel ports are built-in.

Bandwidth: refers to carrying capacity. The greater the bandwidth, the more data the bus, phone line, or other electrical path can carry. Greater bandwidth results in greater speed.

BIOS (Basic Input/Output System): the program that resides in the ROM chip, which provides the basic instructions for controlling your computer's hardware. Both the operating system and application software use BIOS routines to ensure compatibility.

Buffer: a portion of RAM which is used to temporarily store data; usually from an application though it is also used when printing and in most keyboard drivers. The CPU can manipulate data in a buffer before copying it to a disk drive. While this improves system performance (reading to or writing from a disk drive a single time is much faster than doing so repeatedly) there is the possibility of losing your data should the system crash. Information in a buffer is temporarily stored, not permanently saved.

Bus: a data pathway. The term is used especially to refer to the connection between the processor and system memory, and between the processor and PCI or ISA local buses.

Bus mastering: allows peripheral devices and IDEs to access the system memory without going through the CPU (similar to DMA channels).

Cache: a temporary storage area for data that will be needed often by an application. Using a cache lowers data access times since the information is stored in SRAM instead of slower DRAM. Note that the cache is also much smaller than your regular memory: a typical cache size is 512KB, while you may have as much as 4GB of regular memory.

Closed and open jumpers: jumpers and jumper pins are active when they are “on” or “closed”, and inactive when they are “off” or “open”.

CMOS (Complementary Metal-Oxide Semiconductors): chips that hold the basic startup information for the BIOS.

COM port: another name for the serial port, which is called as such because it transmits the eight bits of a byte of data along one wire, and receives data on another single wire (that is, the data is transmitted in serial form, one bit after another). Parallel ports transmit the bits of a byte on eight different wires at the same time (that is, in parallel form, eight bits at the same time).

DDR (Double Data Rate): a technology designed to double the clock speed of the memory. It activates output on both the rising and falling edge of the system clock rather than on just the rising edge, potentially doubling output.

DIMM (Dual In-line Memory Module): faster and more capacious form of RAM than SIMMs, and do not need to be installed in pairs.

DIMM bank: sometimes called DIMM socket because the physical slot and the logical unit are the same. That is, one DIMM module fits into one DIMM socket, which is capable of acting as a memory bank.

DMA (Direct Memory Access): channels that are similar to IRQs. DMA channels allow hardware devices (like soundcards or keyboards) to access the main memory without involving the CPU. This frees up CPU resources for other tasks. As with IRQs, it is vital that you do not double up devices on a single line. Plug-n-Play devices will take care of this for you.

DMI: A specification that establishes a standard framework for managing networked computers. DMI covers hardware and software, desktop systems and servers, and defines a model for filtering events and describing interfaces.

DRAM (Dynamic RAM): widely available, very affordable form of RAM which loses data if it is not recharged regularly (every few milliseconds). This refresh requirement makes DRAM three to ten times slower than non-recharged RAM such as SRAM.

ECC (Error Correction Code or Error Checking and Correcting): allows data to be checked for errors during run-time. Errors can subsequently be corrected at the same time that they’re found.

EEPROM (Electrically Erasable Programmable ROM): also called Flash BIOS, it is a ROM chip which can, unlike normal ROM, be updated. This allows you to keep up with changes in the BIOS programs without having to buy a new chip.

ESCD (Extended System Configuration Data): a format for storing information about Plug-n-Play devices in the system BIOS. This information helps properly configure the system each time it boots.

Firmware: low-level software that controls the system hardware.

Form factor: an industry term for the size, shape, power supply type, and external connector type of the Personal Computer Board (PCB) or motherboard. The standard form factors are the AT and ATX.

IDE (Integrated Device/Drive Electronics): a simple, self-contained HDD interface. It can handle drives up to 8.4 GB in size. Almost all IDEs sold now are in fact Enhanced IDEs (EIDEs), with maximum capacity determined by the hardware controller.

IDE INT (IDE Interrupt): a hardware interrupt signal that goes to the IDE.

I/O (Input/Output): the connection between your computer and another piece of hardware (mouse, keyboard, etc.)

IRQ (Interrupt Request): an electronic request that runs from a hardware device to the CPU. The interrupt controller assigns priorities to incoming requests and delivers them to the CPU. It is important that there is only one device hooked up to each IRQ line; doubling up devices on IRQ lines can lock up your system. Plug-n-Play operating systems can take care of these details for you.

Latency: the amount of time that one part of a system spends waiting for another part to catch up. This occurs most commonly when the system sends data out to a peripheral device and has to wait for the peripheral to spread (peripherals tend to be slower than onboard system components).

NVRAM: ROM and EEPROM are both examples of Non-Volatile RAM, memory that holds its data without power. DRAM, in contrast, is volatile.

OPROM: Firmware on adapter cards that control bootable peripherals. The system BIOS interrogates the option ROMs to determine which devices can be booted.

Parallel port: transmits the bits of a byte on eight different wires at the same time.

PCI (Peripheral Component Interconnect): a 32 or 64-bit local bus (data pathway) which is faster than the ISA bus. Local buses are those which operate within a single system (as opposed to a network bus, which connects multiple systems).

PCI PIO (PCI Programmable Input/Output) modes: the data transfer modes used by IDE drives. These modes use the CPU for data transfer (in contrast, DMA channels do not). PCI refers to the type of bus used by these modes to communicate with the CPU.

PCI-to-PCI bridge: allows you to connect multiple PCI devices onto one PCI slot.

PnP (Plug-n-Play): a design standard that has become ascendant in the industry. Plug-n-Play devices require little set-up to use. Devices and operating systems that are not Plug-n-Play require you to reconfigure your system each time you add or change any part of your hardware.

RAID (Redundant Array of Independent Disks): a way for the same data to be stored in different places on many hard drives. By using this method, the data is stored redundantly and multiple hard drives will appear as a single drive to the operating system. RAID level 0 is known as striping, where data is striped (or overlapped) across multiple hard drives, but offers no fault-tolerance. RAID level 1 is known as mirroring, which stores the data within at least two hard drives, but does not stripe. RAID level 1 also allows for faster access time and fault-tolerance, since either hard drive can be read at the same time. RAID level 0+1 is both striping and mirroring, providing fault-tolerance, striping, and faster access all at the same time.

SDRAM (Synchronous Dynamic RAM): called as such because it can keep two sets of memory addresses open simultaneously. By transferring data alternately from one set of addresses and then the other, SDRAM cuts down on the delays associated with non-synchronous RAM, which must close one address bank before opening the next.

Serial port: called as such because it transmits the eight bits of a byte of data along one wire, and receives data on another single wire (that is, the data is transmitted in serial form, one bit after another).

Sleep/Suspend mode: in this mode, all devices except the CPU shut down.

SRAM (Static RAM): unlike DRAM, this type of RAM does not need to be refreshed in order to prevent data loss. Thus, it is faster and more expensive.

SMBIOS: The system management specification addresses how motherboard and system vendors present management information about their products in a standard format by extending the BIOS interface on Intel architecture systems.

Standby mode: in this mode, the video and hard drives shut down; all other devices continue to operate normally.

UltraDMA-33/66/100: a fast version of the old DMA channel. UltraDMA is also called UltraATA. Without a proper UltraDMA controller, your system cannot take advantage of higher data transfer rates of the new UltraDMA/UltraATA hard drives.

USB (Universal Serial Bus): a versatile port. This one port type can function as a serial, parallel, mouse, keyboard or joystick port. It is fast enough to support video transfer, and is capable of supporting up to 127 daisy-chained peripheral devices.

ZCR (Zero Channel RAID): ZCR card provides RAID-5 solution by working with the onboard SCSI/SATA/SATA-II chip through special PCI-X slot with Intel RAIDIOS logic, thus lowering cost of RAID-5 solution