

KGN(M)H-D16 Series
KGNH-D16
KGMH-D16/QDR



Motherboard

E6105

Second Edition

October 2010

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Notices

Federal Communications Commission Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with manufacturer's instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment to an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



The use of shielded cables for connection of the monitor to the graphics card is required to assure compliance with FCC regulations. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

Canadian Department of Communications Statement

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

This class B digital apparatus complies with Canadian ICES-003.

REACH

Complying with the REACH (Registration, Evaluation, Authorization, and Restriction of Chemicals) regulatory framework, we published the chemical substances in our products at ASUS REACH website at <http://green.asus.com/english/REACH.htm>.

Safety information

Electrical safety

- To prevent electrical shock hazard, disconnect the power cable from the electrical outlet before relocating the system.
- When adding or removing devices to or from the system, ensure that the power cables for the devices are unplugged before the signal cables are connected. If possible, disconnect all power cables from the existing system before you add a device.
- Before connecting or removing signal cables from the motherboard, ensure that all power cables are unplugged.
- Seek professional assistance before using an adapter or extension cord. These devices could interrupt the grounding circuit.
- Make sure that your power supply is set to the correct voltage in your area. If you are not sure about the voltage of the electrical outlet you are using, contact your local power company.
- If the power supply is broken, do not try to fix it by yourself. Contact a qualified service technician or your retailer.

Operation safety

- Before installing the motherboard and adding devices on it, carefully read all the manuals that came with the package.
- Before using the product, make sure all cables are correctly connected and the power cables are not damaged. If you detect any damage, contact your dealer immediately.
- To avoid short circuits, keep paper clips, screws, and staples away from connectors, slots, sockets and circuitry.
- Avoid dust, humidity, and temperature extremes. Do not place the product in any area where it may become wet.
- Place the product on a stable surface.
- If you encounter technical problems with the product, contact a qualified service technician or your retailer.



This symbol of the crossed out wheeled bin indicates that the product (electrical, electronic equipment, and mercury-containing button cell battery) should not be placed in municipal waste. Check local regulations for disposal of electronic products.

About this guide

This user guide contains the information you need when installing and configuring the motherboard.

How this guide is organized

This user guide contains the following parts:

- **Chapter 1: Product introduction**
This chapter describes the features of the motherboard and the new technologies it supports.
- **Chapter 2: Hardware information**
This chapter lists the hardware setup procedures that you have to perform when installing system components. It includes description of the switches, jumpers, and connectors on the motherboard.
- **Chapter 3: Powering up**
This chapter describes the power up sequence and ways of shutting down the system.
- **Chapter 4: BIOS setup**
This chapter tells how to change system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.
- **Chapter 5: Driver installation**
This chapter provides instructions for installing the necessary drivers for different system components.
- **Appendix: Reference information**
This appendix includes additional information that you may refer to when configuring the motherboard.

Where to find more information

Refer to the following sources for additional information and for product and software updates.

1. **ASUS websites**
The ASUS website provides updated information on ASUS hardware and software products. Refer to the ASUS contact information.
2. **Optional documentation**
Your product package may include optional documentation, such as warranty flyers, that may have been added by your dealer. These documents are not part of the standard package.

Conventions used in this guide

To make sure that you perform certain tasks properly, take note of the following symbols used throughout this manual.



DANGER/WARNING: Information to prevent injury to yourself when trying to complete a task.



CAUTION: Information to prevent damage to the components when trying to complete a task.



IMPORTANT: Instructions that you **MUST** follow to complete a task.



NOTE: Tips and additional information to help you complete a task.

Typography

Bold text

Indicates a menu or an item to select.

Italics

Used to emphasize a word or a phrase.

<Key>

Keys enclosed in the less-than and greater-than sign means that you must press the enclosed key.

Example: <Enter> means that you must press the Enter or Return key.

<Key1+Key2+Key3>

If you must press two or more keys simultaneously, the key names are linked with a plus sign (+).

Example: <Ctrl+Alt+Del>

Command

Means that you must type the command exactly as shown, then supply the required item or value enclosed in brackets.

Example: At the DOS prompt, type the command line: **format A:/S**

KGN(M)H-D16 Series specifications summary

Model Name		KGNH-D16	KGMH-D16/QDR
Processor Support / System Bus		2*socket G34 (LGA1944)	
		8/12 Core AMD Opteron™ 6100 series	
		6.4 GT/s per link (dual link)	
Core Logic		- AMD SR5650 - AMD SP5100	- AMD SR5670 - AMD SP5100 - Mellanox ConnectX-2 MT25418 B0 QDR
Form Factor		Half SSI. 6.8" x 16.7"	
ASUS Features	Fan Speed Control	V	
	Rack Ready (Rack and Pedestal dual use)	V	
	ASWM 2.0	V	
Memory	Total Slots	16 (4-channel per CPU)	
	Capacity	Maximum up to 256GB (RDIMM) Maximum up to 64GB (UDIMM)	
	Memory Type	DDR3 800/1066/1333 UDIMM with ECC/non ECC DDR3 800/1066/1333 RDIMM	
	Memory Size	1GB, 2GB, 4GB, 8GB, 16GB (RDIMM) 1GB, 2GB, 4GB (UDIMM)	
Expansion Slots (follow SSI Location #)	Total PCI/PCI-X/PCI-E Slots	1	
	Slot Location 1	1*PCI-E x16 (Gen2 X16 Link)	
Storage	SATA Controller	- AMD SP5100 - 6 x SATA2 300MB/s ports - PROMISE® RAID (for Linux/Windows, supports RAID 0,1, 10, 5)	
Networking	LAN	2 * Intel 82574L + 1 * Mgmt LAN	
Graphic	VGA	Aspeed AST2050 8MB	
Onboard I/O Connectors	PSU Connector	20-pin x 2	
	Management connector	Onboard socket for optional management card	
	USB Connectors	2 (One for internal Type A USB connector)	
	Fan Header	4 * 4-pin	
	SMBus	2	
Rear I/O Connectors	External Serial Port	1	
	External USB Port	2	
	VGA Port	1	
	RJ-45	2 + 1 Management Port	
	Infiniband		1

KGN(M)H-D16 Series specifications summary

Management Solution	Software	ASWM
	Out of Band Remote Management	Optional ASMB4-iKVM for KVM-over-Internet
Monitoring	CPU Temperature	V
	FAN RPM	V
Environment		Operation temperature: 10°C–35°C Non operation temperature: -40°C–70°C Non operation humidity: 20%–90% (non-condensing)

Specifications are subject to change without notice.



- The 20-pin proprietary power connectors are not compatible with SSI power supply. USE THE PROPRIETARY POWER SUPPLY ONLY; otherwise you may damage the motherboard.
- The 4-pin EZ_PLUG is designed for hard disk drives power supply. DO NOT connect other 4-pin power connectors of the power supply unit (PSU) to this connector.



DO NOT touch the Northbridge chipset! The Northbridge chipset may become overheated. Remember to provide sufficient air flow to keep the system stable.

This chapter describes the motherboard features and the new technologies it supports.

1 Product introduction

Chapter summary

1

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1.1 Welcome!

Thank you for buying an ASUS® KGN(M)H-D16 motherboard!

The motherboard delivers a host of new features and latest technologies, making it another standout in the long line of ASUS quality motherboards!

Before you start installing the motherboard, and hardware devices on it, check the items in your package with the list below.

1.2 Package contents

Check your motherboard package for the following items.

		Standard Bulk Pack	
		KGNH-D16	KGMH-D16/QDR
Application CD	Support DVD	1	1
	Mellanox SDVD*		1
Documentation	User Guide	1	1
Cable	Thermistor	2	2
Packing Qty.		10pcs per carton	

		Standard Gift Box Pack	
		KGNH-D16	KGMH-D16/QDR
Application CD	Support DVD	1	1
	Mellanox SDVD*		1
Documentation	User Guide	1	1
Cable	Thermistor	2	2
Packing Qty.		1pcs per carton	

* The Mellanox driver is included in the motherboard support DVD or in an individual driver disc, depending on the shipping sequence. This is subjected to change without notice.



If any of the above items is damaged or missing, contact your retailer.

1.3 Serial number label

Before requesting support from the ASUS Technical Support team, you must take note of the motherboard's serial number containing 13 characters **xxS2xxxxxxxx** shown as the figure below. With the correct serial number of the product, ASUS Technical Support team members can then offer a quicker and satisfying solution to your problems.



1.4 Special features

1.4.1 Product highlights

Latest processor technology

This motherboard supports the latest AMD® Opteron™ 6100 series processors in LGA 1944 package with integrated memory controller to support 4-channel (8 DIMM per CPU) DDR3 memory. AMD® Opteron™ 6100 series processor supports AMD® HyperTransport™ technology with a system bus of up to 6.4GT/s per link. AMD® Opteron™ 6100 series processor is the one of the most powerful and energy-efficient CPUs in the world.

AMD 8/12 Core architecture



The motherboard supports AMD 8/12 core processors with discrete L2 cache structure for each core and shared L3 cache to meet demands for more powerful computing.

HyperTransport™ technology 3.0 (HT3)

HyperTransport™ technology 3.0 (HT3) is a high-speed, low latency, point-to-point link designed to improve the overall system balance and scalability with the maximum interconnect rate of 6.4GT/s.

DDR3 memory support

The KGN(M)H-D16 supports UDIMM and RDIMM DDR3 memory that features data transfer rates of 1333/1066 MHz to meet the higher bandwidth requirements of server and workstation applications. The 4-channel DDR3 architecture boosts system performance, eliminating bottlenecks with peak bandwidth of up to 32GB/s. Furthermore, the supply voltage for the memory is reduced from 1.8 V for DDR2 to just 1.5V, 1.35V, and 1.2V for DDR3. This voltage reduction limits the power consumption and heat generation of DDR3 which makes it an ideal memory solution.



PCIe 2.0

This motherboard supports the latest PCIe 2.0 device for twice the current speed and bandwidth. This enhances system performance while still providing backward compatibility to PCIe 1.0 devices.

82574L LAN solution

The motherboard comes with dual Gigabit LAN controllers and ports which provide a total solution for your networking needs. The onboard Intel 82574L Gigabit LAN controllers use the PCI Express interface and could achieve network throughput close to Gigabit bandwidth.

Serial ATA II technology



The motherboard supports the Serial ATA II 3 Gb/s technology through the Serial ATA interface and AMD SP5100 chipset. The Serial ATA II specification provides twice the bandwidth of the current Serial ATA products with a host of new features, including Native Command Queuing (NCQ), Power Management (PM) Implementation Algorithm, and Hot Swap. Serial ATA allows thinner, more flexible cables with lower pin count and reduced voltage requirements.

USB 2.0 technology

The motherboard implements the Universal Serial Bus (USB) 2.0 specification, dramatically increasing the connection speed from the 12 Mbps bandwidth on USB 1.1 to a fast 480 Mbps on USB 2.0. USB 2.0 is backward compatible with USB 1.1.

Temperature, fan, and voltage monitoring

The CPU temperature is monitored to prevent overheating and damage. The system fan rotations per minute (RPM) is monitored for timely failure detection. The chip monitors the voltage levels to ensure stable supply of current for critical components.

100% solid, long life conductive polymer capacitors



This motherboard uses all high-quality conductive polymer capacitors for durability, improved lifespan, and enhanced thermal capacity.

This chapter lists the hardware setup procedures that you have to perform when installing system components. It includes description of the jumpers and connectors on the motherboard.

Hardware information



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2.1 Before you proceed

Take note of the following precautions before you install motherboard components or change any motherboard settings.



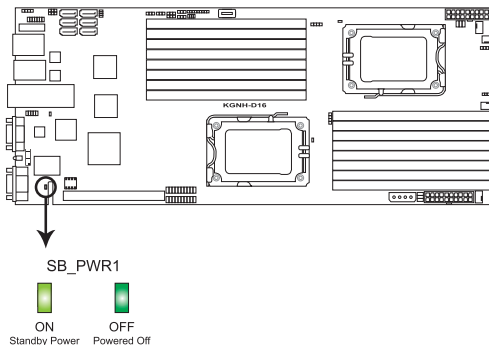
- Unplug the power cord from the wall socket before touching any component.
- Use a grounded wrist strap or touch a safely grounded object or a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.
- Hold components by the edges to avoid touching the ICs on them.
- Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.
- Before you install or remove any component, ensure that the power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the motherboard, peripherals, and/or components.

Onboard LED

1. Standby Power LED

The motherboard comes with a standby power LED. The green LED lights up to indicate that the system is ON, in sleep mode, or in soft-off mode. This is a reminder that you should shut down the system and unplug the power cable before removing or plugging in any motherboard component. The illustration below shows the location of the onboard LED.

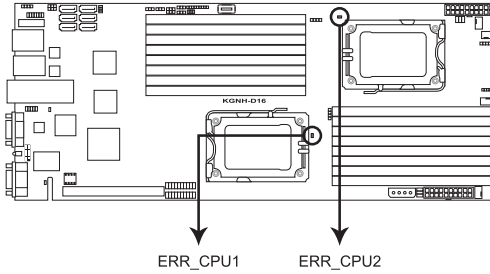
KG(N)H-D16 Series Standby power LED



2. CPU warning LED (ERR_CPU1, ERR_CPU2)

The CPU warning LEDs light up to indicate that an impending failure of the corresponding CPU.

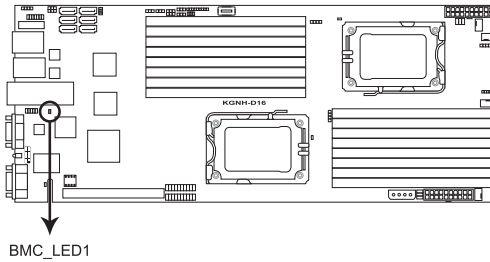
KGN(M)H-D16 Series ERR CPU LED



3. BMC LED (BMC_LED1)

The green heartbeat LED blinks per second to indicate that the ASMB4 is working normally.

KGN(M)H-D16 Series BMC_LED



- The heartbeat LED functions only when you install the ASUS ASMB4.
- Everytime after the AC power is replugged, you have to wait for about 30 seconds for the system power up

2.2 Motherboard overview

Before you install the motherboard, study the configuration of your chassis to ensure that the motherboard fits into it.

To optimize the motherboard features, we highly recommend that you install it in an SSI EEB 1.1 compliant chassis.



Ensure to unplug the chassis power cord before installing or removing the motherboard. Failure to do so can cause you physical injury and damage motherboard components!

2.2.1 Placement direction

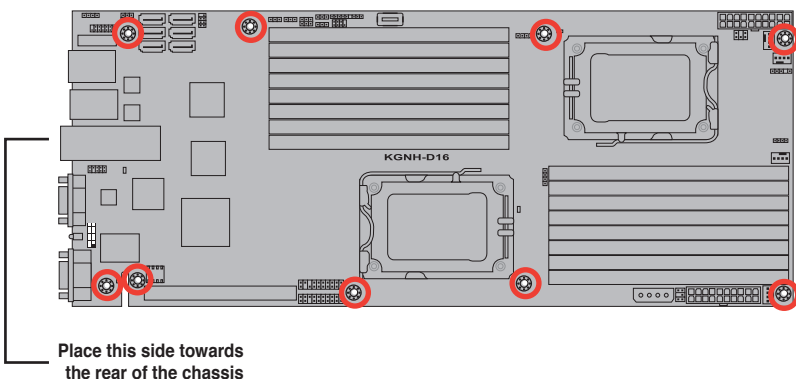
When installing the motherboard, ensure that you place it into the chassis in the correct orientation. The edge with external ports goes to the rear part of the chassis as indicated in the image below.

2.2.2 Screw holes

Place nine (9) screws into the holes indicated by circles to secure the motherboard to the chassis.

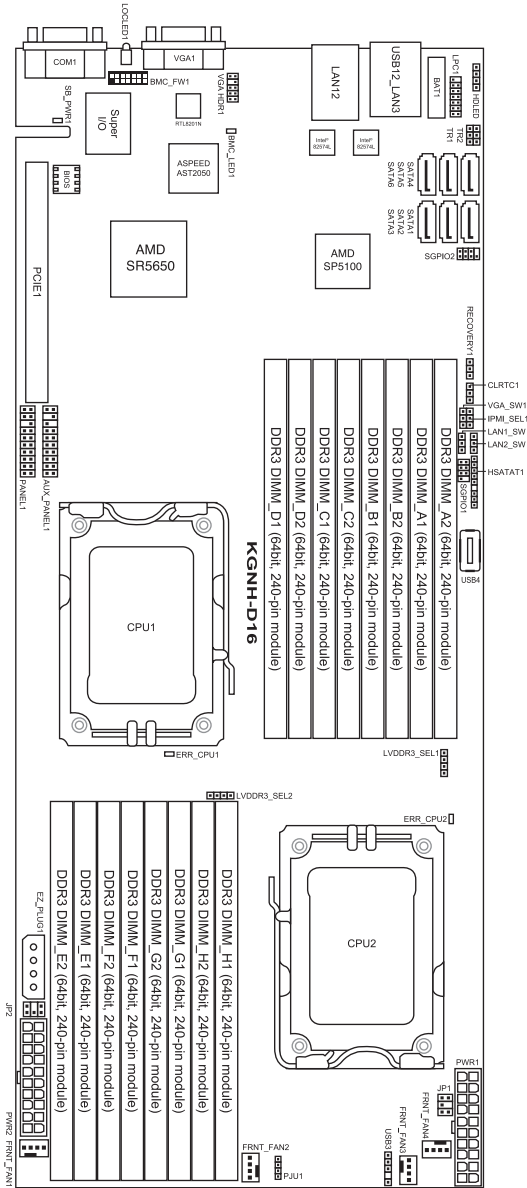


DO NOT overtighten the screws! Doing so can damage the motherboard.

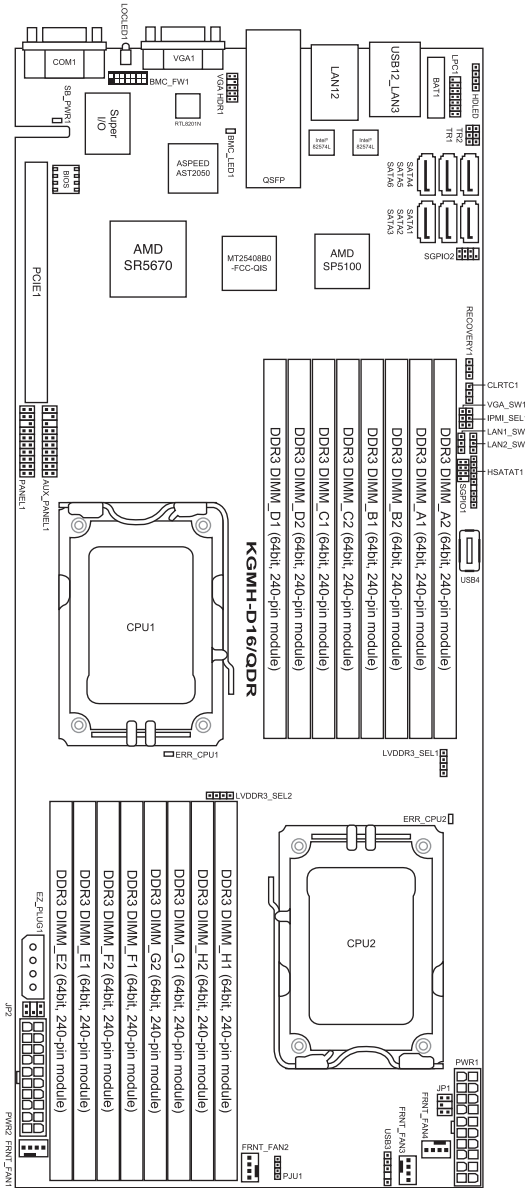


2.2.3 Motherboard layouts

KGNH-D16



KGMM-D16/QDR



2.2.4 Layout contents

Slots/Socket		Page
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Jumpers		Page
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4.	LAN controller setting (3-pin LAN_SW1, LAN_SW2)	2-23
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4.	LAN 1 (RJ-45) port	2-26
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6.	Video Graphics Adapter port	2-26
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8.	Serial (COM1) port	2-26

Internal connectors		Page
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2.	USB connectors (5-1 pin USB3, A-Type USB4)	2-28
3.	Thermal sensor cable connectors (3-pin TR1, TR2)	2-28
4.	Front fan connectors (4-pin FRNT_FAN1, FRNT_FAN2, FRNT_FAN3, FRNT_FAN4)	2-29
5.	LPC debug card connector (14-1 pin LPC1)	2-30
6.	Serial General Purpose Input/Output connector (8-1 pin SGPIO1, SGPIO2)	2-30
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8.	Power Supply SMBus connectors (6-1 pin JP1; JP2)	2-31
9.	Proprietary power connectors (20-pin PWR1, 20-pin PWR2, 4-pin PWR3)	2-32
10.	HDD status indicator header (9-1 pin HSATAT1)	2-33
11.	Hard disk activity LED connector (4-pin HDLED1)	2-33
12.	Internal VGA Header (10-1 pin VGA_HDR1)	2-34
13.	Auxiliary panel connector (20-pin AUX_PANEL1)	2-35
14.	System panel connector (20-pin PANEL1)	2-36

2.3 Central Processing Unit (CPU)

The motherboard comes with dual surface mount LGA 1944 Socket designed for the AMD Opteron™ 6100 series CPU in the Land Grid Array (LGA) package.



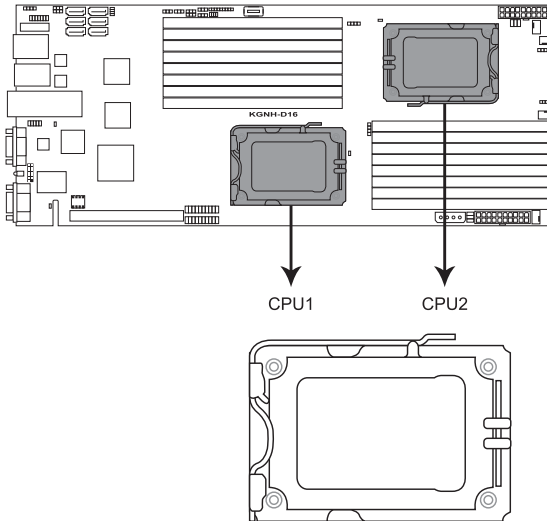
- Upon purchase of the motherboard, ensure that the PnP cap is on the socket and the socket contacts are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket contacts/motherboard components. ASUS shoulders the repair cost only if the damage is shipment/transit-related.
- Keep the cap after installing the motherboard. ASUS will process Return Merchandise Authorization (RMA) requests only if the motherboard comes with the cap on the Socket 1944.
- The product warranty does not cover damage to the socket contacts resulting from incorrect CPU installation/removal, or misplacement/loss/incorrect removal of the PnP cap.

2.3.1 Installing the CPU

To install a CPU:

1. Locate the CPU socket on the motherboard.

KGNI(M)H-D16 Series CPU LGA1944 Socket

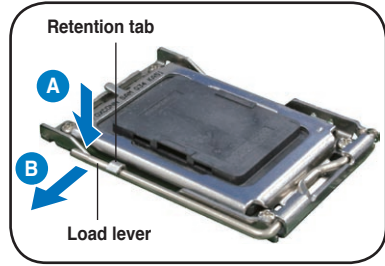


Before installing the CPU, ensure that the socket box is facing toward you and the load lever is on your left.

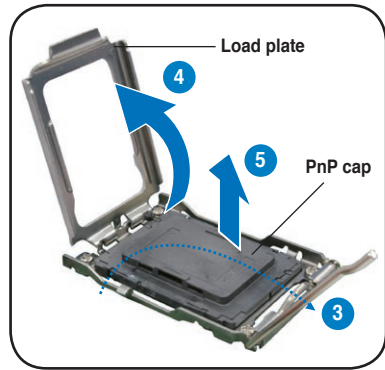
2. Press the load lever with your thumb (A), then move it to the left (B) until it is released from the retention tab.



To prevent damage to the socket pins, do not remove the PnP cap unless you are installing a CPU.



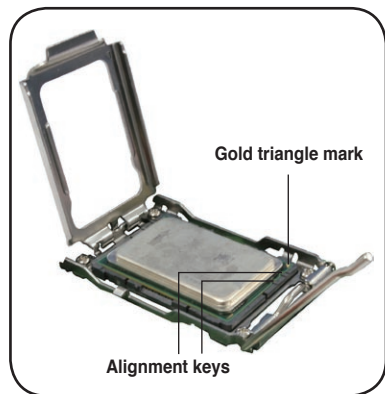
3. Lift the load lever in the direction of the arrow to a 135° angle.
4. Lift the load plate with your thumb and forefinger to a 100° angle.
5. Remove the PnP cap from the CPU socket.



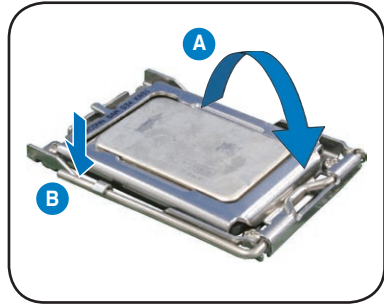
6. Position the CPU over the socket, ensuring that the gold triangle is on the bottom-right corner of the socket, and then fit the socket alignment key into the CPU notch.



The CPU fits in only one correct orientation. DO NOT force the CPU into the socket to prevent bending the connectors on the socket and damaging the CPU!



7. Close the load plate (A), then push the load lever (B) until it snaps into the retention tab.



Apply some Thermal Interface Material to the exposed area of the CPU that the heatsink will be in contact with, ensuring that it is spread in an even thin layer. Some heatsinks come with pre-applied Thermal Interface Material. If so, skip this step.

2.3.2 Installing the CPU heatsink

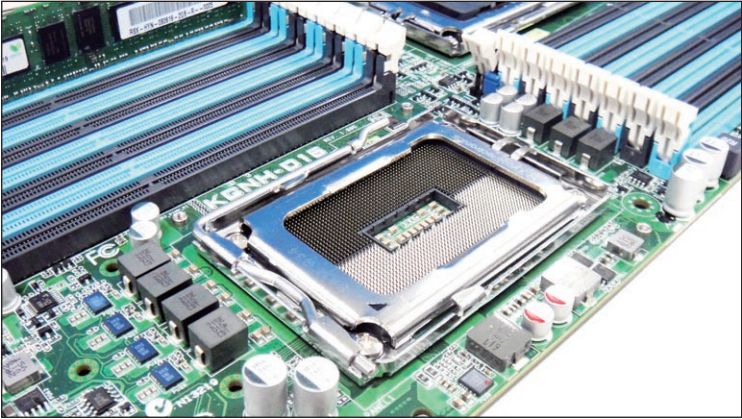
The AMD Opteron™ 6100 series processors require a specially designed heatsink to ensure optimum thermal condition and performance.



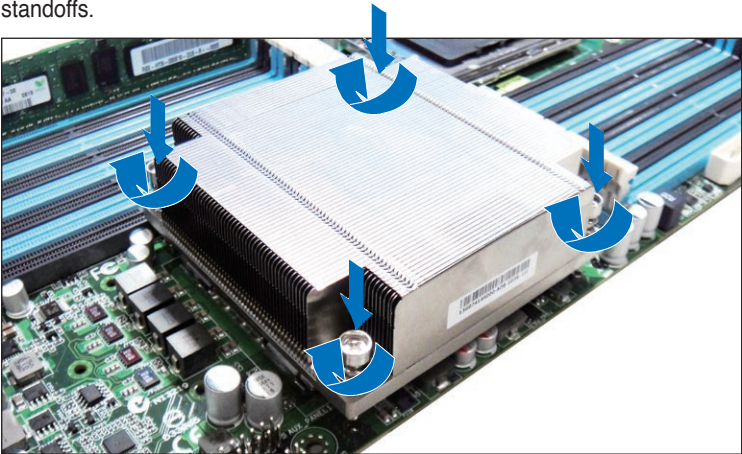
- Ensure to use qualified heatsink assembly with dimension 90mm x 90mm x 27mm only.
- Ensure that you have applied the thermal grease to the top of the CPU before installing the heatsink and fan.

Follow these steps to install the CPU heatsink and fan.

1. Locate the heatsink standoffs on the motherboard.



2. Use a Phillips screwdriver to tighten the four heatsink screws in a diagonal sequence, ensuring that the screw holes are matched with the heatsink standoffs.



Ensure that the heatsink is not skewed or tilted, otherwise the CPU will overheat.

2.4 System memory

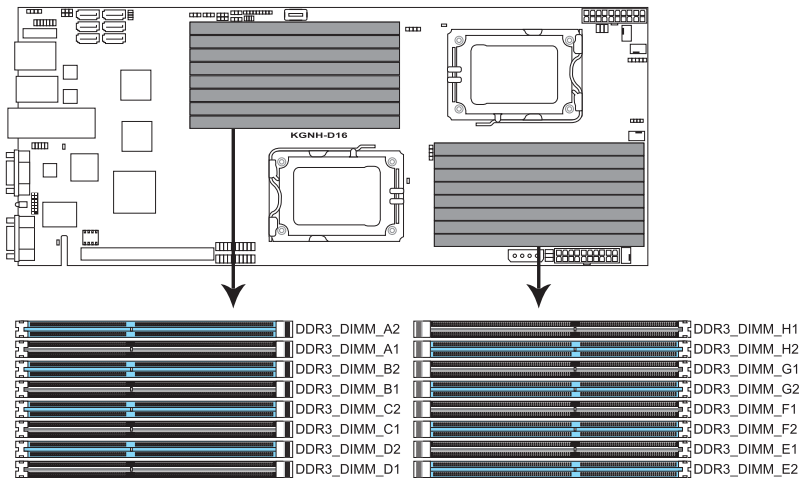
2.4.1 Overview

The motherboard comes with sixteen (16) Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) sockets.

A DDR3 module has the same physical dimensions as a DDR2 DIMM but is notched differently to prevent installation on a DDR2 DIMM socket. DDR3 modules are developed for better performance with less power consumption.

The figure illustrates the location of the DDR3 DIMM sockets:

KGN(M)H-D16 Series 240-pin DDR3 DIMM sockets



2.4.2 Memory Configurations

You may install 1 GB, 2 GB, 4 GB, 8GB and 16GB registered DDR3 DIMMs or 1 GB, 2 GB, and 4 GB ECC/non-ECC, unbuffered DDR3 DIMMs into the DIMM sockets using the memory configurations in this section.

Memory population table

For UDIMM (Single Rank, Dual Ranks)																
CPU 1 Configuration																
	A2	A1	B2	B1	C2	C1	D2	D1	-	-	-	-	-	-	-	
2 DIMMs	●				●											
4 DIMMs	●		●		●		●									
6 DIMMs	●	●	●		●	●	●									
8 DIMMs	●	●	●	●	●	●	●	●								
CPU 1 + 2 Configuration																
	A2	A1	B2	B1	C2	C1	D2	D1	E2	E1	F2	F1	G2	G1	H2	H1
2 DIMMs	●								●							
4 DIMMs	●				●				●				●			
6 DIMMs	●		●		●				●		●		●			
8 DIMMs	●		●		●		●		●		●		●		●	
10 DIMMs	●	●	●		●		●		●	●	●		●		●	
12 DIMMs	●	●	●		●	●	●		●	●	●		●	●	●	
14 DIMMs	●	●	●	●	●	●	●		●	●	●	●	●	●	●	
16 DIMMs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

For RDIMM (Single Rank, Dual Ranks & Quad Ranks)																
CPU 1 Configuration																
	A2	A1	B2	B1	C2	C1	D2	D1	-	-	-	-	-	-	-	
2 DIMMs	●				●											
4 DIMMs	●		●		●		●									
6 DIMMs	●	●	●		●	●	●									
8 DIMMs	●	●	●	●	●	●	●	●								
CPU 1 + 2 Configuration																
	A2	A1	B2	B1	C2	C1	D2	D1	E2	E1	F2	F1	G2	G1	H2	H1
2 DIMMs	●								●							
4 DIMMs	●				●				●				●			
6 DIMMs	●		●		●				●		●		●			
8 DIMMs	●		●		●		●		●		●		●		●	
10 DIMMs	●	●	●		●		●		●	●	●		●		●	
12 DIMMs	●	●	●		●	●	●		●	●	●		●	●	●	
14 DIMMs	●	●	●	●	●	●	●		●	●	●	●	●	●	●	
16 DIMMs	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●



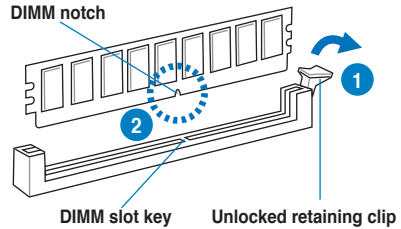
-
- Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain memory modules from the same vendor.
 - For CPU1, install DIMMs to the blue slots in the order of: DIMM_A2 -> DIMM_C2 -> DIMM_B2 -> DIMM_D2. For CPU1+CPU2, install DIMMs to the blue slots in the order of: DIMM_A2 -> DIMM_E2 -> DIMM_C2 -> DIMM_G2.
 - For Quad Rank DIMMs, when installing less than or equal to four DIMMs, install them to the blue slots in the order of: DIMM_A2 -> DIMM_C2 -> DIMM_B2 -> DIMM_D2. For CPU1+CPU2, install DIMMs to the blue slots in the order of: DIMM_A2 -> DIMM_E2 -> DIMM_C2 -> DIMM_G2.
 - For Quad Rank DIMMs, when installing more than four DIMMs, install them to the blue slots in the order of: DIMM_A2 -> DIMM_C2 -> DIMM_B2 -> DIMM_D2 -> DIMM_A1 -> DIMM_C1 -> DIMM_B1 -> DIMM_D1. For CPU1+CPU2, install them to the blue slots in the order of: DIMM_A2 -> DIMM_E2 -> DIMM_C2 -> DIMM_G2 -> DIMM_B2 -> DIMM_F2 -> DIMM_D2 -> DIMM_H2 -> DIMM_A1 -> DIMM_E1 -> DIMM_C1 -> DIMM_G1 -> DIMM_B1 -> DIMM_F1 -> DIMM_D1 -> DIMM_H1.
-

2.4.3 Installing a DIMM



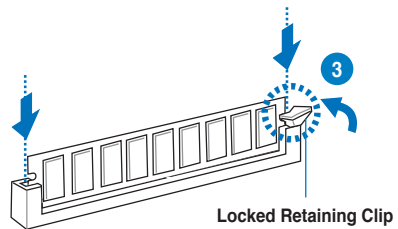
Ensure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

1. Unlock a DIMM socket by pressing the retaining clip outward.
2. Align a DIMM on the socket such that the notch on the DIMM matches the DIMM slot key on the socket.



A DIMM is keyed with a notch so that it fits in only one direction. **DO NOT** force a DIMM into a socket in the wrong direction to avoid damaging the DIMM.

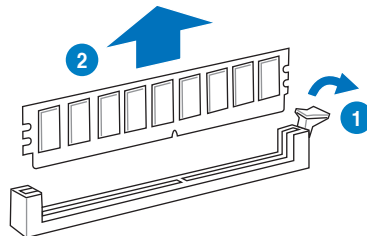
3. Hold the DIMM by both of its ends, then insert the DIMM vertically into the socket. Apply force to both ends of the DIMM simultaneously until the retaining clip snaps back into place, and the DIMM cannot be pushed in any further to ensure proper sitting of the DIMM.



Always insert the DIMM into the socket **VERTICALLY** to prevent DIMM notch damage.

2.4.4 Removing a DIMM

1. Press the retaining clip outward to unlock the DIMM.
2. Remove the DIMM from the socket.



2.5 Expansion slot

In the future, you may need to install expansion cards. The following sub-sections describe the slot and the expansion cards that it supports.



Ensure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage motherboard components.



- ASUS KGN(M)H-D16 server board supports Half-Height, Half-Length expansion cards only.
 - When installing the motherboard to a 1U/2U rackmount server system, first install the expansion card using an optional PCIe x16 riser card, then install the riser card along with the expansion card to the onboard PCI Express x16 slot.
-

2.5.1 Installing an expansion card

To install an expansion card:

1. Before installing the expansion card, read the documentation that came with it and make the necessary hardware settings for the card.
2. Remove the system unit cover (if your motherboard is already installed in a chassis).
3. Remove the bracket opposite the slot that you intend to use. Keep the screw for later use.
4. Align the card connector with the slot and press firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw you removed earlier.
6. Replace the system cover.

2.5.2 Configuring an expansion card

After installing the expansion card, configure the it by adjusting the software settings.

1. Turn on the system and change the necessary BIOS settings, if any. See Chapter 4 for information on BIOS setup.
2. Assign an IRQ to the card. Refer to the tables on the next page.
3. Install the software drivers for the expansion card.



When using PCI cards on shared slots, ensure that the drivers support "Share IRQ" or that the cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups, making the system unstable and the card inoperable.

2.5.3 Interrupt assignments

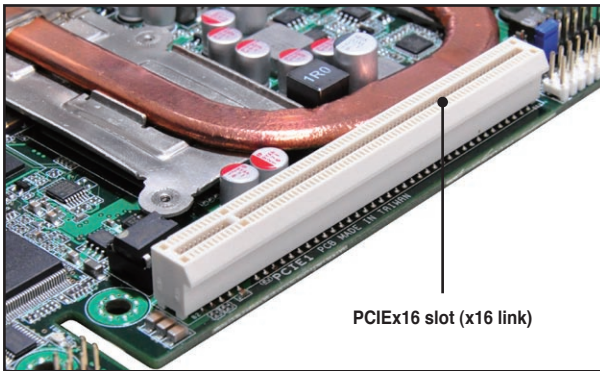
Standard Interrupt assignments

IRQ	Priority	Standard function
0	1	System Timer
1	2	Keyboard Controller
2	-	Programmable Interrupt
4*	12	Communications Port (COM1)
5*	13	--
6	14	Floppy Disk Controller
7*	15	--
8	3	System CMOS/Real Time Clock
9*	4	ACPI Mode when used
10*	5	IRQ Holder for PCI Steering
11*	6	IRQ Holder for PCI Steering
12*	7	PS/2 Compatible Mouse Port
13	8	Numeric Data Processor
14*	9	Primary IDE Channel
15*	10	Secondary IDE Channel

* These IRQs are usually available for ISA or PCI devices.

2.5.4 PCI Express x16 slot (x16 link)

The onboard PCI Express x16 slot provides x16 link to the AMD SP5100 chipset. This slot supports VGA cards and various server class high performance add-on cards.

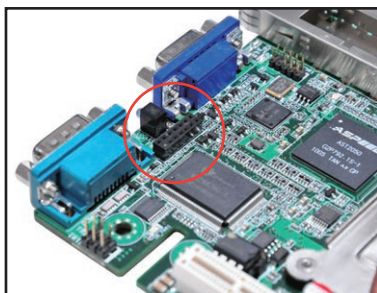


When installing the motherboard to a 1U/2U rackmount server system, first install the expansion card using an optional PCIe x16 riser card, then install the riser card along with the expansion card to the onboard PCI Express x16 slot.

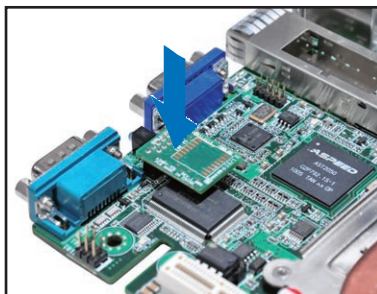
2.5.5 Installing ASMB4 management board

Follow the steps below to install an optional ASMB4 management board on your motherboard.

1. Locate the BMC_FW1 header on the motherboard.



2. Orient and press the ASMB4 management card in place.



2.6 Jumpers

1. Clear RTC RAM (CLRRTC1)

This jumper allows you to clear the Real Time Clock (RTC) RAM in CMOS. You can clear the CMOS memory of date, time, and system setup parameters by erasing the CMOS RTC RAM data. The onboard button cell battery powers the RAM data in CMOS, which include system setup information such as system passwords.

To erase the RTC RAM:

1. Turn OFF the computer and unplug the power cord.
2. Move the jumper cap from pins 1–2 (default) to pins 2–3. Keep the cap on pins 2–3 for about 5–10 seconds, then move the cap back to pins 1–2.
3. Plug the power cord and turn ON the computer.
4. Hold down the key during the boot process and enter BIOS setup to re-enter data.

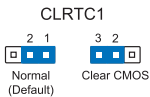
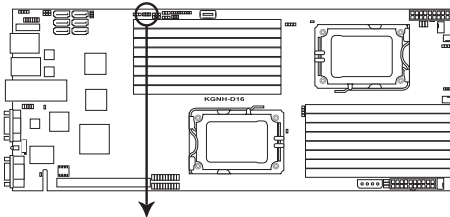


Except when clearing the RTC RAM, never remove the cap on CLRRTC jumper default position. Removing the cap will cause system boot failure!



If the steps above do not help, remove the onboard battery and move the jumper again to clear the CMOS RTC RAM data. After the CMOS clearance, reinstall the battery.

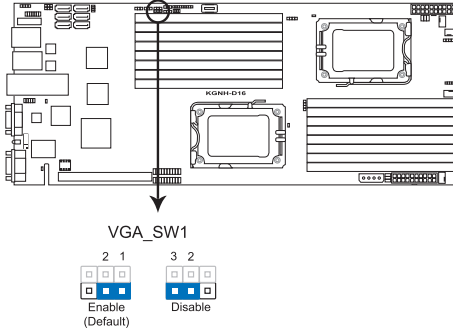
KGN(M)H-D16 Series Clear RTC RAM



2. VGA controller setting (3-pin VGA_SW1)

This jumper allows you to enable or disable the onboard VGA controller. Set to pins 1–2 to activate the VGA feature.

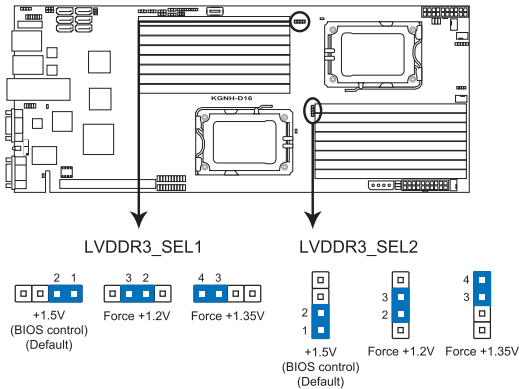
KGNI(M)H-D16 Series VGA setting



3. DDR3 voltage control setting (4-pin LVDDR3_SEL1; LVDDR3_SEL2)

These jumpers allow you to adjust the DIMM voltage. Use LVDDR3_SEL1 to adjust the DIMM voltage for CPU 1, and use LVDDR3_SEL2 to adjust the DIMM voltage for CPU 2. Set to pins 1–2 to select +1.5V BIOS control, pins 2–3 to select Force +1.2V, or pins 3–4 to select Force +1.35V .

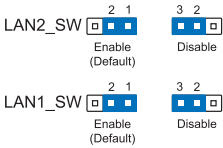
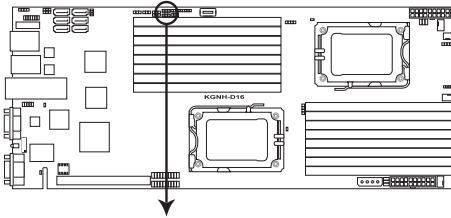
KGNI(M)H-D16 Series LVDDR3 setting



4. LAN controller setting (3-pin LAN_SW1, LAN_SW2)

These jumpers allow you to enable or disable the onboard Intel® Intel 82574L Gigabit LAN controllers. Set to pins 1–2 to activate the Gigabit LAN feature.

KGN(M)H-D16 Series LAN setting

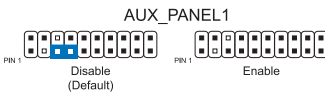
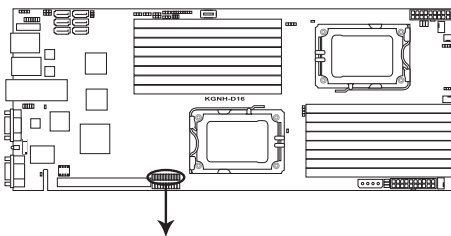


5. Chassis intrusion connector (2 pin CHASSIS)

This connector is for a chassis-mounted intrusion detection sensor or switch. Connect one end of the chassis intrusion sensor or switch cable to this connector. The chassis intrusion sensor or switch sends a high-level signal to this connector when a chassis component is removed or replaced. The signal is then generated as a chassis intrusion event.

By default, the pin labeled “Chassis Signal” and “Ground” are shorted with a jumper cap. Remove the jumper caps only when you intend to use the chassis intrusion detection feature.

KGN(M)H-D16 Series Chassis intrusion connector



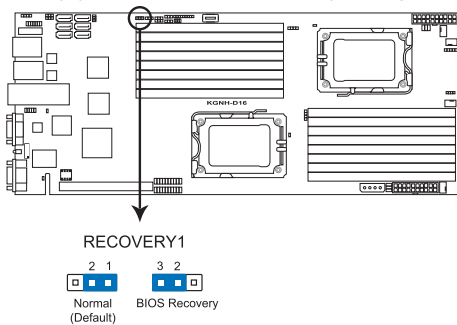
6. Force BIOS recovery setting (3-pin RECOVERY1)

This jumper allows you to quickly update or recover the BIOS settings when it becomes corrupted.

To update the BIOS:

1. Prepare a USB flash disk that contains the original or latest BIOS for the motherboard.
2. Set the jumper to pins 2–3.
3. Insert the USB flash and turn on the system to update the BIOS.
4. Shut down the system.
5. Set the jumper back to pins 1–2.
6. Turn on the system.

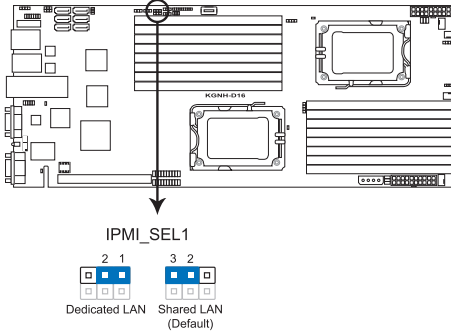
KGNI(M)H-D16 Series BIOS recovery setting



7. IPMI setting (3-pin IPMI_SEL1)

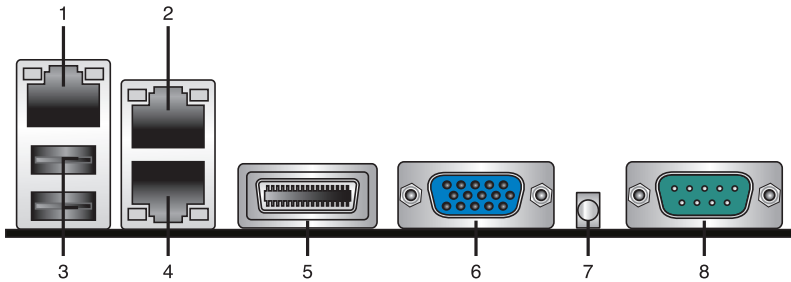
This jumper allows you to use the IPMI feature through the dedicated LAN or share LAN. Place the jumper caps on pins 1–2 if you want to use IPMI through the dedicated LAN (default). Or you can place the jumper caps on pins 2–3 to use IPMI through the shared LAN.

KG(M)H-D16 Series IPMI setting



2.7 Connectors

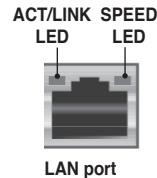
2.7.1 Rear panel connectors



1. **RJ-45 port for iKVM.** This RJ-45 port functions only when you install ASMB4 management card.
2. **LAN 2 (RJ-45) port.** This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.
3. **USB 2.0 ports 1 and 2.** These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 2.0 devices.
4. **LAN 1 (RJ-45) port.** This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.

LAN port LED indications

Activity/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10 Mbps connection
GREEN	Linked	ORANGE	100 Mbps connection
BLINKING	Data activity	GREEN	1 Gbps connection



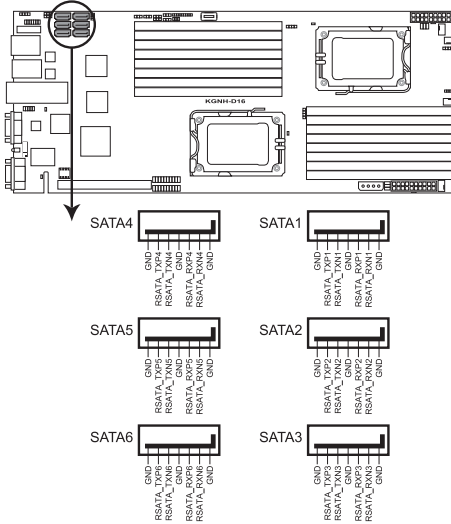
5. **InfiniBand (QSFP).** (*KGMH-D16/QDR only*) This port allows connection with a QSFP cable to an InfiniBand switch.
6. **Video Graphics Adapter port.** This port is for a VGA monitor or other VGA-compatible devices.
7. **Location LED.** This LED lights up for you to conveniently locate the system in error.
8. **Serial (COM1) port.** This 9-pin communication port is for pointing devices or other serial devices.

2.7.2 Internal connectors

1. Serial ATA connectors (7-pin SATA1, SATA2, SATA3, SATA4, SATA5, SATA6)

Supported by the AMD SP5100 chipset, these connectors are for the Serial ATA signal cables for Serial ATA hard disk drives that allows up to 300 Mb/s of data transfer rate.

KG(N)H-D16 Series SATA connectors

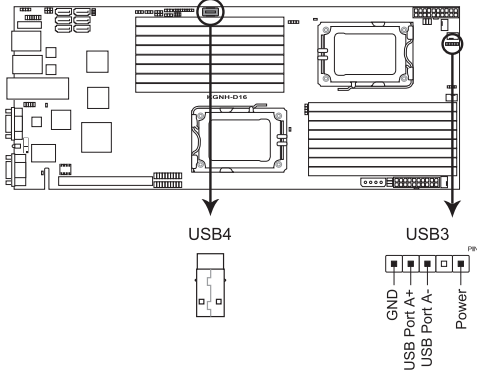


The actual data transfer rate depends on the speed of Serial ATA hard disks installed.

2. USB connectors (5-1 pin USB3; A-Type USB4)

These connectors are for USB 2.0 ports. Connect the USB module cables to connectors USB3, then install the modules to a slot opening at the back of the system chassis. These USB connectors comply with USB 2.0 specification that supports up to 480 Mbps connection speed.

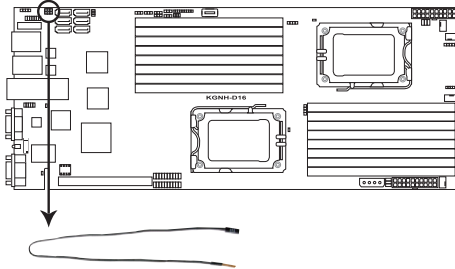
KGN(M)H-D16 Series USB 2.0 connectors



3. Thermal sensor cable connectors (3-pin TR1, TR2)

These connectors are for temperature monitoring. Connect the thermal sensor cables to these connectors and place the other ends to the devices, which you want to monitor temperature.

KGN(M)H-D16 Series Thermal sensor cable connectors



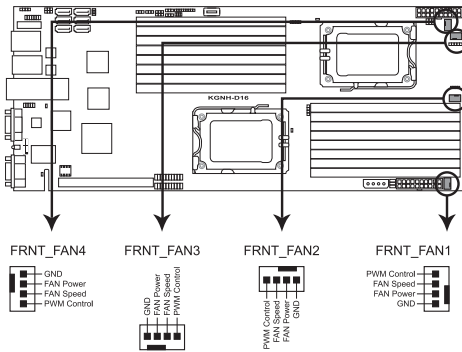
4. Front fan connectors (4-pin FRNT_FAN1, FRNT_FAN2, FRNT_FAN3, FRNT_FAN4)

The fan connectors support cooling fans of 350mA–1.75 A (21W max.) or a total of 1.4A–7A (84W max.) at +12V. Connect the fan cables to the fan connectors on the motherboard, ensuring that the black wire of each cable matches the ground pin of the connector.



- DO NOT forget to connect the fan cables to the fan connectors. Insufficient air flow inside the system may damage the motherboard components.
- These are not jumpers! DO NOT place jumper caps on the fan connectors!
- All fans feature the ASUS Smart Fan technology.

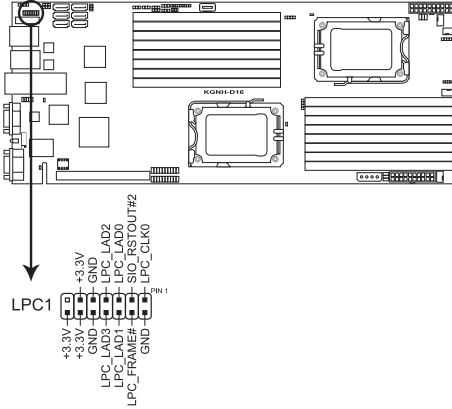
KG(N)H-D16 Series FAN connectors



5. **LPC debug card connector (14-1 pin LPC1)**

This is a low pin count interface used to plug in the LPC debug card.

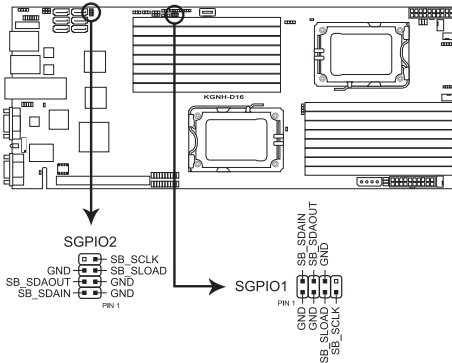
KG(M)H-D16 Series LPC connector



6. **Serial General Purpose Input/Output connector (8-1 pin SGPIO1, SGPIO2)**

This connector connects to the SGPIO connector on the SATA HDD backplane.

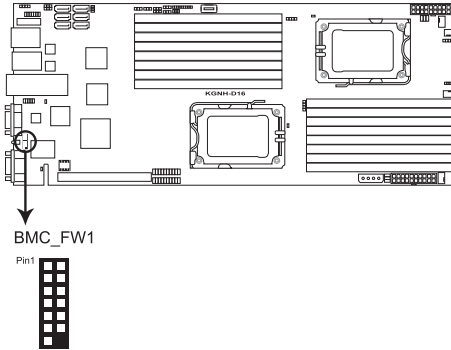
KG(M)H-D16 Series SGPIO connector



7. BMC header (BMC_FW1)

The BMC connector on the motherboard supports an ASUS® Server Management Board 4 Series (ASMB4).

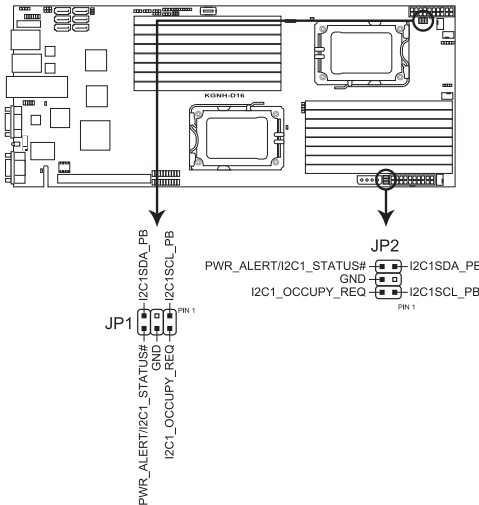
KGN(M)H-D16 Series BMC connector



8. Power Supply SMBus connectors (6-1 pin JP1; JP2)

These connectors allow you to connect SMBus (System Management Bus) to the power supply unit to read PSU information. Devices communicate with an SMBus host and/or other SMBus devices using the SMBus interface.

KGN(M)H-D16 Series JP connectors



9. Proprietary power connectors (20-pin PWR1, 20-pin PWR2, 4-pin EZ_PLUG1)

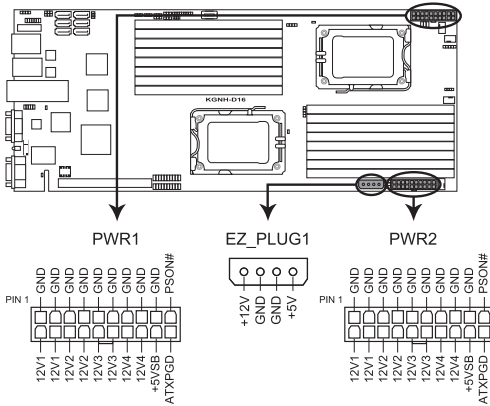
These connectors are for Proprietary power supply plugs. The power supply plugs are designed to fit these connectors in only one orientation. Orient the connectors and push down firmly until they completely fit.

The 4-pin EZ_PLUG is designed for hard disk drives power supply. **DO NOT** connect other 4-pin power connectors of the power supply unit (PSU) to this connector.



- Connect either one of the 20-pin power connectors to boot the system.
- Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot up if the power is inadequate.
- **USE THE PROPRIETARY POWER SUPPLY ONLY;** otherwise you may damage the motherboard. Ensure that your PSU can provide at least the minimum power required by your system.

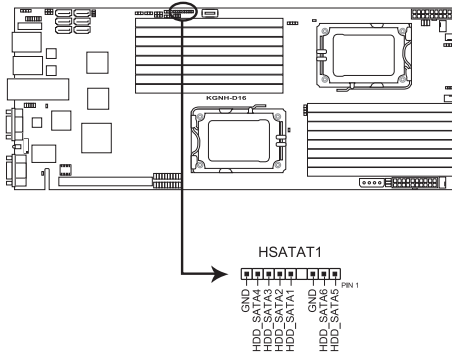
KGN(M)H-D16 Series Proprietary power connectors



10. HDD status indicator header (9-1 pin HSATAT1)

This connector is for the indicators at the back panel. The indicator lights up when the corresponding SATA hard disk functions abnormally.

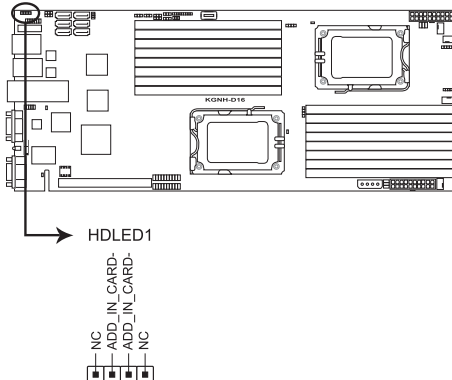
KGNI(M)H-D16 Series HSATAT connector



11. Hard disk activity LED connector (4-pin HDLED1)

This connector is used to connect to a hard disk drive active LED connector on the SCSI or RAID card.

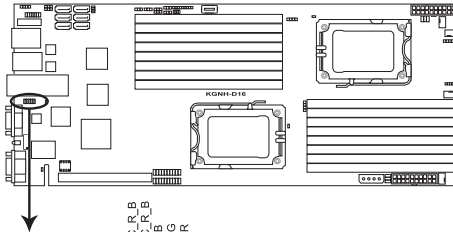
KGNI(M)H-D16 Series Hard disk activity LED connector



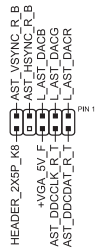
12. Internal VGA Header (10-1 pin VGA_HDR1)

This connector is used to connect an internal VGA output connector.

KGNI(M)H-D16 VGA header



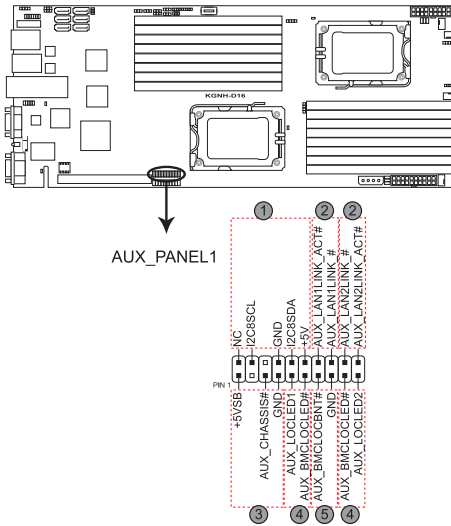
VGA HDR1



13. Auxiliary panel connector (20-pin AUX_PANEL1)

This connector is for additional front panel features including front panel SMB, locator LED and switch, chassis intrusion, and LAN LEDs.

KGN(M)H-D16 Series Auxiliary panel connector



1. Front panel SMB (6-1 pin FPSMB)

These leads connect the front panel SMBus cable.

2. LAN activity LED (2-pin LAN1_LED, LAN2_LED)

These leads are for Gigabit LAN activity LEDs on the front panel.

3. Chassis intrusion (4-1 pin CHASSIS)

These leads are for the intrusion detection feature for chassis with intrusion sensor or microswitch. When you remove any chassis component, the sensor triggers and sends a high-level signal to these leads to record a chassis intrusion event. The default setting is short CASEOPEN and GND pin by jumper cap to disable the function.

4. Locator LED (2-pin LOCATORLED1 and 2-pin LOCATORLED2)

These leads are for the locator LED1 and LED2 on the front panel. Connect the Locator LED cables to these 2-pin connector. The LEDs will light up when the Locator button is pressed.

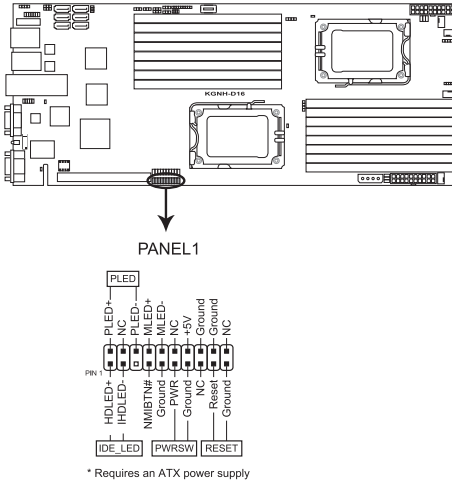
5. Locator Button/Switch (2-pin LOCATORBTN)

These leads are for the locator button on the front panel. This button queries the state of the system locator.

14. System panel connector (20-pin PANEL1)

This connector supports several chassis-mounted functions.

KG(N)H-D16 Series System panel connector



- **System power LED (3-pin PLED)**

This 3-pin connector is for the system power LED. Connect the chassis power LED cable to this connector. The system power LED lights up when you turn on the system power, and blinks when the system is in sleep mode.

- **Message LED (2-pin MLED)**

This 2-pin connector is for the message LED cable that connects to the front message LED. The message LED is controlled by Hardware monitor to indicate an abnormal event occurrence.

- **Hard disk drive activity LED (2-pin HDDLED)**

This 2-pin connector is for the HDD Activity LED. Connect the HDD Activity LED cable to this connector. The IDE LED lights up or flashes when data is read from or written to the HDD.

- **Proprietary power button/soft-off button (2-pin PWRSW)**

This connector is for the system power button. Pressing the power button turns the system on or puts the system in sleep or soft-off mode depending on the BIOS settings. Pressing the power switch for more than four seconds while the system is ON turns the system OFF.

- **Reset button (2-pin RESET)**

This 2-pin connector is for the chassis-mounted reset button for system reboot without turning off the system power.

This chapter describes the power up sequence, and ways of shutting down the system.

Powering up **3**

Chapter summary

3

3.1	Starting up for the first time.....	3-3
3.2	Turning off the computer.....	3-4

3.1 Starting up for the first time

1. After making all the connections, replace the system case cover.
2. Ensure that all switches are off.
3. Connect the power cord to the power connector at the back of the system chassis.
4. Connect the power cord to a power outlet that is equipped with a surge protector.
5. Turn on the devices in the following order:
 - a. Monitor
 - b. External SCSI devices (starting with the last device on the chain)
 - c. System power
6. After applying power, the system power LED on the system front panel case lights up. For systems with Proprietary power supplies, the system LED lights up when you press the Proprietary power button. If your monitor complies with “green” standards or if it has a “power standby” feature, the monitor LED may light up or switch between orange and green after the system LED turns on.

The system then runs the power-on self-test or POST. While the tests are running, the BIOS beeps or additional messages appear on the screen. If you do not see anything within 30 seconds from the time you turned on the power, the system may have failed a power-on test. Check the jumper settings and connections or call your retailer for assistance.

7. At power on, hold down the key to enter the BIOS Setup. Follow the instructions in Chapter 4.

3.2 Powering off the computer

3.2.1 Using the OS shut down function

If you are using Windows® 2000/2003 Server:

1. Click **Start** then click **Shut Down**.
2. Select **Shut Down** from the **What do you want the computer to do?** list box.
3. Select **Shutdown Event Tracker**.
4. Ensure that the **Planned** check box is checked.
5. Select **shutdown** from the list box.
6. If necessary, key in comments.
7. Click **OK**.

3.2.2 Using the dual function power switch

While the system is ON, pressing the power switch for less than four seconds puts the system to sleep mode or to soft-off mode, depending on the BIOS setting. Pressing the power switch for more than four seconds lets the system enter the soft-off mode regardless of the BIOS setting. Refer to section **4.6 Power Menu** in Chapter 4 for details.

This chapter tells how to change the system settings through the BIOS Setup menus. Detailed descriptions of the BIOS parameters are also provided.

BIOS setup 4

4.1	Managing and updating your BIOS	4-3
4.2	BIOS setup program	4-7
4.3	Main menu	4-10
4.4	Advanced menu	4-15
4.5	Server menu	4-27
4.6	Power menu.....	4-29
4.7	Boot menu	4-32
4.8	Tools menu	4-36
4.9	Exit menu	4-37

4.1 Managing and updating your BIOS

The following utilities allow you to manage and update the motherboard Basic Input/Output System (BIOS) setup:

1. **ASUS EZ Flash 2** (Updates the BIOS using a USB flash disk.)
2. **BUPDATER utility** (Updates the BIOS in DOS mode using a bootable USB flash disk drive.)
3. **ASUS CrashFree BIOS 3** (To recover the BIOS using a bootable USB flash disk drive when the BIOS file fails or gets corrupted.)

Refer to the corresponding sections for details on these utilities.



Save a copy of the original motherboard BIOS file to a bootable USB flash disk drive in case you need to restore the BIOS in the future. Copy the original motherboard BIOS using the BUPDATER utility.

4.1.1 ASUS EZ Flash 2 utility

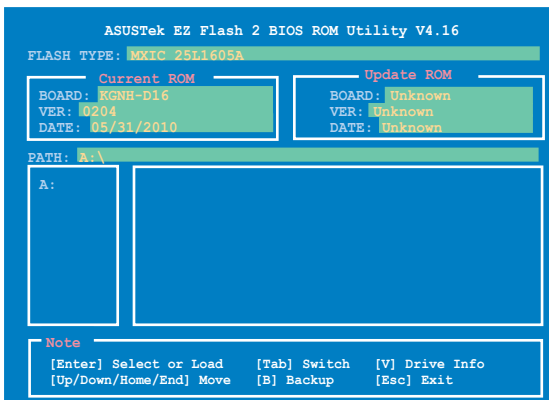
The ASUS EZ Flash 2 feature allows you to update the BIOS without having to use a DOS-based utility.



Before you start using this utility, download the latest BIOS from the ASUS website at www.asus.com.

To update the BIOS using EZ Flash 2

1. Insert the USB flash disk that contains the latest BIOS file to the USB port.
2. Enter the BIOS setup program. Go to the **Tools** menu to select **EZ Flash 2** and press <Enter> to enable it.
Or, press <Alt> + <F2> during the POST to enable EZ Flash 2.



3. Press <Tab> to switch between drives until the correct BIOS file is found. When found, EZ Flash 2 performs the BIOS update process and automatically reboots the system when done.



- This function can support devices such as a USB flash disk with FAT 32/16 format and single partition only.
- DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!



Ensure to load the BIOS default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the **Exit** menu. See section **4.9 Exit Menu** for details.

4.1.2 BUPDATER utility



The succeeding BIOS screens are for reference only. The actual BIOS screen displays may not be the same as shown.

The BUPDATER utility allows you to update the BIOS file in DOS environment using a bootable USB flash disk drive with the updated BIOS file.

Updating the BIOS file

To update the BIOS file using the BUPDATER utility:

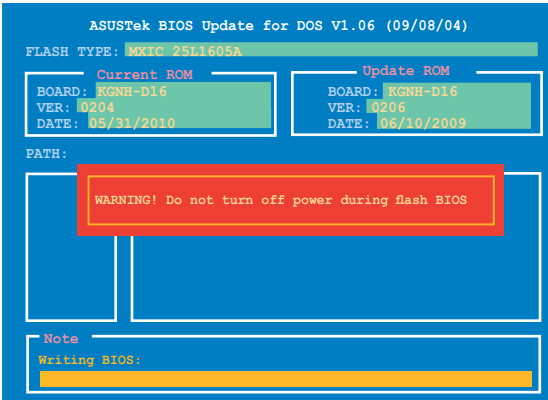
1. Visit the ASUS website at www.asus.com and download the latest BIOS file for the motherboard. Save the BIOS file to a bootable **USB flash disk drive**.
2. Copy the BUPDATER utility (BUPDATER.exe) from the ASUS support website at support.asus.com to the bootable **USB flash disk drive you created** earlier.
3. Boot the system in DOS mode, then at the prompt, type:

```
BUPDATER /i [filename] .ROM
```

where [filename] is the latest or the original BIOS file on the bootable USB flash disk drive, then press <Enter>.

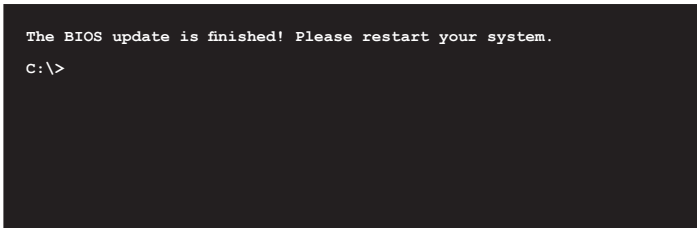
```
A:\>BUPDATER /i[file name].ROM
```

- The utility verifies the file, then starts updating the BIOS file.



DO NOT shut down or reset the system while updating the BIOS to prevent system boot failure!

- The utility returns to the DOS prompt after the BIOS update process is completed. Reboot the system from the hard disk drive.



4.1.3 ASUS CrashFree BIOS 3 utility

The ASUS CrashFree BIOS 3 is an auto recovery tool that allows you to restore the BIOS file when it fails or gets corrupted during the updating process. You can update a corrupted BIOS file using a USB flash drive that contains the updated BIOS file.



Prepare a USB flash drive containing the updated motherboard BIOS before using this utility.

Recovering the BIOS from a USB flash drive

To recover the BIOS from a USB flash drive:

1. Remove any floppy disk from the floppy disk drive and turn the system on.
2. Insert the USB flash drive with the original or updated BIOS file to one USB port on the system.
3. The utility will automatically recover the BIOS. It resets the system when the BIOS recovery finished.



DO NOT shut down or reset the system while recovering the BIOS! Doing so would cause system boot failure!



The recovered BIOS may not be the latest BIOS version for this motherboard. Visit the ASUS website at www.asus.com to download the latest BIOS file.

4.2 BIOS setup program

This motherboard supports a programmable firmware chip that you can update using the provided utility described in section **4.1 Managing and updating your BIOS**.

Use the BIOS Setup program when you are installing a motherboard, reconfiguring your system, or prompted to “Run Setup.” This section explains how to configure your system using this utility.

Even if you are not prompted to use the Setup program, you can change the configuration of your computer in the future. For example, you can enable the security password feature or change the power management settings. This requires you to reconfigure your system using the BIOS Setup program so that the computer can recognize these changes and record them in the CMOS RAM of the firmware chip.

The firmware chip on the motherboard stores the Setup utility. When you start up the computer, the system provides you with the opportunity to run this program. Press during the Power-On Self-Test (POST) to enter the Setup utility; otherwise, POST continues with its test routines.

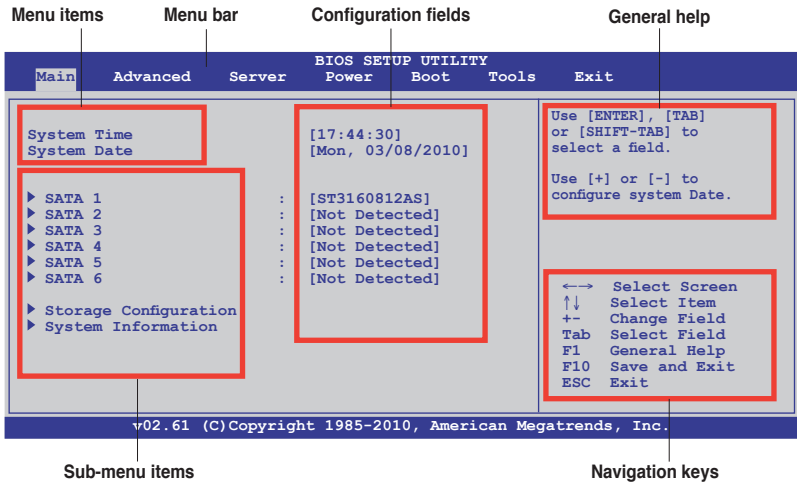
If you wish to enter Setup after POST, restart the system by pressing <Ctrl+Alt+Delete>, or by pressing the reset button on the system chassis. You can also restart by turning the system off and then back on. Do this last option only if the first two failed.

The Setup program is designed to make it as easy to use as possible. Being a menu-driven program, it lets you scroll through the various sub-menus and make your selections from the available options using the navigation keys.



-
- The default BIOS settings for this motherboard apply for most conditions to ensure optimum performance. If the system becomes unstable after changing any BIOS settings, load the default settings to ensure system compatibility and stability. Select the **Load Setup Defaults** item under the Exit Menu. See section **4.9 Exit Menu**.
 - The BIOS setup screens shown in this section are for reference purposes only, and may not exactly match what you see on your screen.
 - Visit the ASUS website at www.asus.com to download the latest BIOS file for this motherboard.
-

4.2.1 BIOS menu screen



4.2.2 Menu bar

The menu bar on top of the screen has the following main items:

- Main** For changing the basic system configuration
- Advanced** For changing the advanced system settings
- Server** For changing the advanced server settings
- Power** For changing the advanced power management (APM) configuration
- Boot** For changing the system boot configuration
- Tools** For configuring options for special functions
- Exit** For selecting the exit options and loading default settings

To select an item on the menu bar, press the right or left arrow key on the keyboard until the desired item is highlighted.

4.2.3 Navigation keys

At the bottom right corner of a menu screen are the navigation keys for that particular menu. Use the navigation keys to select items in the menu and change the settings.



Some of the navigation keys differ from one screen to another.

4.2.4 Menu items

The highlighted item on the menu bar displays the specific items for that menu. For example, selecting Main shows the Main menu items.

The other items (Advanced, Power, Boot, and Exit) on the menu bar have their respective menu items.

4.2.5 Sub-menu items

A solid triangle before each item on any menu screen means that the item has a sub-menu. To display the sub-menu, select the item and press <Enter>.

4.2.6 Configuration fields

These fields show the values for the menu items. If an item is user-configurable, you can change the value of the field opposite the item. You cannot select an item that is not user-configurable.

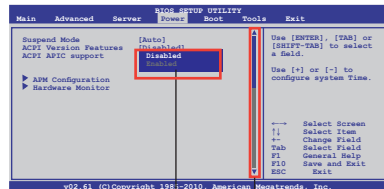
A configurable field is enclosed in brackets, and is highlighted when selected. To change the value of a field, select it then press <Enter> to display a list of options. Refer to 4.2.7 Pop-up window.

4.2.7 Pop-up window

Select a menu item then press <Enter> to display a pop-up window with the configuration options for that item.

4.2.8 Scroll bar

A scroll bar appears on the right side of a menu screen when there are items that do not fit on the screen. Press the Up/Down arrow keys or <Page Up> /<Page Down> keys to display the other items on the screen.



Pop-up window
Scroll bar

4.2.9 General help

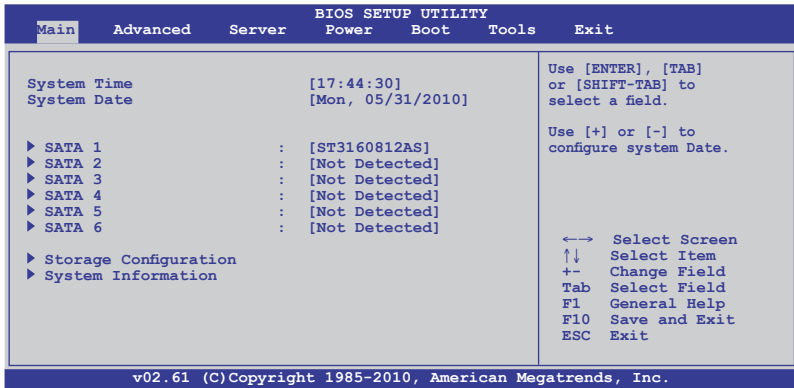
At the top right corner of the menu screen is a brief description of the selected item.

4.3 Main menu

When you enter the BIOS Setup program, the Main menu screen appears, giving you an overview of the basic system information.



Refer to section 4.2.1 BIOS menu screen for information on the menu screen items and how to navigate through them.



4.3.1 System Time [xx:xx:xx]

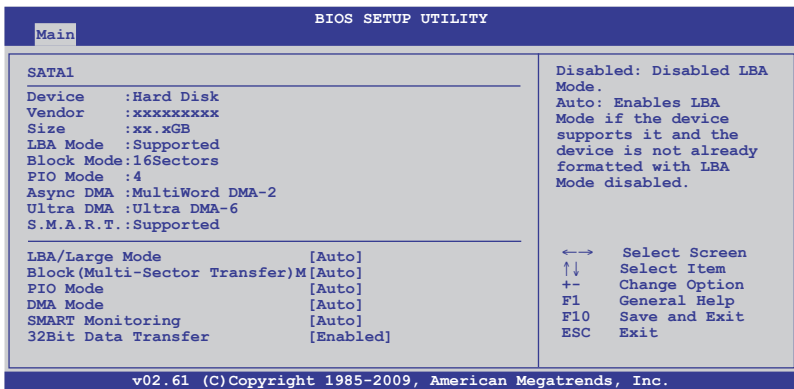
Allows you to set the system time.

4.3.2 System Date [Day xx/xx/xxxx]

Allows you to set the system date.

4.3.3 SATA1–6

While entering Setup, the BIOS automatically detects the presence of IDE/SATA devices. There is a separate submenu for each IDE/SATA device. Select a device item then press <Enter> to display the SATA device information.



The BIOS automatically detects the values opposite the dimmed items (Device, Vendor, Size, LBA Mode, Block Mode, PIO Mode, Async DMA, Ultra DMA, and S.M.A.R.T. monitoring). These values are not user-configurable. These items show N/A if no IDE device is installed in the system.

LBA/Large Mode [Auto]

Enables or disables the LBA mode. Setting to [Auto] enables the LBA mode if the device supports this mode, and if the device was not previously formatted with LBA mode disabled. Configuration options: [Disabled] [Auto]

Block (Multi-Sector Transfer) M [Auto]

Enables or disables data multi-sectors transfers. When set to [Auto], the data transfer from and to the device occurs multiple sectors at a time if the device supports multi-sector transfer feature. When set to [Disabled], the data transfer from and to the device occurs one sector at a time.

Configuration options: [Disabled] [Auto]

PIO Mode [Auto]

Allows you to select the data transfer mode.

Configuration options: [Auto] [0] [1] [2] [3] [4]

DMA Mode [Auto]

Sets the DMA mode.

Configuration options: [Auto] [SWDMA0] [SWDMA1] [SWDMA2] [MWDMA0] [MWDMA1] [MWDMA2] [UDMA0] [UDMA1] [UDMA2] [UDMA3] [UDMA4] [UDMA5]

SMART Monitoring [Auto]

Sets the Smart Monitoring, Analysis, and Reporting Technology.

Configuration options: [Auto] [Disabled] [Enabled]

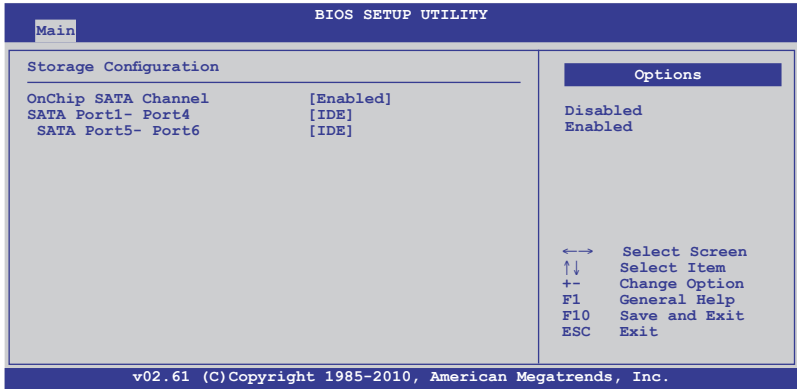
32Bit Data Transfer [Enabled]

Enables or disables 32-bit data transfer.

Configuration options: [Disabled] [Enabled]

4.3.4 Storage Configuration

The items in this menu allow you to set or change the configurations for the IDE/SATA devices installed in the system. Select an item then press <Enter> if you wish to configure the item.



OnChip SATA Channel [Enabled]

Configuration options: [Disabled] [Enabled]

SATA Port1-Port4 [IDE]

Allows you to set the SATA configuration.

[IDE] Set to [IDE] when you want to use the Serial ATA hard disk drives as Parallel ATA physical storage devices.

[RAID] Set to [RAID] when you want to create a RAID configuration from the SATA hard disk drives.

[AHCI] Set to [AHCI] when you want the SATA hard disk drives to use the AHCI (Advanced Host Controller Interface). The AHCI allows the onboard storage driver to enable advanced Serial ATA features that increases storage performance on random workloads by allowing the drive to internally optimize the order of commands.

SATA Port5-Port6

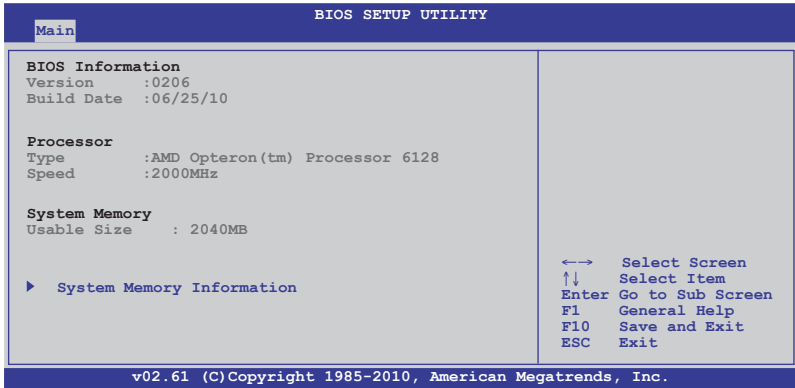
Setting this item to [IDE] instead of [RAID] or [AHCI] allows the system to recognize the optical drives connected to the SATA connectors 5 or 6 when installing OS.



If SATA Port1-Port4 is set to [IDE], SATA Port5-Port6 can only be configured as [IDE]

4.3.5 System Information

This menu gives you an overview of the general system specifications. The BIOS automatically detects the items in this menu.



BIOS Information

Displays the auto-detected BIOS information.

Processor

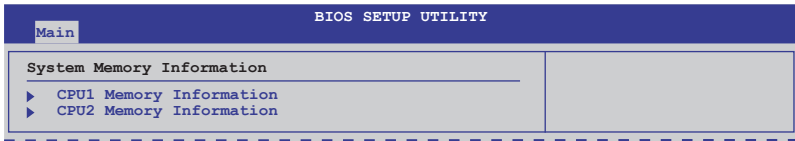
Displays the auto-detected CPU specification.

System Memory

Displays the auto-detected system memory.

System Memory Information

Displays system memory information.



CPU1/2 Memory Configuration

Allows you to check information of installed memory (8 DIMMs per CPU).

CPU1/2 Memory Configuration

Displays the auto-detected memory specification.

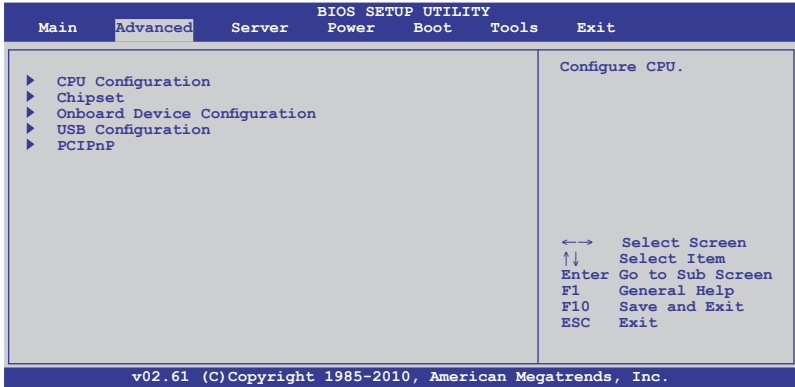
Main		BIOS SETUP UTILITY	
CPU1 Memory Configuration			
Node0 Speed		DDR3	1067
Node1 Speed			N/A
DIMM_A1	N/A		
DIMM_A2	2048	MB, 1R,	1067
DIMM_B1	N/A		
DIMM_B2	N/A		
DIMM_C1	N/A		
DIMM_C2	N/A		
DIMM_D1	N/A		
DIMM_D2	N/A		

4.4 Advanced menu

The Advanced menu items allow you to change the settings for the CPU and other system devices.

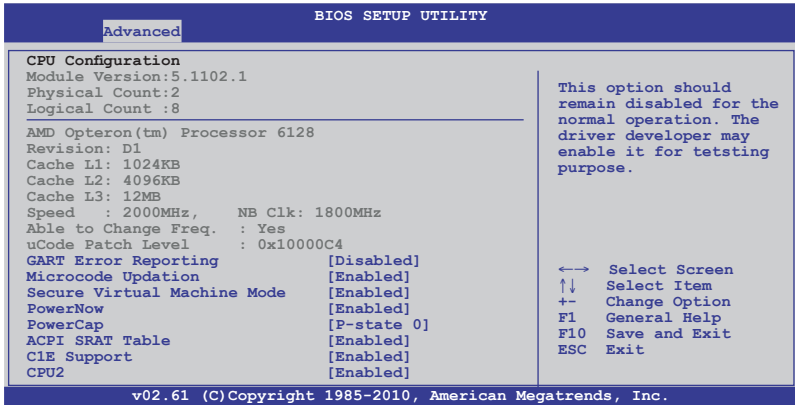


Take caution when changing the settings of the Advanced menu items. Incorrect field values can cause the system to malfunction.



4.4.1 CPU Configuration

The items in this menu show the CPU-related information that the BIOS automatically detects. Some items may not appear if your CPU does not support the related functions.



GART Error Reporting [Disabled]

Configuration options: [Disabled] [Enabled]

Microcode Updation [Enabled]

Configuration options: [Disabled] [Enabled]

Secure Virtual Machine Mode [Enabled]

Allows you to enable or diable the Secure Virtual Machine Mode (SVM).

Configuration options: [Disabled] [Enabled]

PowerNow [Enabled]

Allows you to enable or diable the generation of ACPI_PPC, ACPI_PSS, and ACPI_PCT objects. Configuration options: [Disabled] [Enabled]

PowerCap [P-state 0]

Allows you to decide the highest performance P-state in OS.

Configuration options: [P-state 0] [P-state 1] [P-state 2] [P-state 3] [P-state 4]

ACPI SRAT Table [Enabled]

Enables or disables the building of ACPI SRAT Table.

Configuration options: [Disabled] [Enabled]

C1E Support [Enabled]

Allows you to enable or disable Enhanced Halt State support.

Configuration options: [Disabled] [Enabled]

CPU2 [Enabled]

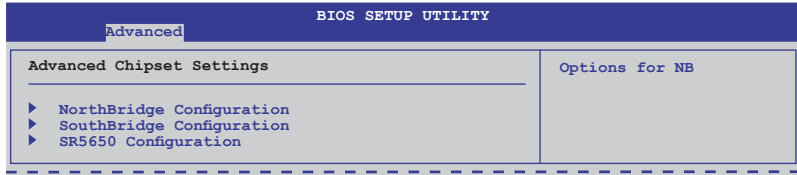
Allows you to enable or diable the CPU2 function.

Configuration options: [Disabled] [Enabled]

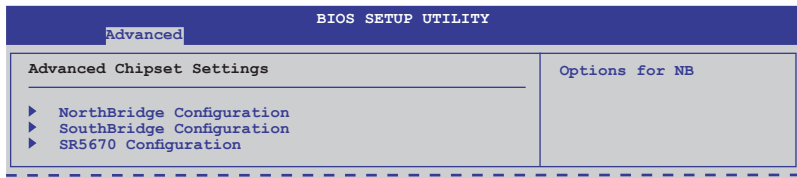
4.4.2 Chipset Configuration

The Chipset configuration menu allows you to change advanced chipset settings. Select an item then press <Enter> to display the sub-menu.

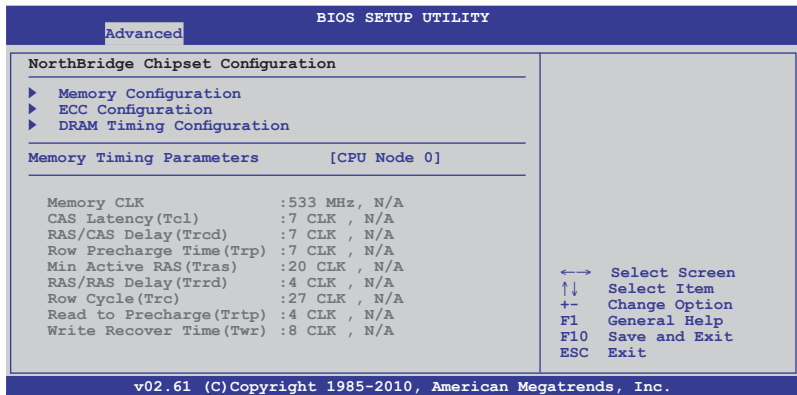
For KGNH-D16:



For KGMH-D16/QDR:



NorthBridge Configuration



Memory Configuration

Advanced		BIOS SETUP UTILITY
Memory Configuration		
Bank Interleaving	[Auto]	
Node Interleaving	[Disabled]	
Channel Interleaving	[Auto]	
CS Sparing Enabled	[Disabled]	
Bank Swizzle Mode	[Enabled]	

Rank Interleaving [Auto]

Allows you to set the rank memory interleaving setting.
Configuration options: [Disabled] [Auto]

Node Interleaving [Disabled]

Allows you to set the node memory interleaving setting.
Configuration options: [Disabled] [Auto]

Channel Interleaving [Auto]

Allows you to set the channel memory interleaving setting.
Configuration options: [Disabled] [Auto]

CS Sparing Enable [Disabled]

Allows you to reserve a spare memory rank in each node.
Configuration options: [Disabled] [Enabled]

Bank Swizzle Mode [Enabled]

Allows you to enable or disable the bank swizzle mode.
Configuration options: [Disabled] [Enabled]

ECC Configuration

Advanced		BIOS SETUP UTILITY
ECC Configuration		
ECC Mode	[Basic]	
DRAM ECC Enable	[Enabled]	
DRAM SCRUB REDIRECT	[Disabled]	
4-Bit ECC Mode	[Enabled]	
DRAM BG Scrub	[Disabled]	
Data Cache BG Scrub	[Disabled]	
L2 Cache BG Scrub	[Disabled]	
L3 Cache BG Scrub	[Disabled]	

ECC Mode [Disabled]

Disables or sets the DRAM ECC mode that allows the hardware to report and correct memory errors.

[Disabled] Disables the DRAM ECC mode.

[Basic] Set to [Basic] to adjust ECC mode automatically.

[Good] Set to [Good] to adjust ECC mode automatically.

- [Super] Set to [Super] to adjust the DRAM BG Scrub sub-item manually.
- [Max] Set to [Max] to adjust ECC mode automatically.
- [User] Set to [User] to adjust all the subitems manually.



The following items become user-configurable when you set **ECC Mode** to [User]

DRAM ECC Enable [Enabled]

[Enabled] Enables the DRAM ECC that allows the hardware to report and correct memory errors automatically.

[Disabled] Disables this function.

DRAM SCRUB REDIRECT [Disabled]

[Enabled] Allows the system to correct the DRAM ECC errors immediately when they occur.

[Disabled] Disables this function.

4-Bit ECC Mode [Disabled]

[Enabled] Enables ECC chip kill feature.

[Disabled] Disables this function.

DRAM BG SCRUB [Disabled]

Disables or sets the DRAM BG Scrub.

Configuration options: [Disabled] [40ns] [80ns] [160ns] [320ns] [640ns] [1.28us] [2.56us] [5.12us] [10.2us] [20.5us] [41.0us] [81.9us] [163.8us] [327.7us] [655.4us] [1.31ms] [2.62ms] [5.24ms] [10.49ms] [20.97ms] [42.00ms] [84.00ms]

Data Cache BG Scrub [Disabled]

Disables or sets the Data Cache BG Scrub. This item allows the data cache BG Scrub RAM to be corrected when idle.

Configuration options: [Disabled] [40ns] [80ns] [160ns] [320ns] [640ns] [1.28us] [2.56us] [5.12us] [10.2us] [20.5us] [41.0us] [81.9us] [163.8us] [327.7us] [655.4us] [1.31ms] [2.62ms] [5.24ms] [10.49ms] [20.97ms] [42.00ms] [84.00ms]

L2 Cache BG Scrub [Disabled]

Disables or sets the L2 Cache BG Scrub. This item allows the cache RAM to be corrected when idle.

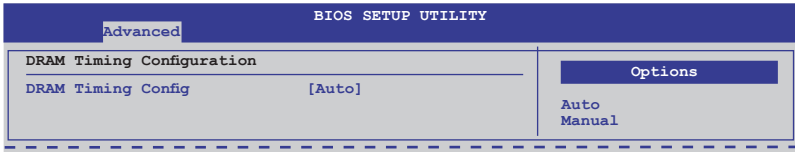
Configuration options: [Disabled] [40ns] [80ns] [160ns] [320ns] [640ns] [1.28us] [2.56us] [5.12us] [10.2us] [20.5us] [41.0us] [81.9us] [163.8us] [327.7us] [655.4us] [1.31ms] [2.62ms] [5.24ms] [10.49ms] [20.97ms] [42.00ms] [84.00ms]

L3 Cache BG Scrub [Disabled]

Disables or sets the L3 Cache BG Scrub. This item allows the cache RAM to be corrected when idle.

Configuration options: [Disabled] [40ns] [80ns] [160ns] [320ns] [640ns] [1.28us] [2.56us] [5.12us] [10.2us] [20.5us] [41.0us] [81.9us] [163.8us] [327.7us] [655.4us] [1.31ms] [2.62ms] [5.24ms] [10.49ms] [20.97ms] [42.00ms] [84.00ms]

DRAM Timing Configuration



DRAM Timing Config [Auto]

Configuration options: [Auto] [Manual]

Memory Clock Speed [400 MHz]

Allows you to set the memory clock frequency. This item available only when you set

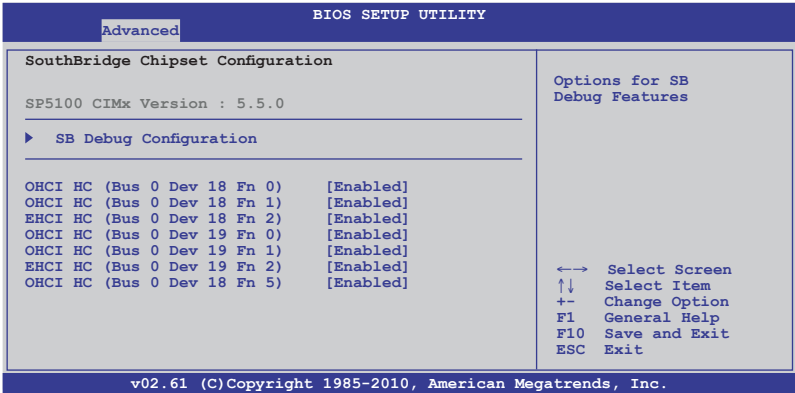
DRAM Timing Config to [Manual].

Configuration options: [400 MHz] [533 MHz] [667 MHz]

Memory Timing Parameters [CPU Node 0]

Allows you to select which node's timing parameters to display.

SouthBridge Configuration



SB Debug Configuration

Advanced		SouthBridge Debug Configuration	
A15 ECOs	[Disabled]	<div style="background-color: #4a7ebb; color: white; padding: 5px; text-align: center;">Options</div> Disabled Enabled	
Port 0 ESP	[ISP]		
Port 1 ESP	[ISP]		
Port 2 ESP	[ISP]		
Port 3 ESP	[ISP]		
Port 4 ESP	[ISP]		
Port 5 ESP	[ISP]		
Dis #THRMTRIP Before KBRst	[Enabled]		
SATA-IDE Ports Auto Clk Ctrl	[Disabled]		
SATA-AHCI Ports Auto Clk Ctrl	[Disabled]		
SATA PORT0 MODE	[Auto]		
SATA PORT1 MODE	[Auto]		
SATA PORT2 MODE	[Auto]		
SATA PORT3 MODE	[Auto]		
SATA PORT4 MODE	[Auto]		
SATA PORT5 MODE	[Auto]		

A15 ECOs [Disabled]

Configuration options: [Disabled] [Enabled]

Port 0–5 ESP [ISP]

Allows you to decide the ESP help. Configuration options: [ISP] [ESP]

Dis #THRMTRIP Before KBRst [Enabled]

Configuration options: [Disabled] [Enabled]

SATA-IDE Ports Auto Clk Ctrl [Disabled]

When set to [Enabled], the clocks for unused SATA ports in IDE will be shut down and the system saves some power.

Configuration options: [Disabled] [Enabled]

SATA-AHCI Ports Auto Clk Ctrl [Disabled]

When set to [Enabled], the clocks for unused SATA ports in AHCI mode will be shut down and the system saves some power, but the hotplug function for those ports will be unavailable Configuration options: [Disabled] [Enabled]

SATA PORT 0–5 MODE [Auto]

When set to [GEN1], the SATA ports are forced to run at the GEN1 mode.

When set to [Auto], the SATA port runs at the default mode.

Configuration options: [Auto] [GEN1]

OHCI HC (Bus 0 Dev 18 Fn 0); OHCI HC (Bus 0 Dev 18 Fn 1); EHCI HC (Bus 0 Dev 18 Fn 2); OHCI HC (Bus 0 Dev 19 Fn 0); OHCI HC (Bus 0 Dev 19 Fn 1); EHCI HC (Bus 0 Dev 19 Fn 2); OHCI HC (Bus 0 Dev 18 Fn 5) [Enabled]

Configuraiton options: [Disabled] [Enabled]

SR5650 Configuration (For KGNH-D16)

BIOS SETUP UTILITY	
Advanced	
SR5650 Configuration	PCI Express Configuration
▶ PCI Express Configuration	
▶ Hyper Transport Configuration	
IOMMU	[Disabled]
VGA ROM BOOT PRIORITY	[PCIE VGA CARD]
▶ Debug Options	

SR5670 Configuration (For KGMH-D16/QDR)

BIOS SETUP UTILITY	
Advanced	
SR5670 Configuration	PCI Express Configuration
▶ PCI Express Configuration	
▶ Hyper Transport Configuration	
IOMMU	[Disabled]
VGA ROM BOOT PRIORITY	[PCIE VGA CARD]
▶ Debug Options	

PCI Express Configuration

PCIe Slot 1 Features

Gen2 High Speed Mode [Auto]

Configuration options: [Auto] [Disabled] [Software Initiated] [Advertised RC]

Link ASPM [Disabled]

Configuration options: [Disabled] [L0s] [L1] [L0s & L1] [L0s Downstream] [L0s Downstream + L1]

Compliance Mode [Disabled]

Configuration options: [Disabled] [Enabled]

Lane Reversal [Disabled]

Configuration options: [Disabled] [Enabled]

NB-SB Port Features

NB-SB Link ASPM [L1]

Configuration options: [Disabled] [L1]

NP NB-SB VC1 Traffic Support [Disabled]

Configuration options: [Disabled] [Enabled]

Compliance Mode [Disabled]

Configuration options: [Disabled] [Enabled]

PCIe Slot 1 Core Setting

Powerdown Unused lanes [Enabled]

Configuration options: [Disabled] [Enabled]

Turn Off PLL During L1/L23 [Enable]

Configuration options: [Disabled] [Enabled]

TX Drive Strength [Auto]

Configuration options: [Auto] [26mA] [20mA] [22mA] [24mA]

TXCLK Clock Gating in L1 [Enabled]

Configuration options: [Disabled] [Enabled]

LCLK Clock Gating in L1 [Enabled]

Configuration options: [Disabled] [Enabled]

SB Core Setting

TX Drive Strength [Auto]

Configuration options: [Auto] [26mA] [20mA] [22mA] [24mA]

TXCLK Clock Gating in L1 [Enable]

Configuration options: [Disabled] [Enabled]

LCLK Clock Gating in L1 [Enable]

Configuration options: [Disabled] [Enabled]

Hyper Transport Configuration

HT Extended Address [Disabled]

Configuration options: [Auto] [Disabled] [Enable]

HT3 Link Power State [Auto]

Configuration options: [Auto] [LS0] [LS1] [LS2] [LS3]

UnitID Clumping [Auto]

Configuration options: [Auto] [Disabled] [UnitID 2/3] [UnitID B/C]
[UnitID 2/3&B/C]

HT Link Tristate [Auto]

Configuration options: [Auto] [Disabled] [CAD/CTL] [CAD/CTL/CLK]

NB Deempasies Level [Disabled]

Configuration options: [Disabled] [-0.4dB] [-1.32dB] [-2.08dB] [-3.1dB]
[-4.22dB] [-5.50dB] [-7.05dB]

IOMMU [Disabled]

Configuration options: [Disabled] [Enabled]

VGA ROM BOOT PRIORITY [PCIE VGA CARD]

Allows you to select the graphics controller to use as the primary boot device.
Configuration options: [PCIE VGA CARD] [ONBOARD VGA]

Debug Option

Memory Decode on Sec. GFX [Disabled]

Configuration options: [Disabled] [Force]

IOC Peer-to-Peer Mode [Auto]

Configuration options: [Auto] [Default] [Mode 1] [Mode 2]

Northbridge interrupt pin [Disabled]

Configuration options: [Disabled] [Enabled]

4.4.3 Onboard Devices Configuration

The items in this menu allows you to change related parameters of onboard devices. Select an item then press <Enter> to display the configuration options.

BIOS SETUP UTILITY	
Advanced	
Onboard Devices Configuration	
Serial Port1 Address	[3F8/IRQ4]
Serial Port2 Address	[2F8/IRQ3]
Onboard LAN1 Chip	[Enabled]
Onboard LAN2 Chip	[Enabled]
Onboard LAN1 Boot	[PXE]
Onboard LAN2 Boot	[PXE]
Allows BIOS to Select Serial Port1 Base Addresses.	

Serial Port1 Address [3F8/IRQ4]

Allows you to select the Serial Port1 base address.
Configuration options: [Disabled] [3F8/IRQ4] [3E8/IRQ4] [2E8/IRQ3]

Serial Port2 Address [2F8/IRQ3]

Allows you to select the Serial Port2 base address.
Configuration options: [Disabled] [2F8/IRQ3] [3E8/IRQ4] [2E8/IRQ3]

Onboard LAN1/2 Chip [Enabled]

Allows you to enable or disable the onboard LAN1/2 chip.
Configuration: [Disabled] [Enabled]

Onboard LAN1/2 Boot [PXE]

Allows you to configure the onboard LAN1/2 boot mode.
Configuration: [Disabled] [PXE] [iSCSI]

4.4.4 USB Configuration

The items in this menu allows you to change the USB-related features. Select an item then press <Enter> to display the configuration options.

BIOS SETUP UTILITY	
Advanced	
USB Configuration	Enables support for legacy USB. AUTO option disables legacy support if no USB devices are connected.
Module Version - 2.24.5-13.4	
USB Devices Enabled: 1 Keyboard	
Legacy USB Support [Enabled]	
USB 2.0 Controller Mode [HiSpeed]	
BIOS EHCI Hand-off [Enabled]	
Legacy USB1.1 HC Support [Enabled]	

Legacy USB Support [Enabled]

Allows you to enable or disable support for legacy USB devices. Setting to [Auto] allows the system to detect the presence of USB devices at startup. If detected, the USB controller legacy mode is enabled. If no USB device is detected, the legacy USB support is disabled. Configuration options: [Disabled] [Enabled] [Auto]



The following item appears only when you set **Legacy USB Support** to [Enabled].

USB 2.0 Controller Mode [HiSpeed]

Allows you to set the USB 2.0 controller to HiSpeed (480Mbps) or FullSpeed (12Mbps). Configuration options: [FullSpeed] [HiSpeed]

BIOS EHCI Hand-Off [Enabled]

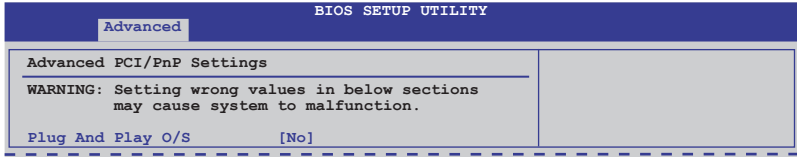
Enables or disables the BIOS EHCI hand-off support. Configuration options: [Disabled] [Enabled]

Legacy USB1.1 HC Support [Enabled]

Enables or disables the legacy USB1.1 HC support. Configuration options: [Disabled] [Enabled]

4.4.5 PCIPnP

The PCI PnP menu items allow you to change the advanced settings for PCI/PnP devices.

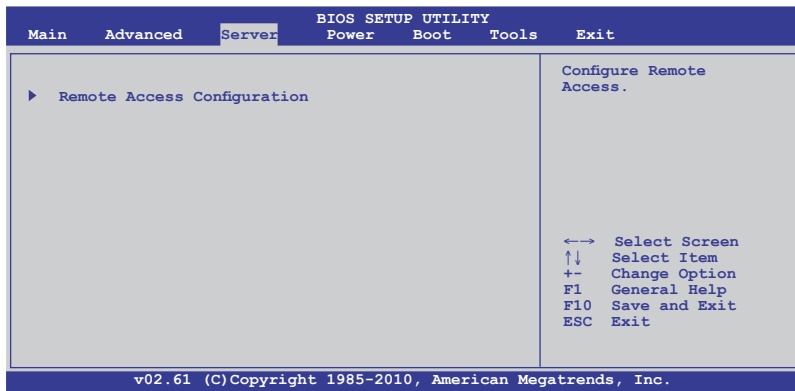


Plug And Play O/S [No]

[Yes] When set to [Yes] and if you install a Plug and Play operating system, the operating system configures the Plug and Play devices not required for boot.

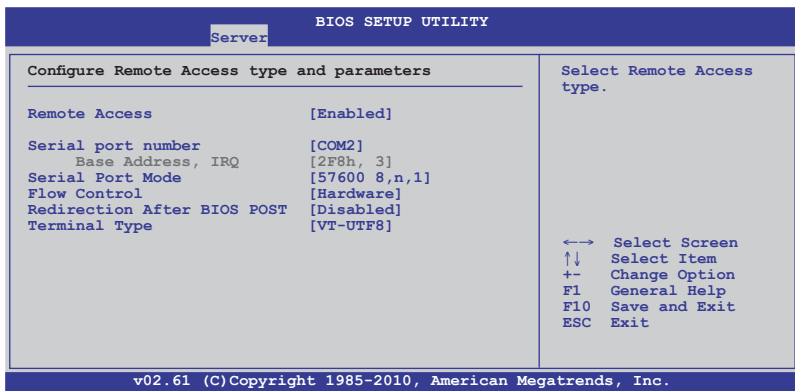
[No] When set to [No], BIOS configures all the devices in the system.

4.5 Server menu



4.5.1 Remote Access Configuration

The items in this menu allows you to configure the Remote Access features. Select an item then press <Enter> to display the configuration options.



Remote Access [Enabled]

Enables or disables the remote access feature.

Configuration options: [Disabled] [Enabled]



The following items appear only when **Remote Access** is set to [Enabled].

Serial port number [COM2]

Selects the serial port for console redirection.

Configuration options: [COM1] [COM2]

Base Address. IRQ [2F8h, 3]

This item is not user-configurable and changes with the configuration of Serial port number.

Serial Port Mode [57600 8,n,1]

Sets the Serial port mode.

Configuration options: [115200 8,n,1] [57600 8,n,1] [38400 8,n,1] [19200 8,n,1] [09600 8,n,1]

Flow Control [Hardware]

Allows you to select the flow control for console redirection.

Configuration options: [None] [Hardware] [Software]

Redirection After BIOS POST [Disabled]

Sets the redirection mode after the BIOS Power-On Self-Test (POST). Some operating system may not work when set to [Always].

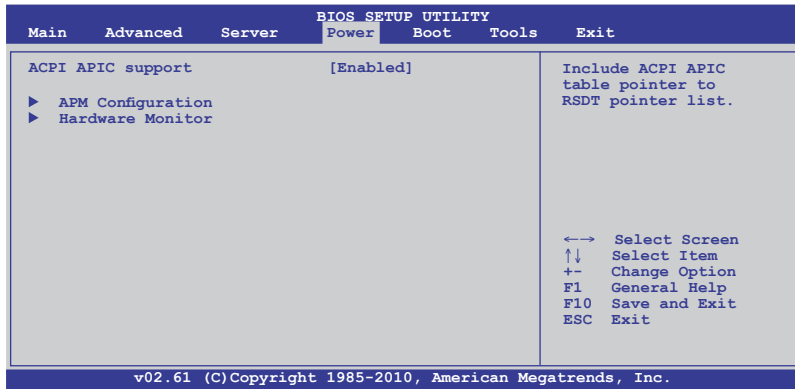
Configuration options: [Disabled] [Boot Loader] [Always]

Terminal Type [VT-UTF8]

Allows you to select the target terminal type.

Configuration options: [ANSI] [VT100] [VT-UTF8]

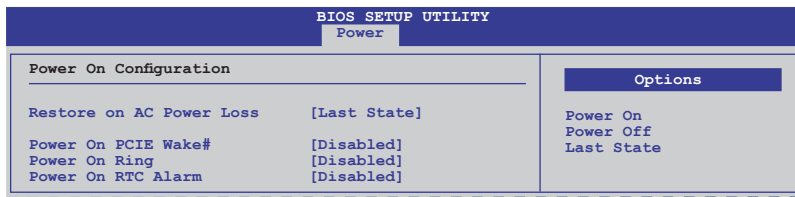
4.6 Power menu



4.6.1 ACPI APIC Support [Enabled]

Allows you to enable or disable the Advanced Configuration and Power Interface (ACPI) support in the Advanced Programmable Interrupt Controller (APIC). When set to [Enabled], the ACPI APIC table pointer is included in the RSDT pointer list. Configuration options: [Disabled] [Enabled]

4.6.2 APM Configuration



Restore on AC Power Loss [Last State]

When set to [Power Off], the system goes into off state after an AC power loss. When set to [Power On], the system will reboot after an AC power loss. When set to [Last State], the system goes into either off or on state, whatever the system state was before the AC power loss.

Configuration options: [Power Off] [Power On] [Last State]

Power On PCIE Wake# [Disabled]

Allows you to enable or disable the PCIE devices to generate a wake event.

[Disabled] Disables the PCIE devices to generate a wake event.

[Enabled] Enables the PCIE devices to generate a wake event.

Power On Ring [Disabled]

Allows you to enable or disable the Ring to generate a wake event.

[Disabled] Disables the Ring to generate a wake event.

[Enabled] Enables the Ring to generate a wake event.

Power On By RTC Alarm [Disabled]

Allows you to enable or disable RTC to generate a wake-up event.

Configuration options: [Disabled] [Enabled]



The following items appear only when the **Resume On RTC Alarm** item is set to [Enabled].

RTC Alarm Date [15]

To set the alarm date, highlight this item and press the <+> or <-> key to make the selection.

System Time [12:30:30]

Use the <ENTER>, <TAB> or <SHIFT-TAB> key to select a field. Use the <+> or <-> key to configure alarm time.

4.6.3 Hardware Monitor

BIOS SETUP UTILITY	
Power	
Hardware Monitor	
CPU1 Temperature	[35°C/ 94°F]
CPU2 Temperature	[35°C/ 94°F]
TR1 Temperature	[N/A]
TR2 Temperature	[N/A]
Front Fan1 Speed	[N/A]
Front Fan2 Speed	[N/A]
Front Fan3 Speed	[N/A]
Front Fan4 Speed	[N/A]
Fan Speed Control	[Generic Mode]
VCORE1	[1.052 V]
VCORE2	[1.052 V]
P1DDR3 Voltage	[1.180 V]
P2DDR3 Voltage	[1.180 V]
P1 +1.2V Voltage	[1.204 V]
P2 +1.2V Voltage	[1.204 V]
P1_VDDNB Voltage	[1.090 V]
+1.8V Voltage	[1.826 V]
+1.2V Voltage	[1.170 V]

←→ Select Screen
↑↓ Select Item
+ Change Option
F1 General Help
F10 Save and Exit
ESC Exit

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Scroll down to display the following items:

+1.1V Voltage	[1.084 V]
+12V Voltage	[11.952 V]
+5V Voltage	[5.043 V]
+3.3V Voltage	[3.228 V]
+5VSB Voltage	[5.075 V]
+3.3VSB Voltage	[3.240 V]
VBAT Voltage	[3.000 V]

←→ Select Screen
↑↓ Select Item
+ Change Option
F1 General Help
F10 Save and Exit
ESC Exit

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CPU1/CPU2/TR1/TR2 Temperature [xxx°C/xxx°F]

The onboard hardware monitor automatically detects and displays the motherboard component and CPU temperatures. Select [Ignored] if you do not wish to display the detected temperatures.

Front Fan1–4 Speed [xxxxRPM] or [Ignored] / [N/A]

The onboard hardware monitor automatically detects and displays the speed of front fans in rotations per minute (RPM). If the fan is not connected to the motherboard, the field shows [N/A].

Fan Speed Control [Generic Mode]

Allows you to configure the ASUS Smart Fan feature that smartly adjusts the fan speeds for more efficient system operation.

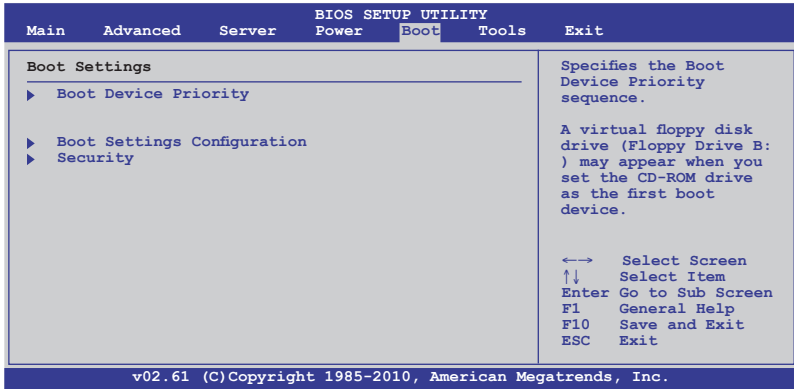
Configuration options: [Full Speed Mode] [High Density Mode] [Generic Mode] [Whisper Mode]

VCORE1/2, P1DDR3 Voltage, P2DDR3 Voltage, P1_+1.2V Voltage, P2_+1.2V Voltage, P1_VDDNB Voltage, +1.8V Voltage, +1.2V Voltage, +1.1V Voltage, +12V Voltage, +5V Voltage, +3.3V Voltage, +5VSB Voltage, +3.3VSB Voltage, VBAT Voltage

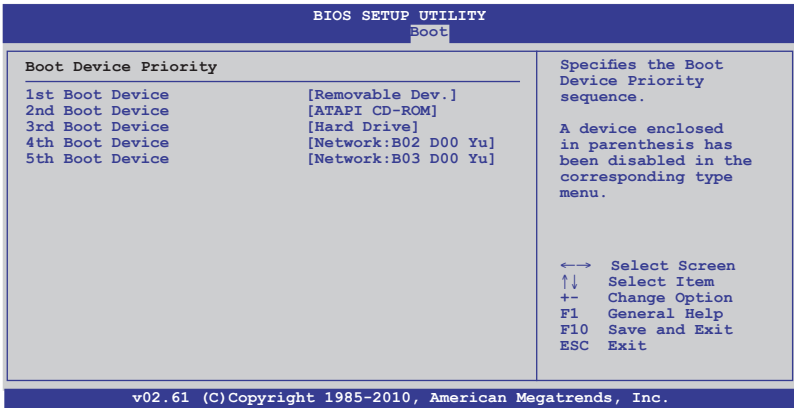
The onboard hardware monitor automatically detects the voltage output through the onboard voltage regulators. Select [Ignored] if you do not want to detect this item.

4.7 Boot menu

The Boot menu items allow you to change the system boot options. Select an item then press <Enter> to display the sub-menu.



4.7.1 Boot Device Priority



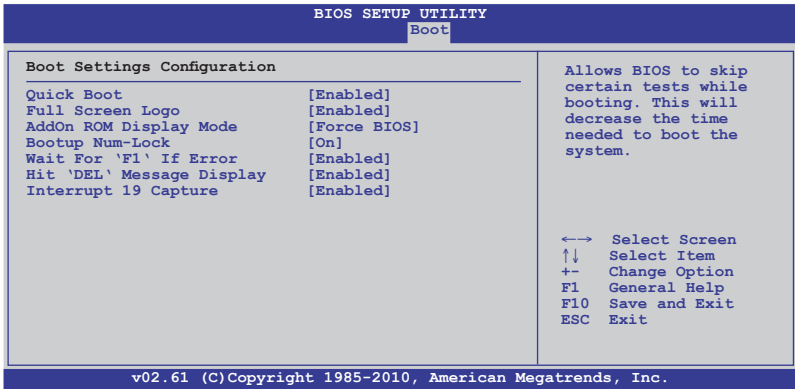
1st—xxth Boot Device [XXXXXXXX]

These items specify the boot device priority sequence from the available devices. The number of device items that appears on the screen depends on the number of devices installed in the system. Configuration options: [xxxxx Drive] [Disabled]

4.7.2 Hard Disk Drives; CDROM Drives

These two items appear only when you install more than two hard disk drives or optical drives to you system. These items allows you to specify the boot priority sequence of the hard disk drives or the optical drives.

4.7.3 Boot Settings Configuration



Quick Boot [Enabled]

Enabling this item allows the BIOS to skip some power on self tests (POST) while booting to decrease the time needed to boot the system. When set to [Disabled], BIOS performs all the POST items. Configuration options: [Disabled] [Enabled]

Full Screen Logo [Enabled]

Allows you to enable or disable the full screen logo display feature. Configuration options: [Disabled] [Enabled]



Set this item to [Enabled] to use the ASUS MyLogo2™ feature.

AddOn ROM Display Mode [Force BIOS]

Allows you to set the display mode for Options ROM. Configuration options: [Force BIOS] [Keep Current]

Bootup Num-Lock [On]

Allows you to select the power-on state for the NumLock. Configuration options: [Off] [On]

Wait For 'F1' If Error [Enabled]

When set to [Enabled], the system waits for the <F1> key to be pressed when error occurs. Configuration options: [Disabled] [Enabled]

Hit 'DEL' Message Display [Enabled]

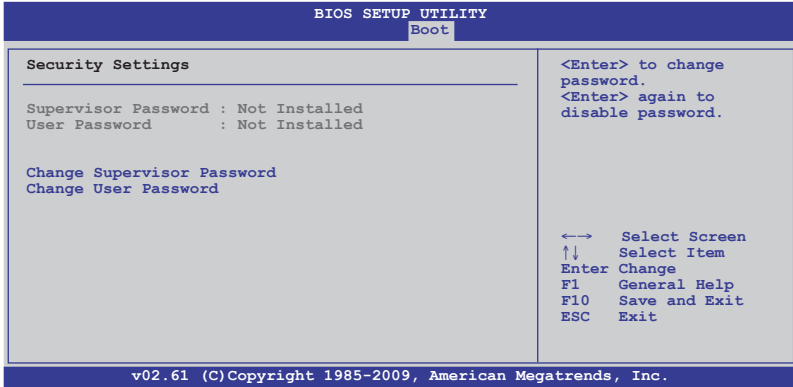
When set to [Enabled], the system displays the message "Press DEL to run Setup" during POST. Configuration options: [Disabled] [Enabled]

Interrupt 19 Capture [Enabled]

Allows the option ROMs to trap interrupt 19. Configuration options: [Disabled] [Enabled]

4.7.4 Security

The Security menu items allow you to change the system security settings. Select an item then press <Enter> to display the configuration options.



Change Supervisor Password

Select this item to set or change the supervisor password. The **Supervisor Password** item on top of the screen shows the default **Not Installed**. After you set a password, this item shows **Installed**.

To set a Supervisor Password:

1. Select the **Change Supervisor Password** item and press <Enter>.
2. From the password box, type a password composed of at least six letters and/or numbers, then press <Enter>.
3. Confirm the password when prompted.

The message "Password Installed" appears after you successfully set your password.

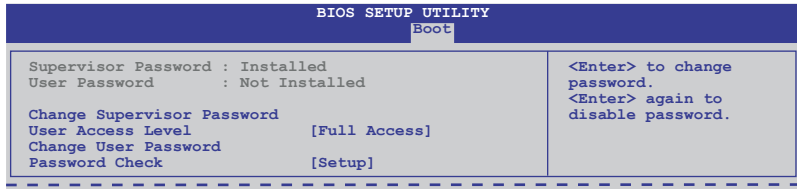
To change the supervisor password, follow the same steps as in setting a user password.

To clear the supervisor password, select the **Change Supervisor Password** then press <Enter>. The message "Password Uninstalled" appears.



If you forget your BIOS password, you can clear it by erasing the CMOS Real Time Clock (RTC) RAM. See section **2.6 Jumpers** for information on how to erase the RTC RAM.

After you have set a supervisor password, the other items appear to allow you to change other security settings.



User Access Level [Full Access]

This item allows you to select the access restriction to the Setup items. Configuration options: [No Access] [View Only] [Limited] [Full Access]

No Access prevents user access to the Setup utility.

View Only allows access but does not allow change to any field.

Limited allows changes only to selected fields, such as Date and Time.

Full Access allows viewing and changing all the fields in the Setup utility.

Change User Password

Select this item to set or change the user password. The **User Password** item on top of the screen shows the default **Not Installed**. After you set a password, this item shows Installed.

To set a User Password:

1. Select the **Change User Password** item and press <Enter>.
2. On the password box that appears, type a password composed of at least six letters and/or numbers, then press <Enter>.
3. Confirm the password when prompted.

The message "Password Installed" appears after you set your password successfully.

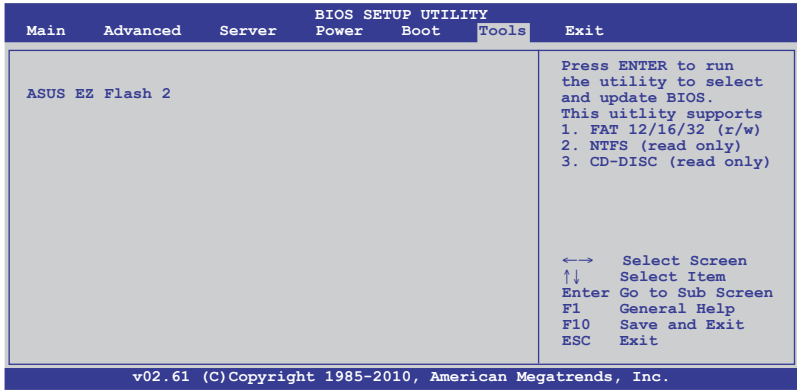
To change the user password, follow the same steps as in setting a user password.

Password Check [Setup]

When set to [Setup], BIOS checks for user password when accessing the Setup utility. When set to [Always], BIOS checks for user password both when accessing Setup and booting the system. Configuration options: [Setup] [Always]

4.8 Tools menu

The Tools menu items allow you to configure options for special functions. Select an item then press <Enter> to display the submenu.

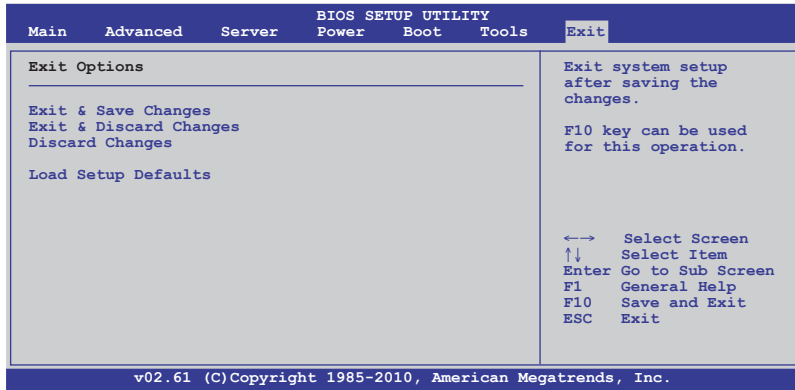


4.8.1 ASUS EZ Flash 2

Allows you to run ASUS EZ Flash 2. When you press <Enter>, a confirmation message appears. Use the left/right arrow key to select between [Yes] or [No], then press <Enter> to confirm your choice. Check section **4.1.1 ASUS EZ Flash 2 utility** for details.

4.9 Exit menu

The Exit menu items allow you to load the optimal or failsafe default values for the BIOS items, and save or discard your changes to the BIOS items.



Pressing <Esc> does not immediately exit this menu. Select one of the options from this menu or <F10> from the legend bar to exit.

Exit & Save Changes

Once you are finished making your selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. An onboard backup battery sustains the CMOS RAM so it stays on even when the PC is turned off. When you select this option, a confirmation window appears. Select **YES** to save changes and exit.



If you attempt to exit the Setup program without saving your changes, the program prompts you with a message asking if you want to save your changes before exiting. Press <Enter> to save the changes while exiting.

Exit & Discard Changes

Select this option only if you do not want to save the changes that you made to the Setup program. If you made changes to fields other than System Date, System Time, and Password, the BIOS asks for a confirmation before exiting.

Discard Changes

This option allows you to discard the selections you made and restore the previously saved values. After selecting this option, a confirmation appears. Select **YES** to discard any changes and load the previously saved values.

Load Setup Defaults

This option allows you to load the default values for each of the parameters on the Setup menus. When you select this option or if you press <F5>, a confirmation window appears. Select **YES** to load default values. Select **Exit & Save Changes** or make other changes before saving the values to the non-volatile RAM.

This chapter provides instructions for setting up, creating, and configuring RAID sets using the available utilities.

5 RAID configuration

5.1	Setting up RAID.....	5-3
5.2	FastBuild Utility.....	5-5

5.1 Setting up RAID

5.1.1 RAID definitions

RAID 0 (*Data striping*) optimizes two identical hard disk drives to read and write data in parallel, interleaved stacks. Two hard disks perform the same work as a single drive but at a sustained data transfer rate, double that of a single disk alone, thus improving data access and storage. Use of two new identical hard disk drives is required for this setup.

RAID 1 (*Data mirroring*) copies and maintains an identical image of data from one drive to a second drive. If one drive fails, the disk array management software directs all applications to the surviving drive as it contains a complete copy of the data in the other drive. This RAID configuration provides data protection and increases fault tolerance to the entire system. Use two new drives or use an existing drive and a new drive for this setup. The new drive must be of the same size or larger than the existing drive.

RAID 10 is data striping and data mirroring combined without parity (redundancy data) having to be calculated and written. With the RAID 10 configuration you get all the benefits of both RAID 0 and RAID 1 configurations. Use four new hard disk drives or use an existing drive and three new drives for this setup.

RAID 5 stripes both data and parity information across three or more hard disk drives. Among the advantages of RAID 5 configuration include better HDD performance, fault tolerance, and higher storage capacity. The RAID 5 configuration is best suited for transaction processing, relational database applications, enterprise resource planning, and other business systems. Use a minimum of three identical hard disk drives for this setup.

JBOD (Spanning) stands for Just a Bunch of Disks and refers to hard disk drives that are not yet configured as a RAID set. This configuration stores the same data redundantly on multiple disks that appear as a single disk on the operating system. Spanning does not deliver any advantage over using separate disks independently and does not provide fault tolerance or other RAID performance benefits.

SPAN helps to combine the capacity of multiple physical disk drives into one single large drive volume, making the small-sized disk drives more useful. The disk drives in this mode need not to be identical in size or speed.



If you want to boot the system from a hard disk drive included in a created RAID set, copy first the RAID driver from the support CD to a floppy disk before you install an operating system to the selected hard disk drive.

5.1.2 Installing hard disk drives

The motherboard supports Serial ATA for RAID set configuration. For optimal performance, install identical drives of the same model and capacity when creating a disk array.

To install the SATA hard disks for RAID configuration:

1. Install the SATA hard disks into the drive bays following the instructions in the system user guide.
2. Connect a SATA signal cable to the signal connector at the back of each drive and to the SATA connector on the motherboard.
3. Connect a SATA power cable to the power connector on each drive.

5.1.3 Setting the RAID item in BIOS

You must set the RAID item in the BIOS Setup before you can create a RAID set from SATA hard disk drives attached to the SATA connectors supported by AMD SP5100 chipset. To do this:

1. Enter the BIOS Setup during POST.
2. Go to the **Main Menu > Storage Configuration**, then press <Enter>.
3. Set **SATA Port1-4** to [RAID] and **SATA Port5-6** will be set to [RAID] too.
4. Press <F10> to save your changes and exit the BIOS Setup.



Refer to Chapter 4 for details on entering and navigating through the BIOS Setup.

5.2 FastBuild Utility

The FastBuild Utility allows you to create RAID 0, RAID 1, RAID 10 ,and RAID 5, SPAN and JBOD set(s) from Serial ATA hard disk drives that are connected to the Serial ATA connectors supported by the Promise RAID.

To enter the FastBuild Utility:

1. Install all the Serial ATA hard disk drives at Red SATA Connector.
2. Turn on the system.
3. During POST, press <Ctrl> + <F> to enter the utility main menu.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ Main Menu ]

View Drive Assignment .....[ 1 ]
LD View / LD Define Menu .....[ 2 ]
Delete LD Menu .....[ 3 ]
Controller Configuration .....[ 4 ]

[ Keys Available ]
Press 1..4 to Select Option [ESC]Exit
```

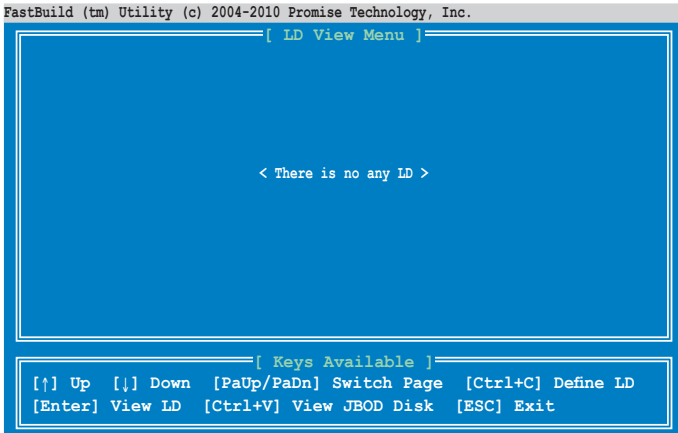
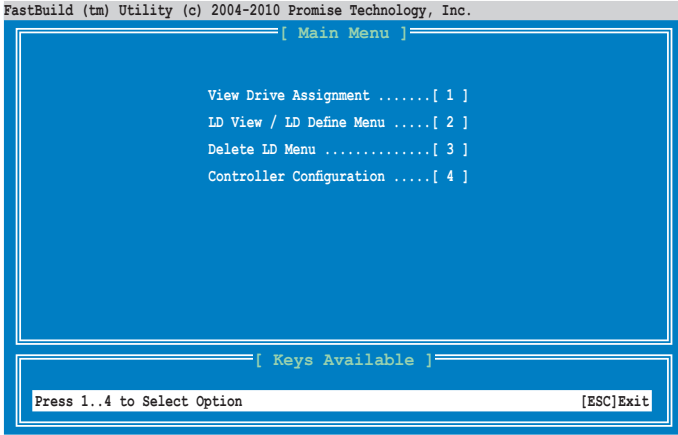


The RAID BIOS setup screens shown in this section are for reference only and may not exactly match the items on your screen.

5.2.1 Creating a RAID set (RAID 0, RAID 1, RAID 10, RAID 5, SPAN or JBOD)

To create a RAID set:

1. From the main control panel, press <2> to enter the **LD View Menu**.



- Press <Ctrl> + <C> to define an LD and use <Spacebar> to select a desired RAID mode.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ LD Define Menu ]
LD No  LD Name          RAID Mode  Drv
LD  1  Logical Drive 1  RAID 1    0

Stripe Block      128 KB      Initialization  Fast
Gigabyte Boundary ON
Read Policy       NA          Write Policy    WriteThru

[ Drives Assignments ]
Port:ID  Drive Model  Capabilities  Capacity (GB)  Assignment
01:01    HDTXXXXXXXXXX SATA 3G       250.05         N
02:01    HDTXXXXXXXXXX SATA 3G       250.05         N
03:01    HDTXXXXXXXXXX SATA 3G       250.05         N
04:01    HDTXXXXXXXXXX SATA 3G       250.05         N

[ Keys Available ]
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Space] Change Option
[Ctrl+Y] Save [ESC] Exit
```

- Use <Spacebar> to set Read Policy to Read Cache and Write Policy to WriteBack.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ LD Define Menu ]
LD No  LD Name          RAID Mode  Drv
LD  1  Logical Drive 1  RAID 1    0

Stripe Block      128 KB      Initialization  Fast
Gigabyte Boundary ON
Read Policy       Read Cache   Write Policy    WriteBack

[ Drives Assignments ]
Port:ID  Drive Model  Capabilities  Capacity (GB)  Assignment
01:01    HDTXXXXXXXXXX SATA 3G       250.05         N
02:01    HDTXXXXXXXXXX SATA 3G       250.05         N
03:01    HDTXXXXXXXXXX SATA 3G       250.05         N
04:01    HDTXXXXXXXXXX SATA 3G       250.05         N

[ Keys Available ]
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Space] Change Option
[Ctrl+Y] Save [ESC] Exit
```

- After you have selected the desired RAID mode, use the down arrow key to select desired disks for the RAID set.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ LD Define Menu ]
LD No  LD Name          RAID Mode  Drv
LD  1  Logical Drive 1  RAID 1    1

Stripe Block      128 KB      Initialization  Fast
Gigabyte Boundary ON          Write Policy    WriteBack
Read Policy

[ Drives Assignments ]
Port:ID  Drive Model  Capabilities  Capacity(GB)  Assignment
01:01    HDTXXXXXXXXX  SATA 3G      250.05        Y
02:01    HDTXXXXXXXXX  SATA 3G      250.05        N
03:01    HDTXXXXXXXXX  SATA 3G      250.05        N
04:01    HDTXXXXXXXXX  SATA 3G      250.05        N

[ Keys Available ]
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Space] Change Option
[Ctrl+Y] Save [ESC] Exit
```

- After you have selected desired disks for the RAID set, press <Ctrl> + <Y> to start building the RAID set.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ LD Define Menu ]
LD No  LD Name          RAID Mode  Drv
LD  1  Logical Drive 1  RAID 1    2

Stripe Block      128 KB      Initialization  Fast
Gigabyte Boundary ON          Write Policy    WriteBack
Read Policy

[ Drives Assignments ]
Port:ID  Drive Model  Capabilities  Capacity(GB)  Assignment
01:01    HDTXXXXXXXXX  SATA 3G      250.05        Y
02:01    HDTXXXXXXXXX  SATA 3G      250.05        Y
03:01    HDTXXXXXXXXX  SATA 3G      250.05        N
04:01    HDTXXXXXXXXX  SATA 3G      250.05        N

Please Press Ctr-Y key to input the LD name
or press any key to exit.
If you do not input any LD name, the default
LD name will be used.

[ Keys Available ]
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Space] Change Option
[Ctrl+Y] Save [ESC] Exit
```


- Press <Ctrl> + <Y> again and enter the LD name. Press <Enter> to continue.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
----- [ LD Define Menu ] -----
LD No  LD Name                      RAID Mode  Drv
LD  1  Logical Drive 1                RAID 1     2

Stripe Block      128 KB      Initialization  Fast
Gigabyte Boundary ON          Read Cache     Write Policy    WriteBack

----- [ Drives Assignments ] -----
Port:ID  Drive Model      Capabilities  Capacity(GB)  Assignment
01:01    HDTXXXXXXXXXXXXX SATA 3G       250.05        Y
02:01    HDTXXXXXXXXXXXXX SATA 3G       250.05        Y
03:01    [Enter the LD name here: XXXX]
04:01    [Enter the LD name here: XXXX]

----- [ Keys Available ] -----
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Space] Change Option
[Ctrl+Y] Save [ESC] Exit
```

- All the data on the selected disk drives will be deleted. Press <Ctrl> + <Y> to continue.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
----- [ LD Define Menu ] -----
LD No  LD Name                      RAID Mode  Drv
LD  1  Logical Drive 1                RAID 1     2

Stripe Block      128 KB      Initialization  Fast
Gigabyte Boundary ON          Read Cache     Write Policy    WriteBack

----- [ Drives Assignments ] -----
Port:ID  Dri [Fast Initialization Option has been selected. It wil erase the MBR data of the disks. <Press Ctrl-Y Key if you are sure to erase it> <Press any other key to ignore this option>] Assignment
01:01    HDT Y
02:01    HDT Y
03:01    HDT N
04:01    HDT N

----- [ Keys Available ] -----
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Space] Change Option
[Ctrl+Y] Save [ESC] Exit
```

- Press <Ctrl> + <Y> to modify the disk array size or press any other key to use all the available capacity of the disk drive.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ LD Define Menu ]
LD No LD Name RAID Mode Drv
LD 1 Logical Drive 1 RAID 1 2

Stripe Block 128 KB Initialization Fast
Gigabyte Boundary ON Write Policy WriteBack
Read Policy Read Cache

[ Drives Assignments ]
Port:ID Drive Model Capabilities Capacity(GB) Assignment
01:01 HDTXXXXXXXXXXXXX SATA 3G 250.05 Y
02:01 HDTXXXXXXXXXXXXX SATA 3G 250.05 Y
03:01 HDTXXXXXXXXXXXXX SATA 3G 250.05 N
04:01 HDTXXXXXXXXXXXXX SATA 3G 250.05 N

Press Ctrl-Y to Modify Array Capacity or press
any other key to use maximum capacity...

[{} Up [{} Down [{} PaUp/PaDn] Switch Page [{} Space] Change Option
Fast Initializing...
```

- Use the number keys to enter your desired array capacity.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ LD Define Menu ]
LD No LD Name RAID Mode Drv
LD 1 Logical Drive 1 RAID 1 2

Stripe Block 128 KB Initialization Fast
Gigabyte Boundary ON Write Policy WriteBack
Read Policy Read Cache

[ Drives Assignments ]
Port:ID Drive Model Capabilities Capacity(GB) Assignment
01:01 HDTXXXXXXXXXXXXX SATA 3G 250.05 Y
02:01 HDTXXXXXXXXXXXXX SATA 3G 250.05 Y
03:01 HDTXXXXXXXXXXXXX SATA 3G 250.05 N
04:01 Enter array capacity (in GB) here: 200 N

[ Keys Available ]
[{} Up [{} Down [{} PaUp/PaDn] Switch Page [{} Space] Change Option
[0-9] Input Capacity [Enter] Save [BackSpace] Delete [Esc] Exit
```

- The RAID set has been built successfully and press <Enter> to view the content.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ LD View Menu ]
LD No      RAID Mode   Drv      Capacity(GB)   Status
LD 1       RAID 1       2        199.99         Functional

[ Keys Available ]
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Ctrl+C] Define LD
[Enter] View LD [Ctrl+V] View JBOD Disk [ESC] Exit
```

- Press any key to return to the main control panel.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ View LD Definition Menu ]
LD No LD Name      RAID Mode   Drv      Capacity(GB)
LD 1  RAID1       RAID 1       2        199.99

Stripe Block      NA
Read Policy       Read Cache    Write Policy    WriteBack

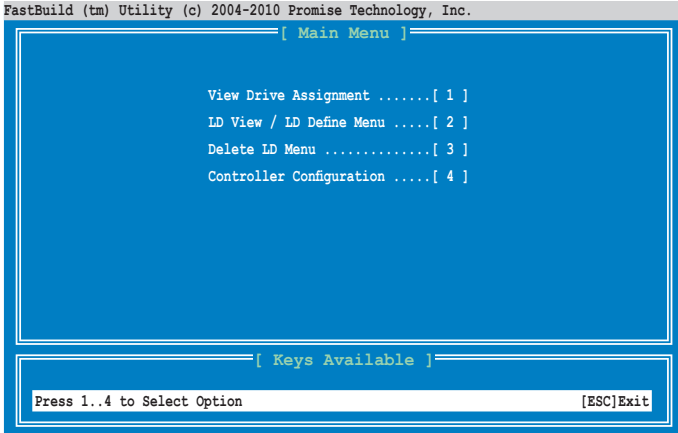
[ Drives Assignments ]
Port:ID  Drive Model  Capabilities  Capacity(GB)
01:01   HDXXXXXXXXXX  SATA 3G      250.05
02:01   HDXXXXXXXXXX  SATA 3G      250.05

Any Key To Continue.....
```

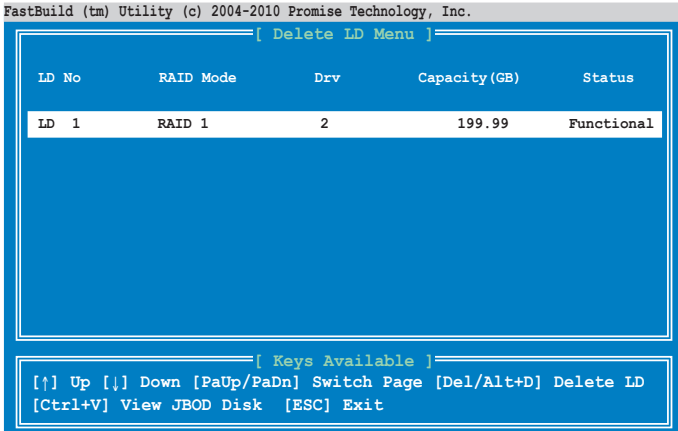
5.2.2 Deleting a RAID set

To delete a RAID set:

1. From the main control panel, press <3> to enter the **Delete LD Menu**.



2. Select the RAID set you would like to delete and press /<Alt>+<D> to delete the selected RAID set.



3. Press <Ctrl>+<Y> to confirm and delete the selected RAID set.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ View LD Definition Menu ]
LD No  LD Name          RAID Mode  Drv   Capacity (GB)
LD 1   RAID1            RAID 1     2     199.99
Stripe Block      NA
Read Policy       NA          Write Policy WriteThru

[ Drives Assignments ]
Port:ID  Drive Model  Capabilities  Capacity (GB)
01:01   HDXXXXXXXXXX SATA 3G       250.05
02:01   HDXXXXXXXXXX SATA 3G       250.05

Press Ctrl-Y to delete the data in the disk!
or press any other key to abort...
```

4. The selected RAID set has been deleted.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ Delete LD Menu ]

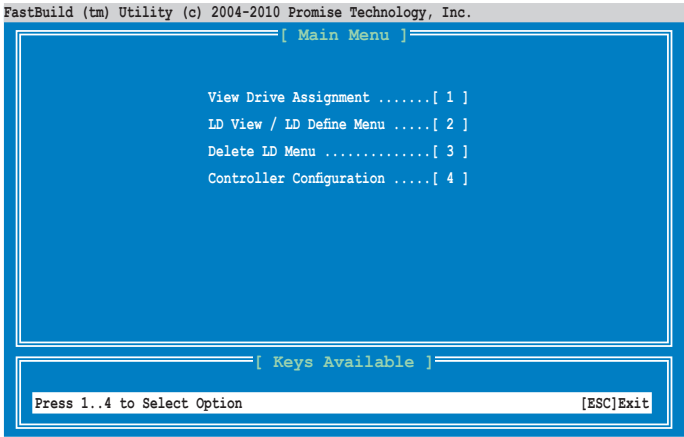
< There is no any LD >

[ Keys Available ]
[↑] Up [↓] Down [PaUp/PaDn] Switch Page [Del/Alt+D] Delete LD
[Ctrl+V] View JBOD Disk [ESC] Exit
```

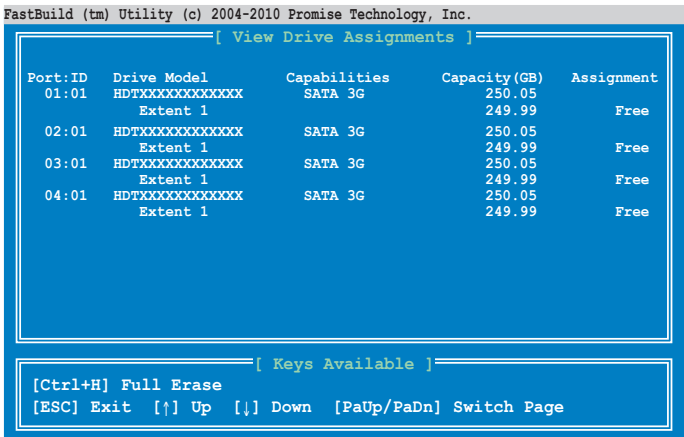
5.2.3 Viewing the Drive Assignment

To view the drive assignment:

1. From the main control panel, press <1> to enter the **Drive Assignment Menu**.



2. The drive assignment is displayed as shown.



5.2.4 Viewing the Controller Configuration

To view the controller configuration:

1. From the main control panel, press <4> to enter the **Controller Configuration Menu**.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ Main Menu ]

View Drive Assignment .....[ 1 ]
LD View / LD Define Menu .....[ 2 ]
Delete LD Menu .....[ 3 ]
Controller Configuration .....[ 4 ]

[ Keys Available ]
Press 1..4 to Select Option [ESC]Exit
```

2. The system resources configuration is displayed as shown.

```
FastBuild (tm) Utility (c) 2004-2010 Promise Technology, Inc.
[ Adapter Configuration - Options ]
No Parameters Defined for Current Disk(s)...

[ System Resources Configuration ]

Controller IRQ: 10
AHCI HBA MMIO Base Address: FAFFE400

[ Keys Available ]
[ESC] Exit
```


This chapter provides instructions for installing the necessary drivers for different system components.

6 Driver installation

6.1	RAID driver installation	6-3
6.2	ATI SM Bus controller driver installation.....	6-15
6.3	LAN driver installation.....	6-16
6.4	Display driver installation	6-20
6.5	Mellanox ConnectX QDR PCI Gen2 Channel Adapter driver installation	6-23
6.6	Management application and utilities installation	6-30

6.1 RAID driver installation

After creating the RAID sets for your server system, you are now ready to install an operating system to the independent hard disk drive or bootable array. This part provides instructions on how to install the RAID controller drivers during OS installation.



The RAID card driver might be included in the Linux OS installation CD, and could be loaded automatically during the OS installation. However, we recommend you use the RAID driver packaged in the RAID card support CD for a better reliability.

6.1.1 Creating a RAID driver disk



The system does not include a floppy drive. You have to use a USB floppy drive when creating a SATA RAID driver disk.

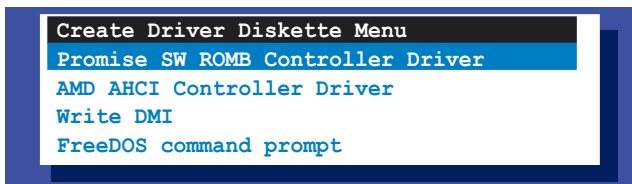


When you use a SATA optical drive and PROMISE RAID, you cannot boot into FreeDOS using this support CD. Either reset **SATA Port1-4** in BIOS to [IDE] and boot again or create the RAID driver in another computer.

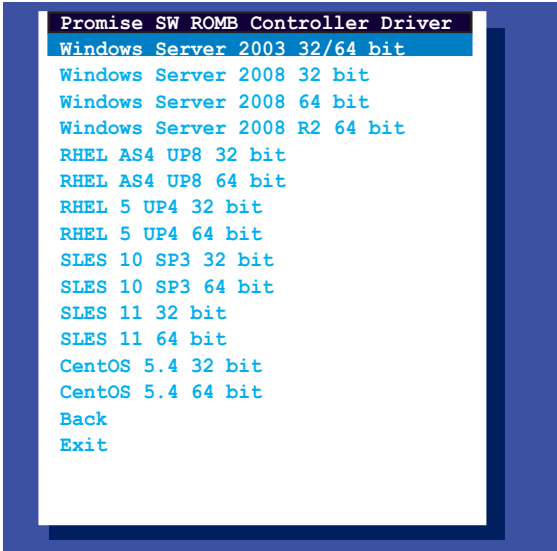
A floppy disk with the RAID driver is required when installing Windows® or Red Hat® Enterprise operating system on a hard disk drive that is included in a RAID set. You can create a RAID driver disk in DOS (using the Makedisk application in the support DVD).

To create a RAID driver disk in DOS environment

1. Place the motherboard support DVD in the optical drive.
2. Restart the computer, and then enter the BIOS Setup.
3. Select the optical drive as the first boot priority to boot from the support DVD. Save your changes, and then exit the BIOS Setup.
4. Restart the computer. The Makedisk menu appears.



5. Use the arrow keys to select the type of RAID driver disk you want to create and press <Enter> to enter the sub-menu.



6. Locate the RAID driver and place a blank, high-density floppy disk to the floppy disk drive.
7. Press <Enter>.
8. Follow screen instructions to create the driver disk.

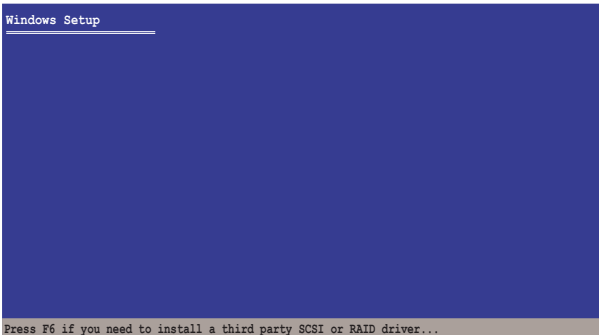
6.1.2 Installing the RAID controller driver

Windows® Server OS

During Windows® Server OS installation

To install the RAID controller driver when installing Windows® Server OS:

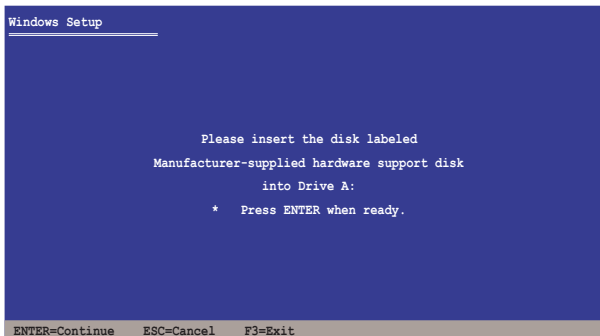
1. Boot the computer using the Windows® Server installation DVD. The Windows® Server OS Setup starts.



2. Press <F6> when the message "Press F6 if you need to install a third party SCSI or RAID driver..." appears at the bottom of the screen.
3. When prompted, press <S> to specify an additional device.



4. Insert the RAID driver disk you created earlier to the floppy disk drive, then press <Enter>.



5. Select the RAID controller driver you need from the list, then press <Enter>.
6. The Windows® Setup loads the RAID controller drivers from the RAID driver disk. When prompted, press <Enter> to continue installation.
7. Setup then proceeds with the OS installation. Follow screen instructions to continue.

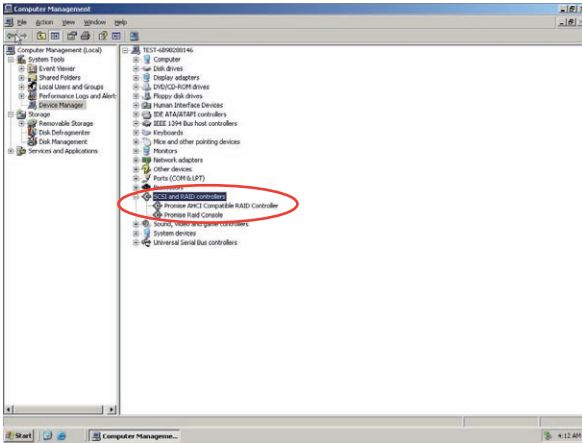
To an existing Windows® Server OS

To install the RAID controller driver on an existing Windows® Server OS

1. Restart the computer, and then log in with **Administrator** privileges.
2. Windows® automatically detects the RAID controller and displays a **New Hardware Found** window. Click **Cancel**.
3. Right-click the **My Computer** icon on the Windows® desktop, and then select **Properties** from the menu.
4. Click the **Hardware** tab, and then click the **Device Manager** button to display the list of devices installed in the system.
5. Right-click the **RAID controller** item, then select **Properties**.
6. Click the **Driver** tab, and then click the **Update Driver** button.
7. The **Upgrade Device Driver Wizard** window appears. Click **Next**.
8. Insert the RAID driver disk you created earlier to the floppy disk drive.
9. Select the option **Install the software automatically (Recommended)**, and then click **Next**.
10. The wizard searches the RAID controller drivers. When found, click **Next** to install the drivers.
11. Click **Finish** after the driver installation is done.

To verify the RAID controller driver installation:

1. Right-click the **My Computer** icon on the Windows® desktop, and then select **Properties** from the menu.
2. Click the **Hardware** tab, and then click the **Device Manager** button.
3. Click the “+” sign before the item **SCSI and RAID controllers**, and then the **Promise AHCI Compatible RAID Controller** item should appear.



The screen differs based on the controller.

4. Right-click the **RAID controller** driver item, and then select **Properties** from the menu.
5. Click the **Driver** tab, and then click the **Driver Details** button to display the RAID controller drivers.
6. Click **OK** when finished.

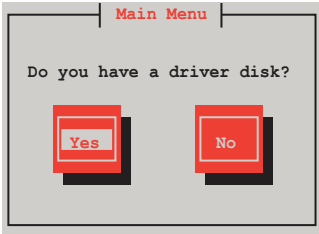
Red Hat® Enterprise Linux OS 4.7/4.8

To install the RAID controller driver when installing Red Hat® Enterprise OS:

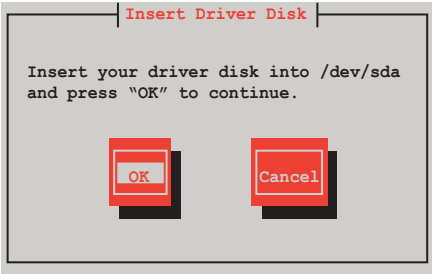
1. Boot the system from the Red Hat® OS installation CD.
2. At the `boot:`, type `linux dd`.
3. Press `<Enter>`.

```
- To install or upgrade in graphical mode, press the <ENTER> key.  
- To install or upgrade in text mode, type: linux text <ENTER>.  
- Use the function keys listed below for more information.  
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]  
boot: linux dd
```

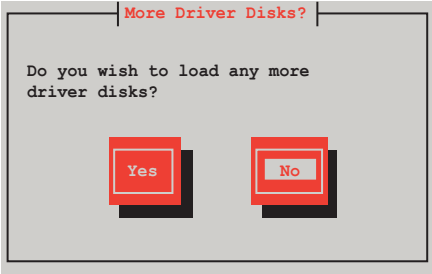
4. Select **Yes** using the `<Tab>` key when asked if you have the driver disk, then press `<Enter>`.



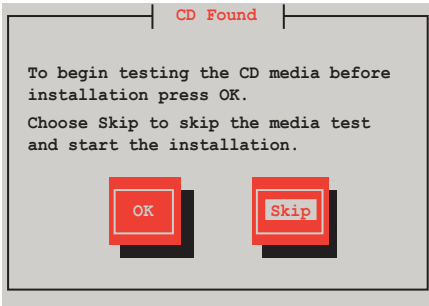
5. Press `<Enter>` to continue.



6. Select **No** and press `<Enter>` to continue.



7. Select **Skip** and press <Enter> to continue.



8. Follow the onscreen instructions to finish installing the RedHat operating system.

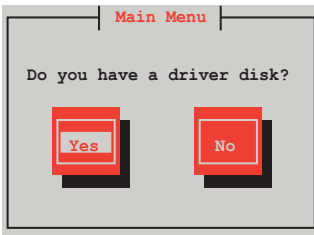
Red Hat® Enterprise Linux OS 5.0

To install the RAID controller driver when installing Red Hat® Enterprise OS:

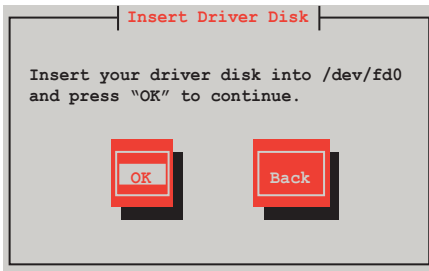
1. Boot the system from the Red Hat® OS installation CD.
2. At the `boot:`, type `linux dd`
3. Press `<Enter>`.

```
- To install or upgrade in graphical mode, press the <ENTER> key.  
- To install or upgrade in text mode, type: linux text <ENTER>.  
- Use the function keys listed below for more information.  
[F1-Main] [F2-Options] [F3-General] [F4-Kernel] [F5-Rescue]  
boot: linux dd
```

4. Select **Yes** using the `<Tab>` key when asked if you have the driver disk, then press `<Enter>`.

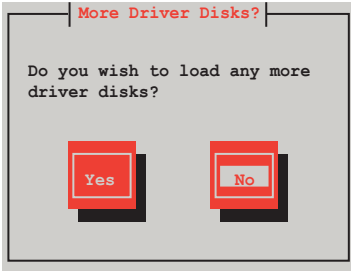


5. Insert the Red Hat® Enterprise RAID driver disk to the floppy disk drive, select **OK**, then press `<Enter>`.



The drivers for the RAID card are installed to the system.

- When asked if you will load additional RAID controller drivers, select **No**, then press <Enter>.

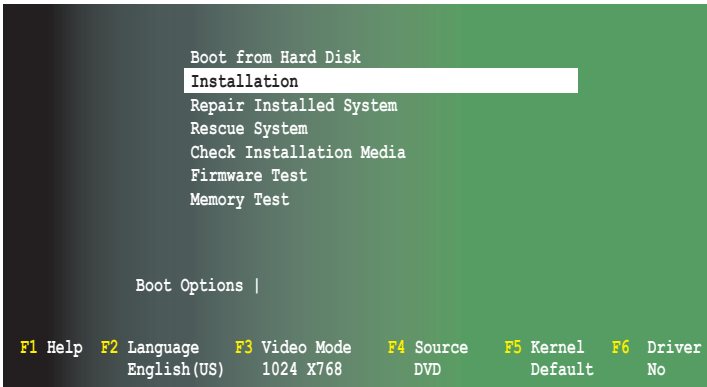


- Follow the onscreen instructions to finish the OS installation.

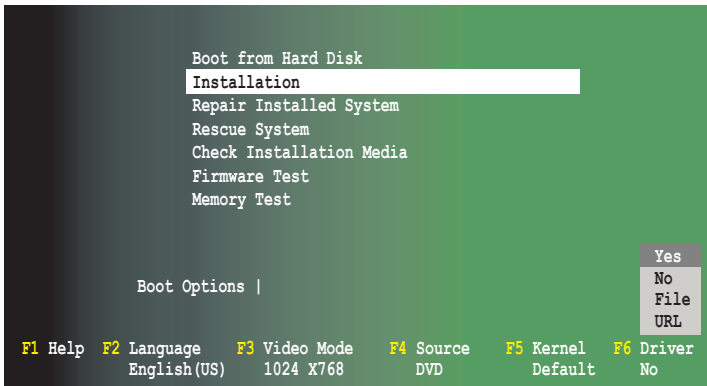
SUSE Linux 11 OS

To install the RAID controller driver when installing SUSE Linux Enterprise Server OS:

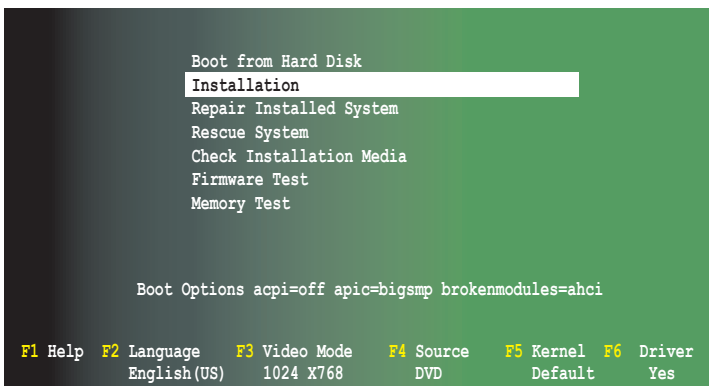
1. Boot the system from the SUSE OS installation CD.
2. Use the arrow keys to select **Installation** from the **Boot Options** menu.



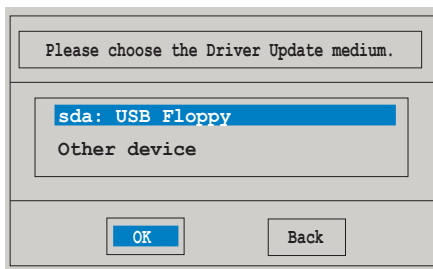
3. Press <F6>, then select **Yes** from the menu. Press <Enter>.



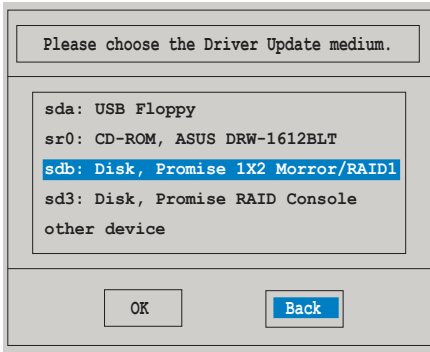
4. Insert the RAID driver disk to the floppy disk drive. Type the command **acpi=off apic=bigsmc brokenmodules=ahci** in **Boot Options** field, and press <Enter>.



5. When below screen appears, select the USB floppy disk drive (sda) as the driver update medium. Select **OK**, then press <Enter>.



- The drivers for the RAID controller are installed to the system as shown below.



- Select **Back** and follow the onscreen instructions to finish the installation.

6.2 ATI SM Bus controller driver installation

This section provides instructions on how to install the ATI SM Bus driver on the system.

You need to manually install the ATI SMBus driver on a Windows® XP / Server 2003 operating system. To install the driver:

1. Restart the computer, then log on with **Administrator** privileges.
2. Insert the motherboard/system support DVD to the optical drive. The support DVD automatically displays the **Drivers** menu if Autorun is enabled in your computer.
3. Click the item **ATI SM Bus Controller Driver** from the menu, and then follow the onscreen instructions to complete the installation.



6.3 LAN driver installation

This section provides the instructions on how to install Intel® Gigabit LAN controller drivers.

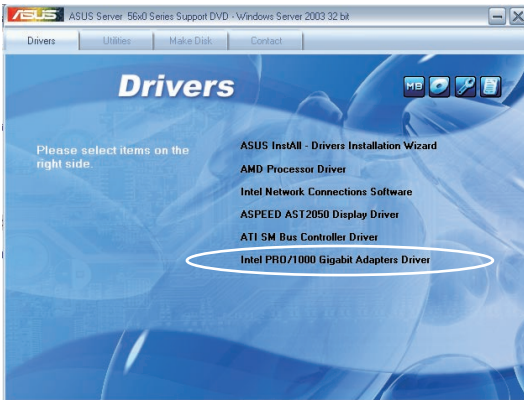
To install the Intel® Gigabit LAN controller driver on a Windows® OS:

1. Restart the computer, and then log on with **Administrator** privileges.
2. Insert the motherboard/system support DVD to the optical drive. The DVD automatically displays the **Drivers** menu if Autorun is enabled in your computer.

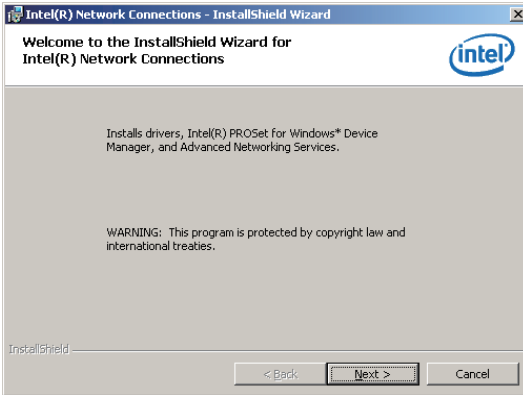


If **Autorun** is NOT enabled in your computer, browse the contents of the support DVD to locate the file **AUTORUN.EXE** and double-click the **AUTORUN.EXE** and follow step 4 to run the installation.

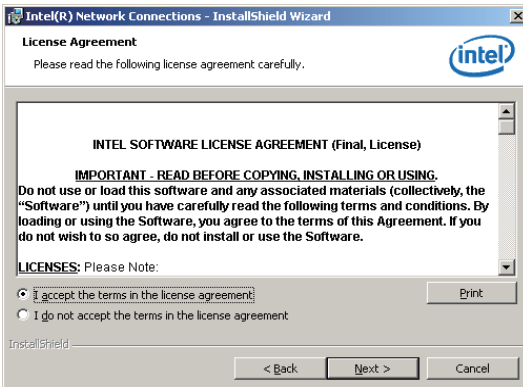
3. Click **Intel® PRO/1000 Gigabit Adapters Driver**.



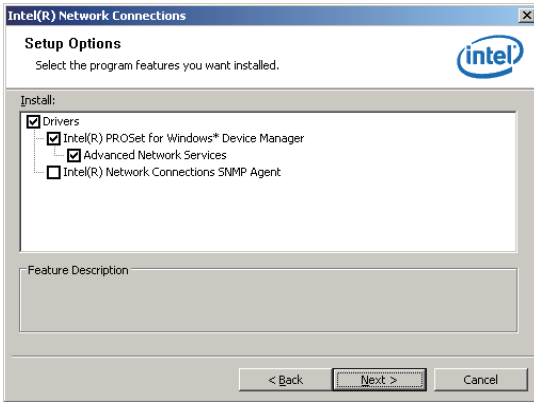
4. When the **Intel® PRO Network Connections – InstallShield Wizard** window appears, click **Next** to start the installation.



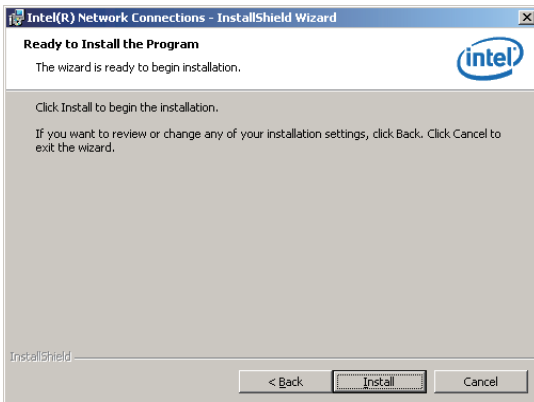
5. Click **I accept the terms in the license agreement** and then click **Next** to continue.



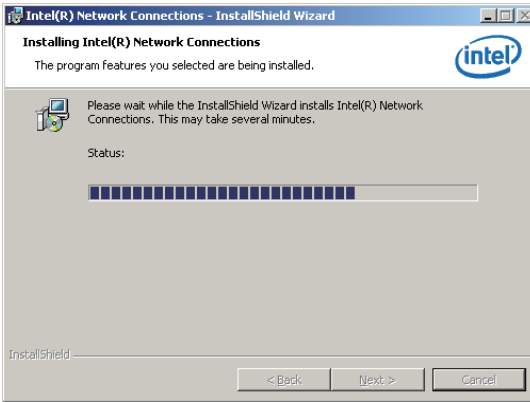
6. Select the programs you want to install and click **Next** to continue.



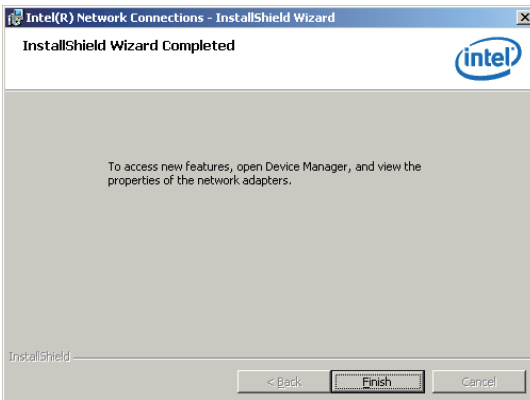
7. Click **Install** to start the installation.



- The programs you select are being installed.



- Click **Finish** to finish the installation.



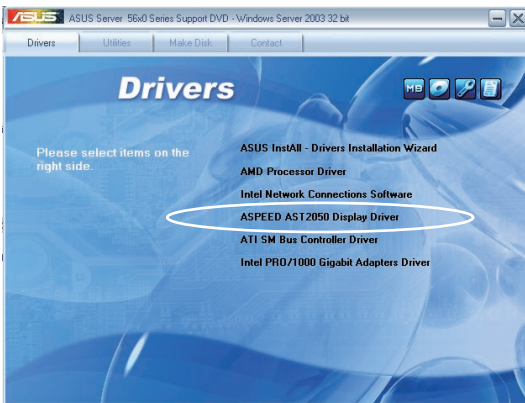
6.4 Display driver installation

This section provides instructions on how to install the ASPEED display driver.

You need to manually install the ASPEED display driver on a Windows® operating system.

To install the ASPEED display driver

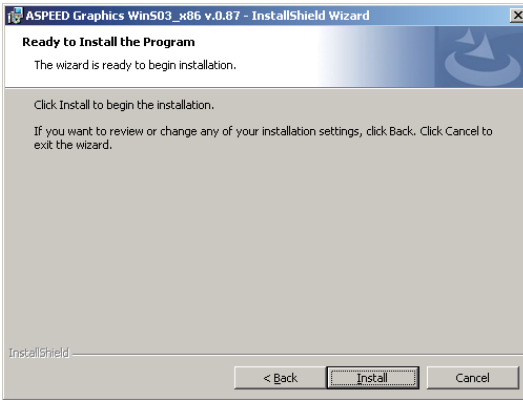
1. Restart the computer, then log on with Administrator privileges.
2. Insert the motherboard/system support DVD to the optical drive. The support DVD automatically displays the Drivers menu if Autorun is enabled in your computer.
3. Click **ASPEED AST2050 Display Driver**.



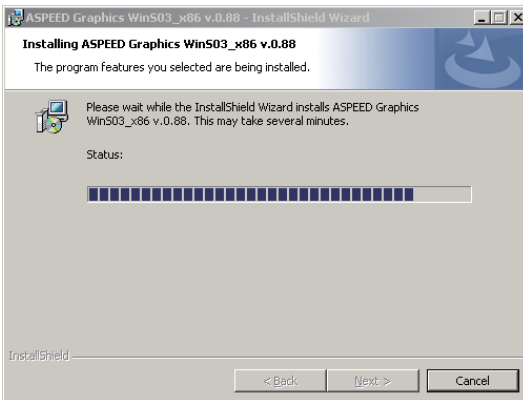
4. When the **ASPEED InstallShield Wizard** window appears, click **Next** to continue.



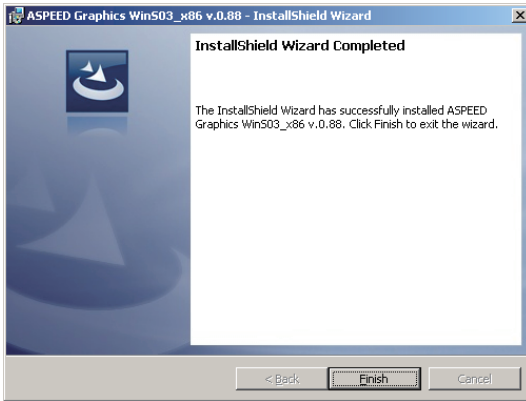
5. Click **Install** to start the installation.



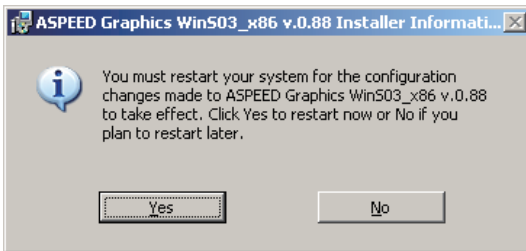
6. The system installs the driver automatically.



7. When the installation completes, click **Finish** to exit the wizard.



8. Click **Yes** to restart the computer.



6.5 Mellanox ConnectX QDR PCI Gen2 Channel Adapter driver installation (For KGMH-D16/QDR only)

This section provides instructions on how to install the Mellanox driver.

6.5.1 Windows operating system

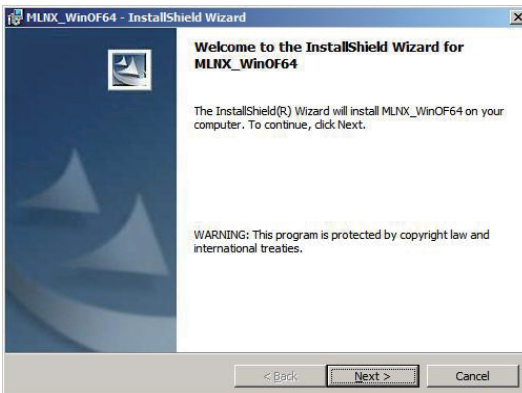
You need to manually install the Mellanox driver on a Windows® operating system.

To install the Mellanox driver

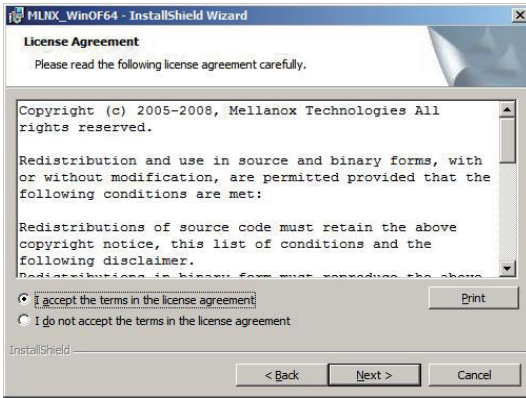
1. Restart the computer, then log on with Administrator privileges.
2. Insert the MLNX_InfiniBand support DVD to the optical drive. The support DVD automatically displays the Drivers menu if Autorun is enabled in your computer.
3. Click **Mellanox ConnectX DDR/QDR PCI Gen2 Channel Adapter Driver**.



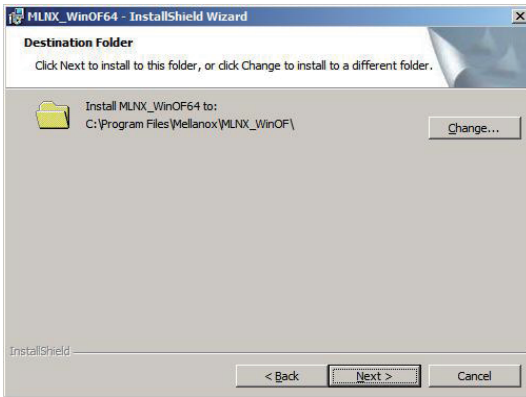
4. Click **Next** to start installing the driver.



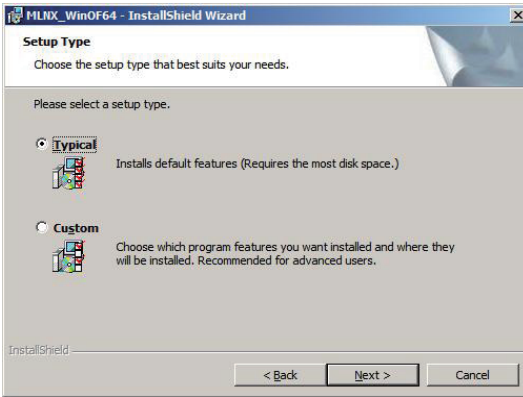
5. Click **I accept the terms in the license agreement** and click **Next** to continue.



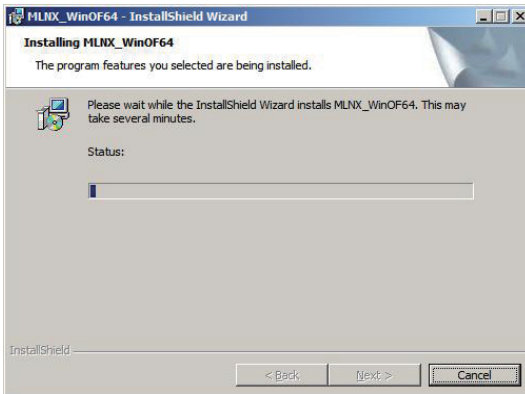
6. Click **Change** to select your desired destination folder and click **Next** to continue.



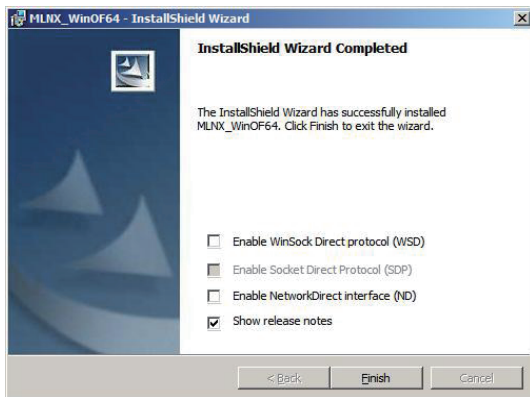
7. Select a setup type and click **Next** to continue.



8. The driver features you selected are being installed.



9. Click your preferred options and click **Finish** to exit the wizard.



6.5.2 Red Hat® Enterprise Linux OS

You need to manually mount the Mellanox driver on a Red Hat® Enterprise Linux OS.



For users using SUSE Linux Enterprise Server OS, follow the general instructions in this section to mount the Mellanox driver on your system.

To mount the Mellanox driver

1. Login to the system as root.
2. Create a folder on the desktop and copy the latest Mellanox driver to the folder.



You can name the folder as you like.

A screenshot of a Linux terminal window titled "root@localhost:~". The terminal shows the following commands and output:

```
File Edit View Terminal Tabs Help
[root@localhost ~]# cd /
[root@localhost /]# mkdir xxx
[root@localhost /]#
```

3. Type the command line and mount the driver to the system.

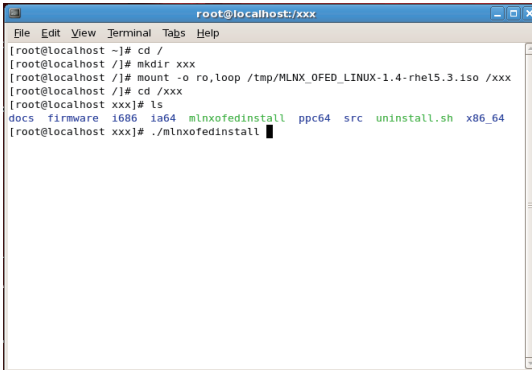


The driver version and the OS label may vary. Ensure that the command line matches your driver version and operating system.

A screenshot of a Linux terminal window titled "root@localhost:~". The terminal shows the following commands and output:

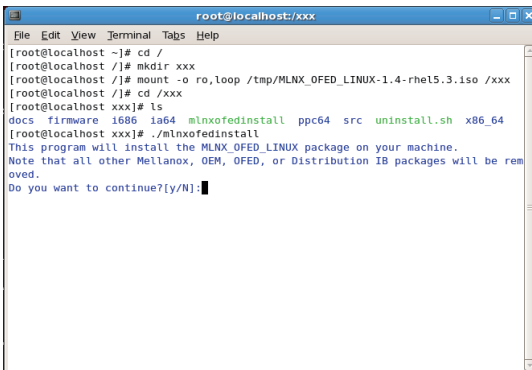
```
File Edit View Terminal Tabs Help
[root@localhost ~]# cd /
[root@localhost /]# mkdir xxx
[root@localhost /]# mount -o ro,loop /tmp/MLNX_OFED_LINUX-1.4-rhel5.3.iso /xxx
```

4. Type the command line and install the driver.



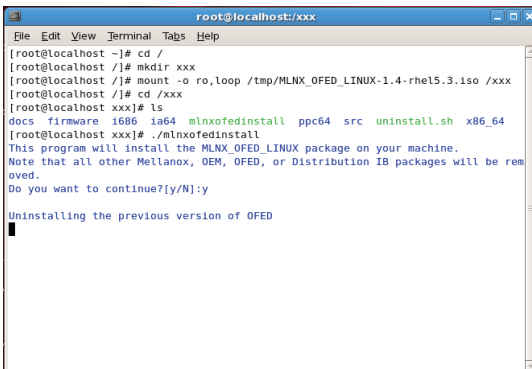
```
root@localhost:/xxx
File Edit View Terminal Tabs Help
[root@localhost ~]# cd /
[root@localhost /]# mkdir xxx
[root@localhost /]# mount -o ro,loop /tmp/MLNX_OFED_LINUX-1.4-rhel5.3.iso /xxx
[root@localhost /]# cd /xxx
[root@localhost xxx]# ls
docs firmware i686 ia64 mlnxofedinstall ppc64 src uninstall.sh x86_64
[root@localhost xxx]# ./mlnxofedinstall
```

5. All other Mellanox, OEM, OFED, or distribution IB packages will be removed. Press <Y> to continue.



```
root@localhost:/xxx
File Edit View Terminal Tabs Help
[root@localhost ~]# cd /
[root@localhost /]# mkdir xxx
[root@localhost /]# mount -o ro,loop /tmp/MLNX_OFED_LINUX-1.4-rhel5.3.iso /xxx
[root@localhost xxx]# ls
docs firmware i686 ia64 mlnxofedinstall ppc64 src uninstall.sh x86_64
[root@localhost xxx]# ./mlnxofedinstall
This program will install the MLNX_OFED_LINUX package on your machine.
Note that all other Mellanox, OEM, OFED, or Distribution IB packages will be removed.
Do you want to continue?[y/N]:
```

6. The system starts uninstalling the previous version of OFED.



```
root@localhost:/xxx
File Edit View Terminal Tabs Help
[root@localhost ~]# cd /
[root@localhost /]# mkdir xxx
[root@localhost /]# mount -o ro,loop /tmp/MLNX_OFED_LINUX-1.4-rhel5.3.iso /xxx
[root@localhost /]# cd /xxx
[root@localhost xxx]# ls
docs firmware i686 ia64 mlnxofedinstall ppc64 src uninstall.sh x86_64
[root@localhost xxx]# ./mlnxofedinstall
This program will install the MLNX_OFED_LINUX package on your machine.
Note that all other Mellanox, OEM, OFED, or Distribution IB packages will be removed.
Do you want to continue?[y/N]:y
Uninstalling the previous version of OFED
```

7. When the installation finishes, reboot your system to complete the installation.

```
root@localhost:xxx
File Edit View Terminal Tabs Help
65:libibmad-static ##### [ 88%]
66:libibmad-static ##### [ 89%]
67:librdmacm-devel ##### [ 91%]
68:librdmacm-devel ##### [ 92%]
69:libsdp-devel ##### [ 93%]
70:libsdp-devel ##### [ 95%]
71:opensm-devel ##### [ 96%]
72:opensm-devel ##### [ 97%]
73:opensm-static ##### [ 99%]
74:opensm-static ##### [100%]
Device (15b3:6732):
  0a:00:0 InfiniBand: Mellanox Technologies MT26418 [ConnectX IB DDR, PCIe
  2.0 5GT/s] (rev a0)
  Link Width: 8x
  Link Speed: 5Gb/s

Installation finished successfully.

The firmware version 2.6.0 is up to date.
Note: To force firmware update use '--force-fw-update' flag.
warning: /etc/infiniband/openib.conf saved as /etc/infiniband/openib.conf.rpmshv
e
[root@localhost xxx]#
```



If your system has the latest firmware, no firmware update will occur. To force firmware update, type **--force-fw-update**.

6.6 Management applications and utilities installation

The support DVD that came with the motherboard package contains the drivers, management applications, and utilities that you can install to avail all motherboard features.



The contents of the support DVD are subject to change at any time without notice. Visit the ASUS website at www.asus.com for updates.

6.6.1 Running the support DVD

Place the support DVD to the optical drive. The DVD automatically displays the Drivers menu if Autorun is enabled in your computer.



If Autorun is NOT enabled in your computer, browse the contents of the support DVD to locate the file ASSETUP.EXE from the BIN folder. Double-click the ASSETUP.EXE to run the DVD.

6.6.2 Drivers menu

The Drivers menu shows the available device drivers if the system detects installed devices. Install the necessary drivers to activate the devices.

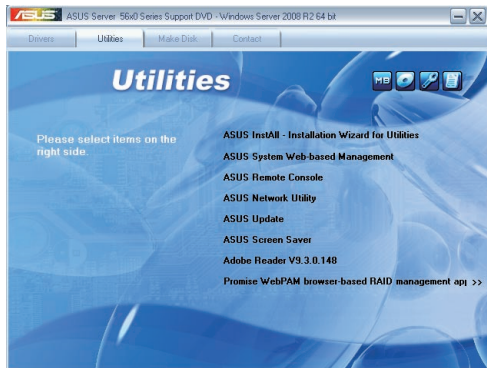


The screen display and driver options vary under different operating system versions.



6.6.3 Utilities menu

The Utilities menu displays the software applications and utilities that the motherboard supports. Click an item to install.



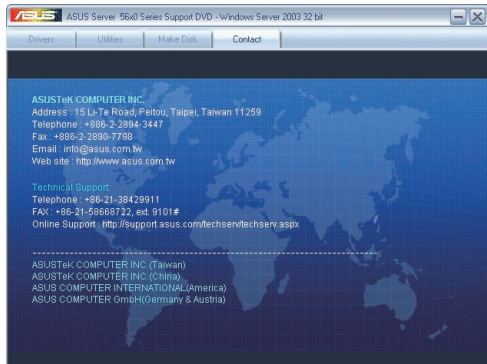
6.6.4 Make disk menu

The Make disk menu contains items to create the AMD AHCI Controller driver disk.



6.6.5 Contact information

Click the Contact tab to display the ASUS contact information. You can also find this information on the inside front cover of this user guide.



This appendix includes additional information that you may refer to when configuring the motherboard.

Reference information

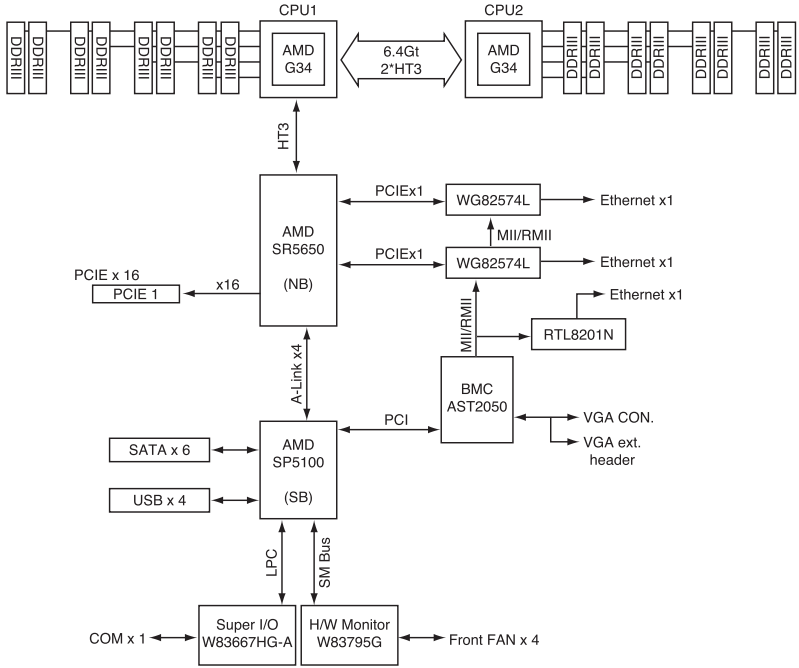


Appendix summary

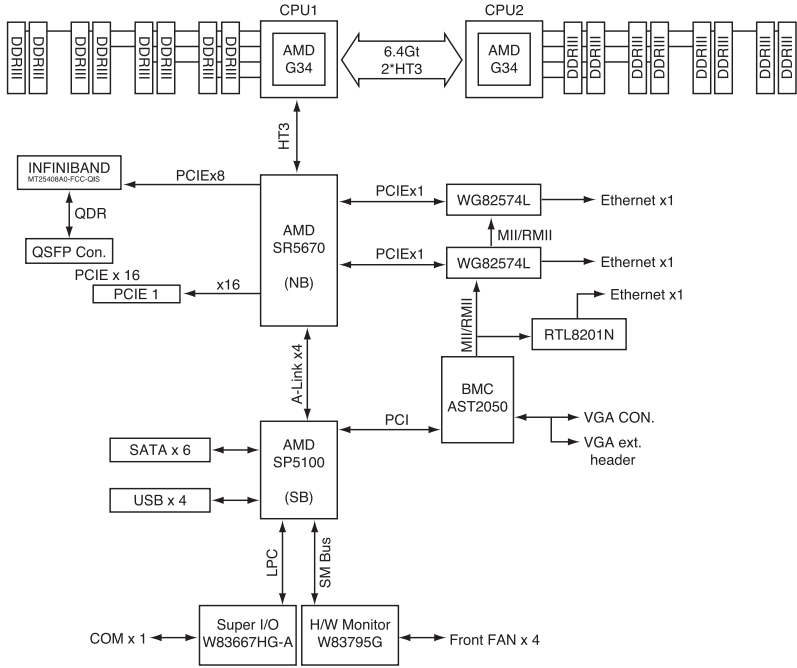


A.1	KGNH-D16 block diagram	A-3
A.2	KGMH-D16/QDR block diagram.....	A-4

A.1 KGNH-D16 block diagram



A.2 KGMH-D16/QDR block diagram



ASUS contact information

ASUSTeK COMPUTER INC. (Taiwan)

Address 15 Li-Te Road, Peitou, Taipei, Taiwan 11259
Telephone +886-2-2894-3447
Fax +886-2-2890-7798
E-mail info@asus.com.tw
Web site <http://www.asus.com.tw>

Technical Support

Telephone +886-2-2894-3447 (0800-093-456)
Online Support <http://support.asus.com/techserv/techserv.aspx>

ASUSTeK COMPUTER INC. (China)

Address No.508, Chungong Road, Xinzhuang Industrial Zone,
Minhang District, Shanghai, China.
Telephone +86-21-5442-1616
Fax +86-21-5442-0099
Web site <http://www.asus.com.cn>

Technical Support

Telephone +86-21-3407-4610 (800-820-6655)
Online Support <http://support.asus.com/techserv/techserv.aspx>

ASUS COMPUTER INTERNATIONAL (America)

Address 800 Corporate Way, Fremont, CA 94539, USA
Fax +1-510-608-4555
Web site <http://usa.asus.com>

Technical Support

Support fax +1-812-284-0883
General support +1-812-282-2787
Online support <http://support.asus.com/techserv/techserv.aspx>

ASUS COMPUTER GmbH (Germany and Austria)

Address Harkort Str. 21-23, D-40880 Ratingen, Germany
Fax +49-2102-959911
Web site <http://www.asus.de>
Online contact <http://www.asus.de/sales>

Technical Support

Telephone +49-1805-010923*
Support Fax +49-2102-959911
Online support <http://support.asus.com/techserv/techserv.aspx>

* EUR 0.14/minute from a German fixed landline; EUR 0.42/minute from a mobile phone.

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2. 1077(a)



Responsible Party Name: **Asus Computer International**

Address: **800 Corporate Way, Fremont, CA 94539.**

Phone/Fax No: **(510)739-3777/(510)608-4555**

hereby declares that the product

Product Name : Motherboard

Model Number : KGNH-D16

Conforms to the following specifications:

- FCC Part 15, Subpart B, Unintentional Radiators
- FCC Part 15, Subpart C, Intentional Radiators
- FCC Part 15, Subpart E, Intentional Radiators

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Representative Person's Name : Steve Chang / President

Signature : _____
Date : Jul. 19, 2010

EC Declaration of Conformity



We, the undersigned,

Manufacturer: **ASUSTAR COMPUTER INC.**
Address, City: **No. 150, LI-TE RD., PEITOU, TAIPEI 112, TAIWAN R.O.C.**
Country: **TAIWAN**
Authorized representative in Europe: **ASUS COMPUTER GmbH**
Address, City: **HARKORT STR. 21-23, 40880 RATINGEN**
Country: **GERMANY**

declare the following apparatus:

Product name : **Motherboard**
Model name : **KGNH-D16**

conform with the essential requirements of the following directives:

2004/109/EC-EMC Directive
 EN 55022:2006-A1:2007
 EN 61000-3-2:2006
 EN 55013:2001+A1:2003-A2:2006
 EN 55024:1998+A1:2001+A2:2003
 EN 61000-3-3:2008
 EN 55020:2007

1999/5/EC-R&TTE Directive

EN 300 338 V1.7.1(2006-05)
 EN 300 338 V1.7.1(2006-05)
 EN 300 440-2 V1.2.1(2006-03)
 EN 300 440-2 V1.2.1(2006-03)
 EN 301 511 V9.0.2(2003-03)
 EN 301 511 V9.0.2(2003-03)
 EN 301 908-A V3.2.1(2007-05)
 EN 301 908-A V3.2.1(2007-05)
 EN 301 883 V1.4.1(2005-03)
 EN 301 883 V1.4.1(2005-03)
 EN 50660:2001
 EN 50660:2001
 EN 50371:2002
 EN 50371:2002
 EN 50685:2002
 EN 50685:2002

2006/65/EC-LVD Directive

EN 60950:12001+A11:2004
 EN 60950:12001
 EN 60950-1:2006
 EN 60950-1:2006
 EN 60950-1:2006+A11:2009
 EN 60605:2002-A:12008
 EN 60605:2002-A:12008

2009/125/EC-ErP Directive

Regulation (EC) No. 1275/2008
 EN 62301:2005
 EN 62301:2005
Regulation (EC) No. 642/2009
 EN 62301:2005
 EN 62301:2005

CE marking



(EC conformity marking)

Position : **CEO**
Name : **Jerry Shen**

Signature : _____

Declaration Date: **Jul. 19, 2010**
Year to begin affixing CE marking: **2010**

DECLARATION OF CONFORMITY

Per FCC Part 2 Section 2.1077(a)



Responsible Party Name: **Asus Computer International**

Address: **800 Corporate Way, Fremont, CA 94539.**

Phone/Fax No: **(510)739-3777/(510)608-4555**

hereby declares that the product

Product Name : Motherboard

Model Number : KGMH-D16/QDR

Conforms to the following specifications:

- FCC Part 15, Subpart B, Unintentional Radiators
- FCC Part 15, Subpart C, Intentional Radiators
- FCC Part 15, Subpart E, Intentional Radiators

Supplementary Information:

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Representative Person's Name : Steve Chang / President

Steve Chang

Signature :

Date : Jul. 19, 2010

EC Declaration of Conformity



We, the undersigned,

Manufacturer : **ASUSTEK COMPUTER INC.**
Address, City : **No. 150, LITE RD., PEITOU, TAIPEI 112, TAIWAN R.O.C.**
Country : **TAIWAN**
Authorized representative in Europe: **ASUS COMPUTER GmbH**
Address, city: **HARKORT STR. 21-23, 40880 RATINGEN**
Country: **GERMANY**

declare the following apparatus:

Product name : **Motherboard**
Model name : **KGMH-D16/QDR**

conform with the essential requirements of the following directives:

2004/10/EC-EMC Directive
 EN 55022:2007
 EN 61000-3-2:2006
 EN 55013:2001+A1:2003+A2:2006
 EN 55020:2007

1999/05/EC-RTTE Directive

EN 300 328 V1.7.1(2006-05)
 EN 300 440-1 V1.4.1(2006-05)
 EN 301 486-3 V1.3.1(2006-05)
 EN 301 519-A1 V2.0(2006-05)
 EN 301 908-1 V3.2.1(2007-05)
 EN 301 908-2 V3.2.1(2007-05)
 EN 301 893 V1.4.1(2005-03)
 EN 301 893 V1.4.1(2005-03)
 EN 50271:2002
 EN 62311:2008
 EN 50985:2002

2006/05/EC-LVD Directive

EN 60950-1:2001+A11:2004
 EN 60950-1:2006
 EN 60950-1:2006+A11:2009

2009/12/EC-ERP Directive

Regulation (EC) No. 1275/2008
 EN 62301:2005
Regulation (EC) No. 642/2009
 EN 62301:2005



(EC conformity marking)

Position : **CEO**
Name : **Jerry Shen**

Jerry Shen

Signature : _____

Declaration Date: **Jul. 19, 2010**
Year to begin affixing CE marking: **2010**

