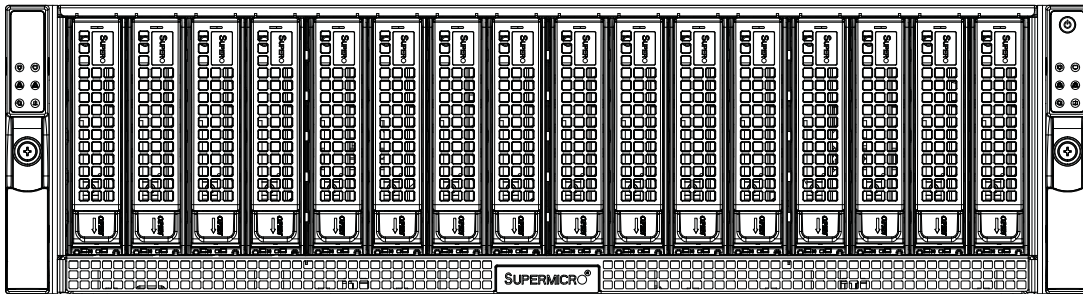


# SUPERO®

## SUPER STORAGE SYSTEM

### 6037B-DE2R16L



## USER'S MANUAL

1.0

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Manual Revision 1.0

Release Date: December 26, 2013

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## Preface

### About This Manual

This manual is written for professional system integrators and PC technicians. It provides information for the installation and use of the 6037B-DE2R16L. Installation and maintenance should be performed by experienced technicians only.

The 6037B-DE2R16L is a high-end storage server solution based on the SC937 3U rackmount chassis and the X9DBS-F dual processor serverboard.

### Manual Organization

#### Chapter 1: Introduction

The first chapter provides a checklist of the main components included with the server system and describes the main features of the X9DBS-F serverboard and the SC937ETS-R1200NDBP chassis.

#### Chapter 2: Server Installation

This chapter describes the steps necessary to install the 6037B-DE2R16L into a rack and check out the server configuration prior to powering up the system. If your server was ordered without processor and memory components, this chapter will refer you to the appropriate sections of the manual for their installation.

#### Chapter 3: System Interface

Refer here for details on the system interface, which includes the functions and information provided by the control panels on the chassis as well the HDD carrier LEDs.

#### Chapter 4: Standardized Warning Statements

You should thoroughly familiarize yourself with this chapter for a general overview of safety precautions that should be followed when installing and servicing the 6037B-DE2R16L.

## **Chapter 5: Advanced Serverboard Setup**

Chapter 5 provides detailed information on the X9DBS-F serverboard, including the locations and functions of connections, headers and jumpers. Refer to this chapter when adding or removing processors or main memory and when reconfiguring the serverboard.

## **Chapter 6: Advanced Chassis Setup**

Refer to Chapter 6 for detailed information on the SC937 server chassis. You should follow the procedures given in this chapter when installing, removing or reconfiguring SAS/SATA or peripheral drives and when replacing system power supply units and cooling fans.

## **Chapter 7: BIOS**

The BIOS chapter includes an introduction to BIOS and provides detailed information on running the CMOS Setup Utility.

## **Appendix A: BIOS Error Beep Codes**

## **Appendix B: System Specifications**



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# Chapter 1

## Introduction

### 1-1 Overview

The 6037B-DE2R16L is a high-end Super Storage Bridge Bay (SBB) system comprised of two main subsystems: the SC937ETS-R1200NDBP chassis and two X9DBS-F dual processor serverboards. Please refer to our web site for information on operating systems that have been certified for use with the system ([www.supermicro.com](http://www.supermicro.com)).

In addition to the serverboard and chassis, various hardware components have been included with the 6037B-DE2R16L, as listed below. Quantities indicate the number included in the whole system (two nodes).

- Four passive CPU heatsinks (2x SNK-P0037P, 2x SNK-P0038P))
- Twelve 4-cm fans (FAN-0088L4)
- Two KVM cables (CBL-0218L)
- SAS/SATA Accessories
  - One SAS midplane (BPN-SAS-937)
  - Sixteen hard drive carriers (MCP-220-93703-0B)
- Two riser cards for PCI-Express 3.0 expansion cards (RSC-R2US-3E8R)
- Two SAS controller mezzanine cards (one per node) (AOM-S2308-L8i-SB)
- One set of rackmount hardware (MCP-290-00057-ON)

**Note:** For your system to work properly, please follow the links below to download all necessary drivers/utilities and the user's manual for your server.

- Supermicro product manuals: <http://www.supermicro.com/support/manuals/>
- Product drivers and utilities: <ftp://ftp.supermicro.com>
- Product safety info: [http://super-dev/about/policies/safety\\_information.cfm](http://super-dev/about/policies/safety_information.cfm)
- If you have any questions, please contact our support team at: [support@supermicro.com](mailto:support@supermicro.com)

## 1-2 Serverboard Features

The 6037B-DE2R16L is built around two X9DBS-F serverboards for a dual-node system that shares storage resources as well as features a dedicated PCI-E bus between server nodes for High Availability (HA), Cluster in a Box (CiB) applications. The X9DBS-F is a dual processor serverboard based on the Intel® C602J chipset. Below are the main features of the X9DBS-F. (See Figure 1-1 for a block diagram of the chipset).

### Processors

The X9DBS-F supports single or dual Intel® Xeon E5-2400 of up to 95W in B2 type sockets. Two X9DBS-F boards are included in the storage system. Please refer to the serverboard description pages on our web site for a complete listing of supported processors ([www.supermicro.com](http://www.supermicro.com)).

### Memory

Each X9DBS-F has six DIMM slots that can support up to 192 GB of Registered (RDIMM) ECC/Non-ECC DDR3-1866/1600/1333/1066/800 memory. See Chapter 5 for details.

### SAS Disk Controller

Two external SAS 2.0 ports are supported by a disk controller on a mezzanine included on each X9DBS-F (four total per system).

### SAS Expander

One 36-port SAS expander is integrated into the X9DBS-F board.

### SATA

Each X9DBS-F has two SATA 3.0 ports with power headers to support two SATA Disk-on-Module (SATA DOM) devices per node. RAID 0 and 1 are supported.

### NTB Connectivity

Non Transparent Bridge connectivity featuring 8 lanes of PCI-E 3.0 between server nodes.

### PCI Expansion Slots

Each X9DBS-F features one PCI-E 3.0 x24 slot for riser card support.

## **Rear Chassis Ports**

The rear of each serverboard includes two mini SAS HD ports, two 1 GB Ethernet ports and a KVM connector (includes USB, VGA and COM ports).

## **Graphics Controller**

The X9DBS-F features an integrated Matrox G200eW video controller. The G200eW is a 2D/3D/video accelerator chip with a 128-bit core.

# **1-3 Server Chassis Features**

## **System Power**

The 6037B-DE2R16L features a redundant Platinum Level 920W power supply composed of two separate power modules. This power redundancy feature allows you to replace a failed power module without shutting down the system.

## **SAS Subsystem**

The 6037B-DE2R16L supports up to 16 3.5" SAS drives. These drives are hot-swappable units and are connected to a midplane that provides power and control.

## **Front Control Panel**

Two control panels are included on each end of the 6037B-DE2R16L to provide you with system monitoring and control. LEDs indicate system power, network (NIC) activity, system overheat and power supply failure. Each set of LEDs are associated with the node/serverboard on the same side of the chassis. A single power button is located on the right side control panel. When pressed, both nodes will power on or off.

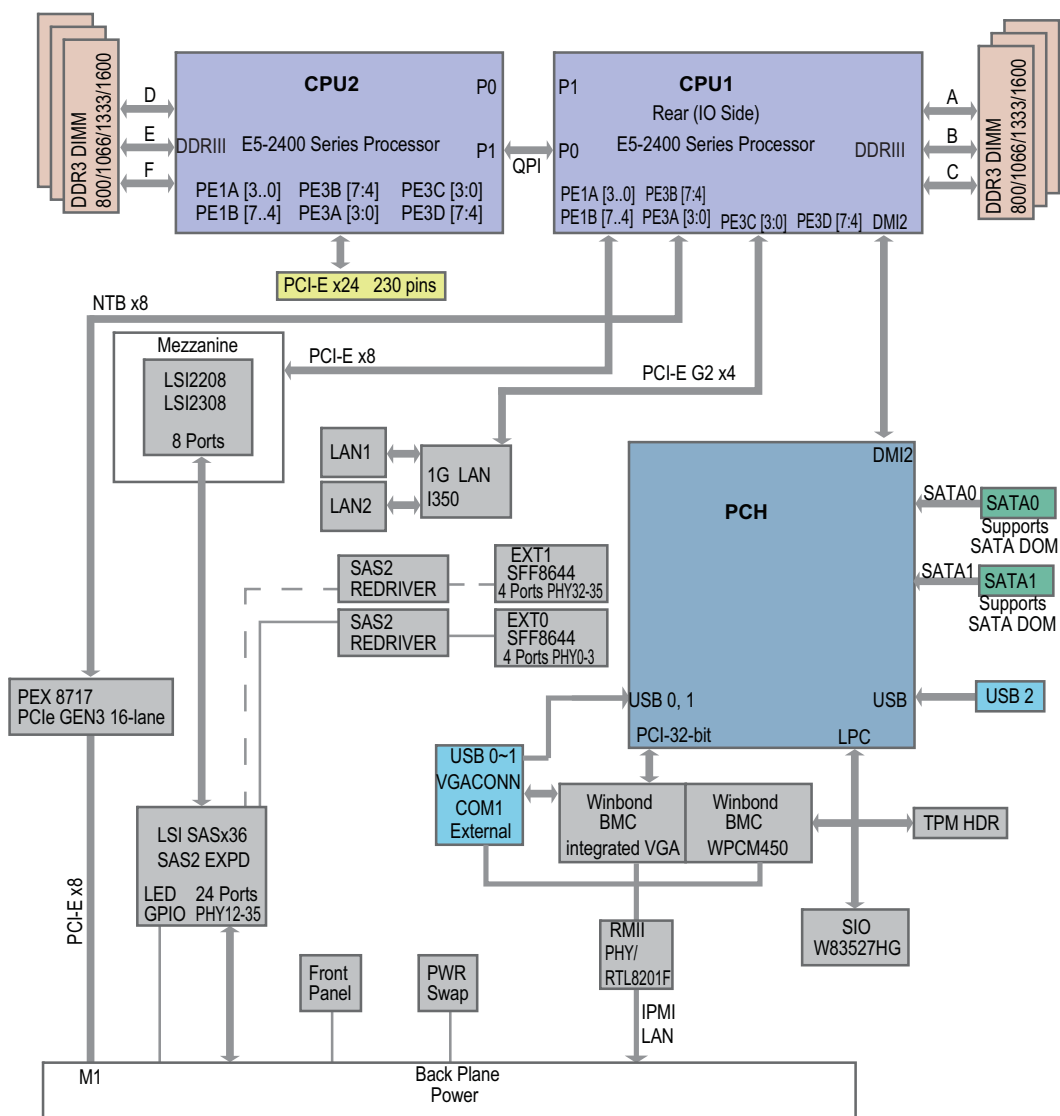
## **Cooling System**

The 6037B-DE2R16L chassis has 12 4-cm counter-rotating fans: six at the front and another six at the rear of each node. This counter-rotating action works to dampen vibration levels while generating exceptional airflow.

Another set of back-to-back fans are also located on each serverboard in front of the CPU2 socket. Each power supply module also includes a cooling fan.

**Figure 1-1. Intel C602J Chipset:  
System Block Diagram**

Note: This is a general block diagram. Please see Chapter 5 for details.





## 1-4 Contacting Supermicro

### Headquarters

Address: Super Micro Computer, Inc.  
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San Jose, CA 95131 U.S.A.

Tel: +1 (408) 503-8000

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Tel: +886-(2) 8226-3990

Fax: +886-(2) 8226-3992

Web Site: [www.supermicro.com.tw](http://www.supermicro.com.tw)

Technical Support:

Email: [support@supermicro.com.tw](mailto:support@supermicro.com.tw)

Tel: +886-(2)-8226-3990

## 1-5 SBB: Storage Bridge Bay

The 6037B-DE2R16L Super SBB was designed to function as a fully redundant, fault-tolerant "cluster-in-a-box" system. The standard support for 16 3.5" hot-swap HDDs (SAS1 or SAS2) may be expanded to support additional storage with the optional SBB JBOD SYS-937R-E2JB configuration.

The Super SBB provides hot-swappable canisters for all active components. Each of the two serverboard canisters support dual-processors, 6 DIMM slots, 3 PCI-E Gen2 slots and 6 Gbps SAS (SAS2). The 6037B-DE2R16L features eight lanes of PCI-E 3.0 connecting the left server module with the right server module. This connection is used for high speed data transfers between nodes for High Availability/server fail-over. This fail-over capability is fully dependent on the software/OS installed and how the chosen software uses the connection (Active-Active or Active-Passive). 6037B-DE2R16L hardware is supplied without a storage OS or fail-over software.

Equipped with 920W 80PLUS Platinum Level redundant power supplies and redundant cooling fans, the 6026ST-6LR offers fully redundant high-availability while maintaining energy efficient operation.

## Chapter 2

### Server Installation

#### 2-1 Overview

This chapter provides a quick setup checklist to get your 6037B-DE2R16L up and running. Following these steps in the order given should enable you to have the system operational within a minimum amount of time. This quick setup assumes that your system has come to you with the processors and memory preinstalled. If your system is not already fully integrated with a serverboard, processors, system memory etc., please turn to the chapter or section noted in each step for details on installing specific components.

#### 2-2 Unpacking the System

You should inspect the box the 6037B-DE2R16L was shipped in and note if it was damaged in any way. If the server itself shows damage you should file a damage claim with the carrier who delivered it.

Decide on a suitable location for the rack unit that will hold the 6037B-DE2R16L. It should be situated in a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. You will also need it placed near a grounded power outlet. Read the Rack and Server Precautions in the next section.

#### 2-3 Preparing for Setup

The box the 6037B-DE2R16L was shipped in should include two sets of rail assemblies, two rail mounting brackets and the mounting screws you will need to install the system into the rack. Follow the steps in the order given to complete the installation process in a minimum amount of time. Please read this section in its entirety before you begin the installation procedure outlined in the sections that follow.

##### Choosing a Setup Location

- Leave enough clearance in front of the rack to enable you to open the front door completely (~25 inches) and approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and ease in servicing.

- This product is for installation only in a Restricted Access Location (dedicated equipment rooms, service closets and the like).
- This product is not suitable for use with visual display work place devices according to §2 of the the German Ordinance for Work with Visual Display Units.

## 2-4 Warnings and Precautions

### Rack Precautions

- Ensure that the leveling jacks on the bottom of the rack are fully extended to the floor with the full weight of the rack resting on them.
- In single rack installation, stabilizers should be attached to the rack. In multiple rack installations, the racks should be coupled together.
- Always make sure the rack is stable before extending a component from the rack.
- You should extend only one component at a time - extending two or more simultaneously may cause the rack to become unstable.

### Server Precautions

- Review the electrical and general safety precautions in Chapter 4.
- Determine the placement of each component in the rack *before* you install the rails.
- Install the heaviest server components on the bottom of the rack first, and then work up.
- Use a regulating uninterruptible power supply (UPS) to protect the server from power surges, voltage spikes and to keep your system operating in case of a power failure.
- Allow any hot plug drives and power supply modules to cool before touching them.
- Always keep the rack's front door and all panels and components on the servers closed when not servicing to maintain proper cooling.

## Rack Mounting Considerations

### ***Ambient Operating Temperature***

If installed in a closed or multi-unit rack assembly, the ambient operating temperature of the rack environment may be greater than the ambient temperature of the room. Therefore, consideration should be given to installing the equipment in an environment compatible with the manufacturer's maximum rated ambient temperature (Tmra).

### ***Reduced Airflow***

Equipment should be mounted into a rack so that the amount of airflow required for safe operation is not compromised.

### ***Mechanical Loading***

Equipment should be mounted into a rack so that a hazardous condition does not arise due to uneven mechanical loading.

### ***Circuit Overloading***

Consideration should be given to the connection of the equipment to the power supply circuitry and the effect that any possible overloading of circuits might have on overcurrent protection and power supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

### ***Reliable Ground***

A reliable ground must be maintained at all times. To ensure this, the rack itself should be grounded. Particular attention should be given to power supply connections other than the direct connections to the branch circuit (i.e. the use of power strips, etc.).



**Warning!** To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

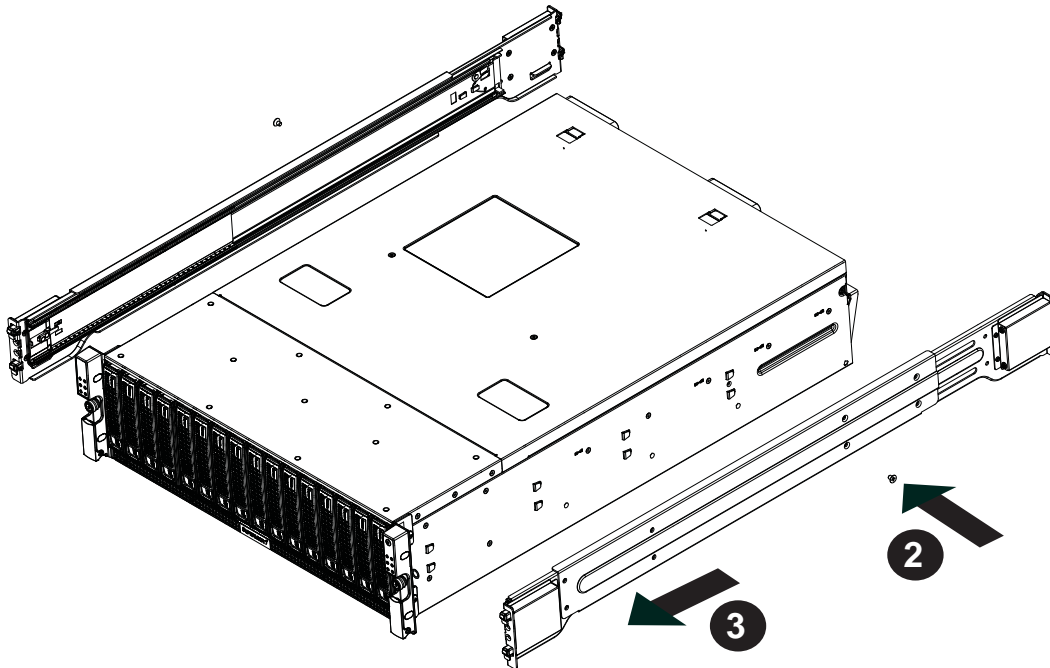
## 2-5 Installing the System into a Rack

This section provides information on installing the SC937 chassis into a rack unit with the quick-release rails provided. There are a variety of rack units on the market, which may mean the assembly procedure will differ slightly. You should also refer to the installation instructions that came with the rack unit you are using.

### Installing the Inner Rack Rails

#### *Installing the Inner Rails*

1. Extend the inner rail toward the front of the rail assembly as far as possible, then depress the locking tab to pull it completely out.
2. Place the inner rail on the side of the chassis aligning the hooks of the chassis with the rail extension holes.
3. Slide the extension toward the front of the chassis.
4. You may secure the chassis with screws if desired.
5. Repeat steps 1-3 for the other inner rail.



**Figure 2-1. Installing the Outer Rack Rails**



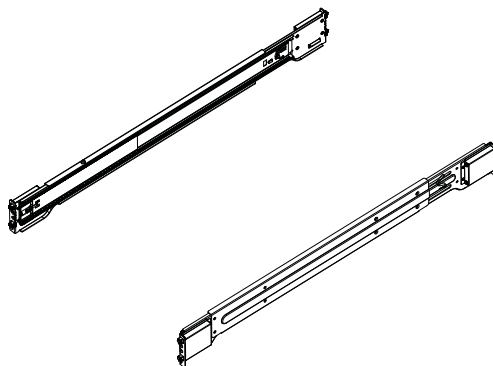
**Warning:** Do not pick up the server with the front handles. They are designed to pull the system from a rack only.

## Installing the Outer Rack Rails

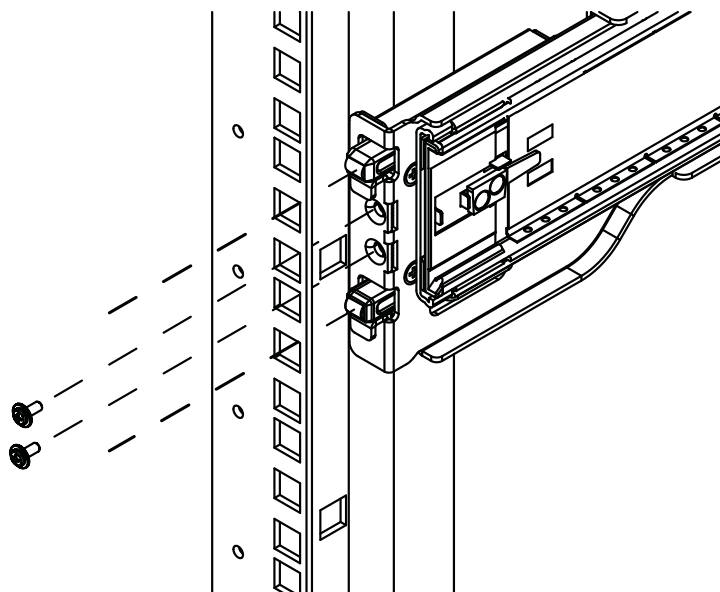
Outer rails attach to the server rack and hold the server in place. The outer rails for the SC937 chassis extend between 30 inches and 33 inches.

### *Installing the Outer Rails*

1. Attach the right outer rail to the rack by inserting the hooks included on the rails into the holes provided on the rack.
2. If desired, screw the rails to the chassis for added support.
3. Repeat these steps for the left outer rail.



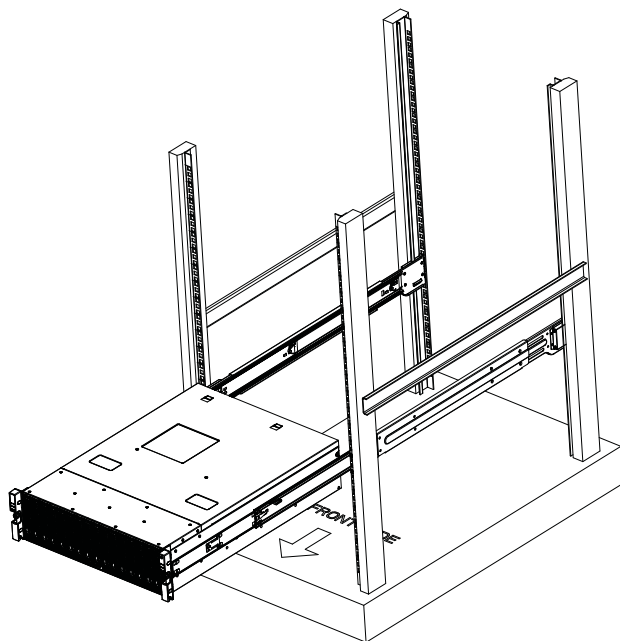
**Figure 2-2. Outer Rack Rails**



**Figure 2-3. Outer Rack Rail Install**



Stability hazard. The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you slide the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.



**Figure 2-3. Installing the Chassis into the Rack**

## **Installing the Chassis into a Rack**

### ***Installing into a Rack***

1. Confirm that the inner and outer rails are properly installed.
2. Line up the inner (chassis) rails with the front of the outer (rack) rails.
3. Slide the chassis rails into the rack rails, keeping the pressure even on both sides (you may have to depress the locking tabs when inserting). When the server has been pushed completely into the rack, you should hear the locking tabs "click" into position.
4. (Optional) Insert and tighten the thumbscrews that hold the front of the server to the rack.

**Note:** Figure is for illustrative purposes only. Always install servers to the bottom of a rack first.



## Chapter 3

# System Interface

### 3-1 Overview

There are several LEDs on two control panels as well as others on the drive carriers to keep you constantly informed of the overall status of the system as well as the activity and health of specific components. A main power button is also located on the right side (only) control panel.

### 3-2 Control Panel Button



#### Power

The single button located on the right control panel is the power on/off button. Depressing this button will either power both nodes on or off. Turning off system power with this button removes the main power but keeps standby power supplied to the system.

### 3-3 Control Panel LEDs

The two control panels located on the front of the chassis have several LEDs. With the exception of the power fail LED, these LEDs provide you with critical information related to the node on the same side of the chassis. This section explains what each LED indicates when illuminated and any corrective action you may need to take.



#### Power Fail

Indicates a power supply module has failed. The second power supply module will take the load and keep the system running but the failed module will need to be replaced. Refer to Chapter 6 for details on replacing the power supply. This LED should be off when the system is operating normally.

**Overheat/Fan Fail:**

When this LED flashes, it indicates a fan failure. When on continuously it indicates an overheat condition, which may be caused by cables obstructing the airflow in the system or the ambient room temperature being too warm. Check the routing of the cables and make sure all fans are present and operating normally. You should also check to make sure that the chassis covers are installed. Finally, verify that the heatsinks are installed properly (see Chapter 5). This LED will remain flashing or on as long as the indicated condition exists.

**NIC1**

Indicates network activity on the LAN1 port when flashing.

**NIC2**

Indicates network activity on the LAN2 port when flashing.

**Heartbeat**

On the SuperServer 6037B-DE2R16L, this is a serverboard heartbeat LED and indicates that power is being supplied to the serverboard.



## **Power**

Indicates power is being supplied to the system's power supply units. This LED should normally be illuminated when the system is operating.

### **3-4 Drive Carrier LEDs**

Each drive carrier has two LEDs:

- **Green:** When illuminated, the green LED on the drive carrier indicates the drive is powered on. If this LED is not lit, it means no power is being provided for the drive. Please refer to Chapter 6 for instructions on replacing failed drives.
- **Red:** A steady red LED indicates a drive failure. If one of the drives fails, you should be notified by your system management software. Please refer to Chapter 6 for instructions on replacing failed drives. If this LED flashes ~ once per second (1 Hz) it indicates RAID rebuilding activity.

**Notes**

## Chapter 4

### Standardized Warning Statements for AC Systems

#### 4-1 About Standardized Warning Statements

The following statements are industry standard warnings, provided to warn the user of situations which have the potential for bodily injury. Should you have questions or experience difficulty, contact Supermicro's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this appendix in its entirety before installing or configuring components in the Supermicro chassis.

These warnings may also be found on our web site at [http://www.supermicro.com/about/policies/safety\\_information.cfm](http://www.supermicro.com/about/policies/safety_information.cfm).

#### Warning Definition



##### Warning!

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents.

##### 警告の定義

この警告サインは危険を意味します。

人身事故につながる可能性がありますので、いずれの機器でも動作させる前に、電気回路に含まれる危険性に注意して、標準的な事故防止策に精通して下さい。

此警告符号代表危險。

您正处于可能受到严重伤害的工作环境中。在您使用设备开始工作之前，必须充分意识到触电的危险，并熟练掌握防止事故发生的标准工作程序。请根据每项警告结尾的声明号码找到此设备的安全性警告说明的翻译文本。

此警告符號代表危險。

您正處於可能身體可能會受損傷的工作環境中。在您使用任何設備之前，請注意觸電的危險，並且要熟悉預防事故發生的標準工作程序。請依照每一注意事項後的號碼找到相關的翻譯說明內容。

## Warnung

### WICHTIGE SICHERHEITSHINWEISE

Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu Verletzungen führen kann. Machen Sie sich vor der Arbeit mit Geräten mit den Gefahren elektrischer Schaltungen und den üblichen Verfahren zur Vorbeugung vor Unfällen vertraut. Suchen Sie mit der am Ende jeder Warnung angegebenen Anweisungsnummer nach der jeweiligen Übersetzung in den übersetzten Sicherheitshinweisen, die zusammen mit diesem Gerät ausgeliefert wurden.

BEWAHREN SIE DIESE HINWEISE GUT AUF.

### INSTRUCCIONES IMPORTANTES DE SEGURIDAD

Este símbolo de aviso indica peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considere los riesgos de la corriente eléctrica y familiarícese con los procedimientos estándar de prevención de accidentes. Al final de cada advertencia encontrará el número que le ayudará a encontrar el texto traducido en el apartado de traducciones que acompaña a este dispositivo.

GUARDE ESTAS INSTRUCCIONES.

### IMPORTANTES INFORMATIONS DE SÉCURITÉ

Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant entraîner des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers liés aux circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions des avertissements figurant dans les consignes de sécurité traduites qui accompagnent cet appareil, référez-vous au numéro de l'instruction situé à la fin de chaque avertissement.

CONSERVEZ CES INFORMATIONS.

## תקנון הזהרות אזהרה

הזהרות הבאות הן אזהרות על פי תקני התעשייה, על מנת להזהיר את המשתמש מפני חבלה פיזית אפשרית. במידה ויש שאלות או היתקלות בבעיה כלשהי, יש ליצור קשר עם מחלקת תמיכה טכנית של סופרמיקרו. טכנאים מוסמכים בלבד רשאים להתקין או להגדיר את הרכיבים.

יש לקרוא את הנספח במלואו לפני התקנת או הגדרת הרכיבים במארזי סופרמיקרו.

تحذير! هذا الرمز يعني خطر انك في حالة يمكن أن تتسبب في اصابة جسدية .  
قبل أن تعمل على أي معدات، كن على علم بالمخاطر الناجمة عن الدوائر  
الكهربائية  
وكن على دراية بالممارسات الوقائية لمنع وقوع أي حوادث  
استخدم رقم البيان المنصوص في نهاية كل تحذير للعثور ترجمتها

안전을 위한 주의사항

경고!

이 경고 기호는 위험이 있음을 알려 줍니다. 작업자의 신체에 부상을 야기 할 수 있는 상태에 있게 됩니다. 모든 장비에 대한 작업을 수행하기 전에 전기회로와 관련된 위험요소들을 확인하시고 사전에 사고를 방지할 수 있도록 표준 작업절차를 준수해 주시기 바랍니다.

해당 번역문을 찾기 위해 각 경고의 마지막 부분에 제공된 경고문 번호를 참조하십시오

#### **BELANGRIJKE VEILIGHEIDSINSTRUCTIES**

Dit waarschuwings symbool betekent gevaar. U verkeert in een situatie die lichamelijk letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij een elektrische installatie betrokken risico's en dient u op de hoogte te zijn van de standaard procedures om ongelukken te voorkomen. Gebruik de nummers aan het eind van elke waarschuwing om deze te herleiden naar de desbetreffende locatie.

#### **BEWAAR DEZE INSTRUCTIES**

## Installation Instructions



### Warning!

Read the installation instructions before connecting the system to the power source.

設置手順書

システムを電源に接続する前に、設置手順書をお読み下さい。

警告

将此系统连接电源前, 请先阅读安装说明。

警告

將系統與電源連接前，請先閱讀安裝說明。

Warnung

Vor dem Anschließen des Systems an die Stromquelle die Installationsanweisungen lesen.

¡Advertencia!

Lea las instrucciones de instalación antes de conectar el sistema a la red de alimentación.

Attention

Avant de brancher le système sur la source d'alimentation, consulter les directives d'installation.

יש לקרוא את הוראות התקנה לפני חיבור המערכת למקור מתח.

اقر إرشادات التركيب قبل توصيل النظام إلى مصدر للطاقة

시스템을 전원에 연결하기 전에 설치 안내를 읽어주십시오.

Waarschuwing

Raadpleeg de installatie-instructies voordat u het systeem op de voedingsbron aansluit.



## Circuit Breaker



### Warning!

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective device is rated not greater than: 250 V, 20 A.

サーキット・ブレーカー

この製品は、短絡(過電流)保護装置がある建物での設置を前提としています。

保護装置の定格が250 V、20 Aを超えないことを確認下さい。

### 警告

此产品的短路(过载电流)保护由建筑物的供电系统提供,确保短路保护设备的额定电流不大于250V,20A。

### 警告

此產品的短路(過載電流)保護由建築物的供電系統提供,確保短路保護設備的額定電流不大於250V,20A。

### Warnung

Dieses Produkt ist darauf angewiesen, dass im Gebäude ein Kurzschluss- bzw. Überstromschutz installiert ist. Stellen Sie sicher, dass der Nennwert der Schutzvorrichtung nicht mehr als: 250 V, 20 A beträgt.

### ¡Advertencia!

Este equipo utiliza el sistema de protección contra cortocircuitos (o sobrecorrientes) del edificio. Asegúrese de que el dispositivo de protección no sea superior a: 250 V, 20 A.

### Attention

Pour ce qui est de la protection contre les courts-circuits (surtension), ce produit dépend de l'installation électrique du local. Vérifiez que le courant nominal du dispositif de protection n'est pas supérieur à :250 V, 20 A.

מוצר זה מסתמך על הגנה המותקנת במבנים למניעת קצר חשמלי. יש לוודא  
המכשיר המגן מפני הקצר החשמלי הוא לא יותר מ-20A, 60VDC

هذا المنتج يعتمد على معدات الحماية من الدوائر القصيرة التي تم تثبيتها في  
المبنى

تأكد من أن تقييم الجهاز الوقائي ليس أكثر من: 20A, 250VDC

**경고!**

이 제품은 전원의 단락(과전류)방지에 대해서 전적으로 건물의 관련 설비에 의존합니다. 보호장치의 정격이 반드시 250V(볼트), 20A(암페어)를 초과하지 않도록 해야 합니다.

**Waarschuwing**

Dit product is afhankelijk van de kortsluitbeveiliging (overspanning) van uw elektrische installatie. Controleer of het beveiligde apparaat niet groter gedimensioneerd is dan 220V, 20A.

**Power Disconnection Warning**



**Warning!**

The system must be disconnected from all sources of power and the power cord removed from the power supply module(s) before accessing the chassis interior to install or remove system components.

**電源切断の警告**

システムコンポーネントの取り付けまたは取り外しのために、シャーシー内部にアクセスするには、

システムの電源はすべてのソースから切断され、電源コードは電源モジュールから取り外す必要があります。

**警告**

在你打开机箱并安装或移除内部器件前,必须将系统完全断电,并移除电源线。

**警告**

在您打開機殼安裝或移除內部元件前，必須將系統完全斷電，並移除電源線。

**Warnung**

Das System muss von allen Quellen der Energie und vom Netzanschlusskabel getrennt sein, das von den Spg.Versorgungsteilmodulen entfernt wird, bevor es auf den Chassisinnenraum zurückgreift, um Systemsbestandteile anzubringen oder zu entfernen.

¡Advertencia!

El sistema debe ser disconnected de todas las fuentes de energía y del cable eléctrico quitado de los módulos de fuente de alimentación antes de tener acceso el interior del chasis para instalar o para quitar componentes de sistema.

Attention

Le système doit être débranché de toutes les sources de puissance ainsi que de son cordon d'alimentation secteur avant d'accéder à l'intérieur du châssis pour installer ou enlever des composants de système.

**אזהרה !**

יש לנתק את המערכת מכל מקורות החשמל ויש להסיר את כבל החשמלי מהספק לפני גישה לחלק הפנימי של המארז לצורך התקנת או הסרת רכיבים.

يجب فصل النظام من جميع مصادر الطاقة وإزالة سلك الكهرباء من وحدة امداد الطاقة قبل الوصول إلى المناطق الداخلية للهيكल لتثبيت أو إزالة مكونات الجهاز

경고!

시스템에 부품들을 장착하거나 제거하기 위해서는 새시 내부에 접근하기 전에 반드시 전원 공급장치로부터 연결되어있는 모든 전원과 전기코드를 분리해주어야 합니다.

Waarschuwing

Voordat u toegang neemt tot het binnenwerk van de behuizing voor het installeren of verwijderen van systeem onderdelen, dient u alle spanningsbronnen en alle stroomkabels aangesloten op de voeding(en) van de behuizing te verwijderen

## Equipment Installation



### Warning!

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

### 機器の設置

トレーニングを受け認定された人だけがこの装置の設置、交換、またはサービスを許可されています。

### 警告

只有经过培训且具有资格的人员才能进行此设备的安装、更换和维修。

### 警告

只有經過受訓且具資格人員才可安裝、更換與維修此設備。

### Warnung

Das Installieren, Ersetzen oder Bedienen dieser Ausrüstung sollte nur geschultem, qualifiziertem Personal gestattet werden.

### ¡Advertencia!

Solamente el personal calificado debe instalar, reemplazar o utilizar este equipo.

### Attention

Il est vivement recommandé de confier l'installation, le remplacement et la maintenance de ces équipements à des personnels qualifiés et expérimentés.

### אזהרה !

צוות מוסמך בלבד רשאי להתקין, להחליף את הציוד או לתת שירות עבור הציוד.

يجب أن يسمح فقط للموظفين المؤهلين والمدربين لت تركيب واستبدال أو خدمة هذا الجهاز

### 경고!

훈련을 받고 공인된 기술자만이 이 장비의 설치, 교체 또는 서비스를 수행할 수 있습니다.

### Waarschuwing

Deze apparatuur mag alleen worden geïnstalleerd, vervangen of hersteld door geschoold en gekwalificeerd personeel.

## Restricted Area



### Warning!

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. (This warning does not apply to workstations).

### アクセス制限区域

このユニットは、アクセス制限区域に設置されることを想定しています。

アクセス制限区域は、特別なツール、鍵と錠前、その他のセキュリティの手段を用いてのみ出入りが可能です。

### 警告

此部件应安装在限制进出的场所，限制进出的场所指只能通过使用特殊工具、锁和钥匙或其它安全手段进出的场所。

### 警告

此裝置僅限安裝於進出管制區域，進出管制區域係指僅能以特殊工具、鎖頭及鑰匙或其他安全方式才能進入的區域。

### Warnung

Diese Einheit ist zur Installation in Bereichen mit beschränktem Zutritt vorgesehen. Der Zutritt zu derartigen Bereichen ist nur mit einem Spezialwerkzeug, Schloss und Schlüssel oder einer sonstigen Sicherheitsvorkehrung möglich.

### ¡Advertencia!

Esta unidad ha sido diseñada para instalación en áreas de acceso restringido. Sólo puede obtenerse acceso a una de estas áreas mediante la utilización de una herramienta especial, cerradura con llave u otro medio de seguridad.

### Attention

Cet appareil doit être installée dans des zones d'accès réservés. L'accès à une zone d'accès réservé n'est possible qu'en utilisant un outil spécial, un mécanisme de verrouillage et une clé, ou tout autre moyen de sécurité.

## אזור עם גישה מוגבלת

### אזהרה!

יש להתקין את היחידה באזורים שיש בהם הגבלת גישה. הגישה ניתנת בעזרת כלי אבטחה בלבד (מפתח, מנעול וכד').

تم تخصيص هذه الوحدة لتركيبها في مناطق محظورة .  
يمكن الوصول إلى منطقة محظورة فقط من خلال استخدام أداة خاصة،  
قفل ومفتاح أو أي وسيلة أخرى للأمان

경고!

이 장치는 접근이 제한된 구역에 설치하도록 되어있습니다. 특수도구, 잠금 장치 및 키, 또는 기타 보안 수단을 통해서만 접근 제한 구역에 들어갈 수 있습니다.

### Waarschuwing

Dit apparaat is bedoeld voor installatie in gebieden met een beperkte toegang. Toegang tot dergelijke gebieden kunnen alleen verkregen worden door gebruik te maken van speciaal gereedschap, slot en sleutel of andere veiligheidsmaatregelen.

## Battery Handling



### Warning!

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

### 電池の取り扱い

電池交換が正しく行われなかった場合、破裂の危険性があります。交換する電池はメーカーが推奨する型、または同等のものを使用下さい。使用済電池は製造元の指示に従って処分して下さい。

### 警告

電池更換不當會有爆炸危險。請只使用同類電池或製造商推薦的功能相當的電池更換原有電池。請按製造商的說明處理廢舊電池。

### 警告

電池更換不當會有爆炸危險。請使用製造商建議之相同或功能相當的電池更換原有電池。請按照製造商的說明指示處理廢棄舊電池。

**Warnung**

Bei Einsetzen einer falschen Batterie besteht Explosionsgefahr. Ersetzen Sie die Batterie nur durch den gleichen oder vom Hersteller empfohlenen Batterietyp. Entsorgen Sie die benutzten Batterien nach den Anweisungen des Herstellers.

**Attention**

Danger d'explosion si la pile n'est pas remplacée correctement. Ne la remplacer que par une pile de type semblable ou équivalent, recommandée par le fabricant. Jeter les piles usagées conformément aux instructions du fabricant.

**¡Advertencia!**

Existe peligro de explosión si la batería se reemplaza de manera incorrecta. Reemplazar la batería exclusivamente con el mismo tipo o el equivalente recomendado por el fabricante. Desechar las baterías gastadas según las instrucciones del fabricante.

**אזהרה !**

קיימת סכנת פיצוץ של הסוללה במידה והוחלפה בדרך לא תקינה. יש להחליף את הסוללה בסוג התואם מחברת יצרן מומלצת.

סילוק הסוללות המשומשות יש לבצע לפי הוראות היצרן.

هناك خطر من انفجار في حالة استبدال البطارية بطريقة غير صحيحة فعليك استبدال البطارية فقط بنفس النوع أو ما يعادلها كما أوصت به الشركة المصنعة تخلص من البطاريات المستعملة وفقا لتعليمات الشركة الصانعة

**경고!**

배터리가 올바르게 교체되지 않으면 폭발의 위험이 있습니다. 기존 배터리와 동일하거나 제조사에서 권장하는 동등한 종류의 배터리로만 교체해야 합니다. 제조사의 안내에 따라 사용된 배터리를 처리하여 주십시오.

**Waarschuwing**

Er is ontploffingsgevaar indien de batterij verkeerd vervangen wordt. Vervang de batterij slechts met hetzelfde of een equivalent type die door de fabrikant aanbevolen wordt. Gebruikte batterijen dienen overeenkomstig fabrieksvoorschriften afgevoerd te worden.

## Redundant Power Supplies



### Warning!

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit.

### 冗長電源装置

このユニットは複数の電源装置が接続されている場合があります。  
ユニットの電源を切るためには、すべての接続を取り外さなければなりません。

### 警告

此部件连接的电源可能不止一个，必须将所有电源断开才能停止给该部件供电。

### 警告

此裝置連接的電源可能不只一個，必須切斷所有電源才能停止對該裝置的供電。

### Warnung

Dieses Gerät kann mehr als eine Stromzufuhr haben. Um sicherzustellen, dass der Einheit kein Strom zugeführt wird, müssen alle Verbindungen entfernt werden.

### ¡Advertencia!

Puede que esta unidad tenga más de una conexión para fuentes de alimentación. Para cortar por completo el suministro de energía, deben desconectarse todas las conexiones.

### Attention

Cette unité peut avoir plus d'une connexion d'alimentation. Pour supprimer toute tension et tout courant électrique de l'unité, toutes les connexions d'alimentation doivent être débranchées.

### אם קיים יותר מספק אחד

### אזהרה!

ליחידה יש יותר מחיבור אחד של ספק. יש להסיר את כל החיבורים על מנת לרוקן את היחידה.



قد يكون لهذا الجهاز عدة اتصالات بوحدات امداد الطاقة.  
يجب إزالة كافة الاتصالات لعزل الوحدة عن الكهرباء

경고!

이 장치에는 한 개 이상의 전원 공급 단자가 연결되어 있을 수 있습니다. 이 장치에 전원을 차단하기 위해서는 모든 연결 단자를 제거해야만 합니다.

Waarschuwing

Deze eenheid kan meer dan één stroomtoevoeraansluiting bevatten. Alle aansluitingen dienen verwijderd te worden om het apparaat stroomloos te maken.

### Backplane Voltage



#### Warning!

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.

バックプレーンの電圧

システム稼働中は危険な電圧または電力が、バックプレーン上にかかっています。

修理する際にはご注意ください。

警告

当系统正在进行时，背板上有很危险的电压或能量，进行维修时务必小心。

警告

當系統正在進行時，背板上有危險的電壓或能量，進行維修時務必小心。

Warnung

Wenn das System in Betrieb ist, treten auf der Rückwandplatine gefährliche Spannungen oder Energien auf. Vorsicht bei der Wartung.

¡Advertencia!

Cuando el sistema está en funcionamiento, el voltaje del plano trasero es peligroso. Tenga cuidado cuando lo revise.

Attention

Lorsque le système est en fonctionnement, des tensions électriques circulent sur le fond de panier. Prendre des précautions lors de la maintenance.

## מתח בפנל האחורי

אזהרה !

קיימת סכנת מתח בפנל האחורי בזמן תפעול המערכת. יש להיזהר במהלך העבודה.

هناك خطر من التيار الكهربائي أو الطاقة الموجودة على اللوحة عندما يكون النظام يعمل كن حذرا عند خدمة هذا الجهاز

경고!

시스템이 동작 중일 때 후면판 (Backplane)에는 위험한 전압이나 에너지가 발생합니다. 서비스 작업 시 주의하십시오.

Waarschuwing

Een gevaarlijke spanning of energie is aanwezig op de backplane wanneer het systeem in gebruik is. Voorzichtigheid is geboden tijdens het onderhoud.

## Comply with Local and National Electrical Codes



### Warning!

Installation of the equipment must comply with local and national electrical codes.

地方および国の電気規格に準拠

機器の取り付けはその地方および国の電気規格に準拠する必要があります。

警告

设备安装必须符合本地与本国电气法规。

警告

設備安裝必須符合本地與本國電氣法規。

Warnung

Die Installation der Geräte muss den Sicherheitsstandards entsprechen.

¡Advertencia!

La instalacion del equipo debe cumplir con las normas de electricidad locales y nacionales.

#### Attention

L'équipement doit être installé conformément aux normes électriques nationales et locales.

#### תאום חוקי החשמל הארצי

אזהרה !

התקנת הציוד חייבת להיות תואמת לחוקי החשמל המקומיים והארציים.

تركيب المعدات الكهربائية يجب أن يمتثل للقوانين المحلية والوطنية المتعلقة بالكهرباء

경고!

현 지역 및 국가의 전기 규정에 따라 장비를 설치해야 합니다.

#### Waarschuwing

Bij installatie van de apparatuur moet worden voldaan aan de lokale en nationale elektriciteitsvoorschriften.

### Product Disposal



#### Warning!

Ultimate disposal of this product should be handled according to all national laws and regulations.

#### 製品の廃棄

この製品を廃棄処分する場合、国の関係する全ての法律・条例に従い処理する必要があります。

#### 警告

本产品的废弃处理应根据所有国家的法律和规章进行。

#### 警告

本產品的廢棄處理應根據所有國家的法律和規章進行。

#### Warnung

Die Entsorgung dieses Produkts sollte gemäß allen Bestimmungen und Gesetzen des Landes erfolgen.

¡Advertencia!

Al deshacerse por completo de este producto debe seguir todas las leyes y reglamentos nacionales.

Attention

La mise au rebut ou le recyclage de ce produit sont généralement soumis à des lois et/ou directives de respect de l'environnement. Renseignez-vous auprès de l'organisme compétent.

סילוק המוצר

אזהרה !

סילוק סופי של מוצר זה חייב להיות בהתאם להנחיות וחוקי המדינה.

عند التخلص النهائي من هذا المنتج ينبغي التعامل معه وفقا لجميع القوانين واللوائح الوطنية

경고!

이 제품은 해당 국가의 관련 법규 및 규정에 따라 폐기되어야 합니다.

Waarschuwing

De uiteindelijke verwijdering van dit product dient te geschieden in overeenstemming met alle nationale wetten en reglementen.

## Hot Swap Fan Warning



### Warning!

The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan assembly's housing.

ファン・ホットスワップの警告

シャーシから冷却ファン装置を取り外した際、ファンがまだ回転している可能性があります。ファンの開口部に、指、ドライバー、およびその他のものを近づけないで下さい。

警告

当您从机架移除风扇装置，风扇可能仍在转动。小心不要将手指、螺丝起子和其他物品太靠近风扇

**警告**

當您從機架移除風扇裝置，風扇可能仍在轉動。小心不要將手指、螺絲起子和其他物品太靠近風扇。

**Warnung**

Die Lüfter drehen sich u. U. noch, wenn die Lüfterbaugruppe aus dem Chassis genommen wird. Halten Sie Finger, Schraubendreher und andere Gegenstände von den Öffnungen des Lüftergehäuses entfernt.

**¡Advertencia!**

Los ventiladores podran dar vuelta cuando usted quite el montaje del ventilador del chasis. Mantenga los dedos, los destornilladores y todos los objetos lejos de las aberturas del ventilador

**Attention**

Il est possible que les ventilateurs soient toujours en rotation lorsque vous retirerez le bloc ventilateur du châssis. Prenez garde à ce que doigts, tournevis et autres objets soient éloignés du logement du bloc ventilateur.

**אזהרה !**

כאשר מסירים את חלקי המאוורר מהמארז, יתכן והמאווררים עדיין עובדים. יש להרחיק למרחק בטוח את האצבעות וכלי עבודה שונים מהפתחים בתוך המאוורר

من الممكن أن المراوح لا تزال تدور عند إزالة كتلة المروحة من الهيكل يجب إبقاء الأصابع ومفكات البراغي وغيرها من الأشياء بعيدا عن الفتحات في كتلة المروحة.

**경고!**

새시로부터 팬 조립품을 제거할 때 팬은 여전히 회전하고 있을 수 있습니다. 팬 조립품 외관의 열려있는 부분들로부터 손가락 및 스크류드라이버, 다른 물체들이 가까이 하지 않도록 배치해 주십시오.

**Waarschuwing**

Het is mogelijk dat de ventilator nog draait tijdens het verwijderen van het ventilatorsamenstel uit het chassis. Houd uw vingers, schroevendraaiers en eventuele andere voorwerpen uit de buurt van de openingen in de ventilatorbehuizing.

## Power Cable and AC Adapter



### Warning!

When installing the product, use the provided or designated connection cables, power cables and AC adaptors. Using any other cables and adaptors could cause a malfunction or a fire. Electrical Appliance and Material Safety Law prohibits the use of UL or CSA -certified cables (that have UL/CSA shown on the code) for any other electrical devices than products designated by Supermicro only.

### 電源コードとACアダプター

製品を設置する場合、提供または指定された接続ケーブル、電源コードとACアダプターを使用下さい。他のケーブルやアダプタを使用すると故障や火災の原因になることがあります。電気用品安全法は、ULまたはCSA認定のケーブル(UL/CSEマークがコードに表記)を Supermicroが指定する製品以外に使用することを禁止しています。

### 警告

安裝此產品時，請使用本身提供的或指定的連接線，電源線和電源適配器。使用其它線材或適配器可能會引起故障或火災。除了Supermicro所指定的產品，電氣用品和材料安全法律規定禁止使用未經UL或CSA認證的線材。（線材上會顯示UL/CSA符號）。

### 警告

安裝此產品時，請使用本身提供的或指定的連接線，電源線和電源適配器。使用其它線材或適配器可能會引起故障或火災。除了Supermicro所指定的產品，電氣用品和材料安全法律規定禁止使用未經UL或CSA認證的線材。（線材上會顯示UL/CSA符號）。

### Warnung

Bei der Installation des Produkts, die zur Verfügung gestellten oder benannt Anschlusskabel, Stromkabel und Netzteile. Verwendung anderer Kabel und Adapter kann zu einer Fehlfunktion oder ein Brand entstehen. Elektrische Geräte und Material Safety Law verbietet die Verwendung von UL-oder CSA-zertifizierte Kabel, UL oder CSA auf der Code für alle anderen elektrischen Geräte als Produkte von Supermicro nur bezeichnet gezeigt haben.

### ¡Advertencia!

Al instalar el producto, utilice los cables de conexión previstos o designados, los cables y adaptadores de CA. La utilización de otros cables y adaptadores podría ocasionar un mal funcionamiento o un incendio. Aparatos Eléctricos y la Ley de Seguridad del Material prohíbe el uso de UL o CSA cables certificados que tienen UL o CSA se muestra en el código de otros dispositivos eléctricos que los productos designados por Supermicro solamente.

## Attention

Lors de l'installation du produit, utilisez les bables de connection fournis ou désigné. L'utilisation d'autres cables et adaptateurs peut provoquer un dysfonctionnement ou un incendie. Appareils électroménagers et de loi sur la sécurité Matériel interdit l'utilisation de UL ou CSA câbles certifiés qui ont UL ou CSA indiqué sur le code pour tous les autres appareils électriques que les produits désignés par Supermicro seulement.

## חשמליים ומתאמי AC

## אזהרה !

כאשר מתקינים את המוצר, יש להשתמש בכבלים, ספקים ומתאמים AC אשר נועדו וסופקו לשם כך. שימוש בכל כבל או מתאם אחר יכול לגרום לתקלה או קצר חשמלי. על פי חוקי שימוש במכשירי חשמל וחוקי בטיחות, קיים איסור להשתמש בכבלים המוסמכים ב- UL או ב- CSA (כשאר מופיע עליהם קוד של UL/CSA) עבור כל מוצר חשמלי אחר שלא צוין על ידי סופרמיקרו בלבד.

عند تركيب الجهاز يجب استخدام كابلات التوصيل، والكابلات الكهربائية ومحولات التيار المتردد التي . أن استخدام أي كابلات ومحولات أخرى يتسبب في حدوث عطل أو حريق. تم توفيرها لك مع المنتج الأجهزة الكهربائية ومواد قانون السلامة يحظر استخدام الكابلات UL أو CSA معتمدة من قبل لأي أجهزة كهربائية أخرى غير المنتجات المعينة من قبل Supermicro (التي تحمل علامة UL/CSA)

## 경고!

제품을 설치할 때에는 제공되거나 지정된 연결케이블과 전원케이블, AC어댑터를 사용해야 합니다. 그 밖의 다른 케이블들이나 어댑터들은 고장 또는 화재의 원인이 될 수 있습니다. 전기용품안전법 (Electrical Appliance and Material Safety Law)은 슈퍼마이크로에서 지정한 제품들 외에는 그 밖의 다른 전기 장치들을 위한 UL또는 CSA에서 인증한 케이블(전선 위에 UL/CSA가 표시)들의 사용을 금지합니다.

## Waarschuwing

Bij het installeren van het product, gebruik de meegeleverde of aangewezen kabels, stroomkabels en adapters. Het gebruik van andere kabels en adapters kan leiden tot een storing of een brand. Elektrisch apparaat en veiligheidsinformatiebladen wet verbiedt het gebruik van UL of CSA gecertificeerde kabels die UL of CSA die op de code voor andere elektrische apparaten dan de producten die door Supermicro alleen.

**Notes**



## Chapter 5

### Advanced Serverboard Setup

This chapter provides detailed information on the X9DBS-F serverboard. All serverboard jumpers and connections are described. A layout and quick reference chart are also included in this chapter for your reference. Remember to completely close the chassis when you have finished working with the serverboard to better cool and protect the system.

#### 5-1 Handling the Serverboard

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully (see previous chapter). To prevent the serverboard from bending, keep one hand under the center of the board to support it when handling. The following measures are generally sufficient to protect your equipment from electric static discharge.

##### Precautions

- Use a grounded wrist strap designed to prevent Electrostatic Discharge (ESD).
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

## 5-2 Cable and Device Connections

All data and power connections between the serverboard to the system (including the power supplies and the hard drives) are provided through the midplane. Most of these connections are made automatically when the system is assembled. "Right" and "left" refer to the side of the chassis as viewed from the front of the system. Also refer to Chapter 6 Section 5 for an image of the midplane with the connections listed below.

### ***Power Connections***

Power is routed from the power supplies to the power distribution board which in turn connects to the midplane. When the serverboards are seated in their bays they plug into the midplane to receive power.

### ***Fan Cabling***

All six cooling fans are connected to headers on the serverboard and may be monitored through IPMI. Fans can be accessed for replacement by removing the entire hot-swap server module.

### ***Control Panels***

A ribbon cable connects each control panel to the midplane. The right and left side control panels connect to JP1 and JP2 on the midplane, respectively.

## 5-3 Installing the Processor and Heatsink

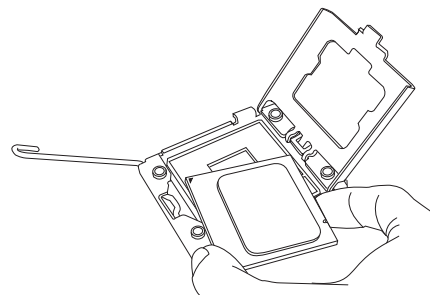
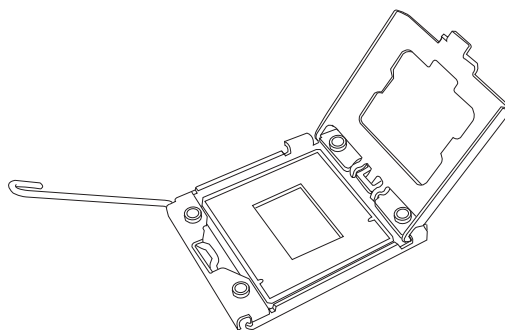
**Caution:** When handling the processor package, avoid placing direct pressure on the label area of the fan.

**Notes:**

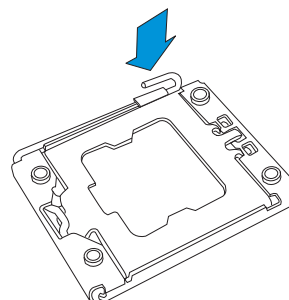
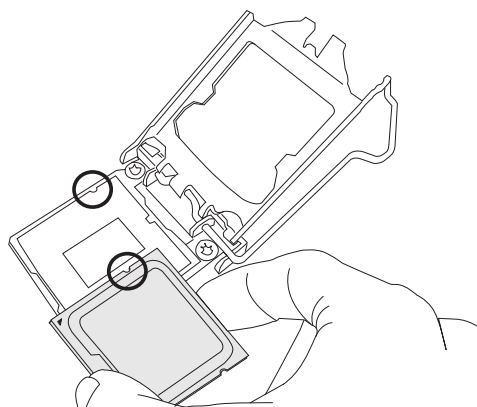
- Always connect the power cord last and always remove it before adding, removing or changing any hardware components. Make sure that you install the processor into the CPU socket before you install the CPU heatsink.
- If you buy a CPU separately, make sure that you use an Intel-certified multi-directional heatsink only.
- Make sure to install the serverboard into the chassis before you install the CPU heatsinks.
- When receiving a serverboard without a processor pre-installed, make sure that the plastic CPU socket cap is in place and none of the socket pins are bent; otherwise, contact your retailer immediately.
- Refer to the Supermicro web site for updates on CPU support.

### Installing an LGA 1356 Processor

1. Press the socket clip to release the load plate covering the CPU socket from its locked position.
2. Gently lift the socket clip to open the load plate.
3. Hold the plastic cap at its north and south center edges to remove it from the CPU socket.
4. After removing the plastic cap, hold the CPU at the north and south center edges with your thumb and index finger,.



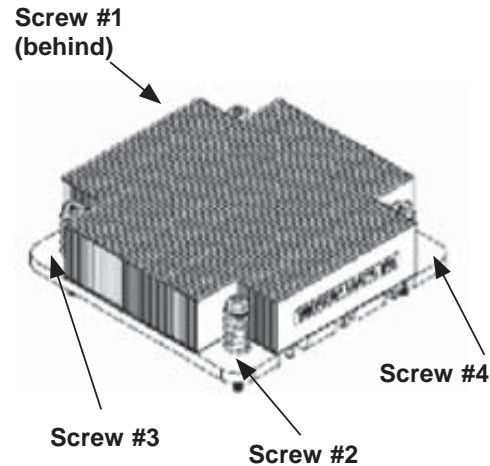
5. Align the CPU key, which is a semi-circle cutout, against the socket key, which is the notch below the gold color dot on the side of the socket.
6. Align pin 1 of the CPU against pin 1 of the CPU socket.
7. Once both CPU and the socket are aligned, carefully lower the CPU straight down into the socket. (To avoid damaging the CPU or the socket, do not rub the CPU against the surface of the socket or its pins.)
8. With the CPU inside the socket, inspect the four corners of the CPU to make sure that the CPU is properly installed.
9. Once the CPU is securely seated on the socket, lower the CPU load plate to the socket.
10. Use your thumb to gently push the socket clip down to the clip lock.



**Warning:** Please save the plastic cap. The serverboard must be shipped with the plastic cap properly installed to protect the CPU socket pins. Shipment without the plastic cap properly installed will cause damage to the socket pins.

## Installing a CPU Heatsink

1. Remove power from the system and unplug the AC power cord from the power supply.
2. Do not apply any thermal grease to the heatsink or the CPU die; the required amount has already been applied.
3. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the (preinstalled) heatsink retention mechanism.
4. Screw in two diagonal screws (i.e. the #1 and the #2 screws) until just snug. Do not fully tighten the screws or you may damage the CPU.)
5. Add the two remaining screws then finish the installation by fully tightening all four screws.



## Removing the Heatsink

**Warning:** We do not recommend removing the CPU or the heatsink. If you do need to remove the heatsink, please follow the instructions below to prevent damage to the CPU or other components.

1. Power down the node and unplug the AC power cord.
2. Unscrew and remove the heatsink screws in the sequence shown in the illustration above.
3. Hold the heatsink and gently wiggle it to loosen it from the CPU. (Do not use excessive force when doing this!)
4. Once the heatsink is loosened, remove it from the CPU.
5. Clean the surface of the CPU and the heatsink to get rid of the old thermal grease. Reapply the proper amount of thermal grease before you re-install the heatsink.

## 5-4 Installing Memory

**Caution:** Exercise extreme care when installing or removing DIMM modules to prevent any possible damage.

### Memory Support

Each X9DBS-F has six DIMM slots that can support up to 192 GB of Registered (RDIMM) ECC/Non-ECC DDR3-1866/1600/1333/1066/800 memory. Use memory modules of the same type and speed. See the following tables for memory installation.

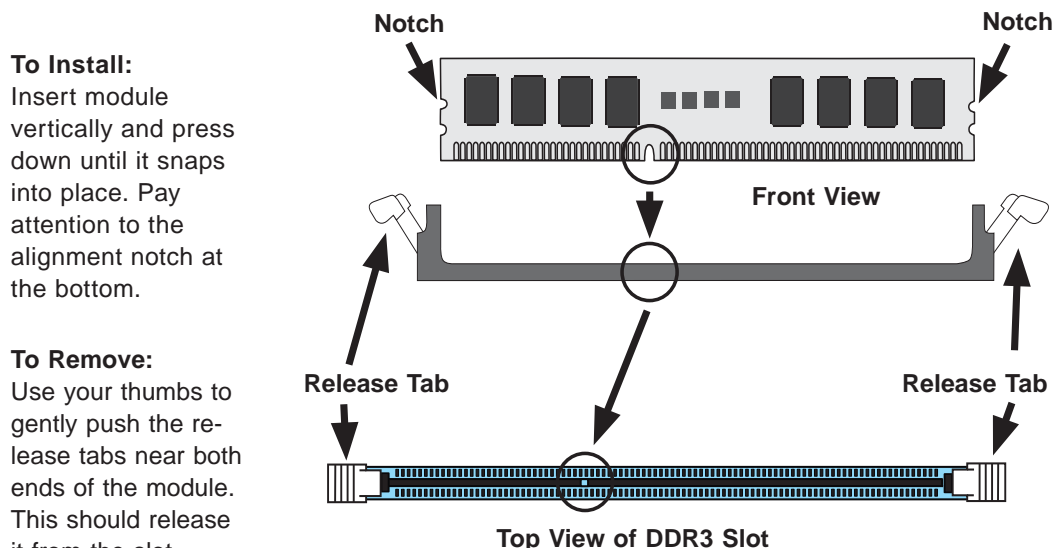
**Note:** For additional NVDIMM installation guidelines and developer kits, please contact your NVDIMM vendor.

### DIMM Installation

#### Installing Memory Modules

1. Insert the desired number of DIMMs into the memory slots starting with DIMM #P1-DIMMA1. For optimal memory performance, please install a pair (or pairs) of memory modules of the same type and speed (see the Memory Installation Table below).
2. Insert each DIMM module vertically into its slot. Pay attention to the notch along the bottom of the module to avoid installing incorrectly (see Figure 5-3).
3. Gently press down on the DIMM module until it snaps into place in the slot. Repeat for all modules.

**Figure 5-3. DIMM Installation**



**Note:** Notch should align with the receptive key point on the slot.

## DIMM Module Population Configuration

Refer to the tables below when installing memory.

Processors and their Corresponding Memory Modules			
CPU#	Corresponding DIMM Modules		
CPU 1	P1-DIMMA1	P1-DIMMB1	P1-DIMMC1
CPU2	P2-DIMMD1	P2-DIMME1	P2-DIMMF1

Processor and Memory Module Population for Optimal Performance	
Number of CPUs+DIMMs	CPU and Memory Population Configuration Table (For memory to work properly, please follow the instructions below.)
1 CPU & 2 DIMMs	CPU1 P1-DIMMA1/P1-DIMMB1
2 CPUs & 4 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1, P2-DIMMD1/P2-DIMME1
2 CPUs & 6 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1, P2-DIMMD1/P2-DIMME1/ P2-DIMMF1

Intel E5-2400 Series Processor RDIMM Memory Support					
Ranks Per DIMM & Data Width	Memory Capacity Per DIMM (See the Note Below)			Speed (MT/s) and Voltage Validated by Slot per Channel (SPC) and DIMM Per Channel (DPC)	
				1 Slot Per Channel	
				1DPC	
				1.35V	1.5V
SRx8	1GB	2GB	4GB	1066, 1333	1066, 1333, 1600
DRx8	2GB	4GB	8GB	1066, 1333	1066, 1333, 1600
SRx4	2GB	4GB	8GB	1066, 1333	1066, 1333, 1600
DRx4	4GB	8GB	16GB	1066, 1333	1066, 1333, 1600
QRx4	8GB	16GB	32GB	800	800
QRx8	4GB	8GB	16GB	800	800
<b>Note:</b> For detailed information on memory support and updates, please refer to the SMC Recommended Memory List posted on our website at <a href="http://www.supermicro.com/support/resources/mem.cfm">http://www.supermicro.com/support/resources/mem.cfm</a> .					

**Note:** For the memory modules to work properly, please install DIMM modules of the same type, same speed and same operating frequency. Mixing of RDIMMs, UDIMMs or LRDIMMs is not allowed. Do not install both ECC and Non-ECC memory modules on the same serverboard.

## Installing NVDIMMs

Please adhere to the following guidelines when installing NVDIMMs.

- If only one NVDIMM is used in the system, it can be installed into any DIMM slot on the board.
- If two or more NVDIMMs are used with regular DIMMs, the following limitations apply:
  - Three NVDIMMs or less: can only populate within one processor's DDR slots (all in the CPU1 or CPU2 slots but not spread between both).
  - More than three NVDIMMs: should populate all the CPU2 DIMM slot first, then any remaining into the CPU1 DIMM slots.



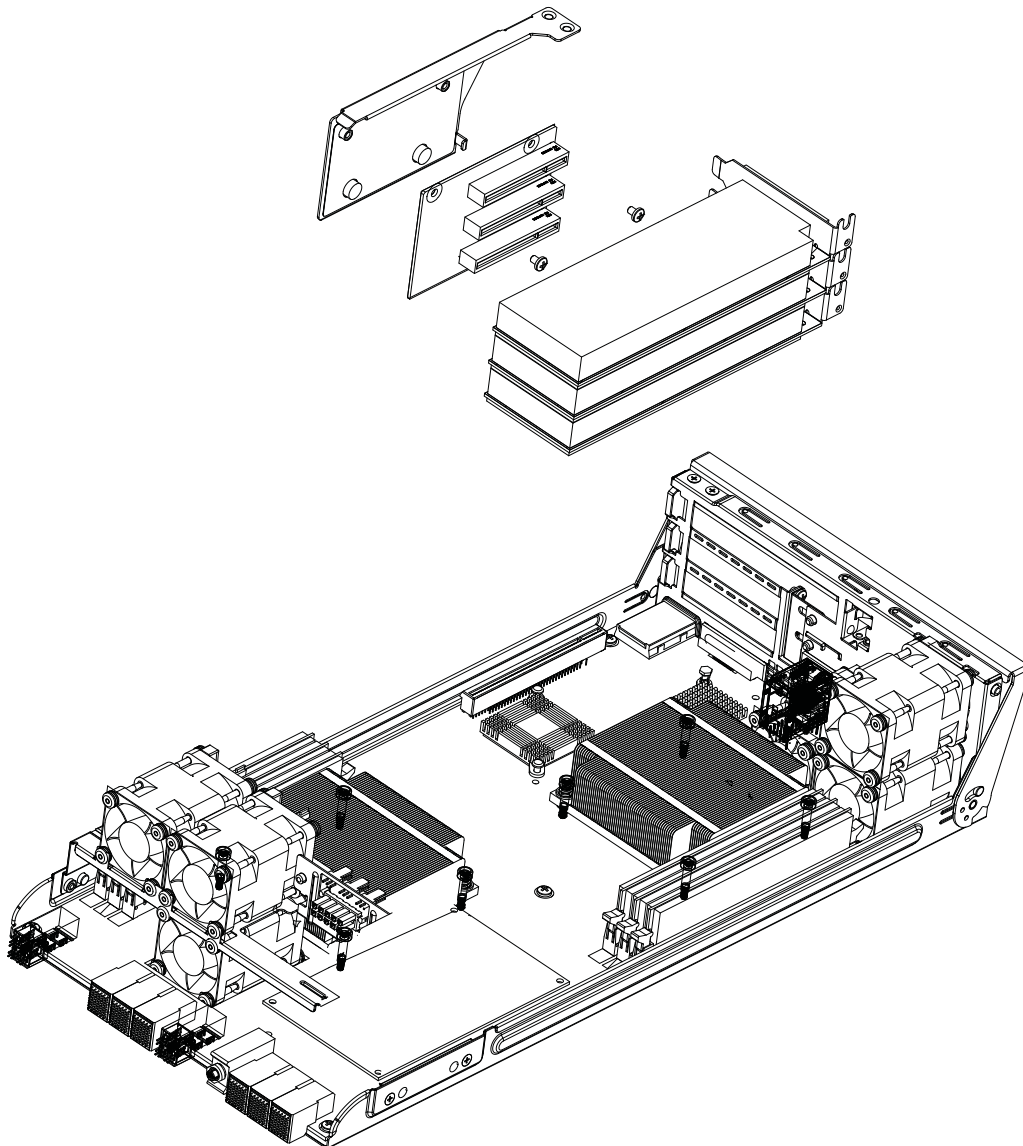
## 5-5 Installing PCI Add-On Cards

Each node in the 6037B-DE2R16L can accommodate up to three PCI-E 3.0 x8 add-on cards.

### *Installing an Add-on Card (Figure 5-4)*

1. Begin by removing the node you wish to populate with add-on cards.
2. Locate the riser card and fully seat the cards into the slots in the riser, pushing down with your thumbs evenly on both sides of the card.
3. If standard size cards are used, only passive heatsinks may be used for the processors as the card size will interfere with active type heatsinks.

**Figure 5-4. Installing Add-on Cards**





## X9DBS-F Quick Reference

Jumper	Description	Default Setting
JBT1	Clear CMOS	See Section 5-8
J1 <sup>2</sup> C1/J1 <sup>2</sup> C2	SMB to PCI-E Slots	Open (Normal)
JPL1	GLAN 1/2 Enable/Disable	Pins 1-2 (Enabled)
JPME1	Manufacture Mode Select	Pins 1-2 (Normal)
JPME2	ME Recovery	Pins 1-2 (Normal)
JWD1	Watch Dog	Pins 1-2 (Reset)

Connector	Description
FAN1-6	CPU/System Fan Headers
J21	SAS Mezzanine Header
JKVM1	Keyboard/VGA/Mouse Connector
JOH1	Overheat/Fan Fail LED
JSD1/JSD2	SATA DOM (Device On Module) Power Connectors
JTPM1	TPM (Trusted Platform Module)/Port 80
LAN1/LAN2	Gigabit Ethernet LAN Ports 1/2 (LAN1/LAN2)
(External) SAS	External Serial-Link SAS Connector (with SAS mezzanine card)
(I-)SATA 0/1	Intel SATA Connectors 0/1
Slot1	PCI-Exp. 3.0 x24 Slot (for riser card)
USB3	Type A USB Port 3

LED	Description	State/Status
D95	BMC Heartbeat	Upper LED is blinking: BMC Active
	System Heartbeat	Lower LED is blinking: System Normal
LE2	Onboard Power	Green: Onboard Power Connected
LED2	SATA LED	Blinking Green: SATA Active
LED10/ LED11	SAS Activity LED	Blinking Green: SAS Active

## 5-7 Connector Definitions

### KVM Port

The KVM port, located next to the LAN ports on the I/O backplane, provides keyboard/video/mouse connections. These connections can be used for remote console via BMC IPMI.

### Fan Headers

The X9DBS-F has six fan headers (Fan1 - Fan6). These 4-pin fans headers are backward compatible with traditional 3-pin fans (which do not support fan speed control). Fan speed is controlled by IPMI. See the table on the right for pin definitions.

Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	+12V
3	Tachometer
4	PWR Modulation

### External SAS Ports

Two External Mini-SAS HD ports are located on each server node to allow high bandwidth, 8-lane connectivity to the JBOD expansion units.

### Ethernet Ports

Two Gigabit Ethernet ports (LAN1/LAN2) are located on the I/O backplane to provide Ethernet connections. In addition, a Dedicated IPMI LAN also provides KVM support for IPMI 2.0.



### Overheat/Fan Fail LED

The JOH1 header is used to connect an LED indicator to provide warnings of chassis overheating and fan failure. This LED will blink when a fan failure occurs. Refer to the table on right for pin definitions.

OH/Fan Fail LED Status	
State	Message
Solid	Overheat
Blinking	Fan Fail

### TPM Header/Port 80

A Trusted Platform Module/Port 80 header is located at JTPM1 to provide TPM support and Port 80 connection. Use this header to enhance system performance and data security. See the table on the right for pin definitions.

TPM/Port 80 Header Pin Definitions			
Pin #	Definition	Pin #	Definition
1	LCLK	2	GND
3	LFRAME#	4	<(KEY)>
5	LRESET#	6	+5V (X)
7	LAD 3	8	LAD 2
9	+3.3V	10	LAD1
11	LAD0	12	GND
13	SMB_CLK4	14	SMB_DAT4
15	+3V_DUAL	16	SERIRQ
17	GND	18	CLKRUN# (X)
19	LPCPD#	20	LDRQ# (X)

### SATA DOM Power Connectors

Two power connectors for SATA DOM (Disk On Module) devices are located at JSD1/JSD2. Connect appropriate cables here to provide power support for your DOM devices.

DOM PWR Pin Definitions	
Pin#	Definition
1	+5V
2	Ground
3	Ground

### Universal Serial Bus (USB)

A Type A connector (USB 3) is located on the serverboard to provide front USB support. (Cable is not included). See the table on the right for pin definitions.

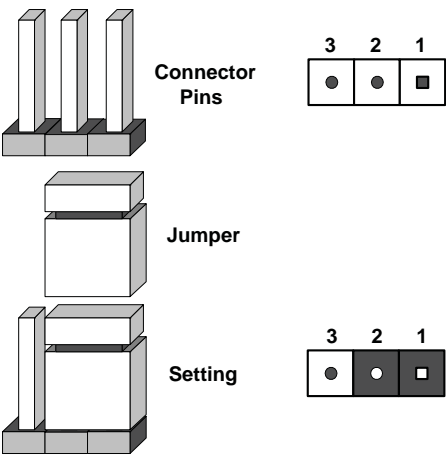
Type A USB Pin Definitions	
Pin#	Definition
1	+5V
2	PO-
3	PO+
4	Ground
5	NA

## 5-8 Jumper Settings

### Explanation of Jumpers

To modify the operation of the serverboard, jumpers can be used to choose between optional settings. Jumpers create shorts between two pins to change the function of the connector. Pin 1 is identified with a square solder pad on the printed circuit board. See the serverboard layout pages for jumper locations.

**Note:** On a two-pin jumper, "Closed" means the jumper is on both pins and "Open" means the jumper is either on only one pin or completely removed.



### CMOS Clear

JBT1 is used to clear CMOS (which will also clear any passwords). Instead of pins, this jumper consists of contact pads to prevent accidentally clearing the contents of CMOS.

#### To clear CMOS,

1. First power down the system and unplug the power cord(s).
2. With the power disconnected, short the CMOS pads with a metal object such as a small screwdriver.
3. Remove the screwdriver (or shorting device).
4. Reconnect the power cord(s) and power on the system.

**Note:** Do not use the PW ON connector to clear CMOS.

### LAN1/2 Enable/Disable

Change the setting of jumper JPL1 to enable or disable the LAN1 and LAN2 Ethernet ports. See the table on the right for jumper settings. The default setting is enabled.

LAN1/2 Enable/Disable Jumper Settings (JPL1)	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

### Watch Dog Enable/Disable

Jumper JWD controls the Watch Dog function. Watch Dog is a system monitor that can reboot the system when a software application hangs. Jumping pins 1-2 will cause WD to reset the system if an application hangs. Jumping pins 2-3 will generate a non-maskable interrupt signal for the application that hangs. See the table on the right for jumper settings. Watch Dog must also be enabled in BIOS.

**Note:** When enabled, the user needs to write their own application software in order to disable the Watch Dog Timer.

Watch Dog Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Reset
Pins 2-3	NMI
Open	Disabled

### Manufacture Mode

JPME1 allows the user to flash the system firmware from a host server. Jump pins 2-3 to bypass SPI flash security, and force ME into Recovery mode in order to use recovery jumpers. See the table on the right for jumper settings.

ME Mode Select Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Normal (Default)
Pins 2-3	Manufacture Mode

### ME Recovery

JPME2 is used for ME Firmware Recovery mode, which will limit system resources for essential functions only without putting restrictions on power use. In single operation mode, online upgrade will be available via recovery mode. See the table on the right for jumper settings.

ME Recovery Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Normal (Default)
Pins 2-3	ME Recovery

### I2C Bus to PCI-Exp. Slots

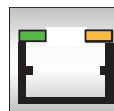
Jumpers JI<sup>2</sup>C1 and JI<sup>2</sup>C2 allow you to connect the System Management Bus (I<sup>2</sup>C) to the PCI-Express slot (Slot1) on the serverboard. The default setting is Open to disable the connection. See the table on the right for jumper settings.

I <sup>2</sup> C to PCI-Exp Jumper Settings	
Jumper Setting	Definition
Closed	Enabled
Open	Disabled (Default)

## 5-9 Onboard Indicators

### LAN LEDs

The Ethernet ports (located on the I/O backplane) have two LEDs. On each port: the green LED flashes to indicate activity while the other LED may be green, amber or off to indicate the speed of the connection. See the table on the right for the functions associated with the connection speed LED.



LAN1/2 LED (Connection Speed Indicator)	
LED Color	Definition
Off	No Connection or 10 Mb/s
Amber	100 Mb/s
Green	1 Gb/s

### BMC Heartbeat/System Heartbeat LED

A paired BMC/System Heartbeat LED is located by the KVM port. When the upper LED blinks, the BMC is active. The lower LED blinking indicates that the system is functioning normally. See the table at right for more information.

BMC Heartbeat/System Heartbeat LED Status	
State	Definition
Upper LED Blinking	BMC Active
Lower LED Blinking	System Normal

### Onboard Power LED

An Onboard Power LED is located at LE2 on the serverboard. When this LED is on, the system is on. Be sure to turn off the system and unplug the power cord before removing or installing components. See the table at right for more information.

Onboard PWR LED Indicator LED States	
LED Color	Definition
Off	System Off (PWR cable not connected)
Green	System On
Green: Flashing Quickly	ACPI S1 State

### SATA Heartbeat LED

A SATA Heartbeat LED is located at LED2 on the serverboard. When LED2 is blinking, SATA is functioning normally. See the table at right for more information.

SATA Heartbeat LED Status	
Color/State	Definition
Green: Blinking	SATA: Normal



### SAS Activity LED

SAS Activity LEDs are located at LED10/LED11 on the serverboard. When LED10/LED11 are blinking, SAS is active. See the table at right for more information.

SAS Activity LED Status	
Color/State	Definition
Green: Blinking	SAS: Active

## 5-10 Serial ATA Ports

### Serial ATA Ports

There are two Serial ATA Ports (I-SATA0/I) located on the serverboard. See the table on the right for pin definitions.

Serial ATA Pin Definitions	
Pin#	Definition
1	Ground
2	TX_P
3	TX_N
4	Ground
5	RX_N
6	RX_P
7	Ground

**Note:** For more information on SATA HostRAID configuration, please refer to the Intel SATA HostRAID User's Guide posted on our website @ <http://www.supermicro.com>.

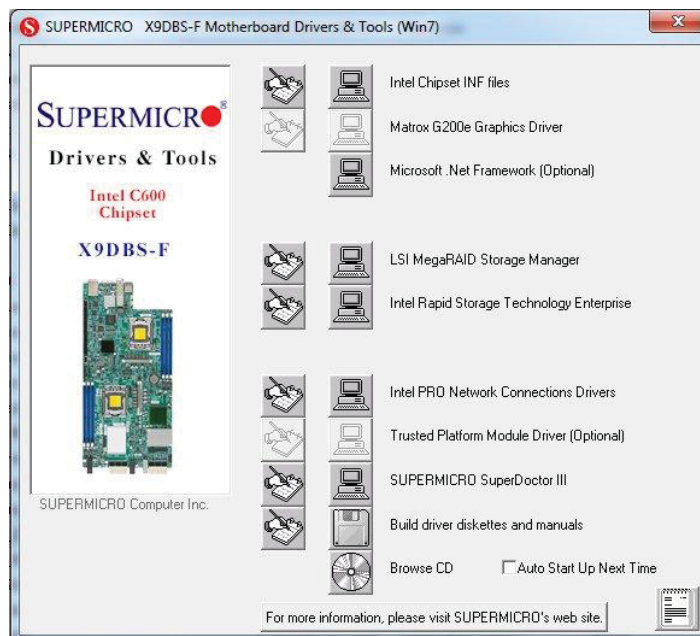
## 5-11 Installing Software

The Supermicro ftp site contains drivers and utilities for your system at <ftp://ftp.supermicro.com>. Some of these must be installed, such as the chipset driver.

After accessing the ftp site, go into the CDR\_Images directory and locate the ISO file for your serverboard. Download this file to create a CD/DVD of the drivers and utilities it contains. (You may also use a utility to extract the ISO file if preferred.)

Another option is to go to the Supermicro Website at <http://www.supermicro.com/products/>. Find the product page for your serverboard here, where you may download individual drivers and utilities.

After creating a CD/DVD with the ISO files, insert the disk into the CD/DVD drive on your system and the display shown in Figure 5-6 should appear.



**Figure 5-6. Driver/Tool Installation Display Screen**

**Note:** Click the icons showing a hand writing on paper to view the readme files for each item. Click the computer icons to the right of these items to install each item (from top to the bottom) one at a time. **After installing each item, you must re-boot the system before moving on to the next item on the list.** The bottom icon with a CD on it allows you to view the entire contents.

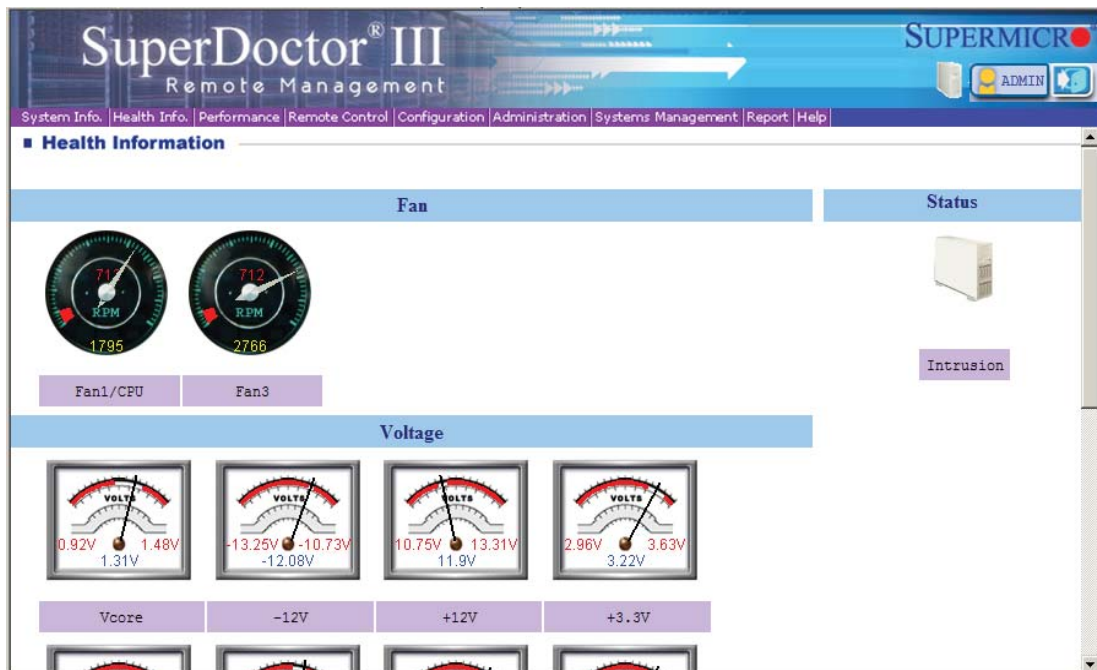
## SuperDoctor III

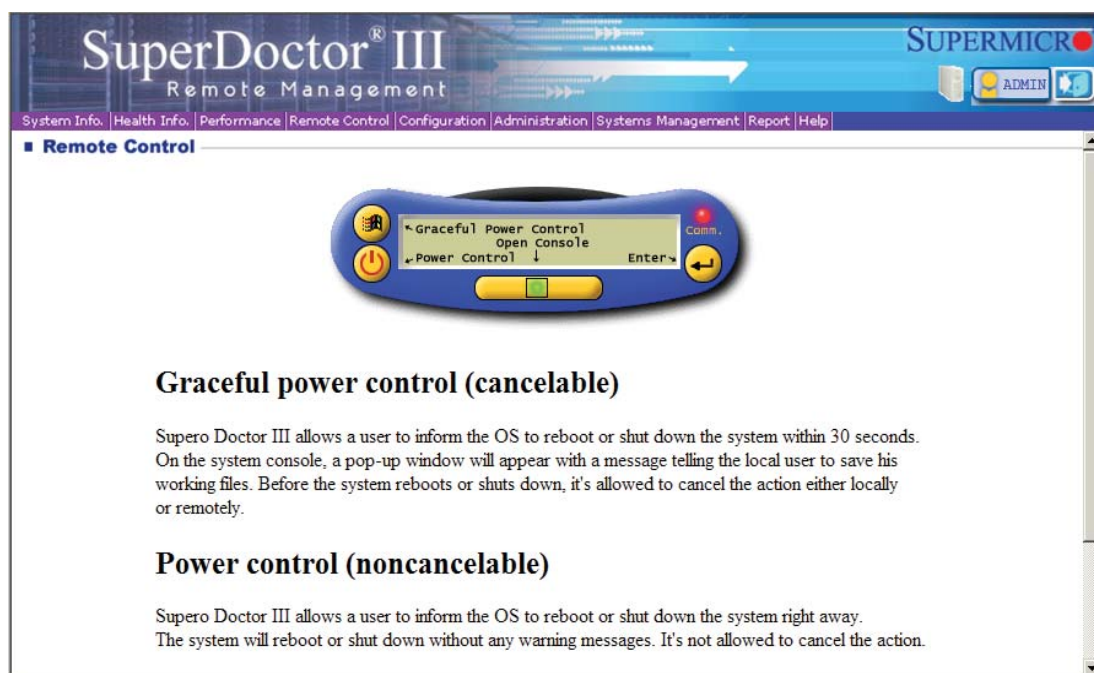
The SuperDoctor® III program is a web-based management tool that supports remote management capability. It includes Remote and Local Management tools. The local management is called SD III Client. The SuperDoctor III program allows you to monitor the environment and operations of your system. SuperDoctor III displays crucial system information such as CPU temperature, system voltages and fan status. See the figures below for examples of the SuperDoctor III interface.

**Note:** The default User Name and Password for SuperDoctor III is ADMIN / ADMIN.

**Note:** When SuperDoctor III is first installed, it adopts the temperature threshold settings that have been set in BIOS. Any subsequent changes to these thresholds must be made within SuperDoctor III, as the SuperDoctor III settings override the BIOS settings. To set the BIOS temperature threshold settings again, you would first need to uninstall SuperDoctor III.

**Figure 5-7. SuperDoctor III Interface Display Screen (Health Information)**

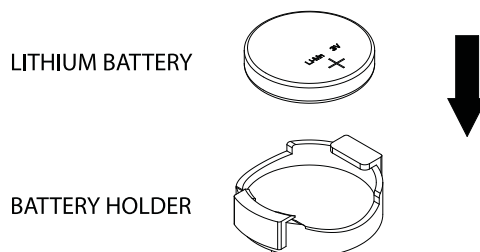


**Figure 5-8. SuperDoctor III Interface Display Screen (Remote Control)**

**Note:** The SuperDoctor III program and User's Manual can be downloaded from the Supermicro web site at <http://www.supermicro.com/products/accessories/software/SuperDoctorIII.cfm>. For Linux, we recommend that you use the SuperDoctor II application instead.

## 5-12 Onboard Battery

Please handle used batteries carefully. Do not damage the battery in any way; a damaged battery may release hazardous materials into the environment. Do not discard a used battery in the garbage or a public landfill. Please comply with the regulations set up by your local hazardous waste management agency to dispose of your used battery properly.

**Figure 5-9. Installing the Onboard Battery**

## Chapter 6

### Advanced Chassis Setup

This chapter covers the steps required to install components and perform maintenance on the SC937 chassis. For component installation, follow the steps in the order given to eliminate the most common problems encountered. If some steps are unnecessary, skip ahead to the step that follows.

**Tools Required:** The only tool you will need to install components and perform maintenance is a Philips screwdriver.

#### 6-1 Static-Sensitive Devices

Electrostatic Discharge (ESD) can damage electronic components. To prevent damage to any printed circuit boards (PCBs), it is important to handle them very carefully. The following measures are generally sufficient to protect your equipment from ESD damage.

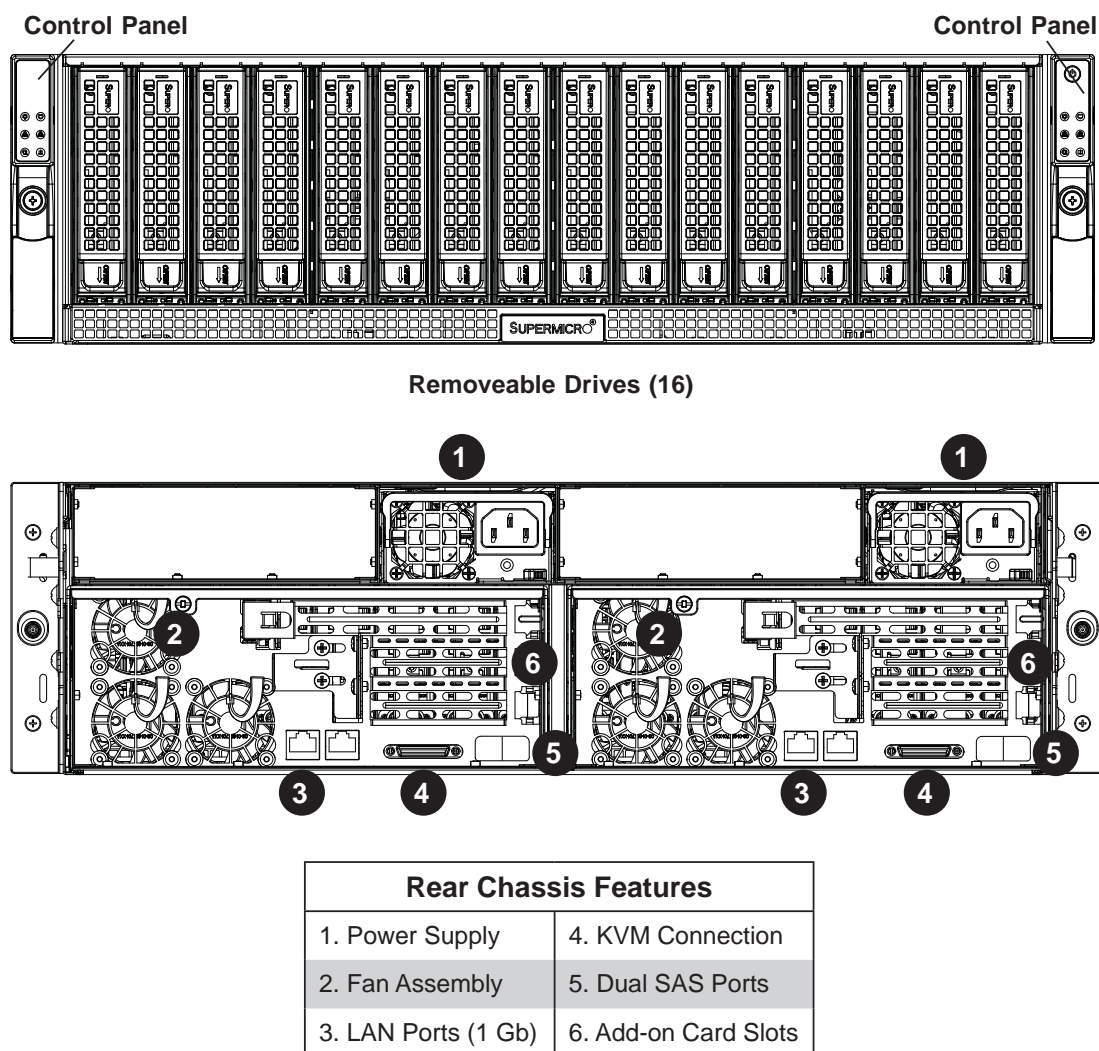
##### Precautions

- Use a grounded wrist strap designed to prevent static discharge.
- Touch a grounded metal object before removing any board from its antistatic bag.
- Handle a board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.
- When handling chips or modules, avoid touching their pins.
- Put the serverboard, add-on cards and peripherals back into their antistatic bags when not in use.
- For grounding purposes, make sure your computer chassis provides excellent conductivity between the power supply, the case, the mounting fasteners and the serverboard.

##### Unpacking

The serverboard is shipped in antistatic packaging to avoid static damage. When unpacking the board, make sure the person handling it is static protected.

Figure 6-1. Front and Rear Chassis Views



## 6-2 Control Panel

The control panels are connected to the serverboards through the midplane. The LEDs on the control panels are associated with the node on the same side of the chassis. Note that only the right-side control panel includes a power button. Depressing this button will turn both nodes on or off.

See Chapter 3 for details on the LEDs and the control panel buttons.

## 6-3 System Fans

System cooling is provided by three sets of counter-rotating fans on each serverboard as well as an assembly that holds three fans near the front of the node. Each fan assembly (one for each node) consists of three sets of counter-rotating

fans. The counter-rotating action helps dampen vibration levels while generating exceptional airflow.

**Note:** An air shroud has been preinstalled to fit over CPU2 and should not be removed.

It is very important that the chassis cover is properly installed and making a good seal for the cooling air to circulate properly through the chassis and cool the components.

## System Fan Failure

Fan speed is controlled by system temperature via a BIOS setting. If a fan fails, the remaining fans will ramp up to full speed and the overheat/fan fail LED on the control panel (of the same side as the failed fan) will turn on.

The fans may also be visually inspected for failure. Replace any failed fan at your earliest convenience with the same type and model (the system can continue to run with a failed fan). Remove the top chassis cover while the system is still running to determine which of the fans has failed.

## Replacing System Fans

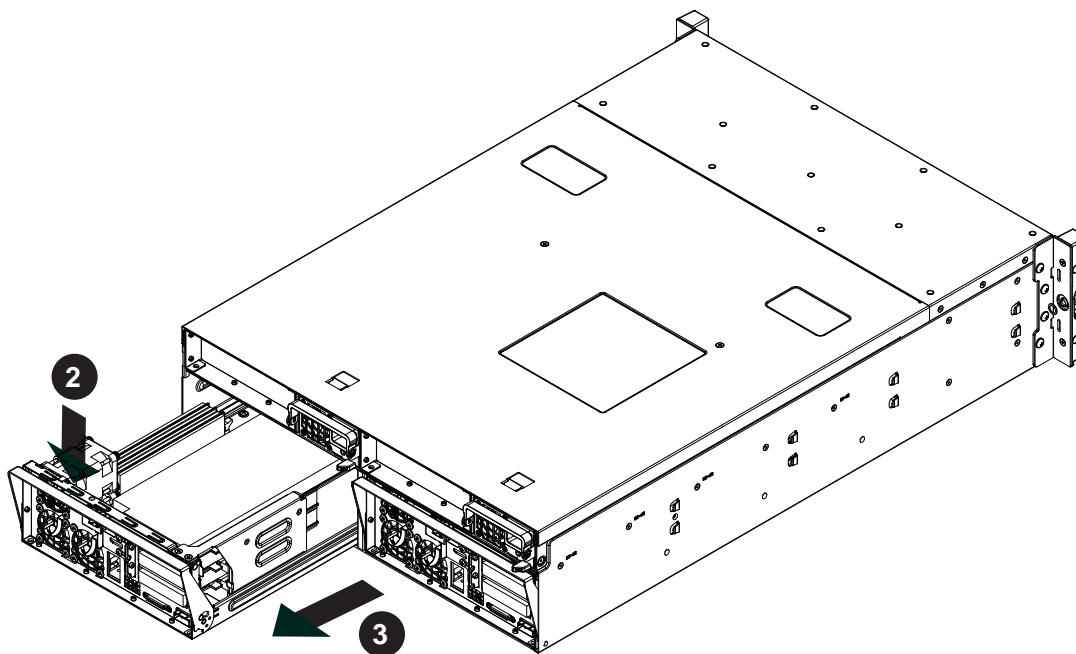
Replace the failed fan with an identical 4-cm, 12-volt counter-rotating fan (p/n FAN-0088L4, available from Supermicro). See Figures 6-2 and 6-3.

### *Replacing Fans*

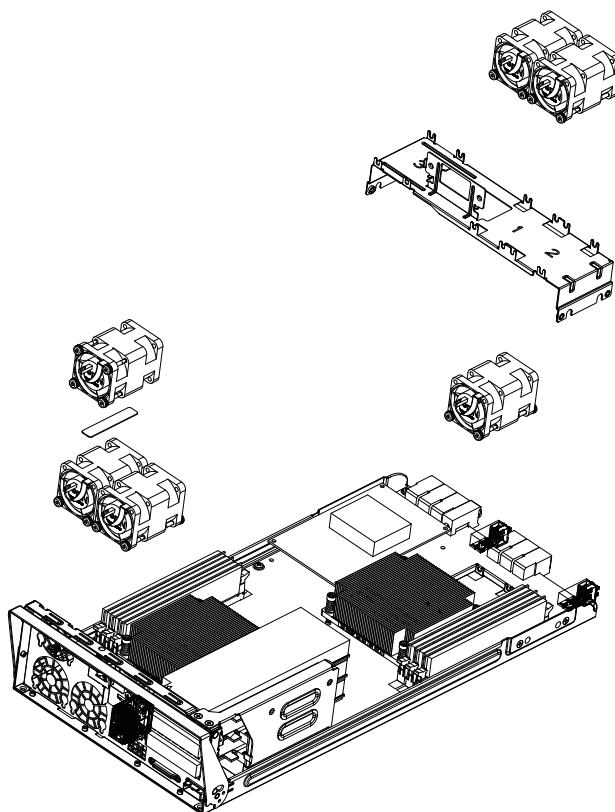
1. Shutdown the node with the failed fan(s) and remove the AC power cord.
2. On the node with the failed fan, push the release bar down to unlock the serverboard tray.
3. Use the bar to pull the node/serverboard from the chassis.
4. Remove the failed fan from the assembly and replace it with an identical replacement. You may need to remove the assembly to replace the lower fan.
5. Slide the serverboard tray back into the chassis. When seated, lift the release bar to lock it into place.
6. Reconnect the AC power cord and power up the node.
7. Inspect the replaced fan to verify it is working.



**Figure 6-2. Replacing a Serverboard Fan**



**Figure 6-3. Exploded View of Fan Assembly**





## 6-4 Drive Bay Installation/Removal

### Accessing the Drive Bays

SAS Drives: You do not need to access the inside of the chassis or remove power to replace or swap SAS drives. Proceed to the next step for instructions. Typically Large Form Factor 3.5" x 1" deep SAS drives are used. Optional conversion trays are available to install Small Form Factor 2.5" drives.

**Note:** Refer to the following ftp site for setup guidelines: <[ftp://ftp.supermicro.com/driver/SAS/LSI/LSI\\_SAS\\_EmbMRAID\\_SWUG.pdf](ftp://ftp.supermicro.com/driver/SAS/LSI/LSI_SAS_EmbMRAID_SWUG.pdf)> and Supermicro's web site for additional information < <http://www.supermicro.com/support/manuals/>>.

### Hard Drive Midplane

The hard drives plug into a midplane that provides power, drive ID and bus termination. This system uses an IT mode disk controller, offering users the most flexibility in creating fault tolerant software. Many open source platforms and modern commercial operating systems support RAID as well as other techniques to allow hot-swap maintenance of the storage devices. The midplane is already preconfigured, so no jumper or switch configurations are required.

### SAS 3.0 Controller

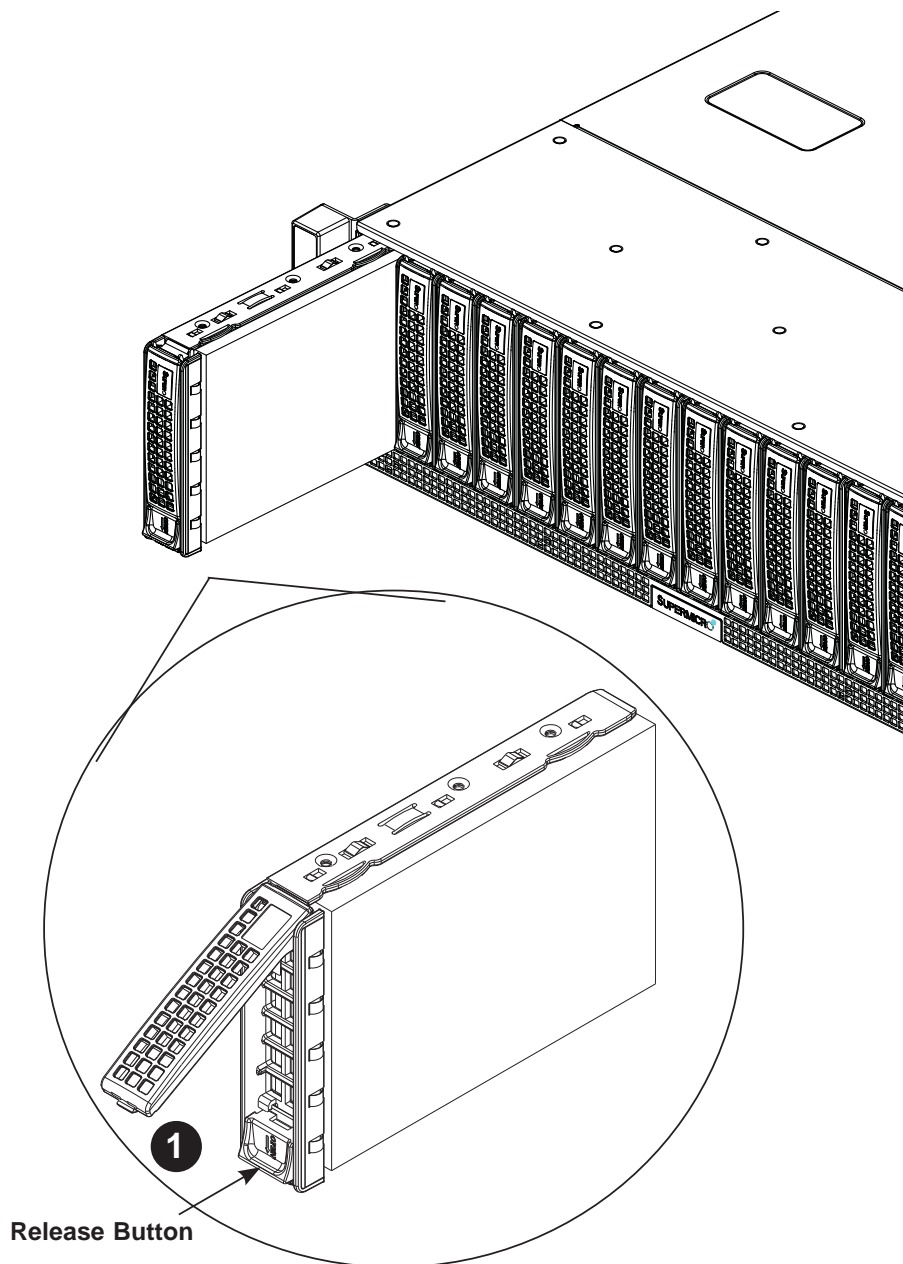
The SAS 3.0 controller (LSI 2308) is located on a mezzanine card that plugs into the "SAS Controller Card" slot (see serverboard layout diagram for location).

### SAS Drive Installation

These drives are mounted in drive carriers to simplify their installation and removal from the chassis. The carriers also help promote proper airflow for the drives. For this reason, even empty carriers without hard drives installed must remain in the chassis.

#### *Removing a HDD Carrier from the Chassis (Figure 6-4)*

1. Press the release button on the drive tray. This extends the drive tray handle.
2. Use the handle to pull the drive out of the chassis.

**Figure 6-4. Removing a HDD Carrier from the Chassis**

**Warning:** Enterprise level hard disk drives are recommended for use in Supermicro chassis and servers. For information on recommended HDDs, visit the Supermicro Web site.

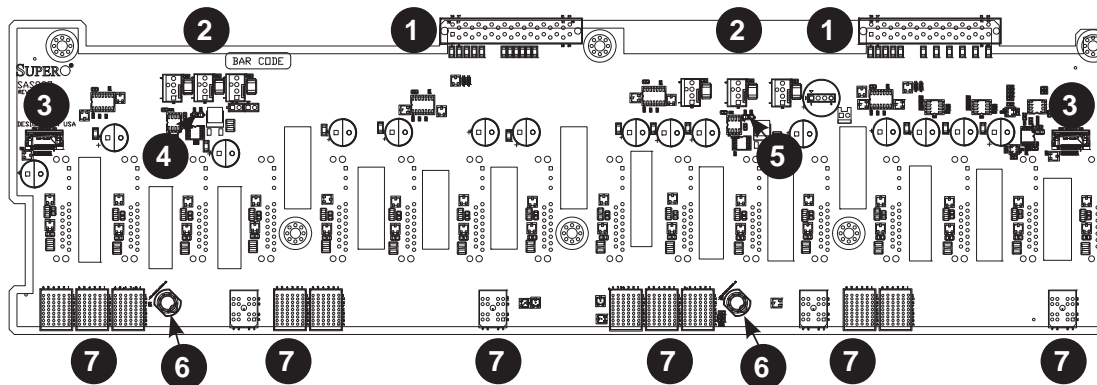
**Warning:** Regardless of how many hard drives are installed, all drive carriers must remain in the drive bays to maintain proper airflow.



## 6-5 Midplane

The midplane is a passive component that provides a reliable hot-swap interconnect between the active components of the system. See Figure 6-7 below for a list of connections to the midplane.

Figure 6-7. Midplane Connections



Item	Description	Connects To
1.	Power Connections	Power Distribution Board
2.	Fan Headers (3 each)	Fan Assemblies
3.	Control Panel Connections	Control Panel
4.	Overheat LED (for right-side node)	N/A
5.	Overheat LED (for left-side node)	N/A
6.	Node Present/Absent Sensor	Node/Serverboard
7.	SBB (Storage Bridge Bay) Connections	Node/Serverboard

**Warning:** Use caution when working around the midplane. Do not touch the midplane with any metal objects and make sure no cables touch the midplane or obstruct the holes, which aid in proper airflow.

## 6-6 Power Supply

The 6037B-DE2R16L has a 920 watt redundant power supply consisting of two separate power modules. Each power supply module has an auto-switching capability, which enables it to automatically sense and operate at a 100V - 240V input voltage.

When fully inserted into the chassis, the power supplies connect automatically to a power distribution board (PDB). The PDB in turn connects to the midplane via two black power connectors as shown in Figure 6-7.

### Power Supply Failure

If either of the two power supply modules fail, the other module will take the full load and allow the system to continue operation without interruption. The PWR Fail LED will illuminate and remain on until the failed unit has been replaced. Replacement units can be ordered directly from Supermicro. The power supply units have a hot-swap capability, meaning you can replace the failed unit without powering down the system.

### Replacing the Power Supply

You do not need to shut down the system to replace a power supply unit. The backup power supply module will keep the system up and running while you replace the failed hot-swap unit. Replace with the same model (see part number in the Appendix), which can be ordered directly from Supermicro.

#### *Replacing the Power Supply*

1. The SC937 chassis includes a redundant power supply (at least two power modules), you can leave the server running if you remove only one power supply at a time.
2. Unplug the power supply that you will replace.
3. Push the release tab (on the back of the power supply) as illustrated.
4. Pull the power supply out using the handle provided.
5. Replace the failed power module with the same model.
6. Push the new power supply module into the power bay until you hear a click.
7. Plug the AC power cord back into the module and power up the server.

**Notes**

## Chapter 7

### BIOS

#### 7-1 Introduction

This chapter describes the AMI BIOS Setup utility for the X9DBS-F/X9DBS-F-2U. It also provides the instructions on how to navigate the AMI BIOS Setup utility screens. The AMI ROM BIOS is stored in a Flash EEPROM and can be easily updated.

#### Starting BIOS Setup Utility

To enter the AMI BIOS Setup utility screens, press the <Del> key while the system is booting up.

**Note:** In most cases, the <Del> key is used to invoke the AMI BIOS setup screen. There are a few cases when other keys are used, such as <F3>, <F4>, etc.

Each main BIOS menu option is described in this manual. The Main BIOS setup menu screen has two main frames. The left frame displays all the options that can be configured. Grayed-out options cannot be configured. Options in blue can be configured by the user. The right frame displays the key legend. Above the key legend is an area reserved for informational text. When an option is selected in the left frame, it is highlighted in white. Often, informational text about the option will display on the right.

**Note:** The AMI BIOS has default informational messages built in. The manufacturer retains the option to include, omit, or change any of these informational messages.

The AMI BIOS Setup utility uses a key-based navigation system called "hot keys." Most of the AMI BIOS setup utility "hot keys" can be used at any time during setup navigation. These keys include <F3>, <F4>, <Enter>, <ESC>, arrow keys, etc.

**Note 1:** In this section, options printed in **Bold** are default settings.

**Note 2:** <F3> is used to load optimal default settings. <F4> is used to save the settings and exit the setup utility.

## How To Change the Configuration Data

The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <Delete> at the appropriate time during system boot.

**Note:** For AMI UEFI BIOS Recovery, please refer to the UEFI BIOS Recovery User Guide posted @<http://www.supermicro.com/support/manuals/>.

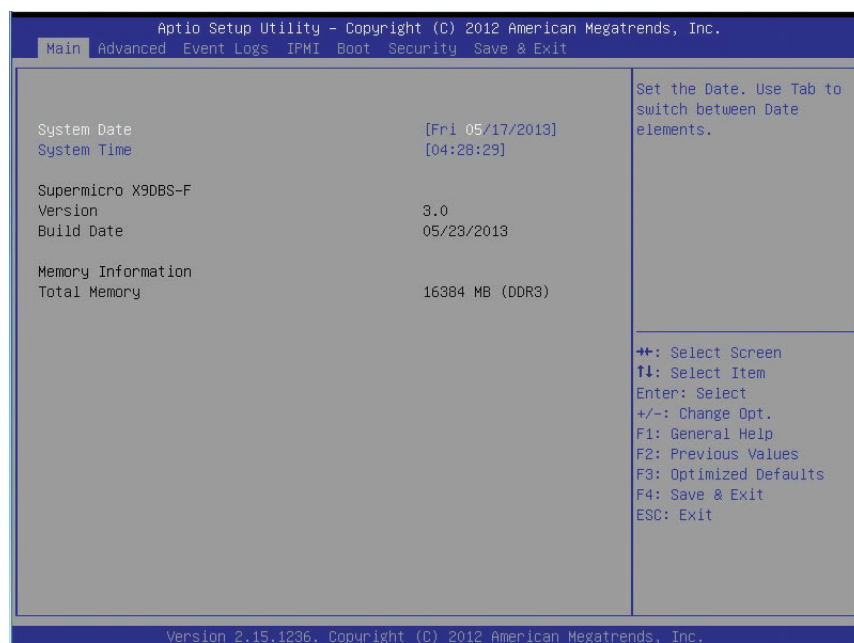
## Starting the Setup Utility

Normally, the only visible Power-On Self-Test (POST) routine is the memory test. As the memory is being tested, press the <Delete> key to enter the main menu of the AMI BIOS Setup utility. From the main menu, you can access the other setup screens. An AMI BIOS identification string is displayed at the left bottom corner of the screen below the copyright message.

**Warning:** Do not upgrade the BIOS unless your system has a BIOS-related issue. Flashing the wrong BIOS can cause irreparable damage to the system. In no event shall the manufacturer be liable for direct, indirect, special, incidental, or consequential damage arising from a BIOS update. If you have to update the BIOS, do not shut down or reset the system while the BIOS is being updated to avoid possible boot failure.

## 7-2 Main Setup

When you first enter the AMI BIOS Setup utility, you will enter the Main setup screen. You can always return to the Main setup screen by selecting the Main tab on the top of the screen. The Main BIOS Setup screen is shown below.





The AMI BIOS main menu displays the following information:

**System Date**

This item displays the system date in Day MM/DD/YY format (e.g. Wed 10/12/2012).

**System Time**

This item displays the system time in HH:MM:SS format (e.g. 15:32:52).

**Supermicro X9DBS-F****Version**

This item displays the SMC version of the BIOS ROM used in this system.

**Build Date**

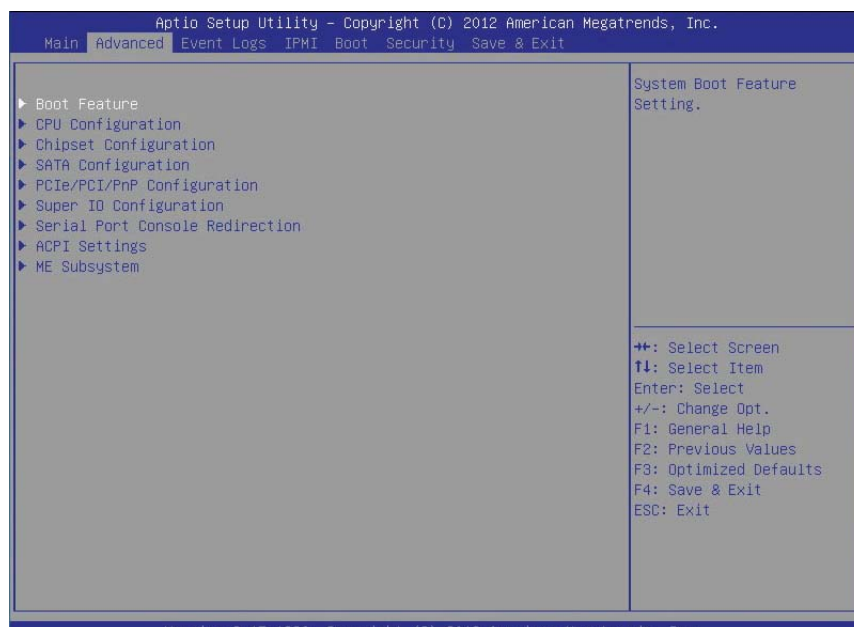
This item displays the date that the BIOS ROM was built.

**Memory Information****Total Memory**

This displays the amount of memory that is available in the system.

## 7-3 Advanced Setup Configurations

Use the arrow keys to select Advanced Setup and press <Enter> to access the following submenu items.



### ► Boot Features

#### Quiet Boot

This feature allows the user to select bootup screen display between POST messages and the OEM logo. Select Disabled to display the POST messages. Select Enabled to display the OEM logo instead of the normal POST messages. The options are **Enabled** and Disabled.

#### AddOn ROM Display Mode

Use this item to set the display mode for the Option ROM. Select Keep Current to use the current AddOn ROM Display setting. Select Force BIOS to use the Option ROM display mode set by the system BIOS. The options are **Force BIOS** and Keep Current.

#### Bootup Num-Lock

Use this feature to set the Power-on state for the Numlock key. The options are Off and **On**.

#### Wait For 'F1' If Error

Select Enabled to force the system to wait until the 'F1' key is pressed if an error occurs. The options are Disabled and **Enabled**.

### Interrupt 19 Capture

Interrupt 19 is the software interrupt that handles the boot disk function. When this item is set to Enabled, the ROM BIOS of the host adaptors will "capture" Interrupt 19 at bootup and allow the drives that are attached to these host adaptors to function as bootable disks. If this item is set to Disabled, the ROM BIOS of the host adaptors will not capture Interrupt 19, and the drives attached to these adaptors will not function as bootable devices. The options are **Enabled** and Disabled.

### Re-try Boot

If this item is enabled, the BIOS will automatically attempt to boot from a specified boot device again after its initial failure to boot. The options are **Disabled**, Legacy Boot, and EFI Boot.

## Power Configuration

### Watch Dog Function

If enabled, the Watch Dog timer will allow the system to automatically reboot when a non-recoverable error occurs that lasts for more than five minutes. The options are Enabled and **Disabled**.

### Power Button Function

If this feature is set to Instant Off, the system will power off immediately as soon as the user presses the power button. If this feature is set to 4 Seconds Override, the system will power off when the user presses the power button for 4 seconds or longer. The options are **Instant Off** and 4 Seconds Override.

### Restore on AC Power Loss

Use this feature to set the power state after a power outage. Select Stay Off for the system power to remain off after a power loss. Select Power On for the system power to be turned on after a power loss. Select Last State to allow the system to resume its last state before a power loss. The options are Power On, Stay Off, and **Last State**.

## CPU Configuration

This submenu displays the information of the CPU as detected by the BIOS. It also allows the user to configure CPU settings.

### ►Socket 1 CPU Information/Socket 2 CPU Information

This submenu displays the following information regarding the CPU installed in Socket 1 or Socket 2.

- Type of CPU
- CPU Signature
- Microcode Patch
- CPU Stepping
- Maximum CPU Speed
- Minimum CPU Speed
- Processor Cores
- Intel HT (Hyper-Threading) Technology
- Intel VT-x Technology
- Intel SMX Technology
- L1 Data Cache
- L1 Code Cache
- L2 Cache
- L3 Cache

### CPU Speed

This item displays the speed of the CPU installed in Socket 1 or Socket 2.

### 64-bit

This item indicates if the CPU installed in Socket 1 or Socket 2 supports 64-bit technology.

**Clock Spread Spectrum**

Select Enable to enable Clock Spectrum support, which will allow the BIOS to monitor and attempt to reduce the level of Electromagnetic Interference caused by the components whenever needed. The options are **Disabled** and Enabled.

**RTID (Record Types IDs)**

This feature displays the total number of Record Type IDs for local and remote pools. Select Optimal for normal operations and benchmarking. Select Alternate for I/O centric applications that require direct access to the system memory. The options are **Optimal** and Alternate.

**Hyper-threading**

Select Enabled to support Intel Hyper-threading Technology to enhance CPU performance. The options are **Enabled** and Disabled.

**Active Processor Cores**

Set to Enabled to use a processor's second core and above. (Please refer to Intel's website for more information.) The options are **All**, 1, 2, 4, and 6.

**Limit CPUID Maximum**

This feature allows the user to set the maximum CPU ID value. Enable this function to boot the legacy operating systems that cannot support processors with extended CPUID functions. The options are Enabled and **Disabled** (for the Windows OS).

**Execute-Disable Bit (Available if supported by the OS & the CPU)**

Select Enabled to enable the Execute Disable Bit which will allow the processor to designate areas in the system memory where an application code can execute and where it cannot, thus preventing a worm or a virus from flooding illegal codes to overwhelm the processor or damage the system during an attack. The default is **Enabled**. (Refer to Intel and Microsoft Web sites for more information.)

**Intel® AES-NI**

Select Enable to use the Intel Advanced Encryption Standard (AES) New Instructions (NI) to ensure data security. The options are **Enabled** and Disabled.

**MLC Streamer Prefetcher (Available when supported by the CPU)**

If set to Enabled, the MLC (mid-level cache) streamer prefetcher will prefetch streams of data and instructions from the main memory to the L2 cache to improve CPU performance. The options are Disabled and **Enabled**.

**MLC Spatial Prefetcher (Available when supported by the CPU)**

If this feature is set to Disabled, The CPU prefetches the cache line for 64 bytes. If this feature is set to Enabled the CPU fetches both cache lines for 128 bytes as comprised. The options are Disabled and **Enabled**.

**DCU Streamer Prefetcher (Available when supported by the CPU)**

If this feature is set to Enabled, the Data Cache Unit (DCU) will prefetch L1 data and speed up data accessing and processing to enhance CPU performance. The options are Disabled and **Enabled**.

**DCU IP Prefetcher**

Select Enabled for DCU (Data Cache Unit) IP Prefetcher support, which will prefetch IP addresses to improve network connectivity and system performance. The options are **Enabled** and Disabled.

**Intel® Virtualization Technology (Available when supported by the CPU)**

Select Enabled to support Intel Virtualization Technology, which will allow one platform to run multiple operating systems and applications in independent partitions, creating multiple "virtual" systems in one physical computer. The options are **Enabled** and Disabled.

**Note:** If there is any change to this setting, you will need to power off and restart the system for the change to take effect. Please refer to Intel's website for detailed information.)

**PPIN (Protected Processor Inventory Number) (Available when supported by the CPU)**

If this feature is set to Enabled, the CPU will return a 64-bit ID number via a PPIN MSR, which is a magnetic reader and writer machine that reads data from and writes data to a magnetic strip card. The options are **Enabled** and Disabled.

**► CPU Power Management Configuration**

This submenu allows the user to configure the following CPU Power Management settings.

**Power Technology**

Select Energy Efficiency to support power-saving mode. Select Custom to customize system power settings. Select Disabled to disable power-saving settings. The options are Disabled, **Energy Efficient**, Custom, and Max Performance. If the option is set to Custom, the following items will display:

**EIST (Available when Power Technology is set to Custom)**

EIST (Enhanced Intel SpeedStep Technology) allows the system to automatically adjust processor voltage and core frequency to reduce power consumption and heat dissipation. The options are Disabled (GV3 Disabled), and **Enabled (GV3 Enabled)**. (**Note:** GV3 is Intel Speedstep support used on older platforms. Please refer to Intel's website for detailed information.)

**Turbo Mode (Available when Power Technology is set to Custom)**

Select Enabled to use the Turbo Mode to boost system performance. The options are **Enabled** and Disabled.

**C1E Support (Available when Power Technology is set to Custom)**

Select Enabled to enable Enhanced C1 Power State to boost system performance. The options are **Enabled** and Disabled.

**CPU C3 Report (Available when Power Technology is set to Custom)**

Select Enabled to allow the BIOS to report the CPU C3 State (ACPI C2) to the operating system. During the CPU C3 State, the CPU clock generator is turned off. The options are Enabled and **Disabled**.

**CPU C6 Report (Available when Power Technology is set to Custom)**

Select Enabled to allow the BIOS to report the CPU C6 State (ACPI C3) to the operating system. During the CPU C6 State, the power to all caches is turned off. The options are **Enabled** and Disabled.

**Package C-State limit (Available when Power Technology is set to Custom)**

This feature allows the user to set the limit on the C-State package register. The options are C0, C2, **C6**, and No Limit.

**Energy Performance Bias**

Use this feature to select an appropriate fan setting to achieve maximum system performance (with maximum cooling) or maximum energy efficiency (with maximum power saving). The fan speeds are controlled by the firmware management via IPMI 2.0. The options are Performance, **Balanced Performance**, Balanced Energy, and Energy Efficient.

**Factory Long Duration Power Limit**

This item displays the power limit (in watts) set by the manufacturer during which long duration power is maintained.

**Long Duration Power Limit**

This item displays the power limit (in watts) set by the user during which long duration power is maintained. The default setting is **0**.

**Factory Long Duration Maintained**

This item displays the period of time (in seconds) set by the manufacturer during which long duration power is maintained.

**Long Duration Maintained**

This item displays the period of time (in seconds) during which long duration power is maintained. The default setting is **0**.

**Recommended Short Duration Power Limit**

This item displays the short duration power settings (in watts) recommended by the manufacturer.

**Short Duration Power Limit**

During Turbo Mode, the system may consume more power than the default power setting set for a processor, and thus, exceeds the Short Duration Power limit. By increasing this value, the processor can provide better performance during a short period. This item displays the time period during which short duration power is maintained. The default setting is **0**.

**► Chipset Configuration****► North Bridge**

This feature allows the user to configure the settings for the Intel North Bridge.

**► Integrated IO Configuration****► ADR Configuration**

Use the items listed in this submenu to configure Asynchronous DRAM Refresh (ADR) settings.

**Intel® VT-d**

Select Enabled to enable Intel Virtualization Technology support for Direct I/O VT-d by reporting the I/O device assignments to the VMM (Virtual Machine Monitor) through the DMAR ACPI Tables. This feature offers fully-protected I/O resource sharing across Intel platforms, providing greater reliability, security and availability in networking and data-sharing. The options are **Enabled** and Disabled.



**Ageing Timer Rollover**

Select **Disabled** to allow the BIOS to determine how long the system should wait before reallocating resources to PCI-E devices for data transferring when a deadlock occurs. Select 32 us for the BIOS to wait for 32 us second before reallocating system resources for use of PCI-E data transferring when a deadlock occurs. The options are Disabled, 32 us, **128 us**, and 512 us.

**Intel® I/OAT**

Select Enabled to enable Intel I/OAT (I/O Acceleration Technology), which will significantly reduce CPU overhead by leveraging CPU architectural improvements and freeing the system resource up for other tasks. The options are Disabled and **Enabled**.

**DCA Support**

Select Enabled to use Intel's DCA (Direct Cache Access) Technology to improve data transfer efficiency. The default is **Enabled** and can not be changed.

**MMCFG Base**

Use this feature to select the default value for the PCI MMIO (Memory-Mapped IO) Base Address. The lower the value, the less available the system memory will be in 32-bit OS. The options are **0x80000000**, 0xA0000000 and 0xC0000000.

**I/O 1 PCIe Port Bifurcation Control**

This submenu configures the following IO PCIe Port Bifurcation Control settings for I/O 1 PCIe ports to determine how the available PCI-Express lanes to be distributed between the PCI-Exp. Root Ports.

**LSI SAS Link Speed**

This feature allows the user to set the PCI-Exp bus speed for the slot specified above. The options are Gen1 (Generation 1), Gen2 and **Gen3**.

**PLX NTB Link Speed**

This feature allows the user to set the PCI-Exp bus speed for the slot specified above. The options are Gen1 (Generation 1), Gen2 and **Gen3**.

**I350 NIC Link Speed**

This feature allows the user to set the PCI-Exp bus speed for the slot specified above. The options are Gen1 (Generation 1), Gen2 and **Gen3**.

## IIO 2 PCIe Port Bifurcation Control

### CPU2 Port 3A Link Speed

Select GEN1 to enable PCI-Exp Generation 1 support for Port 3A. Select GEN2 to enable PCI-Exp Generation 2 support for Port 3A. Select GEN3 to enable PCI-Exp Generation 3 support for Port 3A. The options are GEN1, GEN2, and **GEN3**.

### CPU2 Port 3C Link Speed

Select GEN1 to enable PCI-Exp Generation 1 support for Port 3C. Select GEN2 to enable PCI-Exp Generation 2 support for Port 3C. Select GEN3 to enable PCI-Exp Generation 3 support for Port 3C. The options are GEN1, GEN2, and **GEN3**.

## ►QPI Configuration

### Current QPI Link Speed

This item displays the current status of the QPI Link.

### Current QPI Link Frequency

This item displays the frequency of the QPI Link.

### Isoc

Select Enabled to enable Isochronous support to meet QoS (Quality of Service) requirements. This feature is especially important for virtualization technology. The options are Enabled and **Disabled**.

### QPI (Quick Path Interconnect) Link Speed Mode

Use this feature to select data transfer speed for QPI Link connections. The options are **Fast** and Slow.

### QPI Link Frequency Select

Use this feature to select the desired QPI frequency. The options are **Auto**, 6.4 GT/s, 7.2 GT/s, and 8.0 GT/s.

## ► DIMM Configuration

This section displays the following DIMM information:

CPU Socket 1 DIMM Information

- P1-DIMM1A/P1-DIMM1B/P1-DIMM1C

CPU Socket 2 DIMM Information

- P2-DIMM1D/P2-DIMM1E/P2-DIMM1F

## Memory Mode

Use this feature to configure memory mode when memory is initialized. When Independent is selected, all DIMMs are available to the operating system. The default setting is **Independent**.

## ArxCis

Select Enabled to use DDR3 ArxCis memory modules which combine super-capacitor DRAM and flash memory to provide a solution to save critical data during power failure events. The options are Enabled and **Disabled**.

## DRAM RAPL Mode

RAPL (Running Average Power Limit) provides mechanisms to enforce power consumption limits on supported processors. The options are DRAM RAPL MODE0 , **DRAM RAPL MODE1**, and Disabled.

## DDR Speed

Use this feature to force a DDR3 memory module to run at a frequency other than what is specified by the manufacturer. The options are **Auto**, Force DDR3-800, Force DDR3-1066, Force DDR3-1333, Force DDR3-1600 and Force SPD.

## Channel Interleaving

This feature selects from the different channel interleaving methods. The options are **Auto**, 1 Way, 2 Way, 3, Way, 4 Way and 8 Way.

## Rank Interleaving

This feature allows the user to select a rank memory interleaving method. The options are **Auto**, 1 Way, 2 Way, 4, Way, and 8 Way.

## Patrol Scrub

Patrol Scrubbing is a process that allows the CPU to correct correctable memory errors detected on a memory module and send the correction to the requestor (the original source). When this item is set to Enabled, the IO hub will read and write back one cache line every 16K cycles, if there is no delay caused by internal

processing. By using this method, roughly 64 GB of memory behind the IO hub will be scrubbed every day. The options are **Enabled** and Disabled.

#### **Demand Scrub**

Demand Scrubbing is a process that allows the CPU to correct correctable memory errors found on a memory module. When the CPU or I/O issues a demand-read command, and the read data from memory turns out to be a correctable error, the error is corrected and sent to the requestor (the original source). Memory is updated as well. Select Enabled to use Demand Scrubbing for ECC memory correction. The options are Enabled and **Disabled**.

#### **Data Scrambling**

Select Enabled to enable data scrambling to ensure data security and integrity. The options are Disabled and **Enabled**.

#### **Device Tagging**

Select Enabled to support device tagging. The options are **Disabled** and Enabled.

#### **Thermal Throttling**

Throttling improves reliability and reduces power consumption in the processor via automatic voltage control during processor idle states. The options are Disabled and **CLTT** (Closed Loop Thermal Throttling).

#### **Double Refresh**

Select Enabled to support double refresh for memory stability under high temperature. The options are Disabled, **Auto**, and Enabled.

### **► South Bridge Configuration**

This feature allows the user to configure the settings for the Intel PCH chip.

#### **PCH Information**

This feature displays the following PCH information.

**Name:** This item displays the name of the PCH chip.

**Stepping:** This item displays the PCH stepping.

**USB Devices:** This item displays the USB devices detected by the BIOS.

#### **All USB Devices**

This feature enables all USB ports/devices. The options are Disabled and **Enabled**. (If set to Enabled, EHCI Controller 1 and Controller 2 will appear.)

**EHCI Controller 1/EHCI Controller 2 (Available when All USB Devices is set to Enabled)**

Select Enabled to enable EHCI (Enhanced Host Controller Interface) Controller 1 or Controller 2 to enhance system performance. The options are Disabled and **Enabled**.

**Legacy USB Support (Available when USB Functions is not Disabled)**

Select Enabled to support legacy USB devices. Select Auto to disable legacy support if USB devices are not present. Select Disabled to have USB devices available for EFI (Extensive Firmware Interface) applications only. The settings are Disabled, **Enabled** and Auto.

**Port 60/64 Emulation**

Select Enabled to enable I/O port 60h/64h emulation support for the legacy USB keyboard so that it can be fully supported by the operating systems that does not recognize a USB device. The options are Disabled and **Enabled**.

**EHCI Hand-Off**

This item is for operating systems that do not support Enhanced Host Controller Interface (EHCI) hand-off. When enabled, EHCI ownership change will be claimed by the EHCI driver. The options are **Disabled** and Enabled.

**►SATA Configuration**

When this submenu is selected, the AMI BIOS automatically detects the presence of IDE or SATA devices and displays the following items.

**SATA Port0~SATA Port5:** The AMI BIOS displays the status of each SATA port as detected by the BIOS.

**SATA Mode**

Use this feature to configure SATA mode for a selected SATA port. The options are Disabled, IDE Mode, **AHCI Mode** and RAID Mode. The following are displayed depending on your selection:

**IDE Mode**

The following items are displayed when IDE Mode is selected:

**Serial-ATA (SATA) Controller 0 and Serial-ATA (SATA) Controller 1**

Use this feature to activate or deactivate the SATA controller, and set the compatibility mode. The options are Disabled, Enhanced, and Compatible. The default for SATA Controller 0 is **Compatible**. The default of SATA Controller 1 is **Enhanced**.

## AHCI Mode

The following items are displayed when the AHCI Mode is selected.

### Aggressive Link Power Management

When Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link in a low power mode during extended periods of I/O inactivity, and will return the link to an active state when I/O activity resumes. The options are **Enabled** and Disabled.

### Port 0~5 Hot Plug

Select Enabled to enable hot-plug support for a particular port, which will allow the user to change a hardware component or device without shutting down the system. The options are **Enabled** and Disabled.

### Port 0~5 Staggered Spin Up

Select Enabled to enable Staggered Spin-up support to prevent excessive power consumption caused by multiple HDDs spinning-up simultaneously. The options are Enabled and **Disabled**.

## RAID Mode

The following items are displayed when RAID Mode is selected:

### Port 0~5 Hot Plug

Select Enabled to enable hot-plug support for the particular port. The options are **Enabled** and Disabled.

## ► PCIe/PCI/PnP Configuration

### Launch Storage OpROM Policy

This feature selects the Storage Option ROM to be used to bootup the system when there are multiple Storage Option ROMs available. The options are UEFI Only and **Legacy Only**.

### PCI Latency Timer

Use this feature to set the latency timer for each PCI device installed on a PCI bus. Select 64 to set the PCI latency to 64 PCI clock cycles. The options are 32 PCI Bus Clocks, **64 PCI Bus Clocks**, 96 PCI Bus Clocks, 128 PCI Bus Clocks, 160 PCI Bus Clocks, 192 PCI Bus Clocks, 224 PCI Bus Clocks, and 248 PCI Bus Clocks.

### PERR# Generation

Select Enabled to allow a PCI device to generate a PERR number for a PCI Bus Signal Error Event. The options are Enabled and **Disabled**.

### SERR# Generation

Select Enabled to allow a PCI device to generate an SERR number for a PCI Bus Signal Error Event. The options are Enabled and **Disabled**.

### Maximum Payload

Select Auto to allow the system BIOS to automatically set the maximum payload value for a PCI-E device to enhance system performance. The options are **Auto**, 128 Bytes and 256 Bytes.

### Maximum Read Request

Select Auto to allow the system BIOS to automatically set the maximum read request size for a PCI-E device to enhance system performance. The options are **Auto**, 128 Bytes, 256 Bytes, 512 Bytes, 1024 Bytes, 2048 Bytes, and 4096 Bytes.

### ASPM Support

This feature allows the user to set the Active State Power Management (ASPM) level for a PCI-E device. Select Auto to allow the system BIOS to automatically set the ASPM level for the system. Select Disabled to disable ASPM support. The options are **Disabled** and Auto.

**Warning:** Enabling ASPM support may cause some PCI-E devices to fail!

### Above 4G Decoding (Available if the system supports 64-bit PCI decoding)

Select Enabled to decode a PCI device that supports 64-bit in the space above 4G Address. The options are Enabled and **Disabled**.

**CPU2 Port1 PCI-E 3.0 x8 OPROM/CPU2 Port3A PCI-E 3.0 x8 OPROM//CPU2 Port3C PCI-E 3.0 x8 OPROM**

Select Enabled to enable Option ROM support to boot the computer using a device installed on the slots specified above. The options are **Enabled** and Disabled.

**Onboard LAN Option ROM Select**

Select iSCSI to use the iSCSI Option ROM to boot the computer using a network device. Select PXE (Preboot Execution Environment) to use an PXE Option ROM to boot the computer using a network device. The options are iSCSI, FCoE, and **PXE**.

**Load Onboard LAN1 Option ROM/Load Onboard LAN2 Option ROM**

Select Enabled to enable the onboard LAN1 Option ROM/LAN2 Option ROM. This is to boot the computer using a network device. The default setting for LAN1 Option ROM is **Enabled**, and the default setting for LAN2 Option ROM is **Disabled**.

**Load Onboard SAS Option ROM**

Select Enabled to enable the onboard SAS Option ROM. This is to boot the computer using a SAS device. The options are **Enabled** and Disabled.

**VGA Priority**

This feature allows the user to select the graphics adapter to be used as the primary boot device. The options are **Onboard**, and Offboard.

**Network Stack**

When this featurer is set to Enabled, both PXE (Preboot Execution Environment) and UEFI (Unified Extensible Firmware Interface) will be enabled for network stack support. The options are Enabled and **Disabled**.

**►Super IO Configuration**

**Super IO Chip:** This item displays the Super IO chip used in the motherboard.

**►COM Configuration****Serial Port**

Select Enabled to enable a serial port specified by the user. The options are **Enabled** and Disabled.

**Device Settings**

This item displays the settings of the COM port specified by the user.



### Change Settings

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 1. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port becomes unavailable. The options are **Auto**, IO=3F8h; IRQ=4; IO=3F8h; IRQ=3; IO=2F8h; IRQ=3; IO=3E8h; IRQ=5; IO=2E8h; IRQ=7; IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; and IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12.

### Device Mode

Use this feature to select the desired mode for a serial port specified. The options are **Normal** and High Speed.

## ► Serial SOL Configuration

### SOL (Serial\_Over\_LAN) Serial Port

Select Enabled to enable the serial port specified for SOL use. The options are **Enabled** and Disabled.

### Device Settings

This item displays the settings of SOL Port .

### SOL (Serial\_Over\_LAN) Change Settings

This option specifies the base I/O port address and the Interrupt Request address of Serial Port 2. Select Disabled to prevent the serial port from accessing any system resources. When this option is set to Disabled, the serial port becomes unavailable. The options are **Auto**, IO=3F8h; IRQ=4; IO=3F8h; IRQ=3; IO=2F8h; IRQ=3; IO=3E8h; IRQ=5; IO=2E8h; IRQ=7; IO=3F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=2F8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; IO=3E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12; and IO=2E8h; IRQ=3, 4, 5, 6, 7, 10, 11, 12.

### SOL (Serial\_Over\_LAN) Device Mode

Use this feature to select the desired mode for a serial port specified. The options are **Normal** and High Speed.

### Serial Port 2 Attribute

Use this feature to select the attribute for serial port 2. The options are **SOL** (Serial\_On\_LAN), and COM.

## ► Serial Port Console Redirection

### COM/SOL

These two submenus allow the user to configure the following Console Redirection settings for the COM Port or the SOL port specified by the user.

#### Console Redirection

Select Enabled to use the COM Port or the SOL port selected by the user for Console Redirection. The options are Enabled and Disabled. The default setting for the COM port is **Disabled**, and for the SOL port is **Enabled**.

## ► Console Redirection Settings

This feature allows the user to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

#### Terminal Type

This feature allows the user to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII Character set. Select VT100+ to add color and function key support. Select ANSI to use the Extended ASCII Character Set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are ANSI, VT100, **VT100+**, and VT-UTF8.

#### Bits Per second

Use this feature to set the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 38400, 57600 and **115200** (bits per second).

#### Data Bits

Use this feature to set the data transmission size for Console Redirection. The options are 7 Bits and **8 Bits**.

#### Parity

A parity bit can be sent along with regular data bits to detect data transmission errors. Select Even if the parity bit is set to 0, and the number of 1's in data bits is even. Select Odd if the parity bit is set to 0, and the number of 1's in data bits is odd. Select None if you do not want to send a parity bit with your data bits in transmission. Select Mark to add a mark as a parity bit to be sent along with the data bits. Select Space to add a Space as a parity bit to be sent with your data bits. The options are **None**, Even, Odd, Mark and Space.

### Stop Bits

A stop bit indicates the end of a serial data packet. Select 1 Stop Bit for standard serial data communication. Select 2 Stop Bits if slower devices are used. The options are **1** and **2**.

### Flow Control

This feature allows the user to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None** and Hardware RTS/CTS.

### VT-UTF8 Combo Key Support

Select Enabled to enable VT-UTF8 Combination Key support for ANSI/VT100 terminals. The options are **Enabled** and Disabled.

### Recorder Mode

Select Enabled to capture the data displayed on a terminal and send it as text messages to a remote server. The options are **Disabled** and Enabled.

### Resolution 100x31

Select Enabled for extended-terminal resolution support. The options are Disabled and **Enabled**.

### Legacy OS Redirection Resolution

Use this feature to select the number of rows and columns used in Console Redirection for legacy OS support. The options are 80x24 and **80x25**.

### Putty KeyPad

This feature selects Function Keys and KeyPad settings for Putty, which is a terminal emulator designed for the Windows OS. The options are **VT100**, LINUX, XTERMR6, SC0, ESCN, and VT400.

### Redirection After BIOS POST

If **Always Enabled** is selected, Legacy Console Redirection will be enabled for Legacy OS after BIOS POST (Power-On Self Test) is completed. The options are **Always Enabled**, and BootLoader.

### Serial Port for Out-of-Band Management/Windows Emergency Management Services (EMS)

The submenu allows the user to configure Console Redirection settings to support Out-of-Band Serial Port management.

### Console Redirection (for EMS)

Select Enabled to use a serial port selected by the user for Console Redirection. The options are **Enabled** and Disabled.

### ►Console Redirection Settings (for EMS)

This feature allows the user to specify how the host computer will exchange data with the client computer, which is the remote computer used by the user.

#### Out-of-Band Management Port

The feature selects a serial port used by the Microsoft Windows Emergency Management Services (EMS) to communicate with a remote server. The options are **COM1** and COM2.

#### Terminal Type

This feature allows the user to select the target terminal emulation type for Console Redirection. Select VT100 to use the ASCII character set. Select VT100+ to add color and function key support. Select ANSI to use the extended ASCII character set. Select VT-UTF8 to use UTF8 encoding to map Unicode characters into one or more bytes. The options are ANSI, VT100, **VT100+**, and VT-UTF8.

#### Bits Per Second

This item sets the transmission speed for a serial port used in Console Redirection. Make sure that the same speed is used in the host computer and the client computer. A lower transmission speed may be required for long and busy lines. The options are 9600, 19200, 57600, and **115200** (bits per second).

#### Flow Control

This feature allows the user to set the flow control for Console Redirection to prevent data loss caused by buffer overflow. Send a "Stop" signal to stop sending data when the receiving buffer is full. Send a "Start" signal to start sending data when the receiving buffer is empty. The options are **None**, Hardware RTS/CTS, and Software Xon/Xoff.

#### Data Bits, Parity, Stop Bits

The status of these features is displayed.

### ►ACPI Settings

Use this feature to configure Advanced Configuration and Power Interface (ACPI) power management settings for your system.

### ACPI Sleep State

Use this feature to select the ACPI State when the system is in sleep mode. Select S1 (CPU Stop Clock) to erase all CPU caches and stop executing instructions. Power to the CPU(s) and RAM is maintained, but RAM is refreshed. Select Suspend Disabled to use power-reduced mode. Power will only be supplied to limited components (such as RAMs) to maintain the most critical functions of the system. The options are **S1 (CPU Stop Clock)**, and Suspend Disabled.

### NUMA (NON-Uniform Memory Access)

This feature enables the Non-Uniform Memory Access ACPI support. The options are **Enabled** and Disabled.

### High Precision Event Timer

Select Enabled to activate the High Precision Event Timer (HPET) that produces periodic interrupts at a much higher frequency than a Real-time Clock (RTC) does in synchronizing multimedia streams, providing smooth playback, reducing the dependency on other timestamp calculation devices, such as an x86 RDTSC Instruction embedded in the CPU. The High Performance Event Timer is used to replace the 8254 Programmable Interval Timer. The options are **Enabled** and Disabled.

## ►ME (Manageability Engine) Subsystem

This feature displays the following Intel ME Subsystem Configuration settings.

- **ME BIOS Interface Version**
- **ME Version**

## ►Trusted Computing (Available when a TPM device is detected by the BIOS)

### Configuration

#### TPM Support

Select Enabled on this item and enable the TPM jumper on the motherboard to enable TPM support to improve data integrity and network security. The options are **Enabled** and Disabled.

#### TPM State

Select Enabled to enable TPM security settings to improve data integrity and network security. The options are Disabled and **Enabled**.

**Pending Operation**

Use this item to schedule an operation for the security device. The options are **None**, Enable Take Ownership, Disable Take Ownership, and TPM Clear.

**Note:** During restart, the computer will reboot in order to execute the pending operation and change the state of the security device.

**Current Status Information:** This item displays the information regarding the current TPM status.

**TPM Enable Status**

This item displays the status of TPM Support to indicate if TPM is currently enabled or disabled.

**TPM Active Status**

This item displays the status of TPM Support to indicate if TPM is currently active or deactivated.

**TPM Owner Status**

This item displays the status of TPM Ownership.

**►Intel TXT (LT-SX) Configuration****Intel TXT (LT-SX) Hardware Support**

This feature indicates if the following hardware components support the Intel Trusted Execution Technology.

**CPU:** TXT (Trusted Execution Technology) Feature

**Chipset:** TXT (Trusted Execution Technology) Feature

**Intel TXT (LT-SX) Configuration**

This feature displays the following TXT configuration setting.

**TXT (LT-SX) Support:** This item indicates if the Intel TXT support is enabled or disabled. The default setting is **Disabled**.

**Intel TXT (LT-SX) Dependencies**

This feature displays the features that need to be enabled for the Intel Trusted Execution Technology to work properly in the system.

**VT-d Support:** Intel Virtualization Technology with Direct I/O support

**VT Support:** Intel Virtualization Technology support

**TPM Support:** Trusted Platform support

**TPM State:** Trusted Platform state

### Intel TXT (LT-SX) Dependencies

This feature displays the features that need to be enabled for the Intel Trusted Execution Technology to work properly in the system.

**VT-d Support:** Intel Virtualization Technology with Direct I/O support

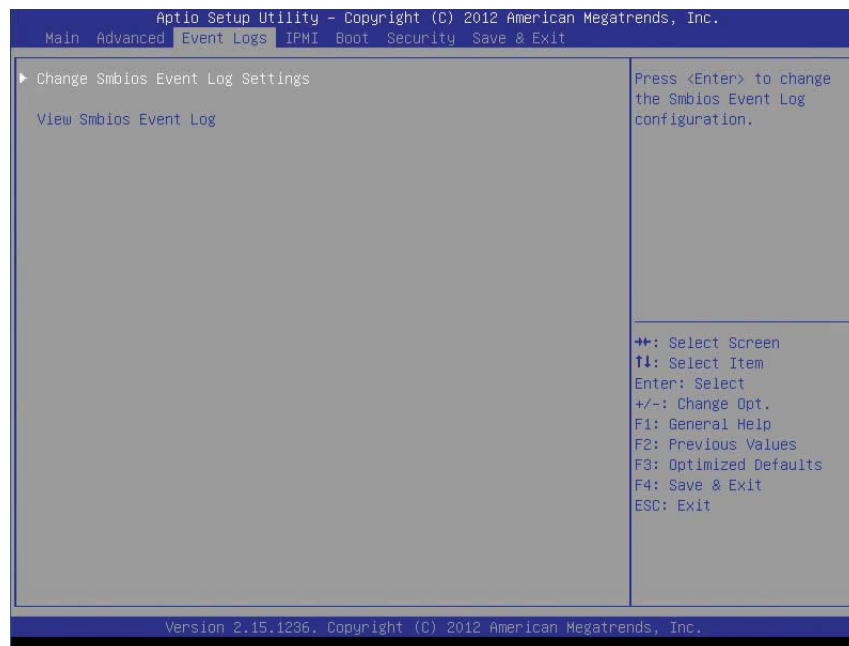
**VT Support:** Intel Virtualization Technology support

**TPM Support:** Trusted Platform support

**TPM State:** Trusted Platform state

## 7-4 Event Logs

Use this feature to configure Event Log settings.



### ► Change SMBIOS Event Log Settings

This feature allows the user to configure SMBIOS Event settings.

### Enabling/Disabling Options

#### SMBIOS Event Log

Select Enabled to enable SMBIOS (System Management BIOS) Event Logging during system boot. The options are **Enabled** and Disabled.

**Runtime Error Logging Support**

Select Enabled to support Runtime Error Logging. The options are **Enabled** and **Disabled**.

**Memory Correctable Error Threshold**

This feature allows the user to enter the threshold value for correctable memory errors. The default setting is **10**.

**PCI Error Logging Support**

Select Enabled to support error event logging for PCI slots. The options are **Enabled** and **Disabled**.

**Erasing Settings****Erase Event Log**

Select Enabled to erase the SMBIOS (System Management BIOS) Event Log, which is completed before an event logging is initialized upon system reboot. The options are **No**, **Yes, next reset**, and **Yes, every reset**.

**When Log is Full**

Select Erase Immediately to immediately erase SMBIOS error event logs that exceed the limit when the SMBIOS event log is full. Select Do Nothing for the system to do nothing when the SMBIOS event log is full. The options are **Do Nothing** and **Erase Immediately**.

**SMBIOS Event Log Standard Settings****Log System Boot Event**

Select Enabled to log system boot events. The options are **Disabled** and **Enabled**.

**MECI (Multiple Event Count Increment)**

Enter the increment value for the multiple event counter. Enter a number between 1 to 255. The default setting is **1**.

**METW (Multiple Event Count Time Window)**

This item allows the user to decide how long (in minutes) should the multiple event counter wait before generating a new event log. Enter a number between 0 to 99. The default setting is **60**.

**View SMBIOS Event Log**

This item allows the user to view the event in the SMBIOS event log. Select this item and press <Enter> to view the status of an event in the log.

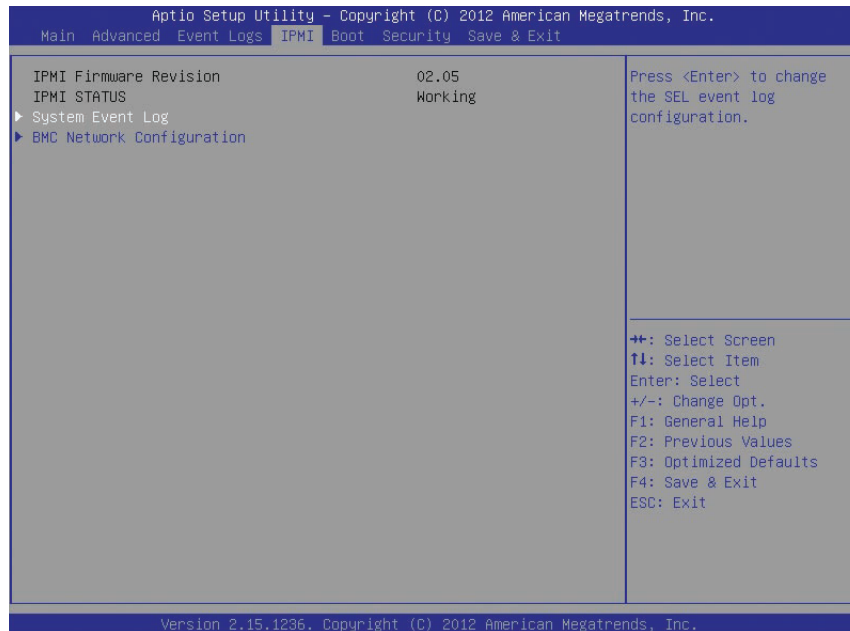
Date/Time/Error Code/Severity

---



## 7-5 IPMI

Use this feature to configure Intelligent Platform Management Interface (IPMI) settings.



### IPMI Firmware Revision

This item indicates the IPMI firmware revision used in your system.

### IPMI Status

This item indicates the status of the IPMI firmware installed in your system.

## ► System Event Log

### Enabling/Disabling Options

#### SEL Components

Select Enabled for all system event logging at bootup. The options are **Enabled** and Disabled.

#### Erasing Settings

##### Erase SEL

Select Yes, On next reset to erase all system event logs upon next system reboot. Select Yes, On every reset to erase all system event logs upon each system reboot. Select No to keep all system event logs after each system reboot. The options are **No**, Yes, On next reset, and Yes, On every reset.

**When SEL is Full**

This feature allows the user to decide what the BIOS should do when the system event log is full. Select Erase Immediately to erase all events in the log when the system event log is full. The options are **Do Nothing** and Erase Immediately.

**Custom EFI Logging Options****Log EFI Status Codes**

Select Enabled to log EFI (Extensible Firmware Interface) Status Codes, Error Codes or Progress Codes. The options are **Enabled** and Disabled.

**Note:** After making changes on a setting, be sure to reboot the system for the changes to take effect.

**►BMC Network Configuration**

**LAN Channel 1:** This feature allows the user to configure the settings for LAN1 Port.

**IPMI LAN Selection:** This feature displays the available IPMI LAN modes.

**IPMI Network Link Status:** This feature displays the IPMI Network Link status.

**Update IPMI LAN Configuration**

This feature allows the BIOS to implement any IP/MAC address changes at the next system boot. If the option is set to Yes, any changes made to the settings below will take effect when the system is rebooted. The options are **No** and Yes.

**Configuration Address Source**

This feature allows the user to select the source of the IP address for this computer. If Static is selected, you will need to know the IP address of this computer and enter it to the system manually in the field. If DHCP is selected, the BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server in the network that is attached to and request the next available IP address for this computer. The options are **DHCP** and Static. The following items are assigned IP addresses automatically if DHCP is selected, or can be configured manually if Static is selected.

**Station IP Address**

This item displays the Station IP address for this computer. This should be in decimal and in dotted quad form (i.e., 192.168.10.253).

**Subnet Mask**

This item displays the sub-network that this computer belongs to. The value of each three-digit number separated by dots should not exceed 255.

### Station MAC Address

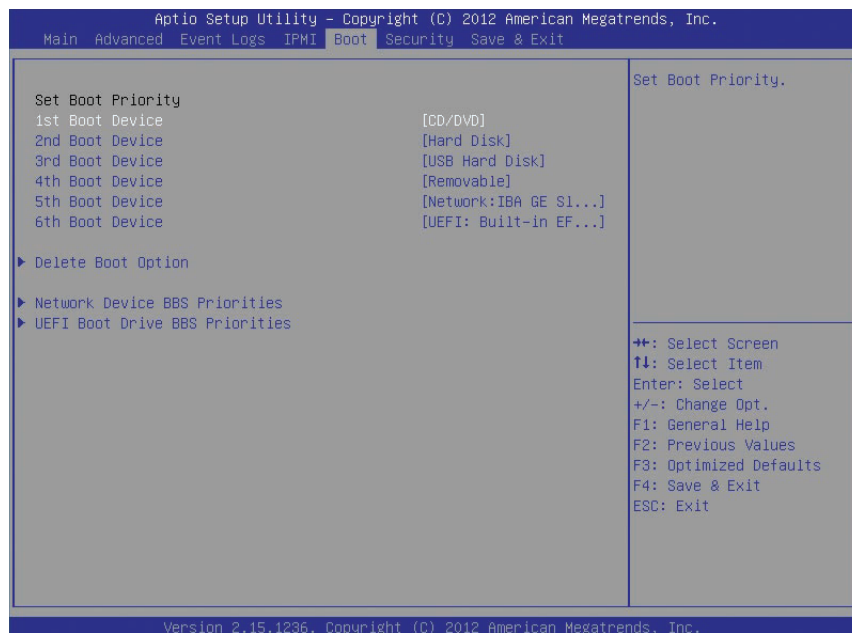
This item displays the Station MAC address for this computer. Mac addresses are 6 two-digit hexadecimal numbers.

### Gateway IP Address

This item displays the Gateway IP address for this computer. This should be in decimal and in dotted quad form (i.e., 192.168.10.253).

## 7-6 Boot

This submenu allows the user to configure the following boot settings for the system.



### Set Boot Priorities

#### 1st Boot Device/2nd Boot Device/3rd Boot Device/4th Boot Device/5th Boot Device/6th Boot Device

Use this feature to specify the sequence of boot priority for a device specified by the user.

#### ► Delete Boot Option

This feature allows the user to select a boot device to delete from the boot priority list.

#### ► Network Device BBS Priorities

This submenu allows the user to specify the boot priority sequence of a network device.

1st Device

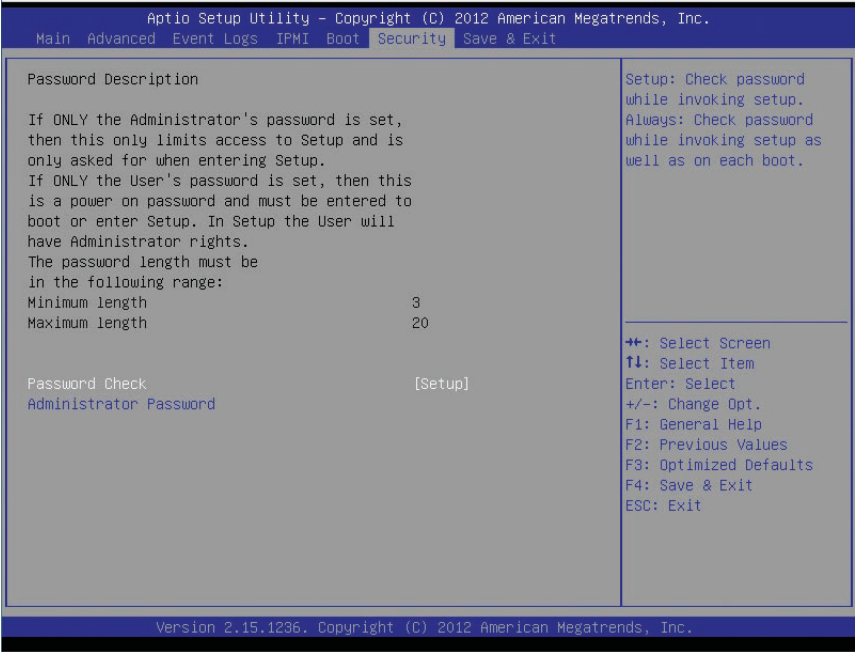
►UEFI Boot Device BBS Priorities

This submenu allows the user to specify the boot priority sequence of a UEFI bootable device.

1st Device

7-7 Security

This menu allows the user to configure the security settings for the system.



Administrator Password

Use this feature to set the Administrator Password which is required to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

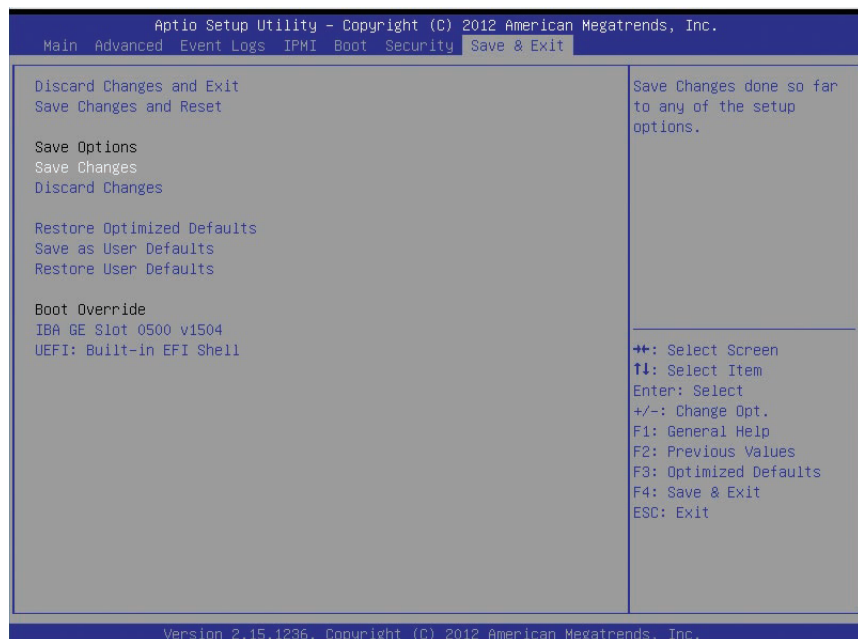
User Password

Use this feature to set a User Password which is required to log into the system and to enter the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

Password Check

This feature allows the user to decide if a password is required to enter the BIOS Setup utility or upon system boot. The options are **Setup** and Always.

## 7-8 Save & Exit



This submenu allows the user to configure the Save and Exit settings for the system.

### Discard Changes and Exit

Select this option to quit the BIOS Setup without making any permanent changes to the system configuration, and reboot the computer. Select Discard Changes and Exit, and press <Enter>. When the dialog box appears, asking you if you want to exit the BIOS setup without saving, select **Yes** to quit BIOS without saving the changes, or select No to quit the BIOS and save changes.

### Save Changes and Reset

When you have completed the system configuration changes, select this option to save the changes and reboot the computer so that the new system configuration settings can take effect. Select Save Changes and Exit, and press <Enter>. When the dialog box appears, asking you if you want to exit the BIOS setup without saving, select **Yes** to quit BIOS without saving the changes, or select No to quit the BIOS and save changes.

### Save Options

### Save Changes

Select this option and press <Enter> to save all changes you've done so far and return to the AMI BIOS utility Program. When the dialog box appears, asking you if you want to save configuration, select **Yes** to save the changes, or select No to return to the BIOS without making changes.

**Discard Changes**

Select this feature and press <Enter> to discard all the changes and return to the BIOS setup. When the dialog box appears, asking you if you want to load previous values, select **Yes** to load the values previous saved, or select No to keep the changes you've made so far.

**Restore Optimized Defaults**

Select this feature and press <Enter> to load the optimized default settings that help optimize system performance. When the dialog box appears, asking you if you want to load optimized defaults, select **Yes** to load the optimized default settings, or select No to abandon optimized defaults.

**Save as User Defaults**

Select this feature and press <Enter> to save the current settings as the user's defaults. When the dialog box appears, asking you if you want to save values as user's defaults, select **Yes** to save the current values as user's default settings, or select No to keep the defaults previously saved as the user's defaults.

**Restore User Defaults**

Select this feature and press <Enter> to load the user's defaults previously saved in the system. When the dialog box appears, asking you if you want to restore user's defaults, select **Yes** to restore the user's defaults previously saved in the system, or select No to abandon the user's defaults that were previously saved.

**Boot Override**

This feature allows the user to override the Boot Option Priorities setting in the Boot menu, and instead immediately boot the system with one of the listed devices. This is a one-time override.

## Appendix A

### BIOS Error Beep Codes

During the POST (Power-On Self-Test) routines, which are performed at each system boot, errors may occur.

**Non-fatal errors** are those which, in most cases, allow the system to continue to boot. The error messages normally appear on the screen.

**Fatal errors** will not allow the system to continue with bootup procedure. If a fatal error occurs, you should consult with your system manufacturer for possible repairs.

These fatal errors are usually communicated through a series of audible beeps. The numbers on the fatal error list correspond to the number of beeps for the corresponding error.

BIOS Error Beep Codes		
Beep Code/LED	Error Message	Description
1 beep	Refresh	Ready to boot
5 short beeps + 1 long beep	Memory error	No memory detected in the system
5 beeps	No Con-In or No Con-Out devices	Con-In: USB or PS/2 keyboard, PCI or Serial Console Redirection, IPMI KVM or SOL  Con-Out: Video Controller, PCI or Serial Console Redirection, IPMI SOL
1 beep	Refresh	1 beep for each USB device installed
X9 IPMI Error Codes		
1 Continuous Beep	System OH	System Overheat

**Notes**



## Appendix B

### System Specifications

#### Processors (each node)

Single or dual Intel® Xeon E5-2400 of up to 95W in B2 type sockets (both CPUs must be of the same type)

Note: Please refer to our web site for a complete listing of supported processors.

#### Chipset

Intel C602J

#### BIOS

16 Mb AMI® Flash ROM

#### Memory Capacity (each node)

Six DIMM slots that can support up to 192 GB of Registered (RDIMM) ECC/Non-ECC DDR3-1866/1600/1333/1066/800 memory

Note: see Section 5-6 for details.

#### SAS/SATA (each node)

Two external SAS 2.0 x4 ports (eight 6Gb/s lanes) and two SATA 3.0 ports with power header for for SATA DOM

#### Drive Bays

Sixteen hot-swap drive bays to house 3.5" hard drives

#### Expansion Slots (each node)

Riser card with four PCI-E 3.0 x8 (in x24 slots)

#### Serverboard (two per system)

X9DBS-F (Proprietary form factor)

Dimensions: 16.64 x 8.1 in (423 x 206 mm)

## **Chassis**

SC937ETS-R1200NDBP (3U rackmount)

Dimensions: (WxHxD) 17.2 x 5.2 x 24.2 in. (437 x 132 x 615 mm)

Weight (Net): 56 lbs. (25.5 kg.)

## **Weight**

Gross (Bare Bone): 75 lbs. (34 kg.)

## **System Cooling**

Three sets of 4-cm counter-rotating fans above each node, two sets of counter-rotating fans at the back of each node, one set of counter-rotating fans on each serverboard (each set contains two fans placed back-to-back)

## **System Input Requirements**

AC Input Voltage: 100 - 240V AC auto-range

Rated Input Current: 11.5 - 5.5A max

Rated Input Frequency: 50 to 60 Hz

## **Power Supply**

Rated Output Power: 1200W (Part# PWS-1K21P-1R) 80 Plus Gold Certified

Rated Output Voltages: +12V (100A @ 240V, 83A @ 100V), +5Vsb (6A @ 240V, 4A @ 100V)

## **Operating Environment**

Operating Temperature: 10° to 35° C (50° to 95° F)

Non-operating Temperature: -40° to 70° C (-40° to 158° F)

Operating Relative Humidity: 20% to 95% (non-condensing)

Non-operating Relative Humidity: 5 to 95% (non-condensing)

## **Regulatory Compliance**

Electromagnetic Emissions: FCC Class A, EN 55022 Class A, EN 61000-3-2/-3-3, CISPR 22 Class A

Electromagnetic Immunity: EN 55024/CISPR 24, (EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-5, EN 61000-4-6, EN 61000-4-8, EN 61000-4-11)

Safety: CSA/EN/IEC/UL 60950-1 Compliant, UL or CSA Listed (USA and Canada), CE Marking (Europe)

California Best Management Practices Regulations for Perchlorate Materials:  
This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. "Perchlorate Material-special handling may apply. See [www.dtsc.ca.gov/hazardouswaste/perchlorate](http://www.dtsc.ca.gov/hazardouswaste/perchlorate)"

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