

Niveus 4904GT

Technical Guide
Rev. 1.0



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Manual Revision 1.0

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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 server. Installation and maintenance should be performed by experienced technicians only.

Please refer to the server specifications page on our Web site for updates on supported memory, processors and operating systems (www.penguincomputing.com).

Notes

If you have any questions, please contact our support team at: support@penguincomputing.com

This manual may be periodically updated without notice. Please check the Penguin Computing Web site for possible updates to the manual revision level.

Warnings

Special attention should be given to the following symbols used in this manual.



Warning! Indicates important information given to prevent equipment/property damage or personal injury.



Warning! Indicates high voltage may be encountered when performing a procedure.

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Chapter 1

Introduction

1-1 Overview

The workstation Niveus 4904gt is comprised of two main subsystems: the SC747BTQ-R2K02B 4U/Tower chassis and the X10DRG-Q dual Intel Xeon processor serverboard. Please refer to our web site for information on operating systems that have been certified for use with the system (www.penguincomputing.com).

In addition to the serverboard and chassis, various hardware components have been included with the workstation, as listed below:

- SATA accessories:
 - One HD backplane (BPN-SAS-747TQ)
 - Eight 3.5" hard disk drive carriers (MCP-220-00094-0B)
 - Three 5.25" drive trays (MCP-220-00073-0B)
- Cooling
 - Four 92x38 mm middle fans (FAN-0138L4, FAN-0114L4)
 - Two 80x38 mm rear exhaust fans (FAN-0082L4)
 - Two 4U active CPU heatsinks (SNK-P0050AP4)

Optional

- One 4U 17.2" width rack rail set (MCP-290-00059-0B)
- SC747B GPU / Add-on Card Dummy Assembly (2 Slots), Single Pack (MCP-240-00096-0N)
- GPU Kit that includes two rear fans and one air shroud (MCP-320-74701-0N-KIT)
- HDD conversion tray, hotswap Gen. 6 3.5" to 2.5" (MCP-220-93801-0B)

For support, email support@penguincomputing.com.

1-2 Serverboard Features

At the heart of the Niveus 4904GT workstation lies the X10DRG-Q, a dual processor serverboard based on the Intel C612 Express chipset. Below are the main features of the serverboard. (See Figure 1-1 for a block diagram of the chipset).

Processors

The system supports two Intel Xeon E5-2600 v3 Series processors in Dual Socket R3 (LGA 2011). Please refer to the serverboard description pages on the Penguin Computing web site for a complete listing of supported processors.

Memory

The system has sixteen DDR4 DIMM slots that can support up to 1 TB ECC LRDIMM or 512 GB ECC RDIMM. Memory type is 2133/1866/1600MHz ECC DDR4 SDRAM 72-bit. See Chapter 5 for details.

SATA

A SATA controller is integrated into the chipset to provide a ten-port SATA 3.0 subsystem, which is RAID 0, 1, 5 and 10 supported. The SATA drives are hot-swappable units.

Note: The operating system you use must have RAID support to enable the hot-swap capability and RAID function of the Serial ATA drives.

PCI Expansion Slots

The serverboard has four PCI-E 3.0 x16, two PCI-E 3.0 x8 (one in x16) and one PCI-E 2.0 x4 (in x8) slots for a total of seven PCI expansion slots.

Rear I/O Ports

The I/O ports include one COM port, a VGA (monitor) port, two USB 3.0 ports and two USB 2.0 ports, a dedicated IPMI LAN port and two Gb Ethernet LAN ports.

IPMI

IPMI (Intelligent Platform Management Interface) is a hardware-level interface specification that provides remote access, monitoring and administration for Penguin Computing workstation platforms. IPMI allows administrators to view a workstation's hardware status remotely, receive an alarm automatically if a failure occurs, and power cycle a system that is non-responsive.

1-3 Chassis Features

The following is a general outline of the main features of the SC747BTQ-R2K02B chassis.

System Power

The chassis includes a 2000 W high-efficiency, hoto-plug, redundant (1+1) power supply consisting of two power supply modules. In the unlikely event a power supply module fails, replacement is simple.

Hard Drive/Drive Bays

The chassis features eight drive bays for SATA drives. These drives are hot-swappable. Once set up correctly, these drives can be removed without powering down the workstation.

The SC747B chassis also provides three 5.25" peripheral drive bays for floppy drives, DVD/CD drives, or additional hard drives.

Control Panel

The control panel on the workstation provides you with system monitoring and control. LEDs indicate system power, HDD activity, network activity, system overheat, UID and power supply failure. A main power button and a system reset button are also included.

Cooling System

The chassis accepts four system fans and two rear exhaust fans. System fans are powered from the serverboard. These fans are 4U high and are powered by 4-pin connectors.

Mounting Rails (optional)

The system can be placed in a rack for secure storage and use.

1-4 GPU Subsystem

The Niveus 4904GT is a massively parallel-processing, quad-GPU server with support for up to four NVIDIA Tesla GPUs (such as Kepler K10, K20, K20X, K40, K80) and Xeon Phi Coprocessor GPUs, placing this system at the forefront of today's GPU computing solutions.

Refer to the NVIDIA web site (www.nvidia.com) or the Intel website (www.intel.com) for details on these GPUs

GPU Kit

When using passive GPUs with this system, you must use the GPU add-on kit, MCP-320-74701-0N-KIT. This kit consists of one mylar air shroud to concentrate air flow to the GPU and two fans with cages that can be attached to the back of the chassis to provide the required cooling for passive GPUs.

1-5 Contacting Penguin Computing

Headquarters

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Email: marketing@penguincomputing.com (General Information)
support@penguincomputing.com (Technical Support)

Website: www.penguincomputing.com

Chapter 2

Rack Installation

This chapter provides instructions for preparing and mounting your chassis in a rack. By default, the chassis is shipped configured as a tower. The tower top cover and bottom feet must be removed to mount in a rack. Also, the control panel/drive module should be rotated 90 degrees. See Chapter 6 for this procedure.

2-1 Unpacking the System

You should inspect the box the chassis was shipped in and note if it was damaged in any way. If the chassis itself shows damage, file a damage claim with the carrier who delivered it.

Mounting rails are optional for this system. Be sure you have received the correct rail kit for your server.

2-2 Preparing for Setup

Decide on a suitable location for the rack unit that will hold your chassis. It should be a clean, dust-free area that is well ventilated. Avoid areas where heat, electrical noise and electromagnetic fields are generated. A nearby grounded power outlet is required.

Choosing a Setup Location

- Leave at least 25 inches clearance in front of the rack to open the front door completely.
- Leave approximately 30 inches of clearance in the back of the rack to allow for sufficient airflow and access for servicing.
- It should be a restricted access location, such as a dedicated equipment room or a service closet.

2-3 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 installations, stabilizers should be attached to the rack.
- In multiple rack installations, the racks should be coupled together.
- Always make sure that the rack is stable before extending a component from the rack.
- Only one chassis should be extended from the rack at a time. Extending two or more chassis simultaneously may cause the rack to become unstable.
- When initially installing the server to a rack, test that the rail locking tabs engage to prevent the server from being overextended. Have a rack lift in place as a precaution in case the test fails.
- In any instance of pulling the system from the rack, always use a rack lift and follow all associated safety precautions.

General Server Precautions

- Review the electrical and general safety precautions that came with the components you are adding to your chassis.
- 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 upward.
- 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 the hot-swappable hard 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).

Sufficient Airflow

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

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.
- Slide rail mounted equipment is not to be used as a shelf or a work space.

2-4 Procedure for Rack Mounting

This section provides information on installing a 4U chassis into a rack. There are a variety of rack units on the market, so the assembly procedure may differ slightly. Also refer to the installation instructions for your rack unit.

The tower top cover and bottom feet must be removed to mount in a rack. Also, the control panel/drive module should be rotated 90 degrees. See Chapter 6 for this procedure.

Removing the Tower Top Cover and Feet

The chassis is shipped with the tower top cover and feet installed. Both must be removed for before installing the rails.

Removing the Tower Top Cover

1. Locate the chassis cover lock (blue lever) at the rear of the chassis cover.
2. Slide the chassis cover lock to the right and push chassis cover forward.
3. Lift the chassis top cover off the chassis.

Removing the Chassis Feet

1. Place the chassis on its side with the chassis side cover facing upward.
2. Remove the screw holding the chassis foot in place.
3. The foot lock is a tab located in the center of the foot that prevents the foot from sliding. Using a flat head screwdriver, **gently** lift the foot lock upward and slide the foot toward the rear of the chassis.

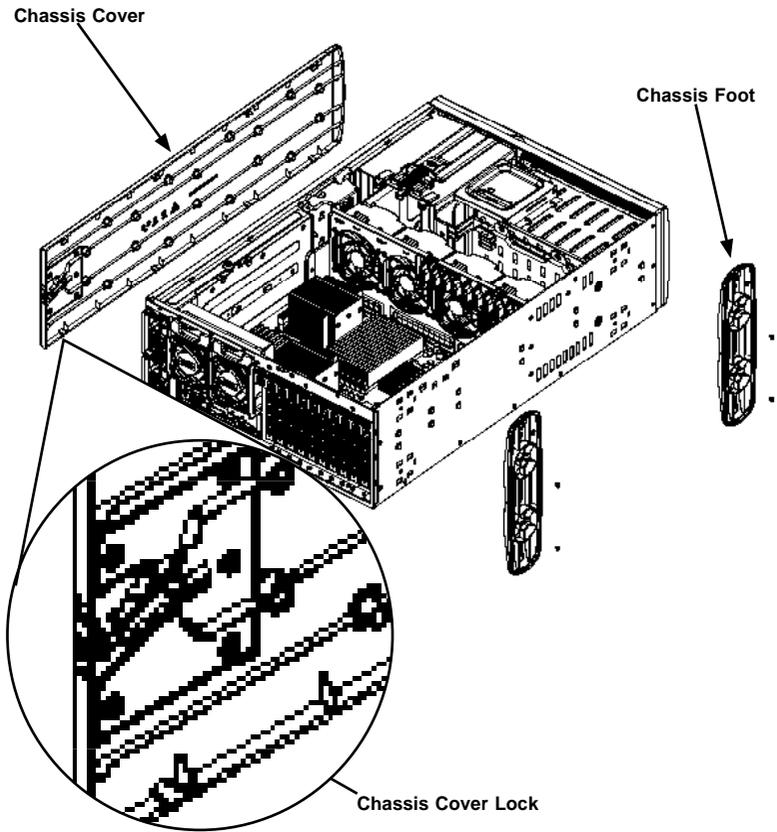


Figure 2-1. Removing the Feet and Chassis Top Cover

Identifying the Sections of the Rack Rails

The chassis package includes two rail assemblies. Each assembly consists of three sections: An inner rail that secures directly to the chassis, an outer rail that secures to the rack, and a middle rail which extends from the outer rail. These assemblies are specifically designed for the left and right side of the chassis.

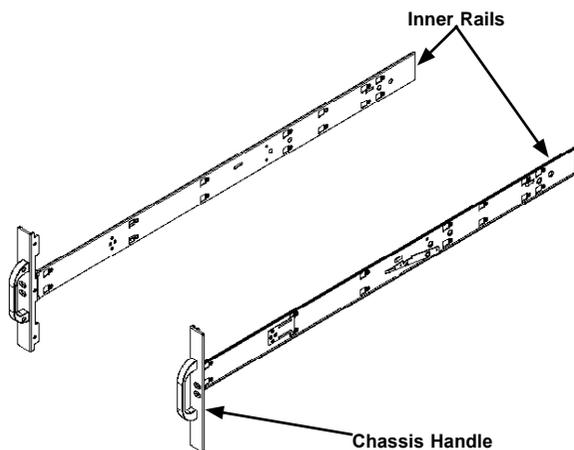


Figure 2-2. Identifying the Inner Rails and Chassis Handles



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

Installing the Chassis Handles and Inner Rails

Installing the Inner Rails

1. Locate the chassis handles and handle screws.
2. Align the chassis handle with the front of the chassis and secure with the three chassis handle screws.
3. Repeats steps 1 and 2 with the other handle.
4. Locate the inner rails and screws in the shipping package.
5. Align the inner rails against the chassis, as shown. Confirm that the rails are flushed against the edge of the chassis.
6. Tighten the screws. Do not over-tighten.
7. Repeat steps 5 and 6 with the other inner rail.

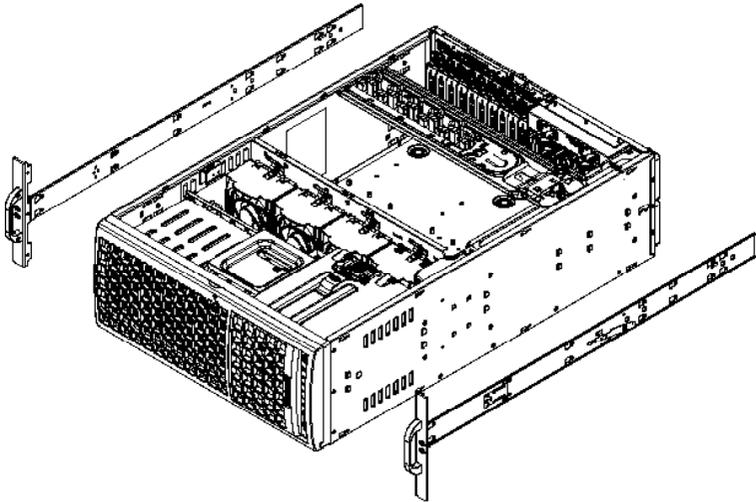


Figure 2-3. Installing the Inner Rack Rails

Installing the Outer Rails onto the Rack

Installing the Outer Rails

1. Press upward on the locking tab at the rear end of the middle rail.
2. Push the middle rail back into the outer rail.
3. Hang the hooks on the front of the outer rail onto the square holes on the front of the rack. If desired, use screws to secure the outer rails to the rack.
4. Pull out the rear of the outer rail, adjusting the length until it just fits within the posts of the rack.
5. Hang the hooks of the rear section of the outer rail onto the square holes on the rear of the rack. Take care that the proper holes are used so the rails are level. If desired, use screws to secure the rear of the outer rail to the rear of the rack.
6. Repeat for the other outer rail.

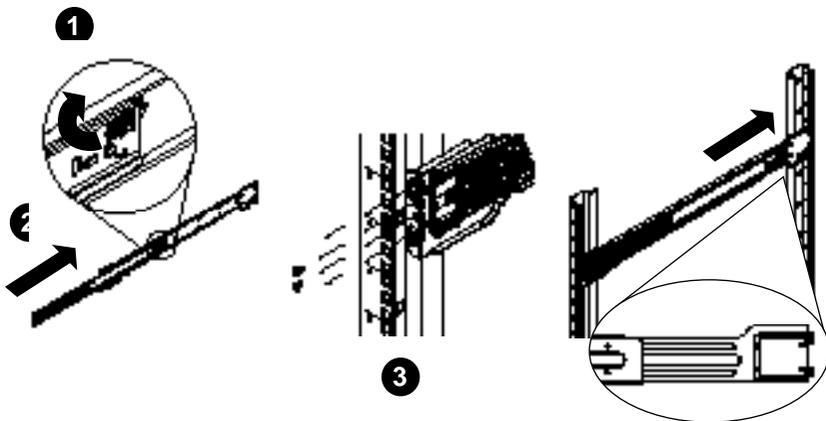


Figure 2-4. Extending and Mounting the Outer Rails



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.

Do not use a two post "telco" type rack.

Sliding the Chassis onto the Rack Rails



Warning: Use a lift to hold the system while installing. Please follow safety recommendations printed on the rails.

Installing the Chassis into a Rack

1. Extend the outer rails as illustrated above.
2. Align the inner rails of the chassis with the outer rails on the rack.
3. Slide the inner rails into the outer rails, keeping the pressure even on both sides. When the chassis has been pushed completely into the rack, it should click into the locked position.
4. Optional screws may be used to hold the front of the chassis to the rack.

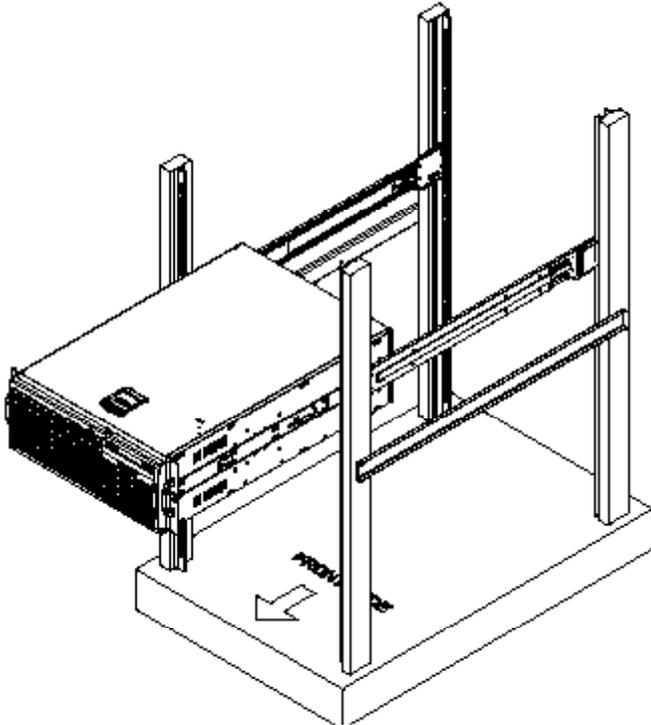


Figure 2-5. Installing into a Rack

Note: The figure above is for illustrative purposes only. Always install servers to the bottom of the rack first.



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

2-5 Tower Configuration Instructions

The 4U chassis is shipped with the tower top cover and feet pre-installed. To use the chassis as a desktop server, no other installation is required. Use the instructions in this section if you have converted the chassis for rack use and need to return the chassis to tower orientation.

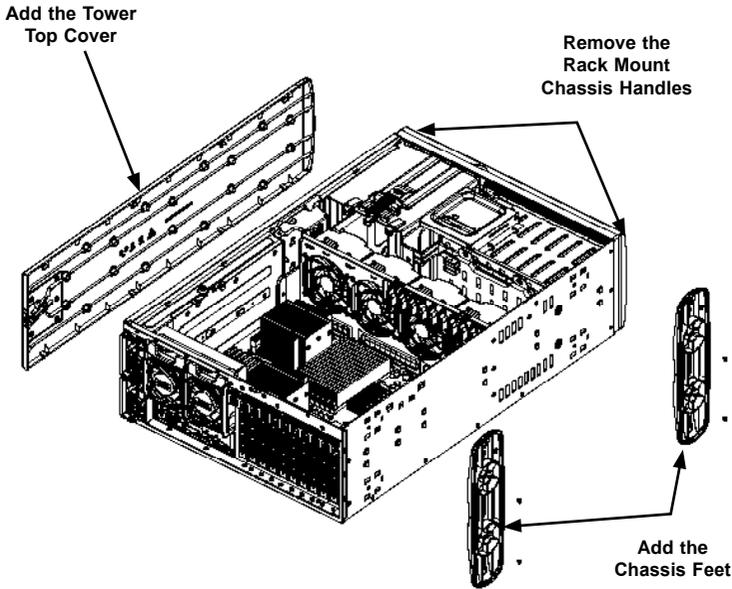


Figure 2-6. Adding Chassis Feet and the Top Cover

Converting to Tower Configuration

1. Remove the rack mount handles.
2. Align the tower top cover post with the corresponding holes on the top of the chassis and place the cover on the chassis. The cover should hang over the front of the chassis approximately one-half inch.
3. Slide the chassis cover toward the rear of the chassis to lock the cover into place.
4. Place each chassis foot in place.
5. Secure each foot to the chassis with the screws.

Chapter 3

System Interface

3-1 Overview

The chassis includes the following user interface elements:

- A control panel on the front that includes power buttons and status monitoring lights
- Status lights on externally accessible hard drives
- Status lights for the power supply

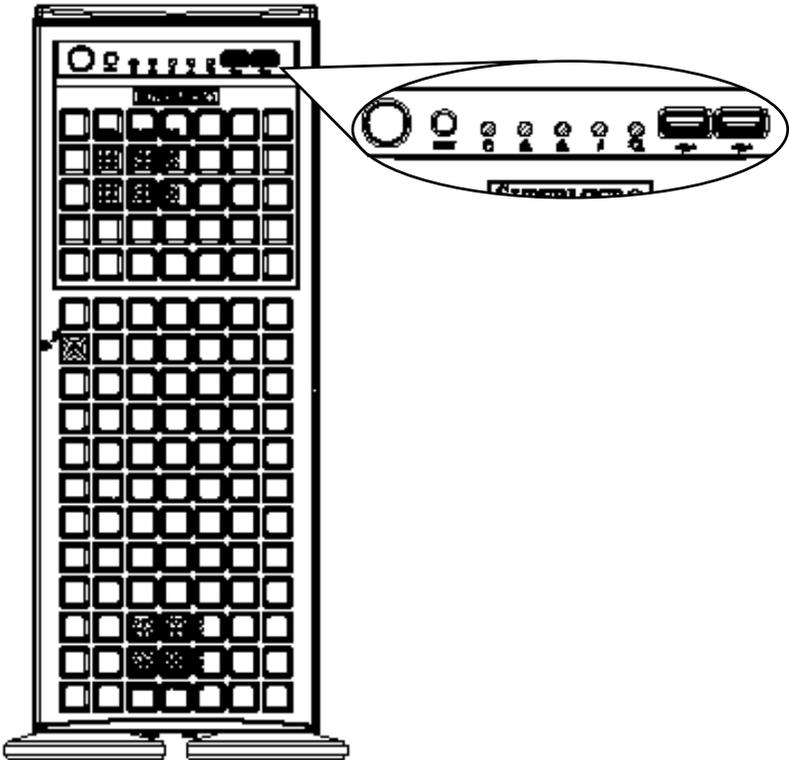


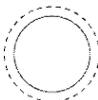
Figure 3-1. Control Panel

3-2 Control Panel Buttons

The chassis includes two push-buttons that control power to the system.



Power: The main power switch is used to apply or remove power from the power supply to the server. Turning off system power with this button removes the main power but maintains standby power. To perform many maintenance tasks, you must unplug system before servicing.



Reset: The reset button is used to reboot the system

3-3 Control Panel LEDs

There are five LEDs that provide status information about the system.



HDD: Indicates IDE channel activity on the hard drive when flashing.



NIC1: Indicates network activity on LAN1 when flashing.



NIC2: Indicates network activity on LAN2 when flashing.



Information LED: Alerts operator of several states, as noted in the table below.

Information LED	
Status	Description
Continuously on and red	An overheat condition has occurred. (This may be caused by cable congestion.)
Blinking red (1Hz)	Fan failure, check for an inoperative fan.
Blinking red (0.25Hz)	Power failure, check for a non-operational power supply.
Solid blue	Local UID has been activated. Use this function to locate the server in a rack mount environment.
Blinking blue	Remote UID is on. Use this function to identify the server from a remote location.



Power Fail: Indicates a power failure to the system's power supply units.

3-4 Drive Carrier LEDs

The chassis includes externally accessible SAS/SATA drives. Each drive carrier displays two status LEDs on the front of the carrier.

- **Green:** When illuminated, this LED indicates drive activity. It blinks on and off when that particular drive is being accessed. This function is controlled by the backplane.
- **Red:** When illuminated, this LED indicates a drive failure. You should be notified by your system management software.

3-5 Power Supply LEDs

On the rear of the power supply module, an LED displays the status.

- **Solid Green:** When illuminated, indicates that the power supply is on.
- **Solid Amber:** When illuminated, indicates the power supply is plugged in and turned off, or the system is off but in an abnormal state.
- **Blinking Amber:** When blinking, this system power supply temperature has reached 63°C. The system will automatically power-down when the power supply temperature reaches 70°C and restart when the power supply temperature goes below 60°C.

Chapter 4

Standardized Warning Statements for AC Systems

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 Penguin Computing's Technical Support department for assistance. Only certified technicians should attempt to install or configure components.

Read this chapter in its entirety before installing or configuring components in the Penguin Computing chassis. Some warnings may not apply for your system.

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.

חשובות מאד הנחיות בטיחות

סמל הזהרה זה מציין סכנת פגיעה פיזית. קיימת סכנה לבריאותך. לפני שימוש בכל ציוד, שקול את סכנות החשמל ואת הליכי הבטיחות הסטנדרטיים למניעת אסונות. בסוף כל אזהרה תמצא מספר שיסייע לך למצוא את התרגום המתאים לטקסט המופיע בחלק התרגומים המלווה את הציוד. שמור את ההנחיות האלו בקפדנות.

**تحذير! هذا الرمز يعني خطر اصابة في حالة يمكن ان تتسبب في اصابة جسدية .
قبل ان تعمل على أي معدات يمكن على حطم بالمخاطر الناجمة عن الدوائر
الكهربائية
وكن على دراية بالعملات الوقائية لمنع وقوع أي حوادث
استخدم رقم البيان المتصوص في نهاية كل تحذير للتحوير 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.

⚠️ **התראה** - לפני חיבור המערכת למקור האנרגיה, קראו את הוראות ההתקנה.

⚠️ **تذكرة** - قبل توصيل النظام إلى مصدر الطاقة، اقرأ التعليمات.

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。

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.

תוצר זה מסתמך על המנהל המבצע במוקד המיועד לשימוש קצר המסוגל. יש לוודא כי המבצע והגודל של התקן ההגנה לא יגדלו מעבר ל-250V, 20A.

هذا المنتج يعتمد على معدات الحماية من الدوائر القصيرة التي تم تثبيتها في المبنى
تأكد من أن تسمية للجهاز الوتقي ليس أكثر من: 250V, 20A

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.

電源切斷の警告

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斷され、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 החשמל קודם לכן לפני גישה לחלק הפנימי של המערכת לצורך התקנה או הסרת רכיבים.

يجب فصل النظام من جميع مصادر الطاقة وإزالة سلك الكهرباء من وحدة امداد الطاقة قبل التوصل إلى المناطق الداخلية ليكامل تثبيت 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.

⚠️
על ידי אנשי צוות מוסמכים בלבד. יש להתייעץ עם המפעיל או לראות את מדריך המשתמש.

يجب أن يسمح فقط للموظفين المؤهلين والمدربين لتثبيت 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.

אזהרה על גישה סגורה

אזהרה!

יש להימנע מהדחיקה באזורים שיש בהם תכולת גישה הנגישה לילדים בלבד.
כלי אכילה בלבד (קפסולה, קפסולת חרוך).

تم تخصيص هذه الوحدة لتثبيتها في مناطق مخصصة .
يمكن الوصول إلى منطقة مخصصة فقط من خلال استخدام أداة خاصة
فقط ومفتاح أو أي وسيلة أخرى للأمان

경고!

이 장치는 접근이 제한된 구역에 설치하도록 되어 있습니다. 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.

⚠️
קיימת סכנת פיצוץ של הסוללה במקרה החלפה בדרך לא תקינה. יש להחליף את הסוללה בלבד במסגרת הנחיות היצרן.
סילוק הסוללות המנוהטות יש לבצע לפי הנחיות היצרן.

هناك خطر من انفجار في حالة استبدال البطارية بطريقة غير صحيحة. استبدل البطارية فقط بنفس النوع أو ما يخلها كما أوصت به الشركة المصنعة. التخلص من البطاريات المستهلكة وفقاً لتعليمات الشركة المصنعة.

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 (if applicable to your system)



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

此装置连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 קיימים יותר מקצבץ אחד

אזהרה!
ליחידה יש יותר מקצבץ אחד של חשמל. יש להסיר את כל החיבורים על קטת לחץ
החשמל לחלוטין.

قد يكون لهذا الجهاز عدة اتصالات بوحدة امداد الطاقة
يجب إزالة كافة الاتصالات لعزل الوحدة عن التيار

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 (if applicable to your system)



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

システムの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.

תנאי התקנה

⚠

יש להקפיד על כללי התקנה המקומיים והלאומיים של המדינה בה מתקין את המכשיר.

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 instalación 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.

תשומת לב! התקנת המוצר חייבת להיות בהתאמה לנורמות החשמל והקשרים המקומיים והלאומיים.

אזהרה!
התקנת המוצר חייבת להיות בהתאמה לנורמות החשמל והקשרים המקומיים והלאומיים.

تركيب المعدات الكهربائية يجب أن يمثل التوافق مع المواصفات الوطنية 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.

פירוק והסרה

אזהרה!

פירוק סופי של סיסטם זה חייב להיות באמצעות להטווחות חשמליים

عند التخلص النهائي من هذا المنتج ينبغي التعامل معه وفقاً 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 (if applicable to your system)



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 retirez le bloc ventilateur du châssis. Prenez garde à ce que doigts, tournevis et autres objets soient éloignés du logement du bloc ventilateur.

⚠️
כאשר תסיר את יחיד הוורידור מהכסוי, ייתכן שהמאוורר ימשיך לרוטור. שמרו על אצבעותיכם, מוורידורים וכלי עבודה אחרים מרחוק מן הפתוחים של יחיד הוורידור.
من الممكن أن المراوح لا تزال تدور عند إزالة كتلة المروحة من الهيكل يجب إبقاء الأصابع ومثاق البراشي وغيرها من الأجزاء 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 Penguin Computing 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 Penguin Computing 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

安装此产品时,请使用本身提供的或指定的连接线,电源线和电源适配器.使用其它线材或适配器可能会引起故障或火灾。除了Penguin Computing 所指定的产品,电气用品和材料安全法律规定禁止使用未经UL或CSA认证的线材。(线材上会显示UL/CSA符号)。

警告

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 Penguin Computing 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 Penguin Computing 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 cables certifiés qui ont UL ou CSA indiqué sur le code pour tous les autres appareils électriques que les produits désignés par Penguin Computing seulement.

התקנת כבלים ומתאמים AC**אזהרה!**

במהלך התקנת המוצר, יש להשתמש בכבלים או מתאמים המסופקים עם המוצר או AC. שימוש בכבלים או מתאמים אחרים עלול לגרום לתפקוד לא תקין של המוצר. שימוש בכבלים או מתאמים שאינם מיועדים לשימוש זה עלול לגרום לתפקוד לא תקין של המוצר או אף להיגרם נזק. יש להשתמש בכבלים או מתאמים המסופקים עם המוצר או AC. שימוש בכבלים או מתאמים אחרים עלול לגרום לתפקוד לא תקין של המוצר או אף להיגרם נזק. יש להשתמש בכבלים או מתאמים המסופקים עם המוצר או AC. שימוש בכבלים או מתאמים אחרים עלול לגרום לתפקוד לא תקין של המוצר או אף להיגרם נזק.

עוד תרכיב ליהיזר ייבב אסתחלם קיילת תווטל סולקילת ללכר יפיר
 ומולת תייל תטרד
 לל - אן אסתחלם אי קיילת ומולת אכרי יתטיב פי חלות טלל או חריק
 תמ תוקיר ה לל מע תטת
 איהזר ללכר יפיר ומול קלון לללמל יטטר אסתחלם קיילת CSA או UL
 מטרד מ קיל
 ללי איהזר ללכר יפיר אכרי אכר תטתל לטרד מ קיל Supermicro
 (ללי תטל טלמל UL/CSA)

경고!

제품을 설치할 때에는 제공되거나 지정된 연결케이블과 전원케이블, AC 어댑터를 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 UL 또는 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 Penguin Computing alleen.

Notes

Chapter 5

Advanced Serverboard Setup

This chapter covers the steps required to connect cables and describes all jumpers and connections. A layout and quick reference chart are included in this chapter for your reference. Always close the chassis when you have finished working on the system to maintain optimal cooling.

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.

Unpacking

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

5-2 Connecting Cables

Several cables need to be connected from the chassis to the serverboard. These include the data cables for the peripherals and control panel and the power cables.

Connecting Data Cables

The cables used to transfer data from the peripheral devices have been carefully routed to prevent them from blocking the flow of cooling air that moves through the system from front to back. If you need to disconnect any of these cables, you should take care to keep them routed as they were originally after reconnecting them (make sure the red wires connect to the pin 1 locations). The following data cables (with their locations noted) should be connected. (See the serverboard layout for connector locations.)

- SATA drive data cables (S-SATA 0-3, I-SATA 0-3)
- Control Panel cable (JF1)

Important! Make sure the the cables do not come into contact with the fans.

Connecting Power Cables

The X10DRG-Q has a 24-pin power supply connector (JPW1) for connection to the ATX power supply. In addition, there are two 8-pin secondary power connectors (JPW2, JPW3) and a 4-pin connector. The 4-pin connection is optional but recommended. See Section 5-8 for power connector pin definitions.

Caution: To avoid damaging your serverboard and components, please use a power supply that supports a 24-pin, two 8-pin and one 4-pin power connectors. Be sure to connect the 24-pin and the 8-pin power connectors to your power supply for adequate power delivery to your system. The 4-pin connector is optional, however, Penguin Computing recommends that this connector also be plugged in for optimal power delivery.

Connecting the Control Panel

JF1 contains header pins for the front control panel connectors. All wires have been bundled into a single ribbon cable to simplify this connection. Make sure the red wire plugs into pin 1 as marked on the board. The other end connects to the Control Panel PCB board, located just behind the system status LEDs on the chassis.

5-3 I/O Ports

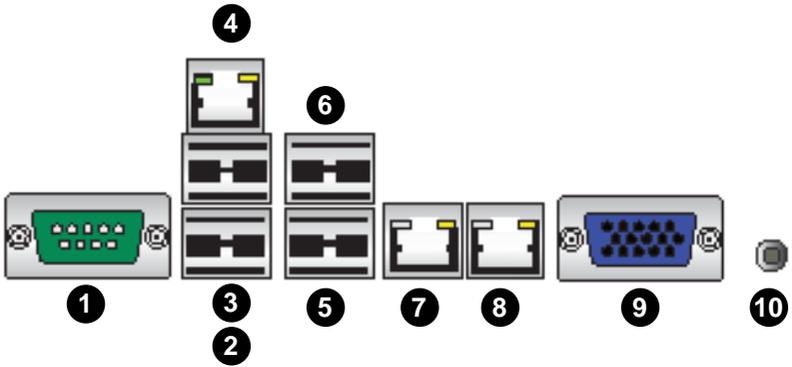


Figure 5-1. Rear I/O Ports

Rear I/O Ports	
1. COM1 Port	2. USB 3.0 Port 4
3. USB 3.0 Port 5	4. IPMI Dedicated LAN
5. USB 2.0 Port 0	6. USB 2.0 Port 1
7. Gigabit LAN 1	8. Gigabit LAN 2
9. VGA (blue)	10. UID Switch

5-4 Installing the Processor and Heatsink

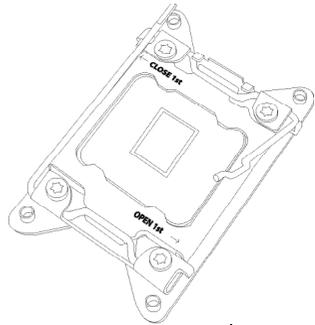
Notes:

- Always remove the power cord before adding, removing or changing a CPU.
- 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.
- If you buy a CPU separately, use only an Intel-certified, multi-directional heatsink.
- Avoid placing direct pressure to the top of the processor package.
- Install the processor into the CPU socket before installing the heatsink.
- Refer to the Penguin Computing web site for updates on CPU support.

Installing an LGA 2011 Processor

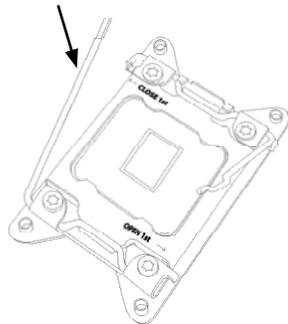
Installing a CPU

1. There are two levers on the LGA 2011 socket. First press and release the load lever labeled "Open 1st".



Release the lever labeled "Open 1st"

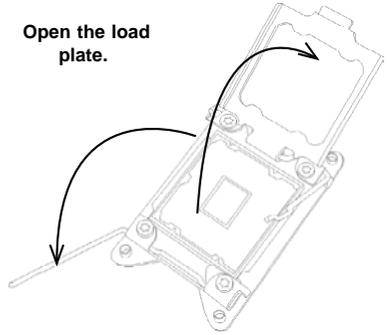
2. Press the second load lever labeled "Close 1st" to release the load plate from its locked position.



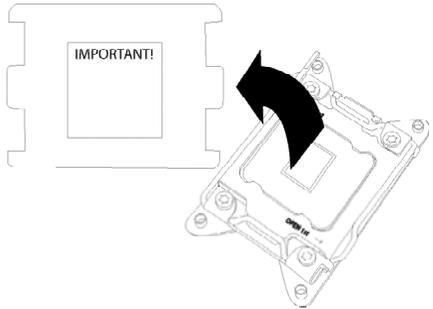
Release the lever labeled "Close 1st"

3. With the second lever fully retracted, gently push down on the "Open 1st" lever to loosen the load plate. Lift the load plate with your fingers to open it completely.

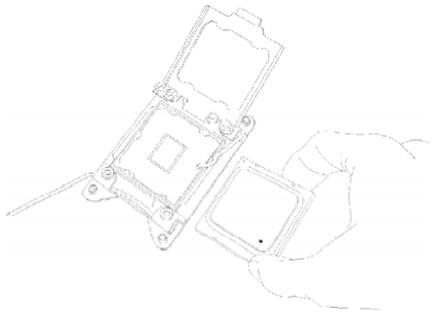
Open the load plate.



4. Pop the plastic cap marked "Warning" out of the load plate.
5. Holding the CPU carefully above the socket, orient the CPU so that all keys and edges will fit the socket.

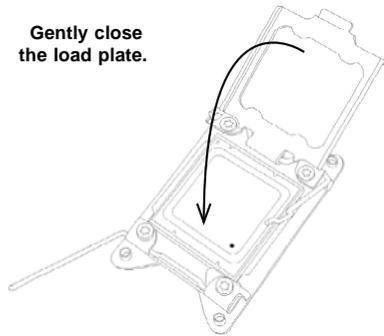


6. Carefully lower the CPU straight down into the socket. Do not move the CPU horizontally, and do not rub the pins of the socket. This may damage the CPU or the socket.

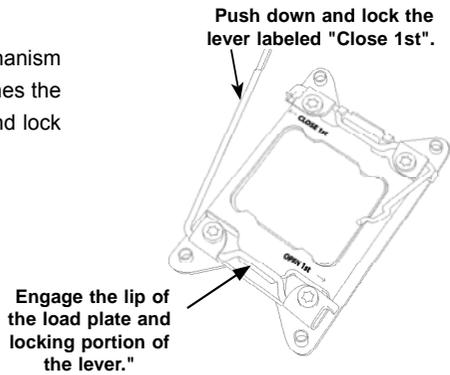


Caution: You can only install the CPU into the socket in one direction. Make sure that the CPU is properly inserted into the socket before closing the load plate. If it does not close properly, do not force it as it may damage your CPU. Instead, open the load plate again and double-check that the CPU is aligned properly.

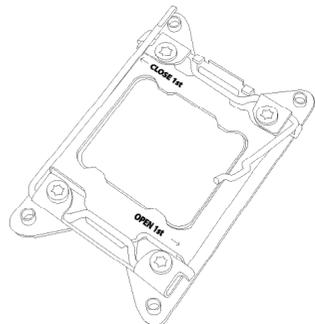
7. With the "Close 1st" lever fully retracted, gently close the load plate.



8. Make sure the locking mechanism on the "Close 1st" lever catches the lip of the load plate. Close and lock the "Close 1st" lever.



9. Close and lock the "Open 1st" lever.

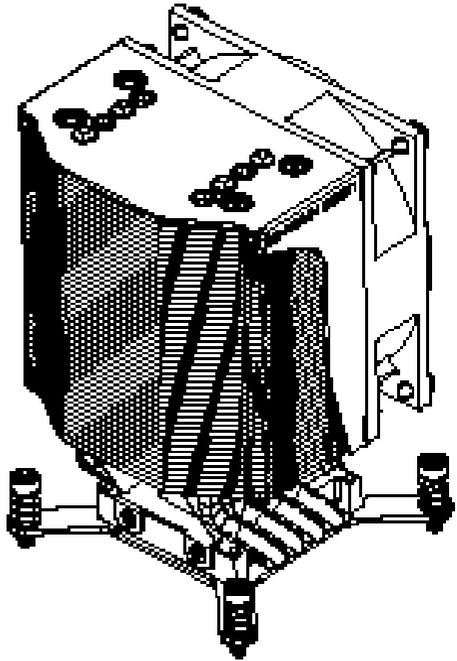


Installation and Removal of the Heatsink

Installing the Heatsink

Do not apply any thermal grease to the heatsink or the CPU die; the required amount has already been applied

1. Place the heatsink on top of the CPU so that the four mounting holes are aligned with those on the retention mechanism.
2. Screw in two diagonal screws until just snug. Do not over-tighten the screws, which may damage the CPU.)
3. Fully tighten all four screws.



Removing the Heatsink

Note: 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 the CPU socket.

1. Unplug the power cord from the power supply.
2. Unscrew and remove the heatsink screws, starting by loosening each a little at a time.
3. Hold the heatsink and gently wriggle it to loosen it from the CPU. (Do not use excessive force!)
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 re-installing the heatsink.

5-5 Installing Memory

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

Installing Memory Modules

1. Insert the desired number of DIMMs into the memory slots, starting with P1-DIMMA1. For best memory performance, please install memory modules of the same type and same speed on the memory slots as indicated on the tables 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.

To Install: Insert module vertically and press down until it snaps into place. Pay attention to the alignment notch at the bottom.

To Remove: Use your thumbs to gently push the release tabs near both ends of the module. This should release it from the slot.

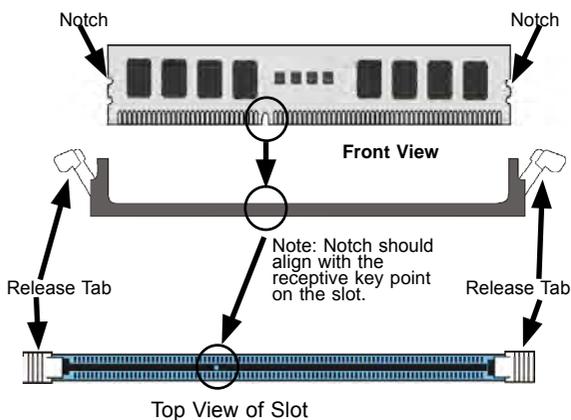


Figure 5-2. DIMM Installation

Memory Support

The X10DRG-Q serverboard supports up to 1 TB of 288-pin registered (RDIMM) DDR4 ECC 1333/1600/1866/2133 MHz in 16 slots. DIMM sizes up to 64GB @ 1.2V. Can be used. See the following table for memory installation. For the latest memory updates, please refer to the Penguin Computing website.

Processor & Memory Module Population Configuration

For memory to work properly, follow the tables below for memory population.

Processors and their Corresponding Memory Modules								
CPU#	Corresponding DIMM Modules							
CPU 1	P1-DIMMA1	P1-DIMMB1	P1-DIMMC1	P1-DIMMD1	P1-DIMMA2	P1-DIMMB2	P1-DIMMC2	P1-DIMMD2
CPU2	P2-DIMME1	P2-DIMMF1	P2-DIMMG1	P2-DIMMH1	P2-DIMME2	P2-DIMM F2	P2-DIMMG2	P2-DIMMH2

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
1 CPU & 4 DIMMs	CPU1 P1-DIMMA1/P1-DIMMB1, P1-DIMMC1/P1-DIMMD1
1 CPU & 5~8 DIMMs	CPU1 P1-DIMMA1/P1-DIMMB1, P1-DIMMC1/P1-DIMMD1 + Any memory pairs in P1-DIMMA2/P1-DIMMB2/P1-DIMMC2/P1-DIMMD2 slots
2 CPUs & 4 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1, P2-DIMME1/P2-DIMMF1
2 CPUs & 6 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1
2 CPUs & 8 DIMMs	CPU1 + CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1
2 CPUs & 9~16 DIMMs	CPU1/CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1 + Any memory pairs in P1, P2 DIMM slots
2 CPUs & 16 DIMMs	CPU1/CPU2 P1-DIMMA1/P1-DIMMB1/P1-DIMMC1/P1-DIMMD1, P2-DIMME1/P2-DIMMF1/P2-DIMMG1/P2-DIMMH1, P1-DIMMA2/P1-DIMMB2/P1-DIMMC2/P1-DIMMD2, P2-DIMME2/P2-DIMMF2/P2-DIMMG2/P2-DIMMH2

Notes:

- For optimal memory performance, please install DIMM modules in pairs (w/even number of DIMMs installed).
- All channels in a system will run at the fastest common frequency.

Populating LRDIMM and RDIMM ECC Memory Modules

Type	Ranks Per DIMM and Data Width	DIMM Capacity (GB)		Speed (MT/s); V			
				Slot Per Channel (SPC) and D			
				1 Slot Per Channel	2 Slots Per Channel		
		1DPC	1DPC	2DPC			
		4Gb	8Gb	1.2V	1.2V	1.2V	
RDIMM	SRx4	8GB	16GB	2133	2133	1866	
RDIMM	SRx8	4GB	8GB	2133	2133	1866	
RDIMM	DRx8	8GB	16GB	2133	2133	1866	
RDIMM	DRx4	16GB	32GB	2133	2133	1866	
LRDIMM	QRx4	32GB	64GB	2133	2133	2133	
LRDIMM 3DS†	8Rx4	64GB	128GB	2133	2133	2133	

Note: For the memory modules to work properly, 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.

5-6 Installing PCI Expansion Cards

The system supports PCI Express cards and up to four double-width GPU cards.

- Four PCI-E 3.0 x16 slots (Slot2/Slot4: supported by CPU1, Slot6/Slot8: supported by CPU2)
- One PCI-E 2.0 x4 in x8 slot with TBT support (Slot9: supported by Intel PCH)
- One PCI-E 3.0 x8 in x16 slot (Slot10: supported by CPU1)
- One PCI-E 3.0 x8 slot (Slot11: supported by CPU2)

Installing an Expansion Card

1. Locate the release tab on the top of the PCI slot bracket. Gently apply pressure to the middle of the release tab to unlock the PCI slot bracket.
2. Pull the release tab upward.
3. Remove the screw holding the bracket in place and pull the bracket from the chassis.
4. Install your PCI card or other add-on card into the PCI slot bracket and serverboard.
5. Push the PCI bracket release tab down until it locks into place with an audible "click".
6. Secure the PCI card with the screw previously removed from the chassis.
7. Repeat this process with each PCI card you want to install into the chassis.

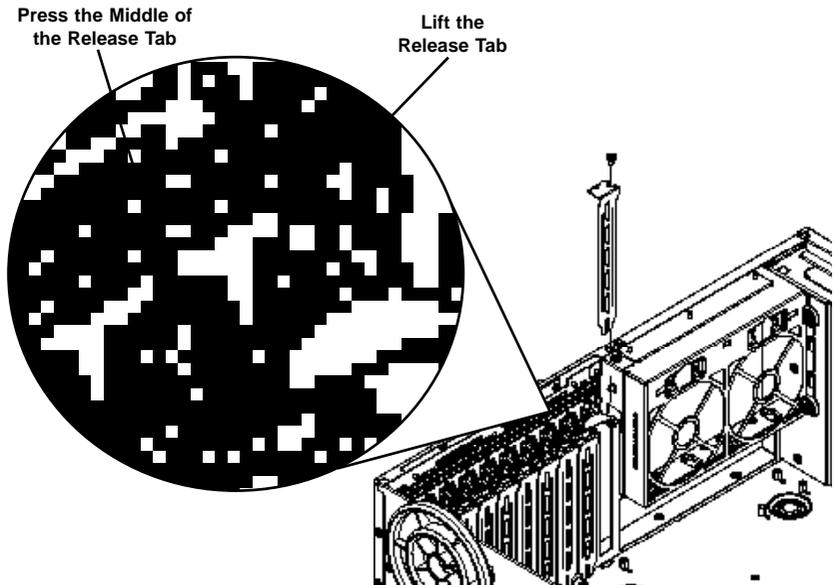


Figure 5-3. Expansion Card Port

5-7 Serverboard Details

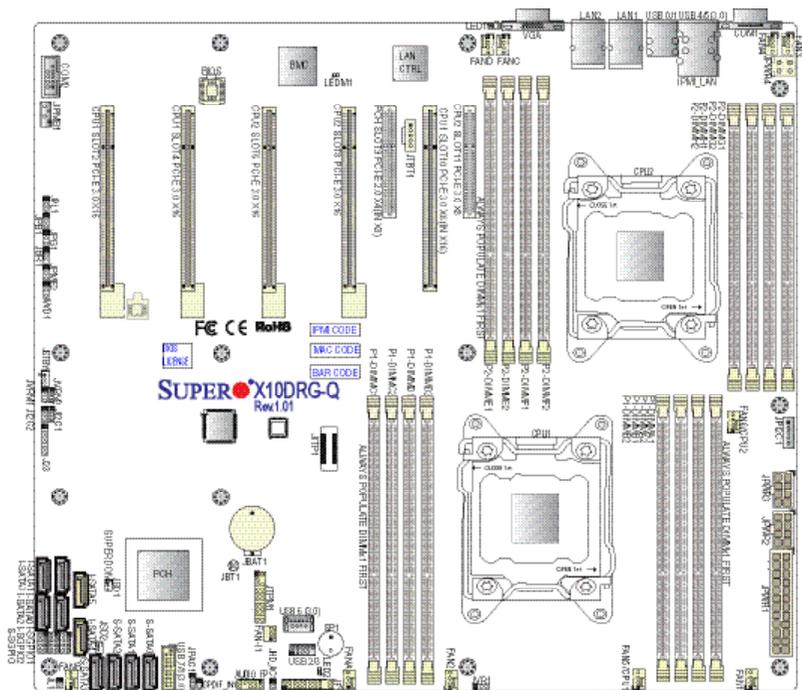


Figure 5-4. X10DRG-Q Layout
(not drawn to scale)

Notes:

- "■" indicates the location of "Pin 1".
- Jumpers/LED Indicators not indicated are for internal testing only.

Connectors

Connectors	Description
Audio_FP	High Definition (HD) 7.1-channel audio header for front access
Battery (JBT1)	Onboard CMOS battery (See Chpt. 3 for used battery disposal)
COM1/COM2	Back-panel COM Port 1/Serial Port 2 for front access
FAN 1/2/3/4/5/6, FAN A/B/C/D	CPU/system cooling fan headers (Fans 1-6, Fans A-D) (Fan 5: CPU Fan1, Fan 6: CPU Fan2)
JF1	Front_Panel_Control header
JIPMB1	4-pin external BMC I ² C header for IPMI card support (shared with NVMe devices & SGPIO connections)
JL1	Chassis intrusion header
JP1 ² C1	Power I ² C System Management Bus (Power SMB) header
JPWR1	24-pin ATX main power connector
JPWR2/JPWR3	12V 8-pin power connectors
JPWR4	4-Pin power connector
JSPDIF_IN1	Sony/Philips Digital InterFace (SPDIF) audio input header for front access
JSD1/JSD2	Power connector SATA DOM
JSTBY1	Standby power connector
JTBT1	GPIO (General-Purpose I/O) Header for Thunderbolt Add-on card
JTPM1	TPM (Trusted Platform Module)/Port 80 header
JVR1	VRM I ² C (SMBus) to CPU header
LAN1/LAN2	G-bit Ethernet (GLAN) ports 1/2
IPMI_LAN	IPMI_Dedicated LAN support by the Aspeed controller
SP1	Internal buzzer/speaker
(I-)SATA 0-3	Intel SATA 3.0 connectors (0-3) from Intel PCH
(I-)SATA 4/5	Intel SATA SuperDOM connectors (I-SATA4/5) from Intel PCH
(S-)SATA0-3	SATA connectors (0-3) from Intel SCU
I-SGPIO1/2	Serial_Link General-Purpose I/O (SGPIO) headers for I-SATA connections (I-SGPIO1 for I-SATA0-3, I-SGPIO2 for I-SATA4/5)
S-SGPIO	Serial_Link General-Purpose I/O (SGPIO) headers for S-SATA connections (S-SATA0-3) supported by Intel SCU
(CPU1) SLOT2/4	PCI-Exp. 3.0 x16 Slot2/Slot4 supported by CPU1
(CPU2) SLOT6/8	PCI-Exp. 3.0 x16 Slot6/Slot8 supported by CPU2
(PCH) SLOT9	PCI-Exp. 2.0 x4 in x8 slot with TBT support (from Intel PCH)

(CPU1) SLOT10	PCI-Exp. 3.0 x8 in x16 slot supported by CPU1
(CPU2) SLOT11	PCI-Exp. 3.0 x8 slot supported by CPU2
(BP) USB 0/1 (2.0)	Backpanel USB 2.0 ports 0/1
(BP) USB 4/5 (3.0)	Backpanel USB 3.0 ports 4/5
(FP) USB 2/3 (2.0)	USB 2.0 connections 2/3 header for front access
(FP) USB 6 (3.0)	Type A USB 3.0 connector 6 for front access
(FP) USB 7/8 (3.0)	USB 3.0 connections 7/8 header for front access
VGA	Backpanel VGA port

Jumpers

Jumper	Description	Default Setting
JBT1	Clear CMOS	See Chapter 2
JHD_AC1	AC'97/HD (High Definition) Audio Select	On (HD Enabled)
JI ² C1/JI ² C2	System Management Bus (I ² C) to PCI-E Slots	Pins 1-2 (Normal)
JPAC1	Front Panel Audio Enable	Pins 1-2 (Enabled)
JPB1	BMC Enable	Pins 1-2 (Enabled)
JPG1	VGA Enable	Pins 1-2 (Enabled)
JPL1	GLAN1/GLAN2 Enable	Pins 1-2 (Enabled)
JPME2	Manufacturer (ME) Mode Select	Pins 1-2 (Normal)
JWD1	Watch-Dog Timer Enable	Pins 1-2 (Reset)

LED Indicators

LED	Description	State	Status
LED1	Rear UID LED	Blue: On	Unit Identified
LED2	Onboard PWR LED	On	System Power On
LEDM1	BMC Heartbeat LED	Green: Blinking	BMC Normal

5-8 Connector Definitions

Power Connections

A 24-pin main power supply connector (JPW1), two 8-pin CPU PWR connectors (JPW2/JPW3) and a 4-pin PWR connector (JPW4) are provided on the serverboard. These power connectors meet the SSI EPS 12V specification. All these power connectors must be connected to your power supply to ensure adequate power supply to your system. See the table on the right for pin definitions.

Caution: To avoid damaging your serverboard and components, please use a power supply that supports a 24-pin, two 8-pin and one 4-pin power connectors. Be sure to connect the 24-pin and the 8-pin power connectors to your power supply for adequate power delivery to your system. The 4-pin connector is optional, however, Penguin computing recommends that this connector also be plugged in for optimal power delivery.

24-pin Main Power Connector Pin Definitions			
Pin#	Definition	Pin #	Definition
13	+3.3V	1	+3.3V
14	-12V	2	+3.3V
15	COM	3	COM
16	PS_ON	4	+5V
17	COM	5	COM
18	COM	6	+5V
19	COM	7	COM
20	Res (NC)	8	PWR_OK
21	+5V	9	5VSB
22	+5V	10	+12V
23	+5V	11	+12V
24	COM	12	+3.3V

12V 8-pin PWR Pin Definitions		12V 4-pin PWR Pin Definitions	
Pins Definition		Pins Definition	
1~ 4	Ground	1/2	Ground
5~8	+12V	3/4	+12V

Required Connections

Control Panel Connections

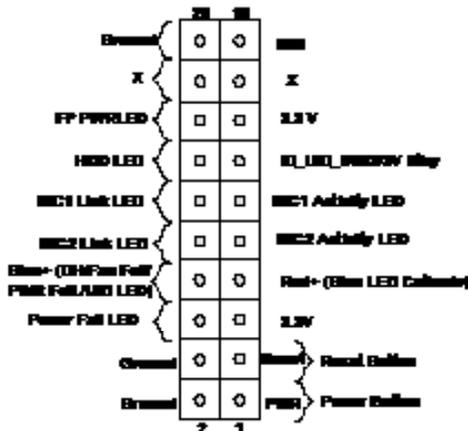


Figure 5-5. Control Panel Header Pins

NMI Button

The non-maskable interrupt button header is located on pins 19 and 20 of JF1. Refer to the table on the right for pin definitions.

NMI Button Pin Definitions (JF1)	
Pin#	Definition
19	Control
20	Ground

Power LED

The Power LED connection is located on pins 15 and 16 of JF1. Refer to the table on the right for pin definitions.

Power LED Pin Definitions (JF1)	
Pin#	Definition
15	3.3V
16	PWR LED

HDD LED

The HDD LED connection is located on pins 13 and 14 of JF1. Attach a cable here to indicate HDD activity. See the table on the right for pin definitions.

HDD LED Pin Definitions (JF1)	
Pin#	Definition
13	3.3V Standby
14	HD Active

NIC1/NIC2 LED Indicators

The NIC (Network Interface Controller) LED connection for GLAN port 1 is located on pins 11 and 12 of JF1, and the LED connection for GLAN Port 2 is on Pins 9 and 10. Attach the NIC LED cables here to display network activity. Refer to the table on the right for pin definitions.

GLAN1/2 LED Pin Definitions (JF1)	
Pin#	Definition
9	Vcc
10	NIC 2 LED
11	Vcc
12	NIC 1 LED

Overheat (OH)/Fan Fail/PWR Fail/UID LED

Connect an LED cable to pins 7 and 8 of Front Control Panel to use the Overheat/Fan Fail/Power Fail and UID LED connections. The Red LED on pin 7 provides warnings of overheat, fan failure or power failure. The Blue LED on pin 8 works as the front panel UID LED indicator. The Red LED takes precedence over the Blue LED by default. Refer to the table on the right for pin definitions.

OH/Fan Fail/ PWR Fail/Blue_ UID LED Pin Definitions (JF1)	
Pin#	Definition
7	Red_LED-Cathode/OH/Fan Fail/Power Fail5.5V.SB
8	Blue_UID LED

OH/Fan Fail/PWR Fail LED Status (Red LED)	
State	Definition
Off	Normal
On	Overheat
Flashing	Fan Fail

Power Fail LED

The Power Fail LED connection is located on pins 5 and 6 of JF1. Refer to the table on the right for pin definitions.

PWR Fail LED Pin Definitions (JF1)	
Pin#	Definition
5	3.3V
6	PWR Supply Fail

Reset Button

The Reset Button connection is located on pins 3 and 4 of JF1. Attach it to a hardware reset switch on the computer case. Refer to the table on the right for pin definitions.

Reset Button Pin Definitions (JF1)	
Pin#	Definition
3	Reset
4	Ground

Power Button

The Power Button connection is located on pins 1 and 2 of JF1. Momentarily contacting both pins will power on/off the system. This button can also be configured to function as a suspend button (with a setting in the BIOS - See Chapter 5). To turn off the power when the system is in suspend mode, press the button for 4 seconds or longer. Refer to the table on the right for pin definitions.

Power Button Pin Definitions (JF1)	
Pin#	Definition
1	Signal
2	Ground

Other Connectors

Serial Ports

Two COM connections (COM1 & COM2) are located on the serverboard. COM1 is located on the rear I/O panel. COM2, located close to PCI-E CPU1 Slot1, provides front access support. See the table on the right for pin definitions.

Serial COM Ports Pin Definitions			
Pin #	Definition	Pin #	Definition
1	DCD	6	DSR
2	RXD	7	RTS
3	TXD	8	CTS
4	DTR	9	RI
5	Ground	10	N/A

NC = No Connection

Universal Serial Bus (USB)

Two USB 3.0 ports (USB 4/5) and two USB 2.0 ports (USB 0/1) are located on the I/O back panel. In addition, two internal USB headers provide two USB 3.0 connections (USB 7/8) and two USB 2.0 connections (USB 2/3) for front panel support. A Type A USB 3.0 connector (USB 6) are also located on the motherboard for front access. (Cables are not included). See the tables on the right and below for pin definitions.

Front Panel USB (3.0) 7/8, USB (3.0) 6 Pin Definitions			
Pin #	Definition	Pin #	Definition
1	+5V	2	+5V
3	USB_PN2	4	USB_PN3
5	USB_PP2	6	USB_PP3
7	Ground	8	Ground
9	Key	10	Ground

Front Panel USB (2.0) 2/3 Pin Definitions			
Pin#	Definition	Pin#	Definition
1	+5V	5	+5V
2	USB_PN1	6	USB_PN0
3	USB_PP1	7	USB_PP0
4	Ground	8	Ground

Ethernet Ports

Two Ethernet ports (LAN1, LAN2) are located on the I/O back panel. These Ethernet ports support Gigabit LAN connections. In addition, an IPMI_Dedicated LAN is located above USB ports 4/5 on the backplane. All Ethernet ports accept RJ45 type cables.

Unit Identifier Switch

A Unit Identifier (UID) switch and two LED Indicators are located on the serverboard. The UID switch is located next to LAN2 port on the rear I/O panel. The rear UID LED (LED3) is located next to the UID Switch. The front control panel UID LED is connected with JF1. When you press the UID switch, both rear UID LED and front UID LED Indicators are turned on. Press the UID switch again to turn off both LED Indicators. These UID indicators provide easy identification of a system unit that may be in need of service.

Note: UID can also be triggered using IPMI on the serverboard. For more information, refer to the IPMI User's Guide posted on our Website.

Video Connection

A Video (VGA) port is located next to LAN port 2 on the I/O back panel.

Fan Headers

There are eleven system/CPU fan headers (Fans 1~6, Fans A~D and Fan 11) on the serverboard. All these 4-pin fans headers are backward compatible with traditional 3-pin fans. However, fan speed control is available for 4-pin fans only. The fan speeds are controlled by firmware thermal management in IPMI. See the table on the right for pin definitions.

UID Switch Pin Definitions	
Pin#	Definition
1	Ground
2	Ground
3	Button In
4	Ground

Fan Header Pin Definitions	
Pin#	Definition
1	Ground
2	+12V
3	Tachometer
4	PW/R Modulation (Available for 4-pin fans only)

Internal Speaker

The Internal Speaker (SP1) provides audible indications for various beep codes. See the table on the right for pin definitions. Refer to the layout below for the location of the internal buzzer.

Internal Buzzer Pin Definition		
Pin#		Definitions
Pin 1	Pos. (+)	Beep In
Pin 2	Neg. (-)	Alarm Speaker

TPM/Port 80 Header

A Trusted Platform Module/Port 80 header, located at JTPM1, provides 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)

I-SGPIO1/2 & S-SGPIO Headers

Three SGPIO (Serial Link General Purpose Input/Output) headers are provided. I-SGPIO1 supports I-SATA 0-3, I-SGPIO2 supports I-SATA 4/5. S-SGPIO is used for S-SATA 0-3. See the table on the right for pin definitions.

I-SGPIO1/2 & S-SGPIO Headers Pin Definitions			
Pin#	Definition	Pin	Definition
1	NC	2	NC
3	Ground	4	Data
5	Load	6	Ground
7	Clock	8	NC

Note: NC= No Connection

Standby Power Header

The +5V Standby Power header is located at JSTBY1 on the motherboard. See the table on the right for pin definitions. (You must also have a card with a Standby Power connector and a cable to use this feature.)

Standby PWR Pin Definitions	
Pin#	Definition
1	+5V Standby
2	Ground
3	No Connection

Chassis Intrusion

A Chassis Intrusion header is located at JL1 on the serverboard. Attach an appropriate cable from the chassis to inform you of a chassis intrusion when the chassis is opened.

Chassis Intrusion Pin Definitions	
Pin#	Definition
1	Intrusion Input
2	Ground

SMBus for IPMI

A 4-pin external BMC System Management Bus (I²C) header for IPMI 2.0 with support of NVMe (Non-Volatile Memory Express) and SGPIO (Serial-Link General Purpose I/O) is located at JIPMB1. Connect an appropriate cable here to use the IPMB I²C connection with NVMe and SGPIO support on your system.

IPMB Header Pin Definitions	
Pin#	Definition
1	Data
2	Ground
3	Clock
4	No Connection

Power SMB (I²C) Connector

Power System Management Bus (I²C) connector (JPI²C1) monitors power supply, fan and system temperatures. See the table on the right for pin definitions.

PWR SMB Pin Definitions	
Pin#	Definition
1	Clock
2	Data
3	PMBUS_Alert
4	Ground
5	+3.3V

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 Serial Link DOM devices.

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

Front Panel Audio Header

Front Panel Audio header is located at AUDIO_FP. Connect a cable to this header to use front panel audio device. To use the FP Audio for '97 Audio, close pins 1~2 of jumper JPAC1. To use this header for High Definition Audio, close pins 1~2 of jumper JHD_AC1.

10-in Audio Pin Definitions	
Pin#	Signal
1	Microphone_Left
2	Audio_Ground
3	Microphone_Right
4	Audio_Detect
5	Line_2_Right
6	Ground
7	Jack_Detect
8	Key
9	Line_2_Left
10	Ground

SPDIF_In Header

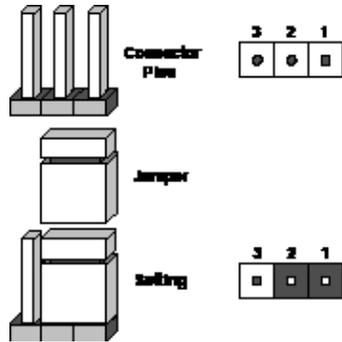
A SPDIF-In (Sony/Philips Digital Interface In) header is located at JPSPDIF_In. Connect a cable to this header to use an SPDIF device.

5-9 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/LAN2 Ethernet ports on the serverboard. See the table on the right for jumper settings. The default setting is enabled.

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

VGA Enable/Disable

JPG1 allows you to enable or disable the VGA port. The default position is on pins 1 and 2 to enable VGA. See the table on the right for jumper settings.

VGA Enable/Disable Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled

Watch Dog Enable/Disable

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.

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

BMC Enable

Jumper JPB1 is used to enable or disable the embedded AST2400 BMC (Baseboard Management Controller) to provide IPMI 2.0/KVM support on the serverboard. See the table on the right for jumper settings.

BMC Enable Jumper Settings	
Jumper Setting	Definition
Pins 1-2	BMC Enable (Default)
Pins 2-3	Disabled

AC'97/HD Select

Jumper JHC_AC1 allows you to select High-Definition (HD) audio or AC'97 audio. The default setting is on to use HD audio the connection. See the table on the right for jumper settings.

AC'97/HD Audio Select Jumper Settings	
Jumper Setting	Definition
On	HD Audio (Default)
Off	AC'97

Manufacturer Mode Select

Close pins 2 and 3 of Jumper JPME2 to bypass SPI flash security and force the system to operate in the Manufacturer mode, which will allow the user to flash the system firmware from a host server for system setting modifications. See the table on the right for jumper settings.

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

I²C Bus to PCI-Exp. Slots

Use Jumpers JI²C1 and JI²C2 to connect the System Management Bus (I²C) to PCI-Express slots to improve PCI performance. These two jumpers must be set at the same time. The default setting is on pins 2-3 to disable the connection for normal operations. See the table on the right for jumper settings.

I ² C for PCI-E slots Jumper Settings	
Jumper Setting	Definition
Pins 1-2	Enabled
Pins 2-3	Disabled (Default)

Audio Enable

Jumper JPAC1 allows the user to enable the front audio (AUDIO_FP) connector. The default setting is on pins 1-2 to enable the connection. See the table on the right for jumper settings.

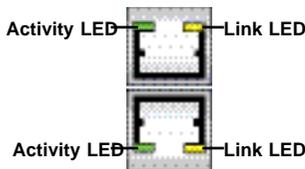
FP Audio Enable Jumper Settings	
Jumper Setting	Definition
1-2	Enabled (Default)
2-3	Disabled

5-10 Onboard Indicators

GLAN LEDs

There are two GLAN ports on the serverboard. An additional IPMI dedicated LAN port is also located above the USB 0/1 ports on the backpanel. Each Gigabit Ethernet LAN port has two LEDs. The yellow LED indicates activity, while the Link LED may be green, amber or off to indicate the speed of the connection. See the tables at right for more information.

Note: IPMI dedicated LAN does not operate at 1 Gbps.

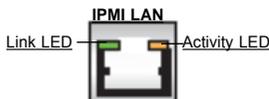


GLAN Activity Indicator LED Settings	
Color	Definition
Green flashing	Active

GLAN Link Indicator LED Settings	
LED Color	Definition
Off	No Connection or 10 Mbps
Green	100 Mbps
Amber	1 Gbps

IPMI Dedicated LAN LEDs

In addition to LAN 1/LAN 2, an IPMI dedicated LAN is located on the I/O Backplane of the motherboard. The amber LED on the right indicates activity, while the green LED on the left indicates the speed of the connection. See the table on the right for more information.



IPMI LAN Link LED (Left) & Activity LED (Right)		
	Color/State	Definition
Link (Left)	Green: Solid	100 Mbps
	Amber: Solid	1 Gbps
Activity (Right)	Orange: Blinking	Active

Onboard Power LED

An Onboard Power LED is located at LED2 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 tables at right for more information.

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

BMC Heartbeat LED

A BMC Heartbeat LED is located at LEDM1. When LEDM1 is blinking, BMC functions normally. See the table at right for more information.

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

5-11 SATA Ports**Serial ATA 3.0 Ports**

There are ten SATA 3.0 (I-SATA 0-5 & S-SATA 0-3). I-SATA ports are supported by the Intel PCH C612, and S-SATA ports are supported by the Intel SCU chip. I-SATA 4/5 support SuperDOMs, which are SATA DOM (Device-on-Module) devices with power supply supported. These SATA ports provide serial-link signal connections, which are faster than the connections of Parallel ATA. 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

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.

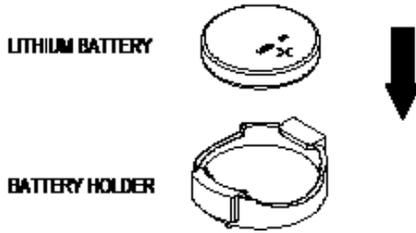


Figure 5-8. Installing the Onboard Battery

Notes

Chapter 6

Advanced Chassis Setup

This chapter covers the steps required to install components and perform maintenance on the SC747BTQ-R2K02B chassis. The only tool required is a Phillips screwdriver.

Your system may require the installation of processors, memory, drives or expansion cards. Other procedures presented in this chapter are for maintenance or replacement.

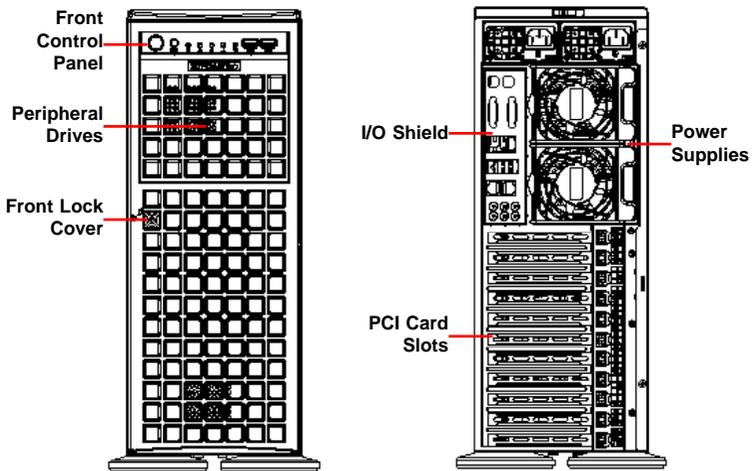


Figure 6-1. Chassis: Front and Rear Views

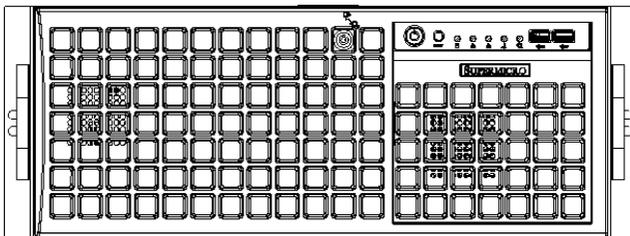


Figure 6-2. Chassis in Rack Mount Mode

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.

6-2 Control Panel

The front control panel helps monitor and control the system. It is located on the front of the chassis and must be connected to the JF1 connector on the serverboard. A ribbon cable has bundled these wires together to simplify the connection. Connect the cable from JF1 on the serverboard to the appropriate header on the Control Panel PCB (printed circuit board). Make sure the red wire plugs into pin 1 on both connectors. Pull all excess cabling out of the airflow path.

The control panel LEDs inform you of system status. See "Chapter 3: System Interface" for details on the LEDs and the control panel buttons. Details on JF1 can be found in "Chapter 5: Advanced Serverboard Installation."

Control Panel Orientation

The server can be configured for either tower or server rack orientation. It is shipped in tower mode and can be immediately used as desktop server. To use it in a rack, rotate the module that contains the control panel and the three drive trays (#1 in Figure 6-3) 90 degrees.

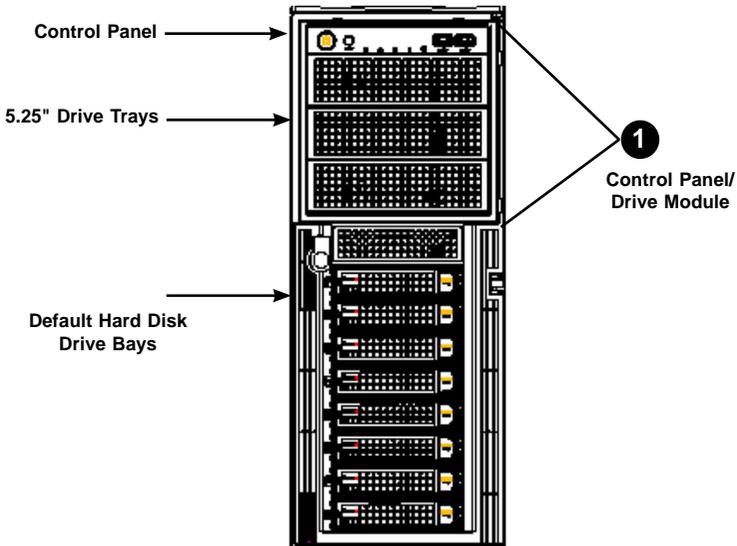


Figure 6-3. Chassis in Tower Mode (Default Configuration)

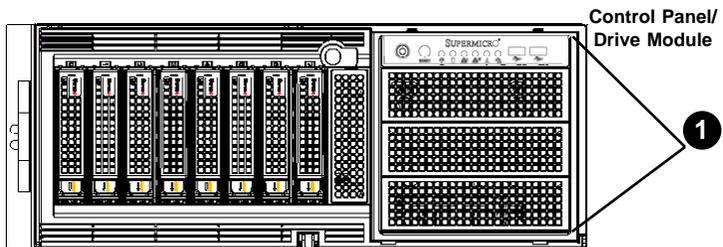


Figure 6-4. Chassis in Rack Mount Mode

Rotating the Control Panel/Drive Module for Rack Mounting

1. Open the chassis cover.
2. Locate the control panel/drive module and disconnect any cables from the module to any component in the chassis.
3. Push the module release lever to unlock the module. (Figure 6-5)
4. Grasp the external edges of the module and pull the unit from the chassis.
5. Rotate the module 90 degrees so that the control panel is on top.
6. Reinsert the module into the chassis and reconnect the cables.

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

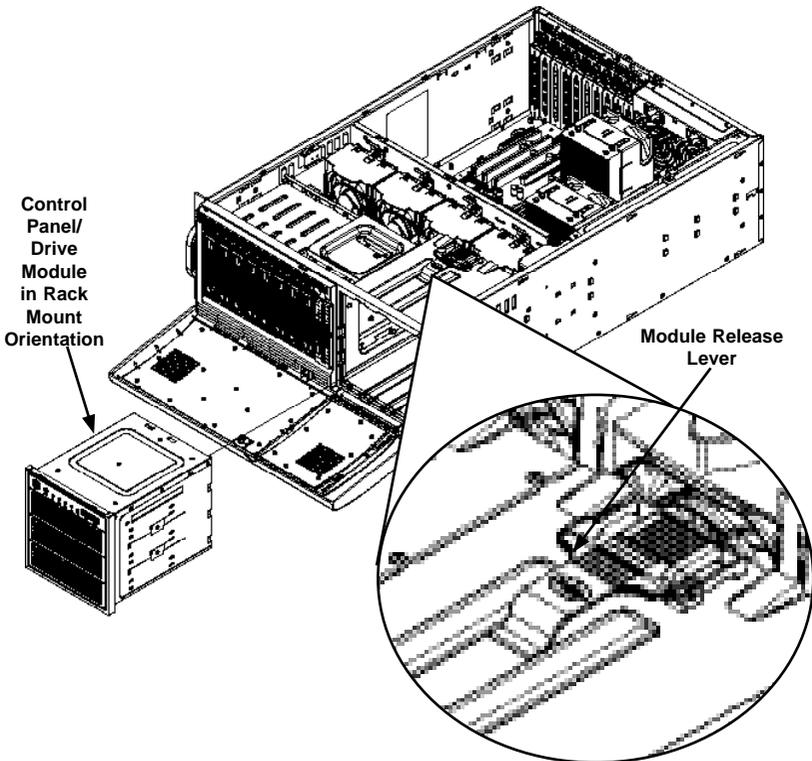


Figure 6-5. Rotating the Control Panel/Drive Module

6-3 Configuring Drives

The default configuration includes eight hot-swap hard disk drives plus three full size drive trays for removable media drives or additional hard disk drives.

Configuring the 5.25" Drive Bays

The control panel/drive module includes three 5.25" drive bays under the front control panel. It can be set up in a variety of configurations to suit the user's needs.

- Three peripheral drives, such as CD, DVD, or floppy
- Additional fixed hard drives in an individual bay
- A combination of the above
- A mobile rack with five additional 3.5" hot-swap hard drives

Installing a Hard Drive into a Drive Tray

1. Open the chassis cover.
2. Locate the drive tray and pull the tray release tab for the slot.
3. Push the drive tray toward the front of the chassis (Figure 6-6).

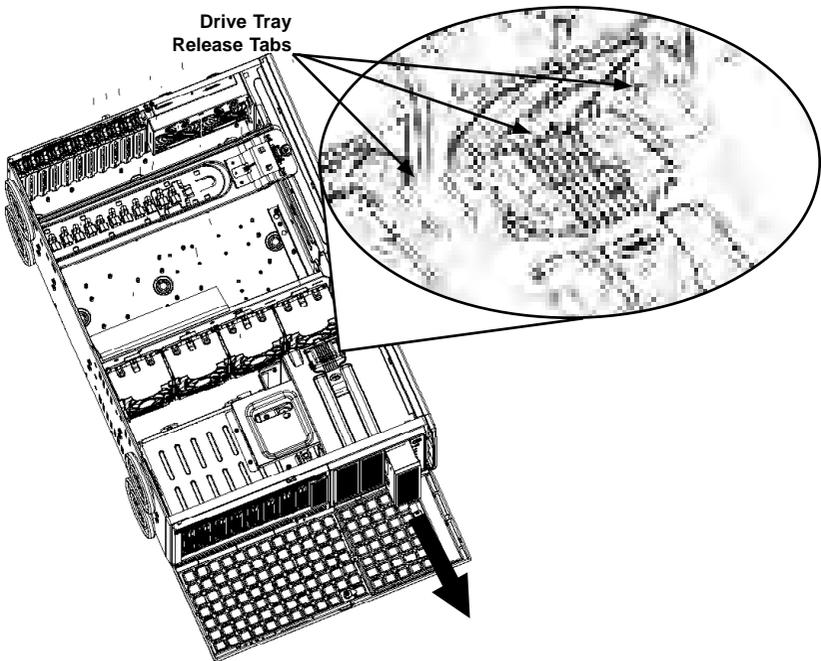


Figure 6-6. Remove Drive Tray

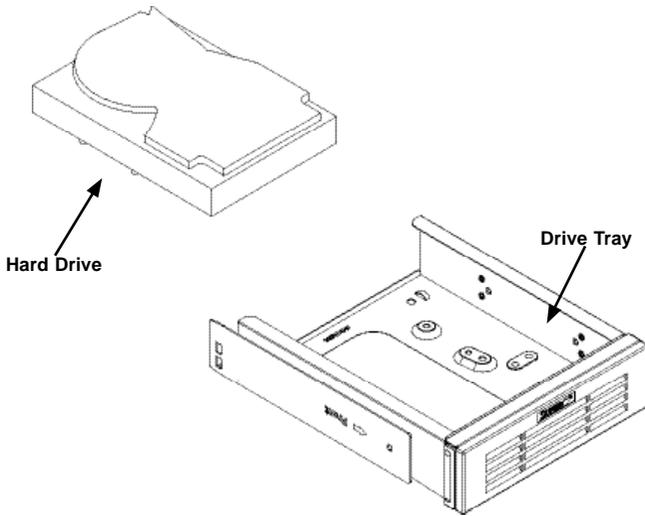


Figure 6-7. Add a Hard Drive to the Drive Tray

4. Place the hard drive in the drive tray. The hard drive may not completely fill the tray (Figure 6-7).
5. Secure the hard drive to the tray with four screws from the bottom.
6. Slide the drive tray into the chassis until the tray clicks into place.

Caution: When the server is operating, all the drive trays should remain in the drive bays to maintain proper cooling airflow.

Adding Peripheral Drives to the Drive Bays

Replace a drive tray with a peripheral drive.

1. Open the chassis cover.
2. Locate the release tab for the drive tray where you want to place the peripheral drive (Figure 6-8).
3. Push the drive tray toward the front of the chassis.

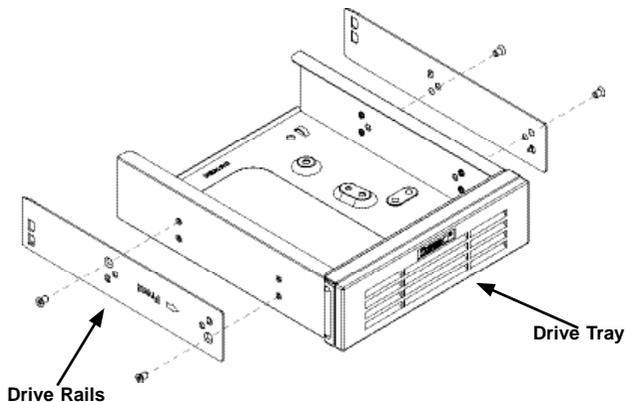


Figure 6-8. Removing Rails from the Drive Tray

4. Remove the rails from the drive tray by removing two screws from each side. (Figure 6-7)
5. Attach the rails to a DVD drive, CD drive, floppy drive, or other peripheral. The rails should fit any standard sized peripheral.
6. Slide the drive into the chassis until it clicks into place.

Additional Hard Drives

The chassis accepts a CSE-M35BP mobile rack in place of the three bays just under the control panel. This configuration yields a total of thirteen hot-swap hard drives and no peripheral drives.

Installing the M35 Mobile Rack

1. Open the chassis cover.
2. Press the drive tray release tabs (Figure 6-6).
3. Push all three drive trays forward and out of the chassis
4. Remove the six drive tray rails (Figure 6-9).

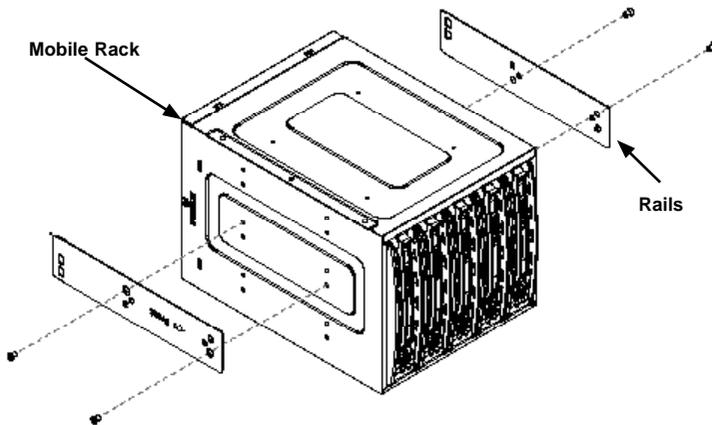


Figure 6-9. Add Rails to the Mobile Rack

(Two shown as an example; install six.)

5. Install all six rails onto the mobile rack. Each rail requires two screws. Make sure the arrow on the rail points toward the front of the chassis (Figure 5-8).
6. Slide the mobile rack into the chassis.

Installing Drives in the Default HDD Bays

Hard drives in the eight default HDD bays are mounted in drive carriers to simplify their installation and removal. These carriers also help promote proper airflow for the drive bays.

Installing Hard Drives

1. Press the release button to extend the drive carrier handle.
2. Using the handle, pull the drive carrier out by the handle. The drive is hot-swappable; there are no cables to disconnect (Figure 6-10).

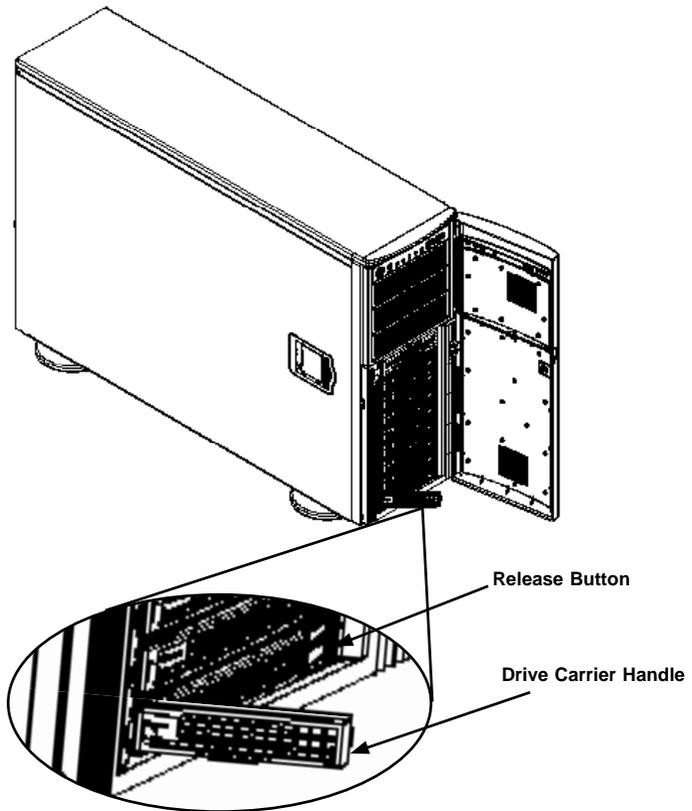


Figure 6-10. Open the Drive Carrier Release Handle

3. Remove the screws holding the drive carrier to the dummy drive.
4. Place a hard drive in the drive carrier (Figure 6-11).

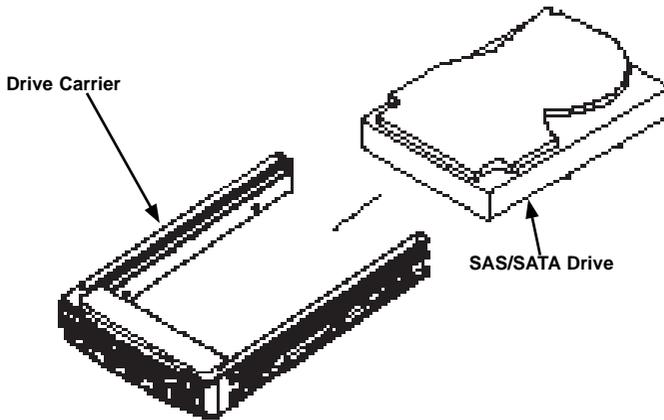


Figure 6-11. Installing the Hard Drive

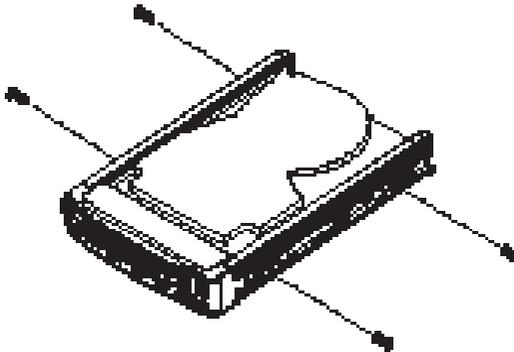


Figure 6-12. Securing Drive

5. Secure the hard drive to the carrier using four screws (Figure 6-12).
6. Insert the hard drive and carrier into the chassis. Press the hard drive release button to extend the drive carrier handle.
7. Close the handle to lock the drive carrier into place.

6-4 System Cooling

Heavy-duty fans provide cooling for the chassis. Four fans are located in the mid-section of the chassis, two fans are located in the rear, and two optional fans can be mounted on the external rear of the chassis.

The internal fans come pre-installed to the chassis. Each fan is hot-swappable and can be replaced without removing any connections.

System Fan Failure

Fan speed is controlled by system temperature through IPMI. If a fan fails, the remaining fans will ramp up to full speed. Replace any failed fan at your earliest convenience with the same type and model (the system can continue to run with a failed fan).

Replacing System Fans

The chassis contains two types of system fans: mid-system fans and rear system fans.

Replacing Mid-System Fans (FAN-0114L4 and FAN-0138L4)

1. Determine which fan has failed. Because the fans are hot-swappable, the system does not need to be powered-down.
2. Press the fan release tab and lift the failed fan from the chassis. Mid fans must be pulled straight out of the chassis (see Figure 6-13). Part numbers: top two fans are FAN-0114L4 and bottom two are FAN-0138L4.
3. Place the new fan into the vacant space in the housing while making sure the arrows on the top of the fan (indicating air direction) point in the same direction as the arrows on the other fans. As soon as the fan is connected, it will begin working.

Replacing the Rear System Fan (FAN-0082L4)

1. Determine which fan has failed.
2. Press the rear fan release tab (see Figure 6-13).
3. Pull the fan away from the chassis by pulling out the top first.
4. Place the new fan in the chassis, inserting the bottom of the fan first.
5. Push the fan fully into the housing until the fan clicks into place.

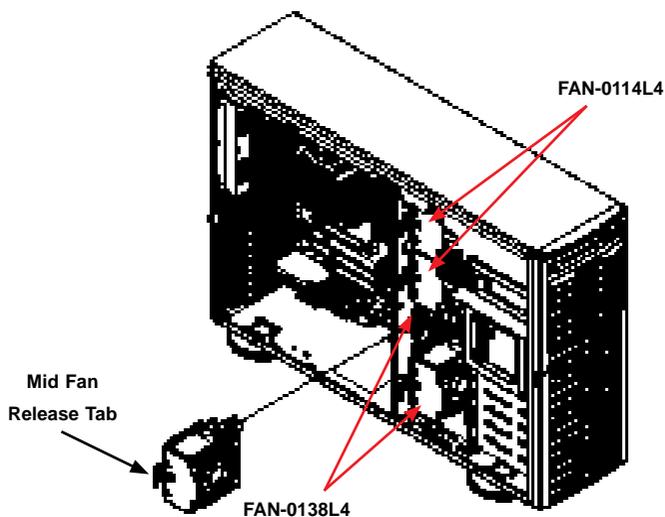


Figure 6-13. Mid-System Chassis Fans

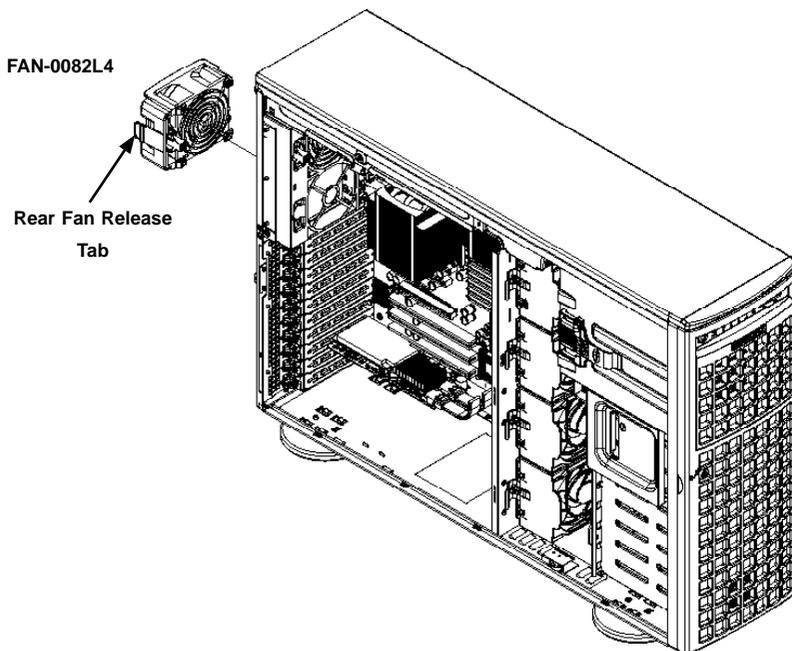


Figure 6-14. Rear System Chassis Fans

Installing the GPU Kit

When using passive GPUs, you must use the GPU cooling kit, MCP-320-74701-0N-KIT. This kit consists of two fans with brackets that can be attached to the back of the chassis and one mylar air shroud to concentrate air flow to the GPUs.

Installing External Rear Fans

1. Power down the system, disconnect the power cords from the rear of the power supplies and open the chassis cover.
2. Insert the feet on the bottom of the external rear fan into the corresponding slots on the bottom of the fan bracket.
3. Push the top of the fan into the bracket until it clicks into the locked position.

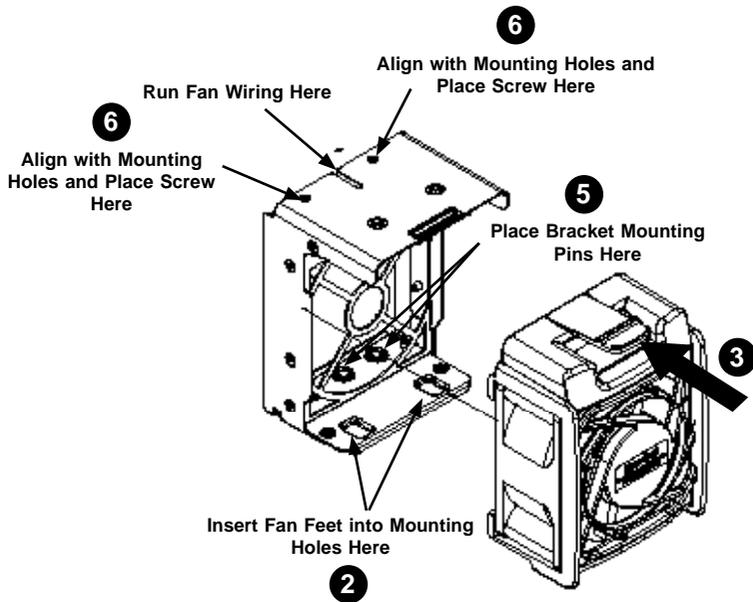


Figure 6-15. External Rear Fan Bracket Mounting Pin Placement

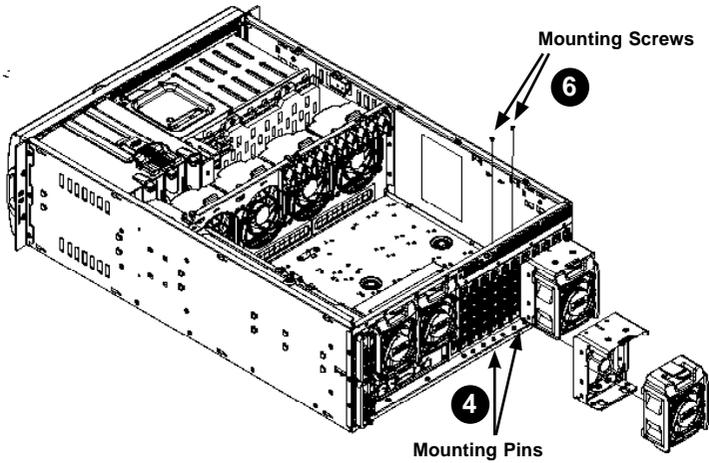


Figure 6-16. Placing the External Rear Fan and Bracket on the Chassis

4. Place two metal mounting pins into the holes in the chassis at the base of the PCI slots in the position where the fan is to be located. Tighten these pins to the rear window using pliers.
5. Place the external rear fan bracket with the fan over the mounting pins.
6. Align the holes at the top of the external rear fan bracket with the corresponding holes at the top of the PCI slot and secure the bracket with two screws.

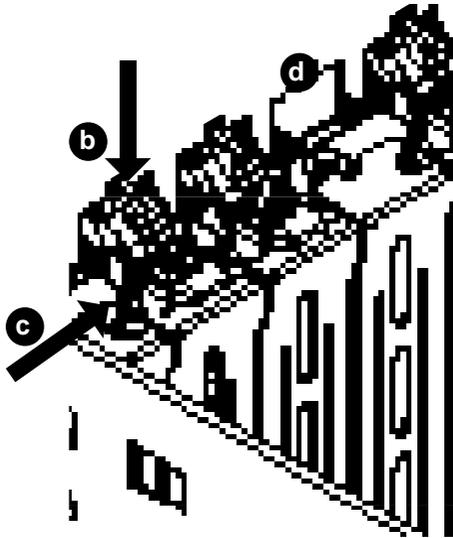


Figure 6-17. PCI Slot Latches

7. Remove the PCI slot snap latch to allow the fan cable access.
 - a. Determine which PCI slot aligns with the slot in the top of the fan bracket.
 - b. Open the PCI slot snap latch by pressing downward on the latch to open it.
 - c. With the latch open, press inward against one side of the latch to release its hinge pin from the hinge mounting hole in chassis.
 - d. Gently move the hinge latch from side to side until it slips out of both hinge mounting holes and remove it from the chassis.
8. Slide the fan cable into the slot at the top of the external rear fan bracket.
9. Route the cable through the open latch slot and into the chassis.
10. For neatness, the plastic latch clip may be reinstalled in the latch slot if desired. Additionally, the cable may be routed along the top of the PCI slots and concealed by closing the latch of each slot over the cable.
11. Plug the fan power connector at the end of the fan cable into the motherboard header.



Figure 6-18. Dummy GPU for Air Flow

12. If you do not fill all the GPU slots, install a PCI card dummy (part number MCP-240-00096-0N). This facilitates proper air flow for the GPUs.
13. Install the GPU air shroud. (Figure 6-19)
14. Close the chassis, reconnect the power cord and power up the server.

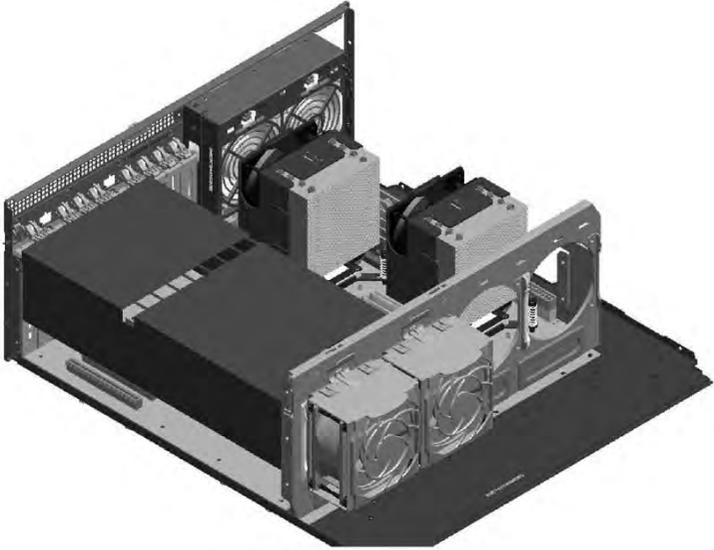


Figure 6-19. GPU Kit Air Shroud Installed

Replacing External Fans

External fans can be replaced during system operation.

1. Visually inspect the fans to determine which one has failed.
2. Press the release tab on the top of the fan and pull the fan from the bracket. See Figure 6-15.
3. Push the new fan into the bracket. Insert the bottom of the fan first, then snap in the top of the fan. Make sure the arrows on the top of the fan indicating air direction point toward the rear. The fan activates once it is mounted..

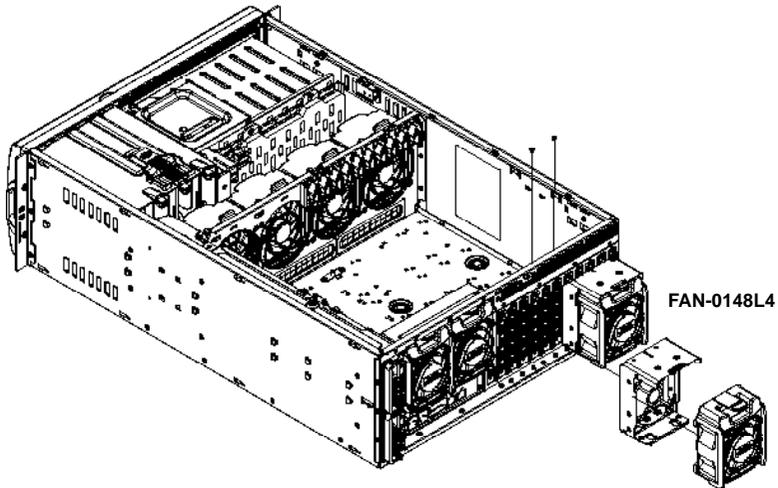


Figure 6-20. External Fans

6-5 Power Supply

This chassis features an auto-switching power supply. This enables it to automatically sense and operate at a 100v to 240v input voltage. An amber light will be illuminated when the power is off. An green light indicates that the power supply is operating.

Replacing the Power Supply

With a redundant power supply, the system automatically switches to the second power supply if the first should fail.

Replacing the Power Supply

1. The power cords attach in the rear of the chassis. Remove the cord that corresponds to the module to be replaced.
2. On the front of the chassis, push the release button on the power supply module. (Figure 6-21)
3. Pull the power supply out using the handle provided.
4. Replace the failed power module with the same model. Push the new module into the power bay until you hear a click.
5. Replace the AC power cord.

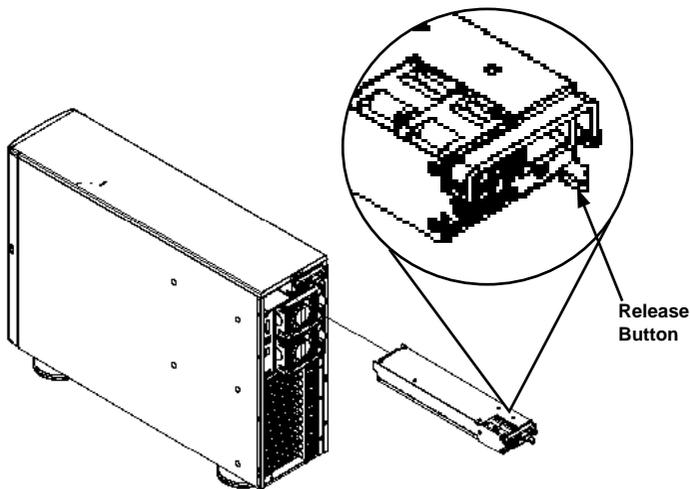


Figure 6-21. Power Supply Release Button

Power Supply Connections

Connect each of the following cables, as required, by your serverboard manufacturer. In some instances, some cables may not need to be connected. Some cables may not be available with your model.

Power Supply Cables			
Name	Qty	Connects to:	Description
20-pin or 24-pin power cable	1	Serverboard	20-pin or 24-pin power cable provides electricity to the serverboard, and has twenty to twenty-four yellow, black, gray, red, orange, green and blue wires.
HDD (Hard Drive) power cable	2	Backplane	Each cable has three connectors (two Hard Drive [HDD] and one Floppy Drive [FDD]). Attach the HDD connectors to the backplane.
8-pin serverboard cable	1	Serverboard	Provides power to the serverboard CPU. This cable has two black and two yellow wires.
4-pin serverboard cable	1	Serverboard	Provides power to PCI expansion card. This cable has two black and two yellow wires.
5-pin SMBus power cable (small)	1	Serverboard	Allows the SM (System Management) bus to monitor power supply
2-pin INT cable	1	Serverboard	Intrusion detection cable allows the system to log when the workstation chassis has been opened.

Notes

Chapter 7

BIOS

7-1 Introduction

This chapter describes the AMI BIOS Setup utility for the X10DRG-Q. 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 key while the system is booting up.

Note: In most cases, the 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 a text message. When an option is selected in the left frame, it is highlighted in white. Often a text message will accompany it.

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

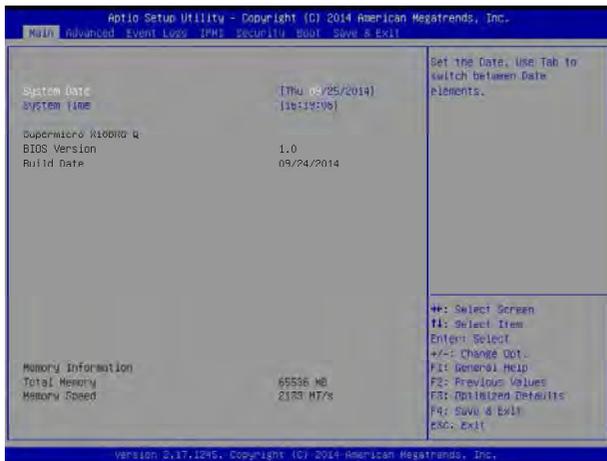
The configuration data that determines the system parameters may be changed by entering the AMI BIOS Setup utility. This Setup utility can be accessed by pressing <F2> at the appropriate time during system boot.

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 <F2> 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

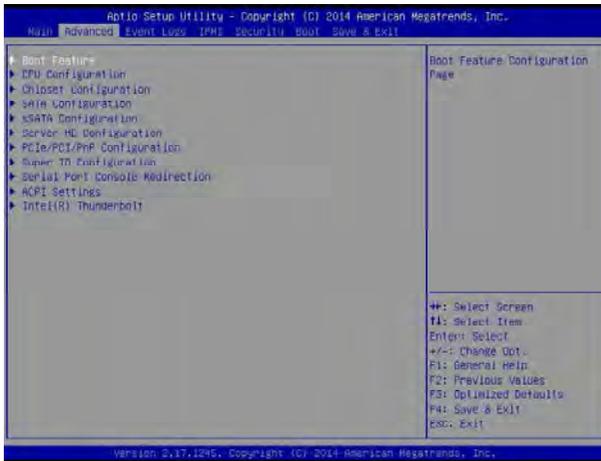
This item displays the system date in Day MM/DD/YY format (e.g. Wed 10/12/2011).

System Time

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

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 selects the 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

This item sets 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

This feature sets 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 **Immediate** and Postponed.

Retry Boot

Select Enabled to force the system to reboot when system fails to boot. The options are **Disabled** and Enabled.

Power Configuration

DeepSX Power Policies

Use this feature to configure the Advanced Configuration and Power Interface (ACPI) settings for the system. Enable S3 to use Standby Mode (Suspend-to-RAM) and maintain power supply to the system RAM when the system is in the sleep mode. Enable S4 to use the Hibernation mode (Suspend to Disk) so that all data stored in of the main memory can be saved in a non-volatile memory area such as in a hard drive and then power down the system. Enable S5 to power off the whole system except the power supply unit (PSU) and keep the power button "alive" so that the user can "wake-up" the system by using a USB keyboard or mouse. The options are **Disabled**, Enabled in S5, Enabled in S4-S5, and Enabled in S3-S4-S5.

Watch Dog Function

If enabled, the Watch Dog timer will allow the system to reboot when it is inactive for more than 5 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_Second_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_Second_Override.

Restore on AC Power Loss

This feature sets the power state after a power outage. Select Power-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 configuration CPU settings.

Socket 1 CPU Information/Socket 2 CPU Information

This submenu displays the following information regarding the CPU installed in Socket 1 and (or) Socket 2 as detected by the BIOS.

- Processor Socket
- Processor ID
- Processor Frequency
- Processor Maximum Ratio
- Processor Minimum Ratio
- Microcode Revision
- L1 Cache RAM
- L2 Cache RAM
- L3 Cache RAM
- CPU1 Version
- CPU2 Version

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.

Hyper-Threading (ALL)

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

Cores Enabled

Set a numeric value to enable the number of cores. (Please refer to Intel's website for more information.) Enter **0** to enable all cores.

Execute Disable Bit Capability (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.)

PPIN Control

Select Enable to unlock the PPIN control. The options are **Enabled** and Disabled.

Hardware Prefetcher (Available when supported by the CPU)

If set to Enabled, the hardware 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**.

Adjacent Cache Line Prefetch (Available when supported by the CPU)

The CPU prefetches the cache line for 64 bytes if this feature is set to Disabled. The CPU prefetches both cache lines for 128 bytes as comprised if this feature is set to **Enabled**.

DCU Streamer Prefetcher (Available when supported by the CPU)

Select Enabled to enable the DCU (Data Cache Unit) Streamer Prefetcher which will stream and prefetch data and send it to the Level 1 data cache to improve data processing and system performance. The options are Disabled and **Enabled**.

DCU IP Prefetcher (Available when supported by the CPU)

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 Disabled and **Enabled**.

Direct Cache Access (DCA Support)

Select Enabled to use Intel's DCA (Direct Cache Access) Technology to improve data transfer efficiency. The options are **Enabled** and Disabled.

X2APIC

Select Enable to activate APIC (Advanced Programmable Interrupt Controller) support. The options are **Enabled** and Disabled.

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.

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 a change is made to this setting, you will need to reboot the system for the change to take effect. Refer to Intel's website for detailed information.

► Advanced Power Management Configuration

This section is used 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 Disable, **Energy Efficiency**, and Custom.

If the above is set to 'Custom' the following options are displayed:

► CPU P State Control

EIST (P-States)

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, and **Enabled**.

Turbo Mode (Available when Intel® EIST Technology is enabled)

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

P-State Coordination

This feature allows the user to change the P-State (Power-Performance State) coordination type. P-State is also known as "SpeedStep" for Intel processors. Select HW_ALL to change the P-State coordination type for hardware components only. Select SW_ALL to change the P-State coordination type for all software installed in the system. Select SW_ANY to change the P-State coordination type for a software program in the system. The options are **HW_All**, SW_ALL, and SW_ANY.

► CPU C State Control

Package C State limit

This feature allows the user to set the limit on the C-State package register. The options are C0/C1 State, C2 State, C6 (Non Retention) State, and **C6 (Retention) State**.

CPU C3 Report

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

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 cache is turned off. The options are **Enabled** and Disabled.

Enhanced Halt State (C1E)

Select Enabled to use Enhanced Halt-State technology, which will significantly reduce the CPU's power consumption by reducing the CPU's clock cycle and voltage during a Halt-state. The options are Disable and **Enable**.

► CPU T State Control

ACPI (Advanced Configuration Power Interface) T-States

Select Enable to support CPU throttling by the operating system to reduce power consumption. The options are **Enable** and Disable.

► Chipset Configuration

► North Bridge

This feature allows the user to configure the following North Bridge settings.

► I/O Configuration

EV DFX (Device Function On-Hide) Feature

When this feature is set to Enable, the EV_DFX Lock Bits that are located on a processor will always remain clear during electric tuning. The options are **Disable** and Enable.

► IIO1 Configuration / IIO2 Configuration

IIO1 PORT 1A Link Speed

This item configures the link speed of a PCI-E port specified by the user. The options are Gen 1 (Generation 1) (2.5 GT/s), Gen 2 (Generation 2) (5 GT/s) and **Gen 3 (Generation 3) (8 GT/s)**.

IIO1 PORT 2A Link Speed

Use this item to configure the link speed of a PCI-E port specified by the user. The options are Gen 1 (Generation 1) (2.5 GT/s), Gen 2 (Generation 2) (5 GT/s) and **Gen 3 (Generation 3) (8 GT/s)**.

IIO1 PORT 3A Link Speed

Use this item to configure the link speed of a PCI-E port specified by the user. The options are Gen 1 (Generation 1) (2.5 GT/s), Gen 2 (Generation 2) (5 GT/s) and **Gen 3 (Generation 3) (8 GT/s)**.

► IIO2 Configuration

IIO2 Port 1A Link Speed

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

IIO2 Port 2A Link Speed

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

IIO2 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**.

► IOAT (Intel® IO Acceleration) Configuration

Enable IOAT

Select Enable to enable Intel I/OAT (I/O Acceleration Technology) support, which significantly reduces CPU overhead by leveraging CPU architectural improvements and freeing the system resource for other tasks. The options are **Enable** and Disable.

No Snoop

Select Enable to support no-snoop mode for each CB device. The options are **Disable** and Enable.

Relaxed Ordering

Select Enable to enable Relaxed Ordering support which will allow certain transactions to violate the strict-ordering rules of PCI bus for a transaction to be completed prior to other transactions that have already been enqueued. The options are **Disable** and Enable.

► Intel® VT for Directed I/O (VT-d)

Intel® VT for Directed I/O (VT-d)

Select Enable to use Intel® Virtualization Technology support for Direct I/O VT-d support 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 **Enable** and Disable.

Interrupt Remapping

Select Enable for Interrupt Remapping support to enhance system performance. The options are **Enable** and Disable.

► QPI (Quick Path Interconnect) Configuration

QPI Status

The following information will display:

- Number of CPU
- Number of IIO
- Current QPI Link Speed

- Current QPI Link Frequency
- QPI Global MMIO Low Base/Limit
- QPI Global MMIO High Base/Limit
- QPI PCIe Configuration Base/Size

Link Frequency Select

Use this item to select the CPU Frequency. The options are 6.4 GB/s, 8.0 GB/s, 9.6 GB/s, **Auto**, Auto Limited.

Link L0p Enable

Select Enable for Link L0p support. The options are **Enable** and Disable.

Link L1 Enable

Select Enable for Link L1 support. The options are **Enable** and Disable.

COD Enable (Available when the OS and the CPU support this feature)

Select Enabled for Cluster-On-Die support to enhance system performance in cloud computing. The options are Enable, Disable, and **Auto**.

Early Snoop (Available when the OS and the CPU support this feature)

Select Enabled for Early Snoop support to enhance system performance. The options are Enable, Disable, and **Auto**.

Isoc Mode

Select Enabled for Isochronous support to meet QoS (Quality of Service) requirements. This feature is especially important for Virtualization Technology. The options are Enable and **Disable**.

► Memory Configuration

Enforce POR

Select Enable to enforce POR restrictions on DDR4 frequency and voltage programming. The options are **Enabled** and Disabled.

Memory Frequency

Use this feature to set the maximum memory frequency for onboard memory modules. The options are **Auto**, 1333, 1400, 1600, 1800, 1867, 2000, 2133, 2200, 2400, 2600, 2667, and Reserved (Do not select Reserved).

Data Scrambling

Select Enabled to enable data scrambling to enhance system performance and data integrity. The options are **Auto**, Disabled and Enabled.

DRAM RAPL Baseline

Use this feature to set the run-time power-limit baseline for DRAM modules. The options are Disable, DRAM RAPL Mode 0, and **DRAM RAPL Mode 1**.

Set Throttling Mode

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).

Socket Interleave Below 4GB

Select Enabled for the memory above the 4G Address space to be split between two sockets. The options are Enable and **Disable**.

A7 Mode

Select Enabled to support the A7 (Addressing) mode to improve memory performance. The options are **Enable** and Disable.

► DIMM Information

This item displays the status of a DIMM module specified by the user.

- P1-DIMMA1 - P1-DIMMD1
- P2-DIMME1 - P2-DIMMH1

► Memory RAS (Reliability_Availability_Serviceability) Configuration

Use this submenu to configure the following Memory RAS settings.

RAS Mode

When Disable is selected, RAS is not supported. When Mirror is selected, the motherboard maintains two identical copies of all data in memory for data backup. When Lockstep is selected, the motherboard uses two areas of memory to run the same set of operations in parallel to boost performance. The options are **Disable**, Mirror, and Lockstep Mode.

Memory Rank Sparing

Select Enable to enable memory-sparing support for memory ranks to improve memory performance. The options are **Disabled** and Enabled.

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 **Enable** and Disable.

Patrol Scrub Interval

This feature allows you to decide how many hours the system should wait before the next complete patrol scrub is performed. Use the keyboard to enter a value from 0-24. The Default setting is **24**.

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 Enable to use Demand Scrubbing for ECC memory correction. The options are **Enable** and Disable.

Device Tagging

Select Enable to support device tagging. The options are **Disable** and Enable.

►South Bridge Configuration

The following South Bridge information will display:

- USB Configuration
- USB Module Version
- USB Devices

Legacy USB Support

Select Enabled to support onboard legacy USB devices. Select Auto to disable legacy support if there are no legacy USB devices present. Select Disable to have all USB devices available for EFI applications only. The options are **Enabled**, Disabled and Auto.

XHCI Hand-Off

This is a work-around solution for operating systems that do not support XHCI (Extensible Host Controller Interface) hand-off. The XHCI ownership change should be claimed by the XHCI driver. The settings are **Enabled** and Disabled.

EHCI Hand-Off

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

Port 60/64 Emulation

Select Enabled for I/O port 60h/64h emulation support, which in turn, will provide complete legacy USB keyboard support for the operating systems that do not support legacy USB devices. The options are Disabled and **Enabled**.

USB 3.0 Support

Select Enabled for USB 3.0 support. The options are Smart Auto, **Auto**, Enabled, Disabled and Manual.

EHCI1

Select Enabled to enable EHCI (Enhanced Host Controller Interface) support on USB 2.0 connector #1 (-at least one USB 2.0 connector should be enabled for EHCI support.) The options are Disabled and **Enabled**.

EHCI2

Select Enabled to enable EHCI (Enhanced Host Controller Interface) support on USB 2.0 connector #2 (-at least one USB 2.0 connector should be enabled for EHCI support.) The options are Disabled and **Enabled**.

XHCI Pre-Boot Driver

Select Enabled to enable XHCI (Extensible Host Controller Interface) support on a pre-boot drive specified by the user. The options are Enabled and **Disabled**.

Real USB Wake Up

Select Enabled to enable the wake-up function of the USB port. The options are **Enabled** and Disabled.

Front USB Wake Up

Select Enabled to enable the wake-up function of the front access USB port. The options are **Enabled** and Disabled.

Azalia

Select Enabled to enable support for Azalia High Definition Audio. The options are Disabled, Enabled, and **Auto**.

Azalia PME Enable

Select Enabled to enable power management capability of the Azalia controller. The settings are Enabled and **Disabled**.

►SATA Configuration

When this submenu is selected, AMI BIOS automatically detects the presence of the SATA devices that are supported by the Intel PCH chip and displays the following items:

SATA Controller

This item enables or disables the onboard SATA controller supported by the Intel PCH chip. The options are **Enabled** and Disabled.

Configure SATA as

Select IDE to configure a SATA drive specified by the user as an IDE drive. Select AHCI to configure a SATA drive specified by the user as an AHCI drive. Select RAID to configure a SATA drive specified by the user as a RAID drive. The options are IDE, **AHCI**, and RAID.

**If the item above "Configure SATA as" is set to AHCI, the following items will display:*

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

SATA Port 0~ Port 5

This item displays the information detected on the installed SATA drive on the particular SATA port.

- Model number of drive and capacity
- Software Preserve Support

Port 0~ Port 5

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

Port 0 ~ Port 5 Hot Plug

Select Enabled to enable hot-plugging support for a port specified by the user, which will allow the user to replace a SATA disk drive installed on this port without shutting down the system. The options are **Enabled** and Disabled.

Port 0 ~ Port 5 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to initialize the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 5 SATA Device Type

Use this item to specify if the SATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are Hard Disk Drive and Solid State Drive.

**If the item above "Configure SATA as" is set to IDE, the following items will display:*

Serial ATA Port 0~ Port 5

This item indicates that a SATA port specified by the user is installed (present) or not.

Port 0 ~ Port 5 SATA Device Type (Available when a SATA port is detected)

Use this item to specify if the SATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are Hard Disk Drive and Solid State Drive.

**If the item above "Configure SATA as" is set to RAID, the following items will display:*

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

SATA RAID Option ROM/UEFI Driver

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disabled, EFI, and **Legacy**.

Serial ATA Port 0~ Port 5

This item displays the information detected on the installed SATA drives on the particular SATA port.

- Model number of drive and capacity
- Software Preserve Support

Port 0~ Port 5

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

Port 0 ~ Port 5 Hot Plug

Select Enabled to enable hot-plugging support for a port specified by the user, which will allow the user to replace a SATA disk drive installed on this port without shutting down the system. The options are Enabled and **Disabled**.

Port 0 ~ Port 5 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to start a COMRESET initialization to the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 5 SATA Device Type

Use this item to specify if the SATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are Hard Disk Drive and Solid State Drive.

►sSATA Configuration

When this submenu is selected, AMI BIOS automatically detects the presence of the SATA devices that are supported by the PCH-sSATA controller and displays the following items:

sSATA Controller

This item enables or disables the onboard SATA controller supported by the Intel PCH-sSATA controller. The options are **Enabled** and Disabled.

Configure sSATA as

Select IDE to configure an sSATA drive specified by the user as an IDE drive. Select AHCI to configure an sSATA drive specified by the user as an AHCI drive. Select RAID to configure an sSATA drive specified by the user as a RAID drive. The options are IDE, **AHCI**, and RAID.

**If the item above "Configure sSATA as" is set to AHCI, the following items will display:*

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

sSATA Port 0~ Port 3

This item displays the information detected on the installed on the sSATA port. specified by the user.

- Model number of drive and capacity
- Software Preserve Support

sSATA Port 0~ Port 3

Select Enabled to enable an sSATA port specified by the user. The options are Disabled and Enabled.

sSATA Port 0 ~ Port 3 Hot Plug

Select Enabled to enable hot-plugging support for a port specified by the user, which will allow the user to replace a sSATA disk drive installed on this port without shutting down the system. The options are **Enabled** and Disabled.

sSATA Port 0 ~ Port 3 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to start a COMRESET initialization to the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 3 sSATA Device Type

Use this item to specify if the sSATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are Hard Disk Drive and Solid State Drive.

**If the item above "Configure sSATA as" is set to IDE, the following items will display:*

sSATA Port 0~ Port 3

This item indicates that an sSATA port specified by the user is installed (present) or not.

Port 0 ~ Port 3 sSATA Device Type (Available when a SATA port is detected)

Use this item to specify if the sSATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are Hard Disk Drive and Solid State Drive.

**If the item above "Configure sSATA as" is set to RAID, the following items will display:*

Support Aggressive Link Power Management

When this item is set to Enabled, the SATA AHCI controller manages the power usage of the SATA link. The controller will put the link to a low power state when the I/O is inactive for an extended period of time, and the power state will return to normal when the I/O becomes active. The options are **Enabled** and Disabled.

sSATA RAID Option ROM/UEFI Driver

Select EFI to load the EFI driver for system boot. Select Legacy to load a legacy driver for system boot. The options are Disabled, EFI, and **Legacy**.

SATA/sSATA RAID Boot Select

Use this item to specify which controller for the system to boot from. The options are SATA Controller, **sSATA Controller**, and Both.

sSATA Port 0~ Port 1

This item displays the information detected on the installed sSATA drives on the particular sSATA port.

- Model number of drive and capacity
- Software Preserve Support

sSATA Port 0~ Port 3

Select Enabled to enable an sSATA port specified by the user. The options are Disabled and Enabled.

sSATA Port 0 ~ Port 3 Hot Plug

This feature designates this port for hot plugging. Set this item to Enabled for hot-plugging support, which will allow the user to replace an sSATA drive without shutting down the system. The options are Enabled and **Disabled**.

sSATA Port 0 ~ Port 3 Spin Up Device

On an edge detect from 0 to 1, set this item to allow the PCH to start a COMRESET initialization to the device. The options are Enabled and **Disabled**.

Port 0 ~ Port 3 sSATA Device Type

Use this item to specify if the sSATA port specified by the user should be connected to a Solid State drive or a Hard Disk Drive. The options are Hard Disk Drive and Solid State Drive.

► Server ME (Management Engine) Configuration

This feature displays the following system ME configuration settings.

- General ME Configuration
- Operational Firmware Version
- Recovery Firmware Version
- ME Firmware Features
- ME Firmware Status #1
- ME Firmware Status #2
 - Current State
 - Error Code

► PCIe/PCI/PnP Configuration

The following PCI information will be displayed:

- PCI Bus Driver Version

PCI PERR/SERR Support

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

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**.

SR-IOV (Available if the system supports Single-Root Virtualization)

Select Enabled for Single-Root IO Virtualization support. The options are Enabled and **Disabled**.

Maximum Payload

Select Auto for 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 for the system BIOS to automatically set the maximum size for a read request 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

Use this item to set the Active State Power Management (ASPM) level for a PCI-E device. Select Auto for the system BIOS to automatically set the ASPM level based on the system configuration. Select Disabled to disable ASPM support. The options are **Disabled**, and Auto.

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

MMIOHBase

Use this item to select the base memory size according to memory-address mapping for the IO hub. The base memory size must be between 4032G to 4078G. The options are **56T**, 48T, 24T, 512G, and 256G.

MMIO High Size

Use this item to select the high memory size according to memory-address mapping for the IO hub. The options are **256G**, 128G, 512G, and 1024G.

- CPU1 SLOT2 PCI-E 3.0 x16 OPRPM**
- CPU1 SLOT4 PCI-E 3.0 x16 OPRPM**
- CPU2 SLOT6 PCI-E 3.0 x16 OPRPM**
- CPU2 SLOT8 PCI-E 3.0 x16 OPRPM**
- PCH SLOT9 PCI-E 2.0 X4 (IN X8) OPRPM**
- CPU1 SLOT10 PCI-E 3.0 x8 (IN X16) OPRPM**
- CPU2 SLOT11 PCI-E 3.0 x8 OPRPM**

Select Enabled to enable Option ROM support to boot the computer using a device installed on the slot specified by the user. The options are Disabled, **Legacy** and EFI.

Onboard LAN Option ROM Type

Select Enabled to enable Option ROM support to boot the computer using a network device specified by the user. The options are Disabled, **Legacy** and EFI.

- Onboard LAN1 Option ROM**
- Onboard LAN2 Option ROM**
- Onboard Video Option ROM**

Use this option to select the type of device installed in LAN Port1, LAN Port2, LAN Port3, LAN Port4, or the onboard video device used for system boot. The default setting for LAN1 Option ROM is **PXE**, **Disabled** for LAN2 Option ROM, and **Legacy** for Onboard Video Option ROM.

VGA Priority

Use this item to select the graphics device to be used as the primary video display for system boot. The options are **Onboard** and **Offboard**.

Network Stack

Select **Enabled** to enable PXE (Preboot Execution Environment) or UEFI (Unified Extensible Firmware Interface) for network stack support. The options are **Enabled** and **Disabled**.

► Super IO Configuration

Super IO Chip AST2400

► Serial Port 1 Configuration/Serial Port 2 Configuration

Serial Port 1/Serial Port 2

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

Device Settings

This item displays the base I/O port address and the Interrupt Request address of a serial port specified by the user.

Change Port 1 Settings/Change Port 2 Settings

This feature specifies the base I/O port address and the Interrupt Request address of Serial Port 1 or Serial Port 2. Select **Auto** for the BIOS to automatically assign the base I/O and IRQ address to a serial port specified.

The options for Serial Port 1 are **Auto**, (IO=3F8h; IRQ=4), (IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), (IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12); (IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), and (IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12).

The options for Serial Port 2 are **Auto**, (IO=3F8h; IRQ=4), (IO=3F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), (IO=2F8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12); (IO=3E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12), and (IO=2E8h; IRQ=3, 4, 5, 6, 7, 9, 10, 11, 12).

Serial Port 2 Attribute

Select **SOL** to use COM Port 2 as a Serial_Over_LAN (SOL) port for console redirection. The options are **COM** and **SOL**.

►Serial Port Console Redirection

COM 1

COM 1 Console Redirection

Select Enabled to enable COM Port 1 Console Redirection, which will allow a client machine to be connected to a host machine at a remote site for networking. The options are **Disabled** and Enabled.

**If the item above set to Enabled, the following items will become available for configuration:*

►COM1 Console Redirection Settings

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 item 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

Use this item 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 item 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, SCO, ESCN, and VT400.

Redirection After BIOS POST

Use this feature to enable or disable legacy Console Redirection after BIOS POST. When the option-Bootloader is selected, legacy Console Redirection is disabled before booting the OS. When the option- Always Enable is selected, legacy Console Redirection remains enabled upon OS bootup. The options are **Always Enable** and Bootloader.

SOL/COM2

Console Redirection

Select Enabled to use the SOL port for Console Redirection. The options are **Enabled** and Disabled.

**If the item above set to Enabled, the following items will become available for user's configuration:*

► SOL/COM2 Console Redirection Settings

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

Terminal Type

Use this feature 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

Use this feature 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 data-sending 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, SCO, ESCN, and VT400.

Redirection After BIOS POST

Use this feature to enable or disable legacy Console Redirection after BIOS POST (Power-On Self-Test). When this feature is set to Bootloader, legacy Console Redirection is disabled before booting the OS. When this feature is set to Always Enable, legacy Console Redirection remains enabled upon OS boot. The options are **Always Enable** and Bootloader.

► EMS Console Redirection Settings

Out-of-Band Management Port

The feature selects a serial port in a client server to be used by the Windows Emergency Management Services (EMS) to communicate with a remote host server. The options are **COM1 (Console Redirection)** and COM2/SOL (Console Redirection).

Terminal Type

Use this feature 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 both 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

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

The setting for each these features is displayed:

Data Bits, Parity, Stop Bits

►ACPI Settings

WHEA Support

Select Enabled to support the Windows Hardware Error Architecture (WHEA) platform and provide a common infrastructure for the system to handle hardware errors within the Windows OS environment to reduce system crashes and to enhance system recovery and health monitoring. The options are Enabled and **Disabled**.

High Precision 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 and 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.

NUMA (Available when the OS supports this feature)

Select Enabled to enable Non-Uniform Memory Access support to enhance system performance. The options are **Enabled** and Disabled.

PCI AER (Advanced Error-Reporting) Support

Select Enabled to support Advanced Error-Reporting for onboard PCI devices. The options are **Disabled** and Enabled.

► Intel® Thunderbolt

The following Thunderbolt information will be displayed:

- Intel® Thunderbolt Configuration
- Thunderbolt Specification Version
- Intel® Sample Code Version
- Thunderbolt Host Chip

Intel® Thunderbolt Technology

Use this feature to enable or disable the wake-up feature on a Thunderbolt device. The options are Disabled and **Enabled**.

Security Level

Use this item to specify the security level for the Intel Thunderbolt port(s). The options are **Legacy Mode**, Unique ID, One time saved key, and DP++ only.

Wake Up From Thunderbolt Devices

This feature allows a Thunderbolt device to wake up the system. The options are **Enabled** and Disabled.

AIC Support

This item allows you to apply the Go2Sx command before a Thunderbolt device goes to sleep mode. The options are **Enabled** and Disabled.

AIC Location

Use this item to specify the Thunderbolt AIC location. The options are SB PCIE D28F0, SB PCIE D28F1, SB PCIE D28F2, SB PCIE D28F3, **SB PCIE D28F4**, SB PCIE D28F5, SB PCIE D28F6, SB PCIE D28F7.

Thunderbolt PCIe Cache-line Size

Use this item to configure the cache-line size value on the Thunderbolt PCIe subtree. The options are 0, 1, 2, 4, 8, 16, **32**, 64, 128.

SMI/Notify Support

Select Enabled to enable the SMI notification support. The options are **Enabled** and Disabled..

SwSMI Support

Select Enabled to enable software SMI support in ASL code. The options are **Enabled** and Disabled.

Notify Support

Select Enabled to enable notification support in ASL code. The options are **Enabled** and Disabled.

Ignore Thunderbolt Optoin ROM

Use this feature to enable or disable ignore Thunderbolt Device Option Rom. Enabling this feature will skip TBT Option Rom at POST time. Disabling this feature will execute TBT Option Rom at POST time. The options are **Enabled** and Disabled.

Thunderbolt SwSMI Delay

Use this feature to configure the Thunderbolt Software SMI Delay. Enter a numeric value in milliseconds. Default is **0**.

TBT Device IO resource Support

This feature enables or disables the Thunderbolt IO resource. The options are **Disabled** and Enabled.

Reserved Mem per phy slot

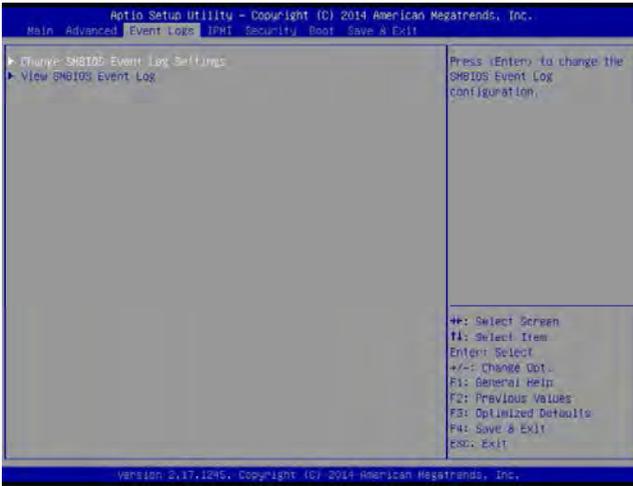
Use this feature to configure the Thunderbolt reserved memory for each physical slot. If a PCIe device consumes <X MB of memory, the BIOS will reserve X MB per physical slot.

Reserved PMem per phy slot

Use this feature to configure the Thunderbolt reserved prefetchable memory for each physical slot. If a PCIe device consumes <X MB of prefetchable memory, the BIOS will reserve X MB per physical slot.

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. If this item is set to Enable, the following item will be available for configuration:

Memory Corrected Error Enabling (Available when the item above-Runtime Error Logging Support is set to Enable)

Select Enabled for the BIOS to correct a memory error if it is correctable. The options are **Enabled** and Disabled.

Memory Correctable Error Threshold

Use this item to enter the threshold value for correctable memory errors. The default setting is **10**.

PCI-Ex (PCI-Express) Error Enable

Select Yes for the BIOS to correct errors occurred in the PCI-E slots. The options are Yes and **No**.

Erasing Settings

Erase Event Log

Select Enabled to erase all error events in the SMBIOS (System Management BIOS) log before an event logging is initialized at bootup. The options are **No** and Yes.

When Log is Full

Select Erase Immediately to immediately erase all errors in the SMBIOS event log when the 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 is used to determine 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**.

Note: Please reboot the system for the changes to take effect.

►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. The following categories are displayed:

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 to enable all system event logging support 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 determine 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.

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

►BMC Network Configuration

The following items will be displayed:

- IPMI LAN Selection
- IPMI Network Link Status

Update IPMI LAN Configuration

Select Yes for the system BIOS to automatically reset the following IPMI settings at next system boot. The options are Yes and **No**.

Configuration Address Source (Available when the item above - Update IPMI LAN Configuration is set to Yes)

Use this item to select the IP address source 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, AMI BIOS will search for a DHCP (Dynamic Host Configuration Protocol) server attached to the network and request the next available IP address for this computer. The options are **DHCP** Unspecified, and Static.

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 is separated by dots and it 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.

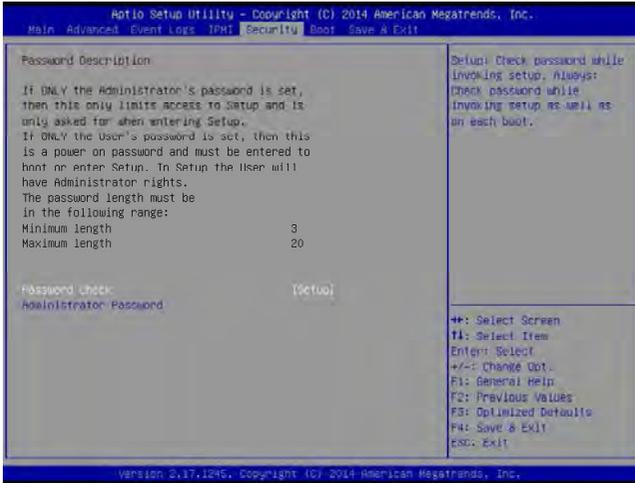
Gateway IP Address

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).

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, click **Yes** to quit BIOS without saving the changes, or click **No** to quit the BIOS and save changes.

7-6 Security Settings

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



Password Check

Select Setup for the system to prompt for a password at Setup. Select Always for the system to prompt for a password at bootup and upon entering the BIOS Setup utility. The options are **Setup** and **Always**.

Administrator Password

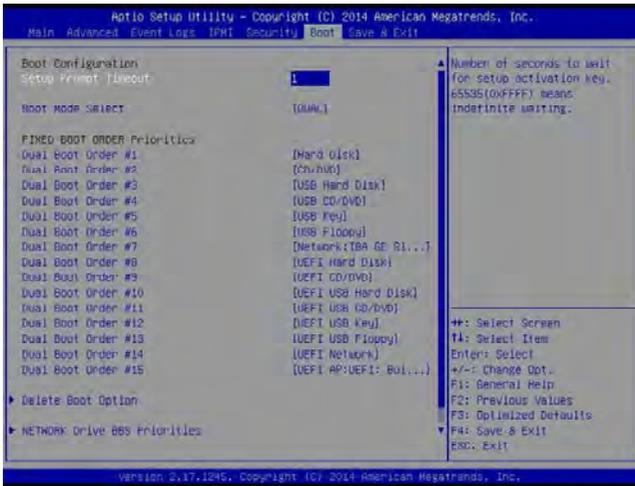
Use this feature to set the administrator password which is required before entering the BIOS setup utility. The length of the password should be from 3 characters to 20 characters long.

User Password

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

7-7 Boot Settings

Use this feature to configure Boot Settings:



Boot Configuration

Setup Prompt Timeout

Use this item to indicate how many seconds the system shall wait for the BIOS setup activation key to respond before the system starts to boot. The default setting is 1.

Boot Mode Select

Use this item to select the type of device to be used for system boot. The options are Legacy, UEFI, and Dual.

Fixed Boot Order Priorities

This option prioritizes the order of bootable devices from which the system will boot. Press <Enter> on each entry from top to bottom to select devices.

- Dual Boot Order #1
- Dual Boot Order #2
- Dual Boot Order #3
- Dual Boot Order #4
- Dual Boot Order #5
- Dual Boot Order #6

- Dual Boot Order #7
- Dual Boot Order #8
- Dual Boot Order #9
- Dual Boot Order #10
- Dual Boot Order #11
- Dual Boot Order #12
- Dual Boot Order #13
- Dual Boot Order #14
- Dual Boot Order #15

Boot Option File Path

Create

After the driver option name and the file path are set, press <Enter> to enter to submenu and click OK to create the new boot option drive.

▶ Delete Boot Option

Use this item to select a boot device to delete from the boot priority list.

Delete Boot Option

Select the target boot device to delete.

▶ Hard Disk Drive BBS Priorities

- Legacy Boot Order #1 - Legacy Boot Order #10

▶ Network Drive BBS Priorities

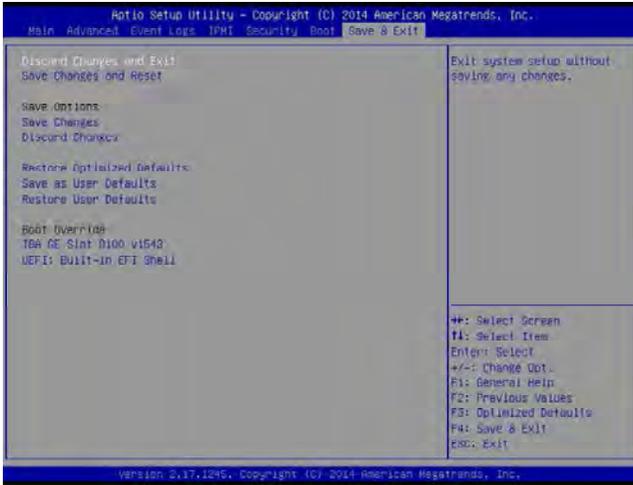
- Legacy Boot Order #1 - Legacy Boot Order #3

▶ UEFI Application Boot Priorities

- UEFI Boot Order #1

7-8 Save & Exit

Select the Save & Exit tab from the BIOS setup screen to configure the settings below.



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 from the Exit menu and press <Enter>.

Save Changes and Reset

When you have completed the system configuration changes, select this option to leave the BIOS setup utility and reboot the computer for the new system configuration parameters can take effect. Select Save Changes and Exit from the Exit menu and press <Enter>.

Save Options

Save Changes

When you have completed the system configuration changes, select this option to save all changes made. This will not reset (reboot) the system.

Discard Changes

Select this option and press <Enter> to discard all the changes and return to the AMI BIOS Utility Program.

Restore Defaults

To set this feature, select Restore Defaults from the Exit menu and press <Enter>. These are manufacture default settings designed for maximum system performance but not for maximum stability.

Save As User Defaults

To set this feature, select Save as User Defaults from the Exit menu and press <Enter>. This enables the user to save any changes to the BIOS setup for future use.

Restore User Defaults

To set this feature, select Restore User Defaults from the Exit menu and press <Enter>. Use this feature to retrieve user-defined settings that were saved previously.

Boot Override

This feature allows the user to override the Boot priorities sequence in the Boot menu, and immediately boot the system with another device specified by the user. This is a one-time override.

Notes

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 the 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.

X10 Serverboard 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 includes USB or PS/2 keyboard, PCI or Serial Console Redirection, IPMI KVM or SOL. Con-Out includes Video Controller, PCI or Serial Console Redirection, IPMI SOL.
1 beep per device	Refresh	1 beep or each USB device detected
X10 IPMI Error Codes		
1 Continuous Beep	System OH	System Overheat

Notes

Appendix B

System Specifications

Processors

Two Intel Xeon E5-2600 v3 Series processors in Dual Socket R3 (LGA 2011) sockets; supports dual full-width Intel QuickPath Interconnect links (up to 9.6 GT/s one direction per QPI)

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

Chipset

Intel C612 Express chipset

BIOS

128Mb SPI AMI BIOS SM Flash UEFI

Memory Capacity

Sixteen DIMM slots that can support up to 1024 GB of 288-pin Registered (RDIMM) DDR4 ECC 1333/1600/1866/2133 MHz; size up to 64 GB at 1.2 V

Note: See the memory section in Chapter 5 for details.

SATA Controller

Integrated into the chipset to provide a ten-port SATA 3.0 subsystem that supports RAID 0, 1, 5 and 10

Drive Bays

Eight hot-swap drive bays to house standard 3.5" drives

Three 5.25" peripheral drive trays

Expansion Slots

- Four PCI-E 3.0 x16 (double-width)
- Two PCI-E 3.0 x8 (1 in x16 slot) support Thunderbolt 2.0 AOC
- One PCI-E 2.0 x4 (in x8)

Serverboard

Supermicro X10DRG-Q

Dimensions: 13.20" (L) x 15.12" (W) (335.28 mm x 384.04 mm)

Chassis

SC747BTQ-R2K02B (4U/Tower rackmount)

Dimensions: 18.2 x 7 x 26.5 in. (462 x 178 x 673 mm)

Weight

Bare Bones: 46 lbs (20.9 kg)

System Cooling

Four 92x38mm 4-pin PWM middle fans

Two 80x38mm 4-pin PWM rear exhaust fans

Heatsinks: two active heatsinks with optimal fan speed control

System Input Requirements

AC Input

1100W Output @ 100-120V, 12.7-10.5A, 50-60Hz

1400W Output @ 120-140V, 13.5-11.5A, 50-60Hz

1800W Output @ 200-220V, 10.0-9.5A, 50-60Hz

1980W Output @ 220-230V, 10.0-9.8A, 50-60Hz

2000W Output @ 230-240V, 10.0-9.8A, 50-60Hz

Power Supply

2000W Redundant Power Supplies with I2C & PMBus, 80 Plus Platinum Certified

5Vstandby 4A

Operating Environment

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

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

Operating Relative Humidity: 8% to 90% (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"

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