Site Planning Guide for the SGI® Altix™ 3300 Server and the SGI® Altix™ 3700 Supercluster

007-4637-001

CONTRIBUTORS

Written by Allison Gosbin

Illustrated by Brian Stickney

Edited by Tom Dye

Production by Glen Traefald

Engineering contributions by Gary Spilde and Brian Stickney

Record of Revision

Version	Description
001	March 2003 Original publishing.

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About This Guide

What This Guide Contains

The *Site Planning Guide for the SGI Altix 3300 Server and SGI Altix 3700 Supercluster* contains the following chapters:

Chapter 1, “Overview”
: Describes the information that helps management and site preparation personnel prepare for an SGI Altix 3000 family system installation. It includes general site planning concepts as well as specific site specifications and requirements that you may use as a guide during the site planning and preparation process.

Chapter 2, “Site Preparation Concepts”
: Describes the site planning process and provides a detailed discussion of the issues involved in any site preparation. For specific Altix 3000 family site planning information, refer to the subsequent sections of this guide.

Chapter 3, “SGI Altix 3000 Family Features, Configurations, and Components”
: Describes the features, configuration options, and brick types for the Altix 3000 family.

Chapter 4, “System Physical Specifications”
: Describes the specifications and dimensions for the Altix 3000 family.

Chapter 5, “Site Requirements”
: Describes the information and guidelines that are necessary to plan your access route and to meet the environmental and power requirements for your system.

Chapter 6, “Securing the Cabinets”
: Describes the four M12 threaded weld nut locations that are used to secure each Altix 3000 family system to the computer room subfloor.

Chapter 7, “Site Planning Checklist”
: Describes the site planning checklist that you can use as an organizational tool during the site planning and preparation process.

Chapter 8, “Summary”
: Describes the methods that are available for contacting your SGI site planning representative.

Appendix A, “U.S. Customary Measure and Metric Measure Conversion”
: Describes the conversions between U.S. customary and metric measures, Fahrenheit-to-Celsius temperature, and Celsius-to-Fahrenheit temperature.

Appendix B, “Regulatory Specifications”
: Describes several national and international specifications to which the SGI Altix 3000 family servers and superclusters conform.

Audience for This Guide

This guide is intended for people who are responsible for physical site planning and preparation.

By planning for your SGI Altix 3300 server or SGI Altix 3700 supercluster installation, you will have the opportunity to make adjustments to your site and order any additional facility equipment, thereby reducing the time required to install your system.

Obtaining Publications

To obtain SGI documentation, go to the SGI Technical Publications Library at http://docs.sgi.com.

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, please tell us. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located on the front cover.)

You can contact us in any of the following ways:

- Send e-mail to the following address:

  site@sgi.com

- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.
- Send mail to the following address:

  SGI Site Planning
  890 Industrial Blvd.
  P.O. Box 4000
  Chippewa Falls, WI 54729-0078
  USA

- Send a fax to the attention of “Site Planning” at +1 715 726 2969.

We value your comments and will respond to them promptly.

Chapter 1

Overview

This document provides information that helps management and site preparation personnel prepare for an SGI Altix 3000 family server or supercluster installation. It includes general site planning concepts as well as specific site requirements that you may use as a guide during the site planning and preparation process.

SGI site planning representatives are available in the United States of America for site planning consultation; contact a site planning representative by telephone in the USA at +1 888 744 8638, extension 676-2820; at +1 715 726 2820; by fax at +1 715 726 2969; or by e-mail at *site@sgi.com*.

Contact your account manager to discuss your site planning, preparation, and installation plans and to obtain configuration information for any system.

Use the following steps as a planning guide for your system installation:

1. Identify the space, power, and environmental requirements for the system.
2. Select a location for the system and identify any necessary modifications.
3. Prepare the site according to the guidelines in this publication. You may use the site planning checklist in Chapter 7 of this document as a guide.

Chapter 2

Site Preparation Concepts

This chapter of the *Site Planning Guide for the SGI Altix 3300 Server and SGI Altix 3700 Supercluster* provides a general overview of the site planning process and information about the issues that are involved in any site preparation. For the system-specific site planning information, refer to the subsequent chapters of this document.

Not all of the items listed here apply to every installation; however, it is a good idea to briefly consider each question for any system installation.

Physical Location

This section addresses the issues that you need to consider when you select a physical location for a new system.

Selecting a Delivery Route

To ensure that the system can be delivered to the planned location, answer the following questions before you plan a delivery route for the new system:

- Will the shipping crate fit through doorways and hallways and on elevators?

  In addition to measuring the width of the hallways along the planned delivery route, measure corners where the system might get stuck, the width and height of doorways and elevators, and other areas that may cause problems. Table 4-1 and Table 4-2 list the relevant system dimensions.

- If the shipping crate cannot be transported to the final destination, can you unpack the system somewhere else?

  Often it is possible to unpack the system in a hallway or on a loading dock, and then roll the system to its final destination.

- Is the floor strong enough to support the weight of the system?

  A rack that is loaded with bricks can be very heavy. Determine the weight of each rack and verify that the floor along the delivery route can handle the weight. Refer to Table 4-1 and Table 4-2 for the maximum weight per system rack.

- Is the elevator capable of lifting the system?

  If the intended delivery route includes an elevator, check its weight capacity and size against the system specifications listed in Table 4-1 and Table 4-2. The use of freight blankets can reduce damage to the elevator or the system.

- Are there any steep angles, bumps, changes in level, or thick carpeting along the delivery route?

  Large systems are typically equipped with casters. However, the casters are designed to roll easily only on relatively smooth, level surfaces. Ramps, sliding door channels, rough flooring, and even thick carpeting may present difficulty. If in doubt, arrange for additional assistance. The maximum access incline should not exceed 10 degrees (height:length = 1:6).

- Did you ensure that the leveling pads are fully retracted?

  Altix 3700 superclusters have screw-in leveling pads. If you move the system with these feet extended, severe damage to the chassis can occur. These feet sometimes unscrew during shipment. Before you unpack or move a system, ensure that the leveling pads are fully retracted. Refer to Figure 5-6 for leveling pad locations.

Selecting a Final Location

Consider the following issues when you select a final location for the system:

- Will the system fit in its intended location?

  Carefully calculate the total system dimensions to ensure that it will fit in its intended final location.

- Does the intended system location provide adequate access space for maintenance?

  Even if the system will fit in its intended final location, you must have room to maintain it. Ensure that you will have enough room to open the doors, remove boards, and accomplish other routine tasks. Table 4-1 and Table 4-2 list the relevant system dimensions and access requirements.

- Is the intended location subject to flooding, extremes of humidity or temperature, or any other factor that would make it inappropriate for sensitive electronic equipment?

  The air temperature should not be too high and should not fluctuate dramatically, air should circulate freely and be relatively dust-free, and the system should not be exposed to any caustic or corrosive chemicals or vapors. Refer to Table 5-1 for system-specific requirements.

- Will the system interfere with normal traffic through aisles, hallways, or entrance ways in the intended location?

- Will the intended location enable you to conveniently perform routine operations, such as loading and unloading tapes or other media, attaching cables, and so on?

- Is the floor of the intended final location strong enough to support the weight of the system and any future expansions?

  Large systems should be installed in computer rooms with raised floors. Pay particular attention to floor loading and weight distribution in this case.

  Floor-loading specifications are typically calculated by averaging the total chassis weight that is distributed over the entire footprint of the chassis. Because the chassis sits on four casters or four leveling pads, the load at each of these four points is greater.

- Have you considered the site preparation cost and ease of installation at this location?
- Does the intended location of the system allow for future expansion plans?

Electrical Requirements

SGI Altix 3000 family systems require electrical resources beyond those that are normally provided in a typical office environment. The following sections describe those requirements in general. These sections, along with the data presented in subsequent sections, can help you determine the exact requirements for the new system. Table 2-1 lists the electrical service requirements.

Table 2-1 Electrical Service Requirements

Electrical Service	Requirement
Phase imbalance	5% maximum (line-to-line, line-to-neutral)
Voltage harmonics	5% maximum total, 3% largest
Voltage deviation from sine wave	+5% to -10%
Voltage modulation	3% maximum
Transient voltage surges	+10%
Transient voltage sags	-10%
Frequency tolerance	5%
Frequency rate of change	Less than 1.0 Hz during any 10-cycle period

Voltage Requirements

SGI Altix 3300 servers ship with single-phase input power. SGI Altix 3700 superclusters ship with the option of either single-phase or three-phase input power. Refer to the section titled “System Power Requirements” in Chapter 5 for the voltage requirements of both chassis. You must ensure that your account manager knows of your needs before the system is ordered.

Ensure that the required voltage is available and is within a reasonable distance of the intended location. If it is not, the site must be wired for the required voltage.

Power Requirements

Even one rack can require more power than is routinely available in an office environment. A room full of racks will almost certainly require some specially installed electrical circuits. Refer to the section titled “System Power Requirements” in Chapter 5 for the power requirements of the rack in question.

Note: The wattages listed in this guide are the system maximums. While most systems never draw the maximum rated wattage, SGI recommends that you install wiring that is capable of supporting the system’s maximum potential wattage.

Power is measured in voltamperes (VA) and watts. Both measurements are important when you prepare to install wiring, power conditioning, and cooling.

A VA rating is a function of the voltage and amperage of a system. A watt rating is the VA rating multiplied by its power factor (refer to the section titled “Power Factor”). You can convert among amps, volts, VA, power factor, and watts by using the following formulas:

Single Phase	**Three Phase**
$VA = (Amps \cdot Volts)$	$VA = (Amps \cdot Volts \cdot 1.73)$
$VA = \left(\frac{Watts}{Power\ Factor}\right)$	$VA = \left(\frac{Watts}{Power\ Factor}\right)$
$Watts = (VA \cdot Power\ Factor)$	$Watts = (VA \cdot Power\ Factor)$
$Amps = \left(\frac{Watts}{Volts \cdot Power\ Factor}\right)$	$Amps = \left(\frac{Watts}{Volts \cdot Power\ Factor \cdot 1.73}\right)$

Use this information and the information provided in Table 5-2 and Table 5-3 to determine the site power requirements. If, after you add up the power requirements of all the devices in the room, you find that the total is close to the limit that the existing wiring can support, you should install additional power circuits to support the systems.

Grounding Requirements

- Ensure that the ground has sufficiently low impedance in order to limit the voltage to ground and to facilitate the operation of protective devices in the electrical circuit.
- Ensure that all grounds entering the room are interconnected somewhere within the building to provide a common ground potential. This includes any separate power sources, lighting, convenience outlets, and other grounded objects such as building steel, plumbing, and ductwork. Refer to the *IEEE Emerald Book: IEEE Recommended Practices for Powering and Grounding Electronic Equipment* and the *National Electric Code (NEC)* for power, grounding, and life safety issues.

Warning: Any difference in ground potential greater than 250 millivolts between two racks that are connected with NUMAlink or Xtown cables can cause severe equipment damage.

- To maintain your entire Altix 3000 family system at the same electrical potential, all multiple-rack systems must be bolted together.

Power Factor

Power factor is a number between 0 and 1 that represents the ratio of the total power in watts to the total volt-amperage input. A system with a power factor of one (sometimes called “unity”) is making full use of the energy that it draws. A system with a power factor of 0.75 is effectively using only three-quarters of the energy that it draws.

SGI Altix 3000 family systems are power-factor corrected and thus have a power factor very close to 1. Some peripherals do not have this correction built in.

Caution: Ensure that you consider the power factor of the system when you select an uninterruptible power supply (UPS).

Inrush Current

Inrush current is the peak current that flows into a power supply as AC power is applied. The inrush current is usually much higher than the nominal current. This temporary increase is due to the charging of the input filter capacitors in the power supply and is limited only by the input impedance of the power supply and the wiring that supplies power to the system.

The inrush current often far exceeds the rating of the electrical outlet to which the system is connected. If the system is connected directly to “wall power” (that is, it is not on a UPS or a standby power system [SPS]), this is typically not a problem. The peak inrush current lasts for only a part of one AC cycle (less than 1/60 of a second). This is not long enough to damage wiring and, in most cases, will not trip a circuit breaker (depending on the delay curves of the circuit breaker).

It is very important that you consider the inrush current of the system when you select a UPS or SPS. Unlike power-company lines, these power-conditioning devices may not be able to supply the current that is required during power-on, even if they are sized appropriately for nominal current loads. For more information, refer to the following "Power-line Treatment" section.

It is possible for the inrush current drawn by a device to cause a slight drop in the line voltage. Although it is very brief, this drop can, in unusual situations, be enough to cause problems in other devices on the same line.

Inrush current is a characteristic of the power supplies in a system. The inrush current values apply whether the system is heavily or lightly loaded. Therefore, although a lightly loaded system may draw less power while it is running, it may still draw a very large inrush current.

SGI Altix 3000 family systems typically have low inrush characteristics.

Power-line Treatment

Power-line treatment may be required if the site has unstable power that results in problems such as fluctuating voltage, transients, surges and spikes, and noise. Common causes of unreliable power are old wiring; load-switching equipment, such as welding and plating devices; and variable-speed motors or motors that start and stop frequently.

A variety of devices are available to improve the quality of a power line, including:

- Line conditioners
- Line regulators
- Isolation transformers
- UPSs

Total Harmonic Distortion

Table 5-2 and Table 5-3 list the total harmonic distortion (THD) for the SGI Altix 3000 family. Total harmonic distortion is a measure of the extent to which a waveform is distorted by harmonic content. This rating indicates how much the power supply in the system affects the quality of power delivered to other systems that are supplied by the same transformer.

Note: While the term *total harmonic distortion* can be applied to either voltage or current, all of the numbers listed in this guide apply to current.

Thermal Requirements

It is important that the Altix 3000 family systems be maintained within their rated thermal range.

Refer to the section titled “System Power Requirements” in Chapter 5 for the temperature ranges for each rack, both operating and nonoperating as well as the recommended operating ambient temperature. Typically, the upper limit of the temperature range is more likely to become a problem than the lower limit.

Heat Output

Both of the systems that this guide describes have a maximum rated operating temperature. Exceeding this temperature greatly increases the rate of hardware failure and, in many cases, causes the system to shut itself down.

All of the power consumed by a computer system must exist as some form of energy. For air-cooled systems, this energy exists in the form of heat in the surrounding air. Every watt drawn by a system is eventually dissipated as heat. This heat tends to raise the temperature of the air in the room that houses the system. Therefore, some method is needed to keep the temperature within the required range. The typical method is to install additional process cooling capacity.

The maximum heat dissipation-to-air per rack is listed in Table 4-1 and Table 4-2.

Air-conditioning Terminology

Air-conditioning capacity is generally measured in Btu/hr, tons, or kilocalories (kcal).

A Btu, or British thermal unit, is the amount of energy needed to raise the temperature of one pound of water by one degree Fahrenheit at a constant pressure of one atmosphere.

One ton of air conditioning removes 12,000 Btu of heat energy per hour.

The more systems that are installed in a given area, the larger the air-conditioning capacity that is required. It is important to calculate the total thermal load of the systems that you will be installing and determine whether the existing air-conditioning system can handle the additional load. If not, you must provide additional cooling capacity.

Calculating Thermal Load

You can calculate the thermal load as follows:

1. Add the wattages of all the items in the room.
2. Calculate Btu/hour by multiplying the total wattage by 3.41.
3. Calculate the kcal/hour by multiplying the total wattage by 3.23.
4. Calculate the tons of air-conditioning load by dividing Btu/hr by 12,000.
   1 kBtu/hr = 1000 Btu/hr
   12,000 Btu/hr = 1 ton of air-conditioning load

The calculations above yield results that represent the maximum thermal output of the equipment. These calculations and the heat-dissipation numbers that Table 4-1 lists are based on maximum rated wattage.

The thermal figures quoted in this guide are likely to be worst-case figures.

Some sources quote a “typical” thermal output for a system, which may be significantly less than the numbers listed in this guide. Selecting an air-conditioning capacity that accommodates the “worst-case” thermal output, however, helps to minimize system problems later.

When you calculate the air-conditioning capacity that is required, be sure to include the heat load from computer equipment that is already installed at the site, noncomputer equipment that is already installed at the site, and the computer equipment that is being added. Also remember to include noncomputer equipment that is already installed or will be installed, and other factors such as solar gain, outside ambient air temperatures, and the number of people who work in the room.

Thermal Gradient

Table 5-1 includes a maximum thermal gradient for each system. The thermal gradient is the rate at which the temperature changes, which is typically expressed in degrees per hour. Temperature changes that are more rapid than the given rate can damage some of the components in the system.

Unless otherwise indicated, the thermal gradients listed apply whether or not the system is operating.

Cooling in Mission-critical Installations

In mission-critical installations, it is important to consider what would happen if an air conditioner failed. Complete consideration of this topic is beyond the scope of this guide; however, consider the following questions:

- Should the site have multiple air-conditioning units, each capable of maintaining a safe temperature?
- If an air conditioner fails, how long can the systems run before they get too warm and must be shut off?
- Can the air conditioner be repaired before the systems get too warm?

Environmental Requirements

Electromagnetic interference (EMI), electrostatic discharge (ESD), vibration, and humidity can cause problems for computer systems.

Electromagnetic Interference

Electromagnetic interference (EMI) is caused by malfunctioning, incorrectly manufactured, or incorrectly installed devices that radiate electrical signals. Common sources of EMI include electronic, telephone, and communications equipment. EMI transmissions can be conducted or emitted.

Use properly shielded connectors and cables throughout the site.

Caution: Failure to use shielded cables where appropriate may violate FCC regulations and void the manufacturer's warranty.

Electrostatic Discharge

SGI designs and tests its products to ensure that they resist the effects of electrostatic discharge (ESD). However, it is still possible for ESD to cause problems that range from data errors and lockups to permanent component damage. To protect the systems from ESD, follow these precautions:

- Minimize the use of carpeting at computer locations (or consider special static-reducing carpet).
- Ensure that all electronic devices are properly grounded.
- Keep chassis doors and access panels closed while the system is operating.
- Fasten all screws, thumbnail-fasteners, and slide locks securely.
- Use a grounded static wrist strap whenever you work with the chassis or components.
- Use antistatic packing material for storage and transportation.
- Clear the site of all devices that create static electricity or provide possible sources of EMI.

Vibration

SGI Altix 3000 family systems are designed for typical computer room environments; they require no special modifications or protection. If you plan to install a system at an industrial site, ensure that vibration does not exceed the limits that Table 4-1 and Table 4-2 lists.

Humidity

Table 5-1 lists the maximum humidity levels for each rack, both operating and nonoperating. Exposure to humidity levels above the rated maximums and/or exposure to condensation can damage equipment.

Humidity Gradient

Table 5-1 lists the maximum humidity gradient for a system. The humidity gradient is the rate at which the humidity changes, which is typically expressed in percent relative humidity per hour. Humidity changes that are more rapid than the given rate can damage some of the components in the system.

Unless otherwise indicated, the humidity gradients that are listed apply whether or not the system is operating.

Ergonomic Requirements

When you select a physical location, pay attention to ergonomic considerations. The location of a system often restricts the location of the devices that attach to it, such as monitors, keyboards, and so on. Decisions that are made during the installation process can affect workers much later.

In addition to attached devices, consider other issues such as noise, temperature, air quality, and so on, some of which may be affected by the addition of the new system.

Acoustics

Acoustic values depend on many factors that are outside the control of the manufacturer. Room characteristics such as carpeting and wall coverings affect the noise levels at an installation. The acoustic measurement provided in this document is in dBa (decibels absolute) rather than dB (decibels). This is a measurement of weighted absolute noise power, and it includes frequency corrections.

If a site exceeds desirable noise levels, try these remedies:

- Reduce the quantity of flat reflective surfaces, such as glass, tile, or metal.
- Add sound-absorbing wall coverings, drapes, and ceiling tiles.
- Add sound baffles in critical locations (without blocking airflow).
- Modify the office space to separate the operators from the hardware.

Local Regulations

Before you install a system, become familiar with any applicable local regulations. Because these vary dramatically by country and state, it is impossible to provide a complete list of such regulations. These regulations, however, might involve:

- Power
- Emissions
- Safety issues
- Ergonomic and health issues
- Telecommunications

Planning for the Future

Even if the existing infrastructure can handle the immediate site needs, consider the future plans. It is much easier to provide enough space, power, air-conditioning capacity, and other resources in advance than it is to add them later.

Chapter 3

SGI Altix 3000 Family Features, Configurations, and Components

The SGI Altix 3000 family, which comprises the SGI Altix 3300 server and the SGI Altix 3700 supercluster, combines SGI supercomputing architecture with Intel Itanium 2 processors and the Linux operating system.

The Altix 3000 family systems are multiprocessor distributed shared memory (DSM) systems that scale to 64 processors in a single-system image. Superclusters of up to 512 processors can be created via multiple system images. (Refer to Figure 5-12.)

The Altix 3300 server and the Altix 3700 supercluster:

- Support Intel Itanium 2 processors
- Require the Linux operating system
- Use fan-assisted ambient air cooling
- Consist of compute nodes that are linked by an interconnect network
- Contain CPU/memory, I/O, and peripheral components that are packaged into standard 19-inch rackmounted subassemblies called *bricks*.
- Expand by increasing either the number of bricks or the memory size
- Employ a PCI-X based I/O system

SGI Altix 3000 Family System Configurations

SGI configures the Altix 3000 family servers and superclusters to contain both standard and optional equipment. The configuration of each computer system depends on customer requirements.

The entry-level Altix 3300 servers are housed in standard 17U racks and are available as routerless 4-, 8-, or 12-processor systems. Each Altix 3300 rack system must contain at least one C-brick, one IX-brick, and one power bay. It can contain up to two additional C-bricks, but is limited to the one IX-brick. Additional racks that contain D-brick2s and TP900 storage modules can be added to the Altix 3300 server.

Note: 1U equals 1.75 inches (44.5 mm).

The Altix 3700 superclusters are housed in custom 40U racks. Each 40U rack can contain a maximum of two I/O bricks, eight C-bricks, four R-bricks, and two power bays. Additional racks that contain C-bricks, R-bricks, I/O bricks, D-brick2s, and TP900 storage modules can be added to the Altix 3700 supercluster.

Customers may have bricks installed in an existing standard 19-in. rack if the system contains 12 CPUs or fewer and the rack meets size, cabling, and airflow requirements. Systems with larger configurations (more than 12 CPUs) require a 40U custom rack that has three 3U vertical slots on the side for power bays; this rack includes special cable management and power distribution infrastructure.

SGI Altix 3000 Bricks

The Altix 3000 family rack system can house the following standard 19-in. rackmounted subassemblies: C-brick, PX-brick, IX-brick, R-brick, D-brick2, TP900 storage module and power bay. These bricks may be mixed and matched within a standard 19-in. system rack to provide the desired system configuration. NUMAlink cables connect the bricks.

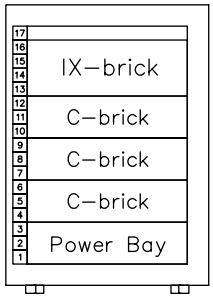
Table 3-1 lists the Altix 3000 family brick types, functions, and vertical rack heights.

Figure 3-1 shows the various Altix 3000 family brick types installed in the rack.

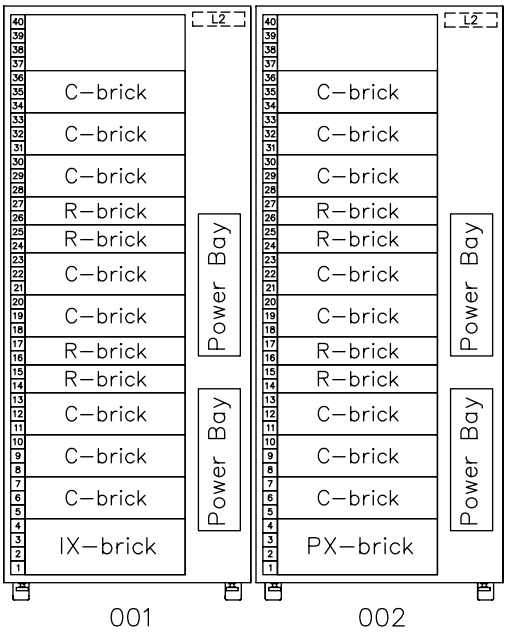
Table 3-1 SGI Altix 3000 Family Brick Types, Functions, and Heights

Brick Type	Function	Height
C-brick	Provides the compute functionality for the system	3U
PX-brick	Seats up to 12 PCI cards that communicate with peripheral devices	4U
IX-brick	Provides the I/O functions and seats the PCI cards	4U
R-brick	Routes information between C-bricks	2U
D-brick2	Houses a maximum of 16 low-profile Fibre Channel disk drives	3U
TP900	Houses a maximum of 8 low-profile Ultra160 SCSI disk drives	2U
Power bay	Holds a maximum of 6 power supplies that convert 220 VAC to 48 VDC	3U[a]

[a]The power bays in an Altix 3700 rack do not use vertical U rack space; they install in the two lower 3U side bays.



SGI Altix 3300 12–processor Configuration
(Viewed from Front)



SGI Altix 3700 64–processor Configuration
(Viewed from Front)

Figure 3-1 Typical SGI Altix 3000 Family Server Configurations

System Control

The SGI Altix 3000 family system control provides the following functions:

- Manages power control and sequencing
- Provides environmental control and monitoring
- Initiates system resets
- Stores identification and configuration information
- Provides a console/diagnostic and scan interface

SGI Altix 3000 family system control comprises two levels:

- L1 controller - brick-level system controller
- L2 controller - rack-level system controller

L1 Controller

The L1 controller is not configurable; it is an internal design feature of all bricks except the D-brick2 and TP900 storage module.

Note: The D-brick2 has its own operators panel with an enclosure services processor to monitor and control all elements of the brick.

L2 Controller

The L2 controller is required with all Altix 3700 superclusters. The L2 controller is a 5.5 in. x 11.1 in. PCB assembly that mounts inside the top rear of the rack. Because the L2 controller mounts behind the bricks, it does not use configurable rack space. It receives AC input power (30 watts) from the rack power distribution strip.

Chapter 4

System Physical Specifications

This chapter provides the physical specifications of the SGI Altix 3000 family rack systems.

Table 4-1 provides the specifications for the SGI Altix 3300 rack system. Figure 4-1 shows the physical dimensions of an Altix 3300 rack system. Table 4-2 provides the specifications for the SGI Altix 3700 rack system. Figure 4-2 shows the physical dimensions of an Altix 3700 rack system.

Figure 4-3 illustrates two SGI 3700 tall racks that are connected via an overhead trellis.

All specifications in Table 4-1 are per rack unless otherwise noted.

Table 4-1 Physical Specifications for the SGI Altix 3300 Rack System

Characteristic	Specification
Cabinet Characteristics:	
Height	36.06 in. (916 mm)
Width	25.41 in. (645 mm)
Depth	41.83 in. (1062 mm)
Maximum Weight:	507 lb (230 kg)
Shipping Size:	
Height	48.75 in. (1238 mm)
Width	29.25 in. (743 mm)
Depth	42.75 in. (1086 mm)
Shipping Weight (maximum):	582 lb (264 kg)
Access Requirements:	
Front	36.00 in. (914 mm)
Rear	36.00 in. (914 mm)
Side	None
Maximum Heat Dissipation to Air:	7.98 kBtu/hr (2.34 kW)
Maximum Airflow (intake, front; exhaust, rear):	Less than 970 CFM (0.46 m^3/s)
Vibration:	
Nonoperational (sine sweep)	3-200-3 Hz, 0.5g @ 1 octave/min (vertical orientation)
Operational (sine sweep)	5-500-5 Hz, 0.25g @ 1 octave/min (vertical orientation)

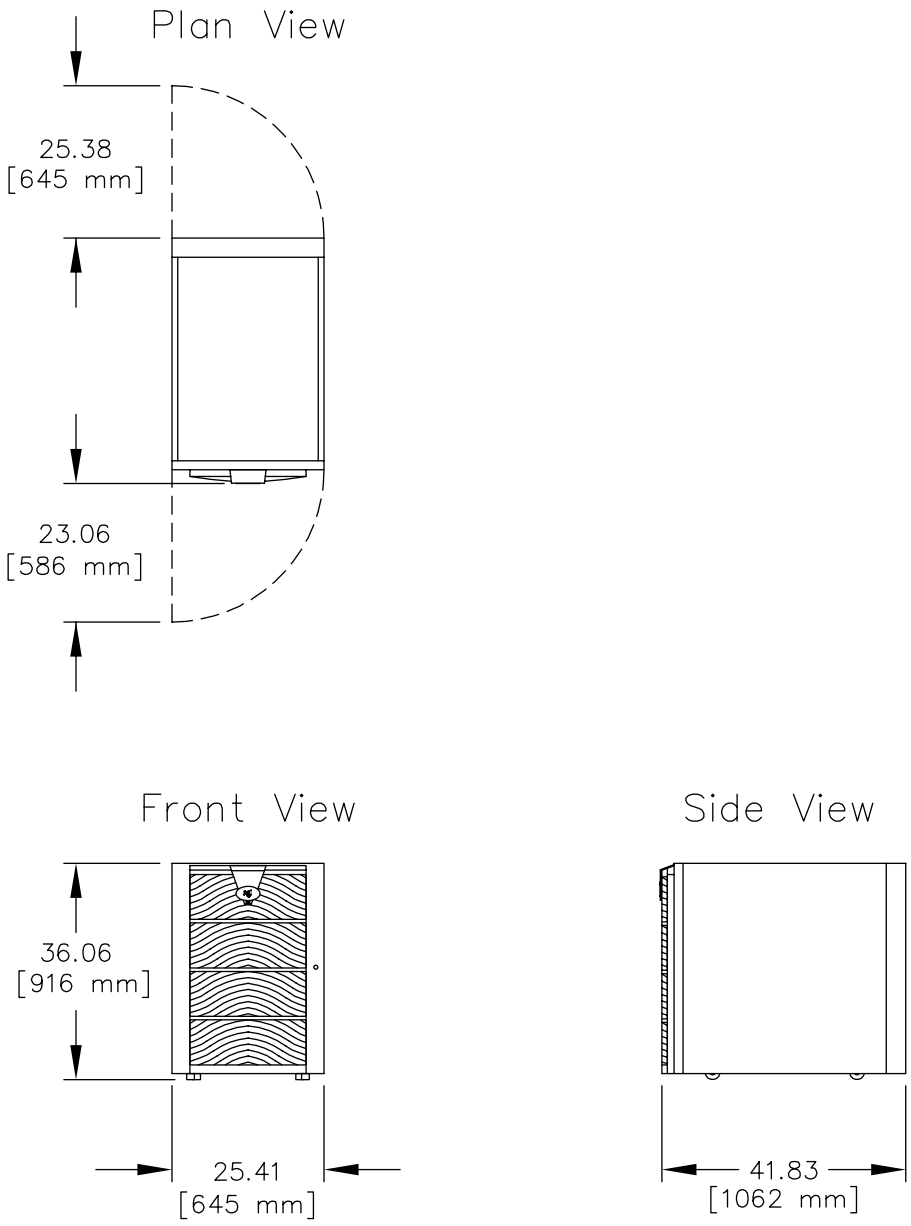


Figure 4-1 SGI Altix 3300 Rack System

Table 4-2 Physical Specifications for the SGI Altix 3700 Rack System

Characteristic	Specification
Cabinet Characteristics:	
Height	74.25 in. (1886 mm)
Width	30.88 in. (784 mm)
Depth	53.27 in. (1353 mm)
Maximum Weight:	1400 lb (635 kg)
Shipping Size:	
Height	80.00 in. (2032 mm)
Width	41.50 in. (1054 mm)
Depth	62.75 in. (1594 mm)
Shipping Weight (maximum):	1,765 lb (800 kg)
Access Requirements:	
Front	48.00 in. (1219 mm)
Rear	48.00 in. (1219 mm)
Side	None
Maximum Heat Dissipation to Air:	21.73 kBtu/hr (6.37 kW)
Maximum Airflow (intake, front; exhaust, rear)	Less than 2600 CFM (1.23 m^3/s)
Vibration:	
Nonoperational (sine sweep)	3-200-3 Hz, 0.5g @ 1 octave/min (vertical orientation)
Operational (sine sweep)	5-500-5 Hz, 0.25g @ 1 octave/min (vertical orientation)

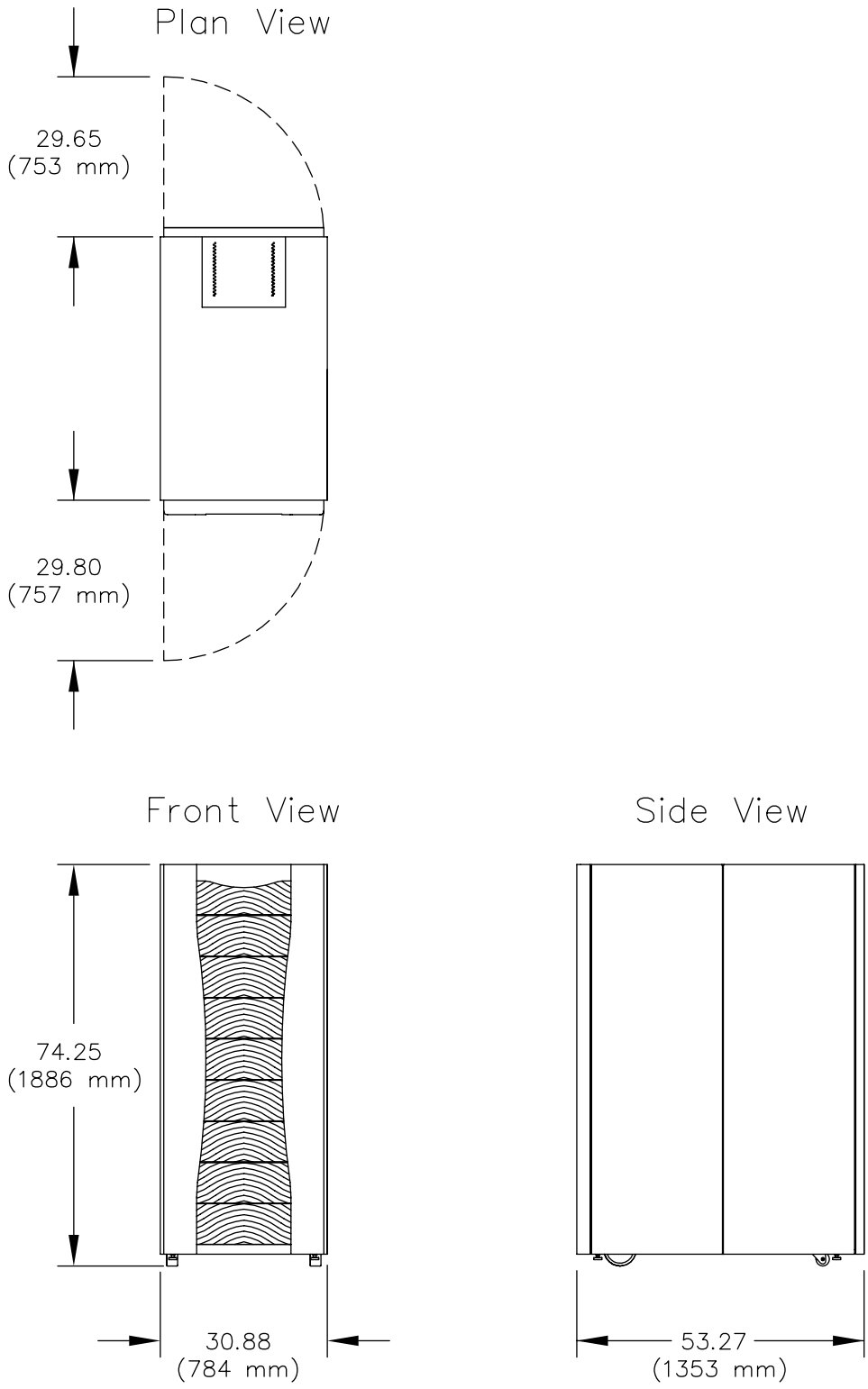


Figure 4-2 SGI Altix 3700 Rack System

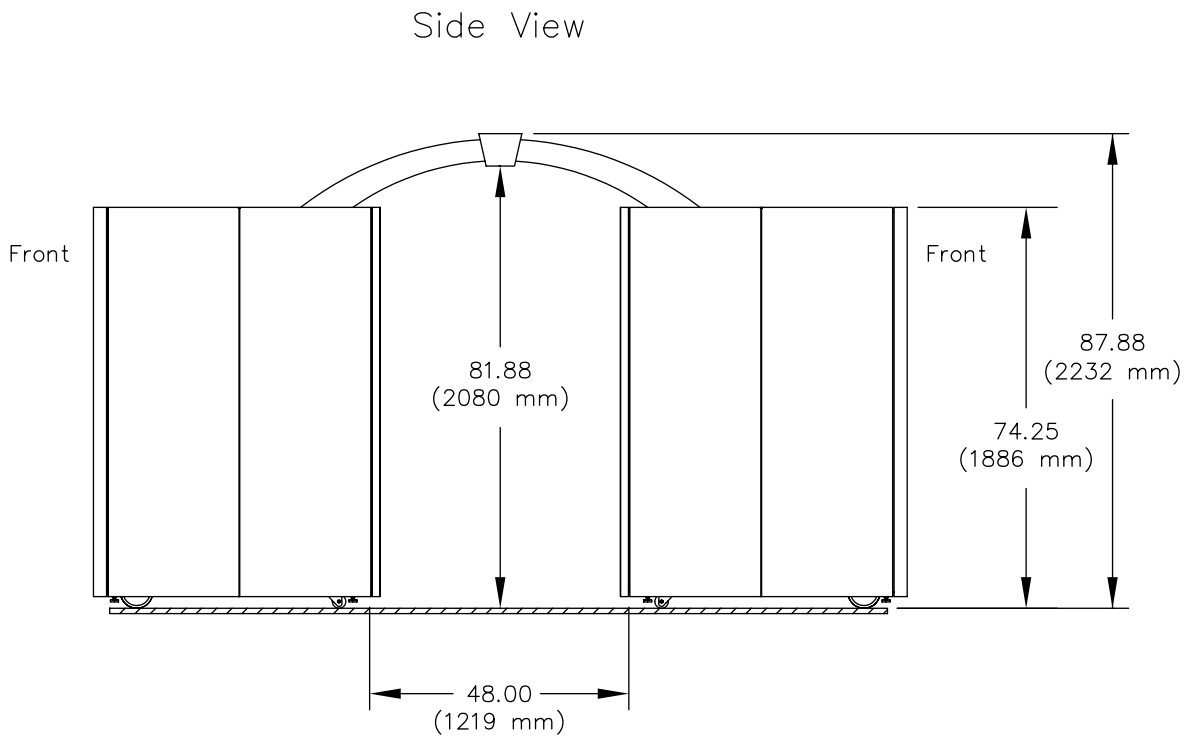


Figure 4-3 SGI Altix 3700 Racks with Overhead Trellis (320 to 512 Processors)

Chapter 5

Site Requirements

Use the information and guidelines in this chapter to plan your access route and to meet the environmental and power requirements for your system.

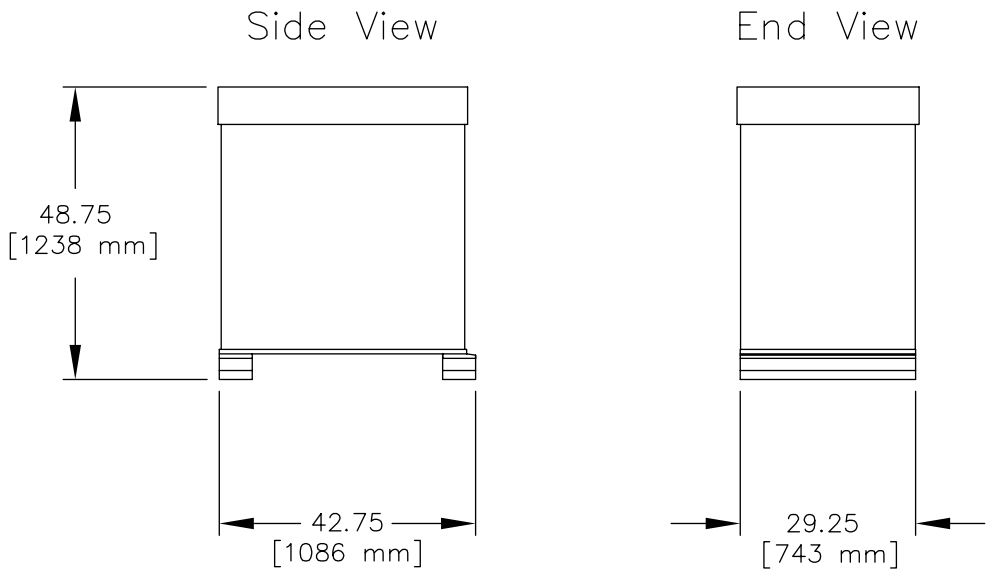
Planning Your Access Route

The standard dock height for freight trailers in the USA is approximately 48.00 in. (1219 mm) from the ground. If your loading dock is standard height, you may use a pallet jack to unload the system, in most cases. If the loading dock is not standard height, you must provide a forklift or other means to unload the system. The maximum access incline should not exceed 10 degrees (height:length = 1:6). If you have concerns about your site access route, contact a site planning representative by telephone in the USA at +1 888 744 8638, extension 676-2820; at +1 715 726 2820; by fax at +1 715 726 2969; or by e-mail at *site@sgi.com*.

Each SGI Altix 3000 family system ships on a pallet in its own container, which includes an attached ramp for system removal from the pallet. You must provide a pallet jack, preferably one with tines that are 48 in. (1219 mm) long, to move each container to the approximate system location, where it can be removed from the pallet and moved to its final destination in the computer room.

SGI recommends that you leave each system cabinet in its shipping crate until it reaches its final destination. If the crate is too large for the planned access route, you may remove the cabinets from the containers and wheel the cabinets on their casters through your facility to the computer room.

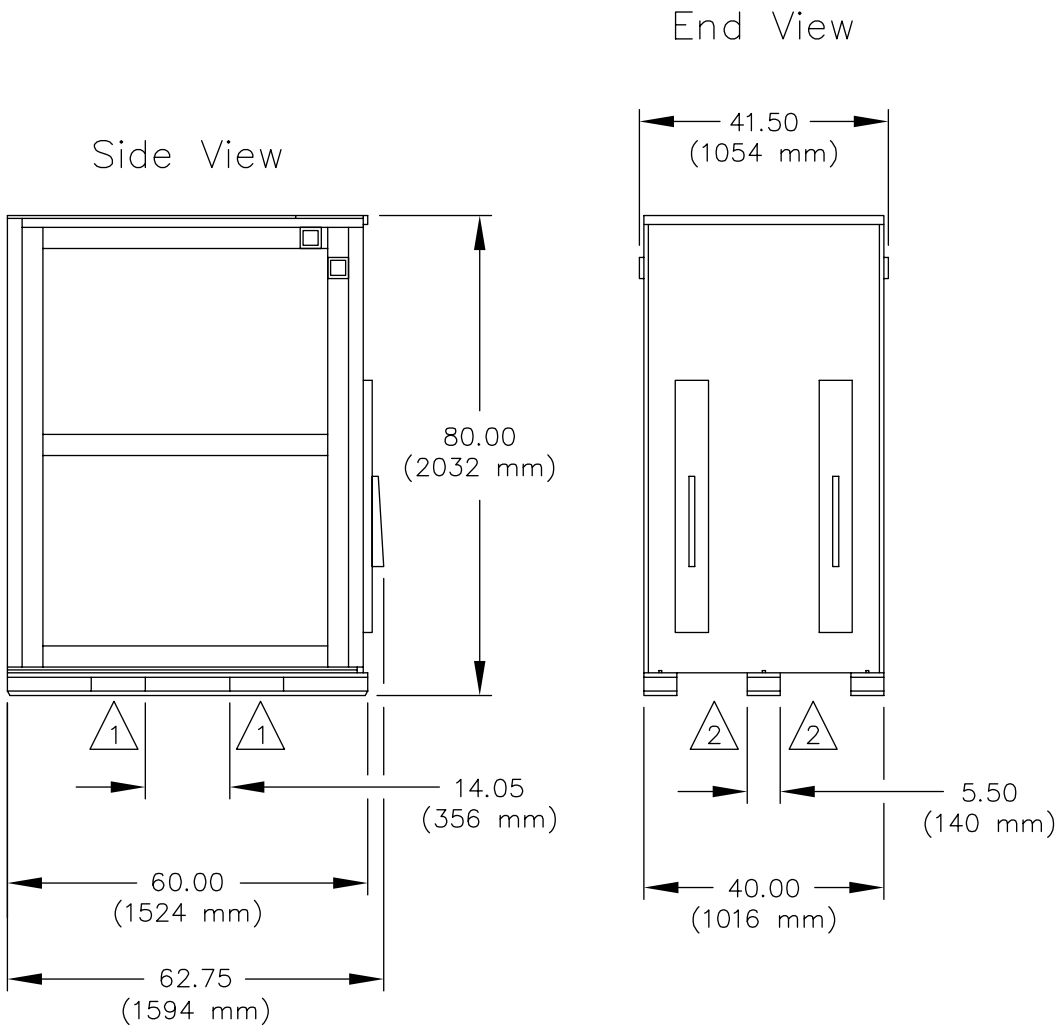
Figure 5-1 illustrates the shipping configuration of an SGI Altix 3300 rack. Figure 5-2 illustrates the shipping configuration of an SGI Altix 3700 rack.



Note:

The shipping container consists of a wooden pallet and a corrugated paper cover. A ramp is enclosed in the shipping container to facilitate the removal of the short rack from the pallet.

Figure 5-1 SGI Altix 3300 Shipping Container



1 Lift opening 9.00 x 2.25 (229 mm x 57 mm)

2 Lift opening 11.75 x 3.75 (298 mm x 95 mm)

Note:

The shipping container consists of a wooden pallet with removable wooden sides and top. An end panel serves as a ramp for unloading the rack.

Figure 5-2 SGI Altix 3700 Shipping Container

Environmental Requirements

The SGI Altix 3000 family systems operate in typical conditions for digital devices that are marketed for commercial and scientific environments. The air-conditioning system at your facility must ensure that the intake air to each system meets the requirements in Table 5-1. SGI strongly recommends that you adhere to the recommended operating ranges to minimize component failures.

Each system cabinet receives intake air through the front of the cabinet and exhausts heated air through the back of the cabinet. When you install the system, ensure that heated air from other equipment does not discharge toward the air intakes of any system cabinets. The equipment can overheat if heated air enters the front intake of any system.

Refer to Table 5-1 for the environmental requirements for the Altix 3000 family systems.

Table 5-1 System Environmental Requirements

Characteristic	Specification
Temperature:	
Operating 0 to 5,000 ft (0 to 1524 m)	41 to 95 °F (5 to 35 °C)
Operating 5,000 to 10,000 ft (1524 to 3048 m)	41 to 86 °F (5 to 30 °C)
Optimum Operating	72 °F (22 °C)
Recommended Operating	68 to 74 °F (20 to 23 °C)
Nonoperating	-40 to 140 °F (-40 to 60 °C)
Maximum Thermal Gradient	18 °F (10 °C) per hour
Relative Humidity:	
Operating	10% to 95% noncondensing
Optimum Operating	45% noncondensing
Recommended Operating	40% to 50% noncondensing
Nonoperating	10% to 95% noncondensing
Maximum Humidity Gradient	10% relative humidity per hour
Altitude:	
Operating	0 to 10,000 ft (0 to 3048 m)

NOTE: Temperature sensors in each Altix 3000 family system automatically power down the system when the intake temperature reaches 104 °F (40 °C) or if internal electronics reach an unsafe operating temperature.

System Power Requirements

Table 5-2 lists the electrical specifications for the SGI Altix 3300 server. Table 5-3 lists the electrical specifications for the SGI Altix 3700 supercluster.

Note: Table 5-2 and Table 5-3 list the maximum numbers; other configurations might require significantly less power.

The calculated power consumption for specific Altix 3000 family configurations is available from your SGI site planning representative. Refer to Chapter 8, “Summary” for contact information.

Note: To maintain a ground potential of less than 250 millivolts between interconnected Altix 3000 family systems, SGI requires that all power circuits that supply power to an Altix 3000 family system originate from the same distribution panel if possible. If not, they must originate from the same source (transformer). Electrical work and installations must comply with all applicable local, state, and national electrical codes.

SGI makes every effort to minimize the effects of power failures and interruptions to the system hardware. Studies indicate that computer systems that are subjected to repeated power interruptions and fluctuations experience higher component failure rates than systems with stable power sources.

SGI encourages you to install a stable power source, such as an uninterruptible power system (UPS), to minimize component failures.

Each Altix 3000 family system and each piece of support equipment requires its own customer-supplied receptacle. If you have difficulty obtaining the correct receptacles as listed in Table 5-2 and Table 5-3, please contact your account manager .

Table 5-2 Electrical Specifications for the SGI Altix 3300 Server

Electrical Service	Specifications
Input Voltage:	
Single-phase option	180 to 254 VAC
Maximum Power Consumption:	2.18 kVA (2.14 kW)
Hold-up Time:	20 ms
Total Harmonic Distortion (THD):	Less than 10% THD-Rms at full load
Power Cable:	8-ft (2.4-m) pluggable drop cord
Power Receptacle:	
Single Phase	30-amp NEMA L6-30R (North America/Japan) or 32-amp IEC60309 (International)

Table 5-3 Electrical Specifications for the SGI Altix 3700 Supercluster

Electrical Service	Specifications
Input Voltage:	
Single-phase option	180 to 254 VAC
Three-phase options	180 to 254 VAC (North America/Japan) or 312 to 440 VAC (International)
Maximum Power Consumption:	5.91 kVA (5.79 kW)
Hold-up Time:	20 ms
Total Harmonic Distortion (THD):	Less than 10% THD-Rms at full load
Power Cable:	8-ft (2.4-m) pluggable drop cord(s)
Power Receptacle:	
Single Phase	(2[a]) 30-amp NEMA L6-30R (North America/Japan) or (2[a]) 32-amp IEC60309
Three Phase	(1) 4-wire, 30-amp IEC60309 (North America/Japan) or (1) 5-wire, 32-amp IEC60309 (International)

[a] The number of receptacles that is required depends on the number of power bays (maximum 2 per rack).

In addition to the equipment that Table 5-2 and Table 5-3 list, your system configuration might also include optional equipment such as modems, printers, and additional displays. Please plan your facility electrical and air-conditioning requirements accordingly.

If you have a system configuration that requires specific power and cooling needs, contact a site planning representative by e-mail at *site@sgi.com*.

Raised-floor Installations

The SGI Altix 3000 family systems do not require a raised-floor system. However, SGI recommends a raised-floor system because it provides convenient routes for underfloor air circulation and for power and communication cabling.

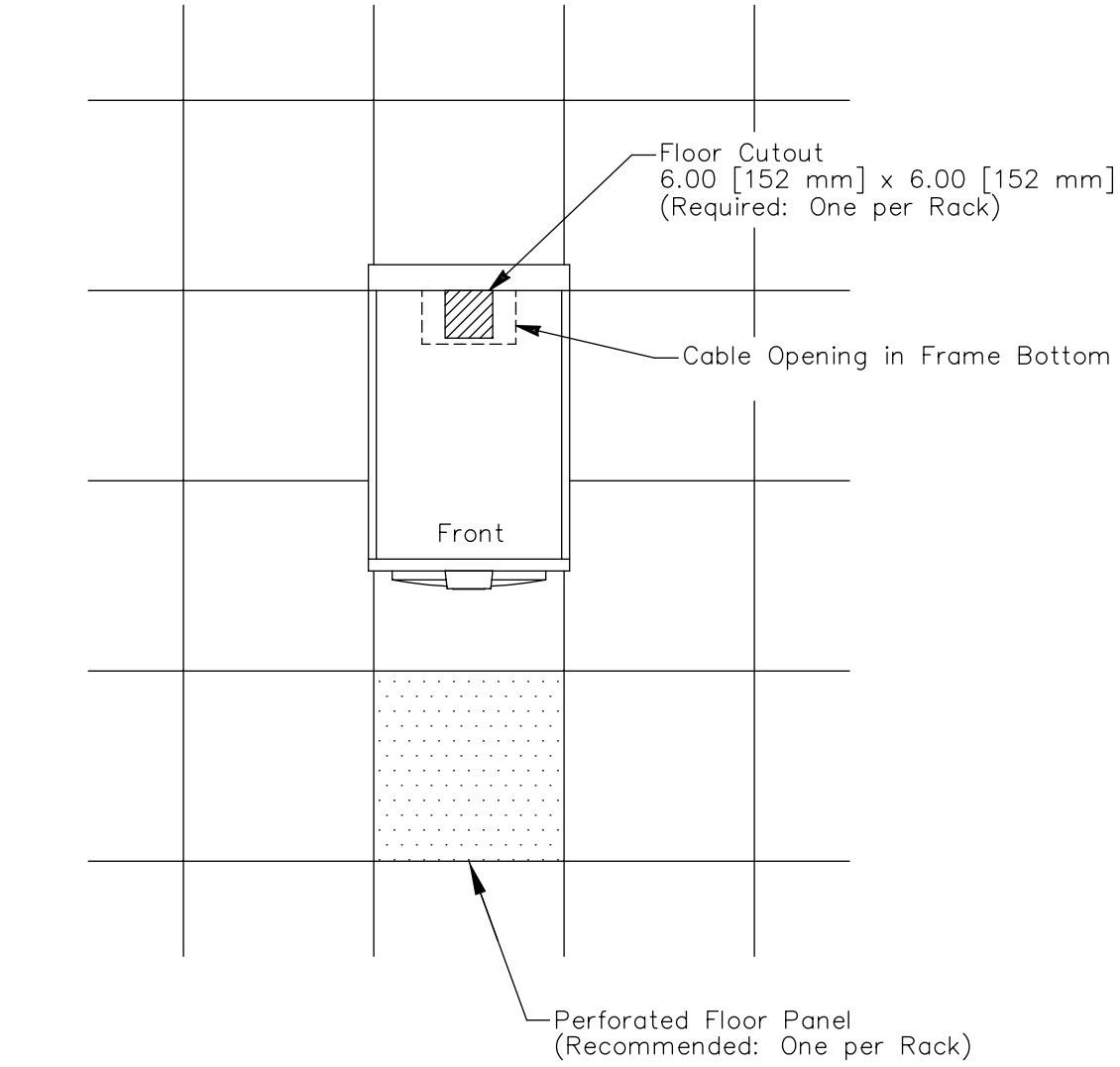
SGI recommends a minimum raised-floor height of 12.00 in. (305 mm).

Each rack that you install on a raised floor requires a floor cutout for cabling. When you design your raised-floor system, place perforated floor panels or floor grilles near the front base of the system racks, not directly under them. SGI recommends placing one perforated floor panel in front of each Altix 3300 rack, and two perforated floor panels in front of each SGI Altix 3700 rack for an additional supply of cooling air. Figure 5-3 illustrates the floor cutout for a single Altix 3300 rack. Figure 5-4 illustrates the floor cutout for a single Altix 3700 rack.

The computer room floor must support the weight of all the system racks in your configuration. Each component rests on four leveling pads and/or casters that concentrate the weight of the cabinet on a small surface area. Refer to Figure 5-5 and Figure 5-6.

Additional floor support pedestals increase the floor-loading strength of the raised floor. If your computer site lies in an earthquake zone, you can secure the computer system components to the computer room subfloor for added stability. Refer to Chapter 6, “Securing the Cabinets”, or contact your site planning representative for additional details.

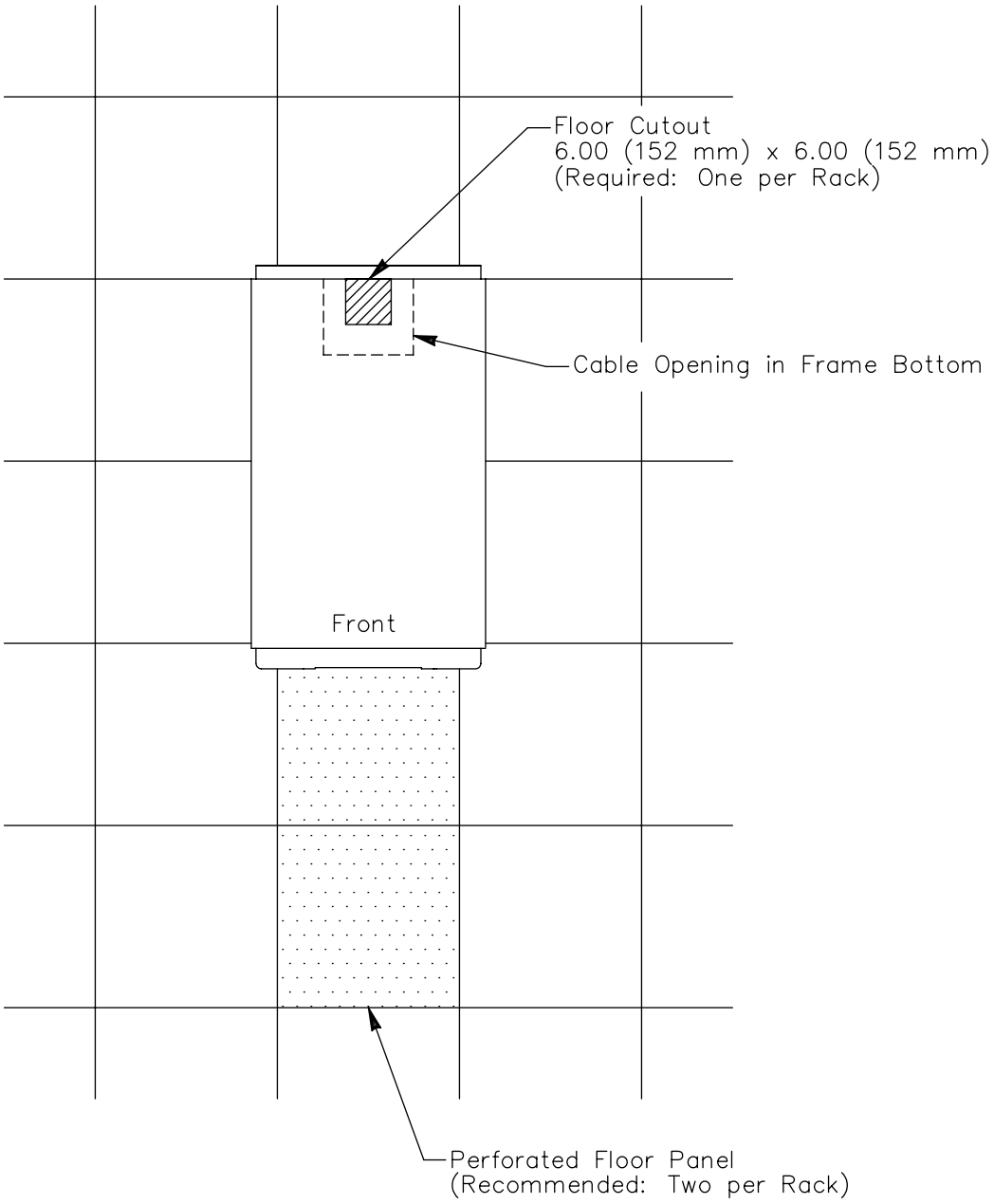
If you have any questions about the structural capabilities of any floor, please contact a qualified structural engineer. If you do not install your system on a raised floor, SGI recommends that you install flat cable covers to protect cables from damage and to protect computer room personnel from injury.



Note:

The Rack is Shown on 24 in. (610 mm) x 24 in. (610 mm) Floor Panels

Figure 5-3 SGI Altix 3300 Rack Floor Cutout Location



Note:

The Rack is Shown on 24 in. (610 mm) x 24 in. (610 mm) Floor Panels

Figure 5-4 SGI Altix 3700 Rack Floor Cutout Location

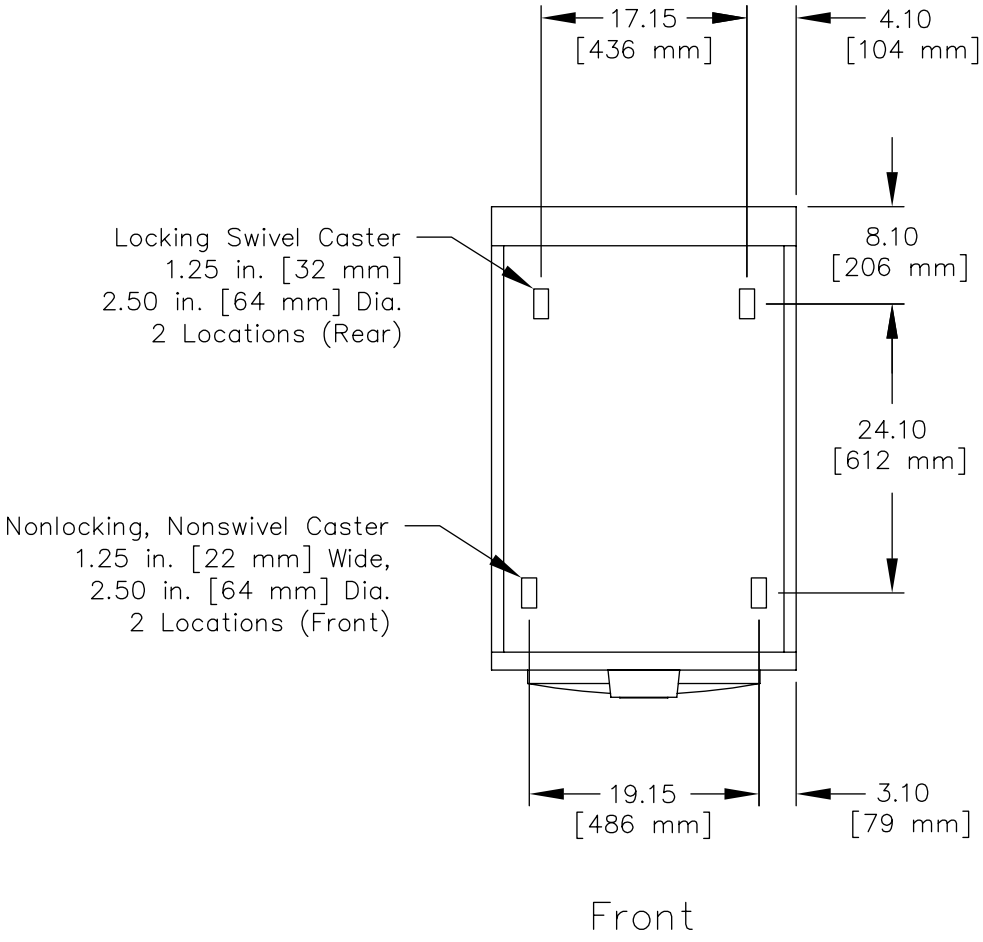


Figure 5-5 SGI Altix 3300 Casters

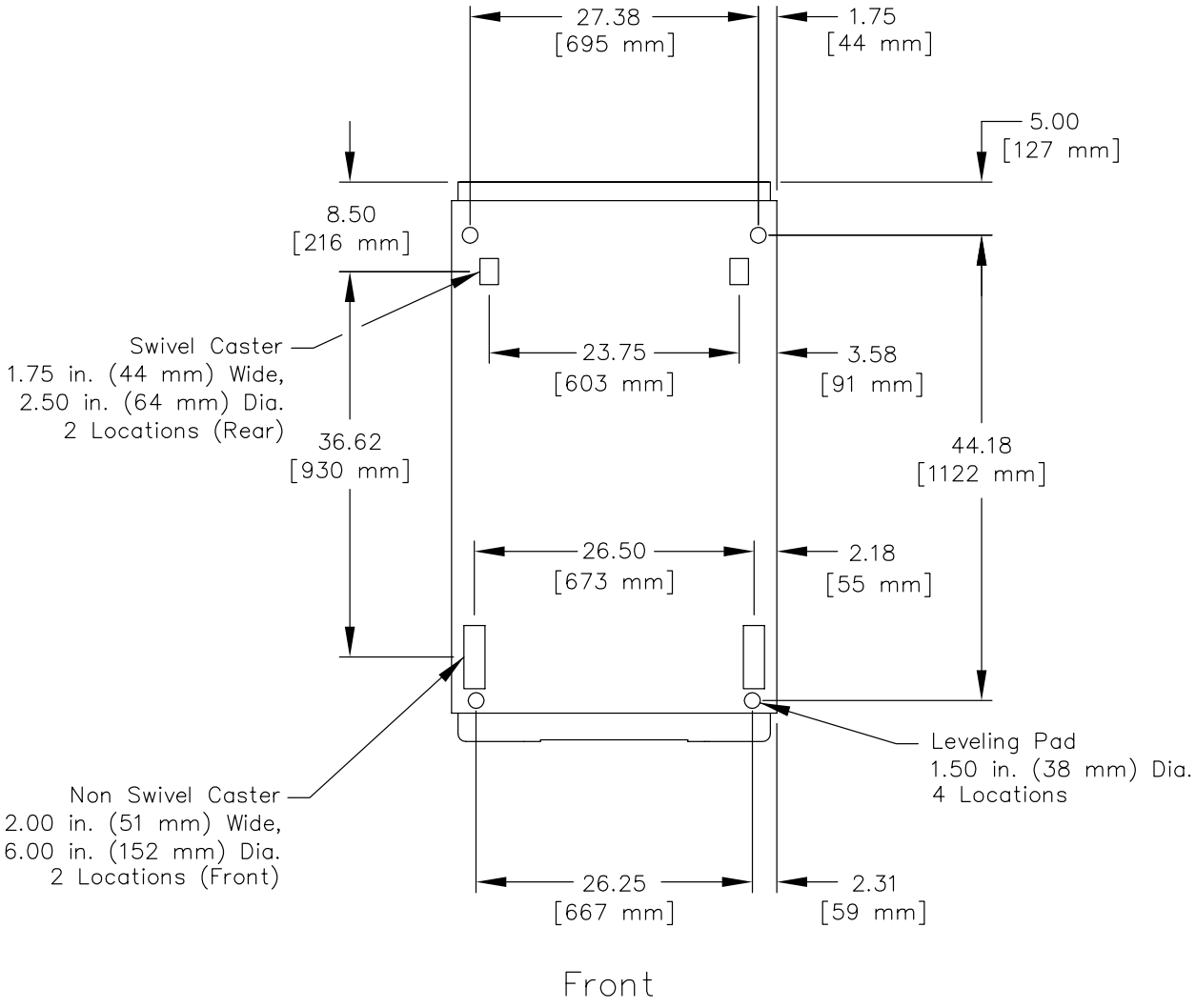


Figure 5-6 SGI Altix 3700 Casters and Leveling Pads

Service Clearances

Adequate room for servicing the equipment must be built in to the floor plan. Figure 5-7 shows the required service clearances and overall dimensions for a typical SGI Altix 3300 configuration.

Figure 5-8, Figure 5-9, Figure 5-10, Figure 5-11, and Figure 5-12 show the required service clearances and overall dimensions for typical SGI Altix 3700 configurations.

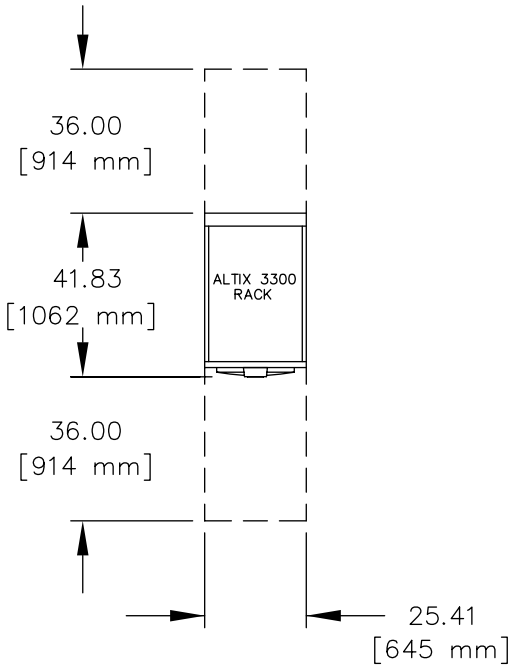


Figure 5-7 SGI Altix 3300 Service Clearance Requirements (4 to 12 Processors)

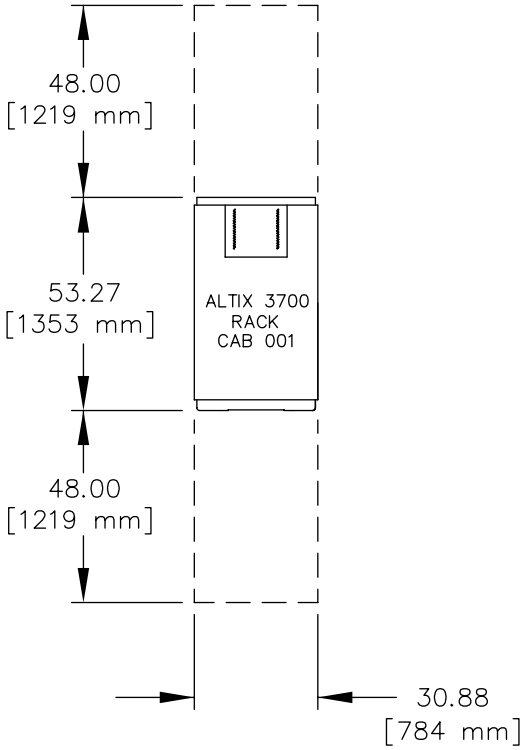


Figure 5-8 SGI Altix 3700 Service Clearance Requirements (16 to 32 Processors)

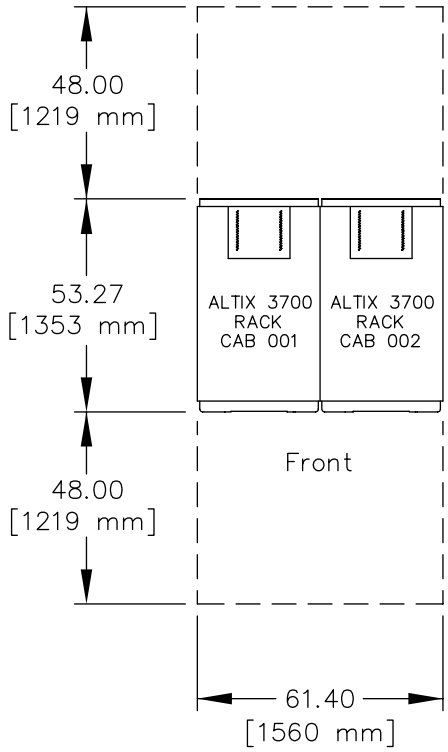


Figure 5-9 SGI Altix 3700 Service Clearance Requirements (36 to 64 Processors)

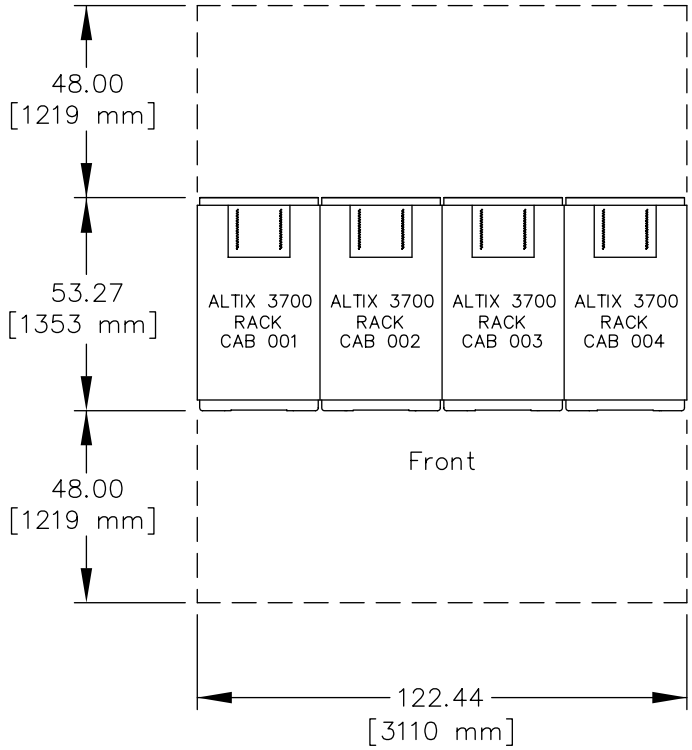


Figure 5-10 SGI Altix 3700 Service Clearance Requirement (128 Processors)

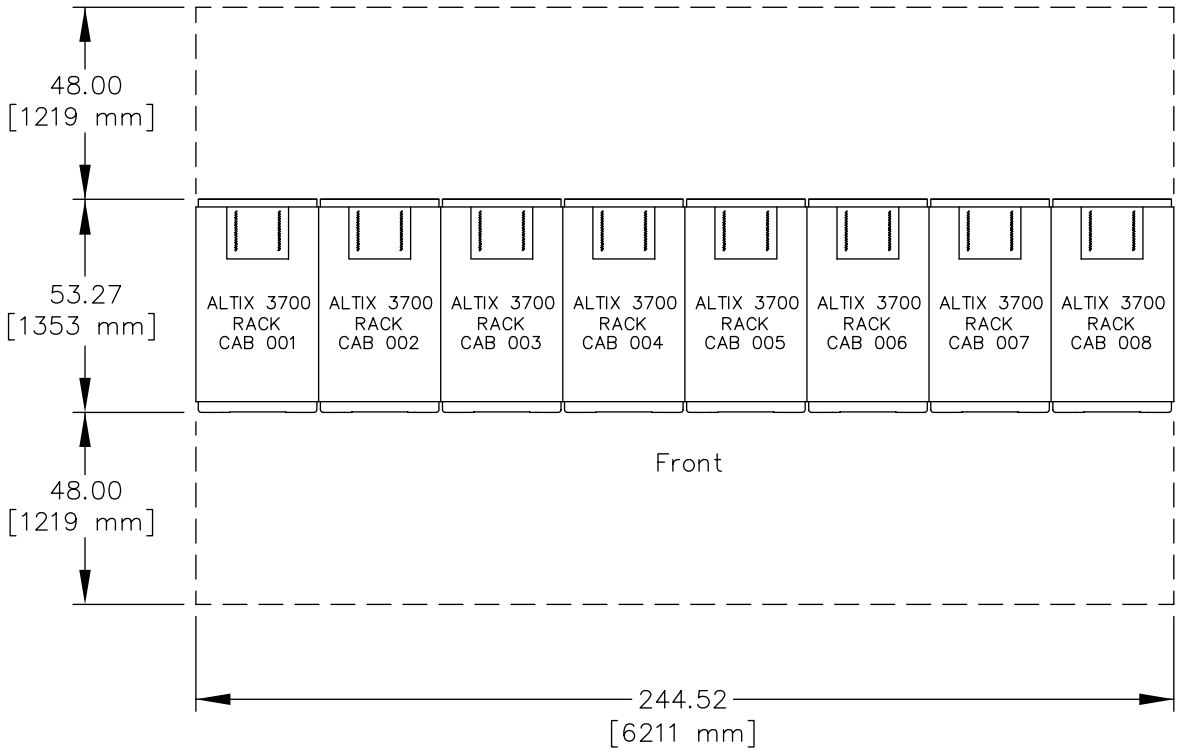


Figure 5-11 SGI Altix 3700 Service Clearance Requirement (256 Processors)

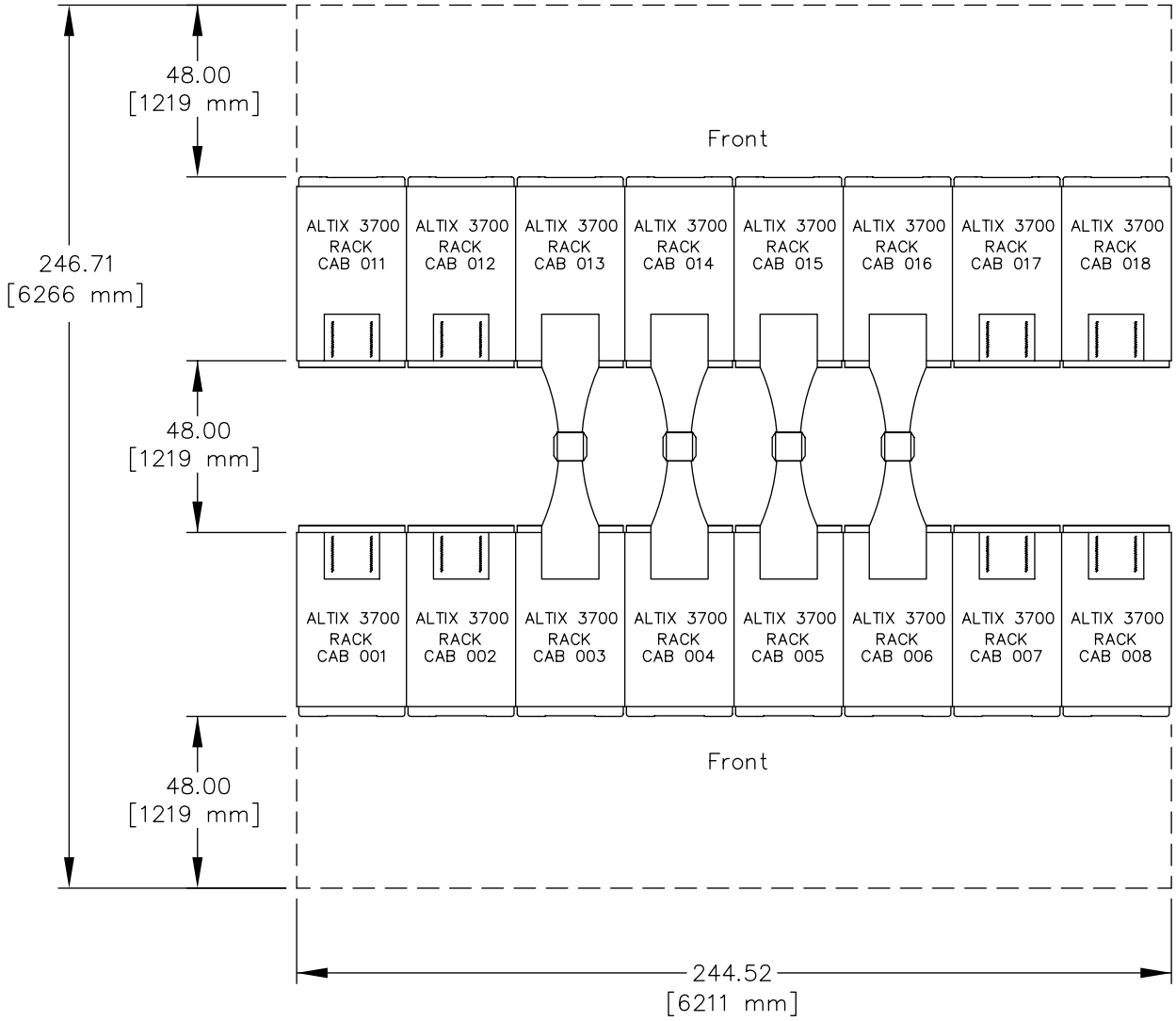


Figure 5-12 SGI Altix 3700 Service Clearance Requirement (512 Processors)

Electronic Support

SGI Electronic Support provides system support and problem-solving services that function automatically, which helps resolve problems before they can affect system availability or develop into actual failures. SGI Electronic Support integrates several services so they work together to monitor your system, notify you if a problem exists, and search for solutions to problems.

The complete SGI Electronic Support services are available to customers who have a valid SGI Warranty, FullCare, FullExpress, or Mission-Critical support contract. To purchase a support contract that allows you to use the complete SGI Electronic Support services, contact your SGI sales representative.

For more information about SGI Electronic Support, refer to the following web page: http://www.sgi.com/support/es.

Network Connections

If you plan to add any optional network interfaces such as Ethernet to your SGI Altix 3000 family system, you must provide the proper cables and transceivers to match your network protocol. Contact your account manager to plan any optional network connections.

Chapter 6

Securing the Cabinets

In areas that are prone to earthquakes, you should secure each SGI Altix 3000 family rack to the computer room subfloor. Four M12 threaded weld nuts are located on the underside of each cabinet frame for attachment to customer-supplied hold-down devices. Figure 6-2 shows the attachment points for the SGI Altix 3300 rack. Figure 6-2 shows the attachment points for the SGI Altix 3700 rack.

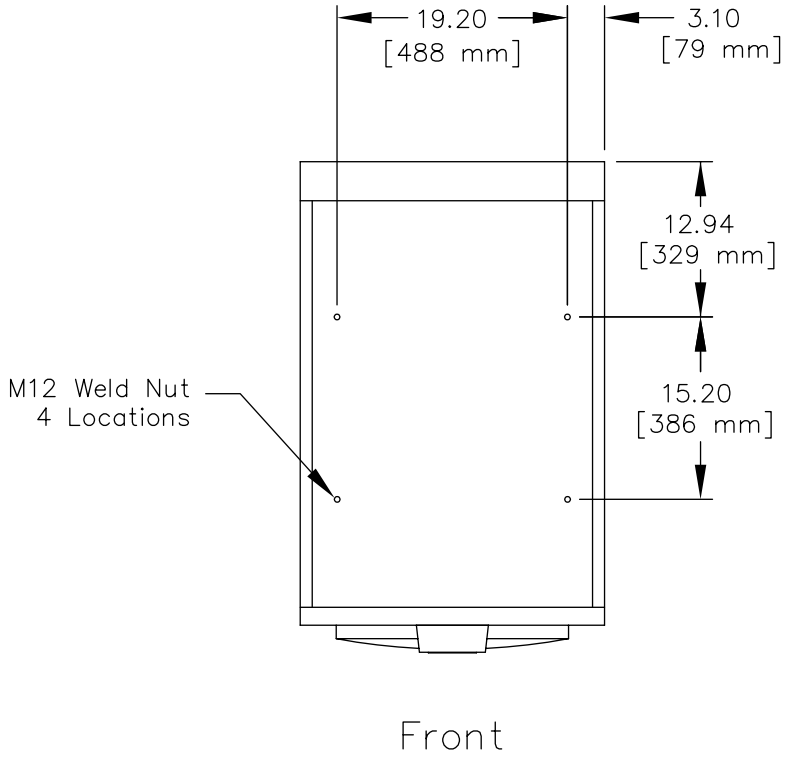


Figure 6-1 SGI Altix 3300 Weld Nut Locations

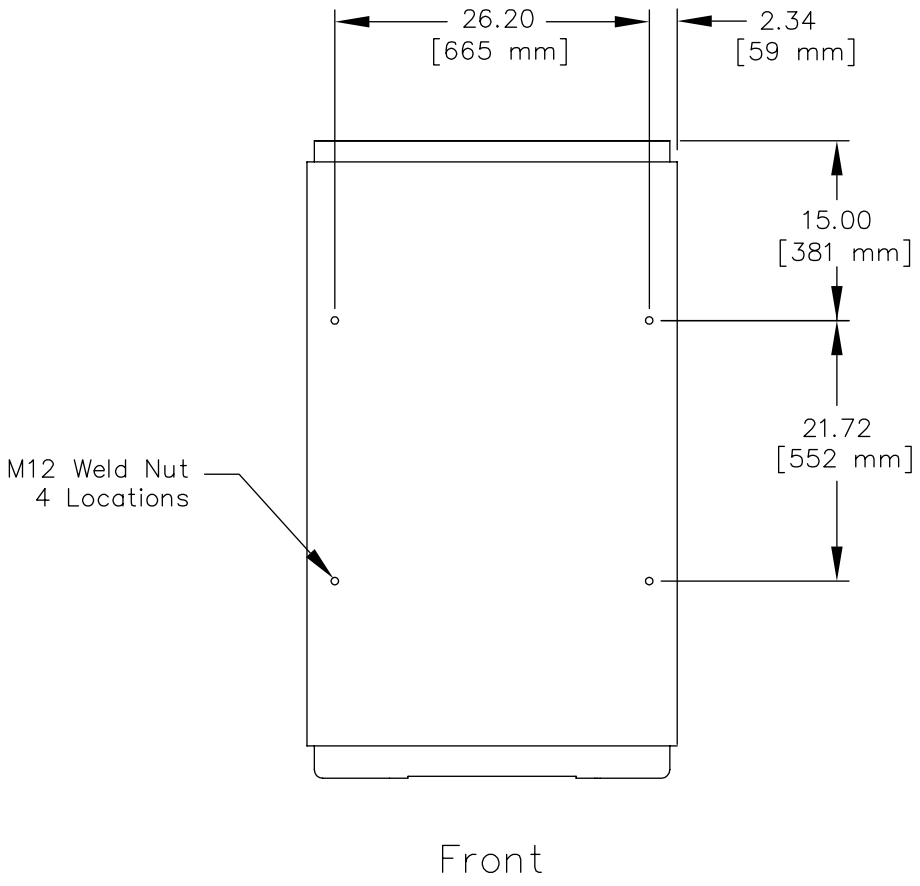


Figure 6-2 SGI Altix 3700 Weld Nut Locations

Chapter 7

Site Planning Checklist

Table 7-1 provides a site planning checklist that you can use as an organizational tool during the site planning and preparation process. During the planning process, you might discover additional preparation issues at your site that this checklist does not address. To discuss your site plans and to resolve any issues, contact an SGI site planning representative by one of the methods listed in the summary of this document.

Table 7-1 Site Planning Checklist

Yes	No	Planning Issue	Comments
		Have you determined the system configuration? Configuration:_____	
		Have you determined the installation date? Date:_____	
		What is the total number of system cabinets?	
		Have you established the system location?	
		Does the equipment floor layout meet the equipment maintenance access requirements?	
		Is the equipment positioned so that the exhaust air of one heat-ejecting device does not enter the air inlet of another?	
		Have you identified an access route to the final system location?	
		Does the access route meet the access requirements for the system?	
		Does the access route meet the floor-loading requirements for the system?	
		Have you made provisions to cover irregular or engraved floor patterns along the access route to reduce vibration of the system while moving it?	
		Is assistance available to help unload, unpack, and move the system during delivery?	

Table 7-1 Site Planning Checklist **(continued)**

Yes	No	Planning Issue	Comments
		Does your loading dock meet standard freight-carrier truck requirements? If not, have you allocated a forklift for delivery? Contact your site planning representative if you have concerns about your loading dock.	
		Is a pallet jack available on-site to move the system in its shipping container to the final system location?	
		Do the pallet-jack fork dimensions meet the requirements for the shipping container?	
		Are the elevator and elevator door dimensions adequate?	
		Is the elevator weight capacity adequate?	
		Does each ramp in the access route have an incline that is less than 10 degrees?	
		Did you order the power receptacles for your system?	
		Are the circuit breakers for all cabinets properly installed and labeled?	
		Are all power receptacles properly installed and labeled?	
		Are the floor cutouts properly positioned and free of sharp edges?	
		Are the recommended perforated floor panels properly positioned?	
		Is the computer room floor strong enough to support the weight of the system?	
		Can the computer room environment be properly maintained within the specifications listed in Table 5-1?	
		Will the distribution panel be able to support all the power circuits that supply power to the system?	
		Do you have a stable power source such as a UPS?	
		Have you trained system administrators or enrolled operators in the necessary training courses?	

Chapter 8

Summary

Now that you understand the basic configurations and requirements of the SGI Altix 3000 family of servers and superclusters, you can make appropriate plans for your site. SGI site planning representatives are available for consultation regarding site planning and preparation. You may contact an SGI site planning representative by any of the following methods:

- Phone +1 715 726 2820, or in the USA: +1 888-744-8638, extension 676-2820
- Fax +1 715 726 2969
- E-mail *site@sgi.com*

SGI sales representatives and employees may access the following internal Site Planning website:

- http://site.americas.sgi.com

Appendix A

U.S. Customary Measure and Metric Measure Conversion

Table A-1 lists some useful conversions between U.S. customary measure and metric measure.

Table A-1 U.S. Customary-to-Metric Conversions

U.S. Customary	Metric
1 inch	2.54 cm
1 foot	30.48 cm
1 square foot (ft^2)	0.093 m^2
1 pound (lb)	0.4536 kg
1 lb/ft^2	4.88 kg/m^2
1 cubic feet per minute (cfm)	0.00047 m^3/s
1 British thermal unit (Btu)	1055 joules
0.3937 in.	1 cm
39.37 in.	1 m
10.76 ft^2	1 m^2
2.205 lbs	1 kg
0.205 lb/ft^2	1 kg/m^2
2127.66 cfm	1 m^3/s
0.00095 Btu	1 joule

Fahrenheit-to-Celsius Conversion

$$\frac{(F - 32) \cdot 5}{9} = C$$

Start with the temperature in Fahrenheit, subtract 32 degrees, multiply by 5, and divide by 9. The result is the temperature in Celsius.

Example:

$$\frac{(86 - 32) \cdot 5}{9} = 30$$

Celsius-to-Fahrenheit Conversion

$$\left(\frac{(C \cdot 9)}{5}\right) + 32 = F$$

Start with the temperature in Celsius, multiply by 9, divide by 5, and add 32 degrees. The result is the temperature in Fahrenheit.

Example:

$$\left(\frac{(30 \cdot 9)}{5}\right) + 32 = 86$$

Appendix B

Regulatory Specifications

The following sections present information that may be important to the operation of your SGI system.

Manufacturer's Regulatory Declarations

The SGI Altix 3000 family of servers and superclusters conform to several national and international specifications and European Directives listed on the "Manufacturer's Declaration of Conformity." The CE insignia displayed on each device is an indication of conformity to the European requirements.

Caution: Each SGI system has several governmental and third-party approvals, licenses, and permits. Do not modify this product in any way that is not expressly approved by SGI. If you do, you may lose these approvals and your governmental agency authority to operate this device.

System Model Number

The CMN (model) number for each system is shown on the system label on the unit.

CE Notice and Manufacturer's Declaration of Conformity

Marking by the "CE" symbol indicates compliance of the device to directives of the European Community. A "Declaration of Conformity" in accordance with the standards has been made and is available from SGI upon request; please contact your local SGI account representative to obtain a copy.

Electromagnetic Emissions

FCC Notice (USA Only)

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

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at the user's own expense.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by using one or more of the following methods:

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

Caution: Users should note that changes or modifications to the equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Industry Canada Notice (Canada Only)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique német pas de perturbations radioélectriques dépassant les normes applicables aux appareils numériques de Classe A préscrites dans le Règlement sur les interferences radioélectriques établi par le Ministère des Communications du Canada.

VCCI Notice (Japan Only)

この装置は、情報処理装置等電波障害自主規制協議会（VCCI）の基準に
基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると
電波妨害を引き起こすことがあります。この場合には使用者が適切な
対策を講ずるよう要求されることがあります。

Chinese Class A Regulatory Notice

警告使用者：

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻
干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Korean Class A Regulatory Notice

이 기기는 업무용으로 전자파적합등록을 한 기기이오니 판매자
또는 사용자는 이 점을 주의하시기 바라며 만약 잘못 판매 또는
구입하였을 때에는 가정용으로 교환하시기 바랍니다.

Shielded Cables

The SGI Altix 3000 family is FCC-compliant under test conditions that include the use of shielded cables between the system and its peripherals. Your system and any peripherals that you purchase from SGI have shielded cables. Shielded cables reduce the possibility of interference with radio, television, and other devices. If you use any cables that are not from SGI, ensure that they are shielded. Telephone cables do not need to be shielded.

Optional monitor cables supplied with your system use additional filtering that is molded into the cable jacket to reduce radio frequency interference.

Always use the cable that is supplied with your system. If your monitor cable becomes damaged, obtain a replacement cable from SGI.