» Technical Product Specification «

Kontron CG2300 Carrier Grade Server

Document Revision 1.5

Revision History

Revision	Brief description of changes	Date of issue
1.0	Final version	6/22/15
1.1	Updated with DC PSU changes	7/28/15
1.2	Revised RAID technical specification inconsistency	2/09/16
1.3	Added mention to Xeon E5-26XX v4 (Broadwell) processors, which are now supported Correcton to Kontron web site links	4/15/16
1.4	Updating some infos in the Regulatory section	03/27/17
1.5	Adding pinout details for Auxiliary Power connector In block diagram, adding SAS controller model and V4 processor Changing Block Diagram Look & Feel Adding infos about SAS controller/RAID Support in new section Remove some unused entry in Acronyms Table	06/08/17

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Acronyms

ASIC	Application specific integrated circuit
BIOS	Basic input/output system
BMC	Bus management controller
CE	Community European (EU mark)
CRMS	Communications Rack Mount Servers
CSA	Canadian Standards Organization
DC	Direct current
DDR4	Double Data Rate Fourth Generation
DIMM	Dual inline memory module
DRAM	Dynamic random access memory
ECC	Error checking and correcting
EEPROM	Electrically erasable programmable read-only memory
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ESD	Electrostatic discharge
ETSI	European Telecommunications Standards Institute
eUSB	Embedded Universal Serial Bus
FCC	Federal Communications Commission
FH/FL	Full Height/Full Length
FRU	Field replaceable unit
Gb, Gbit	Gigabit
GB, Gbyte	Gigabyte – 1024 MB
GbE	Gigabit Ethernet
GND	Ground
GPIO	General purpose input/output
GUI	Graphical user interface
HDD	Hard disk drive
Hz	Hertz – 1 cycle/second
I/O	Input/output
I^2C	Inter-integrated circuit bus
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Initiative
IRQ	Interrupt request line
KB, Kbyte	Kilobyte – 1024 bytes
LAN	Local Area Network
LED	Light-Emitting Diode
LP	Low Profile
LVDS	Low Voltage Differential SCSI
MB, Mbyte	Megabyte – 1024 KB
NEBS	Network Equipment-Building System

NIC	Network interface card, or Network Interface Controller, or Network Interface Controller port
NMI	Non-maskable interrupt
OTP	Over-temperature protection
OVP	Over-voltage protection
PCI	Peripheral component interconnect
PCIe	Peripheral Component Interconnect Express
PIRQ	PCI interrupt request line
PMM	POST memory manager
PnP	Plug and play
POST	Power-On Self Test
PSU	Power Supply Unit
RAID	Redundant Array of Independent Disks
RAS	Reliability, Availability, and Serviceability
RDIMM	Registered Dual In-Line Memory Module
RMM	Remote Management Module
RoHS	Restriction of Hazardous Substances
SAS	Serial Attached SCSI (Small Computer System Interface)
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer Systems Interface
SDRAM	Synchronous Dynamic RAM
SEL	System Event Log
SMBus	Subset of I^2C bus/protocol (developed by Intel), System Management Bus
SMS	Server Management Software
SSD	Solid State Drive
THOL	Tested Hardware and Operating System List
TUV	Technischer Uberwachungs-Verein (A safety testing laboratory with headquarters in Germany)
UL	Underwriters Laboratories, Inc.
USB	Universal Serial Bus
UV	Under-Voltage
V	Volt
VA	Volt-amps (volts multiplied by amps)
Vac	Volts alternating current
Vdc	Volts direct current
VDE	Verband Deutscher Electrotechniker (German Institute of Electrical Engineers)
VGA	Video Graphics Array
VSB	Voltage standby
W	Watt
Ω	Ohm

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Electrostatic Discharge

CAUTION! The CG2300 server is sensitive to electrostatic discharge (ESD). Users must observe the appropriate precautions when handling ESD-sensitive devices.

Limited Warranty

Kontron grants the original purchaser of Kontron products a THREE YEAR LIMITED HARDWARE WARRANTY as described in the following section below. However, no other warranties that may be granted or implied by anyone on behalf of Kontron are valid unless the consumer has the express written consent of Kontron.

Kontron warrants their own products, excluding software, to be free from manufacturing and material defects for a period of 36 consecutive months from the date of purchase. This warranty is neither transferable nor extendible to cover any other users or long- term storage of the product. It does not cover products that have been modified, altered, or repaired by any other party than Kontron or their authorized agents. Furthermore, any product that has been, or is suspected of being, damaged as a result of negligence, improper use, incorrect handling, servicing, or maintenance, or that has been damaged as a result of excessive current/voltage or temperature, or that has had its serial number(s), any other markings or parts thereof altered, defaced or removed will also be excluded from this warranty.

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1 Information

1.1 Product Description

The CG2300 Carrier Grade Server is the 7th generation of the Kontron 2U Carrier Grade Server products. The CG2300 server supports the Intel® Xeon® E5-2600 v3 and v4 series processors, which couple high performance with power efficiency to provide improved performance-per-watt over previous generation rack-mount servers.

The CG2300 server is designed to meet NEBS-3 and ETSI certification, which makes it suited for a host of applications in the telecom Central Office and industrial environment. The server is targeted to OSS (Operations System and Support), Billing, Provisioning, Softswitch, Media Server, Wireless and Unified Messaging, Call Center, and many other applications. The CG2300 server can also support manufacturing, industrial, oil & gas, utility, and even military applications where a rugged, highly reliable server is required for harsh environments such as dust, high altitude, fire hazard, earthquake propensity, and high ambient temperatures.

To add to the many recognized benefits of the Kontron Carrier Grade Server family, the CG2300 server introduces several new important features such as support of Intel® Xeon® v3 and v4 processors, DDR4 memory, PCIe Gen3, hot-swap/redundant fans and many flash storage formats (SD, eUSB, M.2).

1.2 Purpose of this Document

This document provides detailed technical information about all of the components that make up the CG2300 Carrier Grade Server. The Technical Product Specification covers the chassis hardware, cables, connectors, system boards, the power subsystem, and regulatory requirements.

NOTE: Always be sure to search for CG2300 on the Support website at http://www.kontron.com/ for the latest version of this manual with possible updates since this version was published.

More detailed product information about the CG2300 server is available on the Kontron website at:

https://www.kontron.com/products/systems/telecom-systems/cg2300-carrier-grade-server.html

2 System Overview

This chapter provides an overview of the key features of the Kontron CG2300 Carrier Grade Server.

2.1 Introduction

2.1.1 Kontron CG2300 Carrier Grade Server

The Kontron CG2300 Carrier Grade Server is a compact, high-density, rack-mount server with support for the Intel® Xeon® E5-2600 v3 and v4 processor series and up to sixteen DDR4 DIMMs (eight for each processor). The CG2300 server supports high availability features such as hot-swappable and redundant power supply modules, hot-swappable and redundant fans, and up to six hot-swappable 2.5-inch hard disk drives. The scalable architecture of the CG2300 server supports a variety of operating systems.

Figure 1 shows the CG2300 server completely assembled. Figure 2 shows the CG2300 server with the top cover removed.

Figure 1: Kontron CG2300 Carrier Grade Server (Top Cover On, Front Bezel Removed)

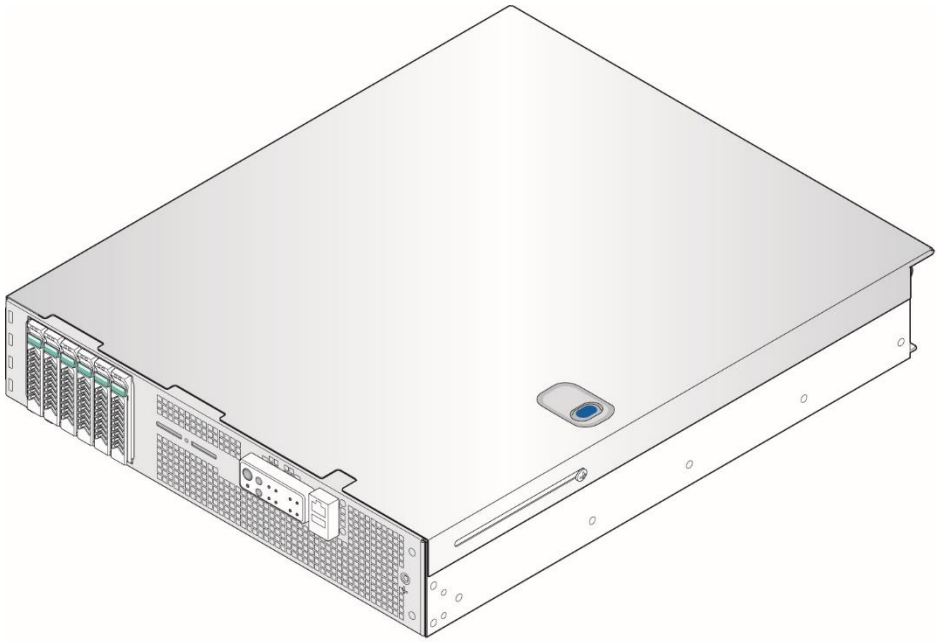

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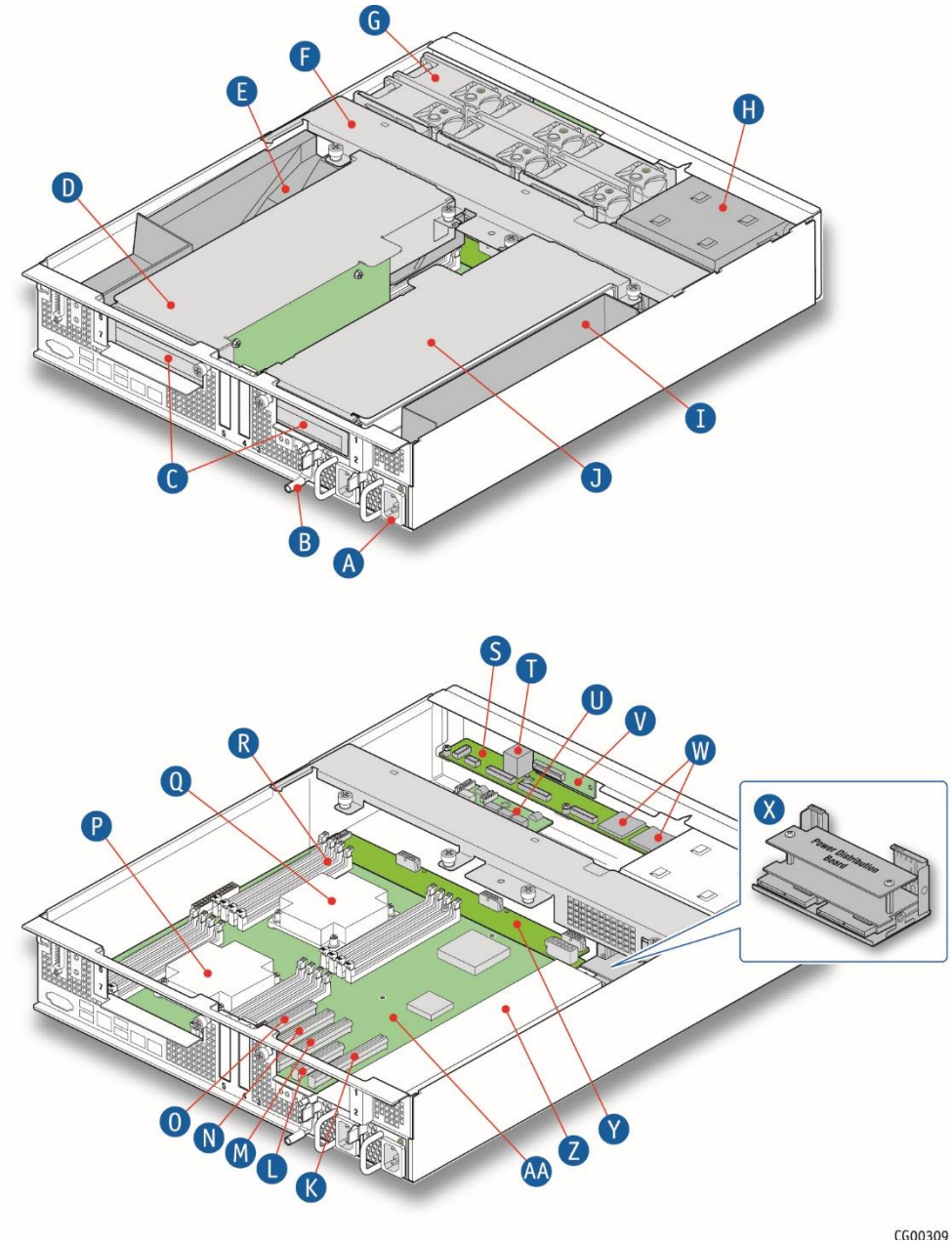
Figure 2: Kontron CG2300 Carrier Grade Server (Cover Removed)



Item	Description	Item	Description
A	Redundant, hot-swappable AC or DC power supply modules	O	Baseboard PCIe slot 6, for right-side risers only
B	Chassis Ground terminal lug	P	CPU 2
C	PCI adapter external port access for up to four adapters.	Q	CPU 1
D	Right riser card assembly	R	DDR4 DIMM slots, two banks of four DIMMs for each processor – 16 total (CPU 1-A1 to B2 slots shown)
E	CPU and DIMM air duct	S	Front panel board
F	Cable tray cover (serves also as chassis support crossbeam)	T	Combo RJ45 serial port and USB port
G	System fans (six)	U	Telco alarm module (TAM) board
H	SAS/SSD Hard Drive Bay	V	LED/switch board
I	Cable duct/Air baffle for left- side riser card assembly	W	SD flash card slots (2)
J	Left riser card assembly	X	Power distribution board (PDB)
K	Baseboard PCIe slot 2 for left-side risers only	Y	Fan control board
L	Baseboard PCIe slot 3 for internal hardware RAID adapter only	Z	Power supply cage for two power supply modules
M	Baseboard PCIe slot 4, for LP adapters only	AA	Intel® S2600CW2SK Server Board
N	Baseboard PCIe slot 5, for LP adapters only		

2.1.2 CG2300 Server Features Summary

Table 1 lists the features of the CG2300 server.

Table 1: CG2300 Server Feature List

Product Features	
System	» Designed to meet NEBS GR63 and GR1089 NEBS level 1 and 3/ETSI » Telco Alarm Manager (TAM) front panel LEDs and relays (rear connector) » RoHS 6/6 compliant » Managed life support (3-5 years)
Chassis	» Ruggedized 2U x 500mm (20" depth) » Locking cover provides 240VA protection during hot-swap of system fans » Post plated external sheet metal

Product Features	
Front Panel Buttons	» Power on/off » System reset » Chassis ID » NMI
Front Panel LEDs	» Power status » Chassis identification » System status » Fan status » HDD activity/fault » NIC activity » Alarms (Critical, Major, Minor, Power)
Storage(note 1)	» Up to six hot-swappable 2.5" SAS HDDs/SATA SSDs(note 2) » Integrated SAS/SATA interface » Various third-party HW RAID controllers supported(note 3) » Two front access SD media flash modules » Internal flash storage supported (eUSB and M.2)
System Cooling	» Six 80mm hot-swappable, redundant fans
Power	» Dual redundant 850W AC hot-swappable power supplies, 80Plus® Platinum » Dual redundant 850W DC hot-swappable power supplies » Common 850W Power Distribution Board (PDB) » PMBus 1.2 specification support » Auxiliary I/O power dongle
Baseboard	» Intel® S2600CW2SK Server Board » SSI EEB (12in x13in) form factor » One low profile 2x5-pin header for low profile eUSB solid state drives » Two SAS HD connectors supporting eight SAS drives, 12Gb/s transfer rate(Note 4) » One RMM4 Lite connector
On-board (HW) RAID Support	» Implemented through a SAS Controller – model LSI3008 - on the motherboard » 6-port SAS with RAID 0/1/10 support, built-in. » To get RAID 5/50 support, use the optional Intel® AXXRPFKHY5 upgrade key
HW RAID Adapter Support (PCI slot 3)	» Optional SAS hardware RAID controller with six internal ports and

Product Features	
	maintenance-free (SuperCap) backup (flash-based) for SAS drives
Processor	» Two LGA2011-3 (socket R3) supporting Intel® Xeon® E5-26XX v3 and v4 processors
Chipset	» Intel® C610 Chipset (PCH)
Memory	» 16 DIMM slots – 2 DIMM slots/channel – 4 memory channels per processor » Support for Registered DDR4 Memory (RDIMM) and Load Reduced DDR4 Memory (LR-DIMM). » Memory DDR4 data transfer rate of 1333, 1600, 1866 and 2133 MT/s.
I/O	» Supports two risers (4 FL/FH cards) and 2 LP adapters for a total of 6 PCIe Gen2/Gen 3 I/O cards » Two riser options for each of two PCIe slots » 2 slot FL/FH PCIe x8 passive (right side* - Gen3) » 2 slot FL/FH PCIe x8 passive (left side* - Gen3) » 1 slot FL/FH PCIe x16 passive (right side* - Gen3) » 1 slot FL/FH PCIe x16 passive (left side* - Gen3) ** Right- or left-side orientation as looking from the front of the chassis* » Front panel: one RJ-45 serial connector, one USB 2.0 connector » Rear panel: two USB 2.0 connectors, two USB 3.0 connectors, one management NIC port, two RJ-45 network interface connectors supporting 10/100/1000 Mbps, one TAM dry relay connector, one RGB Video VGA connector.
Server Management	» Integrated BMC (iBMC) with advanced options
Video	» Integrated 2D Video Graphics controller

The CG2300 S2600CW2SK Server Board is mounted horizontally toward the rear of the chassis behind the CPU/memory area fan board.

Up to six 2.5-inch hot-swappable SAS technology rotating hard drives and/or SATA solid state drives can be mounted in the drive bay, which is accessed from the front of the chassis with the front bezel removed. Figure 2 shows the location of the drive bay.

NOTES:
1) SATA rotating HDDs are not recommended for use in this system because they are sensitive to rotational vibration from system fan blades and other HDDs.
2) Drives can consume up to 12W of power, each. Drives used in this system must be specified to run at a maximum ambient temperature of 40°C.
For a list of validated hard drive manufacturers and hard drive types, refer to the Tested Hardware and Operating System List (THOL) on the Kontron website at http://www.kontron.com (search for CG2300, click on Downloads, then Compatibility Matrix).
3) For a list of HW RAID, refer to the Tested Hardware and Operating System List (THOL) on the Kontron website at http://www.kontron.com (search for CG2300, click on Downloads, then Compatibility Matrix).
4) Only 6 connections are available on the platform.

The Front Panel (FP) board and LED/switch board that provide the user interface for the system and the Telco Alarms Management board are located in front of the system fans.

Up to two hot-swappable 850W power supply modules can be installed at the rear of the chassis for a 1+1 redundant configuration. The server comes with a filler module that must be installed in the empty power supply slot in systems without redundancy. The left slot (looking from the front of the system) is the non-redundant power supply module location.

Three redundant pairs of 80x38mm hot-swappable system fans cool the S2600CW2SK server board and other components. These fans are installed directly behind the FP board and in front of the fan control board and the S2600CW2SK server board. The fan control board has three 2x6-pin connectors to power and control the system fans. Each fan has its own separate carrier that includes a fault LED.

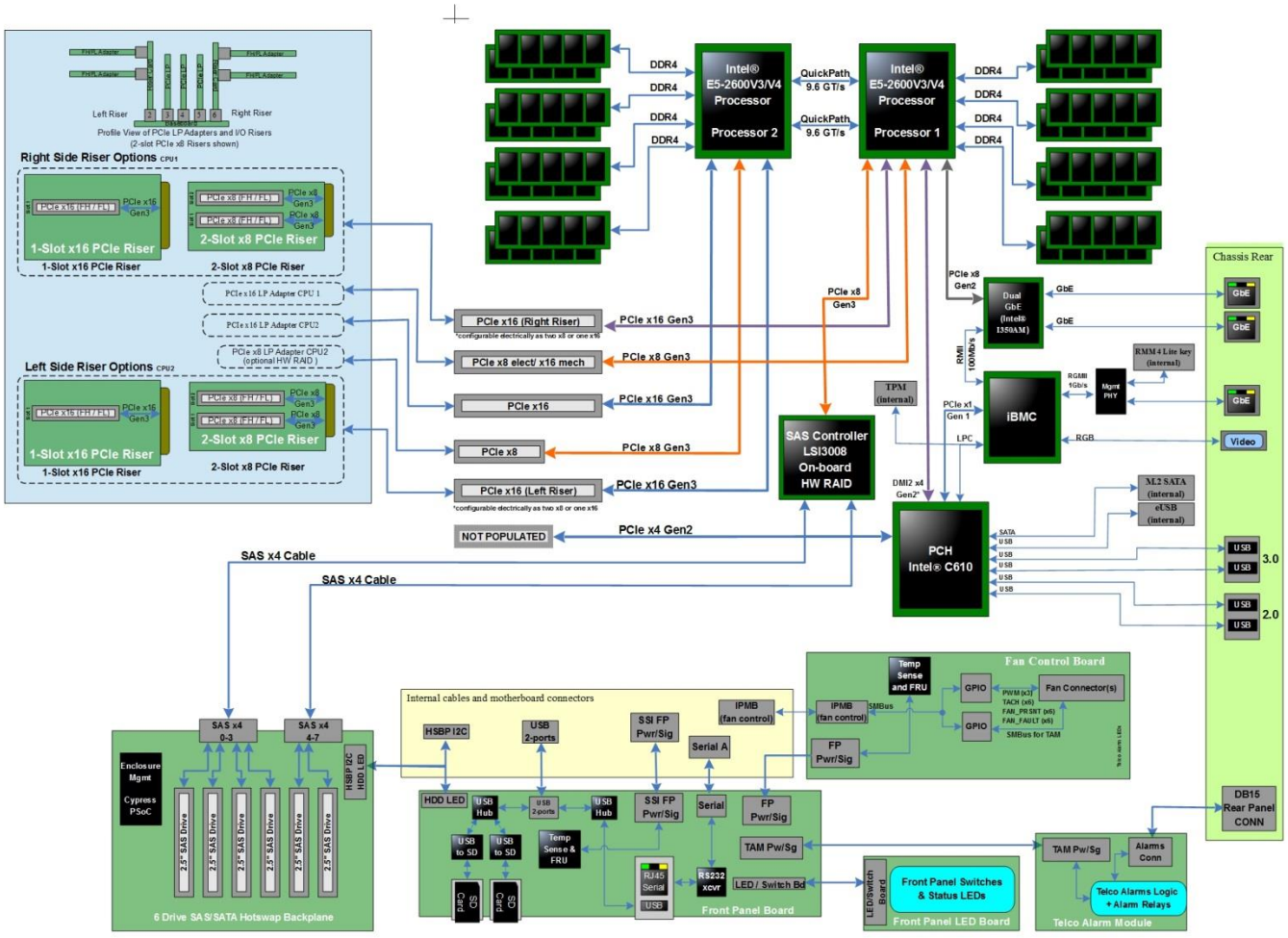
Unlike some previous Kontron servers, cooling for the hard disk drives (HDDs) in the CG2300 server is provided by the three redundant pairs of 80x38mm system fans rather than from 40x40mm power supply fans. Cooling air is drawn through an L-shaped air duct located behind and to the right side of the HDD bay. The front panel of the chassis is designed to ensure that sufficient air is drawn through the HDD air duct.

Cooling air for the power distribution board (PDB) is provided by the left-most pair of 80x38mm system fans.

The front bezel design allows adequate airflow for cooling the system components and it can also be customized to meet OEM industrial design requirements. The bezel has to be removed to access the drive carriers in the hard drive bay and the SD flash card slots.

Figure 3 is a block diagram of the CG2300 server subsystems.

Figure 3: CG2300 Server Block Diagram



2.2 CG2300 Server External Chassis Features

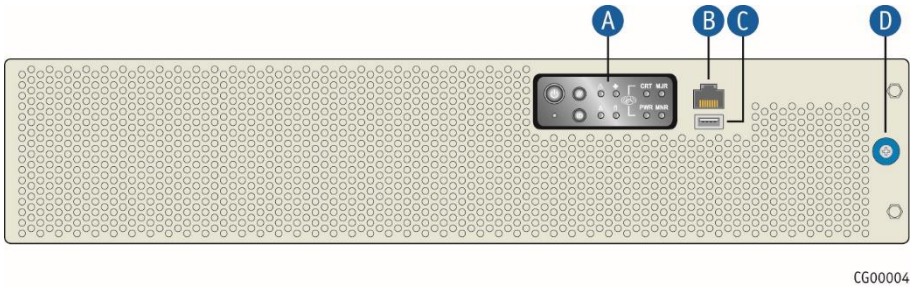
This section shows the features on the front and rear panels of the CG2300 server chassis.

2.2.1 Chassis – Front Views

Figure 4 shows the front of the CG2300 server with the bezel installed

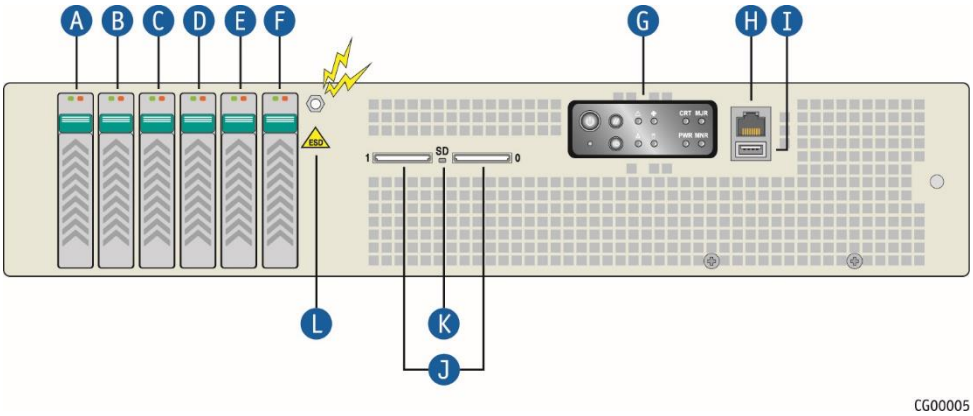
Figure 5 shows the front of the server with the bezel removed. Removing the bezel provides access to the hard drive carriers and SD card slots.

Figure 4: Front View of the CG2300 Server (Bezel Installed)



Item	Description	Item	Description
A	Front panel control buttons, status indicator and telco alarm LEDs	C	USB port (2.0)
B	RJ45 serial port	D	Bezel captive screw

Figure 5: Front View of CG2300 Server (Bezel Removed)



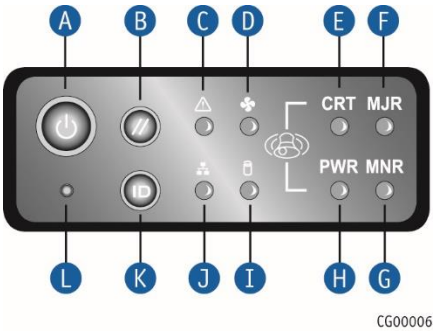
Item	Description	Item	Description
A	Hard disk drive slot 5	G	Front panel control buttons, status indicator and telco alarm LEDs
B	Hard disk drive slot 4	H	RJ45 serial port
C	Hard disk drive slot 3	I	USB 2.0 port
D	Hard disk drive slot 2	J	SD flash card slots
E	Hard disk drive slot 1	K	SD flash module LED
F	Hard disk drive slot 0	L	ESD ground strap attachment

For information about the hard disk drive activity LEDs, see section 7.3, “Hard Disk Drive Activity and Fault LEDs.”

Front Panel

The front panel features are shown in Figure 6. All front panel switches and status LEDs are located on the LED/switch board. See Section 5.2, “LED/Switch Board Features” for a detailed description of the control switches and status LEDs on the front panel.

Figure 6: Front Panel Details



Item	Description	Item	Description
A	Power button	G	Minor alarm (amber)
B	System reset button	H	Power alarm (amber)
C	System Status LED	I	HDD activity LED
D	Fan status LED	J	NIC activity LED
E	Critical alarm (amber or red†)	K	Chassis ID button
F	Major alarm (amber or red†)	L	NMI button

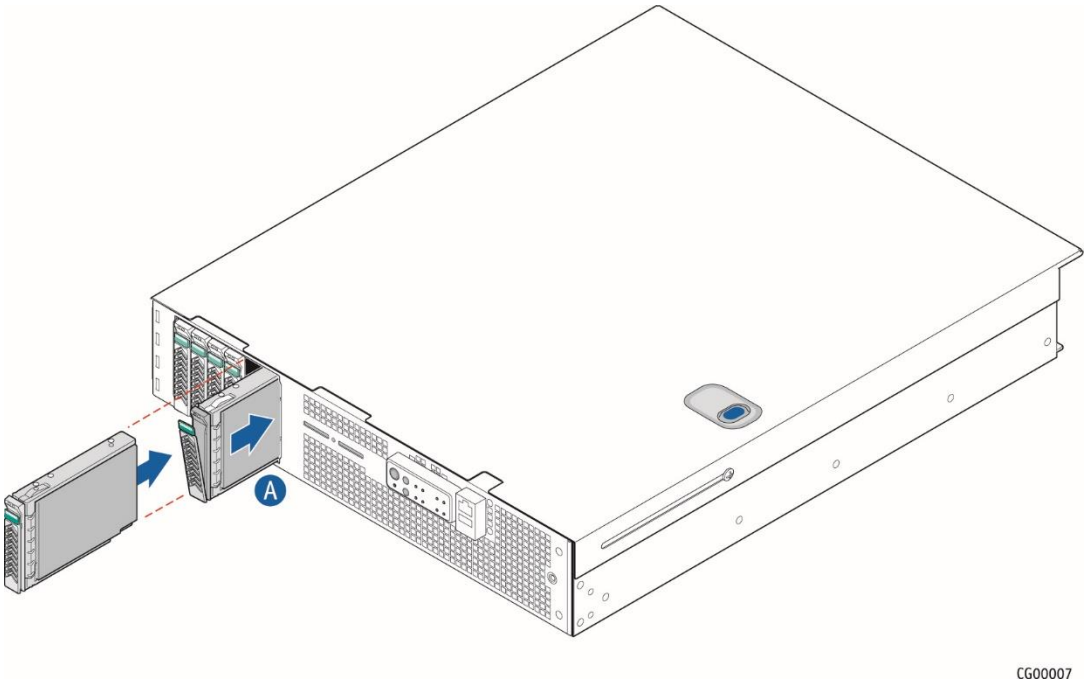
† Critical and Major alarm indicators are bi-color LEDs that can be configured to be amber or red by using an SDR TAM setting. Amber is the default color.

Hard Drives

The CG2300 Carrier Grade Server chassis supports up to six hard disk drives that are accessible from the front of the chassis with the bezel removed. The hard disk drives are mounted in removable drive carriers (Figure 8, "A") that latch into the drive bay sub-assembly. Up to six 2.5-inch hot-swappable SAS technology rotating hard drives and/or SATA solid state drives can be mounted in the drive bay.

The hard disk drives installed in the carriers are hot-swappable. The front bezel must be removed to access the hard disk drive slots.

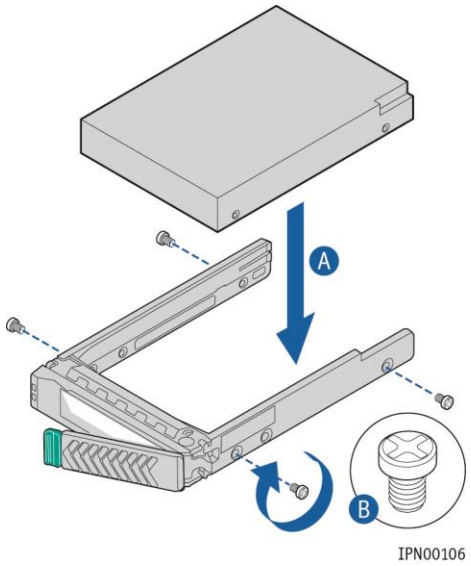
Figure 7: Hard Disk Drives



SAS Hard Drive Carriers

Each hard drive used in the server must be mounted to a drive carrier (A) using four screws (B) inserted into the sides of the drive (with 4 lbs-in torque, max), as shown in Figure 8.

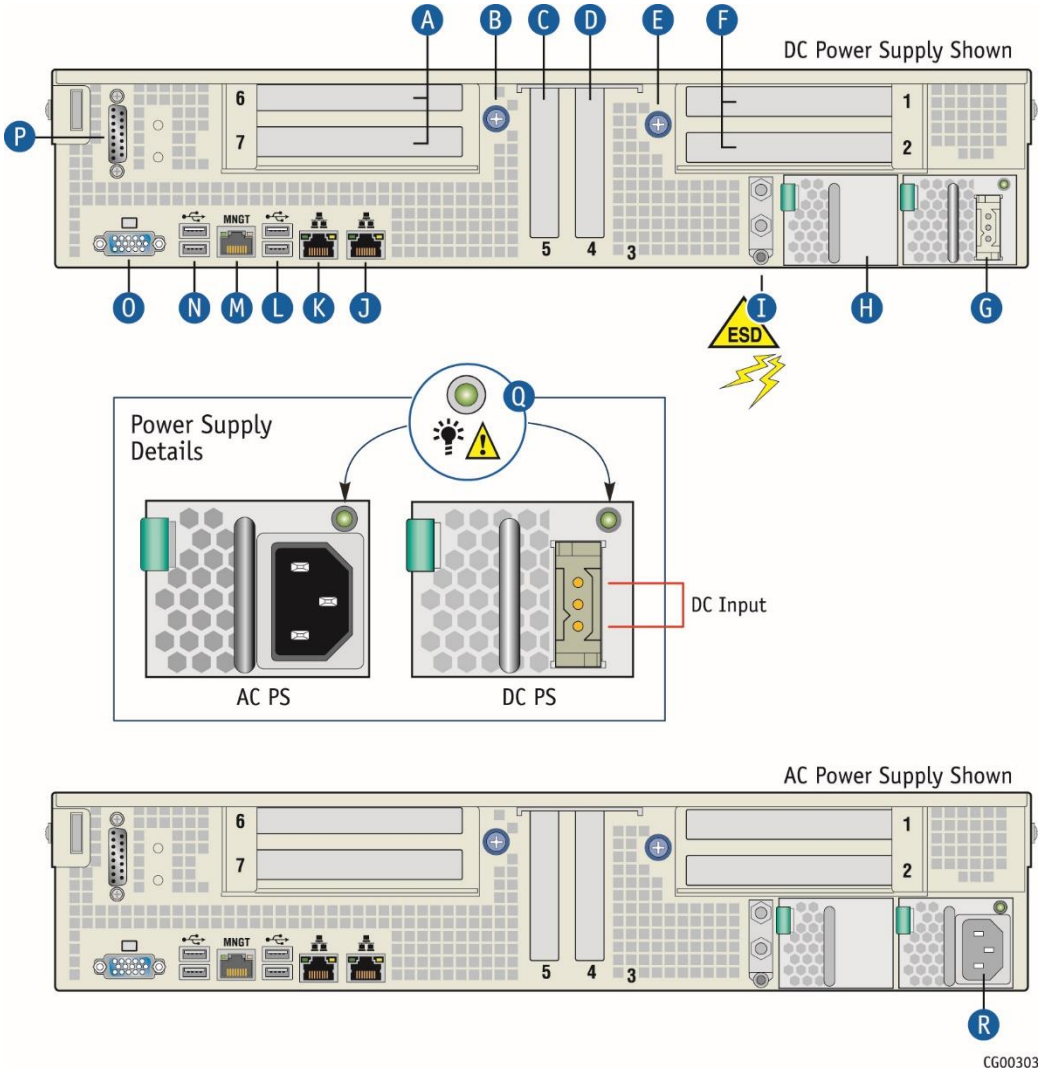
Figure 8: SAS Hard Drive Carrier Assembly



2.2.2 Chassis - Rear View

Figure 9 shows the rear of the CG2300 server chassis.

Figure 9: Chassis Rear View



Item	Description	Item	Description
A	Right[1] 2-slot FL/FH PCIe assembly (slots 6 and 7)	J	GbE NIC2
B	Thumb screw to secure right PCIe assembly (A)	K	GbE NIC1
C	LP PCIe adapter (slot 5)	L	USB0 and USB1 (USB0 on top, USB 3.0)
D	LP PCIe adapter (slot 4)	M	RMM4 Dedicated Server Management NIC
E	Thumb screw to secure left PCIe assembly (F)"	N	USB2 and USB3 (USB2 on top, USB 2.0)
F	Left[1] 2-slot FL/FH PCIe assembly (slots 1 and 2)	O	Video connector
G	Power supply 1 (shown with DC power supply installed)	P	TAM dry relay connector
H	Optional power supply 2 (shown with filler panel)	Q	Power Supply LED signals

NOTES:
1. Right and left notation for PCIe assemblies means when looking from the front of the system.
2. In non-redundant configurations, power supply slot 2 must have a filler panel installed.

2.3 CG2300 Server Internal Features

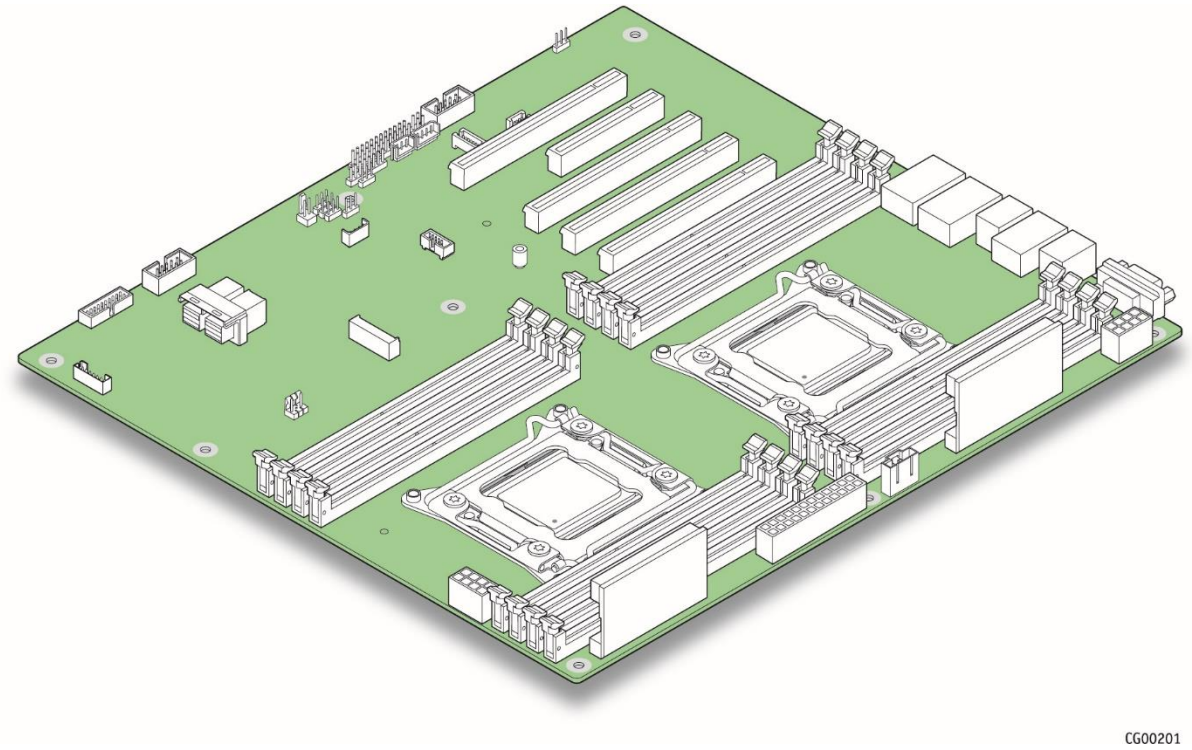
This section covers all of the components inside the CG2300 chassis.

2.3.1 Intel S2600CW2SK Server Board

NOTE: See the *Intel® S2600CW2SK Server Board Technical Product Specification* on the Kontron website for detailed information about the baseboard used in this server.

Figure 10 shows the S2600CW2SK server board.

Figure 10: S2600CW2SK Server Board Layout



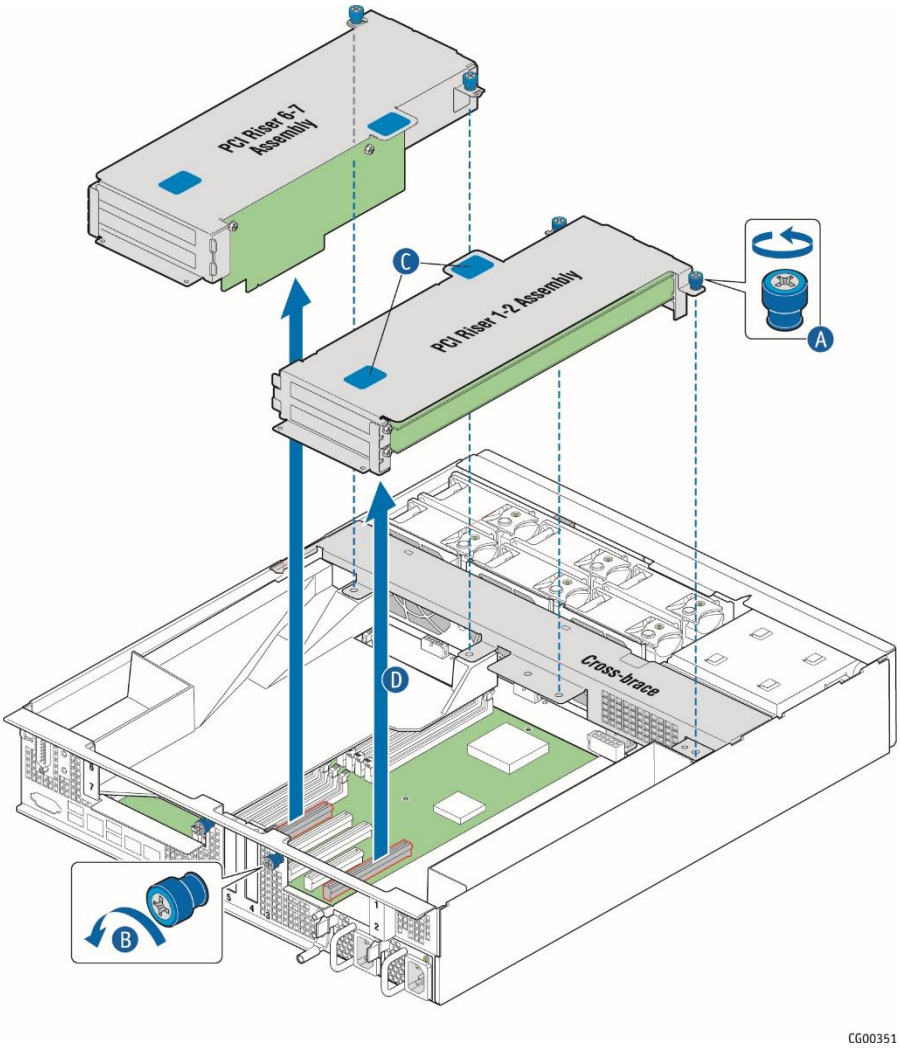
2.3.2 PCI Riser Card Assembly

There are two PCI-Express (PCIe) riser card assemblies; left-side and right-side, as seen from the front of the system. Both assemblies house up to two PCIe riser cards. For more information, see Chapter 10, "PCI Riser Card Assembly".

The riser cards, along with the appropriate PCIe adapter cards, are assembled into the sheet metal housing while the assembly is removed from the chassis.

Figure 11 shows the installation or removal of the riser card assemblies

Figure 11: Riser Card Assemblies

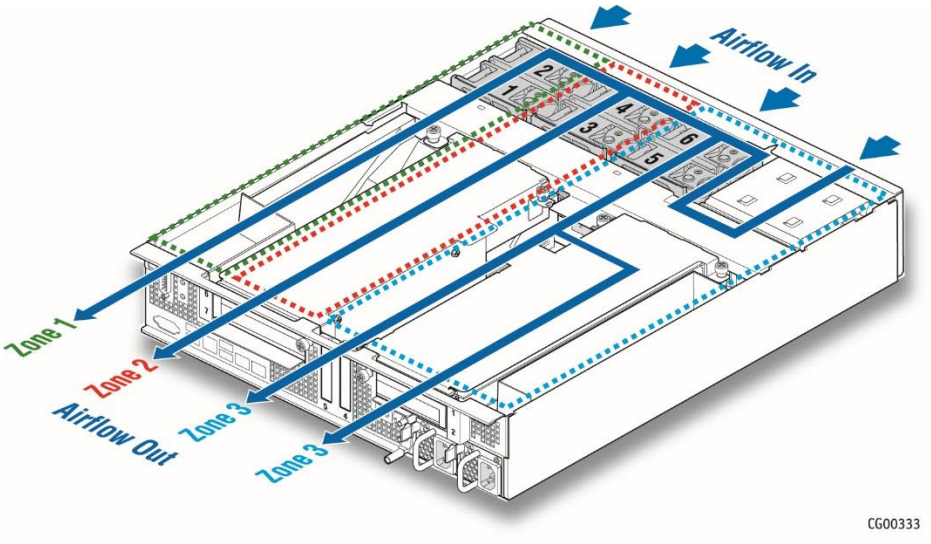


NOTES: 1) Two captive screws (A) at the front of the riser assemblies and one on the rear panel (B) secure each assembly in the chassis.
2) Use the blue touch points when installing the riser assembly in the server board slot.

2.3.3 Cooling Subsystem

All system components except the power distribution board and power supplies are cooled by a set of six fans mounted near the front of the chassis behind the front panel board, as shown in Figure 12.

Figure 12: Cooling Subsystem



The CG2300 server has six 80x38mm fans, configured as three redundant pairs. There are three cooling zones indicated by the colored dotted lines in Figure 12.

- Zone 1 (green dotted lines) contains fans 1 and 2, which cool CPU1, CPU2, DIMMs A1, A2, B1, B2, G1, G2, H1, H2 and all other components in this zone. Air flows through the front bezel to the rear of the chassis (zone 1 arrow).
- Zone 2 (red dotted lines) contains fans 3 and 4 which cool DIMMs C1, C2, D1, D2, E1, E2, F1, F2, the right-side PCI riser assembly, and all other components in this zone. . Air flows through the front bezel to the rear of the chassis (zone 2 arrow).
- Zone 3 (blue dotted lines) contains fans 5 and 6 which cool the six HDDs, the two LP PCI adapters in baseboard slots 3 and 4, the left-side PCI riser assembly and all the other components in this area. Air flow takes two routes for this zone; from the front bezel over the drive bay to the fans and straight back to the rear of the chassis (left zone 3 arrow) or over the drive bay to the fans and then back over the power supplies to the rear of the chassis. (right zone 3 arrow).
- Internal power supply fans as well as system fans 5 and 6 cool the power distribution board (PDB) and power supply modules.

Air ducts direct air over the a) CPUs and memory area of the baseboard in cooling zones 1 and 2, b) the C610, IC chip, in cooling zone 3, and c) the left PCI riser assembly also in cooling zone 3. See Figure 12.

The right riser card assembly sits above the CPU/memory air duct in zone 2. Vertical baffles on the top surface of the CPU/memory air duct combined with the riser card assembly and its sheet metal housing form an air duct for the PCI adapters installed in the right riser card assembly. See Figure 12.

The left riser card assembly sits above the left-most portion of the baseboard and power supply module 2 in Zone 3. The left riser card assembly and its sheet metal housing and the air baffle installed to the left of the riser card assembly form an air duct for the PCI adapters installed in the left riser card assembly. See Figure 12.

Ambient Temperature Control

The fan board contains three separate pulse-width-modulation (PWM) circuit domains that control the speed of the six system fans. PWM fan speed control enables quiet system operation when the ambient temperature is low and there are no fan failures. Domain 0 controls fans 1 and 2, domain 1 controls fans 3 and 4, and domain 2 controls fans 5 and 6.

Cooling Summary

The six-fan cooling subsystem is sized to provide cooling for:

- Up to two processors
- 256 Gbytes of DDR4 DIMM memory
- Six hard drives
- Up to six PCIe cards (250W max for six slots)

The cooling subsystem meets acoustic and thermal requirements at lower fan speed settings, i.e., at 23 ^{0}C+/-2^{0}C. Thermal requirements are met for the maximum ambient temperatures. However, acoustic limits are not specified above 23^{0}C+/-2^{0}C. The environmental specifications are summarized in Chapter 15, "Regulatory Specifications".

2.4 CG2300 Server Platform Management Subsystem

See the *Intel® S2600CW2SK Server Board Technical Product Specification* for a detailed description of the Platform Management design and features.

The on-board platform management subsystem consists of communication buses, sensors, system BIOS, and server management firmware.

The platform management system supports standard IPMI features as well as other features not part of IPMI.

2.4.1 IPMI 2.0 Features

- Baseboard management controller (BMC)
- IPMI Watchdog timer
- Messaging support, including command bridging and user/session support
- Chassis device functionality, including power/reset control and BIOS boot flags support
- Event receiver device: The BMC receives and processes events from other platform subsystems.
- Field Replaceable Unit (FRU) inventory device functionality:
  The BMC supports access to system FRU devices using IPMI FRU commands, including SEL Severity Tracking and the Extended SEL.
- System Event Log (SEL) device functionality:
  The BMC supports and provides access to a SEL.
- Sensor Data Record (SDR) repository device functionality:
  The BMC supports storage and access of system SDRs.
- Sensor device and sensor scanning/monitoring:
  The BMC provides IPMI management of sensors and polls sensors to monitor and report system health.
- IPMI interfaces:
  - Host interfaces include System Management Software (SMS) with receive message queue support, and Server Management Mode (SMM)
  - IPMB interface
  - LAN interface that supports the IPMI-over-LAN protocol (RMCP, RMCP+)
- Serial-over-LAN (SOL)
- ACPI state synchronization
  The BMC tracks ACPI state changes that are provided by the BIOS.

» BMC self-test
The BMC performs initialization and run-time self-tests and makes results available to external entities.

2.4.2 Non-IPMI Features

The Integrated BMC also supports the following non-IPMI features.

» In-circuit BMC firmware update

» Fault resilient booting (FRB): FRB2 is supported by the watchdog timer functionality.

» Power supply redundancy monitoring and support

» Fan redundancy monitoring and support

» Hot-swap fan support

» System airflow monitoring

» Acoustic management, support for multiple fan profiles

» Ethernet controller thermal monitoring

» Platform environment control interface (PECI) thermal management support

» Memory thermal management

» DIMM temperature monitoring
new sensors and improved acoustic management using a closed-loop fan control algorithm taking into account DIMM temperature readings.

» Power supply redundancy monitoring and support

» Power unit management
Support for power unit sensor
The BMC handles power-good dropout conditions.

» Intel® Intelligent Power Node Manager support

» Signal testing support
The BMC provides test commands for setting and getting platform signal states.

» The BMC generates diagnostic beep codes for fault conditions.

» System GUID storage and retrieval

» Front panel management
The BMC controls the system status LED and chassis ID LED and supports secure lockout of certain front panel functionality and monitors button presses.
The chassis ID LED is turned on using a front panel button or a command.

» Basic fan control using TControl version 2 SDRs

» Power state retention

» Power fault analysis

» Intel® Light-Guided Diagnostics

» Address Resolution Protocol (ARP)
The BMC sends and responds to ARPs (supported on embedded NICs).

» Dynamic Host Configuration Protocol (DHCP)
The BMC performs DHCP (supported on embedded NICs).

» E-mail alerting

» Embedded web server:

- Human-readable SEL
- System configurability
- System monitoring capability
- On-line help

- Integrated KVM (requires Advanced management key)
- Integrated Remote Media Redirection (requires Advanced management key)
- Local Directory Access Protocol (LDAP) support
- Enhancements to KVM redirection
  - Support for higher resolution
- Embedded platform debug feature that allows capture of detailed data for later analysis by Intel engineering.
- Provisioning and inventory enhancements:
  - Inventory data/system information export (partial SMBIOS table)
- DCMI 1.5 compliance
- Management support for PMBus rev1.2 compliant power supplies
- Support for embedded web server UI in Basic Manageability feature set
- Power Supply FW Update
- BMC FW reliability enhancements:
  - Redundant BMC boot blocks to avoid a possible scenario where a corrupted boot block prevents a user from updating the BMC
  - BMC System Management Health Monitoring

2.5 CG2300 Server Specifications

This section lists the environmental and physical specifications for the CG2300 server.

2.5.1 Environmental Specifications

The CG2300 server is designed and tested to meet K00158, the CRMS environmental test standards specification.

Table 2: Environmental Specifications Summary

Environment	Specification
Temperature, operating	NEBS Level 3 +5ºC to 40ºC (41º F to 104º F) NEBS Level 1 +10ºC to 35ºC (50º F to 95º F)
Temperature, non-operating	-40º C to 70º C (-40º F to 158º F)
Temperature, short-term* NEBS Level 3 only	-5ºC to 55 ºC (23º F to 131º F) *Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that one-year period.)
Humidity, operating	5% to 85%
Humidity, non-operating	95%, non-condensing at temperatures of 23º C to 40º C (73º F to 104º F)
Altitude	-60 to 1800m (-197 to 5906 ft) @ 40ºC max.

Environment	Specification
	1801 to 4000m (5909 to 13,123 ft) @ 30ºC
Vibration, non-operating	Random profile 5Hz @ 0.001g²/Hz to 20Hz @ 0.01g²/Hz (slope up) 20Hz to 500Hz @ 0.01g²/Hz (flat) Input acceleration is 2.20g RMS 10 min. per axis, in all 3 axes, on all samples Random control limit tolerance in +/- 3dB
Shock operating	Half-sine 2G, 11 ms pulse, 100 pulses in each direction, on each of the three axes
Shock non-operating	Trapezoidal, 25G, 205 inches/sec delta V, two drops in per face, (total 12 drops)
Electrostatic discharge (ESD)	Tested ESD levels up to 12kV (kilovolts) air discharge and up to 8kV contact discharge without physical damage
Acoustic	Sound power: 70 dB max at ambient temperatures < 23°C +/- 2°C
RoHS	Complies with RoHS Directive 2011/65/EU and RoHS 6/6

2.5.2 Physical Specifications

Table 3 describes the physical specifications of the CG2300 server.

Table 3: Physical Dimensions (Max)

Height	3.45 inches (87.6 mm)
Width	17.14 inches (435.3 mm)
Depth	20 inches (508mm)
Front Clearance	2 inches (76 mm)
Side Clearance	1 inch (25 mm)
Rear Clearance	3.6 inches (92 mm)

Table 4: Shipping Weights (Max)

Description	Weight (Kg)	Weight (lbs)
System weight - max configuration (all LP PCI adapters, AC or DC PS)	17.98	39.64
System weight - Base configuration (as shipped from factory)	13.98	30.80
System packaging	2.78	6.12
AC power supply	1.05	2.32
DC power supply	1.06	2.34
CPU heatsink with hardware and TIM	0.41	0.92
RAID adapter and flashback cache module	0.18	0.38
HDD carrier	0.09	0.20
Bezel	0.25	0.54
Riser card (dual slot PCIe x8)	0.08	0.16
Generic 2.5in SAS HDD (spinning media)	0.22	0.48
Generic DIMMs (quantity of 2)	0.04	0.08
Solid state HDD	0.08	0.19
eUSB module	0.01	0.02
M.2 module	0.01	0.02
CPU without heatsink	0.04	0.09

3 Cables and Connections

This chapter describes interconnections between various components of the Kontron CG2300 Carrier Grade Server using an overview diagrams and a table that describes the system connectors. Refer to the *Intel® Server Board S2600CW Family Technical Product Specification* or the board chapters in this document for more information about connector locations and interconnections between server components.

3.1 Interconnect Block Diagram

Figure 13 shows all of the system level cabled interconnections. Each cable is identified and defined in Table 4.

Figure 13: CG2300 Server Interconnect Block Diagram

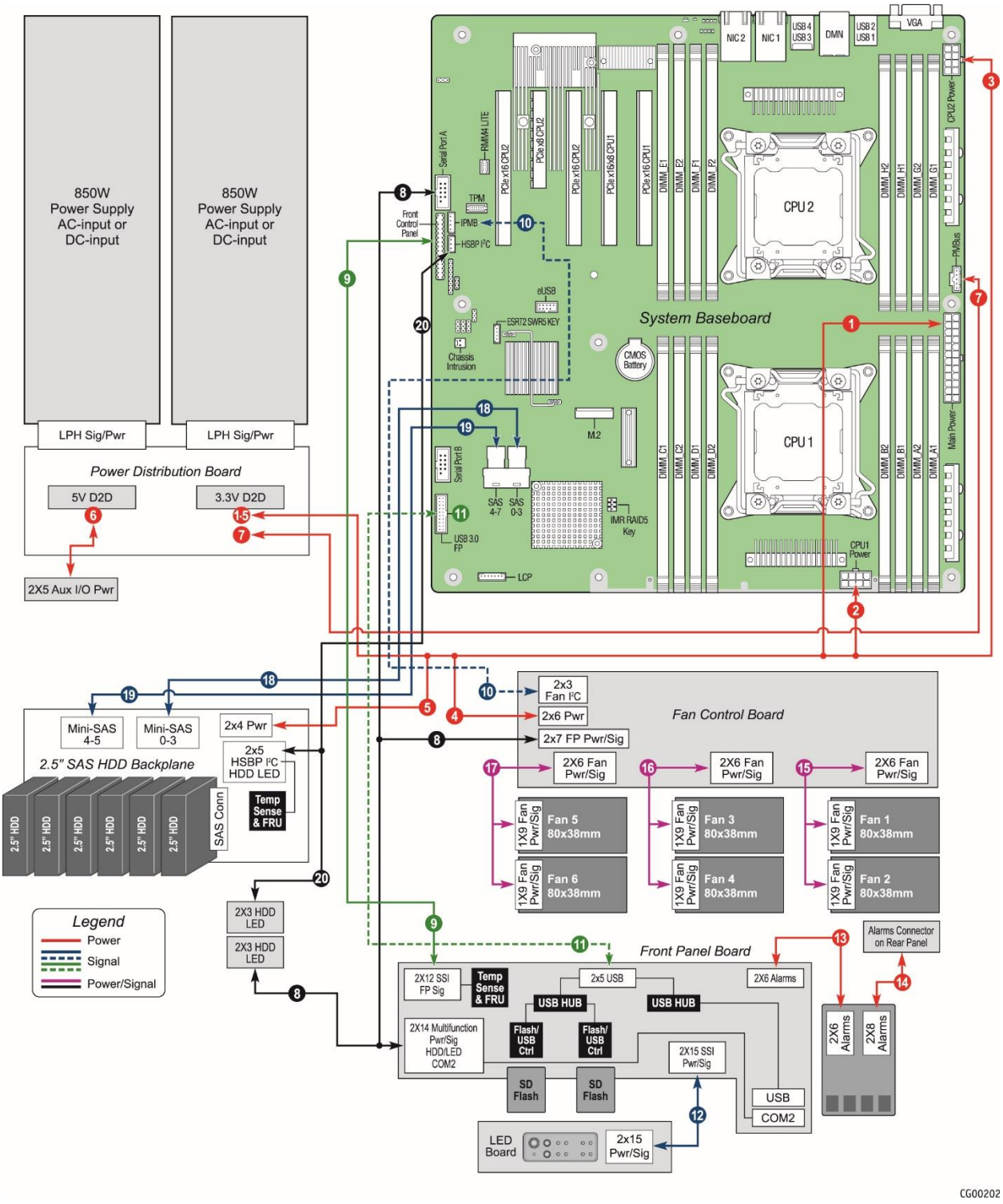


Table 5: System Cables

Interconnect No. and Name	Connections
1. Baseboard SSI Main Power Provides power to the baseboard and the power supply with the PS-ON signal	Power Distribution Board 3.3V D2D (soldered) to Baseboard MAIN_PWR (J9G1)
2. CPU 1 and DIMM Power Provides power for CPU 1 and the DIMMs associated with CPU 1	Power Distribution Board 3.3V D2D (soldered) to Baseboard CPU_1_PWR (J8K2)
3. CPU 2 and DIMM Power Provides power for CPU 2 and the DIMMs associated with CPU 2	Power Distribution Board 3.3V D2D (soldered) to Baseboard CPU_2_PWR (J9A2)
4. Fan Control Board Power Provides power for the fan control board and the six 80mm system fans	Power Distribution Board 3.3V D2D (soldered) to Fan Control Board Power (J9A2)
5. SAS HDD Backplane Board Power Provides power for the HDD backplane board and up to six SAS HDDs	Power Distribution Board 3.3V D2D (soldered) to SAS HDD Backplane Power (J11)
6. Aux I/O Power Dongle Provides power to a 10-pin connector where customers can connect a custom cable of their own design to provide auxiliary power to high-power PCIe adapters	Power Distribution Board 5V D2D (soldered) to Cable-to-Cable NC (custom connection)
7. Baseboard SSI Power Control Signal Provides PMBus signals between the power supplies and the baseboard	Power Distribution Board 3.3V D2D (soldered) to Baseboard PMBUS (J9E1)
8. Multifunction Front Panel Board (Power and Signal, HDD LED, COM2) Interconnects the front panel board, fan control board, baseboard, and the HDD LEDs (C-2-C)	Front Panel Board (multifunction) to Fan Control Board PWR/SIG (J1A1), Baseboard SERIAL_A, and C-2-C HDD LED (NC)
9. SSI Front Panel Board Connects the front panel board with the baseboard	Baseboard SSI_FRONT_PANEL (J1A2) to Front Panel Board SSI signal (J1)
10. Fan I^2C Connects the baseboard and the fan control board to provide fan control signals	Baseboard IPMB (J1D4) to Fan Control Board I^2C (J8A1)
11. Front Panel Board USB Connects the baseboard to the front panel board to provide USB2.0 signals	Baseboard USB_5-6 (J1K1) to Front Panel Board USB (J4)
12. LED/Switch Board Power and Signal A power and signal cable that connects the LED/switch board to the front panel board	Front Panel Board SSI PWR/SIG (J2) to LED/Switch Board PWR/SIG (J1)
13. TAM Signal A signal cable that connects the TAM board to the front panel board	Front Panel Board Alarms (J3) to TAM Module Alarms (J2)
14. Alarms Connects the TAM board to the chassis rear panel alarms connector	TAM Module Alarms, J1 to System Rear Panel Alarms Connector (the DB-15)
15. Fan (Fans 1-2) Connects system fans 1 -2 to the fan control board	Fan Control Board PWR/SIG(J3A1) to Fan Pair (1-2) PWR/SIG (mechanically, only possible fit)
16. Fan (Fans 3-4) Connects system fans 3-4 to the fan control board	Fan Control Board PWR/SIG (J6A1) to Fan Pair (3-4) PWR/SIG (mechanically, only possible fit)
17. Fan (Fans 5-6) Connects system fans 5-6 to the fan control board	Fan Control Board PWR/SIG (J9A1) to Fan Pair (5-6) PWR/SIG (mechanically, only possible fit)
18. SAS 1 (HDD 0-3) Connects the HDD backplane board to SAS HDD 0-3 connector on the baseboard	SAS HDD Backplane MINISAS0 (J1) to Baseboard SAS_0-3 (J1H3)
19. SAS 2 (HDD 4-5)	SAS HDD Backplane Board MINISAS1 (J3) to Baseboard SAS_4-7 (J1H3)

Interconnect No. and Name	Connections
Connects the HDD backplane board to the SAS HDD 4-7 connector on the baseboard (for HDDs 4-5)	
20. HSBP I2C/HDD LED Connects the HDD HSBP (hot-swap backplane) board to the baseboard and front panel board to provide HDD LED signal control on the disk drive carriers and on the system front panel	SAS HDD Backplane Board HSBP I^2C (J2) to Baseboard HSBP I^2C, J1D3 and Front Panel Board C-2-C (HDD-LED).

3.2 User-Accessible Connectors

This section covers all connectors on the front and rear panels of the CG2300 server.

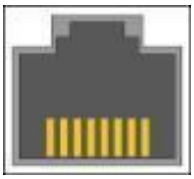
3.2.1 Keyboard and Mouse Ports

The keyboard and mouse connect to two of the four USB ports on the rear panel. See the "Universal Serial Port (USB) Interface" section for the USB port pin definitions.

3.2.2 Serial Port

The CG2300 server has one 8-pin RJ45 connector on the front panel board.

Figure 14: Front Panel Board Serial Port (RJ45)

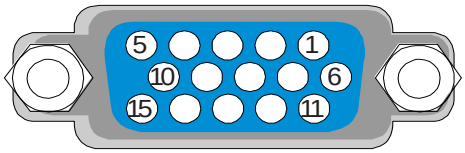


Pin	Signal
1	RTS (request to send)
2	DTR (data terminal ready)
3	TXD (transmit data)
4	GND
5	RIA (ring indicator)
6	RXD (receive data)
7	DSR/DCD (date set ready / data carrier detect
8	CTS (clear to send)

3.2.3 Video Port

The video port interface is a standard VGA-compatible, 15-pin connector. Video is supplied by an on-board ServerEngines video controller with 16 Mbytes of on-board video DDR3 SDRAM

Figure 15: Video Connector

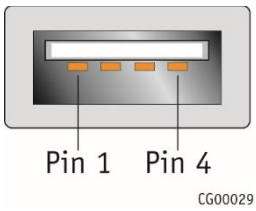


Pin	Signal
1	Red (analog color signal R)
2	Green (analog color signal G)
3	Blue (analog color signal B)
4	No connection
5	GND
6	GND
7	GND
8	GND
9	VCC (+5 V)
10	GND
11	No connection
12	DDC_SDA
13	HSYNC (horizontal sync)
14	VSYNC (vertical sync)
15	DDC_SCL

3.2.4 Universal Serial Port (USB) Interface

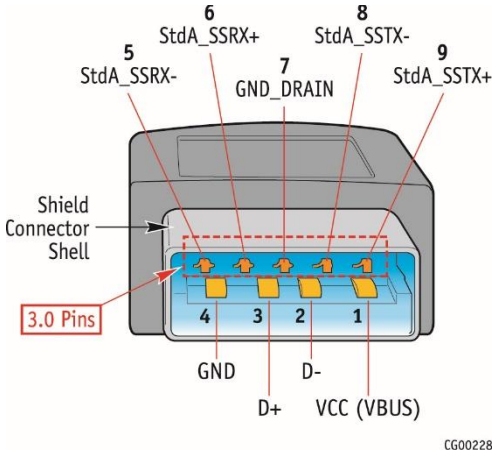
There are five externally accessible USB ports on the CG2300 server: four ports at the rear of the system (two USB 2.0, two USB 3.0) and one at the front (USB 2.0). The port on the front panel is accessible without removing the front bezel. The built-in USB ports permit the direct connection of five (one front, four rear) USB peripherals without an external hub. If more devices are required, an external hub can be connected to any of the user-accessible built-in ports. There are also two internal USB ports that can be used for embedded flash drives.

Figure 16: USB 2.0 Connector



Pin	Signal
1	Fused VCC (+5 V w/over-current monitor of ports 0, 1, 2, and 3)
2	DATAL0 (differential data line paired with DATAH0)
3	DATAH0 (differential data line paired with DATAL0)
4	GND

Figure 17: USB 3.0 Connector



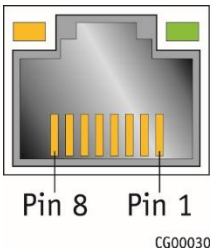
Pin	Signal Name	Description
Shell	Shield	Metal Housing
1	VBUS	Power
2	D-	USB 2.0 Differential Pair
3	D+	
4	GND	Ground for power return

3.2.5 Ethernet NIC Ports

The S2600CW2SK server board (baseboard) provides two network interface controller (NIC), 8-pin, RJ45 connectors oriented side-by-side on the back edge of the board and accessible at the rear I/O panel. The pin-outs for each connector are identical and defined in the table below.

The board also provides a 1Gb RJ45 Dedicated Management NIC port (DMN) for the Intel® Remote Management Module (RMM4 Lite). The DMN is active with or without the RMM4 Lite key installed.

Figure 18: RJ45 Ethernet Connector



Pin	Signal Name	Description
1	BI_DA+	Bi-directional pair A, +
2	BI_DA-	Bi-directional pair A, -
3	BI_DB+	Bi-directional pair B, +
4	BI_DC+	Bi-directional pair C, +
5	BI_DC-	Bi-directional pair C, -

Pin	Signal Name	Description
6	BI_DB-	Bi-directional pair B, -
7	BI_DD+	Bi-directional pair D, +
8	BI_DD-	Bi-directional pair D, -

Each network interface controller drives two LEDs located on the RJ45 connector. The link/activity LED (at the right of the connector) indicates a network connection when on and transmit/receive activity when blinking. The speed LED (at the left of the connector) indicates 1000-Mbps operation when amber, 100-Mbps operation when green, and 10-Mbps when off. Table 6 defines the LEDs

Table 6: NIC Status LED

LED Color	LED State	NIC State
Green/Amber (Left)	Off	10Mbps
	Green	100 Mbps
	Amber	1000 Mbps
Green (Right)	On	Active Connection
	Blinking	Transmit/Receive activity

3.2.6 Telco Alarms External Interface Port

The telco alarms external interface connector is located on the rear panel of the chassis, on the far left side. (See Figure 9, "Chassis Rear View" for the exact location.) The alarms cable connects the TAM board and the alarms port on the back of the system. The alarms port interface is a standard DB15 connector.

Table 7 shows the pin definitions for the 2x8 16-pin alarms external interface connector on the TAM board.

Table 7: Telco Alarms External Interface Connector Pin-Out

Pin	Signal Name	Description
1	MINOR_RST_POS	Minor reset positive
2	MINOR_RST_NEG	Minor reset negative
3	MAJOR_RST_POS	Major reset positive
4	MAJOR_RST_NEG	Major reset negative
5	CRITICAL_NO	Critical alarm normally open
6	CRITICAL_NC	Critical alarm normally closed
7	CRITICAL_COMM	Critical alarm common
8	MINOR_NO	Minor alarm normally open
9	MINOR_NC	Minor alarm normally closed
10	MINOR_COMM	Minor alarm common
11	MAJOR_NO	Major alarm normally open
12	MINOR_NC	Major alarm normally closed
13	MAJOR_COMM	Major alarm common
14	PWR_NO	Power alarm normally open
15	PWR_COMM	Power alarm common
16	GND	Ground

3.2.7 Auxiliary Power Dongle

The auxiliary power dongle provides power to a 10-pin connector where customers can connect a custom cable of their own design to provide auxiliary power to high-power PCIe adapters.

Table 7 shows the pin definitions for the 2x5 10-pin auxiliary power adapter.

Table 8: Auxiliary Power Dongle Pin-Out

Pin	Signal Name	Description
1	+12VDC	+12V Power
2	N.C.	No Connect
3	+12VDC	+12V Power
4	N.C.	No Connect
5	+12VDC	+12V Power
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	+12VDC	+12V Power
10	GND	Ground

To build the custom cable, here are suggestions of possible parts:

Table 9: Auxiliary Power Custom Cable Suggested Parts

Description	Manufacturer Part Number
10-position connector mating the auxiliary power dongle	Molex MPN 39-01-3103
Male pins 18-24AWG tin-plated	Molex PN 39-00-0041
6 Position Rectangular Housing Connector Receptacle mating PCIe card (card dependent)	Molex PN 0455590002

4 Front Panel Board

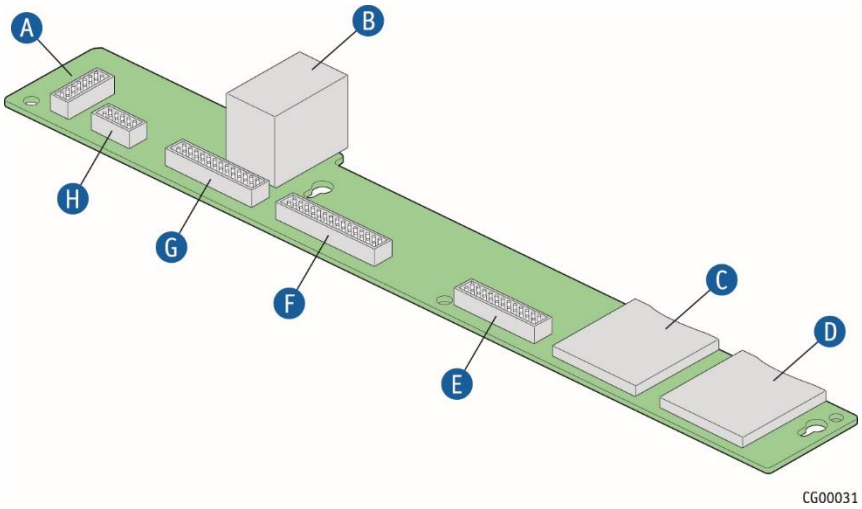
This chapter provides an overview of the Kontron CG2300 Carrier Grade Server Front Panel (FP) board and includes information on board hardware, connectors, power subsystem, optional add-ins, and regulatory requirements.

4.1 Introduction

The CG2300 server Front Panel (FP) board provides a connector interface and supporting logic for the Front Panel LED/switch board, which contains power, reset, and system ID switches, as well as various status LEDs. The FP board provides support for an external combined connector with both a USB and a serial (RJ45) port. Most signals pass from the front panel interface off the baseboard directly to the appropriate device (switch, LED, etc.).

Figure 19 shows the FP board components.

Figure 19: FP Board Layout (Primary Side)



Item	Description	Item	Description
A	TAM signal cable connector (J3)	E	SSI front panel power cable connector (J1)
B	USB/RJ45 serial stacked header	F	LED/switch board power/signal cable connector (J2)
C	SD 0 flash module	G	Multifunction power/signal cable connector
D	SD 1 flash module	H	Front panel board USB cable connector (J4)

4.2 Front Panel Board Features

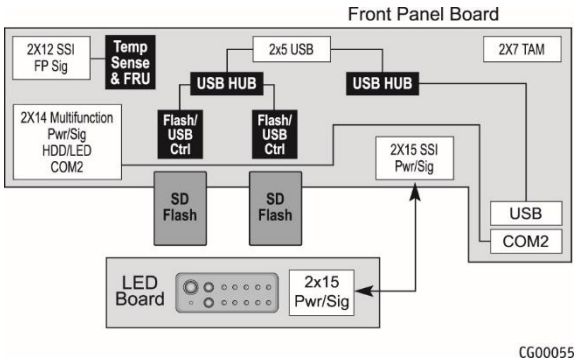
The FP Board provides the following feature set:

- Two USB ports: one to drive the USB port on the combo RJ45/USB connector and one to drive the SD flash module controller(s).
- Serial RS-232 signals to the front panel serial port on the combo RJ45/USB connector
- Control circuitry for driving the NIC activity LED, the system status LED, the power LED, and the disk activity LED, which are all located on the LED/switch board
- On-board LED that indicates USB flash drive activity
- System power state and status indicators -- power, reset, and NMI switches

4.3 Front Panel Board Block Diagram

Figure 20 is a block diagram that shows the major hardware components and interconnections on the front panel board.

Figure 20: FP Board Block Diagram



5 LED/Switch Board

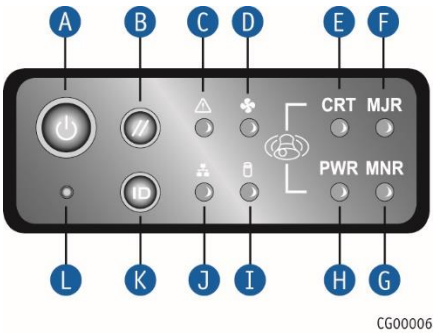
This chapter provides an overview of the Kontron Carrier Grade Server CG2300 LED/switch board, including information about the board hardware, connectors, power subsystem, optional add-ins, and regulatory requirements.

5.1 Introduction

The CG2300 server LED/switch board provides input selection switches and LED status indicators for the server system. There are four switches and six LEDs on the panel. The power status LED and the chassis ID LED are embedded in the switch and the other four are shown in Figure 21.

Figure 21 shows the front panel LED/switch panel layout.

Figure 21: Front Panel Buttons/LEDs



5.2 LED/Switch Board Features

The front panel LED/switch board has the following features:

- Connects the front panel board signals and the front panel via a power/signal connector (J1)
- On board switches for power, reset, ID, and NMI
- On board LEDs to indicate power status, chassis ID, system status, HDD activity/fault, NIC activity, and fan status.

NOTE: For information about the telco alarm LEDs that are also on the front panel, see Table 141412 in Chapter 8.

5.2.1 Front Panel System Control Buttons

The LED/switch board houses a system control button for each of the four switches. The function of each control button is listed in Table 10108.

Table 10: Control Button Functions

Pin	Signal Name	Description
A	Power button	Toggles the system power on/off, also functions as a sleep button if enabled by an ACPI-compliant operating system. A status LED is embedded in this switch and displayed on the button
B	System reset button	Reboots and initializes the system

Pin	Signal Name	Description
K	Chassis ID Button	Toggles the front panel chassis ID LED and the rear server board chassis ID LED on/off. The front panel LED is embedded in the switch and displayed on the button.
L	NMI Button	Puts the system in a halt state for diagnostic purposes and allows issuance of a non-maskable interrupt when pressed. After issuing the interrupt, a memory download can be performed to determine the cause of the problem. **NOTE:** This button is for diagnostic purposes only and can only be accessed by using a thin stylus or a paper clip.

5.2.2 Front Panel Status LEDs

The front panel LED/switch board contains six status LEDs; four separate and two embedded and displayed with their buttons. The LED functions are listed in Table 11119.

Table 11: Front Panel LED Functions

LED Description	LED Power	Color	Condition	Description
Power/Sleep (on button)	P5V	Green	On	Legacy power on / ACPI S0 state
		Green	Blinking	Sleep / ACPI S1 state
		-	Off	Power off / ACPI S4 or S5 state
Chassis Identification (K) (on button)	P5VSTBY	White	On	Chassis identification active via command or button
		-	Off	Chassis identification inactive
System Status	P5VSTBY	Green	On	System ready/normal operation
		Green	Blinking	System ready but degraded
	P5VSTBY	Amber	On	Critical or non-recoverable condition
		Amber	Blinking	Non-critical alarm
		-	OFF	System not ready: POST/system stop
HDD activity (I)	P5V	Green	BLINK	Hard disk drive activity
	P5V	Amber	ON	Hard disk drive fault
		-	OFF	No access and no hard disk drive fault
NIC1/NIC2 activity (J)	P5V	Green	ON	LAN link for NIC1 and NIC2
		Green	BLINK	LAN activity for NIC1 and NIC2
		-	OFF	Idle / No link
Fan Status (D)	P5VSTBY	Amber	ON	Fan fault
		-	OFF	Fan subsystem OK - no fault

5.2.3 System Status LED

Table 12 12 10 shows the meaning of each state on the system status LED.

Table 12: System Status LED States

Color	State	Criticality	Description
Off	N/A	Not ready	AC (or DC if DC power supplies used) power is off
Green	On	OK	System booted and ready
Green	Blinking	Degraded	System degraded Including, but not limited to: » Unable to use all of the installed memory (more than one DIMM installed) » Correctable errors over a threshold of 10 and migrating to a spare DIMM (memory sparing). This indicates that the user no longer has spare DIMMs specifying a redundancy lost condition. The corresponding DIMM LED should light up. » In a mirrored configuration, when memory mirroring takes place and system loses memory redundancy (This is not covered by the second bullet above) » Redundancy loss, such as power supply or fan (This does not apply to non-redundant subsystems) » PCI Express* link errors » CPU failure/disabled – if there are two processors and one of them fails » Fan alarm – Fan failure. Number of operational fans should be more than the minimum number needed to cool the system » Non-critical threshold crossed – temperature and/or voltage
Amber	Blinking	Non-critical	Non-fatal alarm – system is likely to fail Including, but not limited to: » Critical voltage threshold crossed » VRD hot asserted » Minimum number of fans to cool the system are not present or have failed » In non-sparing and non-mirroring mode if the threshold of ten correctable errors is crossed within the window
Amber	On	Critical, non-recoverable	Fatal alarm – system has failed or shut down Including, but not limited to: » DIMM failure when there is one DIMM and no good memory present » Run-time memory uncorrectable error in non-redundant mode » IERR signal asserted » Processor 1 missing » Temperature (e.g., CPU ThermTrip, memory TempHi, critical threshold crossed) » No power good – power fault » Processor configuration error (e.g., processor stepping mismatch)

5.2.4 Chassis Identification LED

The blue chassis identification LED on the baseboard is used to help identify a system for servicing. This is especially useful when the system is installed in a high-density rack or cabinet with several similar systems.

The chassis ID LED can be turned on by:

- Pressing the chassis ID button on the front panel, which illuminates the blue ID LED on the rear of the chassis until the button is pressed again.
- Issuing the appropriate hex IPMI system identify value, which causes the chassis ID LED to either blink for 15 seconds and turn off or blink indefinitely until the appropriate hex IPMI system identify value is issued to turn it off.

6 Fan Control Board

This chapter provides an overview of the Kontron Carrier Grade Server CG2300 fan control board, including information about the board hardware, power, and the fan connectors.

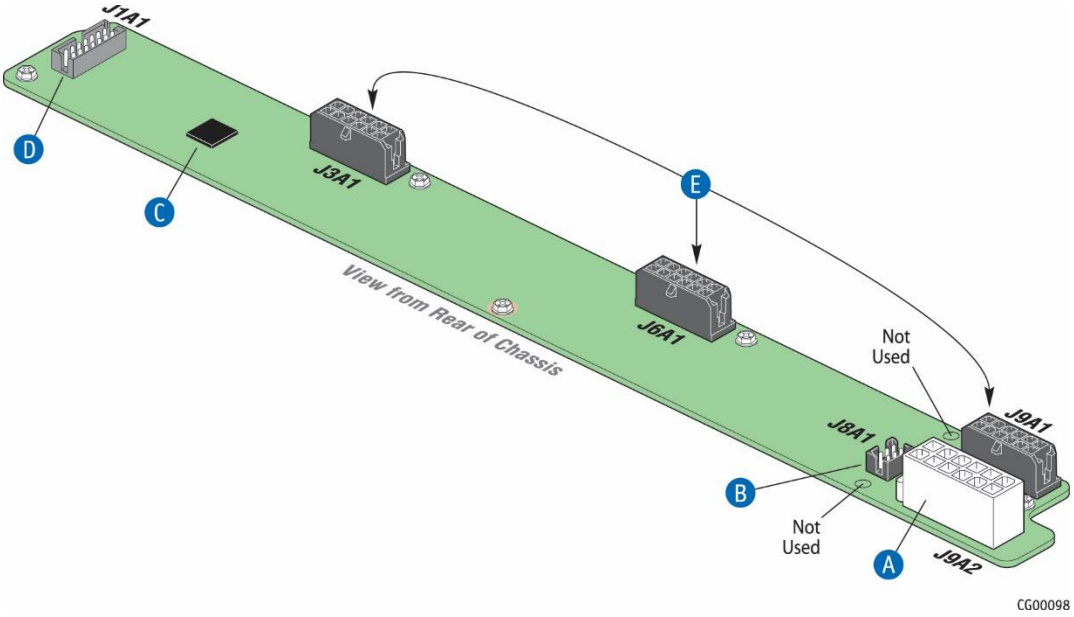
6.1 Introduction

The fan controller is initialized at start-up by reading a configuration code from the boot SEEPROM. After start-up the fan speeds are monitored and controlled by the fan controller through the baseboard SMbus. Fan speed is controlled using temperature sensors located on the baseboard. When a fan fault is detected the fan controller drives the "Fan Fault" signal "ON" in the fault LED on the fan assembly. Simultaneously, a composite fan fault LED, visible at the chassis front bezel, is turned "ON" on the front panel LED board.

6.2 Fan Controller Features

The fan control board uses a modular concept for controlling the system fans. The system baseboard sends the fan control functions to the fan control board via the SMbus. The fan control functions are controlled by a Maxim 72408 fan controller IC. This controller monitors the "Fan Present" signals from each of the fan positions, drives the "Fan PWM" signals, monitors the "Fan Tach" signals, and drives the "Fan Fail" signals. Figure 22 shows the layout of the Fan Control Board.

Figure 22: Fan Control Board Layout



Pin	Definition	Pin	Definition
A	Fan control board input power connector (J9A2) Provides P12V, P5V, P5V-STBY and P3V3 input from the PDB	D	Multi-function power/signal connector (J1A1) Distributes P5V power to the front panel, Connects the sensor SMB for reading and writing to the FRU data EEPROM, Generates a composite "Fan Fault" signal to the FP board
B	Fan I^2C connector (J8A1) Manages SMBus control signals from the baseboard.	E	System fan connectors (three) for fan pairs (J3A1, J6A1, J9A1) Provide the electrical connections to the fan assemblies
C	Fan controller Maxim 72408 fan controller IC that monitors signals from the six fans		

7

7 SAS Backplane Board

This chapter describes the features of the Kontron Carrier Grade Server CG2300 SAS backplane board.

7.1 Introduction

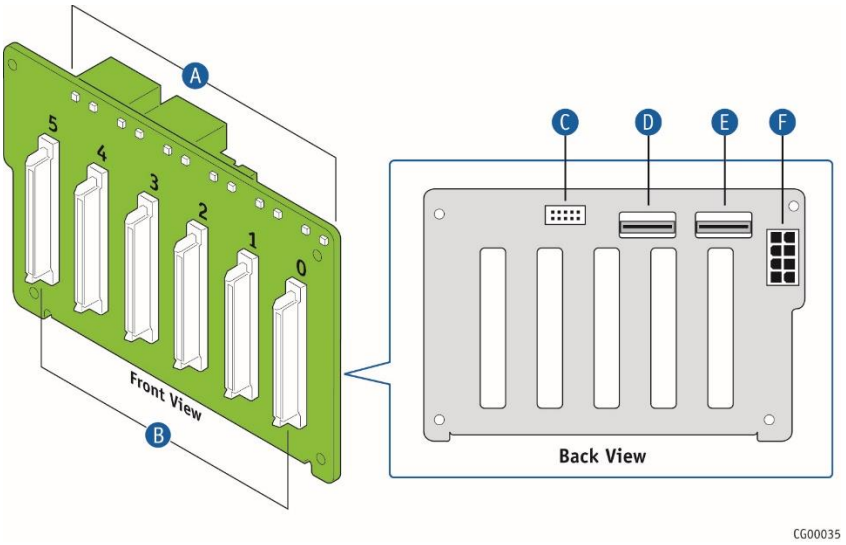
The CG2300 server contains a single hot-swap backplane board (HSBP) that provides support for up to six 2.5" SAS hard disk drives (HDDs). Each SAS connector and cable supports up to four SAS HDDs. By default, these two 36-pin SAS cables connected to the HDD backplane are connected on the other end to the baseboard with a key enabling SAS drive support on the baseboard. The backplane can also be connected to an optional, separately-orderable hardware RAID controller board using the same two 36-pin SAS connectors. The SAS cables are disconnected from the on-board SAS controller and re-connected to the hardware RAID controller card.

On the HDD backplane one SAS connector supports HDD0 through HDD3 and the second SAS connector supports HDD4 and HDD5. The SAS connectors provide the sideband signals between the baseboard or the (optional) RAID controller and the backplane enclosure management controller on the HSBP board. The HSBP SMBus, the HDD activity, and HDD Fault connections are provided by a 2x5 10-pin connector. A 2x4 8-pin connector provides the power to the HDD backplane.

Fault and activity LEDs are provided for each of the six HDD positions. Composite fault and activity LED signals for all six drives are sent to the front panel board to drive the front panel drive activity/fault LED.

Figure 23 shows the backplane board.

Figure 23: HSBP Board Layout



Item	Description
A	Hard disk drive LEDs
B	Six hard disk drive connectors
C	Hot-Swap Backplane I^2C connector (J2)
D	SAS 2 connector , HDD4 and HDD5 (J1)
E	SAS 1 connector, HDD0 – HDD3 (J2)
F	Power connector (J11)

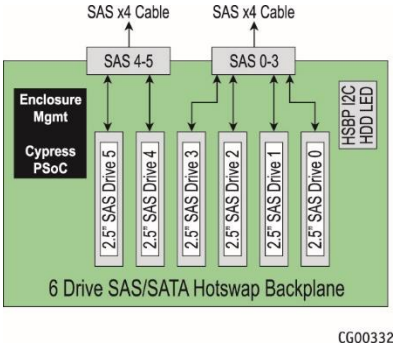
7.2 Backplane Board Features

The backplane board contains the following features:

- Connectors for six hot-swappable disk drives
- Enclosure management using a Cypress CY8C22545 PSoC embedded controller
- Serial EEPROM location for a FRU device (unused)
- Control circuitry for driving the disk drive activity and fault LED on the HDD carrier
- Control circuitry for driving a composite disk drive fault and activity LED on the FP board

Figure 40 is an overall block diagram of the SAS backplane board.

Figure 24: SAS Backplane Board Block Diagram



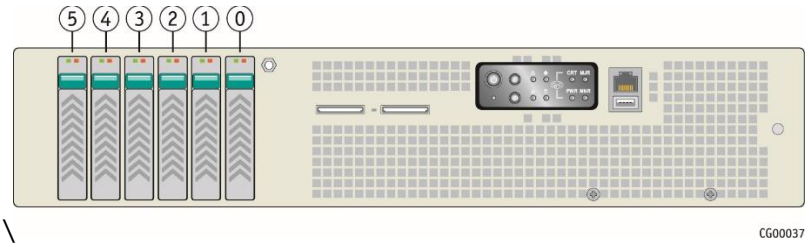
There are two main sections on the board:

Power Distribution: The main supply rails are P12V and P5V, which come from the PDB through a 2x4 power connector, as specified in Figure 23. Power is connected directly to all six HDDs.

Enclosure Management: The HDD enclosure management controller coordinates the hard disk drive activity/fault LED indicators.

Figure 25 shows the physical ordering of the hard disk drives.

Figure 25: Hard Disk Drive Bay Numbering



7.3 Hard Disk Drive Activity and Fault LEDs

The backplane board supports an activity/fault LED for each of the hard drive connections. The LED is green for activity or amber for a drive fault. The green activity setting is driven by the SAS HDD directly. The amber fault LED is driven by the enclosure management controller whenever a fault condition is detected.

NOTE: When drives are used in a RAID configuration, the RAID controller manages the fault LED. In this case the LED may exhibit different behavior then when the enclosure management controller drives it.

Table 13: Hard Drive Status LED Definitions

Status LED	Definition
Solid Green	HDD present
Blinking Green	HDD activity
Amber	HDD fault

7.4 Backplane Board SAS Cables

The SAS cables, SAS 1 for HDDs 0 – 3 and SAS 2 for HDDs 4 and 5, connect to baseboard SAS connectors by default. These same cables can also be used to connect to an optional RAID controller card in PCIe slot 3 on the baseboard.

When a hardware RAID controller card/kit is selected, no supplemental cables are required. Instead, the SAS cables (ends labelled SFF-8643) already in the system are disconnected from the baseboard SAS controller and re-connected to the hardware RAID controller card.

NOTE: The pin-outs for the two connectors on the SAS cable are not the same.
The end labelled SFF-8346 connects to either the baseboard SAS controller or to the optional RAID controller card.
The end labelled SFF-8087 connects to the HSBP backplane connectors for the (up to six) HDDs/SSDs in the drive bay.

8 Telco Alarms Module (TAM)

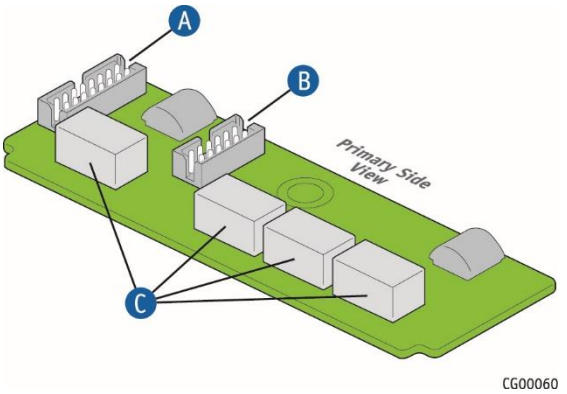
This chapter describes the design and external interface of the Kontron Carrier Grade Server CG2300 Telco Alarms Module assembly.

8.1 Introduction

The CG2300 server Telco Alarms Module (TAM) board provides the connector interface and supporting logic for the telco alarms function. The TAM board also provides an alarms function with fault relays and access at the back of the system by cable to the fault relay contacts. A ribbon cable connects the TAM board to the front panel board.

Figure 26 shows the Telco Alarms Module components.

Figure 26: Telco Alarms Module Layout (Primary Side)



Item	Definition
A	Alarms connector (to rear panel) (J1)
B	TAM signal connector (to front panel board) (J2)
C	Telco alarm relays

8.2 Telco Alarms Module Features

The Telco Alarms Module (TAM) provides the logic and relays for controlling the telco alarm LEDs displayed on the front panel board. The TAM board also provides an alarm function with fault relays and access by cable to the fault relay contacts at the back of the system. A ribbon cable connects the TAM board to the front panel board. Figure 27 is the TAM block diagram.

Figure 27: TAM Block Diagram

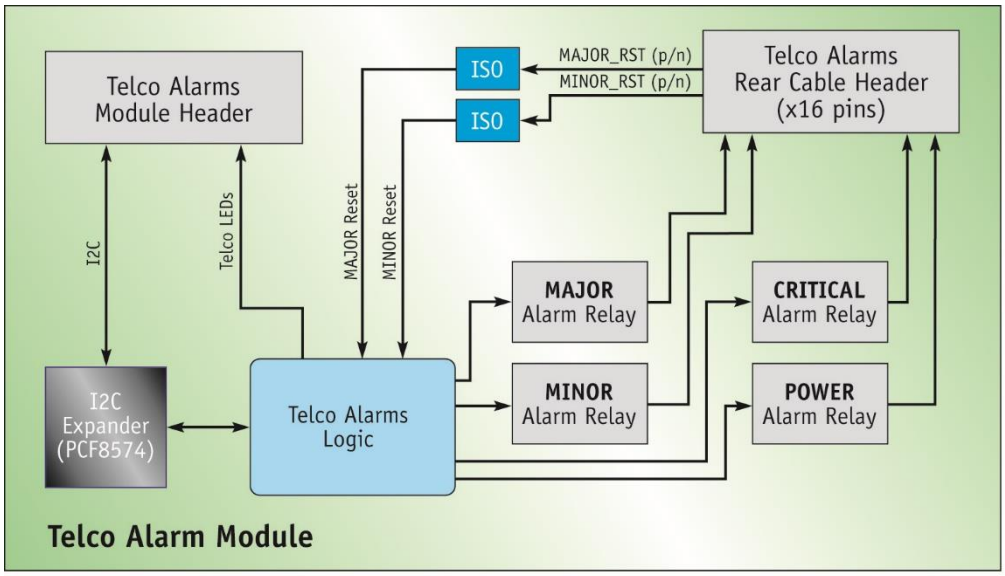


Table 14: Telco Alarms Fault LEDs

Switch	Function
Critical	The critical alarm LED can be either amber (default) or red (set with a FRUSDR update). This LED is illuminated by the BMC private I²C bus, and can only be turned off through BMC private I²C control. When continuously lit, this alarm LED indicates the presence of a "critical system fault". A critical system fault is a system-detected error or event that has a fatal impact, which means the system cannot continue to operate. An example is the loss of a large section of memory, or other corruption, that renders the system non-operational. The TAM board critical alarm relay is engaged.
Major	The major alarm LED can be either amber (default) or red (set with an FRUSDR update). This LED is illuminated by the BMC private I²C bus, and can be turned off via BMC private I²C control or alarm connector reset. When continuously lit, this alarm LED indicates the presence of a "major system fault". A major system fault is a system-detected error or event that has discernible impact to system operation, which means the system can continue to operate, but in a "degraded" fashion (reduced performance or loss of non-fatal feature reduction). An example is the loss of one of two mirrored disks. The TAM board major alarm relay is engaged.
Minor	The minor alarm LED is amber. The LED is illuminated by the BMC private I²C bus, and can be turned off via BMC private I²C control or alarm connector reset. When continuously lit, this alarm LED indicates the presence of a "minor system fault". A minor system fault is a system-detected error or event that has little impact to system operation. An example is a correctable ECC error. The front panel minor alarm relay is engaged.
Power	The power alarm LED is amber. The LED is illuminated by the BMC private I²C bus or the SYS_FLT_LED_L signal, and can only be turned off via BMC private I²C control. When continuously lit, this alarm LED indicates the presence of a "power system fault". The TAM board power alarm relay is engaged.

8.2.1 Telco Alarm Relays

The TAM board contains four relays: one for power, and three for critical, major, and minor alarms. The relays are controlled by the SMBus.

8.3 Telco Alarms Module External Interface Connector

The TAM board has a connection to the external alarms port at the rear of the chassis. For information about the specifications for this connection, see Section 3.2.6, “Telco Alarms External Interface Port”.

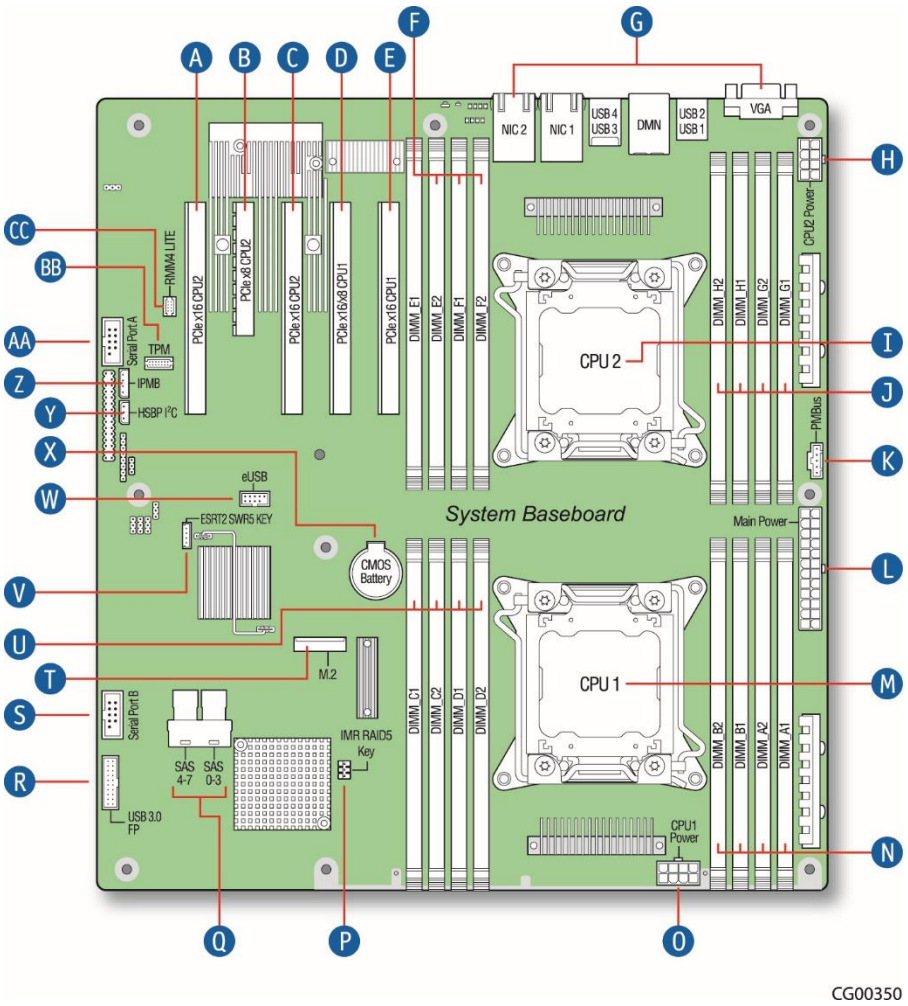
9 Server Board (Baseboard)

This chapter covers the key features of the baseboard used in the CG2300 server.

9.1 Introduction

The CG2300 server uses the Intel® S2600CW2SK server board for the baseboard. Figure 28 shows the key connectors and components on the server board.

Figure 28: Baseboard Components and Connectors



9.2 Server Board Features

Table 151513 defines the features of the baseboard and maps them to the board as shown in Figure 28.

Table 15: Baseboard Features

Item	Description	Item	Description
A	PCIe slot 2, PCI Express* Gen3	P	SAS controller (IMR) RAID5 key
B	PCIe slot 3, PCI Express* Gen3	Q	SAS/SATA connectors (4-7, 0-3)
C	PCIe slot 4, PCI Express* Gen3	R	Front panel USB connector
D	PCIe slot 5, PCI Express* Gen3	S	Serial port B connector (not connected to an external port)
E	PCIe slot 6, PCI Express* Gen3	T	M.2 connector
F	CPU2 DIMM slots (E, F)	U	CPU1 DIMM slots (C, D)
G	Rear I/O ports	V	ESRT2 SWR5 key chipset, SW RAID key
H	CPU2 power connector	W	USB 3.0 connector
I	CPU2	X	CMOS battery
J	CPU2 DIMM slots (G, H)	Y	HSBP FC, SMBus connector
K	PMBus	Z	IPMB
L	Main power connector	AA	Serial port A connector
M	CPU1	BB	TPM
N	CPU1 DIMM slots (A, B)	CC	RMM4Lite key
O	CPU1 power connector		

9.3 Server Board Processors

The S2600CW2SK server board accommodates two sixteen-core processors from the Intel® Xeon® processor E5-2600 v3 and v4 series. These processors can be ordered from Intel or an authorized distributor using Kontron part numbers listed in the CG2300 Carrier Grade Server Configuration Guide at http://www.kontron.com (search for CG2300, click on Downloads, then Ordering Guide)

9.4 Server Board Memory DIMMs

9.4.1 Supported Memory

The Intel® Server Board S2600CW2SK supports eight DDR4 memory channels (four per processor socket) with two DIMM slots per channel. Up to 16 DIMMs can be used with dual-processor sockets.

The server board supports 1333, 1600, 1866, and 2133 MHz memory transfer rates. Memory modules of mixed speed are supported by automatic selection of the highest common frequency of all memory modules.

For detailed information about RDIMM and LRDIMM support guidelines, see Section 3.2.2.1, “Supported Memory” in the *Intel® Server Board S2600CW Family TPS* that is on the Kontron website at http://www.kontron.com and on the Intel website.

9.4.2 Memory Map and Population Rules

The nomenclature for DIMM sockets implemented on the Intel® Server Board S2600CW2SK is shown in Table 4.

Table 16: Memory Map

Processor Socket 1								Processor Socket 2							
Channel A		Channel B		Channel C		Channel D		Channel E		Channel F		Channel G		Channel H	
A1	A2	B1	B2	C1	C2	D1	D1	E1	E2	F1	F2	G1	G2	H1	H2

NOTE: Although mixed DIMM configurations may be functional, platform validations are performed only on systems configured with identical DIMMs.

The S2600CW2SK server board memory is implemented according to the following rules

- DIMMs are organized into physical slots on DDR4 memory channels that belong to processor sockets.
- The memory channels from processor socket 1 are identified as Channel A, B, C, and D.
  The memory channels from processor socket 2 are identified as Channel E, F, G, and H.
- Each memory slot on the server board is identified by channel and slot number within the channel.
  For example, DIMM_A1 is the first slot on Channel A on processor 1; DIMM_E1 is the first DIMM socket on Channel E on processor 2.
- The memory slots associated with a given processor are unavailable if the given processor socket is not populated.
- A processor can be installed without populating the associated memory slots, provided the other processor is installed with associated memory. In this case, the memory is shared by the processors. However, the platform suffers performance degradation and latency because of the remote memory accesses.
- Processor sockets are self-contained and autonomous. However, all memory subsystem support (i.e., Memory RAS, Error Management, etc.) in the BIOS setup is applied commonly across processor sockets.
- The blue memory slots on the server board identify the first memory slot for each memory channel.

For more information about population considerations, see Section 3.2.2.2 "Memory Slot Identification and Population Rules" in the *Intel® Server Board S2600CW Family TPS*.

9.4.3 Publishing System Memory

The BIOS displays the "Total Memory" of the system during POST if "Display Logo" is disabled in the BIOS setup. This is the total size of memory discovered by the BIOS during POST and it is the sum of the individual installed DDR4 DIMMs in the system. The BIOS provides the total memory of the system in the main page of the BIOS setup.

The BIOS displays the "Effective Memory" of the system in the BIOS setup. The term "Effective Memory" refers to the total size of all DDR4 DIMMs that are active (not disabled) and not used as redundant units.

9.5 SAS Controller / RAID Support

CG2300's motherboard offers HW RAID, but no SW RAID capabilities.

Motherboard is equipped with a built-in, on-board SAS controller, which is implemented with a LSI3008.

Supported RAID types are RAID 0, 1 and 10.

To enable RAID 5 or 50, it is possible to order an Intel® upgrade key, MPN AXXRPFKHY5. This requires only to install the upgrade key on motherboard's header.

For more information about SAS and RAID, see Section 3.4.9 "Serial Attached SCSI (SAS) Support" in the *Intel® Server Board S2600CW Family TPS*. Refer to Integrated MegaRAID Support.

NOTE: The CG2300 does not support SATA connection to chipset, which offers SW RAID through Embedded Server RAID Technology (ESRT2) or Rapid Storage Technology (RSTe).

10 PCI Riser Card Assembly

This chapter describes the design and external interface of the Kontron Carrier Grade Server CG2300 PCI riser card assembly.

10.1 Introduction

The CG2300 server supports different riser card options depending on which add-in card configuration option is selected. Riser card(s) are installed in the PCI cage assembly using two 6/32 screws for each riser.

10.2 Riser Card Options

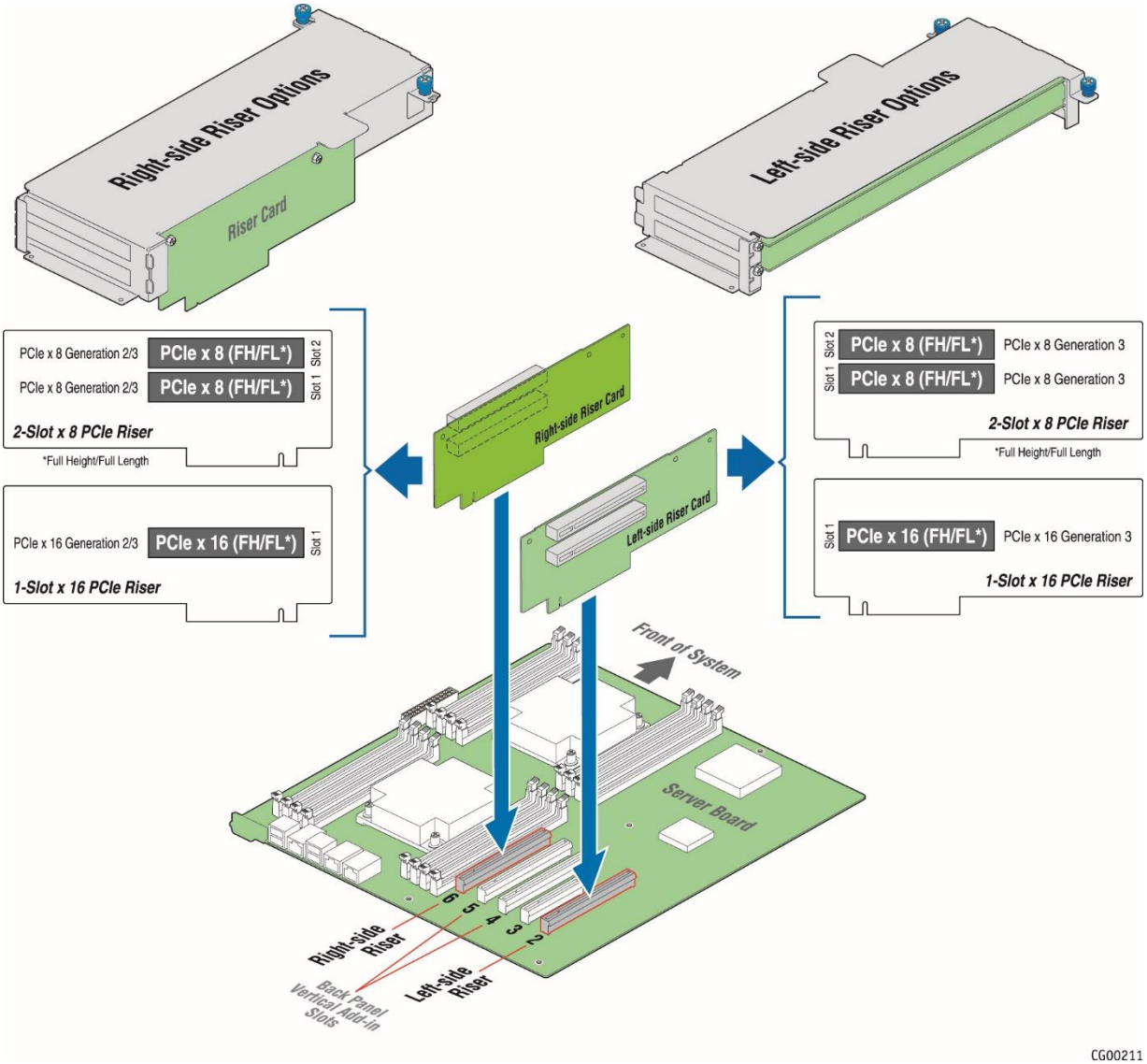
The Intel® Server Board S2600CW2SK has two riser slots for supporting riser cards on the right side and left side of the chassis (as viewed from the front of the system). Baseboard PCIe slot 2 and PCIe slot 6 support the riser boards in the CG2300 system. Slot 2 is on the left side of the chassis and connects to CPU2. Slot 6 is on the right side and connects to CPU1. Both slots support either a single x16 or dual x8 risers and they are independent from each other.

Table 17 17 15 identifies the card configurations and the connector types used.

Table 17: Riser Card Configurations

Riser Card Option	Slot Configuration
PCI Express passive riser single slot x16 Right side riser (baseboard slot 5)	Single full-height PCI Express connector
PCI Express passive riser dual slot x8 Right side riser (baseboard slot 6)	Two full height PCI Express x8 connectors
PCI Express passive riser single slot x16 Left side riser (baseboard slot 2)	Single full-height PCI Express connector
PCI Express passive riser dual slot x8 Left side riser (baseboard slot 2)	Two Full height PCI Express x8 connectors

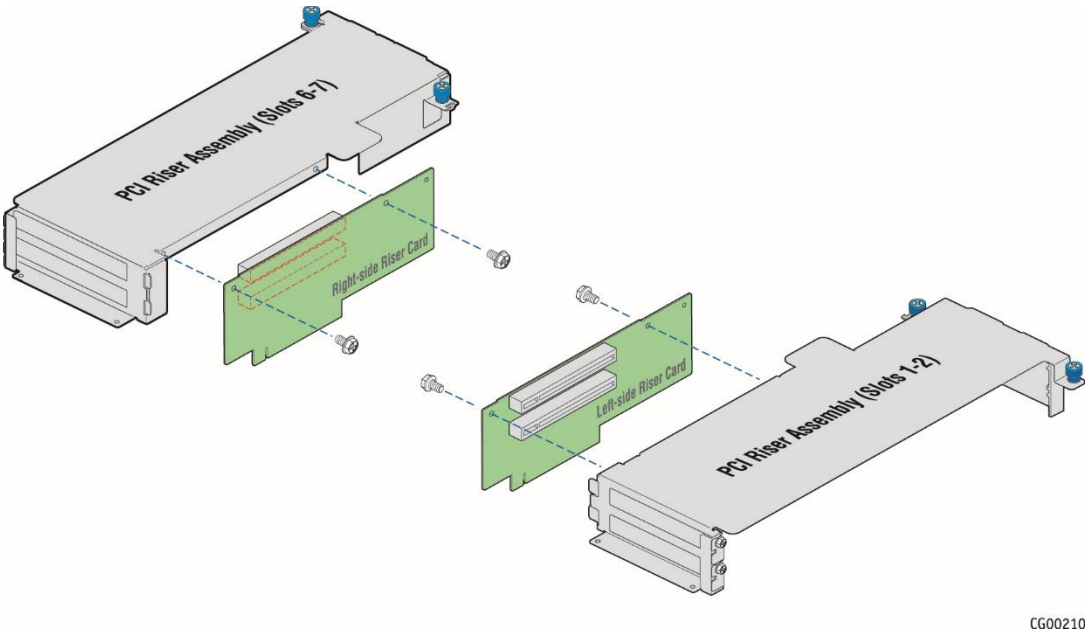
Figure 29: PCIe Add-In Card Options



10.3 Riser Card Installation

Figure 30 shows how the riser cards are installed in the assembly enclosures.

Figure 30: Adding Riser Cards into the Assemblies



11 AC Power Subsystem

This chapter covers the AC power supply system.

The power supply provides a hot-pluggable connector that mates to a compatible connector on the PDB. This is a blind mating connector that connects the power supply output voltages and signals.

The power supply provides a reliable protective earth ground with the power supply's chassis with all secondary ground return circuits connected. Resistance of the ground returns to chassis does not exceed 1.0 mΩ. This path can be used to carry DC current.

11.1 Introduction

The AC power subsystem has up to two redundant AC power supply modules and a power distribution board (PDB). Although this power supply output can deliver up to 850W, the estimated maximum system power draw stated on the system rating label (located on the top cover) is calculated using a theoretical maximum configuration. A typical maximum configuration will consume much less power.

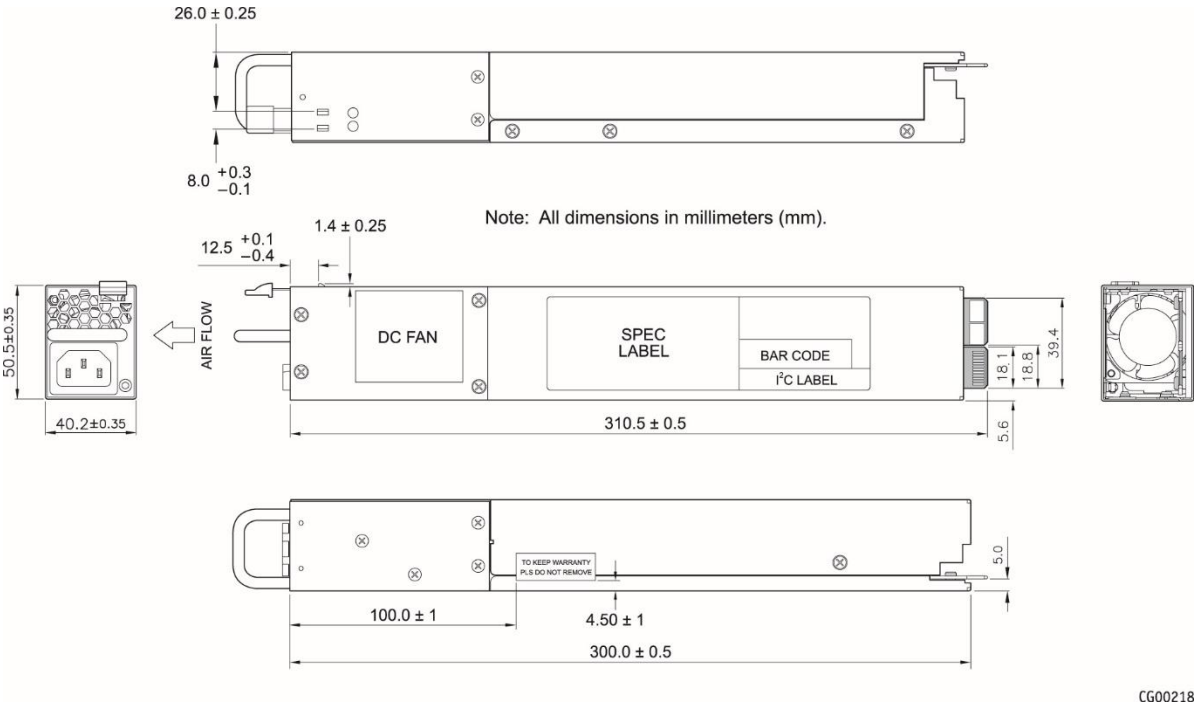
The AC input power supply subsystem has the following features:

- 850W module output capability in full AC input voltage range
- 850W subsystem output capability in full AC input voltage range
- Power Good indication LEDs
- Predictive failure warning
- Internal cooling fans with multi-speed capability
- Remote sense of 3.3V, 5V, and 12 Vdc outputs
- AC_OK circuitry for brown out protection and recovery
- Brown out protection and recovery
- Built-in overloading protection capability
- Onboard field replaceable unit (FRU) information
- PMBus interface for server management functions
- Integral handle for insertion/extraction

The power supply module contains one 40mm fan.

Figure 31 shows the mechanical details of the AC power supply module.

Figure 31: AC Power Supply Module Mechanical Drawing



11.2 AC Power Supply Input Connector and Voltage/Current Requirements

The AC power supply input connector is an IEC320 C14 standard AC inlet connector. The AC power supply input voltage and current requirements are listed in Table 181816.

Table 18: AC Input Rating

Line Voltage	
Nominal 110Vrms	
Minimum	90V_{rms}
Rated	100-127V_{rms}
Maximum	132V_{rms}
Nominal 220Vrms	
Minimum	180V_{rms}
Rated	200-240V_{rm}
Maximum	264V_{rms}
Start-up Voltage	85Vrms +/-5Vrms
Power-Off Voltage	75Vrms +/-5Vrms
Line Current	
Maximum	12A@ 100Vrms / 6A @200Vrms
Frequency	
Minimum	47 Hz
Rated	50/60 Hz
Maximum	63 Hz

11.3 AC Power Supply Output Connector and Voltage/Current Requirements

The AC power supply provides a hot-pluggable output connector that mates with a compatible connector on the PDB. This is a blind-mating connector that connects the power supply output voltages and signals.

The power supply provides a reliable protective earth ground on the power supply chassis with all secondary ground return circuits connected. Resistance of the ground returns to chassis does not exceed 1.0 mΩ. This path can be used to carry DC current.

Figure 32: AC Power Supply Module Output Connector

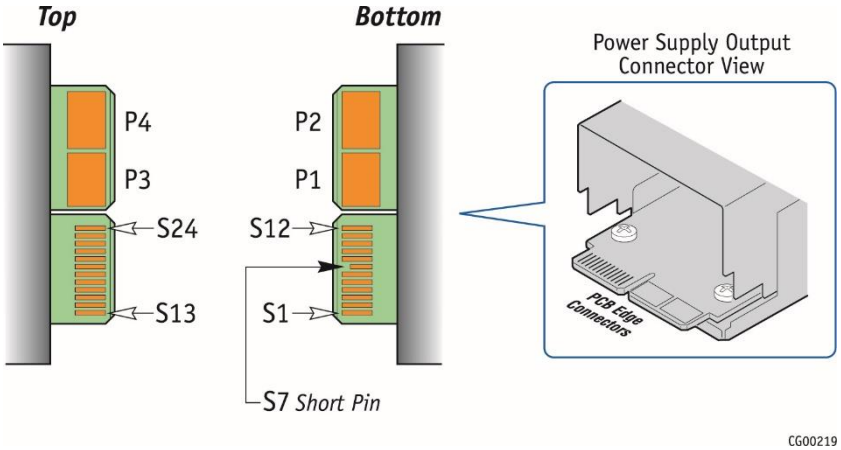


Table 19: AC Output Connector Pin-Out

Pin	Signal Name	Description
P1 Bottom	RTN GND	+12V return
P2 Bottom	Main_Output	+12V
P3 Top	RTN GND	+12V return
P4 Top	Main_Output	+12V
Pin	**Signal Name**	**Description**
S1 Bottom	Main_Output Sense	+12VS
S2 Bottom	GND Sense	+12V RTN Sense
S3 Bottom	+MO IS	+12V Main Output Current Share Bus
S4 Bottom	SMB_Alert TTL	SMB_Alert for failure notification
S5 Bottom	SDA	I2C Data signal
S6 Bottom	SCL	I2C Clock signal
S7 Bottom	+PS Kill	To switch off Main power (short)
S8 Bottom	PSON	Power Enable input
S9 Bottom	PWOK	Power OK output
S10 Bottom	A1	I2C address bit 1
S11 Bottom	Stby_Output	+5Vsb
S12 Bottom	Stby_Output	+5Vsb
S13 Top	Reserved (NC)	Reserved
S14 Top	Present#	Power Supply present
S15 Top	A0	I2C address bit 0
S16 Top	A2	I2C address bit 2
S17 Top	+15Vcc	(+15Vcc)
S18 Top	EEPROM_WP	EEPROM write protection
S19 Top	Input_OK#	Input Present signal

Pin	Signal Name	Description
S20 Top	grRD# (NC)	Green redundancy input
S21 Top	PDB-Fail	PDB fail
S22 Top	NC	Reserved for factory use (NC)
S23 Top	Stby_Output	+5Vsb
S24 Top	Stby_Output	+5Vsb

The power supply module provides two main outputs; +12V, and 5V standby, along with the 15VBIAS voltage. D2D converters located in the PDB provide the 3.3V and 5V rails from the 12V provided by the power supply module.

The combined maximum output power of all outputs is 850W. Each output has a maximum and minimum current rating as shown in Table 202018.

Table 20: AC Power Supply 850W Load Ratings

	+12V	+5Vsb
Max Load	70A	3.0A
Min Static Load	0A	0A
Max Output Power (continuous)	840W max	15W max
	Total = 850W	

NOTE: At max and peak loads the 12V output voltage is allowed to sag to –4 % (11.52V)

11.4 AC Power Supply LED Indicator

The power supply module provides a single external bi-color LED to indicate the status of the power supply.

- When AC is applied to the power supply module and standby voltages are available, the LED is blinking green.
- The LED is green when all power outputs are available.
- The LED is amber when the power supply has failed and is shut down because of over- current or over-temperature.

See Table 2121 19 for definitions of the LED conditions.

Table 21: LED Indicator Status Conditions

Power Supply Condition	Bi-Color LED
No AC power to all power supplies	Off
No AC power to this PSU only (for 1+1 configuration) or Power supply critical event causing a shutdown: failure, fuse blown (1+1 only), OCP(12V), OVP(12V), fan failed	Amber
Power supply warning events where the power supply continues to operate: high temperature, high power/high current, slow fan.	1Hz blinking amber
AC present / only 5Vsb on (PS Off)	1Hz blinking green
Output on and OK	Green

11.5 AC Power Supply Air Flow

Each power supply has one 40mm fan for self-cooling. The fans provide no less than 10 CFM airflow through the power supply when installed in the system and operating at maximum fan speed. The cooling air enters the power module from the PDB side (pre-heated air from the system). Variable fan speed is based on output load and ambient temperature. Under standby mode, the fans must run at the minimum RPM.

11.6 AC Power Supply Thermal Protection

The power supply subsystem is protected against over-temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an over-temperature condition the +12V output of the power supply module shuts down. When the power supply temperature drops to within the specified limits, the power supply restores power automatically while the standby power remains on. The OTP circuit has built-in hysteresis so the power supply does not oscillate on and off because of a temperature recovering condition. The OTP trip level has a minimum of 4°C of ambient temperature hysteresis.

12 DC Power Subsystem

This chapter defines the features and functionality of the DC-input switching power supply subsystem.

12.1 Introduction

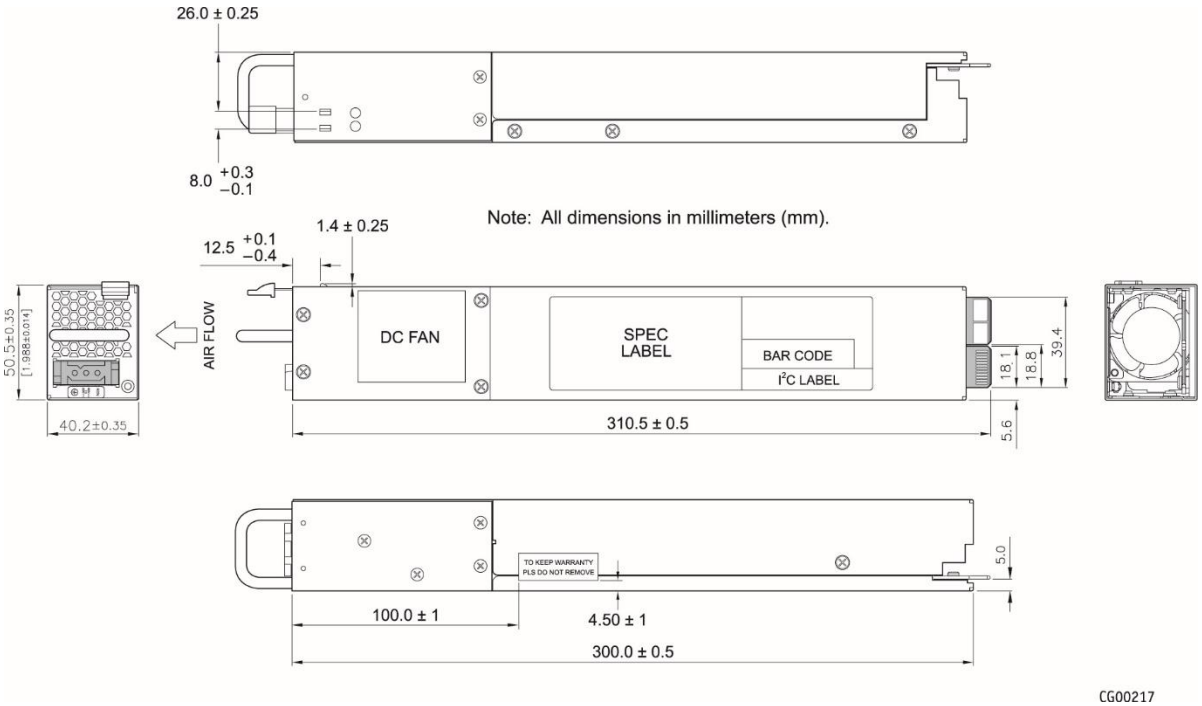
The DC power subsystem consists of up to two DC power supply modules, capable of operating in redundant mode, and a power distribution board (PDB). Although this power supply output can deliver up to 850W, the estimated maximum system power draw stated on the system rating label (located on the top cover) is calculated using a theoretical maximum configuration. A typical maximum configuration will consume much less power.

Features of the DC input power supply subsystem are:

- 850W power module output capability throughout the full DC input voltage range
- Power Good indication LEDs
- Predictive fan failure warning
- Internal cooling fans with multi-speed capability
- Remote sensing of 3.3V, 5V, and 12 Vdc (on the PDB) outputs
- DC_OK circuitry for brown-out protection and recovery
- Built-in load sharing capability
- Built-in overload protection capability
- Onboard field replaceable unit (FRU) information
- PMBus 1.2 interface for server management functions
- Integral handle for hot-swappable insertion/extraction

Figure 33 shows the mechanical details of the DC power supply module.

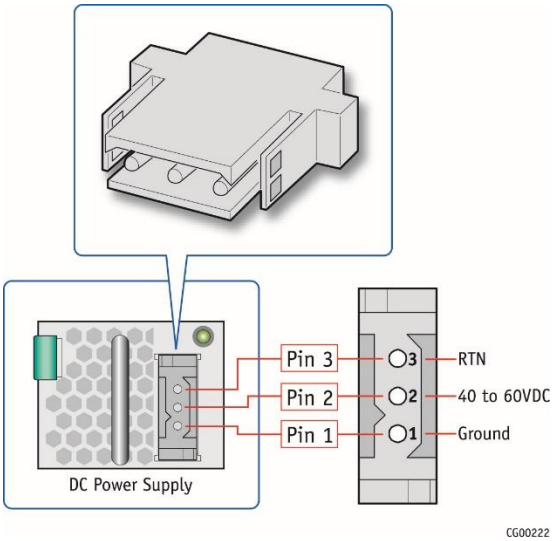
Figure 33: DC Power Supply Mechanical Drawing



12.2 DC Power Supply Input Connector and Earth Ground Connection

The input connector on the DC power supply is a 3-pin Positronic. This connector is rated at 20A/pin. An earth ground pin is not required because the system provides two earth ground studs on the rear panel of the chassis. Figure 34 shows the DC input power connector and pin-out.

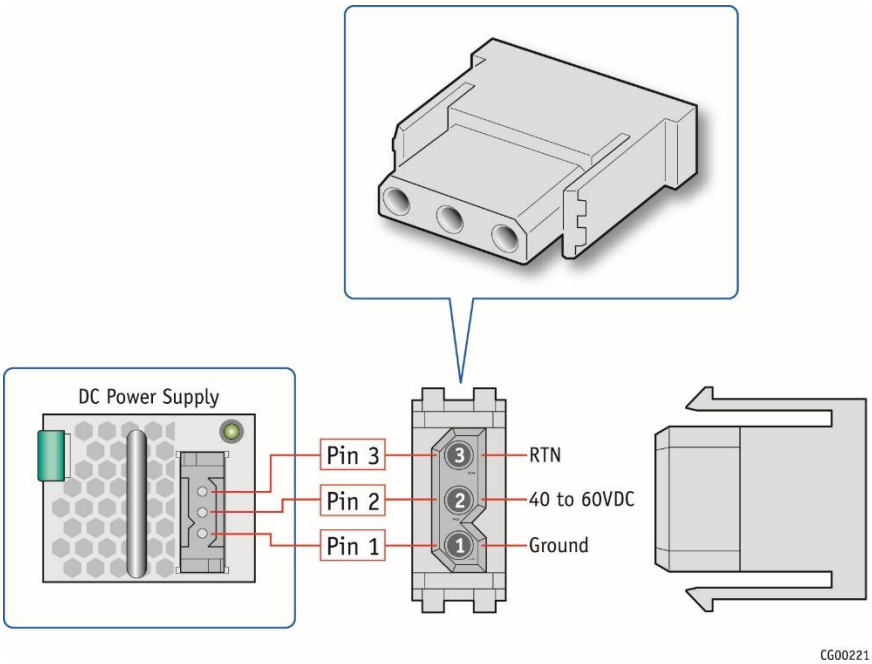
Figure 34: DC Power Supply Input Connector



12.2.1 DC Power Supply 48V Input Power Mating Connector

The DC power supply module input mating connector shown in Figure 35 provides a -48V input power connection to the system. The input wiring connections are also shown in Figure 35. This mating connector (Positronic PLA03F7050/AA) and 3x gauge-16 pins (Positronic FC112N2/AA-14) come delivered with each DC power supply module.

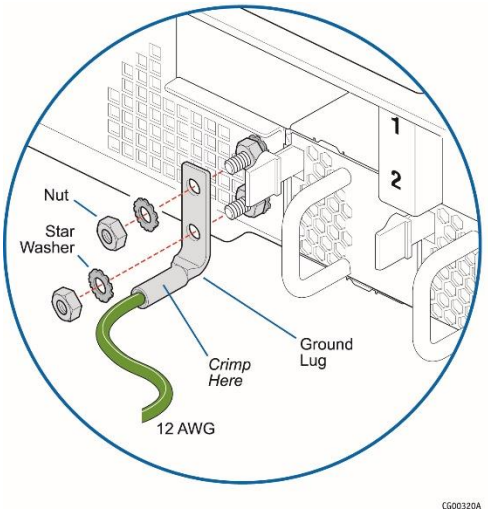
Figure 35: DC Power Supply Mating Connector



12.2.2 DC Power Supply Earth Grounding Studs on Chassis

Figure 36 shows how the safety earth grounding wire is attached to the chassis for use with DC power supplies.

Figure 36: DC Power Supply Grounding



12.3 DC Power Supply Input Voltage and Current Requirements

The DC power supply input voltage and input current requirements are listed in Table 222220.

NOTE: The maximum current listed in Table 222220 is the maximum current the system will draw from the power supply at -48V input voltage.

Table 22: DC Power Supply Input Requirements

DC Input Voltage	
Nominal	-48Vdc
Minimum[1]	-40Vdc
Rated	-48Vdc to -72Vdc
Maximum	-75Vdc
DC Input Current	
Maximum	30A@ -40Vdc, 15A@ -72Vdc

*The minimum steady-state DC input voltage at which the equipment remains fully operational is –40 Vdc.

12.4 DC Power Supply Output Connector and Pin Definitions

The DC power supply provides a hot-pluggable output connector that mates with a compatible connector on the PDB. This is a blind-mating connector that connects the power supply output voltages and signals.

The power supply provides a reliable protective earth ground on the power supply chassis with all secondary ground return circuits connected. Resistance of the ground returns to the chassis does not exceed 1.0 mΩ. This path can be used to carry DC current.

Figure 37: DC Power Supply Output Connector

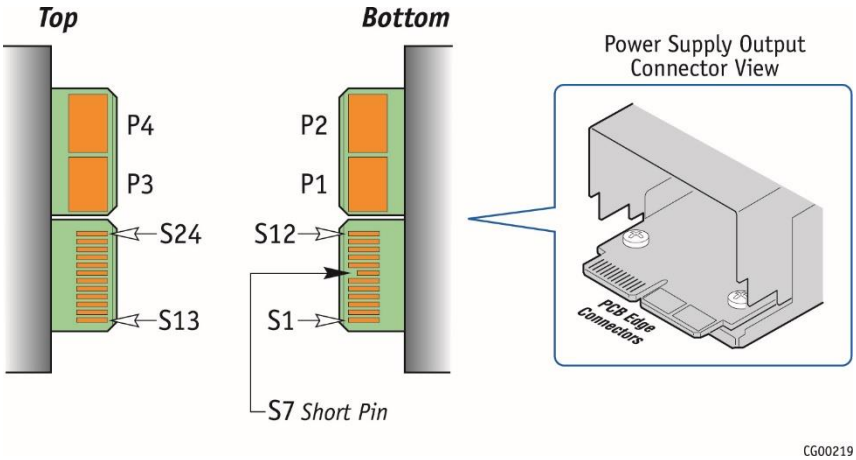


Table 23: DC Output Connector Pin-Out

Pin	Signal Name	Description
P1 Bottom	RTN GND	+12V return
P2 Bottom	Main_Output	+12V
P3 Top	RTN GND	+12V return
P4 Top	Main_Output	+12V
Pin	**Signal Name**	**Description**
S1 Bottom	Main_Output Sense	+12VS
S2 Bottom	GND Sense	+12V RTN Sense
S3 Bottom	+MO IS	+12V Main Output Current Share Bus
S4 Bottom	SMB_Alert TTL	SMB_Alert for failure notification
S5 Bottom	SDA	I2C Data signal
S6 Bottom	SCL	I2C Clock signal
S7 Bottom	+PS Kill	To switch off Main power (short)

Pin	Signal Name	Description
S8 Bottom	PSON	Power Enable input
S9 Bottom	PWOK	Power OK output
S10 Bottom	A1	I2C address bit 1
S11 Bottom	Stby_Output	+5Vsb
S12 Bottom	Stby_Output	+5Vsb
S13 Top	Reserved (NC)	Reserved
S14 Top	Present#	Power Supply present
S15 Top	A0	I2C address bit 0
S16 Top	A2	I2C address bit 2
S17 Top	+15Vcc	(+15Vcc)
S18 Top	EEPROM_WP	EEPROM write protection
S19 Top	Input_OK#	Input Present signal
S20 Top	grRD# (NC)	Green redundancy input
S21 Top	PDB-Fail	PDB fail
S22 Top	NC	Reserved for factory use (NC)
S23 Top	Stby_Output	+5Vsb
S24 Top	Stby_Output	+5Vsb

12.5 DC Power Supply Output Current Requirements

The DC power supply module provides two outputs; +12V and 5V standby. The combined maximum output power is 850W. Each output has a maximum and minimum current rating, as shown in Table 242422.

Table 24: DC Power Supply 850W Load Ratings

	+12V	+5Vsb
Max Load	70A	3.0A
Min Static Load	0A	0A
Max Output Power (continuous)	840W max	15W max
	Total = 850W	

12.6 DC Power Supply LED Indicators

The power supply module provides a single external bi-color LED to indicate the status of the power supply.

- When DC power is applied to the power supply module and standby voltages are available, the LED is blinking green.
- The LED is steady green when all the power outputs are available.
- The LED is amber when the power supply module has failed and is shut down because of over-current or over-temperature.

See Table 252523 for definitions of the LED conditions.

Table 25: LED Indicators

Power Supply Condition	Bi-Color LED
No DC power to all power supplies	Off
No DC power to this PSU only (for 1+1 configuration)	0.5Hz blinking red
DC present/only standby output on	1Hz blinking green
Power supply DC output ON and OK	Green
Power supply failure	Red
Power supply warning	0.5Hz blinking red*/green*

NOTE: Blinking frequency: 1Hz (0.5 sec Red/0.5 sec Green)

12.7 DC Power Supply Air Flow

Each power supply has one 40mm fan for self-cooling. The fans provide no less than 10 CFM airflow through the power supply when installed in the system and operating at maximum fan speed. The cooling air enters the power module from the PDB side (pre-heated air from the system). Variable fan speed is based on output load and ambient temperature. Under standby mode, the fans must run at the minimum RPM.

12.8 DC Power Supply Thermal Protection

The power supply subsystem is protected against over-temperature conditions caused by loss of fan cooling or excessive ambient temperature. In an over-temperature condition the +12V output of the power supply module shuts down. When the power supply temperature drops to within the specified limits, the power supply restores power automatically while the standby power remains on. The OTP circuit has built-in hysteresis so the power supply does not oscillate on and off because of a temperature recovering condition. The OTP trip level has a minimum of 4°C of ambient temperature hysteresis.

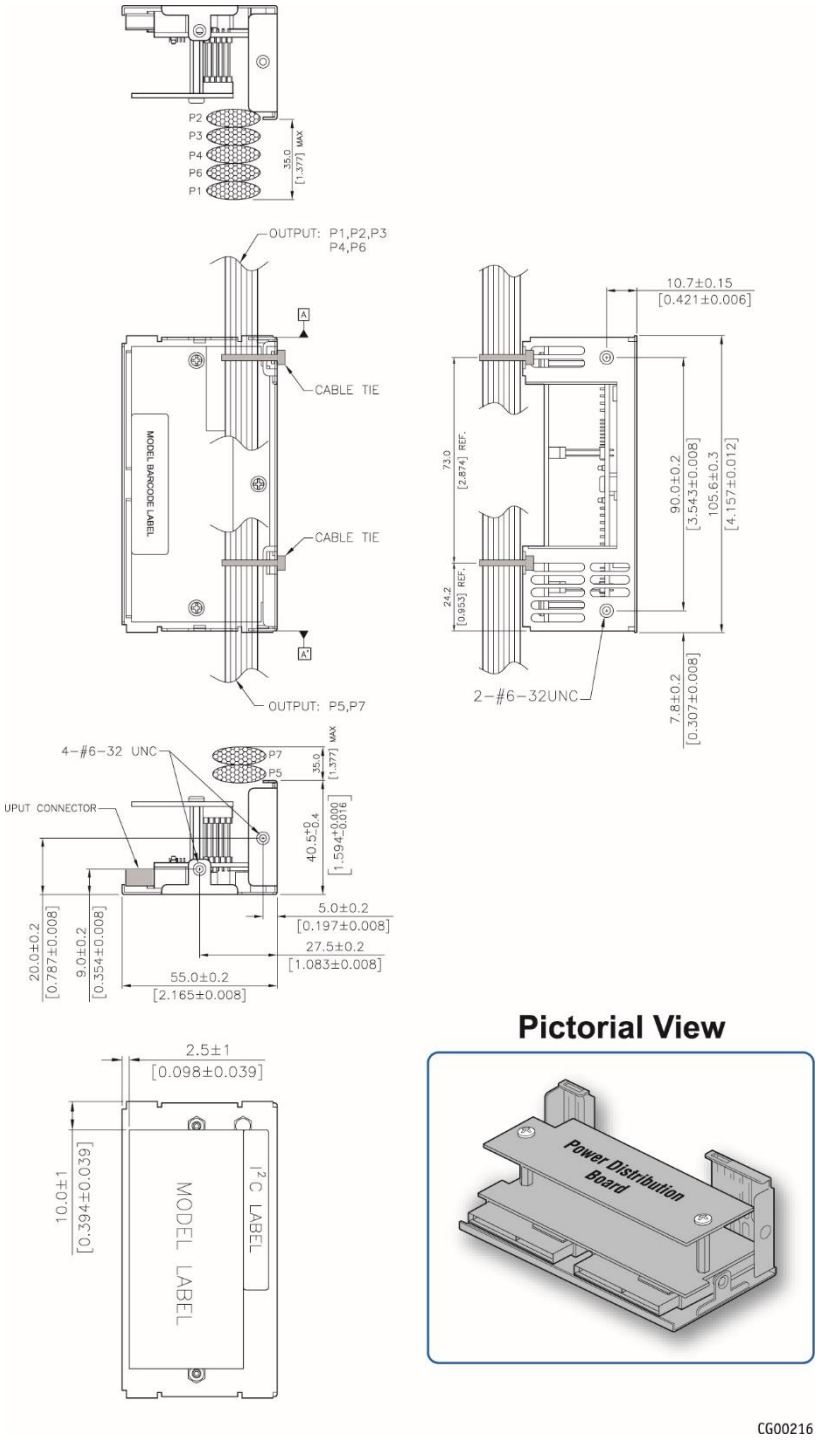
13 Power Distribution Board (PDB)

This chapter defines the features and functionality of the power distribution board (PDB), which is used in conjunction with DC or AC input power supply modules to complete the power subsystem.

13.1 Introduction

The PDB provides power to the system via an output harness of power cables that are soldered to the PDB and connect to various places on the baseboard, fan control board, and the HDD backplane board. AC or DC power supply modules blind mate into the PDB. +12V is generated by the PSUs and passed through the PDB which then provides one 240VA limited +12V power rail a second full power +12V rail. The PDB DC-to-DC converters generate +3.3VDC, +5VDC and -12V outputs from the AC or DC PSU +12V output. Protection circuitry for the PDB-generated outputs is provided. The AC or DC PSUs provide +12V protection circuitry. The PDB includes a FRU EEPROM. Figure 38 shows the mechanical details of the power distribution board.

Figure 38: Power Distribution Board Mechanical Drawing



13.2 PDB Input Connectors

The power distribution board (PDB) has two female input connectors that mate to male output connectors located on the power supply modules. The connector mechanical drawing, pin-out tables, and input signal descriptions are shown in Figure 39 and Table 262624.

Figure 39: PDB Input Connector

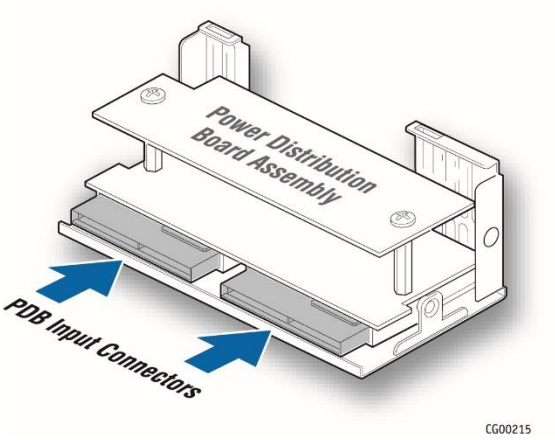


Table 26: PDB Input Connector Pin-Out

Pin	Signal Name	Description
P1 Bottom	RTN GND	+12V return
P2 Bottom	Main_Output	+12V
P3 Top	RTN GND	+12V return
P4 Top	Main_Output	+12V
Pin	**Signal Name**	**Description**
S1 Bottom	Main_Output Sense	+12VS
S2 Bottom	GND Sense	+12V RTN Sense
S3 Bottom	+MO IS	+12V Main Output Current Share Bus
S4 Bottom	SMB_Alert TTL	SMB_Alert for failure notification
S5 Bottom	SDA	I2C Data signal
S6 Bottom	SCL	I2C Clock signal
S7 Bottom	+PS Kill	To switch off Main power (short)
S8 Bottom	PSON	Power Enable input
S9 Bottom	PWOK	Power OK output
S10 Bottom	A1	I2C address bit 1
S11 Bottom	Stby_Output	+5Vsb
S12 Bottom	Stby_Output	+5Vsb
S13 Top	Reserved (NC)	Reserved
S14 Top	Present#	Power Supply present
S15 Top	A0	I2C address bit 0
S16 Top	A2	I2C address bit 2
S17 Top	+15Vcc	(+15Vcc)
S18 Top	EEPROM_WP	EEPROM write protection
S19 Top	Input_OK#	Input Present signal
S20 Top	grRD# (NC)	Green redundancy input
S21 Top	PDB-Fail	PDB fail
S22 Top	NC	Reserved for factory use (NC)
S23 Top	Stby_Output	+5Vsb
S24 Top	Stby_Output	+5Vsb

13.3 PDB Output Load and Voltage Regulation Requirements

Table 272725 defines the total loading, power, and voltage regulation requirements for the PDB and 1+1 redundant PSUs.

The output voltages must stay within the voltage limits, including peak-peak ripple and noise, as specified in Table 272725 below when operating at steady state and dynamic loading conditions. All outputs are measured with reference to the return remote sense signal (ReturnS). The 3.3V and 5V outputs are measured at the remote sense point and all other voltages are measured at the output interface connector.

Table 27: PDB and PSU Output Requirements

Output Voltage Rails	+12V	+5V	+3.3V	-12V	5VSB
MAX Load/Rail	70	20A	20A	0.5A	3A
MIN Static Load	1.5A	1.0A	1.5A	0A	0.1A
Max Output Power/Rail	840W	100W	66W	6W	15W
Total Watts	850W max combined power				
Voltage Regulation +/-%	+5/-3%	+/-5%	+/-5%	+9/-5%	+/-5%
Voltage Regulation +/- V	12.6V 11.64V	5.25V 4.75V	3.47 3.14	-13.08V -11.4V	5.25V 4.75V
Max Ripple/Noise	120mVp-p	50mVp-p	50mVp-p	120mVp-p	50mVp-p

NOTE: The 3.3V + 5V combined power limit is 140W maximum.

13.4 PDB Protection Circuits

Protection circuits inside the power distribution board and power supply can cause either 1) the power supply main +12V output to shut down, which in turn shuts down the PDB outputs, or 2) first shuts down any of the three outputs on the PDB, which in turn also shuts down the entire power supply subsystem. If the power supply latches off because of a protection circuit tripping, an AC or DC cycle OFF for 15 seconds minimum and PSON # cycle HIGH for one second resets the power supply and the PDB.

13.5 PDB PMBus Requirements

The PDB meets the requirements of PMBus specifications parts I and II, revision 1.2. The AC and DC PSUs meet PMBus revision 1.1.

The following related documents give more detailed information about PMBus requirements:

- PMBus™ Power System Management Protocol Specification Part I – General Requirements, Transport And Electrical Interface; Revision 1.2
- PMBus™ Power System Management Protocol Specification Part II – Command Language; Revision 1.2
- System Management Bus (SMBus) Specification Version 2.0

13.6 PDB Output Harness

The PDB output harness includes many cables that are soldered onto the module and bundled with ties. Table 282826 lists all of the cables that exit the PDB and shows where they connect on the other end.

Table 28: PDB Cables

Cable Name	Connections
Baseboard SSI Main Power Provides power to the baseboard and the power supply with the PS-ON signal	Power Distribution Board 3.3V D2D (soldered) to Baseboard MAIN_PWR (J9G1)
CPU 1 and DIMM Power Provides power for CPU 1 and the DIMMs associated with CPU 1	Power Distribution Board 3.3V D2D (soldered) to Baseboard CPU_1_PWR (J8K2)

Cable Name	Connections
CPU 2 and DIMM Power Provides power for CPU 2 and the DIMMs associated with CPU 2	Power Distribution Board 3.3V D2D (soldered) to Baseboard CPU_2_PWR (J9A2)
Fan Control Board Power Provides power for the fan control board and the six 80mm system fans	Power Distribution Board 3.3V D2D (soldered) to Fan Control Board Power (J9A2)
SAS HDD Backplane Board Power Provides power for the HDD backplane board and up to six SAS HDDs	Power Distribution Board 3.3V D2D (soldered) to SAS HDD Backplane Power (J11)
Aux I/O Power Dongle Provides power to a 10-pin connector where customers can connect a custom cable of their own design to provide auxiliary power to high-power PCI adapters	Power Distribution Board 5V D2D (soldered) to Cable-to-Cable connector NC (custom connection).
Baseboard SSI Power Control Signal Provides PMBus signals between the power supplies and the baseboard	Power Distribution Board 3.3V D2D (soldered) to Baseboard PMBUS (J9E1).

14 POST Error Reporting

The system BIOS sends error messages a few different ways:

- Beep codes
- Diagnostic LED codes
- POST error codes
- SEL error codes

Before video initialization, beep codes are sent to indicate serious errors. Most such errors cause fatal halts to the system. Diagnostic LED codes may also be sent with these beep codes.

During the POST sequence, the system displays POST process codes in the diagnostic LEDs to show where in the POST process the system is. These codes are useful for debugging if a halt occurs in the POST process.

Later in the POST sequence, the system displays POST error codes on the video monitor and the error management display. POST error codes are also automatically logged in the System Event Log.

For detailed information, including definitions of all codes and messages, please see the *Intel® Server Board S2600CW Family Technical Product Specification* on the Kontron website.

15 Regulatory Specifications

The Kontron CG2300 Carrier Grade Server meets the specifications and regulations for safety and EMC defined in this chapter

15.1 Safety Compliance

USA/Canada	UL 60950-1 2nd Edition//CSA C22.2 No. 60950-1-07 2nd Edition
Europe	Low Voltage Directive, 2006/95/EC Safety Directive, 2001/95/EC
International	CB Certificate and Report to IEC60950-1, 2nd Edition and all international deviations

15.2 Electromagnetic Compatibility

USA	FCC 47 CFR Parts 15, Verified Class A Limit
Canada	ICES-003 Class A Limit
Europe	EMC Directive, 2004/108/EC EN55022, Class A Limit, Radiated & Conducted Emissions EN55024 Immunity Characteristics for ITE EN61000-4-2 ESD Immunity EN61000-4-3 Radiated Immunity EN61000-4-4 Electrical Fast Transient EN61000-4-5 Surge EN61000-4-6 Conducted RF EN61000-4-8 Power Frequency Magnetic Fields EN61000-4-11 Voltage Fluctuations and Short Interrupts EN61000-3-2 Harmonic Currents EN61000-3-3 Voltage Flicker
Australia/New Zealand	EN55022, Class A Limit
Japan	VCCI Class A ITE (CISPR 22, Class A Limit)
Taiwan	BSMI Approval, CNS 13438, Class A and CNS13436 Safety
Korea	KCC Approval, Class A
Russia	Gost Approval (EMC and safety)
International	CISPR 22, Class A Limit, CISPR 24 Immunity

15.3 CE Mark

The CE marking on this product indicates that it is in compliance with the European Union EMC Directive 2004/108/EC, Safety Directive 2001/95/EC, Low Voltage Directive 2006/95/EC, and RoHS (recast) Directive 2011/65/EU.

15.4 NEBS Compliance

The CG2300 Carrier Grade Server system is designed to be compliant with:

- Telcordia SR-3580 NEBS Level 3
- Telcordia GR-63 Physical Protection
- Telcordia GR-1089 Electromagnetic Compatibility and Safety
- ETSI EN 300 386 EMC Requirements for Telecom Equipment
- ETSI EN 300 019-2-1 Storage Class T1.2
- ETSI EN 300 019-2-2 Transportation Class T2.3
- ETSI EN 300 019-2-3 Operational Class T3.1E
- ETSI EN 300 753 Acoustic Noise
- ETSI EN 300 132-2 Power Supply Interface (DC input)
- ETSI EN 300 132-3 Power Supply Interface (AC input)

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