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>> Kontron Technical Product Specification <<

CG00201

Kontron CG1200 Carrier Grade Server

Document Revision 1.0

Date	Revision Number	Modifications
December 2012	1.0	Initial Release

Disclaimers

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1. Introduction

This technical product specification provides detailed information about the Kontron CG1200 Carrier Grade Server, including information about the chassis hardware, cables, connectors, system boards, power subsystem, and regulatory requirements.

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Provides an overview of this document

Chapter 2: System Overview
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Chapter 3: Cables and Connectors
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2. System Overview

This chapter provides an overview of the key features of the Kontron CG1200 Carrier Grade Server in the following sections:

Section 2.1: **Introduction**
Provides an overview of the server features and a block diagram of the Kontron CG1200 Carrier Grade Server

Section 2.2: **CG1200 Server External Chassis Features**
Describes the user-accessible features of the CG1200 server chassis in detail (buttons, switches, bezel, etc.)

Section 2.3: **CG1200 Server Internal Chassis Features**
Provides an overview of the internal functional components of the CG1200 server

Section 2.4: **CG1200 Server Platform Management**
Describes the server management features of the CG1200 server

Section 2.5: **CG1200 Server Specifications**
Summarizes the environmental and physical specifications of the CG1200 server

2.1 Introduction

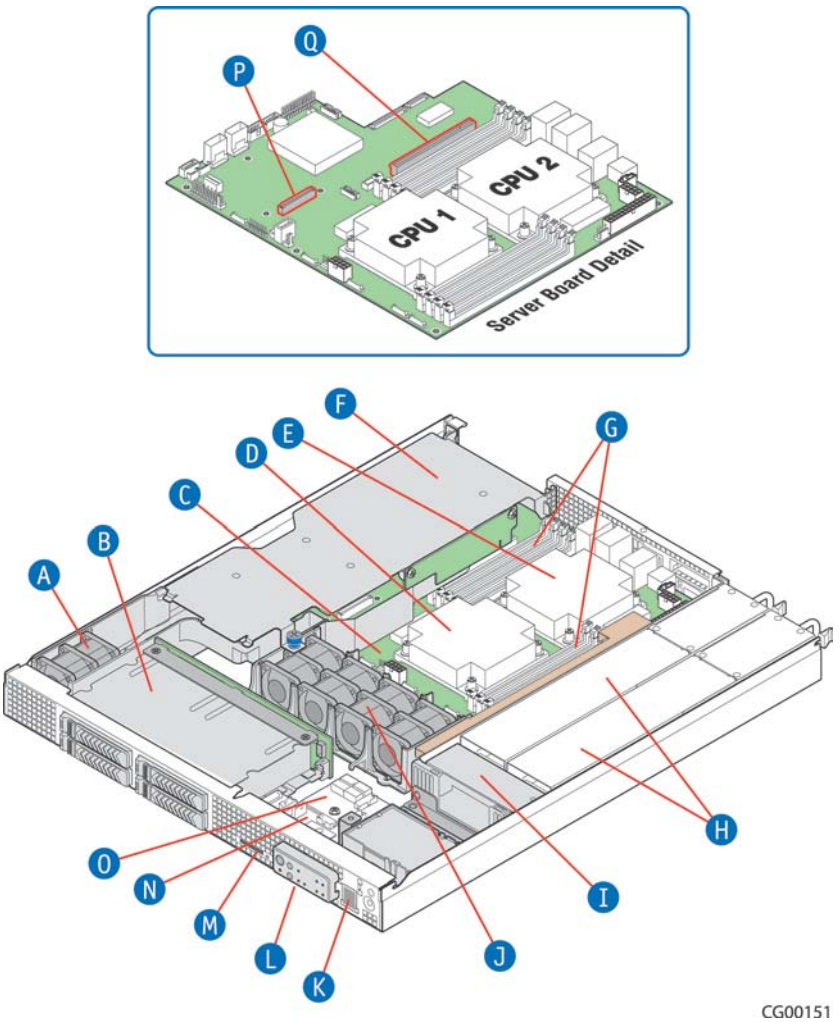
2.1.1 Kontron CG1200 Carrier Grade Server

The Kontron CG1200 Carrier Grade Server is a compact, high-density, rack-mount server with support for the Intel® Xeon® E5-24XXL processor family and up to eight DDR3 DIMMs (four for each processor. The CG1200 server supports high availability features such as hot-swappable and redundant power supply modules and up to four hot-swappable, 2.5-inch hard disk drives. The scalable architecture of the CG1200 server supports a variety of operating systems.

Figure 1 shows the CG1200 server completely assembled. Figure 2 shows the CG1200 server with the top cover removed.

Figure 1: Kontron Carrier Grade Server CG1200 (Top Cover On)

Figure 2: Kontron CG1200 Carrier Grade Server (Cover Removed)



Item	Description	Item	Description
A	PCI fan (one pair)	J	CPU/memory dual-rotor fans
B	SAS hard drive bay	K	USB ports (two)
C	Intel® S2400EP4 Server Board	L	Front panel switches and indicators
D	CPU 1	M	SD media module
E	CPU 2	N	Front panel board
F	PCIe FH/FL riser card assembly	O	Telco alarm module (TAM) board
G	Eight DDR3 memory DIMM slots, two banks of four DIMMs for each processor	P	RAID module connector
H	Redundant, hot-swappable AC or DC power supply modules	Q	PCIe slot
I	Power distribution board (PDB)		

2.1.2 CG1200 Server Feature Summary

Table 1 lists the features of the CG1200 server.

Table 1: CG1200 Server Feature List

Product Features	
System	• NEBS GR63 and GR1089 NEBS level 1 and 3/ETSI compliant • Telco Alarm Manager (TAM) front panel LEDs and relays • RoHS 6/6 compliant • Managed life support (3-5 years)
Chassis	• Ruggedized 1U x 500mm (20” depth) • Post plated external sheet metal
Front Panel Buttons	• Power on/off • System reset • Chassis ID • NMI
Front Panel LEDs	• Power status • Chassis identification • System status • HDD activity/fault • NIC activity • Alarms (Critical, Major, Minor, Power)
Storage	• Up to four hot-swappable 2.5” SAS HDDs/SATA SSDs • Integrated SAS/SATA interface with SW RAID 0/1/10 • Intel RAID on Chip (ROC) and I/O Controller (IOC) supported • Front access SD media flash module • Internal flash storage supported (eUSB)
System Cooling	• Five 40x56mm dual rotor fans • Redundant cooling
Power	• Dual redundant 650W AC hot-swappable power supplies, 80Plus® Gold • Dual redundant 650W DC hot-swappable power supplies • Common 650W Power Distribution Board (PDB) • PMBus 1.2 specification support • Auxiliary I/O power dongle
Baseboard	• Intel® S2400EP4 server board • SSI EEB (12in x13in) form factor • One 2x5-pin connector providing front panel support for two USB 2.0 ports • Tw0 SAS connectors supporting up to 3Gb/sec • Intel® RAID C600 upgrade key connector with RKSAS4 pre-installed • Intel® RMM4 Lite connector • Intel® RMM4 Dedicated Server Management NIC (DMN) connector
SW RAID Module Support	• Optional 4-port SAS with Intel® ESRT2 RAID 0/1/10 0r Intel® RSTe RAID 0/1/10
HW RAID Module Support	• Optional 6Gb Intel SAS ROC with four internal ports and optional maintenance-free (SuperCap) backup (flash-based) for SAS drives
Processor	• Two FC-LGA 1356 Socket B2 support for Intel® Xeon® E5-24XXL processors
Chipset	• Intel® C600(-A) chipset with support for storage option upgrade keys
Memory	• Eight DIMM slots – three memory channels per processor (one DIMM slot/channel for channel A, B, D, E and two DIMM slot/channels for channel C and F) • Support for 800/1066/1333/1600 MT/s ECC Registered (RDIMM) or Unbuffered (UDIMM) LVDDR3 or DDR3 memory

Product Features	
I/O	• One PCIe x16 Gen 3 riser slot • Front panel: Two USB 2.0 connectors • Rear panel: one RJ-45 serial connector, four USB 2.0 connectors, one management NIC port (optional Intel® RMM4), one personality module connector (RMM4 and personality modules are mutually exclusive), four RJ-45 network interface connectors supporting 10/100/1000 Mbps, one TAM dry relay connector, one DB15 Video connector.
Server Management	• Integrated BMC (iBMC) with advanced options
Video	• Integrated graphics core with 2D hardware accelerator

Up to four 2.5-inch hot-swappable SAS technology rotating hard drives 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.

NOTE: 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.

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 CPU fans.

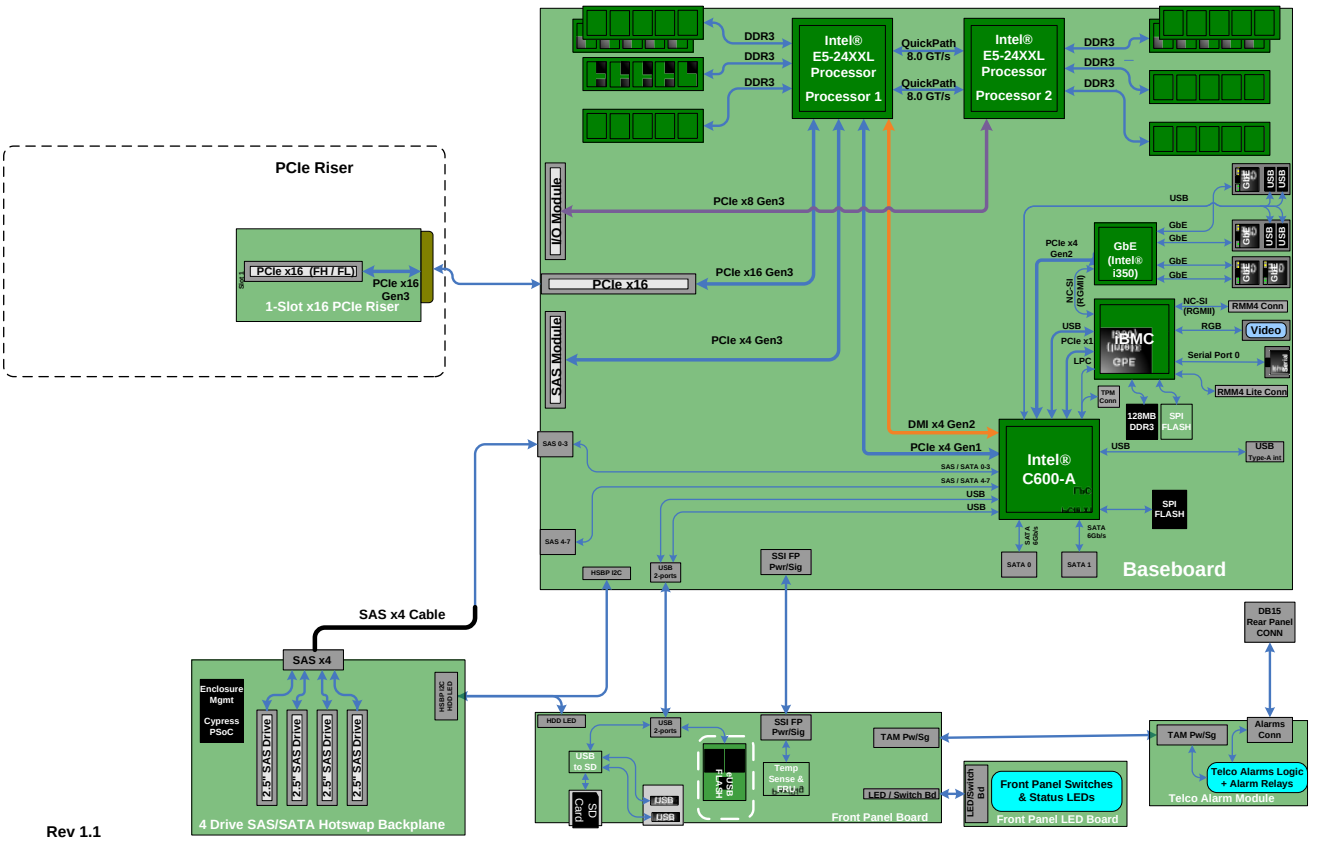
Up to two, hot-swappable, 650W power supply modules can be installed at the rear of the chassis for a 1+1 redundant configuration. The server comes with a filler module that must be installed in the empty power supply slot in systems without redundancy. The left slot (looking from the front of the system) is the non-redundant power supply module location.

Five 40x56mm dual-rotor, counter-rotating fans cool the CG1200 server. There are four fans for the CPU/memory cooling zone and one for the PCI riser card assembly zone. The four CPU/memory fans are located behind the front panel board and in front of the server board. These fans also provide cooling for the disk drive bay. The PCIe fan is located immediately behind the front of the chassis enclosure at the left of the server in front of the riser card assembly. All of the fans are connected to the server board.

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.

Figure 3 is a block diagram of the CG1200 server subsystems.

Figure 3: CG1200 Server Block Diagram



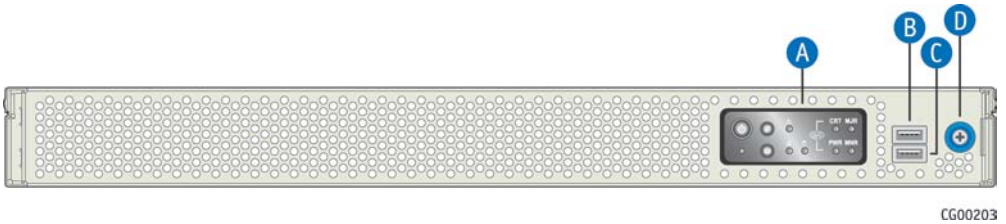
2.2 CG1200 Server External Chassis Features

2.2.1 Chassis -- Front Views

Figure 4 shows the front of the CG1200 server with the bezel installed.

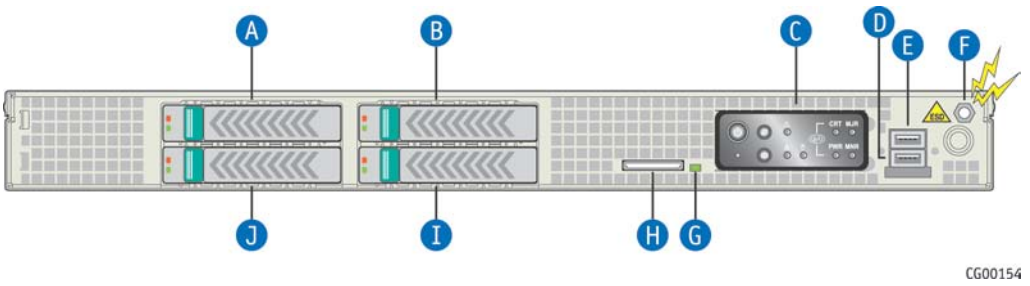
Figure 5 shows the front of the server with the bezel removed. Removing the bezel provides access to the hard drive carriers and SD card slot.

Figure 4: Front View of the CG1200 Server (Bezel Installed)



Item	Description	Item	Description
A	Mini-bezel control buttons, status indicator and telco alarm LEDs	**C**	USB port
B	USB port	**D**	Bezel captive screw

Figure 5: Front View of CG1200 Server (Bezel Removed)

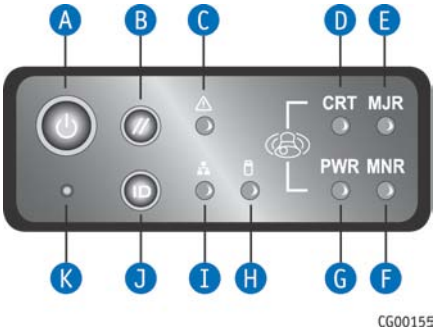


Item	Description	Item	Description
A	Hard disk drive slot 3	**F**	ESD ground strap attachment
B	Hard disk drive slot 2	**G**	SD flash card LED
C	Mini-bezel control buttons, status indicator and telco alarm LEDs	**H**	SD flash card slot
D	USB port	**I**	Hard disk drive slot 0
E	USB port	**J**	Hard disk drive slot 1

2.2.2 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**	Power alarm (amber)
B	System reset button	**H**	HDD activity LED
C	System Status LED	**I**	NIC activity LED
D	Critical alarm (amber or red†)	**J**	Chassis ID button
E	Major alarm (amber or red†)	K	NMI button
F	Minor alarm (amber)		

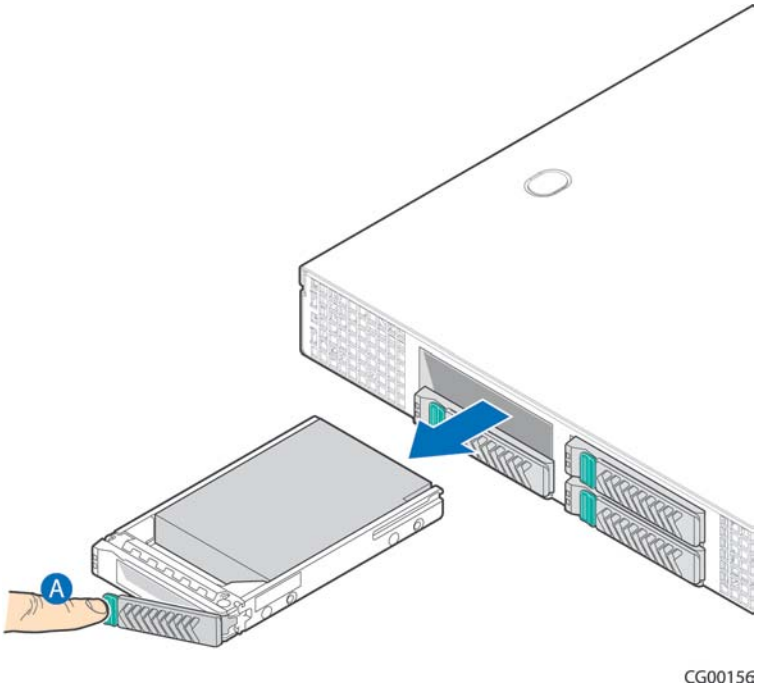
† Critical and Major alarm indicators are bi-color LEDs that can be configured to be amber or red by means of an SDR TAM setting. Amber is the default color.

2.2.3 Hard Drives

The CG1200 Carrier Grade Server chassis supports up to four SAS HDDs or SATA SSDs which are accessible from the front of the chassis. The drives are mounted in removable drive carriers (Figure 7, “A”) that latch into the drive bay sub-assembly. The hard disk drives installed in the carriers are hot-swappable.

The front bezel must be removed to access the hard disk drive slots.

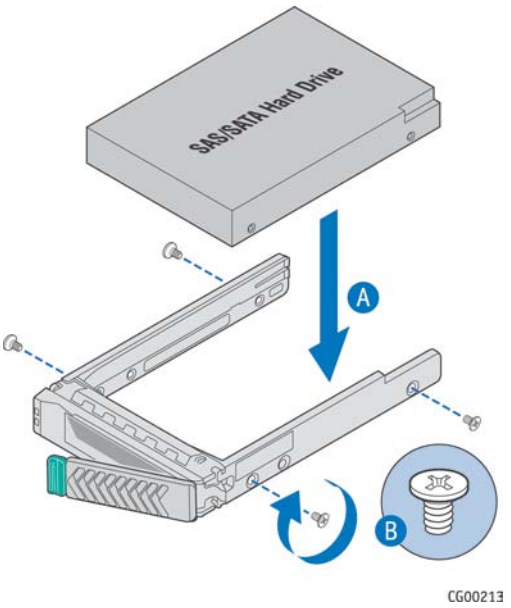
Figure 7: Hard Disk Drives



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 as shown in Figure 8.

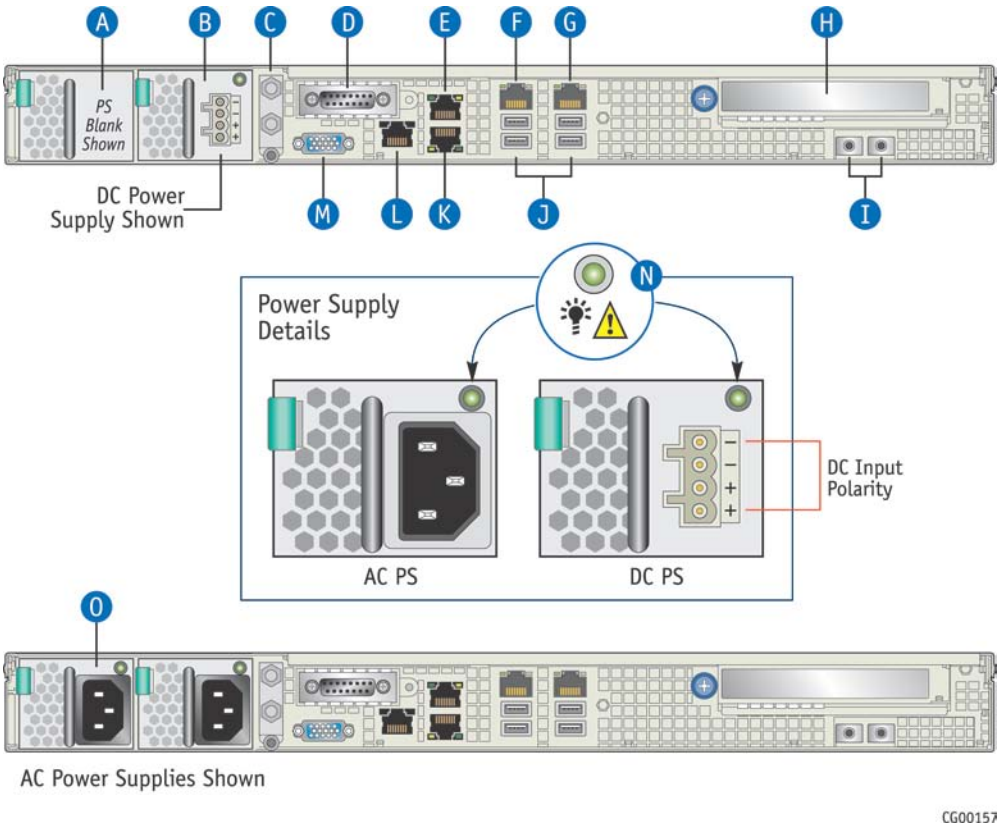
Figure 8: Hard Drive Carrier Assembly



2.2.4 Chassis -- Rear View

Figure 9 shows the rear of the CG1200 server chassis.

Figure 9: Chassis Rear View



Item	Description	Item	Description
A	Optional power supply slot 2 (filler panel shown)[1]	**I**	I/O module (filler panel shown)[2]
B	Power supply slot 1 (shown with DC power supply installed)	**J**	USB Ports
C	DC power grounding studs	**K**	NIC port 2
D	Telco alarms connector	**L**	Serial Port A RJ45 connector
E	NIC port 1	**M**	Video port
F	NIC port 3	**N**	Power supply LED indicators
G	NIC port 4	**O**	Power supply 2 (shown with AC power supply installed
H	PCIe slot		

NOTES:
1. In non-redundant configurations, power supply slot 2 must have a filler panel installed.
2. If RMM4 NIC is not used, a filler panel occupies this space

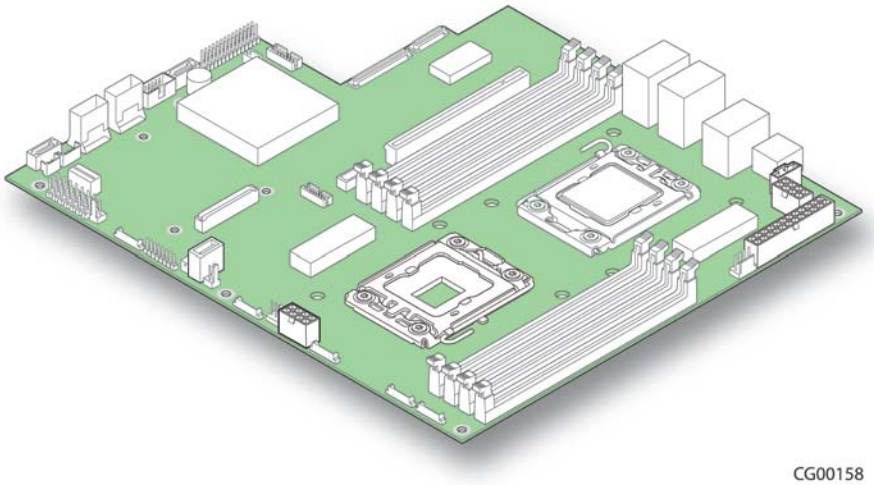
2.3 CG1200 Server Internal Features

2.3.1 Intel® S2400EP4 Server Board

NOTE: See the *Intel*® S2400EP4 *Server Board Technical Product Specification* on the Kontron website for detailed information about the baseboard used in this server.

Figure 10 shows the S2300EP4 server board.

Figure 10: S2400EP4 Server Board Layout

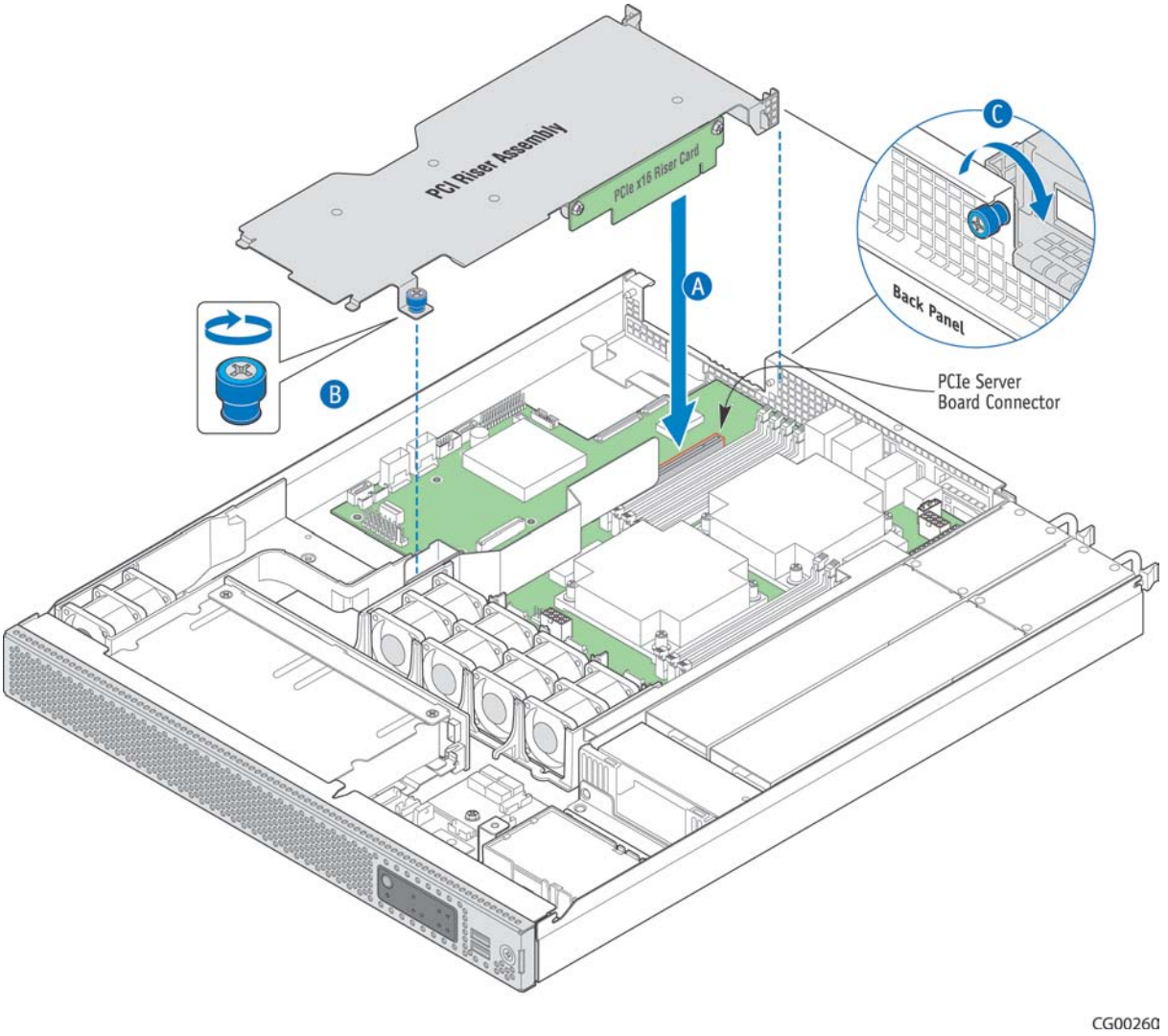


2.3.2 PCI Riser Card Assembly

The riser card assembly houses a PCIe riser card and one PCI adapter card. The riser card, along with the appropriate PCI adapter card, is assembled into the sheet metal bracket while the assembly is removed from the chassis.

Figure 11 shows the installation of the riser card assembly.

Figure 11: Riser Card Assembly

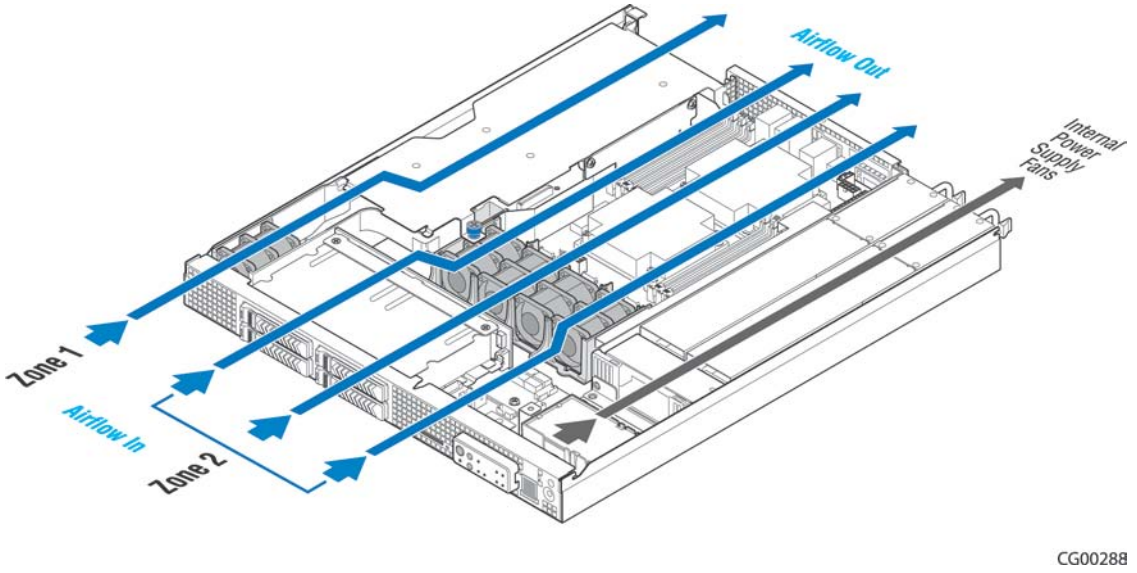


A captive screw (B) at the front of the riser assembly and one on the rear panel (C) secure the assembly in the chassis.

2.3.3 Cooling Subsystem

All system components except the PCI riser card assembly are cooled by a set of four CPU/DIMM fans mounted near the front of the chassis behind the front panel board, as shown in Figure 12The PCI riser card assembly is cooled by a separate fan located in front of the riser assembly on the left side of the chassis.

Figure 12: Cooling Subsystem



Ambient Temperature Control

The server board provides five pulse-width modulation circuits that control the system fan speeds based on readings from ambient temperature sensors.

Cooling Summary

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

- Up to two processors
- Up to 256 Gbytes of DDR3 DIMM memory
- Four hard drives
- One PCIe adapter

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 Chapter13, “Regulatory Specifications”.

2.4 CG1200 Server Platform Management Subsystem

See the *Intel® S2400EP4 Server Board Technical Product Specification* for a detailed description of the Platform Management design and features.

The platform management subsystem is based on the Integrated Baseboard Management Controller (iBMC) features of the Emulex Pilot III controller. 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)
- 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.
- 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.
- Limits number of system resets due to CPU fan speed control
- Power supply redundancy monitoring and support
- Fan redundancy monitoring and 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.

- BIOS logs CPU and memory events via IPMI
- 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
- Integrated KVM.
- Integrated Remote Media Redirection
- Local Directory Access Protocol (LDAP) support

2.4.3 New Manageability Features

The Intel® Server Board S2400EP4 also offers a number of new features:

- Sensor and SEL logging additions/enhancements (for example, additional thermal monitoring capability, better isolation of faults to the FRU level)
- Embedded platform debug feature that allows capture of detailed data for later analysis by Intel engineering.
- Provisioning and inventory enhancements:
  - Signed firmware (improved security)
  - Inventory data/system information export (partial SMBIOS table)
- Enhancements to fan speed control.
- DCMI compliance (product-specific).
- Support for embedded web server UI in Basic Manageability feature set.
- Enhancements to embedded web server
  - Human-readable SEL
  - Additional system configurability
  - Additional system monitoring capability
  - Enhanced on-line help

- Enhancements to KVM redirection
  - Support for higher resolution
- Support for EU Lot6 compliance
- Management support for PMBus rev1.2 compliant power supplies
- DCMI 1.1 compliance

2.5 CG1200 Server Specifications

This section lists the environmental and physical specifications for the CG1200 server.

2.5.1 Environmental Specifications

The CG1200 server is designed and tested to meet the CRMS environmental test standards specification.

.Table 2: Environmental Specifications Summary

Environment	Specification
Temperature, operating	NEBS Level 3 +5°C to 40°C (41° F to 104° F) NEBS Level 1 +10°C to 35°C (50° F to 95° F)
Temperature, non-operating	-40° C to 70° C (-40° F to 158° F)
Temperature, short-term* NEBS Level 3 only	-5°C to 55 °C (23° F to 131° 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 23° C to 40° C (73° F to 104° F)
Altitude	-61 to 1829m (-200 to 6000 ft) @ 40°C max. 1829 to 3960m (6000 to 13,000 ft) @ 30°C
Vibration, non-operating	Random profile 5Hz @ 0.001g^2/Hz to 20Hz @ 0.01g^2/Hz (slope up) 20Hz to 500Hz @ 0.01g^2/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 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: 7B 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 CG1200 server.

Table 3: Physical Dimensions (Max)

Height	1.75 inches (44.5 mm)
Width	17.14 inches (435.3 mm)
Depth	20 inches (508mm)
Front clearance	2 inches (50.8 mm)
Side clearance	1 inch (25.4 mm)
Rear clearance	3.6 inches (91.4 mm)

Table 4: Shipping Weights (Max)

Descriptions	**Weight (kg)**	**Weight (lbs)**
System weight - max configuration (LP PCI adapters, AC or DC PS)	11.82	26.00
System weight - model 0 configuration (as shipped from factory)	8.89	19.56
System packaging	2.18	4.88
AC power supply	1.05	2.32
DC power supply	1.06	2.34
CPU heat sink with hardware and TIM	0.41	0.92
ROC HW RAID module	.09	0.20
IOC SW RAID module	.06	0.14
Maintenance Free Backup Module for ROC	0.08	0.18
RMM4	0.04	0.08
HDD carrier	0.09	0.20
Bezel	0.15	0.34
Riser card (single slot PCIe x16)	0.02	0.04
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
CPU without heat sink	0.04	0.09

3. Cables and Connectors

This chapter describes interconnections between various components of the Kontron CG1200 Carrier Grade Server using overview diagrams as well as tables that describe the signals and pin-outs for the system connectors. Refer to the *Intel® Server Board S2400EP4 Technical Product Specification* or the board sections in this document for any signal descriptions and pin-outs that are not listed in this section.

The information contained in this chapter is organized into three sections:

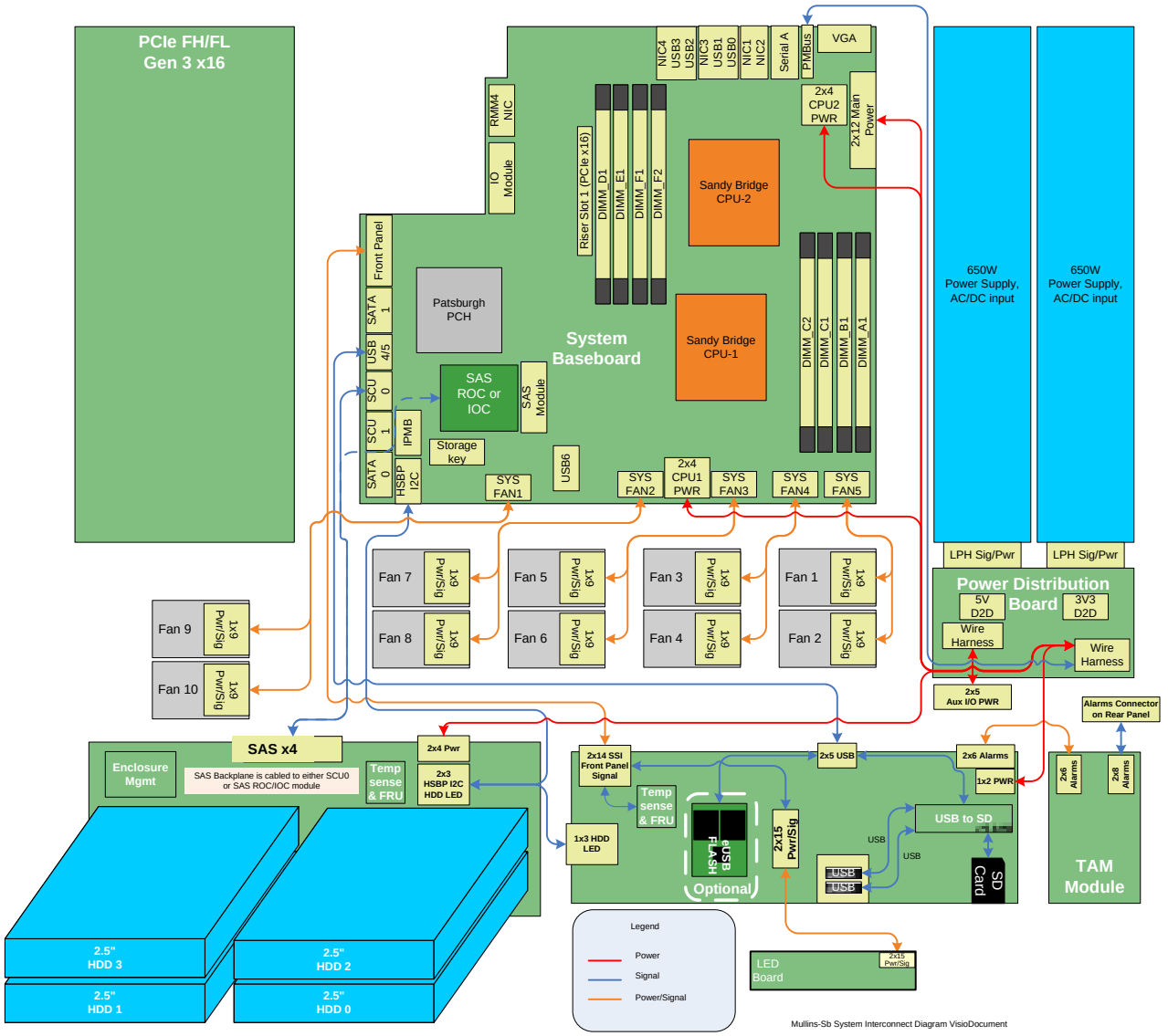
Section 3.1: Interconnect Block Diagram
Provides an overview of system interconnects

Section 3.2: User-Accessible Interconnects
Describes the form-factor and pin-out for user-accessible interconnects

3.1 Interconnect Block Diagrams

Figure 13 shows all of the system level cabled interconnections.

Figure 13: CG1200 Server Interconnect Block Diagram



3.2 User-Accessible Connectors

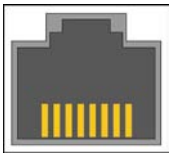
3.2.1 Keyboard and Mouse Ports

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

3.2.2 Serial Port

The CG1200 server has one RJ45 serial port A connector on the rear panel.

Figure 14: Rear Panel Serial Port Connector RJ45

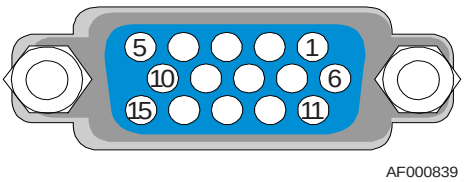


Pin	Signal Name
1	RTS (request to send)
2	DTR (data terminal ready)
3	TXD (transmit data)
4	GND
5	RIA (ring indicator)
6	RXD (receive data)
7	DSR/DCD (date set ready / data carrier detect
8	CTS (clear to send)

3.2.3 Video Port Connector

The video port interface is a standard VGA-compatible, 15-pin connector. Video is supplied by an on-board video controller with 128 Mbytes of on-board video DDR3 SDRAM.

Figure 15: Video Connector



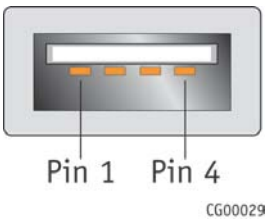
Pin	Signal

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 Bus (USB) Interface

There are six externally accessible USB ports on the CG1200 server: four ports on the rear of the system and two on the front. The ports on the front panel are accessible without removing the front bezel. The built-in USB ports permit the direct connection of six (two 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.

Figure 16: USB 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
5	GND
6	GND

3.2.5 Ethernet Connector

The S2400EP4 server board (baseboard) provides four network interface controller (NIC) RJ45 connectors 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.

Figure 17: RJ45 Ethernet Connector

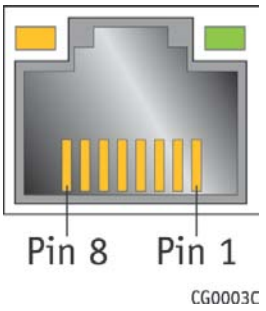


Table 5 RJ45 Ethernet Connector Pin-Out

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, -
6	BI_DB-	Bi-directional pair B, -

Pin	Signal Name	Description
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 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

4. Front Panel Board

This chapter provides an overview of the Kontron CG1200 Carrier Grade Server Front Panel (FP) board and includes information on board hardware, connectors, power subsystem, optional add-ins, and regulatory requirements. This chapter is organized into the following sections:

Section 4.1: Introduction
Provides an overview of the CG1200 server FP board and shows the functional blocks

Section 4.2: Front Panel Board Features
Describes the CG1200 FP functional blocks

Section 4.3: Front Panel Board Block Diagram
Describes additional functions not described in the Functional Description section.

Section 4.4 Front Panel Board Functional Description
Provides a high-level description of the functionality distributed among the architectural blocks of the FP board

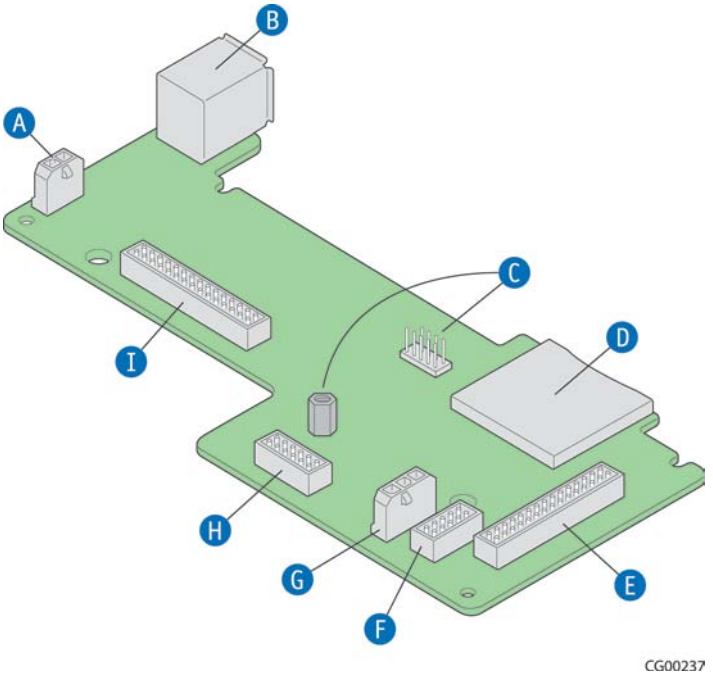
Section 4.5: Front Panel Board Connector Specifications
Provides detailed descriptions and the connector pin-out for each of the front panel board connectors

4.1 Introduction

The CG1200 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 USB-A stacked connector, as well as an internal USB header for USB flash drive support. Most signals pass from the front panel interface off the baseboard directly to the appropriate device (switch, LED, etc.).

Figure 18 shows the FP board components.

Figure 18: FP Board Layout (Primary Side)



Item	Description	Item	Description
A	Front panel board USB cable	F	FP signal
B	Dual USB ports	G	HDD LED signal cable
C	eUSB flash connector and standoff (optional)	H	TAM signal cable
D	SD Module	I	LED/switch board power and signal cable
E	SSI front panel board power		

4.2 Front Panel Board Features

The FP Board provides the following feature set:

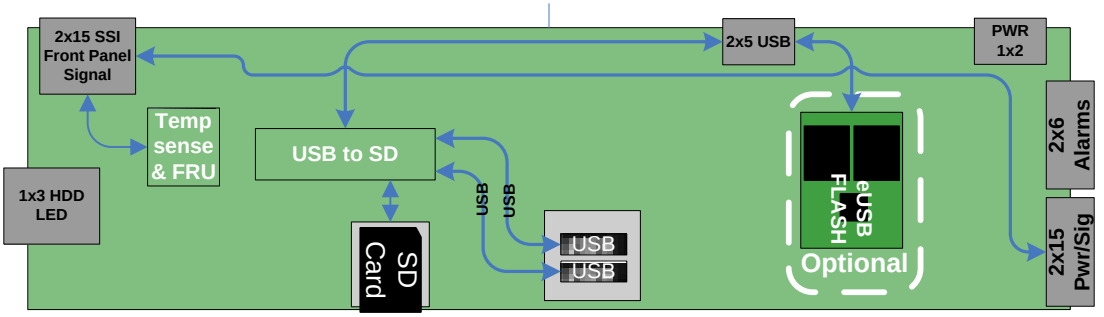
- Two USB ports coming from the baseboard; one to drive the embedded USB solid-state drive and one to drive the SD flash/USB controller(s).
- One stacked USB connector, one eUSB connector (10-pin, 2 mm, low profile connector, 5V powered) and one SD card slot.
- Control circuitry for driving the NIC activity LED, the system status LED, the power LED, the ID LED and the disk activity LED, which are all located on the LED/switch board
- On-board LED indicating SD flash drive activity
- System power state and status indicators -- power, reset, and NMI switches

NOTE: There may be features (for future use) in addition to those in this list.

4.3 Front Panel Board Block Diagram

Figure 19 is a block diagram that shows the major hardware components and interconnections on the front panel board.

Figure 19: FP Board Block Diagram



4.4 Front Panel Board Functional Description

This section provides a high-level description of the functions handled by the architectural blocks on the FP board.

4.4.1 Front Panel Board USB Ports, SD card, and eUSB

There are two USB channels on the CG1200 server FP board. The USB channels are connected to the front panel board from the baseboard by a (2X5) 10-pin signal connector. One USB channel goes to the Embedded USB Solid-State Drive (eUSB) and the second USB channel goes to the SD flash module and USB controller(s).

The FP board provides the P5V power to the external USB connector and overcurrent monitoring for the external USB ports.

The baseboard provides the P5V power to the eUSB connector and overcurrent monitoring for the eUSB.

4.4.2 Front Panel Board LED Board Interface

The front panel board uses a (2x15) 30-pin power and signal connector as the interface between the front panel board and the LED board. The signals in this connector are the telco alarm LED signals, the system status LED signals, and the front panel push button signals.

4.4.3 Front Panel Board TAM Module Interface

The front panel board uses a 2x6 (12-pin) power and signal connector as the interface to the telco alarm module (TAM). This connection provides the telco alarm LED signals from the TAM module to the front panel LED board so the alarm status can be displayed on the front panel LEDs. This connector also provides the SMB Sensor bus connections for communications with the TAM Module.

4.4.4 Front Panel Board Baseboard Interface

The front panel board uses a 30-pin connector (standard SSI 24 pin connector plus 6 other pins) for the electrical connection to the

baseboard. This connector provides the connections for the DC voltage, the SMB Sensor bus, the LED status signals and the front panel power, Reset, ID, and NMI buttons.

4.4.5 Front Panel Board Miscellaneous Circuits

The front panel board provides the de-bounce circuit for the front panel push buttons as well as the isolation and drive circuits for the system status LEDs that are visible on the front panel LED board.

4.4.6 Front Panel Temperature Sensor and FRU EEPROM

A TMP75 combination digital temperature sensor and thermal watchdog provides temperature sensing. The temperature is monitored by the baseboard management controller (BMC) via the SMB sensor bus. The SMBus address is 0x9Ah.

4.5 Front Panel Board Connector Specifications

The following sections provide the pin definitions for the FP board connectors.

4.5.1 Baseboard SSI Power/Control Signal Connector

The SSI connector brings power and control signals from the baseboard to the front panel board. Table 7 shows the SSI connector pin-out.

Table 7: SSI Connector Pin-Out

Pin	Signal Name	Description
1	P3V3_AUX	Baseboard STBY Power
2	P3V3_AUX	Baseboard STBY Power
3	NC	No Connection
4	P5V_STBY	Baseboard STBY Power
5	FP_PWR_LED_BUF_N	PWR LED signal
6	FP_ID_LED_BUF_N	System ID LED signal
7	P3V3	Baseboard Power
8	FP_LED_STATUS_GREEN_BUF_N	System Status LED Good
9	LED HDD_ACTIVITY_N	Composite HDD Activity LED
10	FP_LED_STATUS_AMBER_BUF_N	System Status LED Fault
11	FP_PWR_BTN_J1_N	System Power Button
12	LED_NIC_LINK0_ACT_BUF_N	Link0 Activity LED signal
13	Ground	Ground Power Supply

14	LED_NIC_LINK0_LNKUP_BUF_N	NIC LINK0 Up LED
15	FP_RST_BTN_J1_N	System Reset Button
16	SMB_SENSOR_3V3STBY_DATA	SMB Sensor Bus Data
17	Ground	Ground Power Supply
18	[8] SMB_SENSOR_3V3STBY_CLK	SMB Sensor Bus Clock
19	FP_ID_BTN_J1_N	System ID Button
20	FP_CHASSIS_INTRUSION	Chassis Intrusion switch input (Not used)
21	PU_FW_SIO_TEMP_SENSOR	Temperature Sensor Alert signal to baseboard
22	LED_NIC_LINK1_ACT_BUF_N	Link1 Activity LED signal
23	FP_NMI_BTN_J1_N	System NMI Button
24	LED_NIC_LINK1_LNKUP_BUF_N	NIC LINK1 Up LED
25	NC	No Connection
26	NC	No Connection
27	LED_NIC_LINK2_ACT_BUF_N	Link2 Activity LED signal
28	LED_NIC_LINK3_ACT_BUF_N	Link3 Activity LED signal
29	LED_NIC_LINK2_LNKUP_BUF_N	NIC LINK2 Up LED
30	LED_NIC_LINK3_LNKUP_BUF_N	NIC LINK3 Up LED

4.5.2 HDD BP LEDs Connector

The LED to HDD backplane (BP) connector provides the connections for the HDD composite activity LED and the composite fault LED. The signals are defined in Table 8.

Table 8: HDD Backplane LEDs Connector Pin-Out

Pin	Signal Name	Description
1	HDD_FAULT_LED	HDD Fault LED
2	HDD_ACT_LED	HDD Activity LED
3	GND	Power Supply Ground

4.5.3 Front Panel LED Board Connector

The front panel 2x15 30-pin LED board connector sends power and signals from the FP board to the LED/Switch board for display on the front panel status LEDs. Table 9shows the front panel LED/switch board connector pin-out.

Table 9: Front Panel LED Board Connector Pin-Out

Pin	Signal Name	Description
1	P5VSTBY	Power Supply 5V standby
3	P5VSTBY	Power Supply 5V standby
5	FP_PWR_LED1_N	Power LED 1 Signal
7	FP_PWR_LED2_N	Power LED 2 Signal
9	FP_ID_LED_W_N	System ID White LED signal
11	FP_ID_LED_B_N	System ID Blue LED signal
13	FP_STAT_LED_G_N	Status Green LED signal
15	FP_STAT_LED_A_N	Status Amber LED signal
17	FP_NIC_LED_N	NIC Activity LED signal
19	FP_HDD_LED_G_N	Hard disk Activity LED signal
21	FP_HDD_LED_A_N	Hard disk Fault LED signal
23	FP_BB_LED_A_N	Baseboard Fault LED signal
25	FP_PS_LED_A_N	Power Supply Fault LED signal
27	FP_FAN_LED_A_N	Fan Fault LED signal
29	NC	No connection
2	GND	Power Supply Ground
4	GND	Power Supply Ground
6	TELCO_PWR_LED_N	Telco Power LED signal
8	TELCO_MIN_LED_N	Telco Minor LED signal
10	TELCO_MAJ_LED_R_N	Telco Major Red LED signal
12	TELCO_MAJ_LED_Y_N	Telco Major Yellow LED signal
14	TELCO_CRIT_LED_R_N	Telco Critical Red LED signal
16	TELCO_CRIT_LED_Y_N	Telco Critical Yellow LED signal
18	FP_PWR_BTN_N	Power switch signal

Pin	Signal Name	Description
20	FP_RST_BTN_N	Reset switch signal
22	FP_ID_BTN_N	ID switch signal
24	FP_NMI_BTN_N	NMI switch signal
26	P5V	Power Supply 5V
28	GND	Ground
30	NC	No connection

4.5.4 Front Panel TAM Board Connector

The 2x6 12-pin TAM board signal connector sends the telco alarm signals from the front panel board to the telco alarm module, which drives the external telco relays and alarms. Table 10 shows the TAM board connector pin-out.

Table 10 TAM Board Connector Pin-Out

Pin	Signal Name	Description
1	Telco_PWR_LED_N	Telco Power LED signal
2	Telco_MIN_LED_N	Telco Minor Alarm LED signal
3	Telco_MAJ_LED_R_N	Telco Major Alarm LED RED signal
4	Telco_MAJ_LED_Y_N	Telco Major Alarm LED Yellow signal
5	Telco_CRIT_LED_R_N	Telco Critical Alarm LED RED signal
6	Telco_CRIT_LED_Y_N	Telco Critical Alarm LED Yellow signal
7	Telco ALRM_PRST_N	Telco Alarm Present signal Ground
8	P5V_STBY	Power Supply P5V Standby Voltage
9	SMB_SEN_3V3SB_CLK	SMB Sensor Bus Clock signal
10	SMB_SEN_3V3SB_DAT	SMB Sensor Bus Data signal
11	P3V3_AUX	Power Supply P3V3 Standby Voltage
12	GND	Power Supply Ground

4.5.5 Front Panel Stacked USB Connector

Table 11 shows the pin-out for the USB port on the stacked connector.

Table 11: USB Port Connector Pin-Out

Pin	Signal Name	Description
1	USB_PWR	Connects to ferrite bead and filtered cap
2	USBDN_DM2_R	Connects to protection diode and choke
3	USBDN_DP2_R	Connects to protection diode and choke
4	USB_GND	Connects to ferrite bead and filtered cap
5	USB_PWR	Connects to ferrite bead and filtered cap
6	USBDN_DM3_R	Connects to protection diode and choke
7	USBDN_DP3_R	Connects to protection diode and choke
8	USB_GND	Connects to ferrite bead and filtered cap
9	GND_Chassis	Connects to chassis and logic GND through RC circuit
10	GND_Chassis	Connects to chassis and logic GND through RC circuit
11	GND_Chassis	Connects to chassis and logic GND through RC circuit
12	GND_Chassis	Connects to chassis and logic GND through RC circuit

4.5.6 Front Panel Board Baseboard USB Connector

The FP board 2x5 10-pin USB connector carries signals between the FP board and the baseboard. Table 12 shows the USB connector pin-out.

Table 12: Front Panel USB Connector Pin-Out

Pin	Signal Name	Description
1	P5V_USB_FP	Power Supply 5V to eUSB device
2	P5V_USB_FP	Power Supply 5V to eUSB device
3	USB2_P13_F_DN	USB Channel P13 Negative signal
4	USB2_P11_F_DN	USB Channel P11 Negative signal
5	USB2_P13_F_DP	USB Channel P13 Positive signal
6	USB2_P11_F_DP	USB Channel P11 Positive signal
7	GND	Power Supply Ground
8	GND	Power Supply Ground
9	NC	No connection

Pin	Signal Name	Description
10	GND	Power Supply Ground

4.5.7 Front Panel External SD Flash Module Connectors

The external SD flash module connector sends signals from the FP board to the SD1 flash module. Table 13 shows the SD1 flash module pin-out.

Table 13: Front Panel Board SD Card Flash Module Connector Pin-Out

Pin	Signal Name	Description
1	SD1_D3_R	Flash Data 3 signal
2	SD1 SD1_CMD_R	SD1 Command signal
3	SD1 VSS0	Power Supply Ground
4	SD1 VDD	SD Flash Power
5	SD1_CLK_R	SD Clock signal
6	SD1 VSS1	Power Supply Ground
7	SD1_D0_R	Flash Data 0 signal
8	SD1_D1_R	Flash Data 1 signal
9	SD1_D2_R	Flash Data 2 signal
10	SD1_DS	Flash Control
11	SD1+WP	Flash Write Protect
12	SD1_PS/DS	Power Supply Ground

4.5.8 Front Panel eUSB Connectors

Table 14 shows the pin-out for the USB port on the stacked connector.

Table 14: Front Panel Board eUSB Flash Module Pin-Out

Pin	Signal Name	Description
1	P5V_USB_FP	5V Power Supply
2	NC	No Connection
3	USB2_P11_F_DN_R	USB Channel P11 Negative signal
4	NC	No Connection
5	USB2_P11_F_DP_R	USB Channel P11 Positive signal
6	NC	No Connection
7	GND	Power Supply Ground

Pin	Signal Name	Description
8	NC	No Connection
9	Key	Mechanical Key
10	USB_HDD_LED_ACT	eUSB Activity Signal (Optional)

5. LED/Switch Board

This chapter provides an overview of the Kontron Carrier Grade Server CG1200 LED/switch board, including information about the board hardware, connectors, power subsystem, optional add-ins, and regulatory requirements.

This chapter is organized into the following sections:

Section 5.1: Introduction
Provides an overview and mechanical image of the LED/switch board

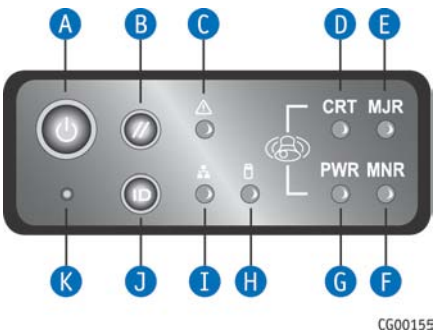
Section 5.2: LED/Switch Board Features
Describes the LED/switch board feature set

5.1 Introduction

The CG1200 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 20.

Figure 20 shows the front panel LED/switch panel layout.

Figure 20: 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
- On board switches for power, reset, ID, and NMI
- On board LEDs to indicate power status, chassis ID, system status, HDD activity/fault and NIC activity.

NOTE: For information about the telco alarm LEDs that are also on the front panel, see Section 7.2, “Telco Alarms Module Features”.

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 is listed in Table 15.

Table 15: Control Button Functions

Switch/Button	Feature	Function
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
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 16.

Table 16: 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 (see **Error! Reference source not found.**)	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

NOTES: .1) Letters in LED Description column entries refer to the letter labels on Figure 20.

2) For detailed information about the HDD LED settings, see Section 5.2, “LED/Switch Board Features”.

System Status LED

Table 17 shows the meaning of each state on the system status LED.

Table 17: 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)

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 white chassis ID LED can be turned on by:

- Pressing the chassis ID button on the front panel. The chassis ID LED remains blue until the button is pressed again.
- Issuing the appropriate hex IPMI system identify value, The chassis ID LED either blinks blue for 15 seconds and turns off or blinks indefinitely until the appropriate hex IPMI system identify value is issued to turn it off.

5.3 LED/Switch Board Connector Specification

The LED/switch board has a 2x15-pin connector to the front panel (FP) board. The connector pin definitions are shown in Table 18.

Table 18 LED/Switch Board Connector Pin-Out

Pin	Definition	Pin	Definition
1	P5VSTBY	16	TELCO_CRIT_LED_Y_N
2	GND	17	FP_NIC_LED_N
3	P5VSTBY	18	FP_PWR_BTN_N
4	GND	19	FP_HDD_LED_G_N
5	FP_PWR_LED1_N	20	FP_RST_BTN_N
6	TELCO_PWR_LED_N	21	FP_HDD_LED_A_N
7	FP_PWR_LED2_N	22	FP_ID_BTN_N
8	TELCO_MIN_LED_N	23	FP_BB_LED_A_N
9	FP_ID_LED_W_N	24	FP_NMI_BTN_N
10	TELCO_MAJ_LED_R_N	25	FP_PS_LED_A_N
11	FP_ID_LED_B_N	26	P5V
12	TELCO_MAJ_LED_Y_N	27	FP_FAN_LED_A_N
13	FP_STAT_LED_G_N	28	GND
14	TELCO_CRIT_LED_R_N	29	NC
15	FP_STAT_LED_A_N	30	NC

6. SAS Backplane Board

This chapter describes the features of the Kontron Carrier Grade Server CG1200 SAS backplane board. The chapter is organized into the following sections:

Section 6.1: Introduction

Section 6.2: SAS Backplane Board Features

Section 6.3: Hard Disk Drive Activity and Fault LEDs

Section 6.4: SAS Backplane Board Power Connector

Section 6.5: SAS Backplane Mini-SAS Connector

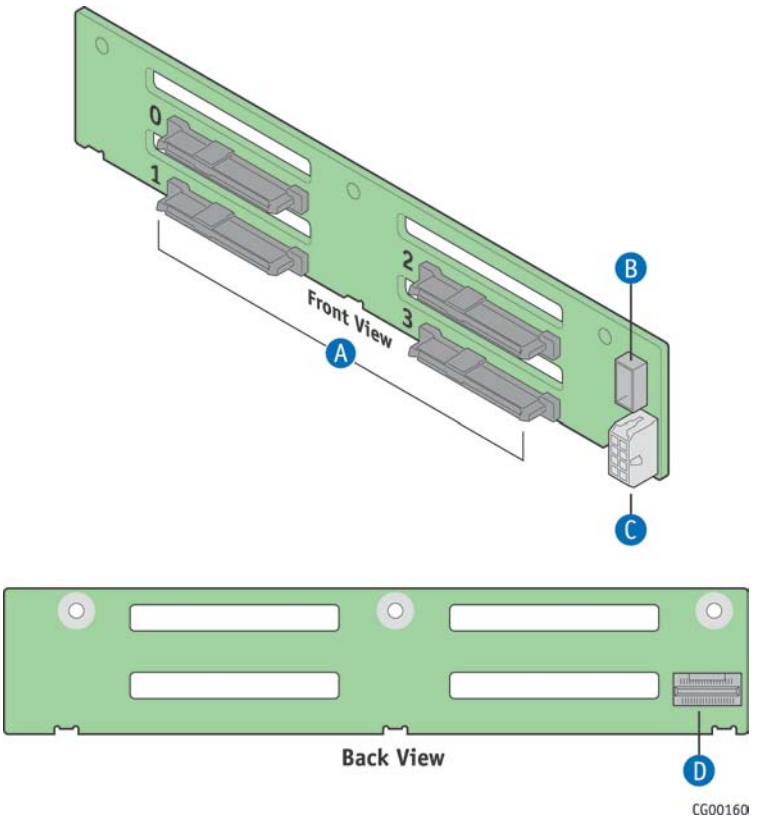
6.1 Introduction

The CG1200 server contains a single SAS backplane board that provides support for four 2.5” SAS HDDs or SATA SSDs. The backplane can connect with a SAS hardware RAID module using a 36-pin mini-SAS connector. By default, and when hardware RAID is not used, the mini-SAS cable is connected to the server board and a key enabling SAS drive support is installed on the server board. The mini-SAS connector provides the sideband signals (Serial GPIO Bus, SFF-8485 Specification) between the server board or the (optional) RAID controller and the backplane enclosure management controller on the SAS backplane 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 four HDD positions. Composite fault and activity LED signals for all four drives are sent to the front panel board to drive the front panel activity/fault LED.

Figure 21 shows the SAS backplane.

Figure 21: SAS Backplane Board Layout



Item	Description
A	Hard disk drive connectors 0 -3
B	HDD/LED cable connector
C	Power cable connector
D	SAS connector

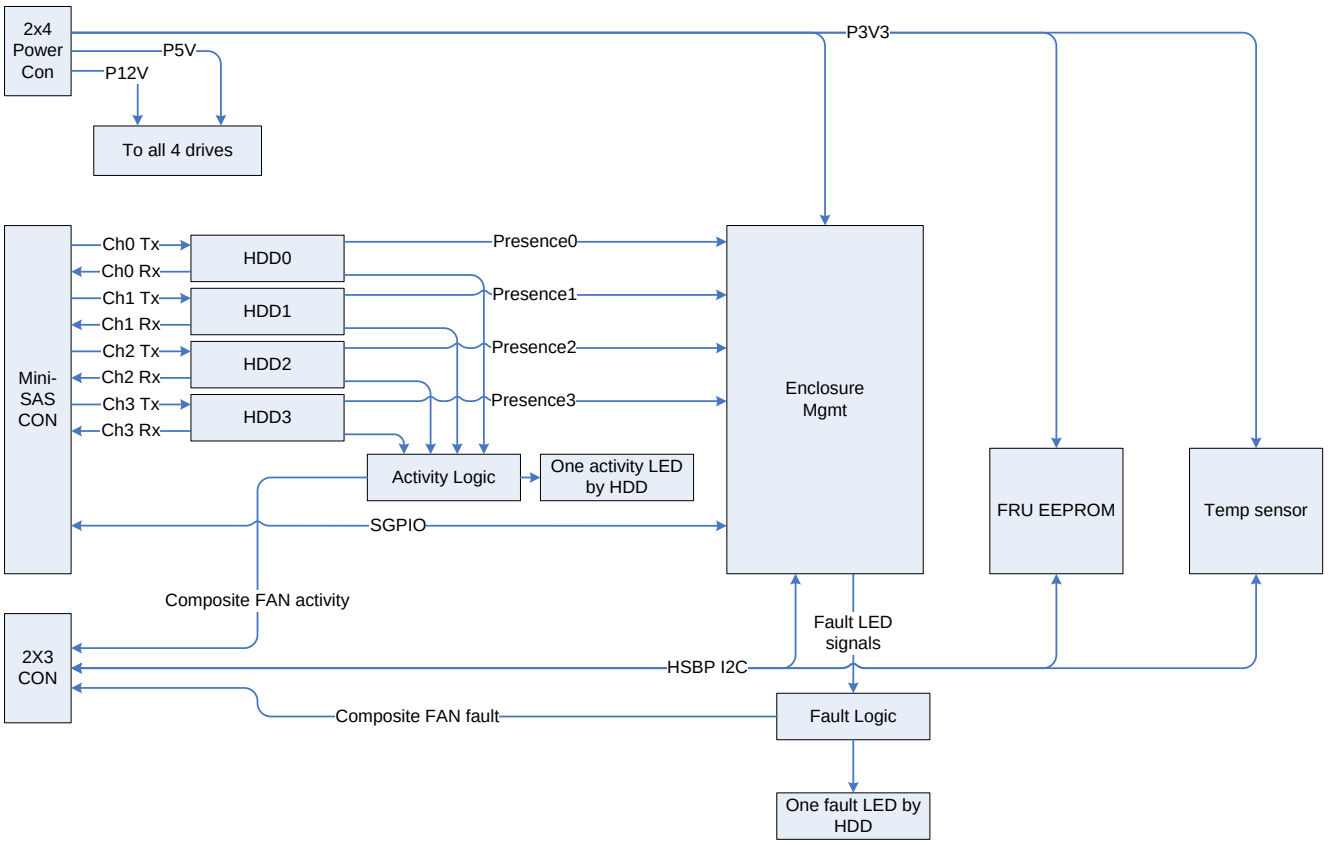
6.2 SAS Backplane Board Features

The backplane board contains the following features:

- Connectors for four hot-swappable disk drives
- Enclosure management using an embedded controller
- 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
- Serial EEPROM location for a FRU device (unused)
- Digital temperature sensor device (unused)

Figure 22 is an overall block diagram of the SAS backplane board, using a SAS hardware RAID module.

Figure 22: SAS Backplane Board Block Diagram



There are two main sections:

Power Distribution: The main supply rails are P3V3, P5V and P12V, which come from the PDB through a 2x4 power connector, as specified in Figure 22. P5V and P12V power is connected directly to all four HDDs.

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

6.3 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 and the LED may exhibit different behavior then when the enclosure management controller drives it.

Table 19: Hard Drive LED Function Definitions

Status LED	Definition
Green	HDD activity
Amber	HDD fault

6.4 SAS Backplane Board Power Connector

There is one power connector on the SAS backplane board that connects to the power distribution board.

The pin definitions and power rating of the P5V, P12V, P3V3 and GND rails coming from the Power Distribution Board (PDB) through a 2x4 8-pin power connector are shown in Table 20.

Table 20: Backplane Power Connector Pin-Out

Pin #	Definition	Pin #	Definition
1	P5V	5	P5V
2	P12V	6	P12V
3	P3V3	7	GND
4	GND	8	GND

6.5 SAS Backplane Mini-SAS Connector

The main connector on the backplane connects with either the SAS control module on the baseboard or a plug-in SAS RAID adapter using industry standard mini-SAS connectors. Table 21 shows the pin definitions for the mini-SAS connectors.

Table 21: SAS Backplane Board Mini-SAS Connector Pin-Out

Pin #	Definition	Pin #	Definition
A1	GND	B1	GND
A2	SAS_TX0_DP	B2	SAS_RX0_DP
A3	SAS_TX0_DN	B3	SAS_RX0_DN
A4	GND	B4	GND
A5	SAS_TX1_DP	B5	SAS_RX1_DP
A6	SAS_TX1_DN	B6	SAS_RX1_DN
A7	GND	B7	GDN
A8	SGPIO_CLK0	B8	TP_SB7

Pin #	Definition	Pin #	Definition
A9	SGPIO_LOAD0	B9	GND
A10	GND	B10	SGPIO_DOUT0
A11	TP_SB86	B11	SGPIO_DIN0
A12	GND	B12	GND
A13	SAS_TX2_DP	B13	SAS_RX2_DP
A14	SAS_TX2_DN	B14	SAS_RX2_DN
A15	GND	B15	GND
A16	SAS_TX3_DP	B16	SAS_RX3_DP
A17	SAS_TX#_DN	B17	SAS_RX3_DN
A18	GND	B18	GND

7. Telco Alarms Module (TAM)

This chapter describes the design and external interface of the Kontron Carrier Grade Server CG1200 Telco Alarms Module assembly. The chapter is organized into the following sections:

Section7.1 Introduction

Section 7.2: Telco Alarms Module Features

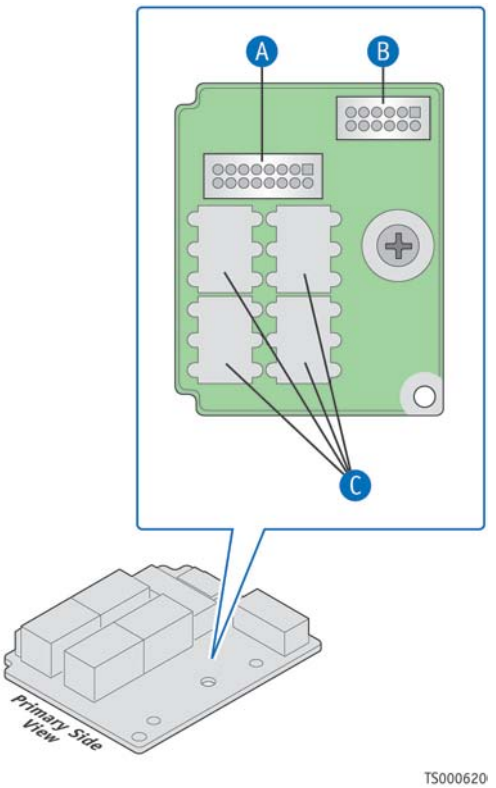
Section 7.3: Telco Alarms Module Connector Specifications

7.1 Introduction

The CG1200 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 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 23 shows the Telco Alarms Module components.

Figure 23: Telco Alarms Module Layout (Primary Side)



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

7.2 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. Figure 24 is the TAM block diagram

Figure 24: TAM Block Diagram

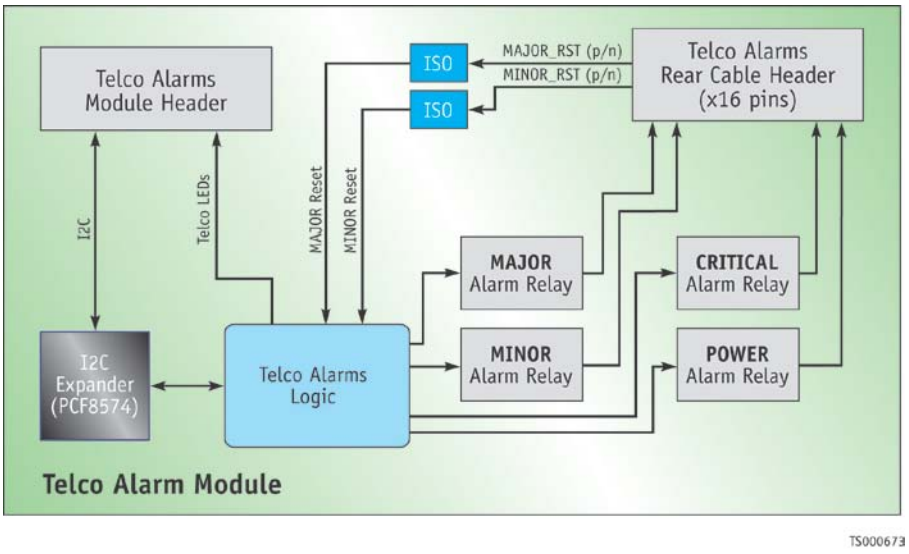


Table 22: Telco Alarms Fault LEDs

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 I^2C bus, and can only be turned off through BMC private I^2C 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 to the system, 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 I^2C bus, and can be turned off via BMC private I^2C 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 I^2C bus, and can be turned off via BMC private I^2C 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 I^2C bus or the SYS_FLT_LED_L signal, and can only be turned off via BMC private I^2C control. When continuously lit, this alarm LED indicates the presence of a “power system fault”. The TAM board power alarm relay is engaged.

7.2.1 Telco Alarms Relays

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

7.3 Telco Alarms Module Connector Specifications

7.3.1 Telco Alarms External Interface Connector

The telco alarms external interface connector connects the TAM board and the alarms port on the back of the system. The alarms port interface is a standard DB15 connector. Each alarm (major, minor, critical, and power) is the output of a Single Pole, Double Throw (SPDT) relay contact. A common contact with normally-open and normally-closed connections is included. The

power alarm has common and normally-open contacts only. Reset circuit contacts are provided for the major and minor alarms.

Table 23 shows the pin definitions for the 2x8 16-pin alarms external interface connector on the TAM board.

Table 23 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

7.3.2 Telco Alarms System Interface Connector

The telco alarms system interface connector is a signal ribbon cable used to connect the telco alarms module (TAM) to the front panel board. Table 24 shows the pin definitions for the 2x6 system interface connector on the TAM board.

Table 24 Telco Alarms System Interface Connector Pin-Out

Pin	Signal Name	Description
1	TELCO_PWR_LED_N	Telco Power Alarm LED indicator signal

Pin	Signal Name	Description
2	TELCO_MIN_LED_N	Telco Minor Alarm LED indicator signal
3	TELCO_MAJ_LED_R_N	Telco Major Alarm Red LED indicator signal
4	TELCO_MAJ_LED_Y_N	Telco Major Alarm Yellow LED indicator signal
5	TELCO_CRIT_LED_R_N	Telco Critical Alarm Red LED indicator signal
6	TELCO_CRIT_LED_Y_N	Telco Critical Alarm Yellow LED indicator signal
7	TELCO_ALRM_PRST_N	Telco Alarm Module present indicator
8	P5V_STBY	+5V standby power
9	SMB_SEN_3V3SB_CLK	SMBus Clock
10	SMB_SEN_3V3SB_DAT	SMBus Data
11	P3V3_STBY	+3.3V standby power
12	GND	Ground

8. PCI Riser Card Assembly

This chapter describes the design and external interface of the Kontron Carrier Grade Server CG1200 PCI riser card assembly. This chapter has the following sections:

Section 8.1: Introduction

Section 8.2 Riser Card

Section 8.3 Riser Card Installation

8.1 Introduction

The CG1200 server supports one PCIe x16 R card assembly. The riser card is installed in the PCI cage assembly using two hex 6/32 locking screws.

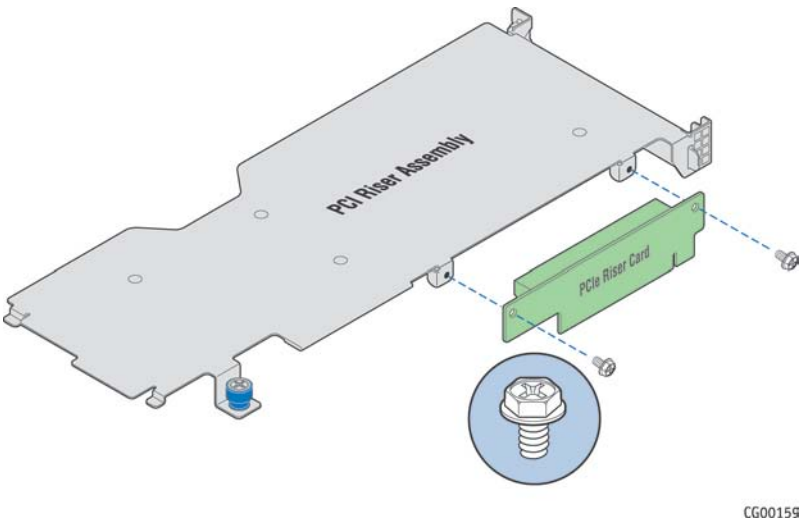
8.2 Riser Card

The Intel® Server Board S2400EP4 has one riser slot capable of supporting a single slot PCIe x16 riser card located on the left side of the chassis. PCIe full height add-in cards are supported. See the “CG1200 Configuration Guide” for additional information about potential dependencies.

8.3 Riser Card Installation

Figure 25 shows how the riser card is installed in the assembly enclosure.

Figure 25: Adding Riser Cards into the Assembly



9. DC Power Subsystem

This chapter defines the features and functionality of the DC-input switching power supply subsystem. The information in this chapter is organized as follows:

Section 9.1 Introduction

Section 9.2:

DC Power Supply Input Connector and Earth Ground Connection

Section 9.3: DC Power Supply Input Voltage and Current Requirements

Section 9.4 DC Power Supply Output Connector and Pin Definitions

Section 9.5: DC Power Supply Output Current Requirements

Section 9.6: DC Power Supply LED Indicator

Section 9.7: DC Power Supply Air Flow

Section 9.8: DC Power Supply Thermal Protection

9.1 Introduction

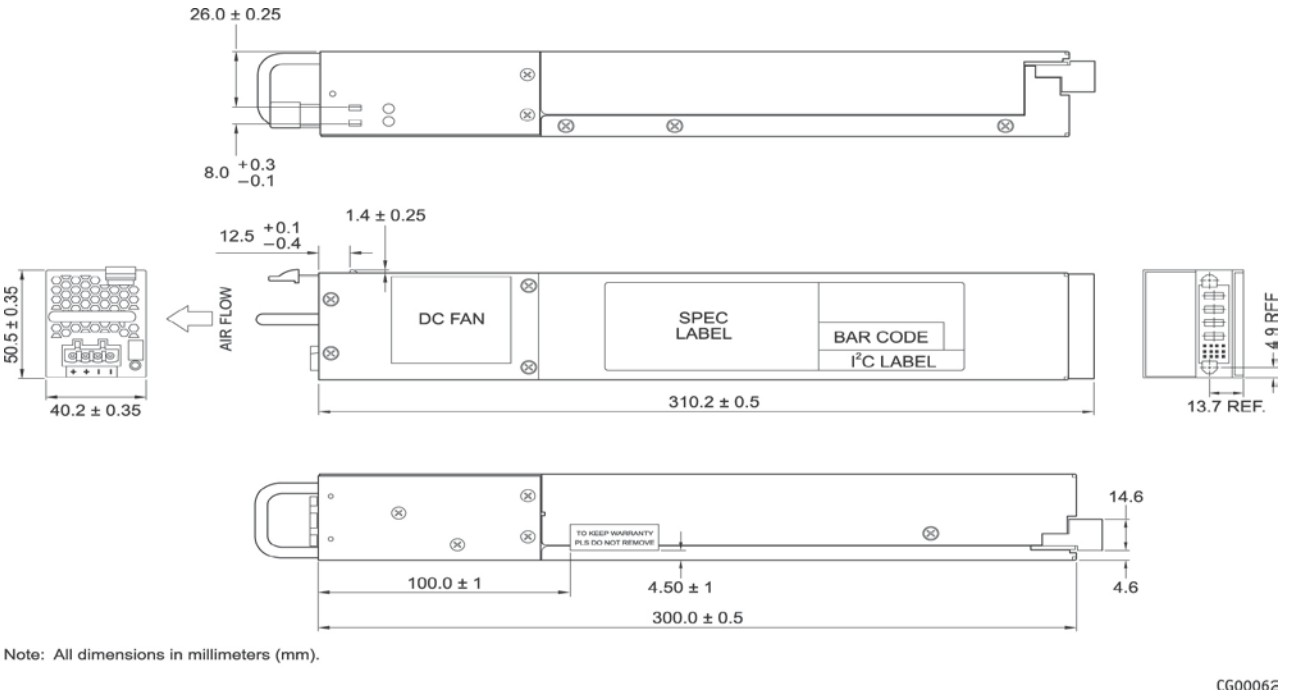
The DC power subsystem consists of up to two DC power supply modules, capable of operating in redundant mode, and a power distribution board (PDB). Although this power supply output can deliver up to 650W, the estimated maximum system power draw stated on the system rating label (located on the top cover) 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:

- 650W 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 26 shows the DC power supply module.

Figure 26: DC Power Supply Module Mechanical Drawing



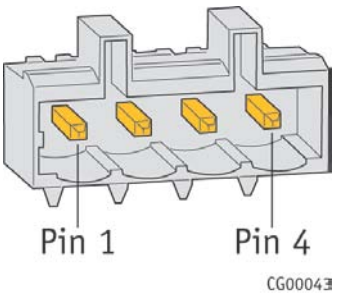
Note: All dimensions in millimeters (mm).

CG00062

9.2 DC Power Supply Input Connector and Earth Ground Connection

The input connector on the DC power supply is a 4-pin Molex 55757-0420. This connector is rated at 16A/pin. An earth ground pin is not required because the system provides two earth ground studs on the rear panel of the chassis. Figure 27, the input connector mechanical drawing and table, show the DC input power connector and pin-out.

Figure 27: DC Power Supply Input Connector



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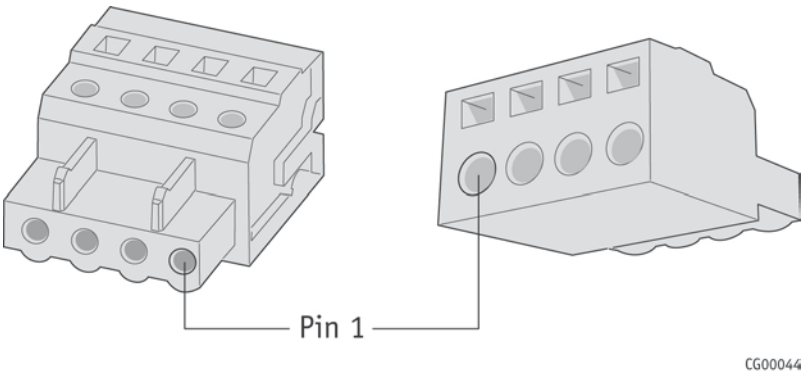
Pin#		Description
1	+	RTN
2	+	RTN
3	-	–48V
4	-	–48V

9.2.1 DC Power Supply 48V Input Power Mating Connector

The mating connector for the DC power supply module input connector, a Molex 54927-0420 4-pin connector shown in Figure 28 provides a -48V input power connection to the system. The input wiring connections are shown in the table in Figure 27.

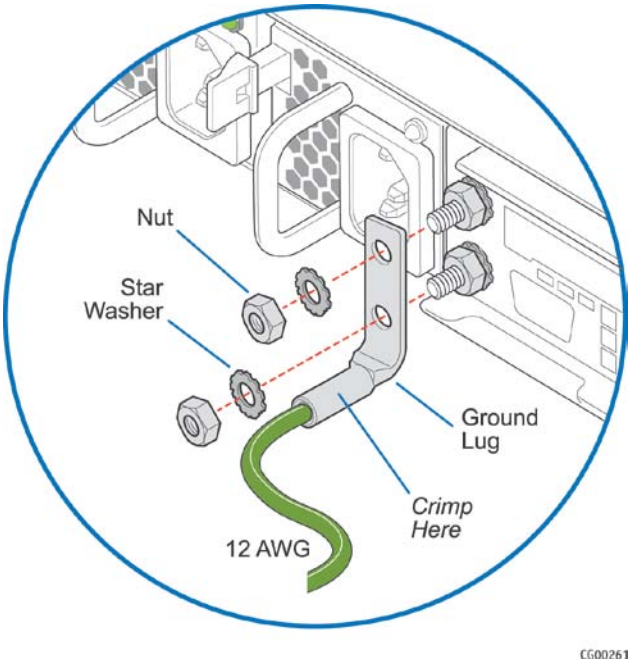
Figure 28: DC Power Supply Mating Connector



9.2.2 DC Power Supply Earth Grounding Studs on Chassis

Figure 29 shows how the safety earth grounding wire is attached to the chassis for use with DC power supplies.

Figure 29: DC Power Supply Grounding



9.3 DC Power Supply Input Voltage and Current Requirements

The DC power supply input voltage and input current requirements are listed in Table 25.

NOTE: The maximum current listed in Table 25 below is the maximum current the system will draw from the power supply at -48V input voltage.

Table 25: DC Power Supply Input Requirements

DC Input Voltage	
Nominal	-48Vdc
Minimum[1]	$-40V_{rms}$
Rated	-48Vdc to -72Vdc
Maximum	-75Vdc
DC Input Current	
Maximum	13A @ -48Vdc

[1] The minimum steady-state DC input voltage at which the equipment remains fully operational is –40VDC.

9.4 DC Power Supply Output Connector and Pin Definitions

The DC power supply provides a hot-pluggable output 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 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 30: DC Power Supply Output Connector

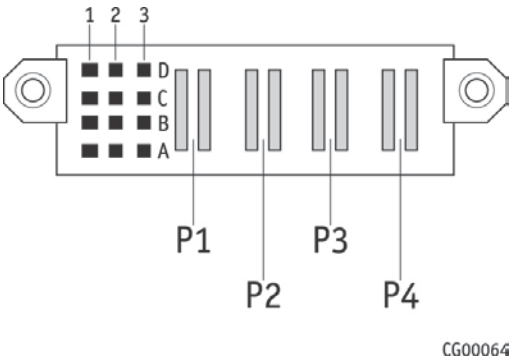


Table 26: Output Connector Pin-Out

Signal Pins			
Position	**1**	**2**	**3**
D	A0	PWOK	+5VSB
C	+12VLS	+15VCC	+12VRS
B	PS ON	SCL	B/P FAIL
A	PS-KILL	SDA	+5VSB
Power Blades			
P1	P2	P3	P4
RTN	RTN	+12V	+12V

Table 27 Output Signal Definitions

Signal	Description	Signal	Description
+12VLS	+12V load share bus	PS-KILL	Supply fast shutdown/I2Caddress bit1
+5VSB	5V standby output	+15VCC	For B/P use (10mA)
PS ON	Power enable input	SCL	I2C clock signal
B/P* FAIL	B/P fail input & fan speed control	A0	I2C address bit 0

PWOK	Power output OK	SDA	I2C data signal
+12VRS	12V sense		

NOTE: *B/P = Back Plane which is the signal name for the PDB (Power Disribution Board)

9.5 DC Power Supply Output Current Requirements

The DC power supply module provides two outputs; +12V and 5V standby. The combined maximum output power is 650W. Each output has a maximum and minimum current rating, as shown in Table 28.

Table 28: DC Power Supply 650W Load Ratings

	+12V	**+5Vsb**	**+15V**
Max Load	52.9A	3.0A	10ma
Min Static Load	2A	0A	NA
Max Output Power (continuous), see note	12V x 52.9A = 635W max	5V x 3A = 15W max	15V x 10mA = 150mW
	Total = 650W		

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

9.6 DC Power Supply LED Indicator

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 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 29 for definitions of the LED conditions.

Table 29: 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) 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 temp, high power/high current, slow fan.	1Hz blinking amber
DC present / Only 5Vsb on (PS Off)	1Hz blinking green
Output ON and OK	Green

9.7 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 minimum RPM.

9.8 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 5VSB 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.

10. 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. The information in this chapter is presented in the following sections:

Section 10.1: Introduction

Section 10.2: PDB Input Connectors

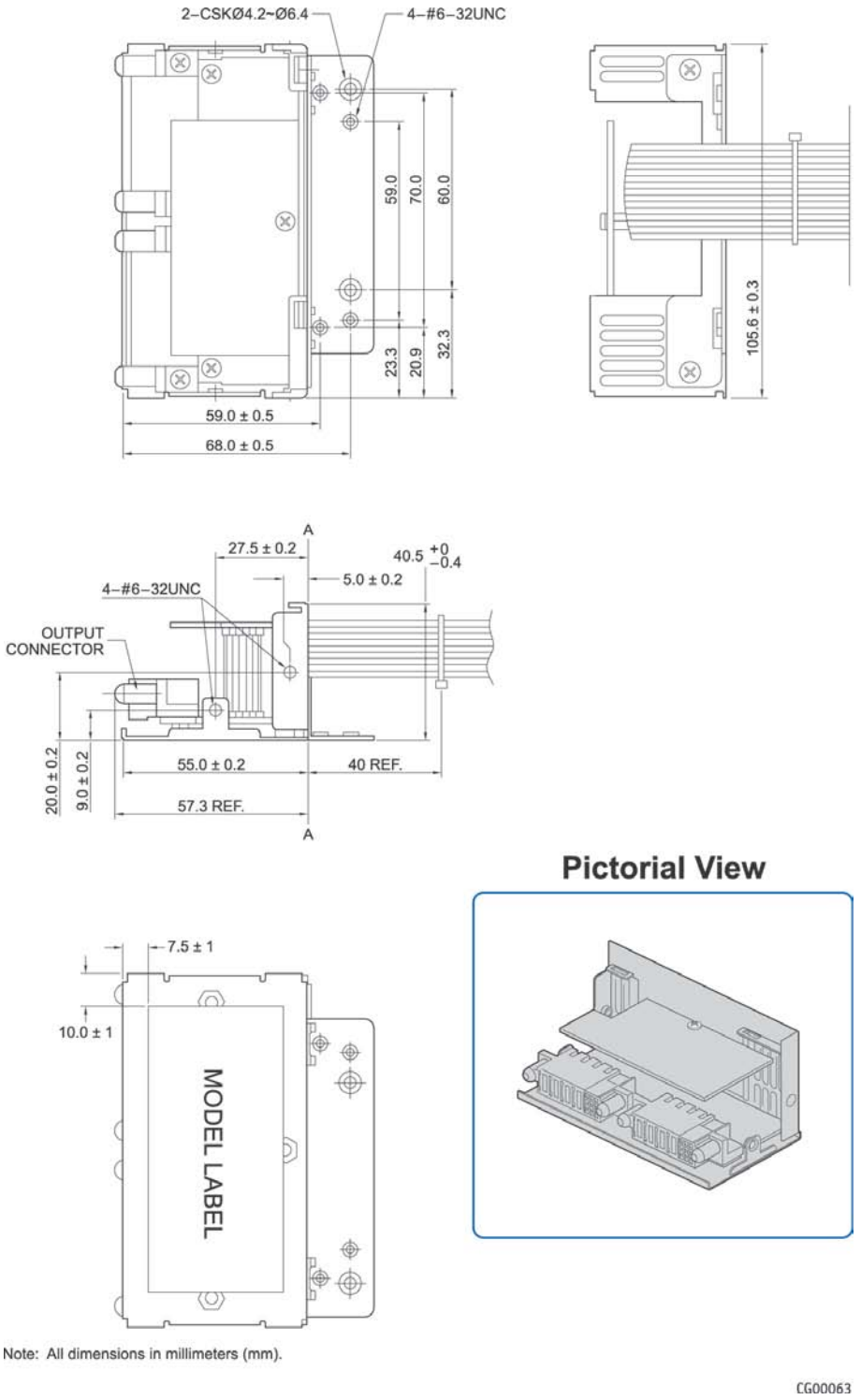
Section 10.3: PDB Output Load and Voltage Regulation Requirements

Section 10.4: PDB PMBus Requirements

10.1 Introduction

The PDB provides power to the system via an output harness which connects to various places on the baseboard, front panel 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 31 shows the mechanical details of the power distribution board.

Figure 31: Power Distribution Board Mechanical Drawing



10.2 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 32 and Table 30.

Figure 32: PDB Input Connector

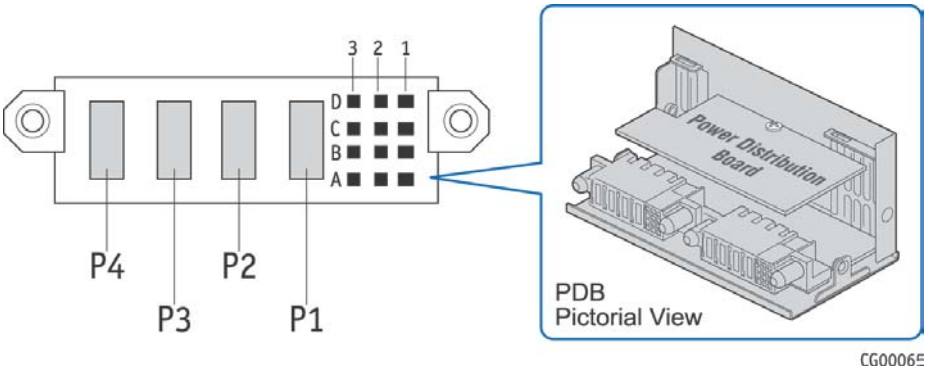


Table 30: PDB Input Connector Pin-Out

Signal Pins			
Position	**1**	**2**	**3**
D	A0	PWOK	+5VSB
C	+12VLS	+15VCC	+12VRS
B	PS ON	SCL	B/P FAIL
A	PS-KILL	SDA	+5VSB
Power Blades			
P1	P2	P3	P4
RTN	RTN	+12V	+12V

Table 31: Input Signal Definitions

Signal	Description	Signal	Description
12VLS	+12V load share bus	PS-KILL	Supply fast shutdown/I2C address bit1
5VSB	5V standby output	+15VCC	For B/P use (10mA)
PSON	Power enable input	SCL	I2C clock signal
B/P* FAIL	B/P fail input and fan speed control	A0	I2C address bit 0
PWOK	Power output OK	SDA	I2C data signal
+12VRS	12V sense		

NOTE: *B/P = Back Plane which is the signal name for the PDB (Power Disribution Board)

10.3 PDB Output Load and Voltage Regulation Requirements

Table 32 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 the table 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 32: PDB and PSU Output Requirements

Output Voltage Rails	+12V1	+12V2	+5V	+3.3V	-12V	5VSB
MAX Load / Rail	41.3A	3A	10.5A	13.5A	0.5A	3A
MIN Static Load	0.5A	05A	1.0A	0A	0A	0A
Max Output Power / Rail	495.6W	36W	52.5W	44.55W	6W	15W
Total Watts	649.65W					
Voltage Regulation +/-%	+/-3%	+/-3%	+/-5%	+/-5%	+/-5%	+/-5%
Voltage Regulation +/- V	12.36V 11.64V	12.36V 11.64V	5.25V 4.75V	3.47 3.14	12.6V 11.4V	5.25V 4.75V
Max Ripple / Noise	120mVp-p	120mVp-p	50mVp-p	50mVp-p	120mVp-p	50mVp-p

NOTE: The 3.3V + 5V combined power limit is 140W maximumPDB 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 a PSON# cycle HIGH for one second resets the power supply and the PDB.

10.4 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

11. AC Power Subsystem

This chapter covers the AC power supply system in the following sections:

Section 11.1: Introduction

Section 11.2: AC Power Supply Input Connector and Voltage/Current Requirements

Section 11.3: AC Power Supply Output Connector, Voltage, and Current Requirements

Section 11.4: AC Power Supply LED Indicator

Section 11.5: AC Power Supply Air Flow

Section 11.6: AC Power Supply Thermal Protection

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

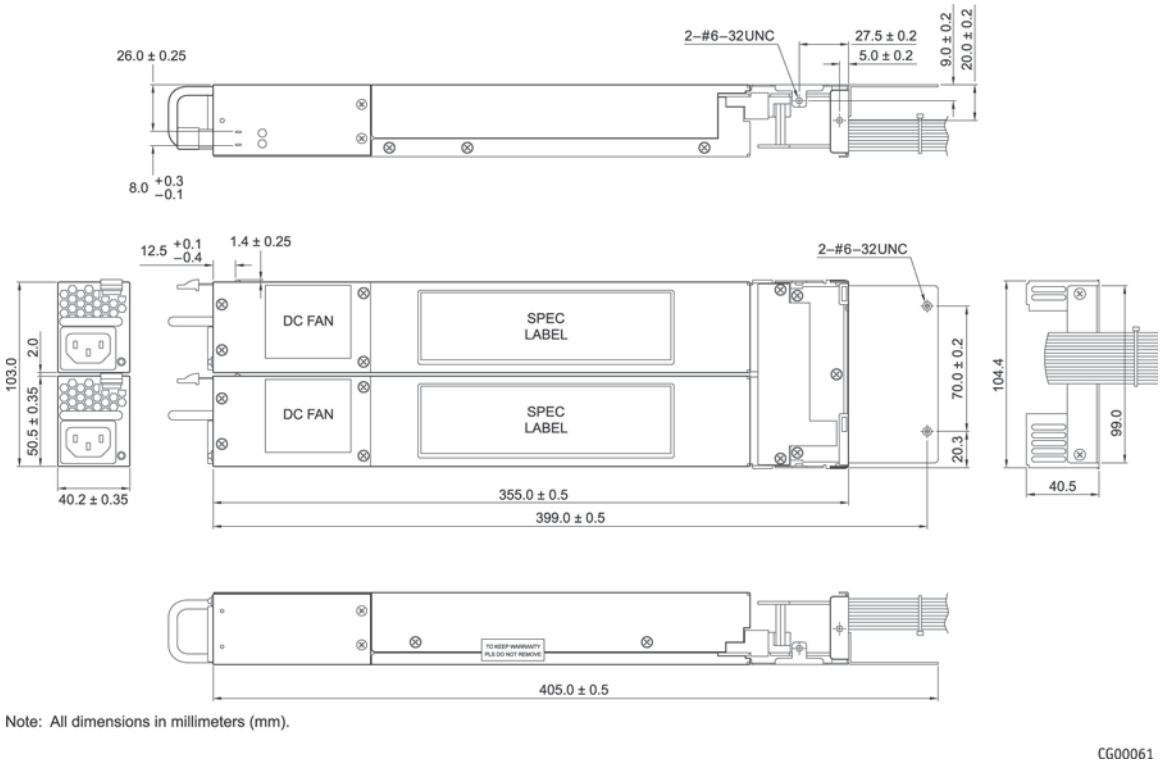
The AC power subsystem has up to two redundant AC power supply modules and a power distribution board (PDB). Although this power supply output can deliver up to 650W, the estimated maximum system power draw stated on the system rating label (located on the top cover) is calculated using a theoretical maximum configuration. A typical maximum configuration will consume much less power.

The AC input power supply subsystem has the following features:

- 650W module output capability in full AC input voltage range
- 650W 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, which is shown in Figure 33, contains one 40mm fan. The module has a handle for inserting and extracting it without using tools.

Figure 33: 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 33.

Table 33: AC Input Rating

Line Voltage	
Nominal110Vrms	
Minimum	90V_{rms}
Rated	100-127 V_{rms}
Maximum	140V_{rms}
Nominal 220Vrms	
Minimum	180V_{rms}
Rated	200-240 V_{rms}

Line Voltage	
Maximum	264V_{rms}
Start-up Voltage	88Vrms +/-4Vrms
Power-Off Voltage	75Vrms +/-5Vrms
Line Current	
Maximum	6A @ 100Vrms / 3 A @200Vrms
Frequency	
Minimum	47 Hz
Rated	50/60 Hz
Maximum	63 Hz

11.3 AC Power Supply Output Connector, Voltage, and 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 34: AC Power Supply Module Output Connector

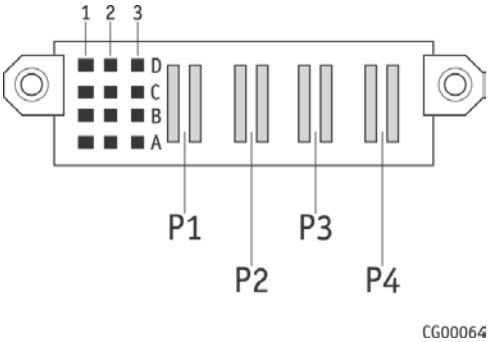


Table 34: AC Output Connector Pin-Out

Signal Pins			
Position	**1**	**2**	**3**
D	A0	PWOK	+5VSB
C	+12VLS	+15VCC	+12VRS
B	PS ON	SCL	B/P FAIL
A	PS-KILL	SDA	+5VSB
Power Blades			
P1	P2	P3	P4
RTN	RTN	+12V	+12V

Table 35: Output Signal Definitions

Signal	Description	Signal	Description
+12VLS	+12V load share bus	PS-KILL	Supply fast shutdown/I2Caddress bit1
+5VSB	5V standby output	+15VCC	For B/P use (10mA)
PS ON	Power enable input	SCL	I2C clock signal
B/P* FAIL	B/P fail input & fan speed control	A0	I2C address bit 0
PWOK	Power output OK	SDA	I2C data signal
+12VRS	12V sense		

NOTE: *B/P = Back Plane ,which is the signal name for the PDB (Power Disribution Board)

The power supply module provides three main outputs; +12V, -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 650W (680W peak). Each output has a maximum and minimum current rating as shown in Table 36.

Table 36: AC Power Supply 650W Load Ratings

	+12V	+5Vsb	+15V
Maximum Load	52.9A	3.0A	0. 10mA
Minimum Static Load	0.5A	0.0A	N/A
Maximum Output Power (Continuous), See Note 1	12V x 52.9A = 635W max	5V x 3A = 15W max	15V x .10mA = 150mW
	Total = 650W		

NOTE: At max load the 12V output voltage is allowed to sag to –4%, which is 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 37 for definitions of the LED conditions.

Table 37: 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 minimum the 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 5VSB 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. 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 manager 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® S2400EP4 Server Board Technical Product Specification* on the Kontron website.

13. Regulatory Specifications

The Kontron CG1200 Carrier Grade Server meets the specifications and regulations for safety and EMC defined in this chapter.

13.1 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

13.2 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

13.3 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.

13.4 NEBS Compliance

The CG1200 Carrier Grade Server system with DC input is compliant with the NEBS Level 3 criteria and the system with AC input is compliant with NEBS Level 1 criteria from the following NEBS specifications:

- NEBS GR-63-CORE, Issue 4 – Physical Protection
- NEBS GR-1089-CORE, Issue 6 – Electromagnetic Compatibility and Electrical Safety

- ETSI Standards Compliance (DC Input Only)

The CG1200 Carrier Grade Server system with DC input is compliant with the following ETSI specifications:

- ETSI EN 300 386 – EMC requirements for Telecom Equip.
- ETS 300-019-2-1 – Storage Tests, Class T1.2
- ETS 300-019-2-2 – Transportation Tests, Class T2.3
- ETS 300-019-2-3 – Operational Tests, Class T3.1E
- ETS 753 – Acoustic Noise

Appendix A: Glossary

This appendix contains acronyms and terms used in the preceding chapters.

Term	Definition
A, Amp	Ampere
A/µs	Amps per microsecond
AC	Alternating current
ACPI	Advanced Configuration and Power Interface
ANSI	American National Standards Institute
APIC	Advanced Programmable Interrupt Controller
ASIC	Application specific integrated circuit
AWG	American wire gauge
BIOS	Basic input/output system
BMC	Bus management controller
Bridge	Circuitry that connects one computer bus to another
Byte	8-bit quantity
C	Centigrade
CE	Community European (EU mark)
CFM	Cubic feet per minute
CISPR	International Special Committee on Radio Interference
CSA	Canadian Standards Organization
CTS	Clear to send
DAT	Digital audio tape
dB	Decibel
dBA	Acoustic decibel
B	Acoustic Bel
DC	Direct current
DC/DC	DC to DC (converter); also termed D2D
DIMM	Dual inline memory module
DMI	Desktop management interface
DOS	Disk operating system
DRAM	Dynamic random access memory
DSR	Data set ready
DTR	Data terminal ready
DWORD	Double word – 32-bit quantity
ECC	Error checking and correcting
EEPROM	Electrically erasable programmable read-only memory
EFP	Ethernet Front Panel
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
EMP	Emergency management port
EN	European Standard (Norme Européenne or Europäische Norm)
EPS	External product specification
ESCD	Extended system configuration data

Term	Definition
ESD	Electrostatic discharge
ESR	Equivalent series resistance
F	Fahrenheit

Term	Definition
FCC	Federal Communications Commission
FFC	Flexible flat connector
Flash ROM	EEPROM
FPC	Front panel controller
FRB	Fault resilient booting
FRU	Field replaceable unit
G	Acceleration in gravity units, 1G = 980665 m/s2
Gb, Gbit	Gigabit
GB, Gbyte	Gigabyte – 1024 MB
GND	Ground
GPIO	General purpose input/output
Grms	Root mean square of acceleration in gravity units
GUI	Graphical user interface
HDD	Hard disk drive
HPIB	Hot-plug indicator board
HSC	Hot-swap controller
Hz	Hertz – 1 cycle/second
I/O	Input/output
I^2C*	Inter-integrated circuit bus
ICMB	Intelligent Chassis Management Bus
IDE	Integrated drive electronics
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IFLASH	Utility to update flash EEPROM
IMB	Intelligent management bus
IPMB	Intelligent Platform Management Bus
IPMI	Intelligent Platform Management Initiative
IRQ	Interrupt request line
ITE	Information technology equipment
ITP	In-target probe
JAE	Japan Aviation Electronics
KB, Kbyte	Kilobyte – 1024 bytes
kV	Kilovolt – 1,000 volts
L2	Second-level cache
LAN	Local Area Network
LED	Light-Emitting Diode
LVDS	Low Voltage Differential SCSI
mA	Milliamp
MB, Mbyte	Megabyte – 1024 KB
MEC	Memory expansion card
mm	Millimeter
MPS	Multiprocessor specification
MTTR	Mean time to repair
m□	Milliohm
NEMKO	Norges Elektriske Materiellkontroll

Term	Definition
	(Norwegian Board of Testing and Approval of Electrical Equipment)
NIC	Network interface card, or Network Interface Controller, or Network Interface Controller port
NMI	Non-maskable interrupt
NWPA	NetWare* Peripheral Architecture
ODI	Open data-link interface
OEM	Original equipment manufacturer
OPROM	Option ROM (expansion BIOS for a peripheral)
OS	Operating system
OTP	Over-temperature protection
OVP	Over-voltage protection
PC-100	Collection of specifications for 100 MHz memory modules
PCB	Printed circuit board
PCI	Peripheral component interconnect
PHP	PCI hot-plug
PID	Programmable interrupt device
PIRQ	PCI interrupt request line
PMM	POST memory manager
PnP	Plug and play
POST	Power-On Self Test
PSU	Power Supply Unit
PVC	Polyvinyl chloride
PWM	Pulse Width Modulation
RAS	Reliability, Availability, and Serviceability
RIA	Ring indicator
RPM	Revolutions Per Minute
RTS	Request To Send
SAF-TE	SCSI Accessed Fault-Tolerant Enclosures
SCA	Single Connector Attachment
SCL	Serial clock
SCSI	Small Computer Systems Interface
SDR	Sensor Data Records
SDRAM	Synchronous Dynamic RAM
SEC	Single Edge Connector
SEL	System Event Log
SELV	Safety Extra Low Voltage
SEMKO	Sverge Elektriske Materiellkontroll (Swedish Board of Testing and Approval of Electrical Equipment)
FP	(SAS) Front Panel
SGRAM	Synchronous Graphics RAM
SM	Server Management
SMBIOS	System Management BIOS
SMBus	Subset of I^2C bus/protocol (developed by

Term	Definition
	Intel), System Management Bus
SMI	System Management Interrupt
SMM	Server Management Mode
SMP	Symmetric multiprocessing
SMRAM	System Management RAM
SMS	Server Management Software
SPD	Serial Presence Detect
SSI	Server System Infrastructure
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
VCCI	Voluntary Control Council for Interference
Vdc	Volts direct current
VDE	Verband Deutscher Electrotechniker (German Institute of Electrical Engineers)
VGA	Video Graphics Array
VRM	Voltage Regulator Module
VSB	Voltage standby
W	Watt
WfM	Wired for Management
Word	A 16-bit quantity
Ω	Ohm
µf	Microfarad
µs	Microsecond

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