

OPEN
Compute Project

Intel Server in Open Rack Hardware v0.3 (MB-draco-genam-0.3)

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1 Scope

This specification describes how to integrate an Open Compute Project motherboard into an OCP Open Rack.

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3 Overview

When data center design and hardware design move in concert, they can improve efficiency and reduce power consumption. To this end, the Open Compute Project is a set of technologies that reduces energy consumption and cost, increases reliability and choice in the marketplace, and simplifies operations and maintenance. One key objective is openness—the project is starting with the opening of the specifications and mechanical designs for the major components of a data center, and the efficiency results achieved at facilities using Open Compute technologies.

A component of this project integrates a modified Open Compute Project Intel v2.0 motherboard into an Open Rack.

3.1 License

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4 Open Rack Overview

The Open Rack v1.0 has three power zones in a single column rack. Each power zone has 10xOpenU for servers and 3xOpenU for power shelf (1 OpenU = 48mm). Each power shelf has a 6+1 700W redundant PSU to provide 4200W of continuous maximum load and three bus bars per power zone. The total height for each 10xOpenU of server space is 480mm, as shown in **Error! Reference source not found..**

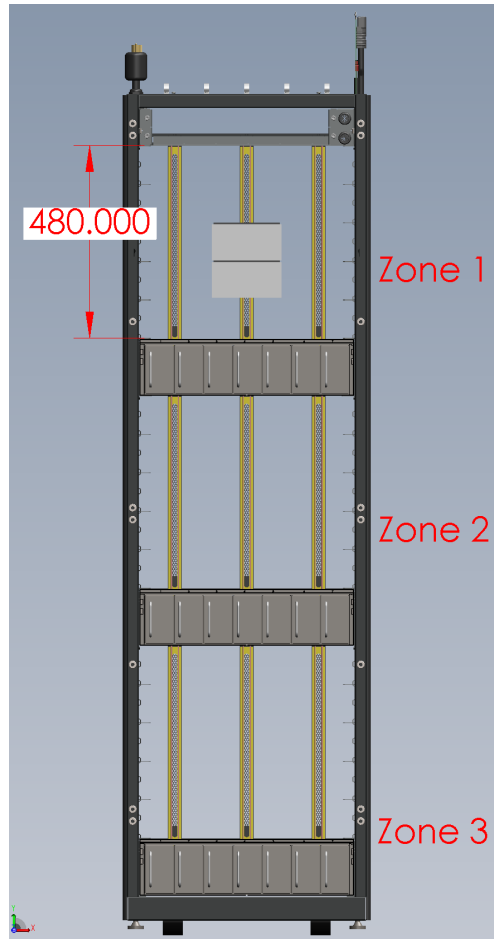


Figure 1 Open Rack Power Zones

5 System Design Requirements

5.1 Motherboard

The system uses the OCP Intel motherboard v2.0, with the following mechanical changes:

- Server height is 2xOpenU, not 1.5xOpenU.
- Supports 1x HDD (up to 3.5" form factor) in front of the motherboard area.
- Supports 1x mSATA module with adapter.

5.2 PCIe Riser Card

The PCIe riser card must be modified to accommodate the following requirements:

- Extend the riser card height to 2xOpenU to support a 2x PCIe full height card and 1x 3.5" HDD.
- The top slot uses an x16 PCIe connector with x8 PCIe signals. It supports a full height, full-length PCIe card.
- The bottom slot uses an x8 PCIe connector with x8 PCIe signals and an open end. It supports a full height, half-length PCIe card.

5.3 HDD Support

The HDD mechanical support should be between the bottom slot on the riser and the motherboard, and should hold one 3.5" HDD or one 2.5" HDD with adapter. The HDD must be serviceable from the front.

5.4 Bus Bar Clip Assembly

The bus bar clip assembly includes the clip, DC cables, slug with screw hole and notch, and common mode choke. The bus bar clip assembly, as shown in **Error! Reference source not found.**, is from Methode, part number 5313-07415-00107. The DC output cable comes out from the clip board as two wires, power and ground. The DC cable is AWG6, the bus bar clip assembly, including the bus bar clip, DC cable and slug.

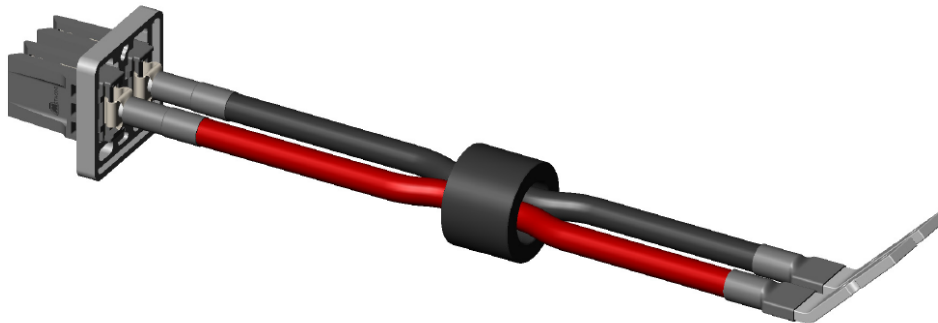


Figure 2 Bus Bar Clip Assembly

5.5 Tray

The server tray must accommodate the Intel v2.0 motherboard, HDD, midplane, fan, mSATA adapter and bus bar clip assembly with CM choke. This allows each server tray to directly mate with bus bar and be hot swappable independently. The server tray is 2xOpenU high, 174mm wide and 820mm deep (not including the tray handle).

Since each power zone has 10xOpenU for servers, the Open Rack supports up to five 2xOpenU slots per power zone. Up to three server trays can be installed in each 2xOpenU slot; each tray mates with the three bus bars both directly and individually.

5.5.1 Tray System Overview

Error! Reference source not found. shows the placement of major components.

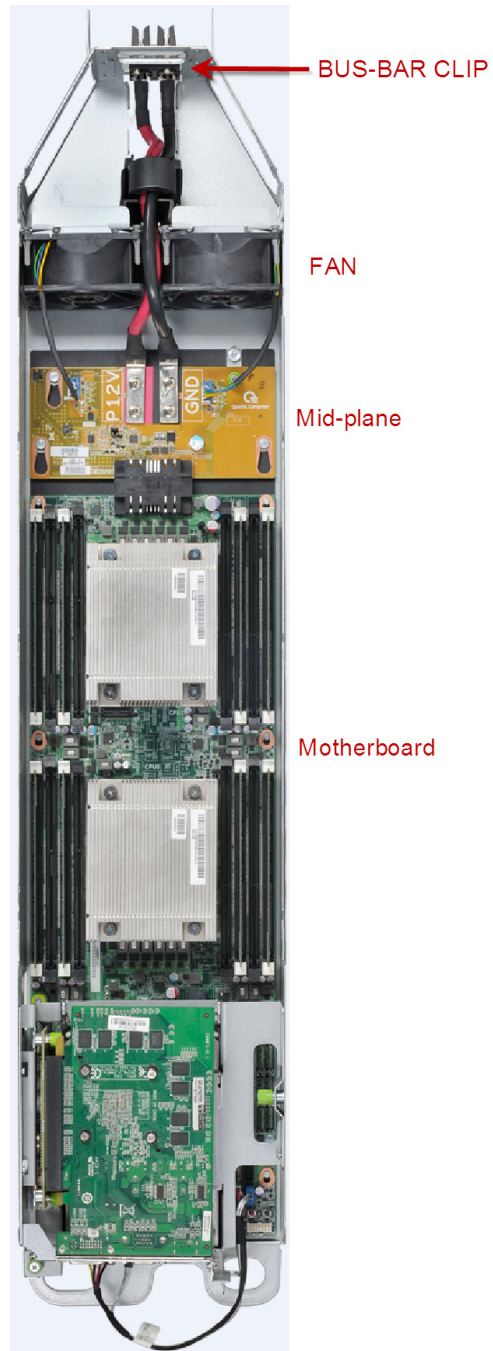


Figure 3 System Overview

5.5.2 Floating Clip

The tray integrates with the floating feature of the bus bar clip plate, which allows the bus bar clip to float $\pm 3\text{mm}$ horizontally and $\pm 4\text{mm}$ vertically as shown in **Error! Reference source not found..**

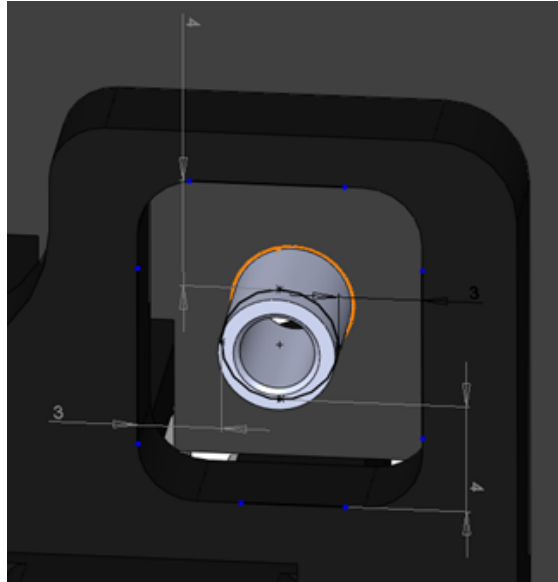


Figure 4 Bus Bar Floating Clip

5.5.3 Latching Plunger

The tray has a latching plunger that fits into a hole on the shelf to provide retention between the tray and shelf, as shown in **Error! Reference source not found..**

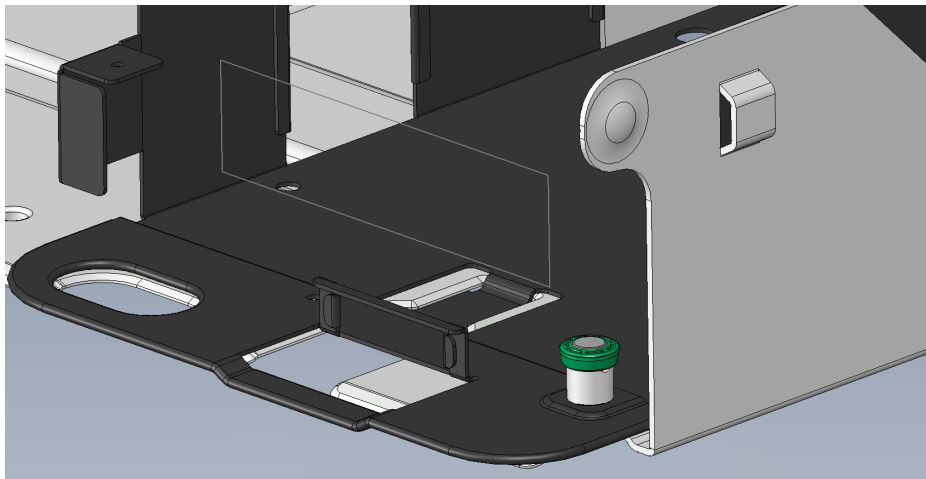


Figure 5 Latching Plunger

5.6 Midplane

The midplane is a PCB that provides connections between the motherboard, fan and power input. Its form factor is 165x76mm. The midplane can be replaced without removing the motherboard from the tray.

5.6.1 DC Input Connection

The DC power cable is a Methode Lug Two-Hole with a current rating >50A. It comes with a wire end that is fixed to the midplane with 2 screws. A notch on the lug mates with a key on the midplane to provide foolproof design.

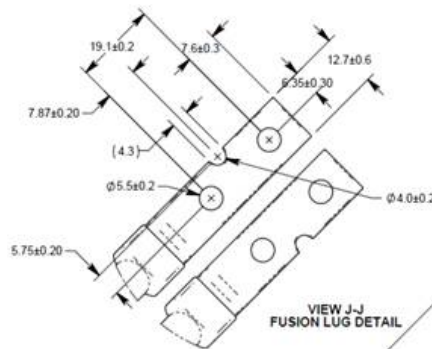


Figure 6 DC Input Connection

5.6.2 Fan Connector

The midplane has two system fan connectors. The fan connectors adhere to the requirements in the Intel motherboard v2.0 specification, and supports both 4-wire (single rotor) and 6-wire (dual rotor) fans. The fan power is connected at the downstream side of the hot swap controller (HSC). The fan power needs to be turned off during S5.

5.6.3 Motherboard Connector

The midplane has one FCI 51770-044 female right-angle power/signal connector (2P+16S+2P: 4 power blades and 16 signals), which mates with the motherboard's FCI 51730-162 male right angle header. The connector's pin definition follows the Intel motherboard v2.0 specification.

5.6.4 Hot Swap Controller

In order to have better control of the 12.5Vdc power input to the motherboard during hot swapping, one hot swap controller (ADI ADM1276 or equivalent) is recommended on the midplane. The hot swap controller implementation follows the Intel motherboard v2.0 specification. The power reporting of the hot swap controller must be better than 2% from 50W to full load in room temperature.

5.7 Fan

The fan is an 80x38mm, PWM 4-pin fan. Choose from one of these vendors:

- Delta (PFR0812DHE-CC1N)
- Sunon (PF80381B1-Q020-S99)
- Sanyo Denki (9GA0812P1G641)

5.8 Shelf

The Open Rack has supports installed on the side panels of the rack. The shelf is designed to hold up to three trays in the enclosure. Its dimensions are listed in **Error! Reference source not found..**

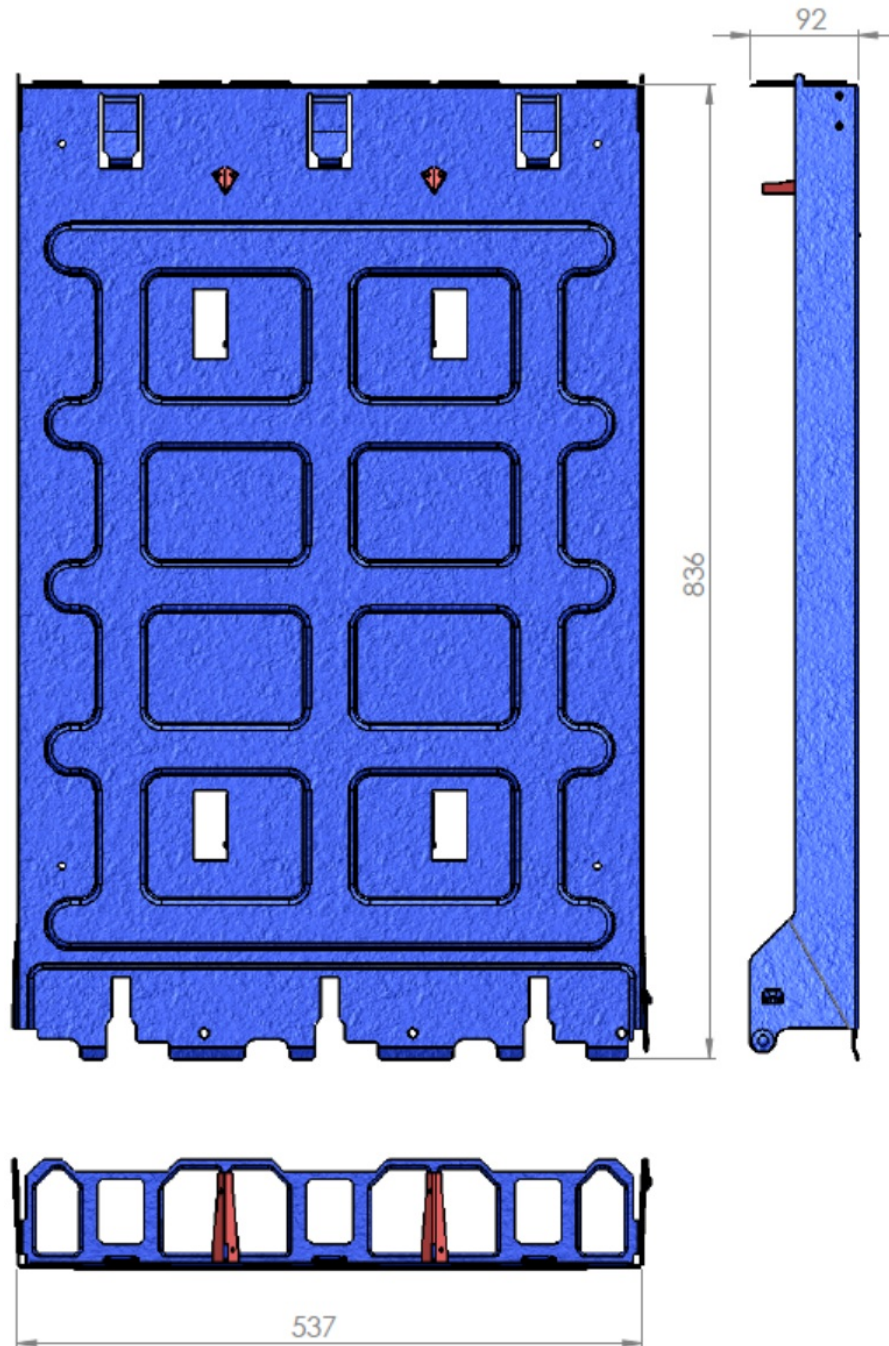


Figure 7 Open Rack Shelf