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Compute Project

Open Rack V3 Power Shelf 48V Output Connector

Rev: 0.33

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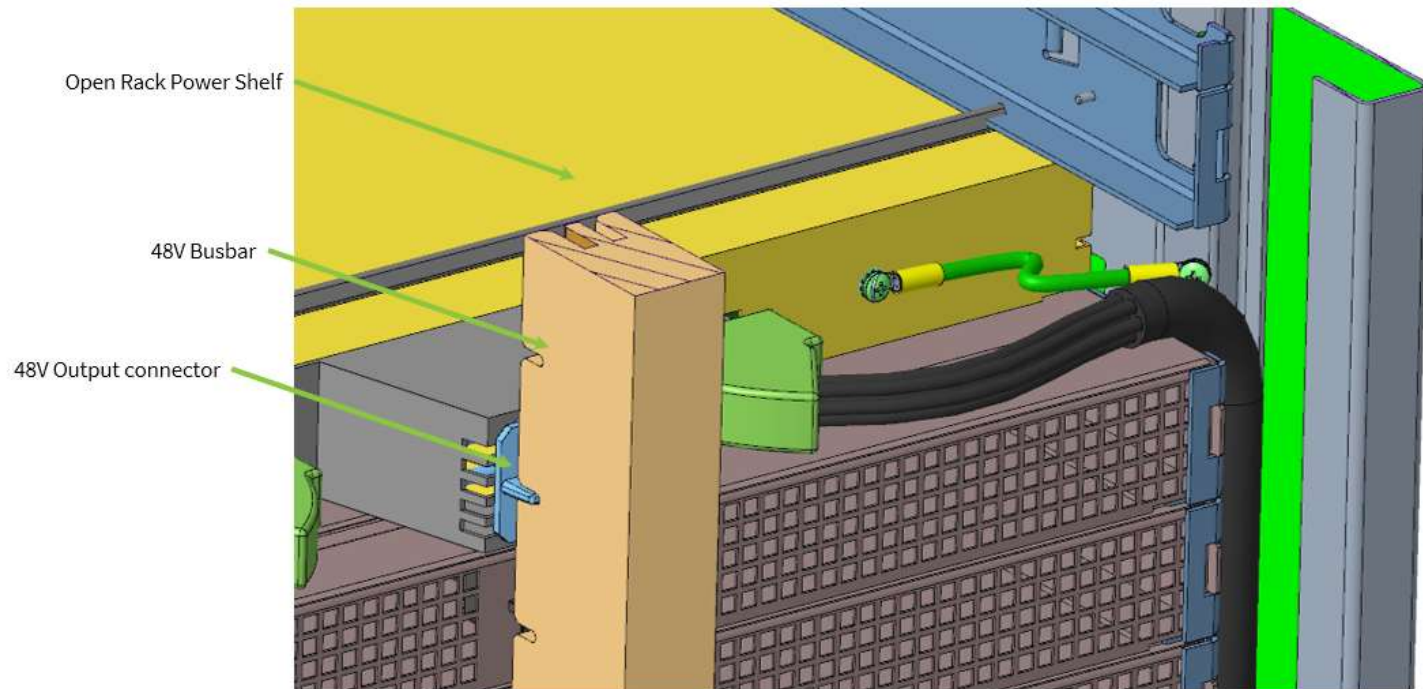
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1. Scope

This document defines the technical specifications for an Open Rack V3 Power Shelf 48V Output Connector used in the Open Compute Project.

2. Overview

This interconnection will allow for the installation of an Open Rack V3 power shelf in any location within an Open Rack by replacing the current bolted interface from Open Rack V2 that requires a pre-defined hole location.



3. Electrical

- Voltage range: 40V – 59.5V dc
- Max current continuous: 500A dc
- Max temperature rise: 30C (with busbar connected, as specified on ORv3 busbar Spec)
- Max voltage drop: 12mV @ max rated current

4. Mechanical

4.1 Geometry

The connector shall fit within the maximum height of a 1U EIA chassis (44.45mm)

The connector shall support a panel thickness of 0.72 – 1.32 mm.

The connector MAY use tools to attach the connector to the power shelf. [Details of hardware, torque, latching forces]

{Hole details for chassis to be here}

Wires shall resist pullout from the connector of XXX N.

4.2 Mating to the Busbar

The connector shall support blind-mate installation of the power shelf onto the 48V busbar as defined in the Open Compute Specification Revision 2.1.

Connector shall support +/-2mm float horizontally and vertically.
Connector shall support 6mm of wipe minimum.

Busbar to be copper stock 3.0 +/- 0.13mm thick with silver plating 11 micron thick minimum over nickel 5 micron thick minimum. Surface roughness Ra <1.0.

The max rate of the power shelf insertion into the rack will be 1 m/s.

The insertion force of the connector onto the busbar shall be less than 50N.

All of the input power cords shall be disconnected prior to disconnecting the shelf from the busbar under normal conditions. However, the rack may have more than one power shelf installed into a power zone, so the rack busbar may be energized when the power shelf is installed or removed from a live rack. So, the connector must survive 2 cycles in this condition.

The power shelf will ship within the rack while connected to the rack busbar. The connector solution shall prevent damage of the power shelf and the rack busbar during the following packaged, rack-level tests (ASTM 4169 details below) while meeting the voltage drop requirements per section 6.0 and show no exposed copper of either the power shelf connector or rack busbar under SEM analysis of the interfaces.

The rack is tested in the shipping packaging for transportation Shock and Vibration per ASTM 4169-16 Schedule E - Vehicle Vibration for 2hrs on vertical axis only for 80 minutes low level, 30 minutes medium level and 10 minutes high level.

Airflow

The Power shelf shall always provide airflow across the interconnect while the power shelf is under load.

Max Temperature:	45 C
Minimum pressure:	XXX Pa
Minimum flow speed:	XXX m/s

5. Environmental Requirements:

- Operating Ambient Temperature at connector location: 10C – 45C
- Long-term Storage: -40C to 50C and 5-95% RH {XXX timeframe}
- Short-term Storage: -20C to 65C and 10-80% RH
- Operating Humidity: 20-90%, 5C dew point minimum
- Lifetime: 5 years

6. Quality

The following tests will be conducted with three samples each per Table 1.

Table 1

Test	Test Standard	Test Condition/ Method	Pass/Fail Criteria	Additional Data to Collect for Review
Durability	EIA-364-09	25 mating/un-mating cycles 30~60mm per second travel speed	contact resistance before and after post test surface wear examination: no exposed nickel or copper	N/A
Contact Retention	EIA-364-29	Method A 15kgf pull force, both axial and at 45degrees, for a minimum of 6 seconds	no visible contact to housing displacement	N/A
Vibration	EIA-364-28	Test condition VII Test condition letter E 15 minutes duration in each of the three mutually perpendicular direction	per standard in addition: contact resistance before and after	post test contact wear optical examination, SEM/EDX optional
Shock	EIA-364-27	half-sine pulse test condition A 3 shocks * 3 perpendicular planes * 2 directions = 18 shocks	per standard in addition: contact resistance before and after	post test contact wear optical examination, SEM/EDX optional
Temperature Life	EIA-364-17	Method C Test condition 1: 125+/-2C Test duration: 168hrs Load current: 500A	per standard, section 4.4 in addition: contact resistance before and after	monitor contact voltage drop during test
Thermal Shock	EIA-364-32	Method A Test condition VII: -55C to 105C Test duration: 10cycles	per standard, section 4.6	N/A
Humidity	EIA-364-31	Method IV	contact resistance before and after dielectric withstand voltage before and after insulation resistance before and after	N/A
Salt Spray	EIA-364-26C	5% solution @ 35C+/-2C, 72hrs	contact resistance before and after	N/A
Temperature rise	TBD	Run 500Adc through connector, connected to busbar	Lower than 30C	N/A
Voltage drop	TBD	Run 500Adc through connector	Lower than 12mV	N/A

7. Regulatory

The connector shall comply with the latest edition, revision, and amendment of the following Standards:

- [USA] UL 60950-1, Information Technology Equipment - Safety - Part 1: General Requirements
- [CAN] CAN/CSA C22.2 No. 60950-1, Information Technology Equipment - Safety – Part 1: General Requirements
- [INT'L] IEC 60950-1, Information Technology Equipment - Safety - Part 1: General Requirements, including all national deviations as specified in the most current CB Bulletin; CB Certificate and report MUST include all countries participating in the CB Scheme; US and Canada national deviations may be excluded since the power supply will have third party certifications for these 2 countries
- [EU] EN 60950-1, Information Technology Equipment - Safety - Part 1: General Requirements
- IEC 62368-1, Audio/video, information and communication technology equipment – Part 1: Safety requirements (applicable to meet anticipated effective date of December 20, 2020 for North America and Europe.)
- Halogen Free per [XXX]
- ROHS [XXX]
- Material flammability: All materials shall be UL94 V-0 rated.
- Connectors shall be UL1977 recognized.

8. Revisions

Rev	Date	Author	Changes
0.31	5 May 19	Steve Mills	Converted to 48V
0.32	5 JUL 19	SM and HK	Extensive updates
0.33	12 JUL 19	Steve Mills	Extensive Changes from the JUL19 OCP Workshop