



# OPEN

Compute Project

Open Rack V3 Power Shelf Universal Input Connector

Rev: 0.2

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## 1. Scope

This document defines the technical specifications for an Open Rack V3 Power Shelf Universal Input Connector used in Open Compute Project.

## 2. Overview

This power from the data center enters the power shelf through this connector set. The set is designed to allow the shelf to adjust to a wide range of input power types while allowing the cabling to the data center to adapt to regional regulatory needs.

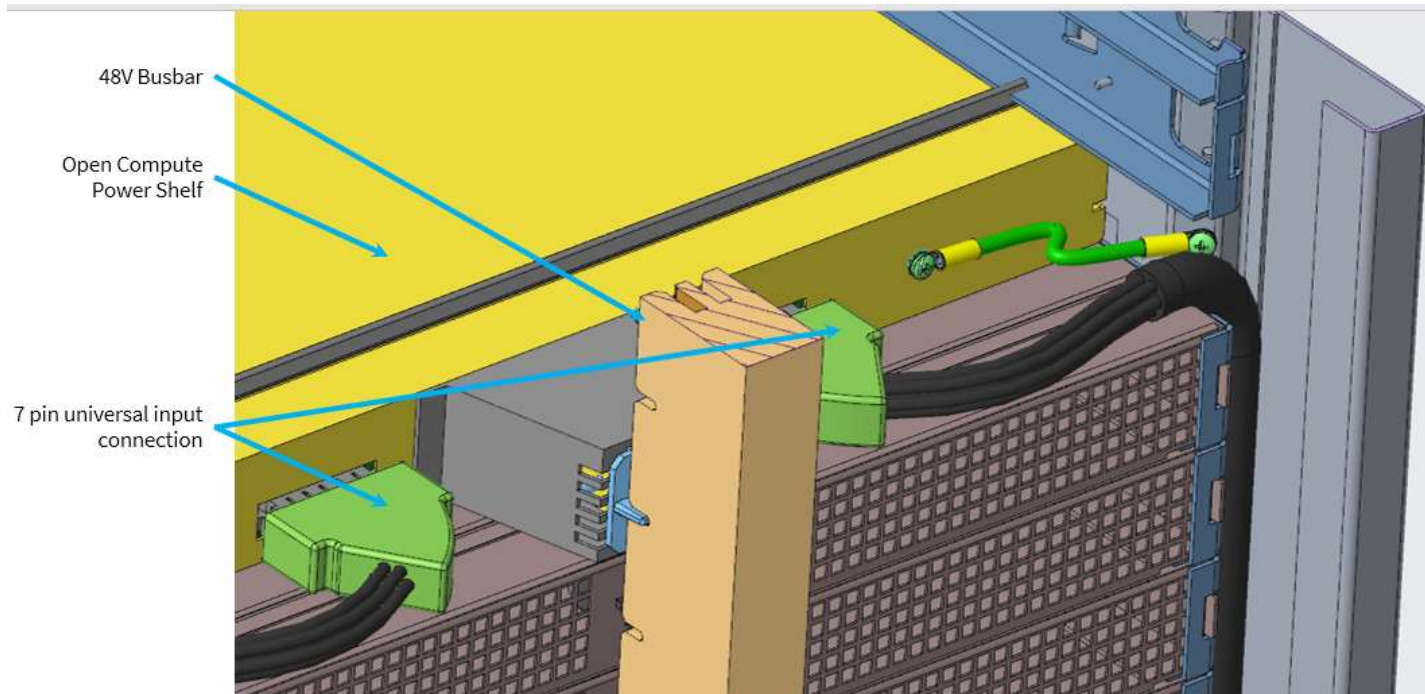


Figure 1. Layout of open rack power shelf in the rack assembly

## 3. Electrical

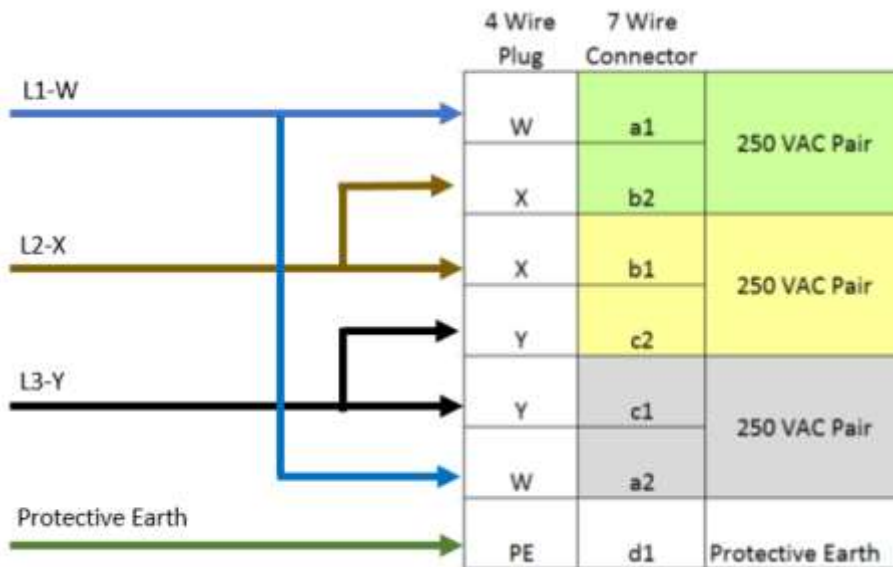
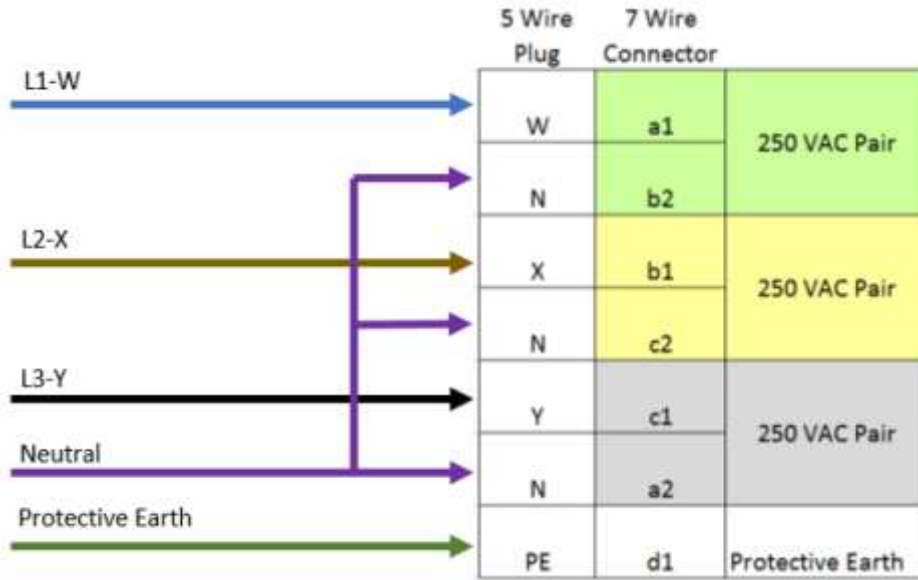
- Seven pin connector with three inputs, three returns, and one Ground (Earth).
- Nominal Voltage (rms) rating:
  - Pin to pin 480V AC
  - 380V DC
  - Frequency: DC, 50 Hz, 60 Hz
- Current Rating: 50A @ 30C temperature rise in still air
- Inrush current:
  - 10X for 100 micro sec
  - two times rated current for 5mS.

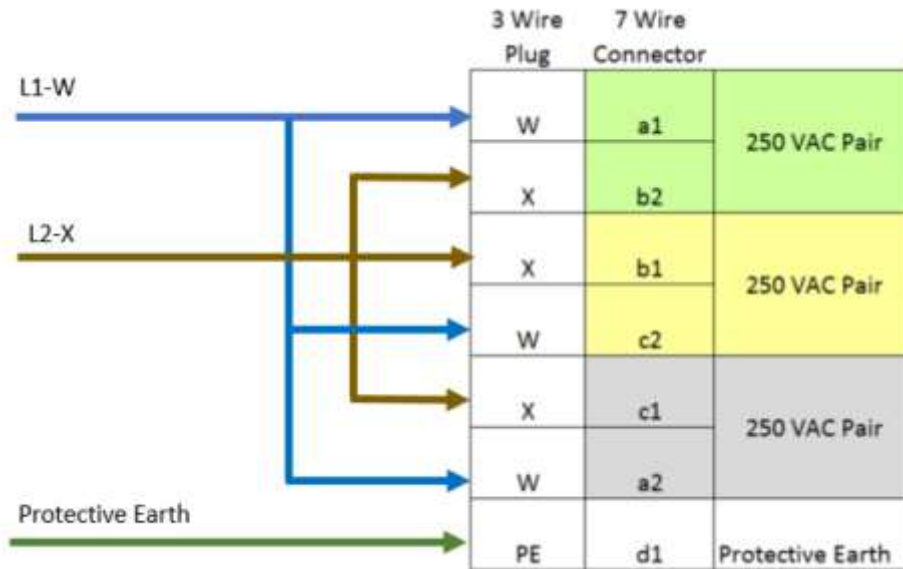
### 3.1 Connector wiring

Connector shall take the following input wiring:

- 3 phase, 5 wire in Star configuration.
- 3 phase, 4 wire in Delta configuration.
- 1 phase, 3 wire configuration.
- High-voltage DC, 3 wire configuration

The following diagrams show the wiring of different configurations the connector shall support:





#### 4. Mechanical

Height must fit within the envelope of a 1 RU EIA chassis (44.45mm). And pass within the cable trough of 23.8 mm minimum.

Height and width of the connector shall be sized so that a connector and a whip wire bundle of max diameter (XXX 8 gauge high strand count) will fit into the Open Rack channel at the same time. This will allow the whip cable to be replaced without moving the rack.

The distance from the back surface of the power shelf chassis to the tip of the tangent of the <of the bend radius of the worst-case cable bundle supported> entering the cable side connector shall be less than 65mm so the whip cable will always remain inside the rack frame. <Add drawing of Max Bend radius for the connector to back surface of chassis = 65mm>

The cable exit from the cable connector shall be reversible so the cable can enter the connector from either direction.

Wire AWG: 8 - 12

The connector shall have a positive retention latch that can be unlatched with a finger release force less than 15 N

The insertion force of the cable connector shall be less than 50 N

Field replaceable terminals are not required.

Connector set shall be polarized.

Connector system shall provide for a ground pin that will make first mate/last break

Provision for an optional protective cover for the connector when the cable is removed. Cover should provide a warning ISO 7010-W012 (shock warning)

The finger latches on the whip side connector need to be protected when the cable is extracted through the rack cable trough.

Chassis-side connector:

Details of the PCB pin-out TBD including the board locks to be added here.

Minimum force for the connector strain relief

Detail of the Panel cut out for the chassis connector

- 1> Cabled internal with strain relief to the chassis
- 2> PCB version with strain relief

PCB Thickness: XXX-XXX mm

Ground pin should be first mate/last break under all entry angles.

#### 5. Environmental Requirements:

- Operating Ambient Temperature: 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	100 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
Durability	UL1977	5 cycles under load		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



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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
Whip Connector wire cable pull test	<TBD>	Axial and Transverse	<XXX> N	N/A
Chassis Connector wire cable pull test	<TBD>	Axial and Transverse	<XXX> N	N/A
Whip Side Connector drop test	UL 486A/B	Section 9.7	No mechanical damage other than cosmetic damage allowed	N/A

7. Regulatory

Both sides of 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]>
- Material flammability: All materials shall be UL94 V-0 rated.
- Connectors shall be UL1977 recognized.

8. Revisions

Rev	Date	Author	Changes
0.1	5 JUL 19	SM and HK	Initial Release
0.2	12 JUL 19	Steve Mills	Extensive updates from the JDA group