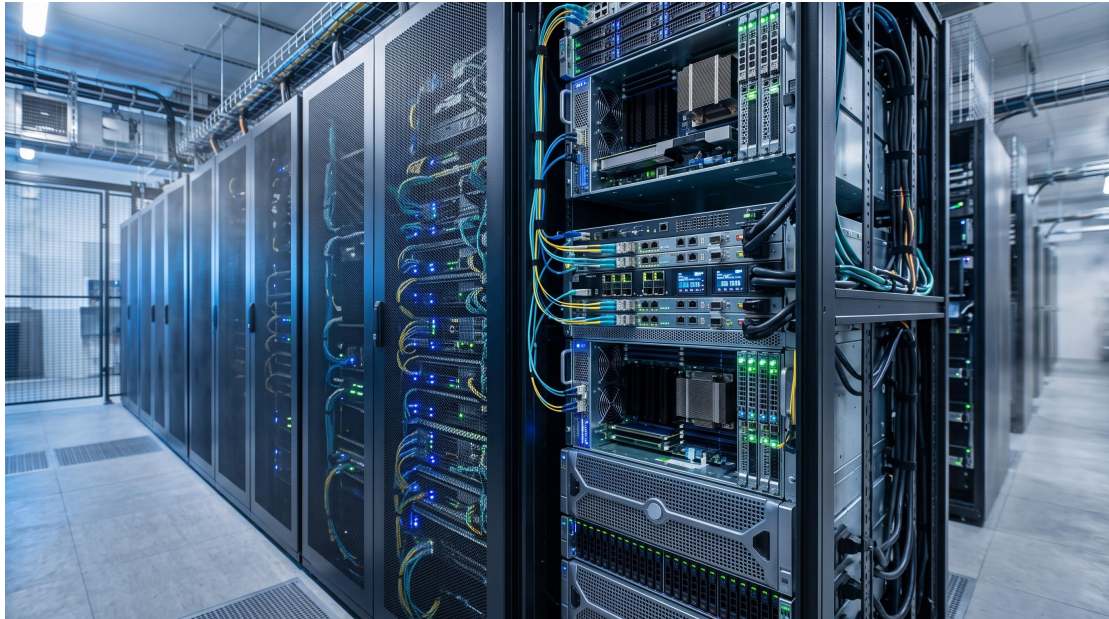


High-Density AI Compute Rack Power and Network Module Dimensions - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

The High-Density AI Compute Rack Power and Network Module represents a purpose-built infrastructure subsystem engineered to meet the stringent power delivery and network interconnect demands of next-generation artificial intelligence compute clusters. As AI training and inference workloads scale beyond 100 kW per rack, conventional power and networking architectures introduce unacceptable inefficiencies, thermal penalties, and deployment complexity. This module delivers a unified, carrier-grade solution that integrates high-amperage DC power distribution with ultra-low-latency network fabric interfaces in a compact, hot-serviceable form factor. The platform supports rack-level power densities up to 150 kW, 48 VDC and 54 VDC bus architectures, and network uplinks from 400GE to 800GE, enabling seamless integration into hyperscale and enterprise AI factories. Designed for interoperability with Open Compute Project (OCP) ORV3 and NVIDIA MGX rack architectures, the module ensures deterministic performance, predictive thermal behavior, and simplified cable management. This document provides a comprehensive technical overview of the module's architecture, hardware features, compliance posture, and ordering configurations.



ARCHITECTURE & CHASSIS DESIGN

The High-Density AI Compute Rack Power and Network Module is implemented as a 2RU rack-mount chassis, with an optional 1RU slimline variant for space-constrained deployments. The chassis is constructed from heavy-gauge galvanized steel with an integrated cable management tray and tool-less mounting flanges. Internally, the module is partitioned into two functional planes: the power distribution plane and the network interconnect plane. The power plane comprises a busbar interface rated for 600 A continuous current at 48 VDC, with active current balancing across up to six rectifier shelves. The network plane hosts a non-blocking switch fabric ASIC with 12.8 Tbps switching capacity, supporting 32 x 400GE QSFP-DD or 16 x 800GE OSFP interfaces. A shared midplane provides isolated power and signal paths, ensuring that a fault in one plane does not propagate to the other.

Front-to-back airflow is managed by dual counter-rotating fan trays with N+1 redundancy, and the chassis supports both AC (3-phase 415 V) and DC (240 V HVDC) input options.

HARDWARE FEATURES

Key hardware features include: hot-swappable power rectifier modules with 96% peak efficiency and 80 PLUS Titanium certification; integrated DC circuit breakers with remote telemetry; per-outlet current monitoring and fault isolation; network fabric ports with support for PAM4 modulation, Forward Error Correction (FEC), and IEEE 802.3cd/ck compliance; redundant management interfaces (1GbE RJ45 and USB-C console); real-time power and thermal telemetry via Redfish and SNMP v3; and a secure element for cryptographic attestation of module firmware. The module also provides a blind-mate connector system for rack-level integration, eliminating manual cabling errors during field replacement.

COMPLIANCE & STANDARDS

The module is designed to comply with the following standards and directives: UL 60950-1 and UL 62368-1 for safety; FCC Part 15 Subpart B Class A for emissions; EN 55032 and EN 55035 for EMC; IEC 61000-4-2 through IEC

61000-4-6 for immunity; NEBS Level 3 (GR-1089-CORE and GR-63-CORE) for carrier-grade environmental and electrical resilience; RoHS 3 and REACH for material restrictions; and OCP ORV3 and Open Rack v3 power shelf specifications. Network interfaces conform to IEEE 802.3cd (400GE), IEEE 802.3ck (800GE), and IEEE 802.1Q for VLAN tagging. The module is also designed for compliance with Energy Star for Computer Servers and the EU Code of Conduct for Data Centres.

TECHNICAL SPECIFICATIONS

The following table summarizes the primary technical parameters of the High-Density AI Compute Rack Power and Network Module. All values are nominal unless otherwise stated.

Parameter	Specification
Form Factor	2RU rack-mount chassis (1RU slimline option)
Power Input	3-phase 415 VAC or 240 VDC HVDC
DC Output Bus	48 VDC / 54 VDC, up to 600 A continuous
Power Capacity	Up to 150 kW per rack
Rectifier Efficiency	96% peak, 80 PLUS Titanium

Network Uplinks	32 x 400GE QSFP-DD or 16 x 800GE OSFP
Switching Capacity	12.8 Tbps non-blocking
Latency	Sub-600 ns port-to-port
Redundancy	N+1 fan trays, 1+1 power feeds, redundant management
Management	Redfish, SNMP v3, 1GbE RJ45, USB-C console
Operating Temperature	0°C to 45°C (continuous), -5°C to 55°C (short-term)
Humidity	5% to 95% non-condensing
Compliance	UL 62368-1, FCC Class A, NEBS Level 3, RoHS 3, OCP ORV3
Dimensions (H x W x D)	88 mm x 440 mm x 800 mm (2RU)
Weight	18.5 kg (fully populated, without cables)

ORDERING OPTIONS

The module is available in the following configurations:

HD-AI-PWR-NET-2RU-AC (2RU chassis, 3-phase AC input, 32 x 400GE);

HD-AI-PWR-NET-2RU-DC (2RU chassis, 240 VDC input, 32 x 400GE);
HD-AI-PWR-NET-1RU-AC (1RU slimline, 3-phase AC input, 16 x 400GE); and
HD-AI-PWR-NET-2RU-800 (2RU chassis, AC or DC input, 16 x 800GE). Optional
accessories include redundant fan trays, spare rectifier modules, blind-mate
power cables, and rack-level thermal sensors. All configurations ship with a
standard three-year hardware warranty and optional five-year extended
support.

