

Modular Edge AI Inference Unit Mechanical Dimensions and Pinout - Official Technical Overview & Hardware Datasheet

EXECUTIVE SUMMARY

The Modular Edge AI Inference Unit is a carrier-grade, field-deployable hardware platform purpose-built for real-time AI inference at the network edge. It combines a compact modular chassis, deterministic thermal design, and a comprehensive connector pinout ecosystem to accelerate latency-sensitive workloads such as video analytics, network telemetry, and industrial anomaly detection. The unit is engineered for telecom cabinets, remote huts, and rugged outdoor enclosures, supporting a wide DC input range and extended operating temperatures. This datasheet defines the mechanical dimensions, connector pinout, electrical interfaces, and environmental limits required for OEM integration.



ARCHITECTURE & CHASSIS DESIGN

The chassis is a 1RU modular enclosure with anodized aluminum front and rear panels, internal stainless-steel reinforcement, and a gasketed lid for ingress protection. The mechanical footprint is designed to fit standard 19-inch EIA-310 racks with a 3-point mounting option for shock-prone installations. The chassis includes a hot-swappable fan tray and redundant DC input terminals, enabling live maintenance in remote sites.

Key mechanical dimensions: width 440.0 mm (17.32 in), depth 300.0 mm (11.81 in), height 44.0 mm (1.73 in). Weight is approximately 4.8 kg (10.6 lb) with no modules installed. The interior backplane provides one mainboard slot and two expansion module slots with keyed connectors to prevent misinsertion. The unit supports front-to-rear airflow, and all external interfaces are located on the

front panel for quick access with a single service window.

HARDWARE FEATURES

- AI Inference Engine: 2x high-efficiency NPU modules, 64 TOPS INT8 combined (configurable via firmware).
- Connectivity: 2x 10/100/1000BASE-T RJ45, 2x 10G SFP+ cages, 1x RS-485 half-duplex, 1x CAN 2.0B, 1x USB 3.0 Type-A, and 1x RJ45 console.
- Power Input: dual redundant DC inputs, 9–36 VDC wide range, with reverse polarity and transient protection.
- Storage: 1x M.2 2280 NVMe slot (PCIe 3.0 x4) and 1x microSD card slot.
- Expansion: two proprietary module slots for AI accelerators or I/O expansion, supporting up to 25 W per module.
- Mechanical: 1RU, 440 x 300 x 44 mm, 4.8 kg, front-to-rear airflow, 3-point rack mounting.

CONNECTOR PINOUT AND INTERFACE DEFINITIONS

All external connectors are clearly silkscreened with pin 1 indication. The pinout follows industry standards where applicable, and custom connectors are keyed and rated for 500 mating cycles.

DC Input Terminal (2-pin pluggable, 5.08 mm pitch, part number: DCI-2P):

- Pin 1: DC IN+ (9–36 VDC)
- Pin 2: DC IN– (return)
- Torque: 0.5 N·m; wire gauge: 12–24 AWG.

RJ45 Console Port (RS-232 electrical levels):

- Pin 1: RTS, Pin 2: DTR, Pin 3: TXD, Pin 4: GND, Pin 5: GND, Pin 6: RXD, Pin 7: DSR, Pin 8: CTS.
- Baud rate: up to 115200 bps.

10G SFP+ Cages (2x): MSA-compliant; supports SR, LR, and DAC cables. Pinout per SFF-8431.

RS-485 Port (3-pin pluggable):

- Pin 1: A (non-inverting), Pin 2: B (inverting), Pin 3: GND.
- Termination: 120 Ω selectable via DIP switch.

CAN 2.0B Port (4-pin pluggable):

- Pin 1: CAN_H, Pin 2: CAN_L, Pin 3: GND, Pin 4: Shield.

USB 3.0 Type-A: Standard pinout, 900 mA per port.

microSD Slot: Push-push type, UHS-I compliant.

M.2 2280 Slot: PCIe 3.0 x4, key M, 3.3 V, max 8 W.

Module Expansion Connector (proprietary, 80-pin high-density):

- Provides PCIe 3.0 x2, USB 2.0, I2C, SPI, UART, and 12 V/3.3 V power.
- Keyed to prevent reverse insertion; rated for 200 mating cycles.

COMPLIANCE & STANDARDS

EMC: EN 55032 Class A, EN 55035, FCC Part 15 Subpart B Class A.

Safety: IEC 62368-1, UL 62368-1.

Environmental: IEC 60068-2-1/2/14/30, IP40 ingress protection.

Telecom: ITU-T K.21 surge immunity, GR-1089-CORE.

RoHS/REACH compliant.

TECHNICAL SPECIFICATIONS

The table below summarizes the primary mechanical, electrical, and environmental parameters.

Parameter	Specification
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Form Factor	1RU modular chassis, 440 x 300 x 44 mm
Weight	4.8 kg (base unit, no modules)
DC Input	9–36 VDC, dual redundant, 5.08 mm terminal
Power Consumption	120 W typical, 180 W max
Operating Temperature	-40°C to +70°C (fan-cooled); -20°C to +60°C fanless
Storage Temperature	-40°C to +85°C
Humidity	5% to 95% non-condensing
Shock/Vibration	IEC 60068-2-27 / IEC 60068-2-6
Ingress Protection	IP40
AI Performance	64 TOPS INT8 (combined)
Network Interfaces	2x 10/100/1000BASE-T, 2x 10G SFP+
Serial/Fieldbus	1x RS-485, 1x CAN 2.0B
Expansion Slots	2x proprietary modules, 25 W each
Storage	1x M.2 2280 NVMe, 1x microSD
MTBF	> 150,000 hours (Telcordia SR-332)

ORDERING OPTIONS

Standard configurations include the base unit with two AI acceleration modules, a blank expansion module, and a power terminal kit. Optional accessories: DIN-rail mounting kit, external fan tray, wide-temperature SSD, and a shielded cable set. Custom pinout configurations are available for volume OEM orders.

