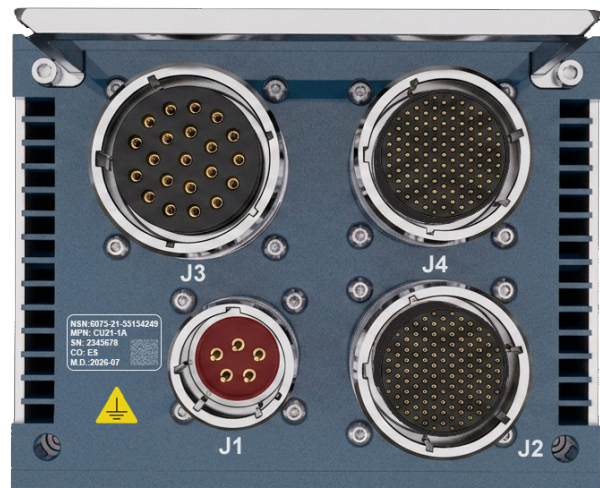


High Power, Forced-Air Conduction 2+1 3U VPX SFF Enclosure

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Description

The Cuantico CU21 is a ruggedized 3U VPX Small Form Factor (SFF) enclosure engineered to meet the demands of next-generation C5ISR mission-critical aerospace and defense applications. Leveraging advanced ANSYS thermal modeling and Cuantico's Design-to-Deployment (D2D) methodology, the enclosure delivers exceptional thermal performance, ensuring that high-power VPX payloads maintain optimal operating temperatures even under the most demanding environmental conditions.

Heat dissipation is maximized through an advanced thermal design incorporating eighteen heat pipes and external finned wall heat exchangers. These cooling features enable enhanced performance and longevity of payload cards at elevated temperatures, supporting up to 75 W per payload slot at 71°C ambient and 165 W per payload slot at 55°C ambient. A VITA 62 plug-in power supply slot is also supported, with eight dedicated heat pipes providing enhanced cooling for the power supply module. For cost-sensitive applications, the enclosure can be configured with a fixed Cuantico CU-650PSU integrated power supply occupying the VITA 62 slot bay area. The integrated supply provides VITA 46/SOSA™-aligned electrical interfaces to the VPX backplane and delivers additional hold-up circuitry in order to reduce total-system cost and lead times associated with a removable VITA 62 plug-in power modules.

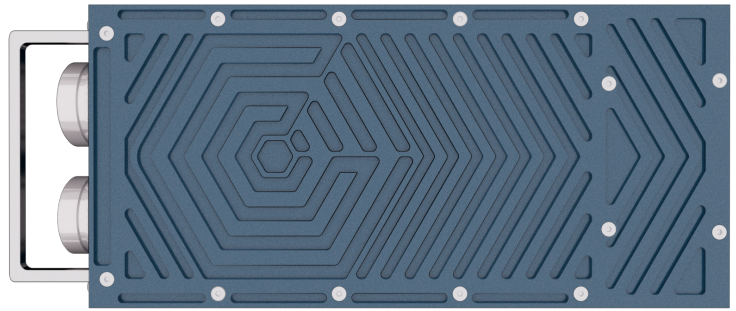
A rear-loading VPX card arrangement takes full advantage of full-length active wedge-lock cooling. The removable rear fan module provides direct access for installing and removing VPX payload cards without disturbing the

front-panel integrated I/O system cabling. This approach enables tighter packaging and maximizes thermal performance to deliver exceptional cooling capacity for high-power payloads.

Optimized for high-speed, high-density interconnectivity, the CU21 features a user-defined front panel with 38999 connectors accommodating up to 200 differential pairs. The interconnect supports data rates compatible with 112 Gbps PAM4, PCIe® 6.0/CXL® 3.2, and 100 GbE, ensuring seamless integration with next-gen high-speed VPX systems. All high-speed VPX P1 and P2 I/O signals are routed to the front panel through a custom low-profile rigid-flex interconnect assembly. Utilizing ultra-compact, signal-integrity-optimized press-fit VPX interfaces, the design eliminates the need for additional mezzanine connectors while providing exceptional reliability. By maximizing usable enclosure volume, rigid-flex assembly enables full access to high-speed electrical, RF, and optical interfaces from the VPX modules, simplifying system integration and enhancing overall system performance.

Built with military-grade components throughout, the sealed CU21 enclosure is designed to meet MIL-STD-461 and MIL-STD-810 requirements, protecting sensitive electronics from dust, moisture, shock, vibration, and electromagnetic interference (EMI). Developed for SWaP-C constrained platforms, the CU21 delivers a cost-effective, compact, and high-thermal-performance embedded computing solution optimized for high-power processing applications, including real-time edge AI inference using GPU and FPGA accelerated VPX processing cards.





Key Features

- Sealed 3U forced-air conduction enclosure.
- Three slot VITA VPX 1" pitch (5HP).
- Two VITA 48.2 conduction cooled slots.
- One VITA 62 conduction cooled power supply slot.
- Integrated PSU VITA/SOSA-aligned outputs (optional).
- OpenVPX and SOSA-aligned backplane slot profiles.
- VITA 67 and VITA 66 ready.
- Aggregate payload power dissipation ≤ 330 Watts.
- 28 VDC input power (MIL-STD-704F).
- Integrated inline 18A power input EMI/EMC filter.
- Industrial rugged rear fan with speed control.
- Military rugged rear fan with speed control (optional)
- Two integrated temperature sensors.
- MIL-38999 type connectors for power and I/O signals.
- LED status indicators (optional).
- 18 Integrated flat heat pipes.
- Integrated rear fan finger guard.
- Removable covers.
- Front extraction handle.
- Enclosure baseplate fixing holes for direct mounting.
- Aeronautical Aluminum 6082-T6 construction.
- Stainless steel 316 fixings.
- SWaP-C optimized.

- Designed to meet MIL-STD-461G and MIL-STD-810H.
- IP67 sealing capability (optional).

An available 5 mm edge bay can accommodate optional expansion modules without occupying a VPX slot. Options include a Blade-Jet® internal forced-air cooling module for localized VPX card cooling, an M.2 NVMe SSD storage module, or custom electronic modules designed to meet application specific requirements. Additional information is available upon request.

Related Products

Custom Backplanes: Need a custom VPX backplane architecture for your system?

Custom I/O Front Panels: Tailored I/O panel solutions for unique requirements.

Custom Mechanical Solutions: Specialized mechanical designs for platform and program applications.



Specifications

Physical

Dimensions:	3.82"/97mm (H) 4.92"/125mm (W) 10.43"/265mm (D)
Weight:	8.27lbs. (3.75kg) excluding payload.
Mounting:	13 M3 position on bottom structure
Cooling:	Forced-Air, conduction cooled
Finish:	Chromite TCP finish (alochrome option available)
Paint:	MIL-C-83286B Color options available

Power/Electrical

Input:	28 VDC (per MIL-STD-704F)
PSU:	≤850W VITA 62 plug-in power supply
EMI/EMC:	MIL-STD-1275 compliant integrated input power filter
Connectors:	MIL-DTL-38999 panel connectors
I/O:	Custom I/O panel supporting high speed
Indicators:	LED status indicators (optional)

Backplanes

Architecture:	3U VITA OpenVPX, SOSA Aligned, fully or partially customized slot profile options
Substrate:	Tachyon 100G
Protocols:	1000BASE-KX 10GBASE-KX4 10GBASE-KR 40GBASE-KR4 100GBASE-KR4
Interconnects:	VITA 46.3 MULTIGIG RT3 VITA 67 apertures for optical and RF I/O

Construction

Assembly:	Modular brazed + bolted assembly
Structure:	Aeronautical Aluminum 6082-T6 Stainless Steel 316 Fixings
Sealing:	Internal payload cavity sealed dry-air EMI/EMC gaskets on all joints
Machining:	Precision 5-axis CNC
Heat Exch.:	Finned side walls
Heat Pipes:	18 flat heat pipes

Environmental

Op. Temp.:	-40°C to +85°C
St. Temp.:	-55°C to +100°C
Altitude:	Operating: 0 to 20 kft Storage: 0 to 35 kft
Humidity:	100% condensing (MIL-STD-810H, Method 507.6, Procedure I, Cycle B)
Shock:	20g, 11ms (MIL-STD-810H, Method 516.8, Procedure I)
Vibration:	Rotary-wing UAV vibration profile Propeller Aircraft (MIL-STD-810H, Method 514.8, Annex D, Category 13) Jet Aircraft (MIL-STD-810H, Method 514.8, Annex D, Category 12) Helicopter (MIL-STD-810H, Method 514.8, Annex D, Category 14)
Fungus:	MIL-STD-810H, Method 508.7
Salt Spray:	5% NaCl salt solution (MIL-STD-810H, Method 509.6)
Rain:	MIL-STD-810H, Method 506.7
Magnetic Eff.:	RTCA/DO-160F, Section 15 for Category A
EMC:	MIL-STD-461G (CE102, CE106, CS101, CS103, CS104, CS105, CS114, CS115, CS116, RE102, RS103)
Sound Level:	40-60 dB(A) (system performance shall vary according to fan speed)
MTBF:	25° GB 500,000 Hours 65° AIC 46,000 Hours

Warranty & Certifications

Warranty:	1-year limited warranty
Supplier:	NCAGE: 9BERB DGAM: 1634
Compliance:	MIL-STD-461G & MIL-STD-810H CE (Conformité Européenne) RoHS (Restriction of Hazardous Substances)



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