Datasheet

CU41S

High Power, Forced-Air Conduction 4+1 3U VPX SAVE$^{1/2}$ Enclosure

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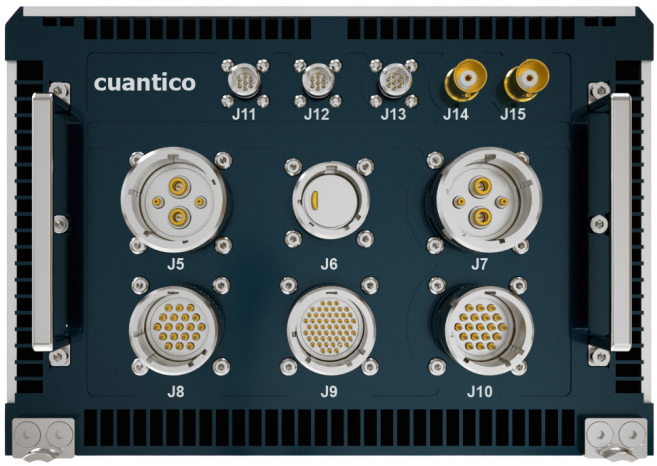

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High Power, Forced-Air Conduction 4+1 3U VPX SAVE$^{1/2}$ Enclosure

Description

The Cuantico 4+1 3U VPX ruggedized 1/2 SAVE enclosure is a high-performance solution, engineered to meet the demands of next-generation C5ISR mission-critical applications within aerospace and defense. Leveraging cutting-edge AI-driven optimization and ANSYS modeling, this holistic, D2D-designed enclosure excels in thermal management, ensuring that VPX payloads maintain optimal operating temperatures even in the most extreme environmental conditions.

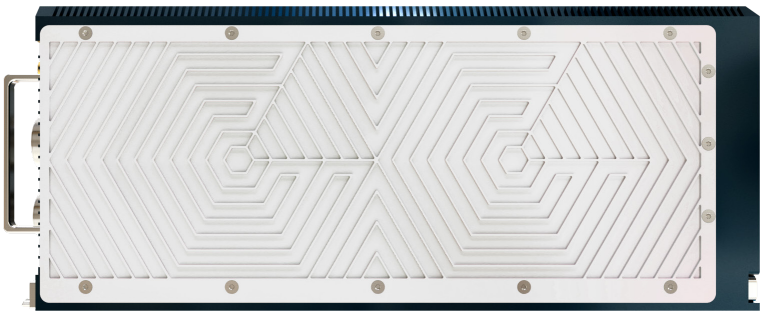
The CU41S maximizes heat dissipation by integrating superior cooling mechanisms that include heat pipes, pin-finned modules, and external finned wall heat exchangers. These systems enable enhanced performance and longevity of payload cards at elevated temperatures, supporting up to 70W per slot at 71°C ambient and 150W per slot at 55°C, respectively. A VITA 62 plug-in power supply slot is supported by an impressive cooling capacity of up to 650W, ensuring reliable operation in demanding applications.

The Cuantico 4+1 enclosure is optimized for high-speed, high density data interconnectivity. A user-defined front panel with MIL-38999 connectors accommodates up to 200 differential pairs that support (112 Gbps PAM4, PCIe® 6.0/CXL® 3.2, and 100 GbE compatibility), ensuring seamless integration with high-speed backplane I/O data rates. The front panel I/O has been designed to support all RF/Optical P2 VPX output channels in addition to P1 I/O signals. Furthermore, the front panel may optionally fit a MIL-S-83731 toggle switch and elapsed time indicator (ETI) without compromising connectivity.

Built with military-grade components throughout, the sealed CU41 enclosure meets MIL-STD-461 & MIL-STD-810 standards, protecting sensitive electronics from dust, moisture, and electromagnetic interference. The system is meticulously designed for SWaP-C, making it an ideal choice for defense applications.

Key to its advanced cooling system is the Cuantico Blade-Jet® internal forced-air system, which provides six CFM of airflow per slot to actively recirculate air across payload card surfaces, effectively eliminating hot spots and preventing thermal buildup. The CU41S is equipped with comprehensive system management capabilities, including six integrated temperature sensors, Blade-Jet array phased functions, operational temperature set trip points, battleshort override, power monitoring, rear fan speed control, and provisions for cold-startup heaters. Ample cavity space is available for additional devices, cabling, RF and optical routing beneath the VPX backplane. A CU-3F28 hold-up capacitor bank may be optionally installed to provide extended hold-up in the event of power failure (location subject to SAVE version).

The SAVE$^{1/2}$ enclosure introduces a rear encapsulated expansion panel for power input, power pass through and auxiliary I/O connectivity. A power input filter is integrated at the connector level to provide EMI/EMC suppression and shielding. This arrangement maybe optionally substituted for the traditional front panel arrangement. A testament to engineering excellence, the CU41S delivers robust durability, high dissipation, and a wide range of capabilities within a compact 1/2 SAVE form factor.



Key Features

- Sealed 3U forced-air conduction enclosure.
- Five slot VITA VPX 1” pitch (5HP).
- Four VITA 48.2 conduction cooled slots.
- One VITA 62 conduction cooled power supply slot.
- OpenVPX and SOSA-aligned backplane slot profiles.
- VITA 67 and VITA 66 ready.
- Aggregate payload power dissipation ≤600 Watts.
- Power supply dissipation ≤650 Watts.
- 28 VDC input power (MIL-STD-704F).
- Integrated inline 25A power input EMI/EMC filter.
- Dual military-grade rear fans with speed control.
- Blade-Jet® internal forced-air cooling system.
- Six integrated temperature sensors.
- I/O panel supporting 200 differential pairs (400 pins).
- MIL-38999 type connectors for power and I/O signals.
- Tri-color ML1631 LED status indicator (optional).
- MIL-S-83731 qualified toggle on/off switch (optional).
- Front panel time elapsed indicator (optional).
- MIL-STD-704 hold-up 3F capacitor bank (optional).
- Integrated panel and pin-finned heat exchangers.
- Integrated flat heat pipes.
- Integrated rear fan finger guards.
- Removable covers.
- Front extraction handle.
- ARINC 404 mounting system for platform integration.
- 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).

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:	5.35"/136mm (H) | 7.76"/197mm (W) 12.64"/321mm (D)
Weight:	15.4lbs. (6.98kg) excluding payload.
Mounting:	Four M4 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-1275F, MIL-STD-704F compliant integrated input power filter
Connectors:	MIL-DTL-38999 panel connectors MIL-S-83731 toggle switch (optional)
Indicators:	Tri-color ML1631 LED status indicator

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 | Samtec AcceleRate® HP | RSATA-MIL (SSD)

Construction

Assembly:	Modular 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 | Splayed and straight pin fin aluminum modules
Heat Pipes:	23 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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