

Providing Unprecedented  
Performance Density

# OpenVPX Chassis Product Line

**OpenVPX**™



**vadatech**  
THE POWER OF VISION

# A Need for Embedded Functions in the Crate

Current VITA open-standards are primarily focused on the military market with secondary adopters in other high-tech industries. As such, many product offerings in the market place have a rugged pedigree in the design techniques. The requirements for rugged applications tend to be very specific to a particular end-use, so suppliers within the ecosystem tend to develop specific chassis for a particular application which includes purpose-built mechanical features and compute functionality.

VadaTech is in a unique position as it is a market leader in both the primary commercial TCA (Telecom Computing Architecture) PICMG market as well as the OpenVPX VITA market. VadaTech has leveraged features and design techniques through years of experience in developing TCA PICMG telecommunication chassis, in order to add more embedded and intelligent functions in the crate, to the benefit of VITA open standard users.

***The result for the operator is a smaller footprint with embedded functions, ease of development and debug with the series of switching and clocking advanced features, and an enhanced reliability with deployed health management for rugged applications.***

VadaTech releases more than 70 new products each year and the present brochure covers of a subset of the products and features available.

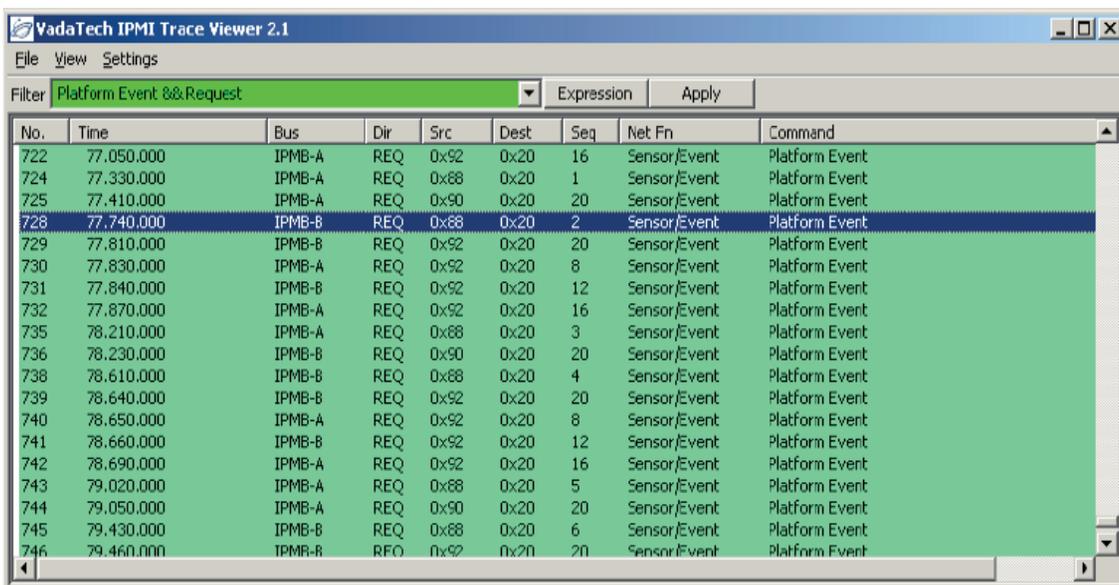
# VITA 46.11 Tier-1 and Tier-2 Chassis Manager

The standard defines components, interfaces, mechanisms, and infrastructure to support the implementation of an interoperable management subsystem within VPX that enables features such as inventory, sensor, and diagnostic management, as well as system configuration and recovery.

*The VITA 46.11 working group chose to leverage the management infrastructure in PICMG's AdvancedTCA (ATCA) architecture and Intelligent Platform Management Interface (IPMI).*

The VadaTech Chassis Management solution is derived from our field-proven VadaTech ATCA Shelf Manager, utilizing core interfaces such as the Simple Network Management Protocol (SNMP), Remote Management Control Protocol (RMCP), Web Interface, System Management application (Scorpionware™), and a user-friendly Command Line Interface.

VadaTech VPX IPMC and Chassis Management solutions support the VITA 46.11 Tier-2 command set, providing a high level of functionality in the management layer and chassis cooling capabilities. Additionally, VadaTech VPX management solutions have taken advantage of the HPM.1 PICMG Specification to provide a framework for upgrading the IPMC firmware.



The screenshot shows the VadaTech IPMI Trace Viewer 2.1 application window. The title bar reads "VadaTech IPMI Trace Viewer 2.1". Below the title bar is a menu bar with "File", "View", and "Settings". A filter bar contains a dropdown menu set to "Platform Event &&Request", an "Expression" field, and an "Apply" button. The main area is a table with the following columns: No., Time, Bus, Dir, Src, Dest, Seq, Net Fn, and Command. The table contains 17 rows of data, all of which are "Platform Event" commands. The row with No. 728 is highlighted in blue.

No.	Time	Bus	Dir	Src	Dest	Seq	Net Fn	Command
722	77.050.000	IPMB-A	REQ	0x92	0x20	16	Sensor/Event	Platform Event
724	77.330.000	IPMB-A	REQ	0x88	0x20	1	Sensor/Event	Platform Event
725	77.410.000	IPMB-A	REQ	0x90	0x20	20	Sensor/Event	Platform Event
728	77.740.000	IPMB-B	REQ	0x88	0x20	2	Sensor/Event	Platform Event
729	77.810.000	IPMB-B	REQ	0x92	0x20	20	Sensor/Event	Platform Event
730	77.830.000	IPMB-A	REQ	0x92	0x20	8	Sensor/Event	Platform Event
731	77.840.000	IPMB-B	REQ	0x92	0x20	12	Sensor/Event	Platform Event
732	77.870.000	IPMB-A	REQ	0x92	0x20	16	Sensor/Event	Platform Event
735	78.210.000	IPMB-A	REQ	0x88	0x20	3	Sensor/Event	Platform Event
736	78.230.000	IPMB-B	REQ	0x90	0x20	20	Sensor/Event	Platform Event
738	78.610.000	IPMB-B	REQ	0x88	0x20	4	Sensor/Event	Platform Event
739	78.640.000	IPMB-B	REQ	0x92	0x20	20	Sensor/Event	Platform Event
740	78.650.000	IPMB-A	REQ	0x92	0x20	8	Sensor/Event	Platform Event
741	78.660.000	IPMB-B	REQ	0x92	0x20	12	Sensor/Event	Platform Event
742	78.690.000	IPMB-A	REQ	0x92	0x20	16	Sensor/Event	Platform Event
743	79.020.000	IPMB-A	REQ	0x88	0x20	5	Sensor/Event	Platform Event
744	79.050.000	IPMB-A	REQ	0x90	0x20	20	Sensor/Event	Platform Event
745	79.430.000	IPMB-B	REQ	0x88	0x20	6	Sensor/Event	Platform Event
746	79.460.000	IPMB-B	RFO	0x92	0x20	20	Sensor/Event	Platform Event

VadaTech chassis managers can be used as an IPMI protocol analyzer with VadaTech ViewTrace tool and graphical interface

# Embedded Layer 2 or Layer 2/3 Switch

As a result of VITA46.6, which defines the GbE control plane on OpenVPX, the payloads often provide data link capability for GbE through the backplane. The inter-module link is handled via direct link or in a star topology via a GbE switch installed in a switch slot.

VadaTech has developed the full stack Layer 2 and support GbE star topology in its chassis with either embedded or modular full Layer 2 switch. This stack is deployed in critical applications in more than 15 countries and has been enhanced over more than 15 years.

***VadaTech has also ported its field-proven full layer 2/3 stack with 1G/10G/25G/40G/100G capability to support 3U and 6U OpenVPX.***

The table below lists some of the functions supported by the L2/L3 stack.

<p><b>Standard</b></p> <ul style="list-style-type: none"> <li>• IEEE 802.3-2005</li> <li>• IEEE 802.3ad (Link aggregation)</li> <li>• IEEE 802.1p (Prioritization)</li> <li>• IEEE 802.1Q (VLAN tagging)</li> <li>• IEEE 802.1Q (Spanning Tree Protocol)</li> <li>• IEEE 802.1Q-2005 (MSTP)</li> </ul> <p><b>SMSH Switch Management Shell</b></p> <ul style="list-style-type: none"> <li>• Configuration Save / Load / Control</li> </ul> <p><b>Ports Settings</b></p> <ul style="list-style-type: none"> <li>• Set/Get port Mode</li> <li>• BMC Port lookup</li> <li>• SFP polling</li> <li>• IPV6</li> </ul> <p><b>MAC Settings</b></p> <ul style="list-style-type: none"> <li>• MAC table / Dynamic MAC address learning</li> </ul> <p><b>L2 Switching</b></p> <ul style="list-style-type: none"> <li>• Multicast/Multicast Forwarding</li> <li>• Strom control</li> <li>• Priority</li> <li>• Mirroring</li> <li>• Uplink Filter</li> <li>• Link Aggregation</li> <li>• Distribution function</li> </ul> <p><b>VLAN</b></p> <ul style="list-style-type: none"> <li>• VLAN management, learning, statistics, etc..</li> </ul>	<p><b>Multicast Snooping</b></p> <ul style="list-style-type: none"> <li>• Multicast Snooping / Multicast Snooping Groups</li> </ul> <p><b>RST Control</b></p> <ul style="list-style-type: none"> <li>• Set/Get RSTP / RSTP Port</li> </ul> <p><b>QoS</b></p> <ul style="list-style-type: none"> <li>• Priority Mapping</li> <li>• Early Drop Threshold at Ingress/Egress</li> <li>• Priority Pause</li> <li>• Port OQ Arbitration / Classification</li> <li>• Port OQ DRR Quantum</li> <li>• Port Ingress BW</li> <li>• Strom control</li> </ul> <p><b>Diagnostics</b></p> <ul style="list-style-type: none"> <li>• Port Loopback / Port PRBS</li> </ul> <p><b>L3 Switching</b></p> <ul style="list-style-type: none"> <li>• Host addressing</li> <li>• L3 / L3 Multicast routing</li> <li>• VRRP</li> <li>• L3 Static Multicast</li> <li>• DHCP</li> </ul> <p><b>QinQ</b></p> <ul style="list-style-type: none"> <li>• CVLAN</li> </ul> <p><b>UFD</b></p> <ul style="list-style-type: none"> <li>• Uplink Failure Detect Groups</li> </ul> <p><b>ACL</b></p> <ul style="list-style-type: none"> <li>• ACL / ACL UDF Location</li> </ul>
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# JTAG and Virtual Probe

FPGA development and debug are performed via JTAG serial link between the FPGA module and the programming PC. When multiple FPGA modules are used in a chassis, the developer normally has to physically change the serial cable connections.

In order to facilitate development and debug, as well as providing unprecedented flexibility and advance capability in deployed systems, VadaTech has introduced a JTAG Switch Module (JSM) in VPX.

***With the JSM, the operator can access any of the FPGA modules installed in the chassis from a single physical connector. Additional Virtual Probe function allows the operator to access the JTAG functions over Ethernet for remote programming and debug.***

The combination of the JSM and virtual probe saves developers both time and money.

The JSM is embedded in VadaTech 1U chassis and available in dedicated 3U and 6U VPX modules, together with switch and/or health management functions.



VadaTech VTX980 6U VPX Health Manager w. JSM feature (left) and its JSM to Xilinx or Altera/Intel FPGA JTAG header adapter (right)

The adapter shown above is not necessary when Virtual probe is used. With Virtual Probe, the network connection is used in place of the traditional serial link.

# 1U Rack Mount Chassis Product Line

OpenVPX can offer from 1 slot to 14 slots in a 19" rack mount chassis. Each slot is designed for either 3U or 6U VPX modules leading to heights of 8U to 11U when the slots are vertical. When the number of slots needed in the application is limited, using a horizontal slot orientation reduces the size significantly.

*"The unique addition of embedded switching, clocking and monitoring functions in the crate provides the end-user with unprecedented density, leaving the payload slots available for essential functions specific to the end-application."*



Innovative 1U VPX chassis w/ data and JTAG switching, clocking and monitoring embedded functions

The VTX955 is a 1U rack mount for dual 3U OpenVPX payloads and rear transition modules.

Differentiation / Innovation:

- Embedded Layer 2 switch w/ dual front IO and routing to the payload control ports (supports 802.1D Spanning Tree Protocol, 802.1W Rapid Spanning Tree, 802.1s Multiple VLAN Spanning Tree, programmable per-port VLAN configurations, 802.1Q, etc)
- Internal clock routing w/ optional embedded GPS for internal frequency generation, front panel clock IO and support for IEEE1588v2.
- Integrated health management with Tier Two support for intelligent monitoring, control and alarm reports
- Embedded JTAG switch module to access any of the FPGA installed in the payload slots from a single physical connector. The additional Virtual JTAG (JTAG over Ethernet) capability allows, in addition, remote programming and debugging which eases FPGA Code development
- Optional support for both convection-cooled or conduction cooled modules

# Integrated Intel Skylake-D w/ NVMe storage

A majority of the applications rely not only on FPGA processing but also use Intel processing capability for computing of control, interface and post-processing functions.

***“In order to reduce the size even further, VadaTech offers the VTX950 integrated Skylake-D Intel CPU 16 cores @2.2MHz with high speed data communication links to both 3U VPX slots.”***

An additional removable embedded 1TB NVMe module provides high speed storage capability. This comes on top of all the features already present in the VTX955 and leaves the two 3U OpenVPX slots available for data acquisition, FPGA processing, serial control interface and other functions.

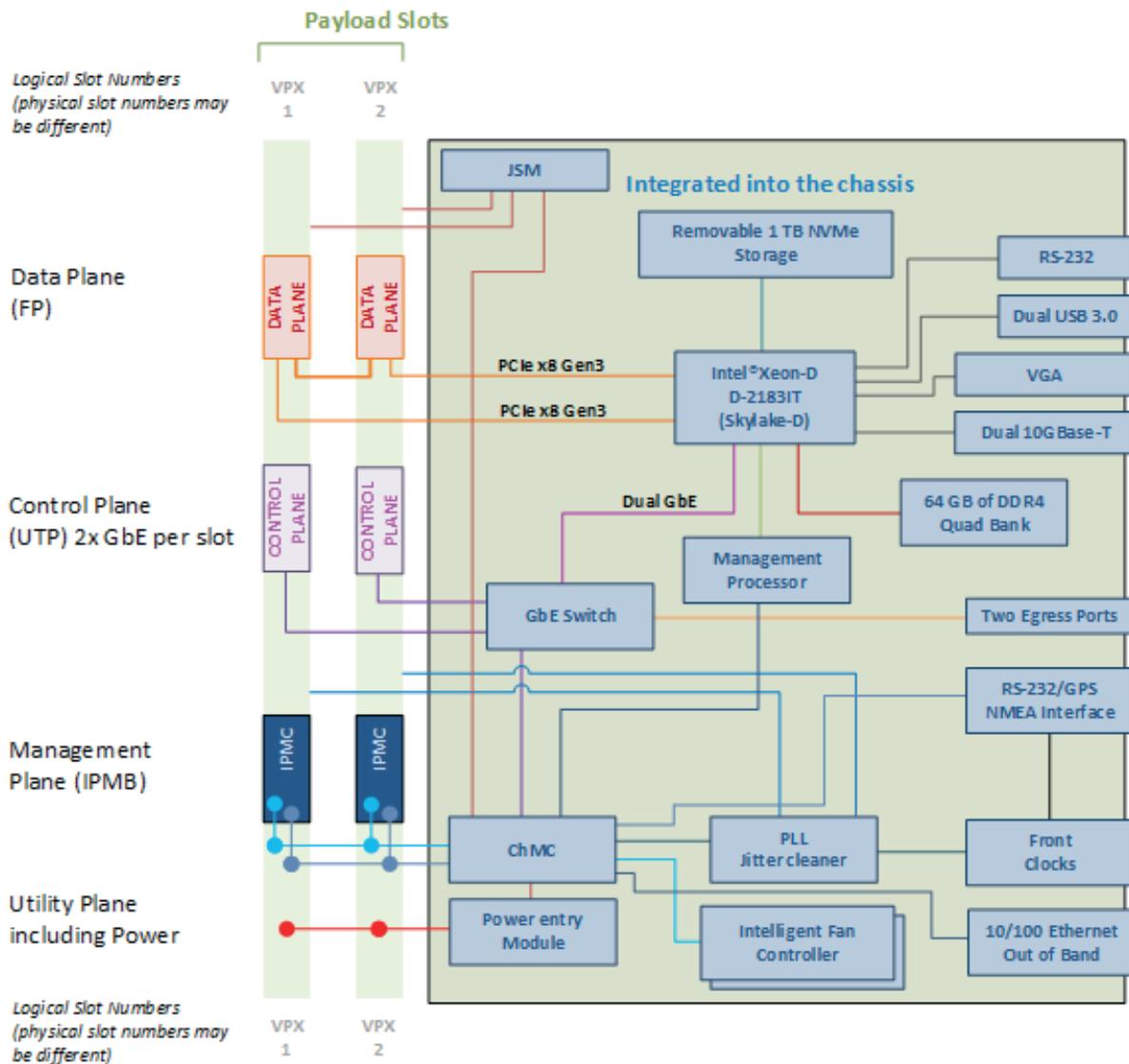
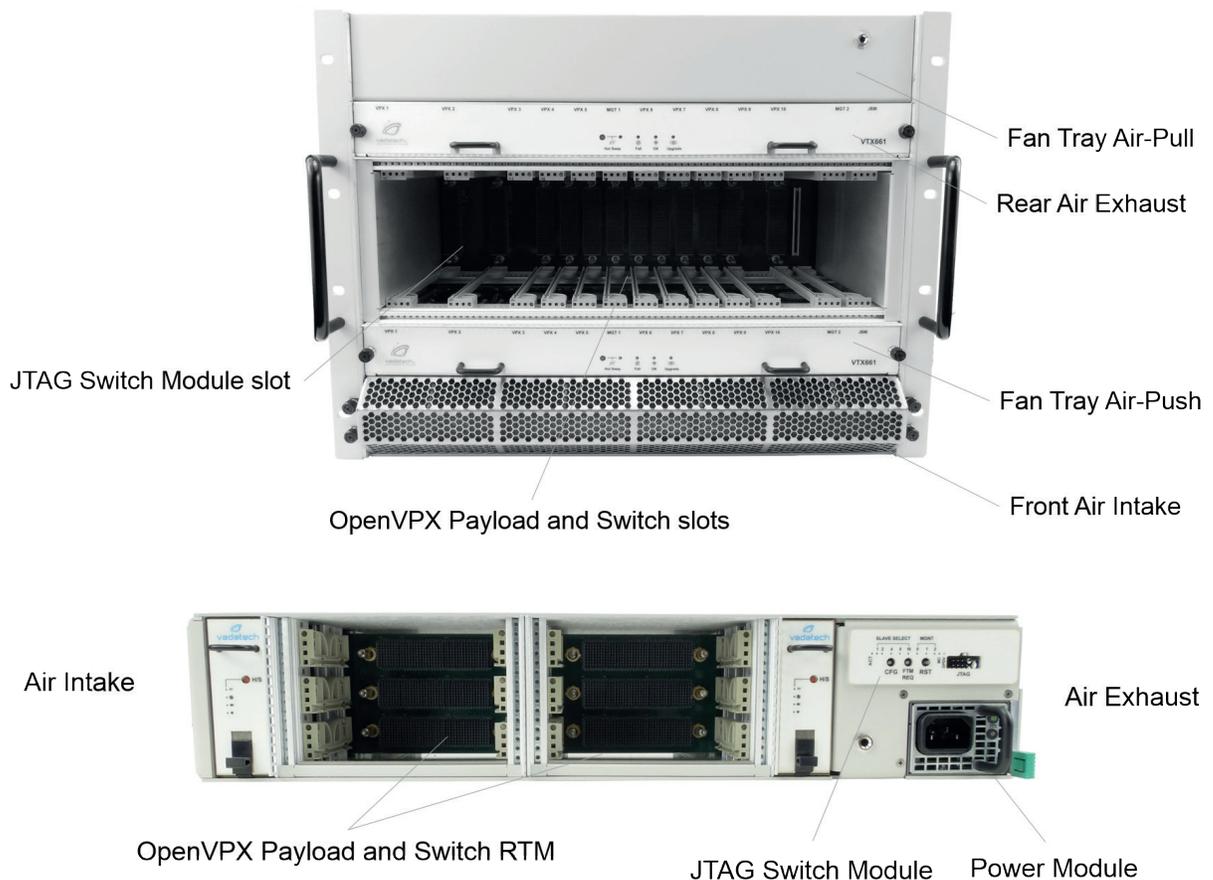


Diagram of 1U VPX chassis w/ embedded Intel CPU processing and NVMe removable storage

# Air-cooled Rack Mount Chassis Product Line

The current VITA ecosystem offers different levels of ruggedization both in air-cooled and conduction-cooled. Air-cooled products ordering options allows integrators to select among two classes of operating/storage temperature range. Conduction-cooled design techniques are not always necessary neither during development nor for the deployed system so off-the-shelf air-cooled chassis offerings accelerate customers development time and lower their cost.

*VadaTech have merged the main commercial PICMG market design features into VPX standard designs to introduce a VPX Product line which meets the need of mil-centric customers, but also has enhanced features leveraged from the telecommunication market that were not previously present in VPX product offerings within the market.*

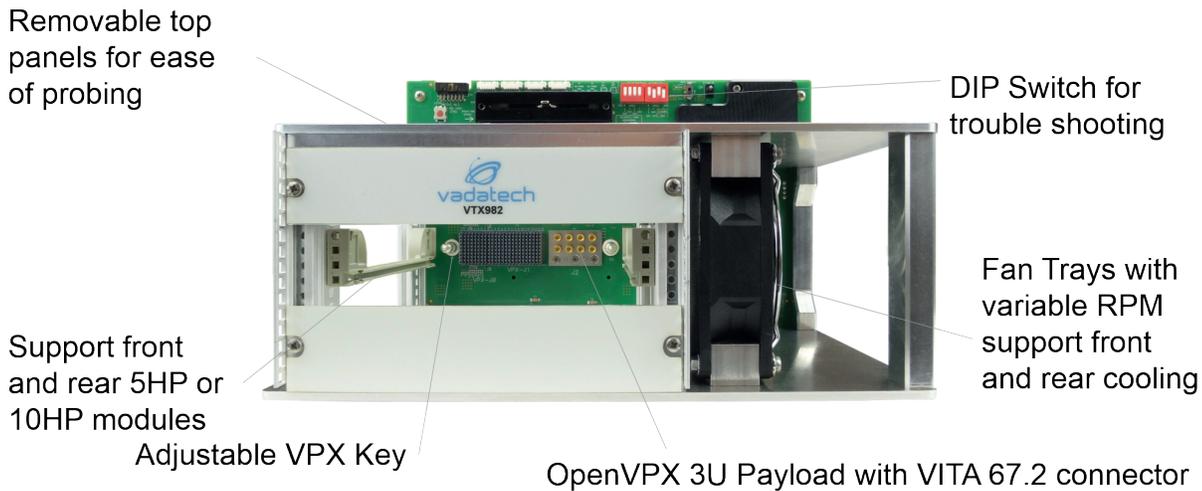


Front View of VTX661 12x 3U OpenVPX (top) and Rear View of VTX881 2U 6 slots (bottom)

# Benchtop Development Chassis Product Line

In development of a system based on VPX and OpenVPX, the chassis backplane is often custom in nature and is associated with a long development lead time. To support end users who do not have existing lab chassis to support the development or prototyping phase, VadaTech offers a line of benchtop chassis.

*This line of benchtop development chassis allows the integrators to develop on and test a 3U or 6U OpenVPX module in a safe environment including cooling, power, connectivity and accessibility for debug.*



Front View of VTX982 for 3U OpenVPX (top) and  
ISO View of VTX990 for 6 OpenVPX (bottom)

# Conduction Cooled ATR and MIL-STD Power Modules

Integrators will select conduction-cooled over convection-cooled where extreme environmental conditions are required in terms of temperature, shock, vibration, corrosion and EMC.

*VadaTech leverages rugged design techniques acquired during PICMG MTCA.3-based projects to support conduction-cooled versions of its OpenVPX 3U and 6U product line and supports ATR designs for the extreme rugged requirements in avionics, naval, and ground vehicles applications.*

The ATR or chassis cover panels can accommodate MIL 38999 connectors.



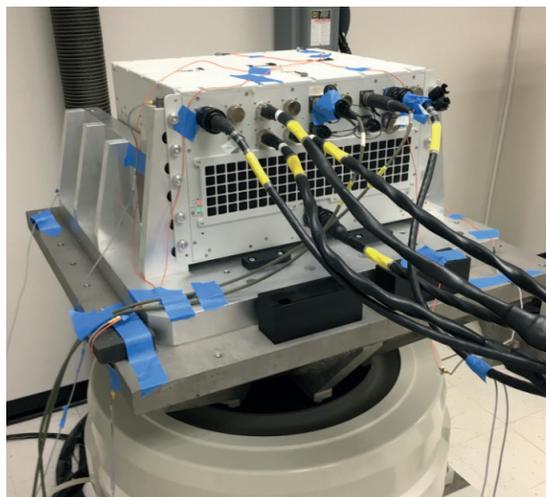
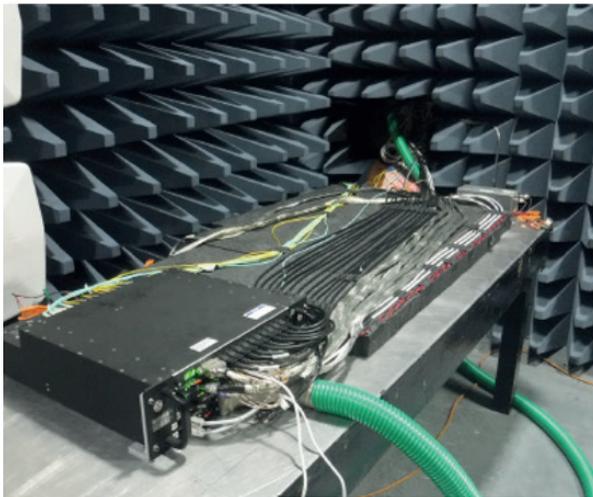
Integrators benefit from VadaTech support for both AC and DC power modules in 3U and 6U with full certification for:

- MIL-STD-810G Environmental Engineering Considerations and Lab Tests
- MIL-STD-704F Aircraft Electrical Power Characteristics
- MIL-STD-461G Electromagnetic Compatibility (EMC)
- MIL-STD-1275E Characteristics of the 28 VDC Electrical Power
- RTCA/DO160G Environmental Conditions and Test Procedures for testing airborne equipment

# Environmental Qualification

Customers trust the VadaTech team for its expertise and support during environmental qualification.

Thermal and structural analysis tools, power and Signal Integrity simulation software, as well as advanced RF test equipment, extend VadaTech's design reach to meet MIL-STD compliance. In addition, the VadaTech team supports laboratories qualification tests and reports for vibration, shock, humidity, altitude, temperature, rapid decompression and EMC/EMI.



# Quality Certifications

VadaTech is certified AS9100 MIL AERO quality management systems and has in-house certification for IPC610 acceptability of electronic assembly, in-house certification for IPC620 acceptability of cable harness and wire assembly and in-house certification for IPC J-STD-001 F manufacturing and soldering process for electronics



VadaTech is a Member of the VITA organization.

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