Including **Daily Briefing:** *News Snippets*

MIL/COTS DIGEST **Supplement inside**

Military EMBEDDED SYSTEMS

VOLUME 6 NUMBER 6
SEPTEMBER 2010

INCLUDING:

MIL-EMBEDDED.COM

ANNUAL RESOURCE GUIDE

Tactical data links – COTS or not?

Also:

Executive interview: GE's Rob McKeel on tomorrow's tech

Innovation sets us apart

Avionics Databus Test, Simulation & Embedded Solutions

Lightweight, small, rugged, reliable, feature rich and cost-effective. These are only a few of the benefits of the new AB2000 series of Avionics BusBoxes® from Ballard Technology. They deliver outstanding avionics performance with multi-protocol and flexible expansion capabilities. Conductively cooled, the AB2000 is ideal for rugged avionics applications such as serving and recording data, converting protocols and providing federated control. Find out today how AB2000 innovation can work for you.

The AB2000 offers multi-protocols in a single, lightweight rugged format.

ARINC 429
MIL-STD-1553
Ethernet
RS232/422
Digital I/O
USB

Innovation for your success

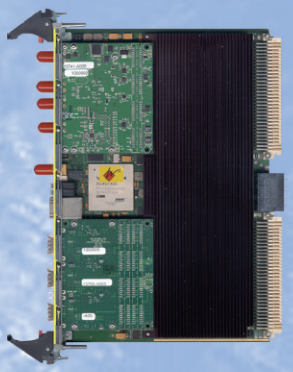
For more information call 425.339.0281 or visit us at www.ballardtech.com

Ballard TECHNOLOGY

Annapolis Micro Systems

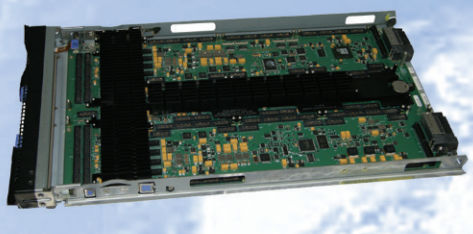
The FPGA Systems Performance Leader

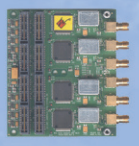
High Performance Signal and Data Processing in Scalable FPGA Computing Fabric

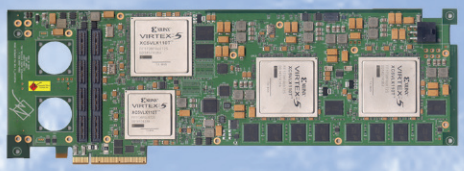


GEOINT, Ground Stations, SDR, Radar, Sigint, COMINT, ELINT, DSP, Network Analysis, Encryption, Image Processing, Pattern Matching, Oil & Gas Exploration, Financial Algorithms, Genomic Algorithms

Direct Seamless Connections with no Data Reduction
Between External Sensors and FPGAs
Between FPGAs and Processors over IB or 10GE
Between FPGAs and Standard Output Modules
Between FPGAs and Storage Arrays







Annapolis Micro Systems

Ultimate Modularity
From 1 to 8 Virtex 4, 5 or 6 FPGA/Memory Modules
Input/Output Modules Include:
Quad 130 MSPS thru Quad 550 MSPS A/D
1.5 GSps thru 5.0 GSps A/D, Quad 600 MSps D/A,
Dual 1.5 GSps thru 4.0 GSps D/A
Infiniband, 10G, 40G or 100G Ethernet or SFPDP

VME/VXS/VPX, IBM Blade, PCI-X/PCI Express, PMC/XMC, MicroTCA

No Other FPGA Board Vendor Streams This Volume of Data Real Time Straight Into the Heart of the Processing Elements and Then Straight Back Out Again

190 Admiral Cochrane Drive, Suite 130, Annapolis, Maryland USA 21401
wfinfo@annapmicro.com USA (410) 841-2514 www.annapmicro.com

Military EMBEDDED SYSTEMS

September 2010 Volume 6 Number 6

COLUMNS

DEPARTMENTS

ON THE COVER:

During WWII, electronic communications gear, though primitive by today's standards, changed the tempo of war from the hand-crank phones of the first world war. In this Resource Guide issue of *Military Embedded Systems*, we look at COTS versions of the venerable Link 16 TDL (page 24), precision timing over Ethernet (page 18), and DSP-based media gateways (page 34).

(In the vintage photo, Radio Operator, Cpl John Robbins, 41st Signal, 41st Inf. Div, operates his SCR 188 in a sandbagged hut in New Guinea on 9 May 1943. Photo courtesy of T/4 Harold Newman.)

Published by: OpenSystems media

ISSN: Print 1557-3222

RESOURCE GUIDE

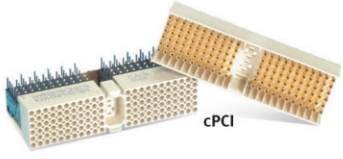
NEW LEVELS OF INTERCONNECT RELIABILITY

For lengthy space missions tasked with discovering the effects of atmospheric phenomena on vital communication transmissions and data gathering, it's critical that equipment be long lasting and impervious to damaging effects. Hypertronics interconnect solutions featuring the Hypertac® hyperboloid contact technology offer the reliability and dependability that are required in making space discovery possible. Hypertronics is the choice of engineers worldwide for mission critical systems.

Hypertac Features	Benefits
Low Insertion/Extraction Forces	High Density Interconnect Systems
Long Contact Life	Low Cost of Ownership
Lower Contact Resistance	Low Power Consumption
Higher Current Ratings	Maximum Contact Performance
Shock and Vibration Immunity	Reliability Under Harsh Conditions

Maintain your system integrity with Hypertronics reliable connectors and dependable solutions.

www.hypertronics.com/discover



HYPERTRONICS: WHEN FAILURE IS NOT AN OPTION

smiths
bringing technology to life

ADVERTISER INFORMATION

Page	Advertiser/Ad title
8	**ACCES I/O Products, Inc.** – USB embedded I/O solutions
29	**AdaCore Technologies** – Safety, security, reliability
3	**Annapolis Micro Systems, Inc.** – High performance signal and data processing
2 MCD	**Annapolis Micro Systems, Inc.** – High performance signal and data processing
2	**Ballard Technology** – Innovation sets us apart
26	**CoreSolid Storage Solutions** – XDOM mini PCI Express DiskOnModule
27	**Curtiss-Wright Controls Electronic Systems** – Rugged deployed enclosures
116	**Curtiss-Wright Controls Embedded Computing** – Speed your time to market
21	**D-TA Systems** – 10 Gigabit sensor processing
36	**ELMA Electronic** – VPX: Admire the collection
17 MCD	**ELMA Electronic** – VPX: Admire the collection
9	**Elma Electronic – Systems** – Embedded storage for secure data
33	**Excalibur Systems, Inc.** – Dense?
23 MCD	**Excalibur Systems, Inc.** – Dense?
112	**Extreme Engineering Solutions** – Intel Core i7 processor solutions
115	**GE Intelligent Platforms, Inc.** – You can only target what you can track
38	**General Micro Systems, Inc.** – Powering our troops
35	**Hartmann Elektronik** – VME backplanes from the experts
5	**Hypertronics** – Discover
3 MCD	**Hypertronics** – Discover
20	**Interface Concept** – Switches and IP routers
15 MCD	**Interface Concept** – Switches and IP routers
24 MCD	**Kontron** – How can I reduce my time-to-deployment?
75	**LiPPERT Embedded Computers** – Mission critical embedded computing
28	**LynuxWorks, Inc.** – We won't leave you high and dry
73	**Microhard Systems, Inc.** – Wireless innovation
19 MCD	**Nallatech** – FPGA accelerated computing
15	**North Atlantic Industries** – Multifunction I/O boards
37	**Parvus Corporation** – Qualified to perform
13	**Pentek, Inc.** – Stroke of genius
9 MCD	**Pentek, Inc.** – Stroke of genius
45	**Phoenix International** – RPC12 ruggedized 3U Fibre Channel RAID system
12 MCD	**Phoenix International** – VC1-250-SSD
31	**RadiSys Corporation** – The future of mobile command and control
COVER	**RadiSys Corporation** – ATCA in defense applications
32	**Rakon** – Acceleration tolerant TCXOs and TCVCXOs
11 MCD	**Schroff, a brand of Pentair Electronic Packaging** – Schroff understands the demands
23	**Sealevel Systems, Inc.** – Rugged connectivity deploys incredible power
108 TAB	**SYSGO AG** – Software/Middleware
45	**TEWS Technologies LLC** – COTS I/O solutions
12 MCD	**TEWS Technologies LLC** – COTS I/O solutions
14	**Themis Computer** – New rugged servers have speed to burn
19	**Trident Space & Defense** – Proteus Series SSDs
37	**Tri-M Systems Inc.** – PC/104 Can-Tainer
113	**Tri-M Systems Inc.** – 100Mhz PC/104 module
94	**Vector Electronics & Technology, Inc.** – VME/cPCI ruggedized chassis
22 MCD	**Vector Electronics & Technology, Inc.** – VME and cPCI system packaging
25	**VersaLogic Corp.** – The Leopard moves fast!
10	**White Electronic Designs/Microsemi** – Guardian, defender of data
7	**Wind River Aerospace & Defense Division** – Mission critical
93	**WinSystems, Inc.** – PC/104 analog I/O modules
22	**Wolf Industrial Systems, Inc.** – On the prowl
21 MCD	**Wolf Industrial Systems, Inc.** – Aggressive? You bet!
111	**Z Microsystems, Inc.** – Rugged rack mounted servers

OpenSystems media

Military EMBEDDED SYSTEMS

DSP-FPGA.com · VME and Critical Systems · PC/104 and small form factors THE JOURNAL of MODULAR EMBEDDED DESIGN · INDUSTRIAL EMBEDDED SYSTEMS · CompactPCI Advanced & Micro TCA SYSTEMS · Embedded COMPUTING DESIGN

Military & Aerospace Group

Chris Ciufo, Group Editorial Director
cciufo@opensystemsmedia.com

Sharon Hess, Assistant Managing Editor
sharon_hess@opensystemsmedia.com

Jennifer Hesse, Assistant Managing Editor
jhesse@opensystemsmedia.com

Terri Thorson, Senior Editor (columns)
tthorson@opensystemsmedia.com

Monique DeVoe, Web Content Editor
mdevoe@opensystemsmedia.com

Christine Capuano, Web/Editorial Assistant

Hermann Strass, European Representative
hstrass@opensystemsmedia.com

Konrad Witte, Senior Web Developer

Steph Sweet, Creative Director

Joann Toth, Senior Designer

David Diomede, Art Director

Phyllis Thompson
Circulation/Office Manager
subscriptions@opensystemsmedia.com

Sales Group

Dennis Doyle, Senior Account Manager
ddoyle@opensystemsmedia.com

Tom Varcie, Senior Account Manager
tvarcie@opensystemsmedia.com

Rebecca Barker, Strategic Account Manager
rbarker@opensystemsmedia.com

Bridget Hildebrand
Strategic Account Manager
bhildebrand@opensystemsmedia.com

Christine Long, Digital Content Manager
clong@opensystemsmedia.com

International Sales
Dan Aronovic, Account Manager – Israel
daronovic@opensystemsmedia.com

Elvi Lee, Account Manager – Asia
elvi@aceforum.com.tw

Regional Sales Managers
Barbara Quinlan, Midwest/Southwest
bquinlan@opensystemsmedia.com

Denis Seger, Southern California
dseger@opensystemsmedia.com

Sydele Starr, Northern California
sstarr@opensystemsmedia.com

Ron Taylor, East Coast/Mid Atlantic
rtaylor@opensystemsmedia.com

Ad Coordinator
Steph Sweet
ssweet@opensystemsmedia.com

Reprints and PDFs

Nan Holliday
800-259-0470
republish@opensystemsmedia.com

Editorial/Business Office

16626 E. Avenue of the Fountains, Ste. 203
Fountain Hills, AZ 85268
Tel: 480-967-5581 ■ Fax: 480-837-6466
Website: www.opensystemsmedia.com

Publishers: John Black, Michael Hopper, Wayne Kristoff

Vice President Editorial: Rosemary Kristoff

Vice President Marketing & Sales:
Patrick Hopper
phopper@opensystemsmedia.com

Business Manager: Karen Layman

Mission Critical

Make the Dreamliner a reality

Breakthrough dependability

Boeing 787 Dreamliner
The Wind River VxWorks platform proved instrumental in the development of the Boeing 787 Dreamliner—history's fastest selling wide-body aircraft.

Wind River embedded systems deliver the cutting-edge reliability and performance that fuel innovation.

Boeing's 787 Dreamliner is taking flight with an innovative integrated modular avionics (IMA)-based Common Core System (CCS) developed by GE Aviation and enabled by Wind River.

Our industry-leading VxWorks 653 partitioning operating system is the foundation for GE's CCS, which serves as the Dreamliner's central nervous system by infallibly orchestrating the operation of over 70 applications supplied by over 15 Boeing suppliers.

VxWorks enables the asynchronous integration of multiple suppliers and allows for applications of different RTCA DO-178B safety criticality levels to reliably run on a single shared computer platform.

It's the kind of cutting-edge dependability and proven performance that's made Wind River a trusted leading provider of advanced embedded solutions for aerospace and defense.

Take your innovation to new heights. Contact us today for our Mission Critical Toolkit, now available for a limited time at www.windriver.com/missioncritical/safety.

WIND RIVER

Field Intelligence

DSP libraries boost Intel's Core i7 performance

By Duncan Young

An insatiable demand for more performance continues to drive technology and market growth in all forms of image and video processing for simulation, visualization, gaming, modeling, manufacturing, and medical applications. Military and security applications, typified by urban and guerrilla warfare, require higher resolutions, better image enhancement, and faster threat analysis and results dissemination, specifically from ground-based and airborne electro-optical sensor systems. In addition, there is a demand for continuous performance growth for military sensor systems such as radar, sonar, all forms of signals intelligence, software radio, and multisensor fusion. These applications all require optimal floating-point processing capability, often packaged to meet the most demanding Size, Weight, and Power (SWaP) criteria.

Integrated vector processor

Freescale Semiconductor's AltiVec broke new ground in the late 1990s for embedded developers by offering floating-point performance comparable to, if not better than, dedicated DSP engines but with the ease-of-use, performance, and development support of general-purpose Power Architecture processor devices. Recently, Freescale Semiconductor's 8641D/8640D dual-core devices have become almost *de facto* standards for complex, multicomputing military sensor-processing systems.

Those advantages, pioneered by Freescale Semiconductor, have focused attention on Intel's latest multicore embeddable processors with Streaming SIMD Extensions (SSE) for many sensor-development projects. SSE, also adopted by AMD, provides an equivalent level of functionality to AltiVec, with 128-bit vector processing capability integrated into a number of processor families, such as Intel's Core 2 Duo and Core i7 (Arrandale). Core i7 has dual cores running at up to 2.53 GHz, each with its own SSE, L1 data and instruction caches, plus a combined L2 cache. The L3 cache with its DDR2/3 memory interface is common to both cores. SSE provides sixteen 128-bit XMM registers and a rich instruction set extension to manipulate floating-point vectors and packed floating-point operands, plus many logical and functional instructions such as directing cache operation. Support for multithreading optimizes the use of XMM register and cache resources.

Renewed market commitment

Military projects are characterized by long gestation periods. Once a capability or technology has been proven, it can have a long "shelf" life prior to a rapid deployment cycle to meet an urgent operational need to counter a particular new threat. COTS embedded computing vendors recognize this by offering compatibility and software migration road maps for their products over many generations. A renewed commitment by Intel to this COTS market model for longevity of supply and ease of migration through successive generations is already ensuring that SSE gains a significant market share of new sensor-systems development.

DSP function libraries

In practical terms, military sensor systems such as radar and signals intelligence, whichever vendor is used, will continue to employ multiple computing nodes interconnected by high-speed fabrics to achieve the DSP performance needed. These will have complex system architectures for data flow and processing throughput that must be supported during development with visualization and modeling tools and DSP function libraries, plus system-level profiling and debugging tools. Typical of these is GE Intelligent Platforms' AXIS multicomputing development environment, recently enhanced with the open standard Vector Signal Image Processing Library (VSIPL) Core 1.0 compliant libraries for SSE version 3 and upwards. The library offers more than 600 DSP functions called from a common Application Programming Interface (API) with both an instrumented, development version and an optimized, deployable version for Intel-based SBCs such as the rugged VMEbus VR12 depicted in Figure 1.

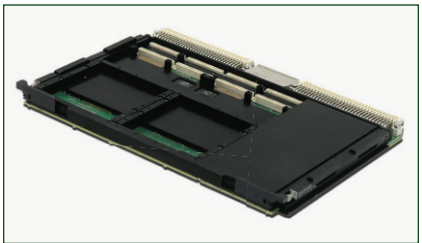
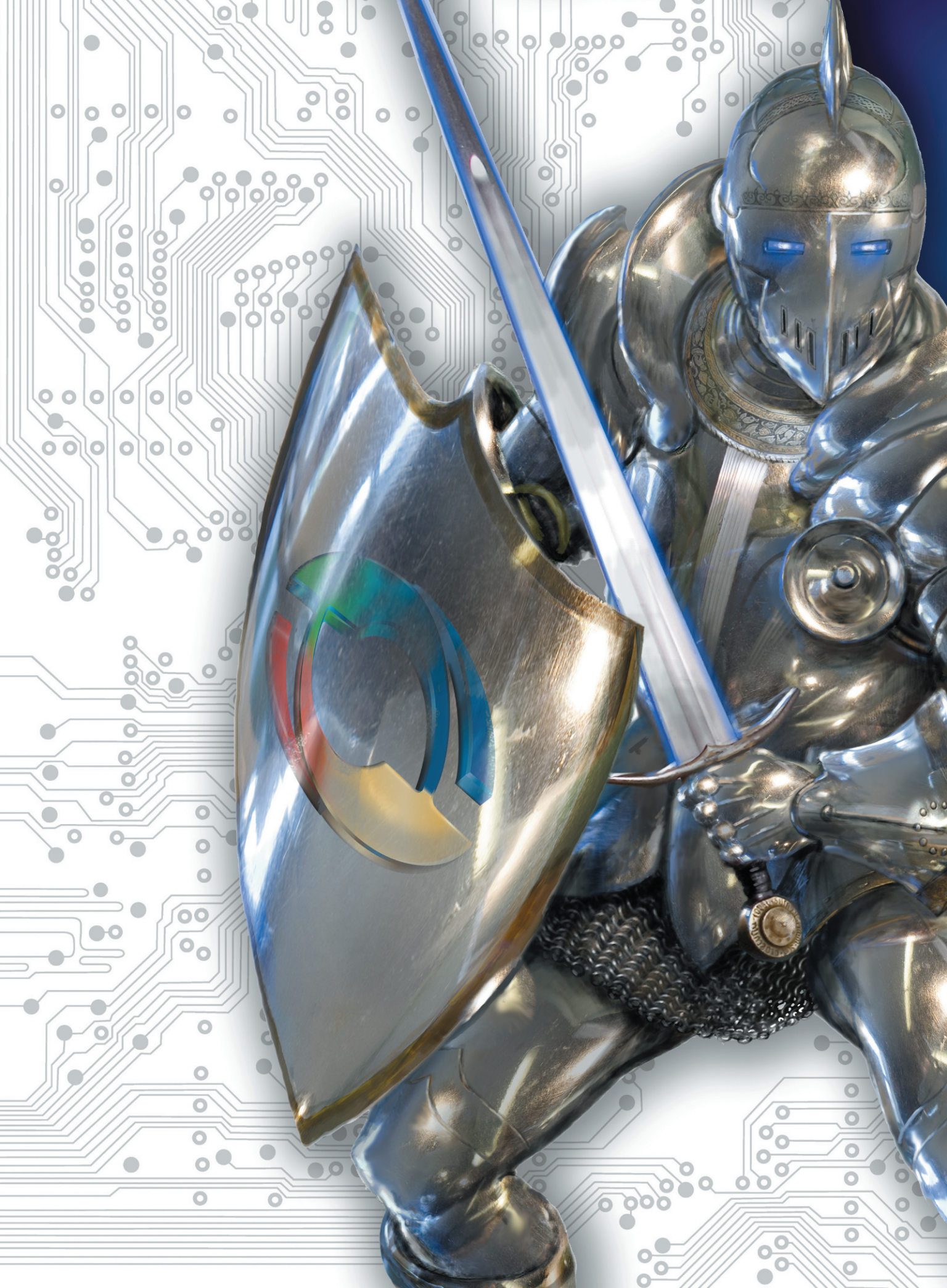


Figure 1 | The VR12 Core i7-based SBC from GE Intelligent Platforms

No longer overshadowed by the high volumes of fixed-point applications in digital and mobile telephony, floating-point DSP has moved back to center stage. Imaging and video processing are major growth opportunities, serving the needs of much broader markets. The successor to SSE has already been announced. Advanced Vector Extensions (AVX) will be available on Intel's Sandy Bridge multicore processor family and beyond, providing 256-bit SIMD processing. By packing two floating-point vectors into each register, big performance gains over SSE are anticipated, and optimized VSIPL support for AVX will play a large part in achieving these goals. SSE combined with AVX is but one architectural direction designers can adopt for image processing. Companies such as GE Intelligent Platforms have also integrated math libraries within their multicomputing development environments for the 100+ stream processors of CUDA-capable General Purpose Graphics Processor Units (GPGPUs) to round out a wealth of support for new DSP development projects.

To learn more, e-mail Duncan at duncan_young1@sky.com.



GUARDIAN™
DEFENDER OF DATA

Your data is under attack.
Help is here.

The new **GUARDIAN**™ solid state drive protects sensitive data from environmental and human threats. Engineered specifically for defense applications, this 2.5" SATA drive with SLC NAND flash transcends limitations inherent in the memory media. Manufactured and designed in our secure, trusted U.S. facility, the **GUARDIAN** provides unparalleled drive performance where data integrity, security and extended environment performance are mission requirements.

Features:

- 50 or 100 GB densities
- Hardware-implemented AES-256 encryption
- Tamper resistant features available
- SnapPurge™ renders data irrecoverable in milliseconds
- Fast clear erases all blocks in seconds
- Hardware-based authentication
- Uncorrectable bit error rate of one sector per 10^{30} bits read
- MTBF greater than 2,000,000 hours
- Military and government agency sanitization protocols
- Built-In-Self-Test (BIST)
- Power interruption protection with over and under voltage detection and protection
- No super caps or batteries
- Self-monitoring analysis and reporting technology
- Industrial temperature operation with extended shock and vibration durability

Join the ranks of the Defenders of Data.
Learn more at **www.whiteedc.com/guardian**
or call **888-SSD-4-MIL.**

602-437-1520 TEL | 602-437-9120 FAX

Microsemi

Securing the Future Through the Power of Design

WWW.WHITEEDC.COM

Mil Tech Insider

Taking video display/distribution further: Getting to 360° situational awareness

By Steve Edwards

The High Definition (HD) video commercial market has increased the number of camera and sensor types and the resolution of flat-panel displays. In turn, this has motivated designers of video distribution systems for military ground vehicles to seek ways to deliver 360° Situational Awareness Systems (360° SASs) while respecting the Size, Weight, and Power (SWaP) limitations of existing ground-vehicle platforms.

360° SAS increases safety, efficiency

360° SAS will enable crew members to safely "see" outside the vehicle regardless of external environmental conditions. It enables multiple viewpoints to be extracted from different sensors and enhanced with sophisticated recognition technology to support tracking, identification, classification, and target alerts to minimize the user workload and speed operational responsiveness.

From thumbnails to HD panorama

Today's ground vehicles typically have up to six video cameras from which the operator must manually select a primary input. The remaining video channels are represented with low-resolution thumbnail screens in a tiled or picture-in-picture format. True 360° SAS replaces this approach with a single panoramic high-resolution video image that can be panned horizontally and vertically in a natural fashion. 360° SAS adapts to the natural way that human operators view a scene and enhances that view with video fusion technology, overlaying a variety of sensor types on top of the visible light display (such as infrared and low-light cameras) to optimize the visual data being displayed.

Today's video systems typically use cameras generating relatively low-resolution images at 640 x 480 or 1,024 x 768 pixels, compared with the 1,920 x 1,080 pixels of HD video. When the number of cameras and sensors needs to grow from a simple 2 or 3 up to 8 or 16, viewing and selecting channels from small thumbnail views quickly becomes impractical.

Using COTS to get to 360°

Seamless pan-and-tilt, panoramic displays require large amounts of compute processing, which today's ground vehicles lack, to correctly register the image streams together. Fortunately, the emergence of small form factor, high-bandwidth, open standard-based COTS boards such as Curtiss-Wright Controls Embedded Computing's (CWCEC's) 3U VPX SBCs and the XMC-280 (Figure 1) video compression mezzanine cards can deliver much-needed multiprocessor compute power; they also provide the ability to distribute multiple channels of uncompressed high-definition video over VPX's 32 Gbps switching fabric and XMC's PCI Express mezzanine multilane data bus. Combined with a video distribution and archival system, such as CWCEC's Sentric 2 software suite, powerful modular systems can be built to meet the demanding requirements of a 360° SAS.

Another powerful component of 360° SAS is video fusion. Vendors today are developing algorithmic solutions for automatic motion detection to alert an operator when an activity of interest is captured by a camera. Video fusion going forward promises to mix technologies such as night vision, passive systems such as long-wave infrared, range laser-based systems, acoustic detection, and passive millimeter wave radar capable of penetrating through sand, fog, and dust. In order of increasing complexity and processing requirements, the fusion tasks include movement detection, image tracking, and object recognition. Object recognition is the most complex because it typically requires databases of image types, and the object in question must be filtered from the background.

The most significant practical challenge to bringing 360° SAS to ground vehicles today is the limited available space and the existing thermal envelope. In the short term, many of the components of 360° SAS can be achieved using COTS card-based products that vendors offer today. They can effectively bridge the divide between HD video and the quantity of data that can realistically be distributed over Ethernet.

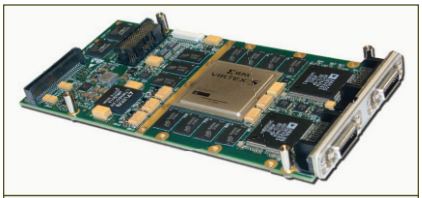


Figure 1 | The XMC-280 multichannel HD video compression card from CWCEC

Bandwidth is key

As the number of sensors and displays rises and the move to HD video accelerates, the bandwidth available from today's Ethernet networks quickly becomes overwhelmed. In the consumer world and broadcast industry, standards such as 3G-SDI (SMPTE 424M) – providing 3 Gbps of serial digital video transmission over ordinary coaxial cable – are making the expectation of HD commonplace. Gigabit Ethernet (GbE) is unable to handle bandwidth beyond standard definition video unless it is compressed. Video compression helps, typically allowing eight channels of full HD video to be sent over a single GbE connection. Latency can cause unacceptable delays for real-time video distribution between targets on the battlefield and their display on screen; 100 ms of latency for a vehicle traveling 60 mph can impose a 10-foot disparity between the actual and displayed location.

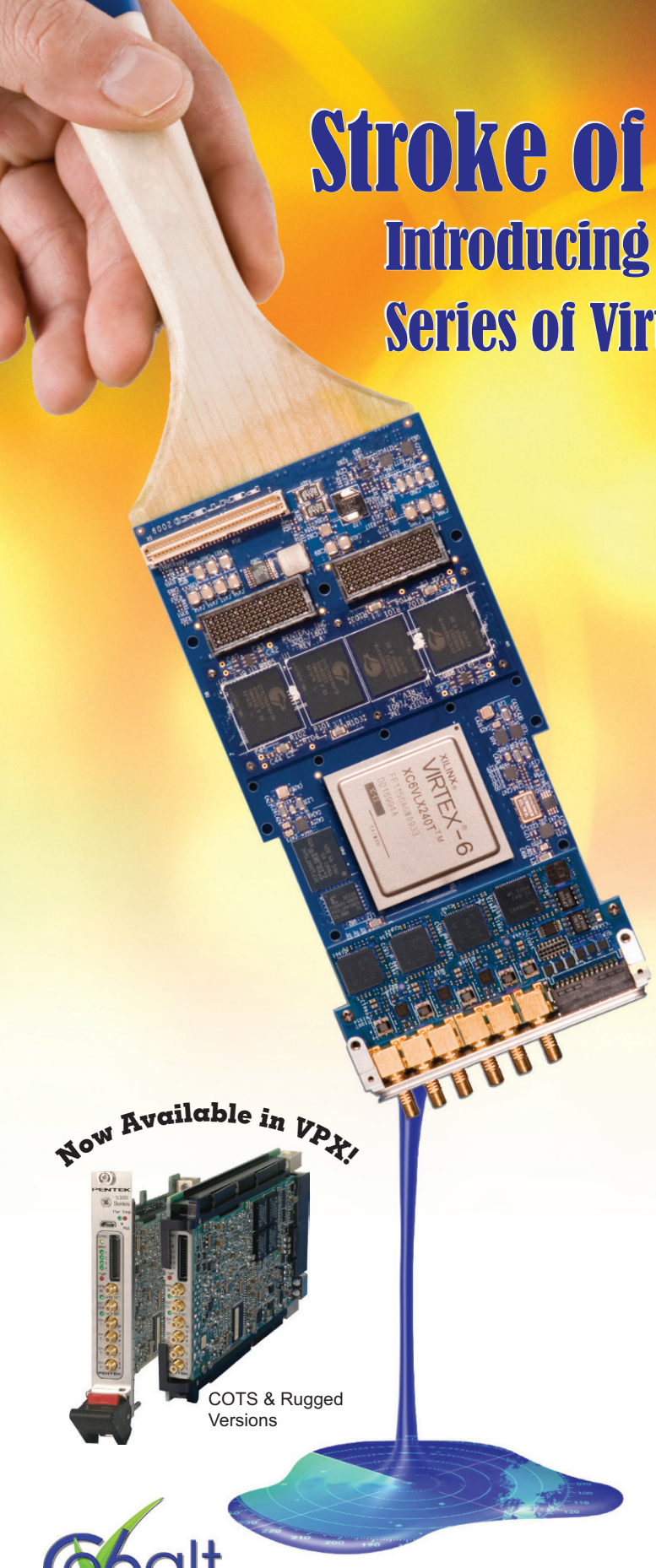
Today's standards and products are a start

Today system designers have to make compromises and trade-offs because legacy networks and processors are unable to deliver the ideal video and sensor functionality and performance. However, the use of current HD video acquisition and compression COTS products, combined with increasingly powerful processing and graphics hardware, will support the multiple-channel, high-resolution video requirements of 360° SA systems.

To learn more, e-mail Steve at Steve.Edwards@curtisswright.com.

Stroke of Genius

Introducing the NEW Cobalt Series of Virtex-6 Modules!



Unleash your inner genius with Pentek's new 71620 Cobalt™ Virtex-6 XMC module. Built to optimize high-performance, wideband, communications, SIGINT, radar, beamforming and telemetry applications, this high-speed module includes:

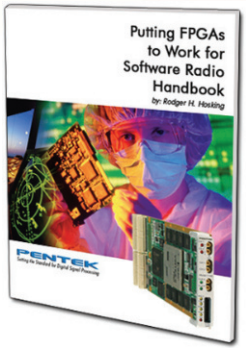
- Three 200 MHz 16-bit A/Ds
- Dual 800 MHz 16-bit D/As
- Intelligent chaining DMA engines
- High dynamic range
- PCI Express x8
- Dedicated memory for each I/O stream
- Secondary x8 XMC for gigabit serial I/O
- Advanced gating and triggering modes optimized for radar applications
- Multi-channel, multi-board synchronization
- GateFlow® FPGA Design Kit
- VPX, XMC, PCI, PCIe, VME/VXS, cPCI, conduction-cooled XMC

With extensive resources and new enhancements in DSP engines, block RAM, logic and clocking technology, the Virtex-6 family represents the industry's most advanced FPGAs.

Now Available in VPX!

COTS & Rugged Versions

Call 201-818-5900 or go to www.pentek.com/go/mescobalt for your FREE *Putting FPGAs to Work in Software Radio Handbook*, technical datasheets and price quotations.



Cobalt

PENTEK
Setting the Standard for Digital Signal Processing

Pentek, Inc., One Park Way, Upper Saddle River, NJ 07458 Phone: 201.818.5900 Fax: 201.818.5904 e-mail:info@pentek.com www.pentek.com

Legacy Software Migration

By Dr. Kelvin Nilsen

Incremental software modernization minimizes risk, reduces costs

Software modernization is often discussed in absolute terms, as if software can be characterized as being either entirely black or entirely white, all legacy or all modern. In reality, most real-world software systems comprise many parts, each representing a combination of good and bad attributes. In practical terms, software modernization consists of the gradual process of replacing the bad with the better. And the choice to focus on software portability versus conditional compilation is integral to modernization.

Software portability is a key to modern software

Consider the efforts associated with modernizing a deployment platform. Suppose an application originally developed with the C++ language on Windows now needs integration into a modern Smartphone running a proprietary OS and an ARM processor. The porting activity needs to identify and replace all dependencies on the Microsoft Foundation classes. It also has to analyze and address all dependencies on the Microsoft compiler and the underlying thread scheduling model as implemented by Microsoft Windows. While some of these porting issues are identified by diagnostic message output from the phone vendor's compilers and linkers, subtle differences between the code generation approaches of the Microsoft and Smartphone compilers can only be detected by extensive testing and/or careful review and analysis of the respective technologies. Similarly, differences between the Microsoft and Smartphone OSs' treatments of thread scheduling queues, mutual exclusion locks, and priority inversion avoidance strategies must depend on extensive testing and/or careful review and analysis of the respective OSs and of the application source code and any available application design documents.

Note that the ability to build new applications by modular composition of independently developed reusable software components depends on the portability of those components. Thus, achieving software portability is critical to developing new systems and maintaining existing systems.

Conditional compilation adds complexity

With a typical C++ porting effort, the amount of code that must change to

support a new platform is relatively small, typically less than 10 percent of the total code. Finding which 10 percent of lines has to change is one of the biggest hurdles of any porting effort. As various porting hurdles are identified and addressed, conscientious software engineers modernize the application by inserting conditionally compiled blocks of code and creating documentation to help clarify the additional effort that might be needed to port this code to yet another platform, such as Linux, INTEGRITY, or VxWorks. There is no guarantee, of course, that the port from Windows to the Smartphone identifies all problems that might arise with a subsequent port to yet another OS or processor. But the lessons learned with the first port provide valuable guidance for additional ports.

A conflicting objective of software modernization is to reduce the effort needed to correct bugs, address performance shortcomings, or add incremental new functionality as system requirements evolve. Applications made portable by inserting conditional compilation directives and documented lists of issues to be considered with each new port are difficult to evolve. If changes to the original application impact conditionally compiled code, then the changes must be propagated into all the conditionally compiled blocks of code that represent support for every relevant platform. Further, every incremental change must be tested with every combination of legal conditional compilation options. This adds significantly to the effort associated with common software maintenance activities.

Portable languages avoid conditional compilation

A popular alternative to using conditional compilation directives is to implement software in a more portable programming language. Java is often the preference, and many use the phrase "software modernization" to describe the process of migrating Ada, C, or C++ software into the Java language. Java, including certain real-time versions of Java, addresses portability issues within the Java runtime environment (the so-called *virtual machine*) itself, rather than requiring conditional compilation directives within the application. The Java language even offers special control structures for addressing multiprocessing issues, including syntax to identify mutually exclusive code regions and coherency between individual processor caches. By abstracting these portability considerations, the Java language offers tremendous cost savings in typical software maintenance activities. One development team reported a savings of 20-fold compared to the C language in a project that consisted of assembling independently developed off-the-shelf software components for deployment on a new embedded platform.

Rarely is it economically feasible to rewrite an entire legacy application into the Java language in a single monolithic effort. Today's typical applications consist of hundreds of thousands or millions of lines of code; thus, it is much more common for legacy applications to be modernized in incremental steps. With each functionality addition, new features are implemented in Java and bolted onto the existing legacy system. If maintenance activities reveal that a specific aspect of the legacy application is difficult to port or evolve, then that part of the application is replaced with a more modern Java implementation.

Dr. Kelvin Nilsen *is CTO for Java at Atego and a participating member of the Java JSR 282 and JSR 302 expert groups. He can be contacted at kelvin.nilsen@atego.com.*

Daily Briefing: News Snippets

By Sharon Hess, Assistant Managing Editor

www.mil-embedded.com/dailybriefing

Lockheed Martin technologies on the move

In keeping with the battlefield's ever-present imperative for communications on the go, General Dynamics recently signed up Lockheed Martin to provide transmission subsystem equipment and communications hardware within the U.S. Army's Warfighter Information Network-Tactical (WIN-T) program's Increment 2 (Figure 1). Expected to span several years, the $71 million production contract could reach a total of $400 million by completion and stipulates that Lockheed Martin provides mast systems, antennae, modems, and radios for WIN-T's transmission subsystem. Integral to WIN-T's mission of providing broadband communications capabilities to tactical commanders via vehicle-mounted equipment, the transmission subsystem is the backbone of the WIN-T network's ability to dynamically transfer data through and from non-contiguous, highly dispersed areas while vehicles are in motion. Lockheed Martin will additionally provide signal operator training during Increment 2 deployment.

Figure 1 | Lockheed Martin will provide transmission subsystem equipment and communications hardware for the U.S. Army's WIN-T program. Pictured: WIN-T Increment 2 test vehicles, photo by Russ Meseroll

Simulation modernization cocoons, prepares troops

The safest way to prepare warfighters for the realities of the battlefield is to keep them in *unreality*, as implied by a recent $39 million contract between the U.S. Marine Corps Systems Command and Saab Training USA LLC. The contract specifies that Saab modernizes the USMC's range training systems via nonautomated and automated simulators and target equipment. Beyond the contract's troop-protecting tenets, the contract also provides for logistics and systems engineering including design, development, integration, installation, and delivery with some training added in. Contract beneficiaries are Marine Corps installations in Japan, Hawaii, and the continental United States. Completion is anticipated in August 2013.

VITA keeps its track shoes on

Gone are the days when VITA/VSO was quietly in the background working on open standards. As if OpenVPX (VITA 65) reaching ANSI/VITA ratification back in June wasn't enough, VITA has achieved two more recent milestones: 1) The formation of a VXS Marketing Alliance to perpetuate VPX's relatively unpublicized sister standard. VXS Marketing Alliance members include: Concurrent Technologies; CSP, Inc.; Curtiss-Wright Controls, Inc.; Elma Electronic, Inc.; EVOC Intelligent Technology; Hartmann Electronic; Mercury Computer Systems, Inc.; Pentek, Inc.; Meritec/Joy Signal Technology; SIE Computing Solutions; TEK MicroSystems; and W-IE-NE-R, Plein & Baus GmbH. Meanwhile, VITA's VPX Marketing Alliance is getting the inside track on VPX, OpenVPX, and VPX-REDI in the form of its industry survey conducted last April 23 through July 31 with the help of OpenSystems Media and other embedded industry publishers. The survey covers cooling methods, switched serial fabrics, I/O pin counts, LRUs, possible VPX implementation obstacles, VPX benefits, and much more. (See editor Chris Ciufo's detailed coverage of VITA's VPX industry survey in his column entitled "Survey says: VPX is the new VME" in this edition of *Military Embedded Systems*.)

The Northrop Grumman contract that almost isn't

CH-46E, CH-53E (Figure 2), and CH-53D helicopters are about to become more countermeasure savvy, thanks to a recent estimated $77 million "undefinitized contract action" between Naval Air Systems Command in Patuxent River, MD and Northrop Grumman Systems Corp. in Rolling Meadows, IL. The "contract" stipulates that Northrop Grumman will provide 121 of its AN/AAQ-24(V) 25 Guardian laser transmitter assemblies for the aircraft, with work completion anticipated in 2012. The Guardian laser transmitter assembly is a laser-based, next-gen, directable countermeasures system geared to protect certain fixed-wing aircraft and helicopters against man-portable air-defense systems attacks.

Figure 2 | The CH-53E will soon be outfitted with a Guardian laser transmitter assembly. U.S. Navy photo by Mass Communications Specialist 1st Class Steve Smith

Raytheon SDB program weaponry to take flight

Raytheon Company and the U.S. Air Force recently put pen to paper, spawning a $450 million contract stipulating that Raytheon starts engineering manufacturing development on its GBU-53/B seeker weapon as part of the USAF's Small Diameter Bomb (SDB) Increment II program. SDB II features a precision-strike, air-launched standoff weapon designed to thwart fixed and moving targets in challenging weather conditions. Meanwhile, having passed its 26 test flight missions sans any hardware malfunctions, GBU-53/B offers three operational modes: semiactive laser, uncooled imaging infrared, and millimeter-wave radar. GBU-53/B also "fully meets the load-out requirements for all versions of the fifth-generation F-35 Joint Strike Fighter's [Figure 3] internal weapon bays," says Raytheon Missile Systems President Dr. Taylor W. Lawrence. Contract delivery is anticipated to commence in 2013 and end in the latter part of 2014.

Figure 3 | Raytheon Company's GBU-53/B seeker weapon will begin engineering manufacturing development per a $450 million USAF contract – part of the SDB II program, anticipated to include F-35 Joint Strike Fighters. Courtesy photo/David Drais

Navy issues "urgent procurement" of Counter RCIED

Undoubtedly the Naval Sea Systems Command realized that IEDs are always a danger to the warfighter when it exercised a $17 million option on its contract with EDO Communications & Countermeasures Systems. The contract modification (to a previous "firm-fixed-price contract") stipulates that the company, a subsidiary of ITT Force Protection Systems, produces and supports 260 Counter Radio-Controlled Improvised Explosive Device (RCIED) Electronic Warfare (CREW) 2.1 systems including Band C Engineering Change Proposal upgrades. The CREW 2.1 systems are designed to electronically jam enemy RCIED systems to prevent radio-controlled IED ignitions. The contract option was initiated "to meet urgent Department of Defense requirements in support of Operation Enduring Freedom." Contract option labor will occur in Thousand Oaks, California, with completion anticipated in April 2011.

For consideration in Daily Briefings, submit your press releases at http://submit.opensystemsmedia.com. Submission does not guarantee inclusion.

Figure 4 | In conjunction with the booming unmanned technologies battlefield trend, the U.S. Army recently ordered 94 new model 310 SUGV robots. Boeing photo

iRobot to become more prolific on battlefield

In conjunction with the booming trend of utilizing more and more unmanned technologies on the battlefield, the U.S. Army recently sent iRobot Corp. and partner The Boeing Company a new task order for 94 new model 310 SUGV robots, in addition to spares. As part of an existing IDIQ contract expiring in February, the most recent task order is the fifth, estimated at $14 million and upping the U.S. government's total quantity to 323. Tipping the scales at 35 lbs, the Small Unmanned Ground Vehicles (SUGVs) can assist dismounted Explosive Ordnance Disposal (EOD) techs in reconnaissance missions, especially those including IEDs and unexploded ordnance. iRobot is a lighter, more compact variant of the PackBot and provides real-time situational awareness to warfighters while enabling them to keep a safe distance from potential hazards (Figure 4).

VPX's future in U.S. Navy is certain – almost

VPX is about to make waves in the U.S. Navy's domain, in the form of a VPX analog-to-digital converter board, according to a recent Federal Business Opportunities (fedbizopps.gov) posting. The expected recipient of the contract, for which a monetary total is yet unspecified: Pentek, Inc. The contract-in-the-works also specifies one each of a three-channel A/D and two-channel D/A converter, in addition to a Linux BSP and Windows BSP. To aid in implementing the requested wares, the Navy is also requesting an FPGA development kit. VPX is also known as VITA 46 (Figure 5).

Figure 5 | VPX (VITA 46) is about to make waves in the U.S. Navy's domain, in the form of a VPX analog-to-digital converter board, likely from Pentek, Inc.

Ethernet-based precision timing enables real-time distributed military systems

By Steve Yates

Precision timing is critical in networked real-time military applications. Recent advances in Ethernet technology provide standards-based precision timing and synchronization to developers of networked wireless communications, radar, multimedia, and other networked real-time applications. The IEEE 1588 Precision Time Protocol enhances Ethernet to deliver timing accuracies in the nanosecond range over standard COTS network infrastructure.

Submicrosecond timing and synchronization are critical to many military electronic systems that encode, decode, transport, or present real-time data in applications such as weapons test systems, distributed sensor networks, radar processing, signal intelligence, distributed RF systems, and IP-based multimedia. Synchronization of multiple distributed devices is a major challenge facing today's military systems developers.

With Ethernet's rapid growth as a networking technology for real-time embedded applications, new industry standards are now emerging to add precision timing to Ethernet itself. The following discussion provides an overview of the challenges facing real-time military applications developers and the standards-based approaches that are becoming available to assist them. These new network-based precision timing standards use COTS technologies to improve timing accuracy while reducing cost. The following discussion also focuses on the IEEE 1588 Precision Time Protocol, which enhances Ethernet to deliver timing accuracies in the nanosecond range over standard COTS network infrastructure.

The need for network-based timing and synchronization

The venerable Network Time Protocol (NTP) provides Time Of Day (TOD) updates to networked devices. NTP, however, only provides TOD information accurate to human levels of perception – from hundreds of milliseconds to seconds. Real-time applications often require timing accuracies 1,000 to 1,000,000 times better than NTP.

Until recently, distributed precision timing solutions available to developers have included separate cables or extra hardware at each device to provide precision clocks, such as IRIG-B or GPS receivers. But these approaches entail substantial challenges in development effort, equipment complexity and cost, and timing accuracy or system topology.

Ethernet-based timing and synchronization is standardized

Ratified in 2002, IEEE 1588 Precision Time Protocol (PTP) is a standardized Layer-2 and -3 method of submicrosecond synchronization across LANs. IEEE 1588 PTP is a master-slave protocol, where one or more slave devices synchronizes with multicast timing messages sent by a PTP clock grandmaster. PTP is a low-overhead protocol and is compatible with standard COTS network infrastructure, while requiring no new cables.

More recently, the IEEE 802.1as draft standard (one of three from the A/V Bridging Task Group) has been proposed as extending IEEE 1588v2 PTP for synchronization across Ethernet in LAN and WAN environments. IEEE 1588v2 was ratified in 2008, and IEEE 802.1as was developed as a simplified profile intended for multimedia applications, and is reusable in many other applications. IEEE 1588v2 makes several improvements to the original IEEE 1588 standard aimed at improving accuracy and reducing costs. 802.1as also extends PTP to other network technologies not specifically addressed by IEEE 1588, such as 802.11.

Synchronous Ethernet (SyncE) is an alternate approach to network-based synchronization that transports precision clocks via the Ethernet PHY layer interfaces. SyncE provides a network-wide Layer 1 synchronization capability similar to SONET/SDH.

The Layer 1 approach taken by SyncE makes its accuracy potentially better than PTP. However, the additional physical layer implementation requirements of SyncE render it largely incompatible with standard COTS Ethernet infrastructure such as routers, bridges, and switches.

How PTP works

Figure 1 shows a simplified series of timing messages between a PTP master and slave, used to estimate the total master/slave clock offsets and network latencies so that slaves may sync up to the master's clock. A PTP slave needs two pieces of information for synchronization: (1) how much its clock is offset from the PTP master, and (2) the network propagation delay. Slaves are given periodic opportunities to measure their clock offset when the PTP master sends Sync multicast messages with a master time stamp T1. PTP masters without dedicated IEEE 1588 packet time stamping hardware often do not exactly know T1 when transmitting the Sync message, so they send T1 in an optional Follow-up message. PTP slaves time stamp the Sync and Follow-up messages with their local clock upon receipt (T2), and from that they compute their total clock offset from the master.

PTP slaves initiate network latency estimates when they send a Delay Request message (T3). The PTP master records its time stamp T4 upon receipt of the Delay Request, and sends a Delay Response also time stamped with T4. Use of T4 as the Delay Response time stamp removes the master's processing latency from the measurement, allowing the slave to measure the round-trip time across the network accurately, and in turn allowing it to estimate the one-way network latency. Note that the PTP network latency measurement algorithm assumes the network latency is symmetrical.

IEEE 1588 PTP typically updates the latency estimation process once a second, but IEEE 1588v2 allows the frequency of this process to increase to as high as 30-40 times a second for improved accuracy. The Delay Request/Response sequence typically is performed less often, since it is assumed that network latencies remain relatively stable with time.

PTP is effective

For military systems developers, PTP has many significant advantages over previous synchronization methods, such as IRIG-B. Primary among these is the concept of "no new wires," since PTP utilizes standard cabling and works with existing Ethernet connector interfaces, simplifying systems and reducing the cost of development, installation, and operation. Additionally, PTP brings nanosecond-level accuracy, up to 1,000x better than IRIG-B, and can null out timing skews introduced by the network itself, offering large potential increases in system-wide timing accuracy.

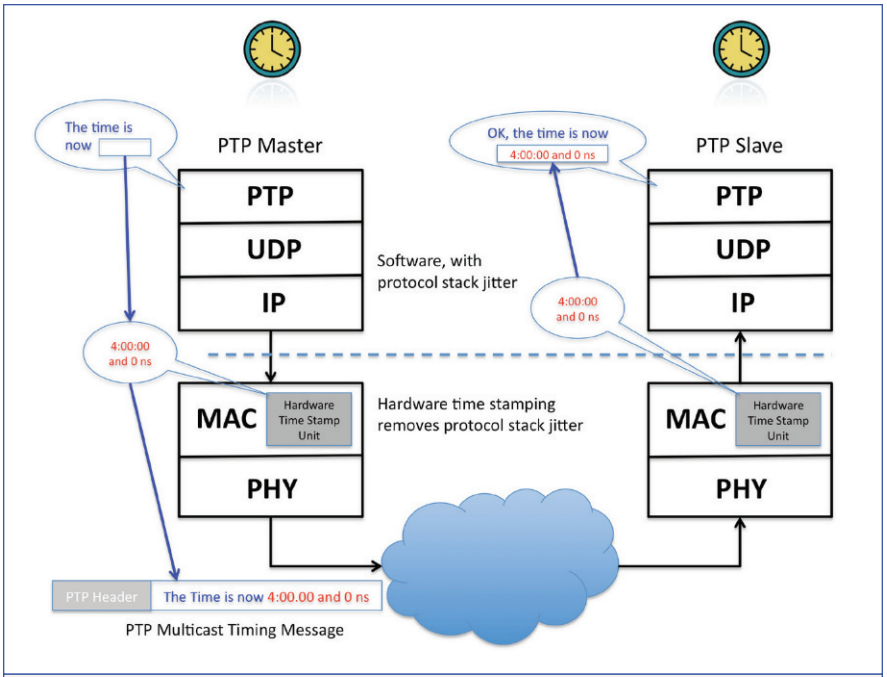


Figure 1 | Simplified IEEE 1588 PTP synchronization messaging

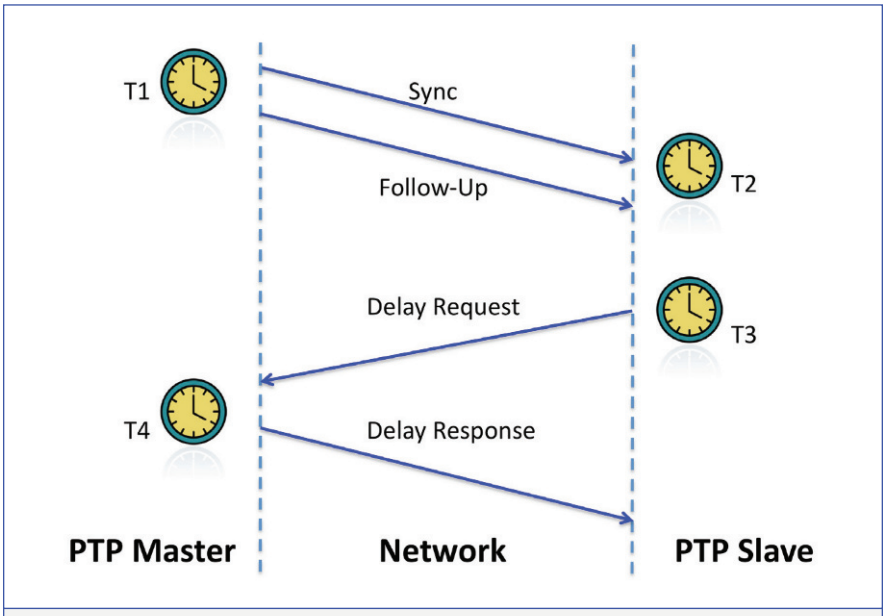


Figure 2 | Simplified IEEE 1588 PTP stack with hardware time stamping

While IEEE 1588 PTP packet time stamping and classification can be implemented purely in software, achieving the best timing accuracy requires dedicated packet classification and time-stamping hardware to avoid introduction of software-related timing variances. PTP-enabled Ethernet MACs time stamp all TX and RX packets as close to the wire as possible, based on a high-frequency timebase. From this, precision timing can be recovered anywhere on the LAN to accuracies down to the nanosecond range, depending on the implementation.

A simplified PTP implementation using hardware time stamping is shown in Figure 2.

IEEE 1588 is COTS

The good news for military developers is that PTP is increasing in popularity and more COTS PTP-enabled devices are coming to market: Ethernet NICs, Single Board Computers (SBCs), components such as Ethernet MACs, and PTP software stacks.

COTS PTP NICs include the National Instruments PCI-1588, the Oregano Systems syn1588, and the Meinberg PTP270PEX. Meinberg also outfits the PRP270PEX and some of their other PTP products with IRIG outputs, allowing IRIG devices to synchronize via PTP. This provides an incremental upgrade path to PTP, without requiring the wholesale replacement of all legacy equipment.

Embedded SBCs with onboard PTP support include ADI Engineering's extended temperature and fanless Cinnamon Bay SBC (Figure 3), based on the low-power Intel Atom Z5xxP processor and the Ocracoke Island SBC based on the Intel EP80579 integrated processor.

Intel, Marvell, Broadcom, and National Semiconductor offer Ethernet MAC silicon providing hardware-based PTP packet time stamping and classification. Available products include single- and multi-port gigabit and 10 GbE chips.

A growing number of microprocessors also provides PTP hardware support. Examples include the EP80579, IXP465, and IXP435 from Intel, the Octeon II processor family from Cavium, and the ColdFire, PowerQUICC II Pro, and PowerQUICC III families from Freescale. The Intel EP80579 not only provides packet time-stamping hardware, but it

Figure 3 | The Cinnamon Bay SBC based on the Intel Atom Z5xxP with IEEE 1588 and 802.1as hardware support from ADI Engineering

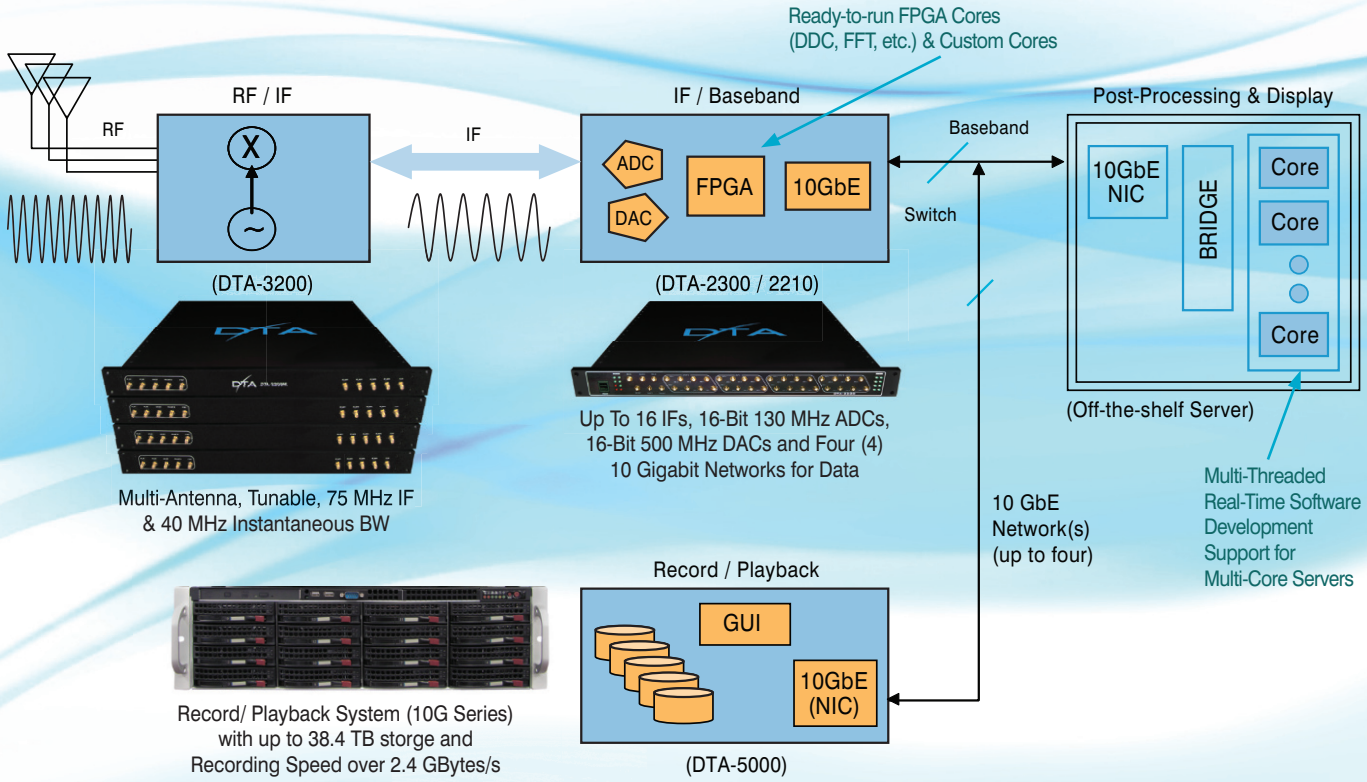
10 GIGABIT SENSOR PROCESSING... WELCOME ABOARD!

Whatever your application...

Phased Array Radar, SIGINT, ELINT, SATCOM, HF/VHF/UHF Radio, MIMO, Cognitive Radio, Wireless Basestation, Sonobuoy, RF Test & Simulation

...We have you covered from RF to Baseband to Multi-Core Software Processing.

D-TA's solutions drastically reduce deployment time & cost.



We have pushed the envelope in every direction to simplify your development effort.

Let's get started!

1-877-382-3222
SALES@D-TA.COM
WWW.D-TA.COM

NOTHING ELSE COMES CLOSE

D-TA SYSTEMS INC.
A Sensor Interface and Processing Company

SENSOR PROCESSORS THAT DRASTICALLY REDUCE DEPLOYMENT TIME AND COSTS

ON THE PROWL for rugged MXM-3.0-E4690

Wolf's advanced card-edge MXM-3.0-E4690-XT offers an excellent video upgrade for commercial, industrial, and medical OEMs. Our MXC-3.0-E4690-XT, with socket connection, presents Military and Avionics OEMs with a MIL-810 solution that encompasses extended temperature, shock, and vibration.

Engineers designing for optimal reliability in high shock, extreme temperature and constant vibration need tough components. Wolf has an enviable reputation for exceeding requirements while supplying outstanding performance.

Wolf offers MXM-3.0-E4690 and the new MXC-3.0-E4690 based video graphic boards, as, i: Frame grabber, ii: Video input and output, and, iii: Video output only, products. All are designed for extended life operation and 5-plus years of availability for military, aerospace, industrial and medical OEMs.

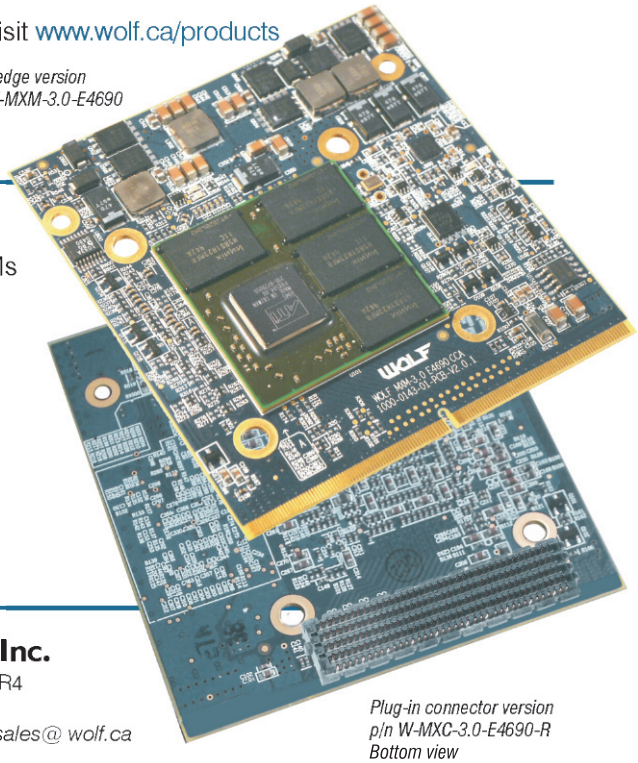
Wolf's modular MXM and MXC-3.0-E4690 graphic processor boards are part of an ongoing roadmap, which allows OEMs to upgrade their first generation products with a plugged in module. Wolf is committed to offering the latest generation of embedded video graphic processors in both MXM 3.0 and MXC 3.0 architectures with Mil-810 environmental: Shock, Vibration and Extended Temperature Operation.

Please visit www.wolf.ca/products

Card edge version
p/n W-MXM-3.0-E4690

FEATURES

- Plug-in high performance MXM-3.0-E4690 video upgrades for OEMs
- Innovative Wolf high density I/O socket connector (MXC version)
- 10x faster 2D & 3D rendering than previous generation products
- 50+ combinations of dual independent video outputs
- 19 combinations of dual video inputs
- Low CPU utilization and brilliant picture quality
- Extended temp -40C to +85C operating environment
- Embedded memory version of AMD E4690 (512MB) graphics chip
- Reduced power modes and improved conductive cooling



Plug-in connector version
p/n W-MXC-3.0-E4690-R
Bottom view

WOLF
Wolf Industrial Systems Inc.

Wolf Industrial Systems Inc.
5 Foxfire Chase, Uxbridge, ON L9P 1R4
1.800.931.4114 Fax: 905.852.1735
Online: www.wolf.ca Please contact sales@ wolf.ca

Custom designs, from Concept to Off-The-Shelf in weeks.

also implements a variable frequency system clock that synchronizes all system-level timing to the PTP master within 15 ns. And it is available in an extended temperature version.

IEEE 1588 PTP and 802.1as: Software support lags

A major issue facing developers looking to use PTP is the sparse support in OSs and software drivers. Even when PTP packet time stamping and classification are performed in hardware, the upper layers of the PTP protocol rely on third-party middleware that must be purchased and integrated, or home-grown code that must be developed. COTS PTP middleware is currently available from vendors including IXAAT, Real-Time Systems, and Quadros Systems.

Next steps for PTP

As tightly synchronized distributed military systems increasingly turn to industry standard networking technology such as Ethernet, PTP offers developers an attractive precision timing and synchronization solution. Military system developers today must weigh the implementation requirements of PTP versus the potential reductions in cost, complexity, cabling, and weight as compared to alternative techniques. Fortunately, with the quickly growing and broad-based commercial and military demand, PTP support should continue to improve. PTP is poised for continued growth, and this is an exciting technology that military system developers should continue to monitor closely.

Steve Yates *is CTO at ADI Engineering, a U.S.-based original design manufacturer providing turnkey design-through-production services under an "Open IP" model. He previously worked as a hardware engineer for GE Fanuc and Intel Corporation. Steve graduated with a BS and MS in Electrical Engineering from the University of Virginia, and is a registered Professional Engineer in the Commonwealth of Virginia. He can be contacted at steve.yates@adiengineering.com.*

ADI Engineering
434-978-2888
www.adiengineering.com

Tactical Data Links: Decades old, but still talking with the Big Boys

Interview with Marty McDonough – Founder, President, and CEO of Tactical Communications Group

EDITOR'S NOTE

Tactical Data Links such as Link 11, Link 16, CDL, and others might date back some 30 years, but their utility and battlefield reach continues to this day. Here's an exposé of Link 16, in use by America's allies and bolted into some 41 countries' mission profiles. The modern capabilities of this digital pipe might surprise you.

MIL EMBEDDED: ***I'm most interested in the status of COTS communications, in regard to communications links, protocols, and so on.***

McDONOUGH: There's a little confusion in the industry as to the definition of Commercial Off-the-Shelf or COTS. I'm coming from the position of the defense industry developing Tactical Data Links [TDLs] for military applications that are off-the-shelf, such that they are no longer "developmental."

MIL EMBEDDED: ***So what is the most prolific tactical data link?***

McDONOUGH: Link 16 is probably the most prolific involvement, considering all the U.S. allies. The marketplace and the demand are significant and continuing to grow. Right now, there are 41 countries – including the United States – that I refer to as the "Link 16 club" with agreements and memorandums of agreements with the U.S. government to receive this technology.

MIL EMBEDDED: ***Tell me about Link 16.***

McDONOUGH: These TDLs are made up of several components: the radio itself, the RF generator, and the intelligence being moved across that radio over the waveform in a network-centric format. They are governed by MIL standards and have been around for a while. *Link 16* is constantly being enhanced. An example of Link 16's latest and greatest is the ability to push imagery over advanced digital data links into the cockpit of an F-15 Strike Eagle or an F-18 [Hornet]. Also new is the ability to develop what they call a Weapons Data Link (WDL), which enables Link 16 usage over the airwaves to actually guide smart weapons after they've been released from the delivery platform.

> "The Link 16 system is really a Cold War "relic." I hate to use that word, but Link 16 is 35-year-old technology. It's a very complex, tiny, secure system."

Our role at TCG is to develop the operational applications software that would be on platforms and in command centers and the like, but we also develop test equipment to be used by integrators and developers in the certification agencies to certify that these tactical data links are functioning as they should.

MIL EMBEDDED: ***How old is Link 16, and how did you come to build it as opposed to a Raytheon or somebody else?***

McDONOUGH: The Link 16 system is really a Cold War "relic." I hate to use that word, but Link 16 is 35-year-old technology. It's a very complex, tiny, secure system. But the system has been plagued by costs – about $1 million apiece in the early days. The cost has come down drastically, but there are only three sources of those radios at this time: ViaSat in California, a consortium of BAE and Rockwell Collins, and a European consortium called EuroMIDS.

Regarding how we got into this and why not Raytheon or somebody else: We are the only small business in the business. We've been focused on Link 16, and it's extremely complex. We started developing the software somewhere around 1997. It's probably cost us easily $25 to $30 million in investments. We were a part of a large company but spun off back in 2001 to become an independently owned small business. We now have 60 people in the company and are supporting product in 18 different countries. The reason we survive is we're very process oriented.

MIL EMBEDDED: ***What are Link 16's technical specifications?***

McDONOUGH: The waveform is time division multiple access. The frequency range is about 900-1,200 MHz, and it has a notch filter in the middle because of potential interference there. Regarding data rates, by today's standards, it doesn't really have too much wideband throughput, about 128 messages per second in normal operations.

MIL EMBEDDED: ***Was Link 16 originally an audio channel or a data channel?***

McDONOUGH: The original system was conceptualized as a CNI, a Communications Navigation Identification system, pre-GPS. So the navigation aspect of it enables users to measure time-of-arrival of pulses from different radios, thus establishing the relative location of the transmitter. It's all digital, and also has what they call *J voice,* digital voice capability in the radios; however, not all platforms care to implement that.

Figure 1 | The F-15E Strike Eagle is one type of aircraft compatible with Link 16 tactical data link technology. U.S. Air Force photo by Master Sgt. Jason Passmore

MIL EMBEDDED: ***Can you theorize where military communications are going? Link 16 is 35 years old, yet people are using Ethernet in comparison.***

McDONOUGH: We are in the middle of the JTRS WNW wide band network and waveform development, and interoperability is the name of the game right now in the mil comms industry. The Navy's, Marines', and Air Force's air components and surface components are very much involved in Link 16. The Army is just starting to get into it. Link 16 is more of an air operations capability than a ground forces kind of network. However, the only true mission for air forces out there today is close-air support for the combat soldier on the ground. It's common communications, primarily digital communications, that enable all the battlefield components to work as one to get a mission done.

An example illustrating the Link 16 system's potential is if warriors from Mountain Home AFB bring in an F-15E (see Figure 1) from a squadron to Bagrum Air Force Base in Afghanistan and want

to put Link 16 imagery into the backseat of that F-15E. Link 16 is developed with all the tactics, techniques, and procedures that needed to be done so that a troop in contact can take an image of his location, and using PowerPoint on a laptop, then annotate it as to the streets and buildings and so forth. And then it moves through our system up to the cockpit of the Strike Eagle, at which time the weapon systems operator in the backseat looks at that annotated picture and can contact the soldiers in combat and discuss where he will deliver ordnance, by looking at the picture and literally looking out of his cockpit saying, "Yes I've got it. I see the building you're on. I see the building they're in. We've got it." And that's just one example. Streaming video can also be transmitted over Link 16 but eats up all available bandwidth.

MIL EMBEDDED: ***What are the evolving battlefield requirements for TDLs?***

McDONOUGH: Enhancements pertain to the type of information being demanded by the commanders on the ground. It's very quick, for example: Where's the bad guy? Where's the truck? Where's the individual planting an IED? The interconnection of new defense systems is what's driving all the communication systems. Now you have RPVs [Remotely Piloted Vehicles] with electro optical and IR sensors – a variety of things loitering over the battlespace with the ability to pour voluminous amounts of data in real time coming off of the battlefield. What do you do with this data? How do you distribute it?

MIL EMBEDDED: ***What are the best ways to distribute this data, then?***

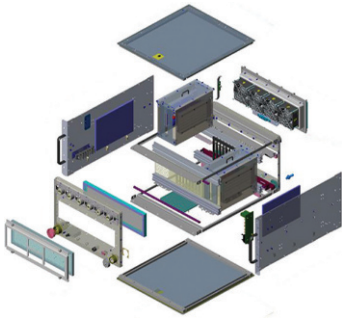
McDONOUGH: There are many data links out there today such as Link 16, as we've discussed, plus Link 11 and Common Data Link (CDL). CDL is really more of a carrier of information of wide band or high-demand information and streaming video and so forth. But we're not doing 24 words per minute teletypes anymore: We're trying to plan and execute commands within 10 or 15 minutes. And so TDL must have the ability to support an eyeball of one sort or another on the battlespace as threats evolve, and troops must stay in contact. Getting that processed data disseminated into the proper hands of a Strike Force is very, very important.

Getting back to your question earlier about Ethernet, there are elements of Link 16 tied to Ethernet. One is the fixed formatted messages, which is quite a detailed library of information message standards. And the other part comprises the radio and the waveform moving around the battlespace and all the other things that a digital radio does. The J series messages, which is the lexicon, we're now pushing those over Ethernet or other means of transmission and getting them out through satellite relay. The idea is to move information in a common format, and it's displayed visually, graphically, on the warrior's display in the cockpit or on the ground. So no matter what your native language is or where you come from, the information is

RUGGED DEPLOYED ENCLOSURES

YOUR CHASSIS & BACKPLANE PARTNER

Design Capabilities

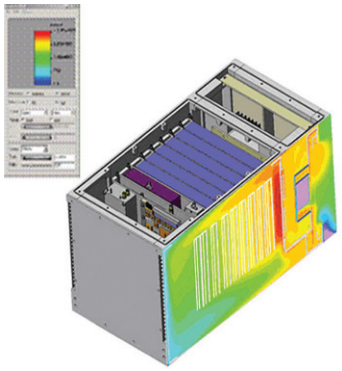


For Chassis & Backplane Solutions That Meet Your System Requirements, Contact Us Today!

- Fully Ruggedized, Standard & Custom Backplane and Chassis Solutions
- Pre-award consultation for complex design challenges
- Professional in-house engineering staff, experienced in meeting mission critical requirements for land, air, and sea military systems
- Full prototype and manufacturing capabilities

Deployable & Development Chassis

Thermal Expertise



Backplanes

Hybricon

CURTISS WRIGHT Controls Electronic Systems

cwcelectronicsystems.com
Tel: +1 (800) 352-3468
systeminfo@curtisswright.com

CHASSIS & BACKPLANES ABOVE & BEYOND

We Won't Leave You High and Dry.

Recent consolidations in the embedded industry have left many PowerPC® users wondering where their next real-time or embedded Linux® operating system will come from.

At LynuxWorks, we are here to help. Our new PowerPC rescue package offers an open-standards based RTOS or embedded Linux, and a migration kit to help PowerPC users stay with their processor of choice.

Visit www.lynuxworks.com/rescue-me to request a migration whitepaper.

LYNUXWORKS™

Open.Reliable.Safe.Secure.

all common, it's all the same, and everybody works together. A good analogy is I have connectivity with a farmhouse in southern France by picking up my phone and dialing a phone number. But I'm not interoperable with the farmer because I do not speak French.

MIL EMBEDDED: ***What about consumer devices such as infrared TV remotes, UHF TV remotes, cell phones, wireless phones, Wi-Fi, and so on – any military applicability?***

McDONOUGH: Yes. Your average warrior on the battlefield today is an 18-, 19-, or 20-year-old kid who has grown up with these technologies and is completely at ease with them. All of these things lead back to one problem on the battlefield though: security. My feeling is that the shelf life of the information is so short, who cares? I think the military should go with the most available thing. The soldier has to be able to get information that's meaningful to him as quickly as possible. The BlackBerry and other devices that are out there right now, the whole thing is maybe 4 inches by 3 inches and it's all a display. That's exactly what a soldier needs when somebody shoots at him.

MIL EMBEDDED: ***To wrap up, what's the future of the TDL community, and who will steer it?***

McDONOUGH: The tactical data link community, formed about 10 to 12 years ago, has an International Data Links Society. Industries, military, and the government all participate, and 40-some countries have participating members. TCG recently started the U.S. chapter of the Society, so there are now about 130 U.S. members. The Society was formed by industry as a communications way to organize "everything data links" in industry and to make that information available to the militaries of the world in a coherent form.

Marty McDonough *is President and CEO of Tactical Communications Group (TCG). He founded TCG in 1994 as an R&D division of Dynamics Research Corporation (DRC). Before joining DRC in 1985, he founded and ran MARTIN Systems Inc., a software development company focused on developing artificial intelligence applications for use by the national intelligence community. Marty has served in the U.S. Air Force as an Airborne Intelligence Analyst. He has also worked as an Intelligence Analyst for the NSA. He holds a B.S. degree in Government and Political Science from the University of Maryland. For more information, email info@g2tcg.com.*

Tactical Communications Group, LLC
978-654-4800
www.g2tcg.com

For more information on the International Data Links Society, visit www.idlsoc.com.

Bringing more good things to life: Industry consolidation, ISR, and GPGPUs

Interview with Rob McKeel, General Manager of GE Intelligent Platforms' Military and Aerospace Embedded Computing business

EDITOR'S NOTE

GE Intelligent Platforms comprises SBS, Radstone, ICS, Ramix, VMIC … and, of course, a healthy dose of General Electric DNA. So when VP Rob McKeel shares his thoughts on the market, technology, and the competition – it's time to listen up.

MIL EMBEDDED: ***What's keeping you busy at GE Intelligent Platforms these days?***

McKEEL: There are two major areas of focus for us at GE.

The first is on adapting what we do and how we do it with the shifting priorities in the defense market. There's no question: Foremost in the military's mind at present is gathering, processing, interpreting, and communicating more information than ever before. You might recall the 16th-century British philosopher Thomas Bacon's coined phrase: "Knowledge is power." This assertion is particularly true in the case of ISR, which absolutely underpins the approach of armies, navies, and air forces around the world.

To explain what I mean: Modern military contact is no longer about firepower – it's about intelligence. So we're looking at what we do – sensors that acquire data, multiprocessors that process and interpret data, switches that communicate data, and so on – and making sure that we are keeping up with industry needs. And because much ISR development effort is focused on unmanned vehicles, we're ensuring that our solutions are compact, lightweight, and low in power consumption.

MIL EMBEDDED: ***Intelligence as a first priority, OK. What's GE's second focus then?***

McKEEL: The second focal point is actually more intangible: It's the way in which GE Intelligent Platforms is perceived. By just about any metric, we're one of the largest embedded computing suppliers for the defense industry. However, that's not the common perception, despite the fact that, for example, we're present in a majority of high-profile military programs.

> "By just about any metric, we're one of the largest embedded computing suppliers for the defense industry. However, that's not the common perception, despite the fact that, for example, we're present in a majority of high-profile military programs."

It could be that the misperception comes about because we're "only a division" of one of the world's largest companies, rather than a stand-alone organization in our own right. Or it could be the wide breadth of industries we serve and the range of technologies we offer, whereas many of our competitors are 100 percent focused on the defense market. But whatever the reason, we've recently made some adjustments to our organization that will further strengthen our focus on the defense market – and hopefully start to make those perceptions more accurate.

MIL EMBEDDED: ***Which technologies excite the company?***

McKEEL: There are some really interesting technology trends starting to emerge. Perhaps the most visible of those is the race to multicore. Both Freescale and Intel have made exciting multicore announcements in the past few months, and the potential their processors offer is very exciting. Today, though, "potential" is the key word. The software tools and environments are lagging.

Then there's the growing focus on low power consumption and heat dissipation, both of which are key to most unmanned platforms. We've already announced a couple of SBCs that feature Freescale's P2020 processor, aimed at providing twice the processing performance but within a legacy power envelope. We also have plans for the Atom processor, too.

MIL EMBEDDED: ***Any other technologies that have caught your eye – and your investment – before we move on?***

McKEEL: We're also doing a lot of interesting things with image-processing technology. In video tracking, for example, video trackers can now operate over longer distances at higher resolutions and track multiple targets and eliminate clutter. Video-streaming XMCs are also providing a platform that supports the H.264 video compression codec and perhaps two channels of HD video.

MIL EMBEDDED: ***Defense budgets are being squeezed. How is that affecting your business?***

McKEEL: There's no question that today, the defense market is characterized by uncertainty. No one knows for sure what the future holds. But for COTS suppliers like GE, that's actually positive. Why do I say that? Simply, because when customers are uncertain, one of their first instincts is to minimize risk. The economic equation for COTS is currently very favorable. If dollars are scarce, customers want to make sure those dollars are not wasted. The implication of that is that they'll turn to major suppliers for COTS solutions.

The other phenomenon we're seeing is that, when times are tight, major contractors are being forced to focus on what they do best. They're turning to us and asking, "Can you build us a complete, integrated, tested subsystem that we can just plug in?" Previously, they would have just bought the boards and built the subsystem themselves. We're also seeing significant interest in graphics subsystems and acoustic data conversion technologies. So basically, customers want much higher degrees of integration for more "packaged" products today than in times when funds were more available – when they could engage in non-core activities and when risk reduction wasn't at the top of their agenda.

MIL EMBEDDED: ***OK, fair enough. GE has come out strongly in favor of GPGPU technology. Why is that?***

McKEEL: I talked earlier about the growing focus on acquiring, processing, interpreting, and communicating sensor-acquired data in a multitude of forms. This includes a multitude of applications that cry out for massively parallel computing: The nature of the way the data needs to be processed means that it's incredibly well suited to nonsequential processing.

GPGPUs, and specifically NVIDIA's CUDA technology, lend themselves incredibly well to that kind of application. Take radar, for example, which is a relatively well-understood application. We've had a customer use GPGPU technology in a new radar subsystem, and he's seen performance increase 15-fold. We'd expect to see comparable – possibly greater – improvements in applications like signals intelligence, encryption/decryption, video processing, and so on. If you look at an OpenVPX multiprocessor board with, say, two NVIDIA CUDA GPUs on it, you can build compact systems that are hugely powerful. No other technology – not DSP,

not FPGA – comes close to what you can do with GPGPU technology.

MIL EMBEDDED: ***Curtiss-Wright just bought Hybricon, and Kontron just bought AP Labs. What do you make of that?***

McKEEL: I don't feel it's appropriate to comment on specific cases, but what we're starting to see is the inevitable fallout in a market that is at best flat, and is possibly declining. There are fewer programs, fewer platforms, fewer opportunities – and whichever market you're in, that's going to lead to consolidation as some companies find it increasingly difficult to compete. We expect that consolidation to continue at all tiers within the defense industry.

But this is good news for the competitive landscape. While it may seem counterintuitive to suggest that fewer competitors make for increased competition, the fact is that it makes those who remain in the market competitively stronger, better able to offer customers what they want. It resonates very strongly with customers who are looking to reduce the number of suppliers they use because, administratively, it's much more cost effective: More than ever, customers are looking for a "one-stop shop."

MIL EMBEDDED: ***How do you see the future?***

McKEEL: In the near term, GE expects more of what we're seeing today. Minimizing program risk is going to remain important, and that may mean that we don't see as much technology innovation as we've historically seen in the defense market. And, more so than ever, customers will turn to suppliers they know will be around for the long term.

We'll continue to see the military focusing on proven solutions – and that means COTS solutions. We'll likely also see continuing consolidation on the supply side, because it's a tough market to compete in. Beyond that, it's hard to say. Of course, we're hopeful that defense spending will rebound – but that depends on a number of factors that include the overall economy, the political landscape, and the stability of international relations.

***Rob McKeel** is General Manager of GE Intelligent Platforms' Military and Aerospace Embedded Computing business. He began his General Electric career in 1993 at GE Fanuc Automation as an engineer. In 2002, he was appointed Vice President of Marketing for GE Cisco Industrial Networks. Prior to his current position, McKeel served as the Business Leader for GE Transportation's Global Signaling business. He holds a Bachelor of Science in Engineering from North Carolina State University, an MS in Computer Science from the University of Virginia, and an MBA from James Madison University.*

www.ge-ip.com/industries/mil-aero


Dense?
...we take it as a compliment
16 dual redundant fully independent 1553 channels on one ccVME.
EXCALIBUR SYSTEMS
IT'S ABOUT THE SUPPORT
www.mil-1553.com

In-theater connectivity – Flexibility is the key to matching local infrastructure

By Ian Colville

DoD/U.S. Army photo by Pfc. Chris McKenna

Telecommunications infrastructure and connectivity underpin the effectiveness of military forces in the field. With multi-national force collaboration in theaters near and far becoming more common, the ability to quickly and easily interconnect communications equipment becomes a priority. The flexibility of DSP-based media gateways enables translation of disparate protocols and physical connections in the field through in-situ configuration and programming.

Whether in a rapid deployment scenario or a long-term, semi-permanent installation, military forces must have the ability to connect to diverse network types to facilitate operations. Telecommunications standards, networking protocols, and physical communications links have evolved over the past 75 years at different rates and in different dimensions across the world. In today's world, a deployed military force must have the flexibility to connect to local military, law enforcement, government, and public communications infrastructures to ensure secure and reliable communications in-theater. Through the programmability of Digital Signal Processor (DSP)-based media gateways, military forces can quickly establish communications links with local infrastructure and other military branches (Figure 1).

Communications – the third C in C4I

It is a well-established procedure for military units to deploy with self-contained communications network infrastructures. These highly sophisticated and secure communications networks underpin strategic and tactical communications, both in the field and upstream. The UK's Skynet 5 is a current example of deployable nodes homed on a satellite network. This type of network provides a communications umbrella for transporting information from front-line locations to a rear command center. It should, therefore, be obvious that with a variety of military units from different countries deployed in various combat zones, the communications equipment will not always be directly compatible. To solve that problem, there is a need to translate signaling and data between these systems.

In the telecommunications world, the devices that carry out this type of interconnection are known as media gateways. And as a force arrives at a site, there are many logistical concerns that require reliable communications beyond the secure strategic network. Gateways become as important outside the core military communications network as they are within.

The basic problem that a media gateway is trying to solve is marrying together the disparity inherent in different telecommunications networks, whether they are based on PSTN/TDM technology or IP

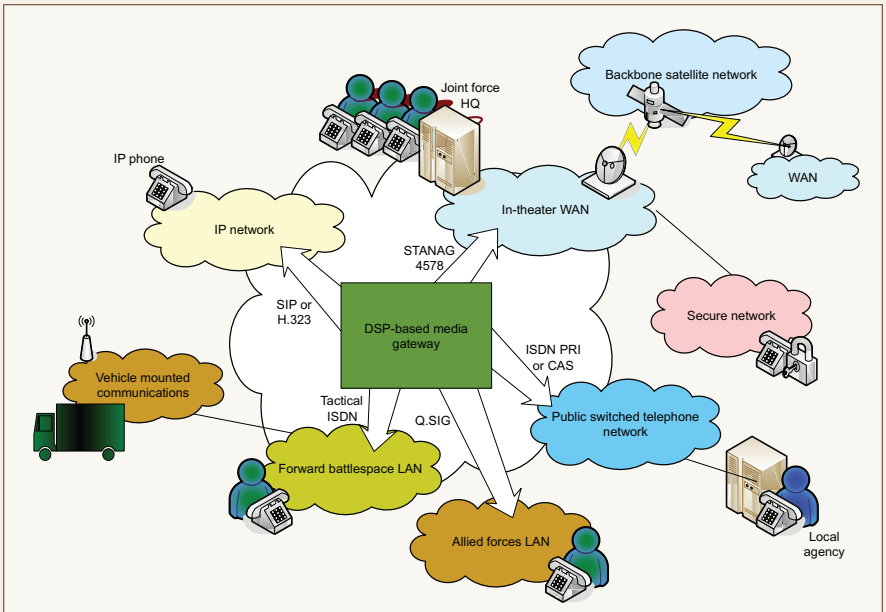


Figure 1 | DSP-based media gateways can join many disparate military and local-infrastructure networks in-theater.

networks based on the SIP protocol. The key function of media gateways is protocol conversion of the telecommunications signaling (see Sidebar 1), which is used to set up and tear down a voice call and transcoding of the actual voice data (what the caller hears) between the data types the different networks are capable of carrying. Session Initiation Protocol (SIP) is the predominant protocol used for setting up and tearing down media sessions for voice calls in an IP network. The legacy Public Switched Telephone Network (PSTN) has relied on Time Division Multiplexing (TDM) encoding to transport voice and signaling for many years. Simply put, IP and TDM are incompatible at the physical and transport layers. SIP is the primary IP voice protocol, and there are numerous TDM voice protocols.

PROTOCOL SUPPORT IN GATEWAYS – BEHIND THE SCENES

Many gateways support a simple interconnect between two preconfigured protocols only. Ideally, a media gateway should cater to the range of protocols likely to be encountered across all possible deployments. It should also be dynamically reconfigurable for any combination of protocols including MFC-R2 CAS, T1RBS, DPNSS, BT DASS2, H.323, ISDN PRI, Tac-ISDN, STANAG 4571, Q.SIG, NI-2, DMS100, INS1500, SIP, or SS7 on a per-deployment basis. This is possible with DSP-based media gateways, a multifaceted process including the following aspects and considerations.

Encoding

With T1 and E1 network connections, it is not only the physical layer that presents incompatibilities; the transport layer conveying the speech data is also encoded differently. In T1 networks in North America, a digital speech encoding scheme known as "μ-law" is employed, whereas European E1 networks use "A-law" encoding. This means media gateways must employ DSPs to handle the encoding conversion between the two types. Another factor that warrants attention is the disparity in signal levels between international telephone networks. Once again, gateways use DSPs to provide signal gain and attenuation, controlled individually across call routes to and from the gateway.

Transcoding

In IP networks, there is a similar problem, which media gateways solve by using DSPs. The Real-Time Protocol (RTP) used to parcel the speech data into packets for transmission also has to contend with data encoded using a variety of different encoding and decoding (codec) schemes. The ability of a gateway to handle an incoming call with one data type, for example, G.729, and encode the same data into an outgoing call using G.711 is known as *transcoding*. This function is performed by a specialized software program (firmware) that executes on DSPs in the gateway.

Routing

Typically, gateways need to apply some intelligence to the routing of incoming calls to an outgoing route toward the ultimate call destination determined by the called-party number. This is a gateway function that can be described as "call routing manager" and involves configuration options, which act upon the information contained in the calling-party number or called-party number. Often, the numbers are manipulated, which means that a number is changed, translated, or ported to a new number to achieve the desired routing to a given destination. Such functionality can be employed to implement so-called "black/white list" or "yes/no" routing. A route is configured to a destination – the next-in-line equipment – based on a number of appropriate parameters.

IP routing

In an IP network using SIP, the equivalent of a telephone number is a form of IP address, which might be represented as <sip: +1700554141@example.com>. For a gateway to correctly route a call to such a "number," it will often be configured to direct all calls with a given IP address, for example, <@example.com> to a SIP Proxy server, which will then be responsible to route the call onward to the destination <+1700554141>. If a proxy is not employed, the gateway will need an internal address translation database to interrogate for a route.

Scalability

Typically, a gateway will provide for connection to at least two disparate network types; however, capacity and scalability are also key considerations. A T1 trunk handles up to 23 concurrent telephone conversations, but a gateway may need to handle many more and also connect to several T1 endpoints or destinations (telephone exchanges or SIP proxy servers or PBXs). Consequently, it will need multiple T1 trunk connections (each physical trunk circuit can connect only to one single destination), which have to be either preprovisioned or upgraded. Gateways can scale from say, two trunks and 60 IP "channels" up to many tens of trunks and IP call capacities.

Sidebar 1 I DSP-based media gateways' protocol support is a complex process, often because of differing multinational protocols.

The media gateway's processing engine is based on DSPs, which perform algorithmic functions such as digitally encoding and decoding audio signals. DSP functions are firmware controlled, based on the specific application, and the firmware can be dynamically changed based on application needs. In the gateway, this dynamic configuration lends itself to managing the protocol and media stream conversion on a per-call basis.

In today's world, those in command of military forces must have reliable connectivity with local military, law enforcement, emergency services providers, and friendly government officials. DSP media gateways reduce the burden on the strategic network and enable a level of separation between the secure communications network and networks not fully under the control of the military.

Flexibility – one conversation, many languages

Depending on the level of development and locale, in-theater telecommunications networks may employ a variety of commercial network protocols including Signaling System #7 (SS7), Session Initiation Protocol (SIP), Channel Associated Signaling (CAS), Integrated Services Digital Network (ISDN), Digital Private Network Signaling System (DPNSS), and others. While performing similar functions, each protocol is a uniquely separate language. Gateways are regularly employed in commercial telecommunications to translate the signaling between these different protocols.

With each of these protocols, another layer of complexity arrives in the physical layer connection. Two basic digital trunk standards are known as E1 (2,048 Mbps European standard) and T1 (1,544 Mbps North American standard.) This is the crux of the situation in which multi-national forces find themselves. U.S. troops will have equipment based on the T1 standard, and British and European troops will have equipment based on the E1 standard. When both are deployed in the same theater, a gateway is required for inter-unit communication because they are not directly compatible. This can be further compounded by the local infrastructure, which could be based on either of the standards.

To be effective, a gateway must have the flexibility to terminate both T1 and E1 connections and to communicate with multiple systems operating with different protocols and encoding methods. The real key to DSP-based gateway success lies in the efficiency with which the gateway transcodes between encoding schemes and translates between different protocols and physical connections.

Secure interconnection with other military forces' communications systems may require different combinations of physical layer and protocol support. This is especially true for administrative communications, which are oftentimes provided by different PBX systems at each command post or encampment. ISDN is a common "uplink" connection for PBXs, but this connection can be any combination of commercial ISDN or Tactical ISDN, and T1 or E1 physical connections. The ISDN protocol was one of the first developed to carry both voice and data on the same multiplexed transport. As such, ISDN was adopted by many PBX manufacturers for digital trunk connections to telephone offices. Known as a Primary Rate Interface (PRI),

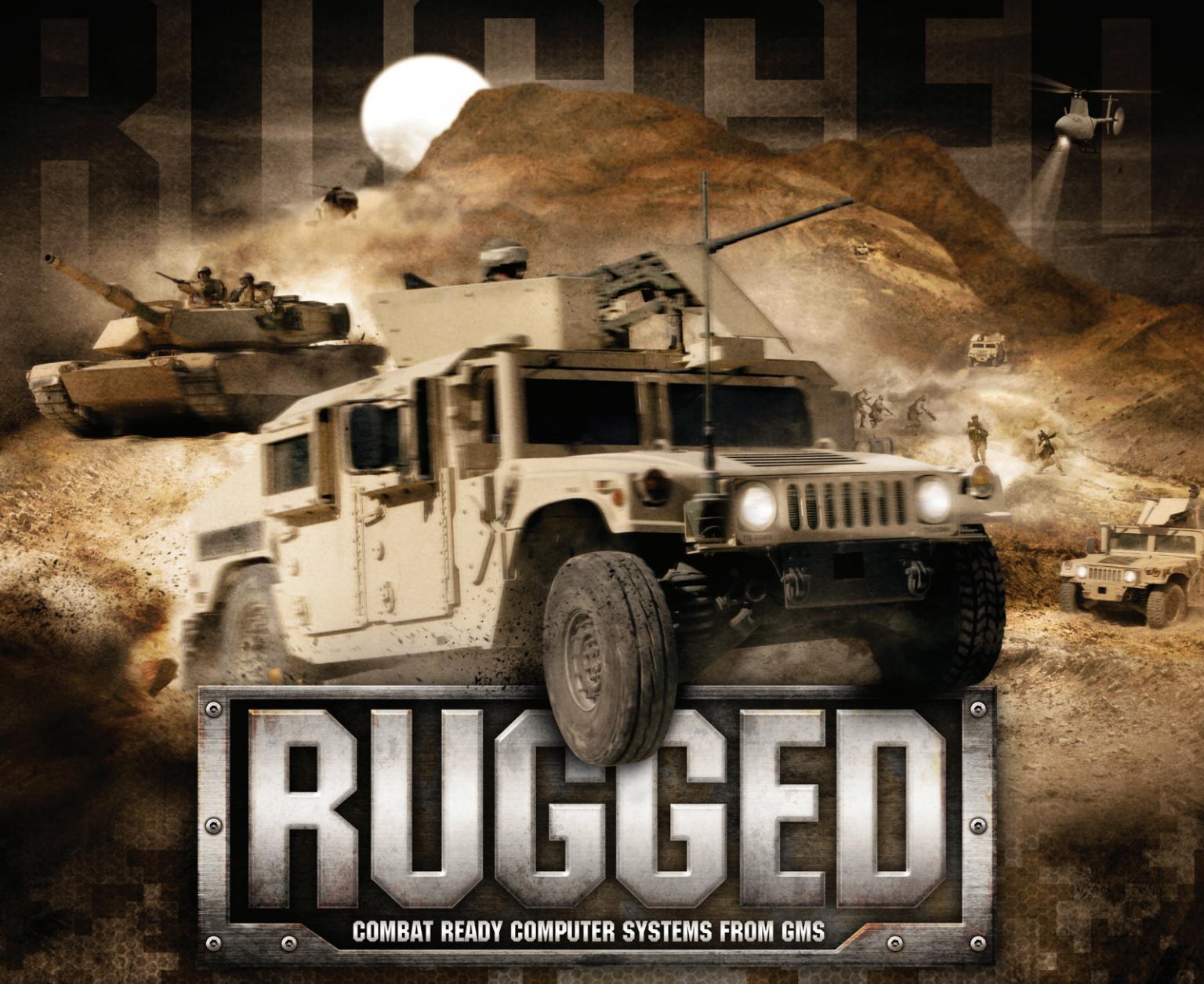
the ISDN trunk provides 23 simultaneous voice connections (T1) – and 30 in E1.

Media processors and DSPs

Military communications system developers must consider the varied requirements for network connectivity and provisionable features. Most effective is a COTS device supporting strong gateway flexibility and programmable DSP resources. Aculab's Prosody X media processing board addresses these needs with inherent support for most commercial and military protocols, selectable T1/E1 physical interfaces, and IP network connectivity. Many of these capabilities and functions have been tested and proven in the field by the UK military.

***Ian Colville** is a Product Manager at Aculab, where his key role includes support for the company's global sales force and interfacing to engineering and R&D. His past experience comprises a variety of management roles by a major telecommunications manufacturer. He can be contacted at ian.colville@aculab.com.*

Aculab
+44-1908-273-800 – UK
781-433-6000 – U.S.
www.aculab.com



POWERING OUR TROOPS

IN VEHICLES, IN THE SKY AND ON THE TROOPS, GMS COMPUTERS ARE ON THE FRONT LINES

Since General Micro Systems, Inc. was formed in 1979, it has become the industry leader for the design and manufacture of high-performance rugged systems based on GMS' Single Board Computers. GMS provides the highest level of performance per watt and per cubic inch with more functionality than any other supplier world wide. This unique performance is achieved via the smallest SBC in the market and unique cooling and packaging solutions, which allow the systems to operate up to +85°C. The entire GMS product line has been recognized as the most reliable offering in the industry while providing the highest quality, upgradability and the longest useful life at the lowest possible cost per performance.

"GOLDEN-EYE II" S802R
Up to 2.26GHz Core™ 2 Duo Processor
Up to 8GB of RAM, 5.25"x5.25"x2" and 2.5 lbs.
As low as 30W Total

"ARMOR" S822R
Up to 2.26GHz Core™ 2 Duo Processor
Dual PMC/XMC, Up to 8GB of RAM,
8"x11"x1.75", As low as 30W Total

"PEBBLE" SX400
3x1.6GHz Intel® Atom™ Processors
6GB of RAM, 4.25" x 3.25" x 2.25" and 1.5 lbs.
Under 30W Total and Mass Storage!

GMS COMPUTING ENGINES

General Micro Systems, Inc.
800-307-4863 **gms**4sbc.com
Since 1979

AS9100 REGISTERED FIRM

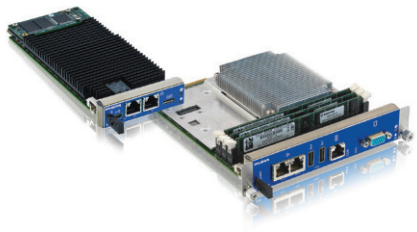
Extended Temp. -40°C to +85°C. **Options Include:** GPS, CANbus, WiFi, Cell Modem, Dual-Redundand 1553. Custom Configurations Welcome.

Kontron
14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

AM4020 and AM5030 – High performance AMCs

The AM4020 is a powerful single-width processor module, designed around the new Intel® Mobile Core™ i7 processor. With up to dual 2.53 GHz, the AMC offers the ultimate in computing power and integrated graphics for MicroTCA™ and AdvancedTCA® integrated platforms. The single-width module integrates the memory controller, PCI Express and the graphics processor within the multi-core processor.

The AM5030 processor module is equipped with the next generation Intel® Xeon® processor LC5518. In tandem with the Intel® 3420 server-class chipset it takes full advantage of processor performance and the high-speed FSB. The 45nm processor offers 8MB shared Last Level Cache, Hyper-Threading support and Intel Turbo Mode technology. Supporting a three-channel memory interface for up to 24 GB of ECC memory (DDR3 at 1066 MHz) the AM5030 ensures the highest memory bandwidth for maximum data throughput.



FEATURES

› **AM4020**
- Up to 8 GByte SDRAM memory (soldered) with ECC @ 1066 MHz
- Graphics interface
- Up to 32 GByte SATA NAND Flash memory module
- Comprehensive I/O capabilities
- PICMG AMC.0/.1/.2/.3 compliant
- Extended temperature according to MicroTCA.1

› **AM5030**
- Up to 24GB DDR3 memory with ECC @ 1066MHz
- Supporting AMC.1, AMC.2, AMC.3
- 2x 10 GbE (XAUI) to backplane
- Graphics interface
- Up to 32 GByte SATA NAND Flash memory module

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45805**

Pinnacle Data Systems, Inc.
6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

AMC-E24D Dual Display Graphics+Storage Module

This mid-size AMC offers both high performance dual display graphics and SATA onboard storage in a single module. Featuring the AMD Radeon™ E2400 graphics controller, the AMC-E24D module supports two independent high resolution display devices (one digital HDMI and one analog VGA) and features 128MB of on-chip GDDR3 video memory for fast, high quality 2D and 3D graphics rendering.

In addition, the module adds enterprise-grade SATA storage to xTCA systems. It carries a 2.5 inch hard drive (HDD) or solid state drive (SSD) with up to 320GB capacity for convenient local boot-up and storage. The Port Selector feature converts SAS commands to SATA allowing the use of SATA drives with compute modules that only support SAS interfaces. This robust module is an excellent I/O expander for ATCA carriers such as PDSi's ATCA-F1 blade.

FEATURES

› AMD Radeon E2400 graphics processor for superior 2D and 3D graphics acceleration
› 128MB on-chip GDDR3 video memory
› Dual independent high performance display interfaces – HDMI/DVI-D and analog VGA
› Dual integrated triple 10-bit DACs for dual RGB output
› Supports analog displays up to QXGA (2048 x 1536)
› HDMI connection for 480p, 720p and 1080i output
› 2.5 inch, 9.5mm SATA drives – Enhanced Availability HDDs up to 320GB or Intel SSDs up to 160GB
› SAS to SATA converter allows SATA drives to interface with SAS commands

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p45801**

COTS collection: Boards, Carriers, Mezzanines – AdvancedTCA (ATCA)

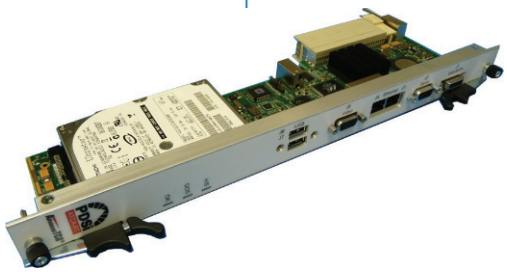
Pinnacle Data Systems, Inc.
6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

ATCA-RT01 Video+Storage Rear Transition Module

The ATCA-RT01 provides high reliability SAS storage, VGA video output, as well as additional Ethernet and USB I/O for AdvancedTCA x86 processor blades from PDSi (ATCA-F1) or Oracle's (Netra™ CP3220). With its industry standard Zone 3 interface, this RTM also operates with Oracle's UltraSPARC® T2-based CP3260 blade. For systems requiring a mix of these compute blades, the ATCA-RT01 can provide a convenient single RTM solution.

The robust ATCA-RT01 RTM has been thoroughly tested and successfully deployed in critical systems including military applications. The 2.5 inch SAS HDD provides local storage with front-panel connection to secondary or redundant storage arrays. Additional ports include VGA video output and USB I/O for convenient local monitoring. In combination with PDSi's ATCA-F1 blade, the ATCA-RT01 RTM has also been validated and is hardware-compliant with the VMWare® ESX Server virtualization platform.

Pinnacle Data Systems, Inc.



FEATURES

- Compatible with x86 and Oracle SPARC® front blades, including PDSi dual AMD Opteron™ ATCA-F1, Oracle Netra CP3220 (single AMD Opteron) and Oracle Netra CP3260 (UltraSPARC® T2)
- High resolution VGA video output
- Onboard SAS storage
- 2 x 10/100BASE-T Ethernet ports
- 1 x Serial port
- 2 x USB ports
- VMware-compliant
- Pigeon Point IPMC management
- Customization and 3rd party integration welcomed, extended availability assured

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p45799**

COTS collection: Boards, Carriers, Mezzanines – AdvancedTCA (ATCA)

Pinnacle Data Systems, Inc.
6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

ATCA-F1 Dual Socket AMD Opteron Processor Blade

This industry-proven ATCA-F1 server blade features two AMD Opteron™ dual-core or quad-core processors for significant performance available in a general purpose AdvancedTCA® compute board. Now offered with a full 32GB of memory and the benchmark-setting AMD quad-core CPUs, this blade supplies the extra level of computing horsepower and built-in virtualization support demanded by the next generation of COTS integrated architectures. With its robust design, the ATCA-F1 blade has been thoroughly tested and successfully deployed in critical systems, including military applications.

The ATCA-F1 features a standard Zone 3 interface for connection to PDSi's ATCA-RT01 rear transition module (RTM), which adds SAS storage, video, Ethernet and USB resources. The ATCA-F1 and ATCA-RT01 RTM combination has been validated and is hardware-compliant with the VMWare® ESX Server virtualization platform.

Pinnacle Data Systems, Inc.

FEATURES

- 2 x AMD Socket F(1207-pin) CPU sockets
- Dual-core or quad-core AMD Opteron CPUs
- Zone 3 RTM interface (to ATCA-RT01 RTM)
- 4 DIMM sockets, up to 32GB DDR2 memory
- Ethernet Base and Fabric Interfaces
- 2 x Gb Ethernet links (front panel)
- 2 x USB 2.0 (front panel)
- 1 x AMC.1 slot (mid-size)
- VMware-compliant
- Pigeon Point IPMC management
- Customization and 3rd party integration welcomed, extended availability assured

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p46014**

ALPHI Technology Corporation

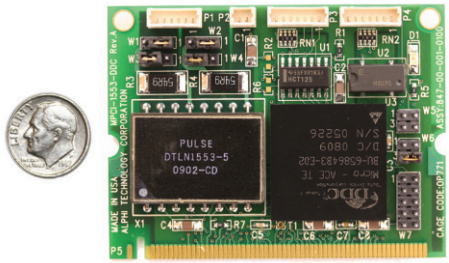
1898 E. Southern Avenue • Tempe, AZ 85282 USA
480-838-2428
www.Alphitech.com

MPCI-1553-DDC

The ALPHI MPCI-1553-DDC provides a dual redundant 1553 controller, on a very small Mini PCI Type III Module; 44.6mm x 59.8mm. It features the BU-65864 communication device as its 1553 bus controller, or remote terminal, or monitor terminal. A single controller has two redundant channels and built in transceivers. The controller has internal transceivers for both channel A and B. The Mini PCI board has on-board transformers for both channels. The board format is a Mini PCI board layout. This is a perfect solution for a wide array of 1553 communication applications such as:

- Industrial and Military: Test equipment supporting Evaluation, Simulation, Monitoring, and Analysis
- Operational equipment such as Avionics, Space, Satellite systems, Aircraft onboard systems, UAVs, etc.

ALPHI Technology also provides a large choice of other MIL-STD-1553 solutions for all major form factors.



FEATURES

- Controller of dual redundant (A/B channel) 1553 communications
- 32-Bit/33MHz PCI Interface
- DDC Chip BU-65864
- Programmable Bus Controller, Remote Terminal, or Monitor Terminal
- Multiprotocol Support MIL-STD-1553A/B Notice 2 and STANAG 3838
- +3.3V Operation and Logic
- Long or short stub support
- Low power consumption
- On-chip transceivers
- Selectable 10, 12, 16 or 20 MHz Systems Clocks

For more information, contact: sales@alphitech.com **www.mil-embedded.com/p41481**

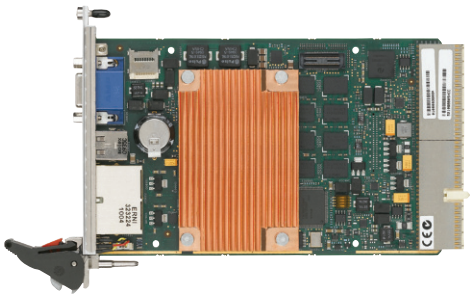
Emerson Network Power

2900 S. Diablo Way, Suite 190 • Tempe, AZ 85282 USA
1 800 759 1107 or +1 602 438 5720
Emerson.com/EmbeddedComputing

CPCI7203 PICMG 2.30 3U Processor Board

The Emerson Network Power CPCI7203 3U form factor SBC features the Intel® Core™ i7 integrated dual-core processor for use in high performance, space-constrained applications. On-board memory includes up to 4GB DDR3 and 256KB non-volatile Ferroelectric Random Access Memory (F-RAM). F-RAM does not require batteries or periodic refreshes and offers many more read/write cycles and faster performance than flash memory, which benefits critical non-volatile data storage, data logs and dynamic program updates. The Trusted Platform Module (TPM) enhances data security and encryption capabilities. The CPCI7203 supports a range of operating system and software options.

The CPCI7203 is a low-power, high-performance SBC that offers full hot swap compliance per PICMG® 2.1 and supports the PICMG 2.9 System Management specification and PICMG 2.30 CompactPCI PlusIO specification, which supports the new serial buses on the J2 connector for data transfer rates of up to 5Gbps.



FEATURES

- Intel Core i7 integrated dual-core processor (up to 2 GHz)
- Up to 4GB ECC-protected DDR3-800/1066 (soldered)
- 256KB non-volatile F-RAM
- Mobile Intel® 5 Series chipset: Ibex Peak-M PCH
- One VGA and two on-board Gigabit Ethernet interfaces
- One UART and four USB 2.0 ports
- Four PCI Express and two SATA interfaces
- Ideal for a wide range of industrial, medical and military/aerospace applications, such as railway control, semiconductor processing, robotics, image processing, vehicle communications and on-board flight information systems

For more information, contact: EmbeddedComputingSales@Emerson.com **www.mil-embedded.com/p45777**

COTS collection: Boards, Carriers, Mezzanines – CompactPCI

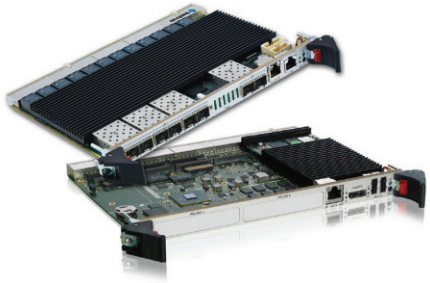
Kontron
14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

CP6002 and CP6930 – a perfect pair for 6U CPCI

Core™ i7 Processor Board and 10 Gigabit Ethernet Switch

The Kontron CP6002, a CompactPCI PICMG 2.16 compliant 6U CPU board, comes with various rugged levels. Based on the Intel® Core™ i7 processor and mobile chipset, the Kontron CP6002 features high computing and graphic performance with a low thermal power design and a complete set of data, communication and multi-media interfaces.

The Kontron CP6930 is a 6U hot-swappable cPCI and VITA 31 switch with 26 GbE ports and six high performance uplinks (10 GbE). The Kontron CP6930 is designed for future oriented applications requiring outstanding bandwidth and communication safety. Six SFP+ front ports running at 10Gb/s full line speed and two SFP ports at the front, with 1Gb support, provide both flexibility and value.



FEATURES

› **CP6002**
- Rugged Levels for demanding application requirements
- Highly shock and vibration resistant, extended temperature range
- Comprehensive I/O capabilities: 4x GbE, 6x SATA with RAID, DVI & HDMI, onboard HDD, CompactFlash

› **CP6930**
- Non-blocking layer 2 & 3 switching & routing, IPv6 compliant
- 24x Gigabit Ethernet Ports according to PICMG 2.16/VITA31.1
- Fully managed
- Hot swap, IPMI
- DHCP Server and Boot media support
- Comprehensive firmware package

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45580**

COTS collection: Boards, Carriers, Mezzanines – CompactPCI

Kontron
14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

CP3002 and CP3923 – a perfect pair for 3U CPCI

Core™ i7 Processor Board and Gigabit Ethernet Switch

The Kontron CP3002-RC, with the Intel® Core™ i7 mobile processor, is conduction cooled and supports operational temperatures ranging from -40°C to +85°C according to VITA 47. The powerful processor and the ruggedness make the board ideal for a wide range of real-time and data intensive applications in military and other sectors that require reliable performance in harsh environments.

The Kontron CP3923 is a fully managed layer 2/3 Gigabit Ethernet switch offering IPv4/IPv6 routing and full management capabilities. It supports a powerful set of CLI, Telnet, Web and SNMP management interfaces to configure the entire set of protocols and parameters. This includes Layer 2 and Layer 3 (IPv4/IPv6) protocols, Multicasting, QoS and Security. The Kontron CP3923 maximizes the reliability of rugged COTS applications by supporting Intelligent Platform Management (IPMI) and hot swap capabilities.

FEATURES

› **CP3002-RC**
- Rugged conduction-cooled
- Operating temperature -40°C to +85°C (VITA 47)
- 8 GB soldered memory ECC at 1066 MHz
- Comprehensive feature set – 4xGBE, 2xUSB 2.0, VGA, 2x COM

› **CP3923**
- Fully managed layer 2 and 3 switching and routing
- Leading edge technology based on BCM56226
- Versatile design with RJ45 or M12-D front options
- EN50155 compliant (with M12 versions)
- Design for conduction cooling

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45804**

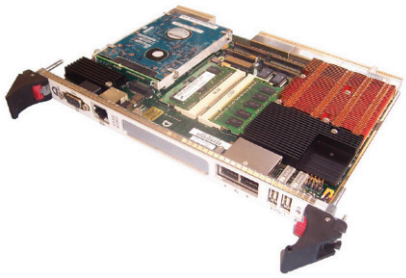
COTS collection: Boards, Carriers, Mezzanines – CompactPCI

Pinnacle Data Systems, Inc.
6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

CP86-N1 Intel Core™2 Duo Processor Blade

PDSi's Intel-based CompactPCI x86 Processor Blade (CP86-N1) provides a robust, high-performance general purpose compute platform for use in CompactPCI PICMG 2.16 systems. This latest addition to PDSi's ComputeNode™ family of carrier-grade CompactPCI solutions is built around Intel's 45nm technology "Penryn" Core 2 Duo processor and server-grade "Eagle Lake" chipset (5100 MCH/ICH9R) supporting ECC memory. This powerful, compact blade offers the highest performance and dependability in its class.

The ComputeNode CP86-N1 blade includes a standard PMC/XMC site for I/O expansion and features an onboard SATA drive plus high resolution graphics. I/O capability covers a very broad range of interfaces that can be accessed through one of PDSi's companion rear transition modules such as CP86-RT01. Two 1000Base-T Ethernet ports provide the PICMG 2.16-compliant fabric interfaces, making the CP86-N1 fully compatible with any ComputeNode cPSB chassis.



FEATURES

- Server-grade CompactPSB compute blade
- Intel T9400 Core 2 Duo 2.53 GHz with 5100 MCH/ICH9R
- Up to 8GB Registered ECC DDR2 667 Memory
- 1 PMC/XMC mezzanine site standard
- 2 x 1Gb Ethernet links (front panel)
- 2 x USB 2.0 ports (front panel)
- Rear I/O interfaces
- Customization and 3rd party integration welcomed, extended availability assured

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p40980**

COTS collection: Boards, Carriers, Mezzanines – Data acquisition

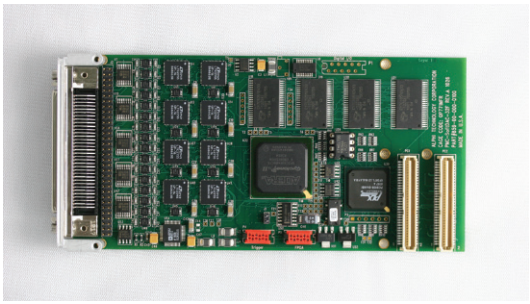
ALPHI Technology Corporation
1898 E. Southern Avenue • Tempe, AZ 85282 USA
480-838-2428
www.Alphitech.com

PMC-SoftDac-32F single-wide 32-bit PMC module

ALPHI Technology Corp. releases a single-wide 32-bit PMC module providing up to 32 channels of high-speed 2µS 16-bit analog outputs with individually programmable range. The board architecture uses a very large buffer memory and is optimized for high-speed DMA transfers, allowing extremely high transfer rates with little processor load, while making the programming simple and logical.

The variety of output voltage ranges (0V to 5V, 0V to 10V, ±5V, ±10V, ±2.5V, -2.5V to 7.5V) is individually selectable on a per-channel basis, and within a channel data can be changed on-the-fly within the data stream. The sample FIFO contains 1 million samples and can be filled up using DMA. Additionally, available Software Drivers include Linux drivers, Microsoft Windows™ drivers, and VxWorks drivers.

The PMC-SoftDac-32F is optimal for these COTS applications: aerospace/defense; industrial; transportation; waveform generator; test equipment supporting evaluation and simulation; monitoring and analysis; operational equipment; and many others.



FEATURES

- 32 channel, 16-bit D/A
- 2µS settling time, 0 to 5V range
- Six programmable output ranges per channel
- Unipolar: 0V to 5V, 0V to 10V
- Bipolar Mode: ±5V, ±10V, ±2.5V, -2.5V to 7.5V
- 2M X16 DAC buffers
- Two stage buffers
- Global output buffer with internal or external triggering
- Flash EPROM for configuration file
- VITA 4, single wide PMC module

For more information, contact: info@alphitech.com **www.mil-embedded.com/p45441**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

Dual 4.0 GSps DAC

The Annapolis Micro Systems Dual Channel 4.0 GSps D/A I/O Card provides one or two 12-bit digital output streams at up to 4.0 GSps. The board has one or two Max 19693 for 4.0 GSps, Max 19692 for 2.3 GSps, or Max 5859 for 1.5 GSps.

The Dual Channel DAC board has five SMA front connectors: two single-ended DAC outputs, a high-precision trigger input with Fs precision, and a universal single- or double-ended 50-ohm clock input. It has excellent gain flatness in the first 3 Nyquist Zones, ultra-low skew and jitter saw-based clock distributions, and main board PCLK sourcing capability.

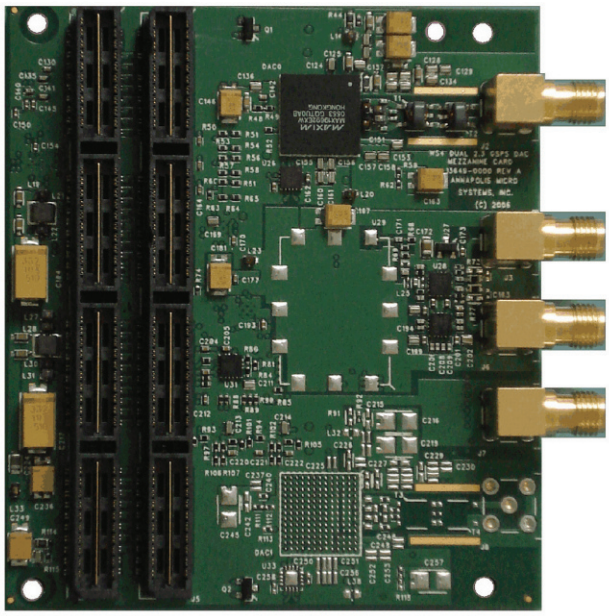
In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine supplies user-configurable real-time A to D conversion and digital output. Up to two A/D or D/A and up to two serial I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS or IBM Blade main board, or up to one A/D or D/A and up to one serial I/O card on each PCI-X or PCIe main board.

Our boards run on many different operating systems. We support our boards with a standardized set of drivers, APIs, and VHDL simulation models. VHDL source is provided for the interfaces to A/Ds, D/As, DRAM/SRAM, LAD bus, I/O bus, and PPC Flash. CoreFire™ users will have the usual CoreFire Board Support Package.

The combination of our COTS hardware and our CoreFire FPGA Application Development tool allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed. We offer training and exceptional special application development support, as well as more conventional customer support.



FEATURES

- One or two 12-bit Analog to Digital Converters: Max 19693 for 4.0 GSps, Max 19692 for 2.3 GSps, or Max 5859 for 1.5 GSps
- Five SMA front panel connectors: two single-ended DAC outputs, one high-precision trigger input with Fs precision
- One universal single- or double-ended 50-ohm clock input
- High-precision trigger input manufacturing options – 1.65 V LVPECL, 2.5 V LVPECL, 3.3 V LVPECL
- I/O card plugs onto WILDSTAR 4 or 5 VME/VXS/PCI-X/PCIe/ IBM Blade main boards
- JTAG, ChipScope, and Serial Port access
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for board-level interfaces
- Proactive thermal management system
- Industrial temperature range
- Includes one-year hardware warranty, software updates, and customer support
- Designed and manufactured in the USA

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p36023**

WinSystems, Inc.

715 Stadium Drive • Arlington, Texas 76011 USA
817-274-7553
www.WinSystems.com

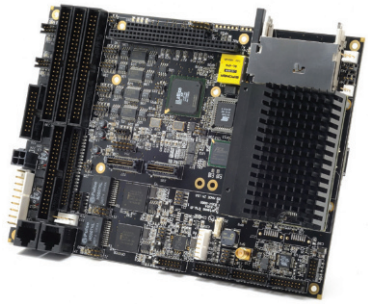
WinSystems®
An Employee-Owned Company

Fanless Intel® Atom™ SBC with SUMIT and PC/104 Expansion

WinSystems' EBC-Z510 is a full-featured EBX-compatible Single Board Computer (SBC) with a rich array of onboard peripherals plus even more I/O expansion options. This SBC supports the new SUMIT-ISM I/O expansion standard, and has both a SUMIT AB connector pair, plus legacy PC/104 connectors to support SUMIT-ISM, PC/104, or Pico-I/O modules.

Since the EBC-Z510's architecture is PC compatible, it supports Windows® XP Embedded and Linux operating systems along with a vast software development tool set including device drivers and libraries. It also supports advanced features such as custom splash screen, power management modes, and PXE boot.

The board is designed for rugged applications including industrial automation, security, MIL/COTS, and transportation. It operates over a temperature range of -40°C to +70°C without a fan or the necessity to slow down the CPU clock frequency.



FEATURES

- Intel® Atom™ 1.1GHz or 1.6GHz processor supported
- Advanced power management features
- Graphics Media Accelerator supports CRT and flat panels
- Two Intel Gigabit Ethernet controllers
- 802.11a/b/g wireless supported with MiniPCIe connector
- Four serial COM ports, four USB 2.0 ports with two more on SUMIT, and 48 bidirectional TTL digital I/O lines
- Bidirectional LPT port plus AT keyboard and mouse controller
- Supports CompactFlash Type 1 and 2 cards
- SUMIT-ISM, PC/104, and Pico-I/O module expansion
- Quick start kits for fast system development

For more information, contact: Info@WinSystems.com **www.mil-embedded.com/p46016**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

WILDSTAR 6 – Pluggable Virtex-6 Module for IBM Blade

Annapolis Micro Systems is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Our 14th-generation Pluggable Virtex-6 Module for WILDSTAR 5 for IBM BladeCenter uses Xilinx's newest Virtex-6 FPGAs for state-of-the-art performance. This module plugs into the WILDSTAR 5 for IBM BladeCenter. Other potential modules available today include Virtex-5 and Tilera. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

Develop your application very quickly with our CoreFire™ FPGA Application Builder, which transforms the FPGA development process, making it possible for theoreticians to easily build and test their algorithms on the real hardware that will be used in the field. CoreFire, based on dataflow, automatically generates distributed control fabric between cores.

Our extensive IP and board support libraries contain more than 1,000 cores, including floating point and the world's fastest FFT. CoreFire uses a graphical user interface for design entry, supports hardware-in-the-loop debugging, and provides proven, reusable, high-performance IP modules. The Virtex-6 Pluggable Module provides extremely high overall throughput and processing performance. The combination of our COTS hardware and CoreFire allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.

Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed. We offer training and exceptional special application development support, as well as more conventional support.

FEATURES

- One Virtex-6 FPGA processing element – XC6LX240T, XC6LX365T, XC6LX550T, XC6SX315, or XC6SX475
- Up to 3.5 GB DDR2 DRAM in 7 banks or up to 224 MB DDRII or QDRII SRAM
- Plugs into any of 6 pluggable processing module slots on WILDSTAR 5 for IBM BladeCenter
- Up to 16 RocketIO lanes to crossbar
- 4 lanes connect to PCIe switch on WILDSTAR 5 Blade Board
- LVDS systolic ring connecting all I/O FPGAs and computing FPGAs
- RocketIO systolic ring connecting pluggable positions 0-2 and 3-5
- Programmable Flash to store FPGA images on WILDSTAR 5 Blade Board, which acts as host
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for hardware interfaces and ChipScope access
- Host software: Windows, Linux, VxWorks, etc.
- Available in both commercial and industrial temperature grades
- Proactive thermal management system – board-level current measurement and FPGA temperature monitor, accessible through Host API
- Save time and effort and reduce risk with COTS boards and software
- Achieve world-class performance – WILD solutions outperform the competition
- Includes one-year hardware warranty, software updates, and customer support; training available

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p45438**

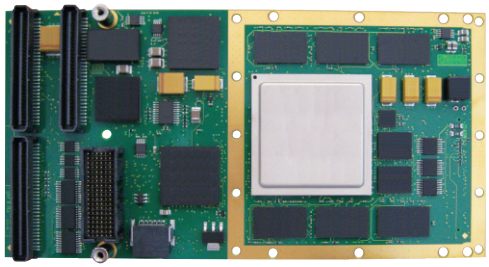
Creative Electronic Systems

Avenue Eugène-Lance 38 • 1212 Grand Lancy 1 • Geneva Switzerland
+41 (0)22.884.51.00
www.ces.ch

CES Latest FPGA Processing Boards

The latest family of CES general-purpose user-programmable I/Os (GPIO) is based on PMCs or XMCs, which are equipped with large FPGAs. The main feature of these boards is the Xilinx Virtex-6 FPGA, which is connected to the PCI and CES high-speed serial links, as well as with all required external memory sub-systems, including an ultra-high-speed staging buffer. CES GPIOs can be integrated on CES VPX, VME or CompactPCI processor boards, creating a very powerful user-programmable assembly.

CES provides a complete FPGA programming environment, which allows users to develop their own applications and to interconnect with all of the hardware functionalities of CES boards. The CES FPGA BSP product (FBSP) is developed specifically for user-application development and is transverse compatible between all CES FPGA boards, independent of their implementation. CES products come in a variety of form-factors, environmental grades, power consumption requirements, and flexible configurations, with a variety of extended software packages.



FEATURES

- PMC or XMC form-factor
- Air-cooled or conduction-cooled environmental specification
- Latest Virtex-6 LXT or SXT FPGA
- Ultra high-speed memory sub-system (DDR3, QDR2, RLDRAM)
- PCIe x 8 on primary XMC
- High-speed links on secondary XMC
- 64 user I/O lines
- Linux, VxWorks or VxWorks 653 software packages
- FPGA user development toolkit (FPGA BSP)
- Board management controller (BMC)
- Debugging environment

For more information, contact: ces@ces.ch **www.mil-embedded.com/p45644**

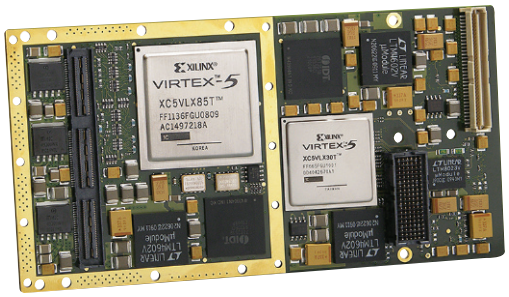
COTS collection: Boards, Carriers, Mezzanines – FPGA/Reconfigurable computing

Acromag

30765 S. Wixom Road • Wixom, MI 48393-7037 USA
877-295-7088
www.acromag.com/fpga

XMC / PMC Virtex-5 FPGA Modules

Acromag's PMC and XMC configurable FPGA modules are available with a choice of Xilinx Virtex-5 FPGAs optimized for logic, DSP, or co-processor applications. The boards are enhanced with multiple high-speed memory buffers and a high-throughput PCIe or PCI-X interface. Generous DDR2 SDRAM buffers store captured data prior to FPGA processing. Afterward, data is moved to dual-port SRAM for high-speed DMA transfer to the bus or CPU. Field I/O interfaces to the FPGA via the rear J4/P4 connector and/or with optional front mezzanine extension I/O modules. Also, take advantage of the conduction-cooled design or select an extended temperature version. The result is a powerful and flexible I/O processor module that is capable of executing your custom instruction sets and algorithms. Typical uses include hardware simulation, communications, military servers, in-circuit diagnostics, signal intelligence, and image processing. Acromag's Engineering Design Kit provides software utilities and example VHDL code to simplify your program development and get you running quickly.



FEATURES

- PMC or XMC format with Xilinx Virtex-5 FPGA
- Up to 155,000 logic gates, 640 DSP48E slices, or hard-core PowerPC (VLX, VSX, or VFX)
- High-throughput PCIe (XMC) or PCI-X bus (PMC) interface
- 64 I/O or 32 LVDS lines direct to FPGA via rear (J4)
- Extension I/O modules available for front mezzanine to provide additional analog or digital I/O processing
- Two banks of up to 1M x 32-bit dual-ported SRAM
- Two banks of 32M x 16-bit DDR2 SDRAM
- Supports dual DMA channel data transfer to CPU/bus
- Up to -40 °C to +85 °C or conduction-cooled operation

For more information, contact: solutions@acromag.com **www.mil-embedded.com/p45789**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

2.0 GSps 10-bit A/D

The Annapolis Single Channel 2.0 GSps A/D I/O Card provides one 2.0 GHz A/D input with a resolution of 10 bits. The board has one e2v AT84AS004 that is fed by an onboard analog input circuit, which converts the single-ended 50-ohm SMA input into differential signals for the ADC. There is a universal single-ended 50-ohm SMA clock input and a high-precision trigger input allowing multiple A/D I/O cards to be synchronized together. Synchronization of A/D I/O cards can be facilitated by the Annapolis 4 or 8 Channel Clock Distribution Boards.

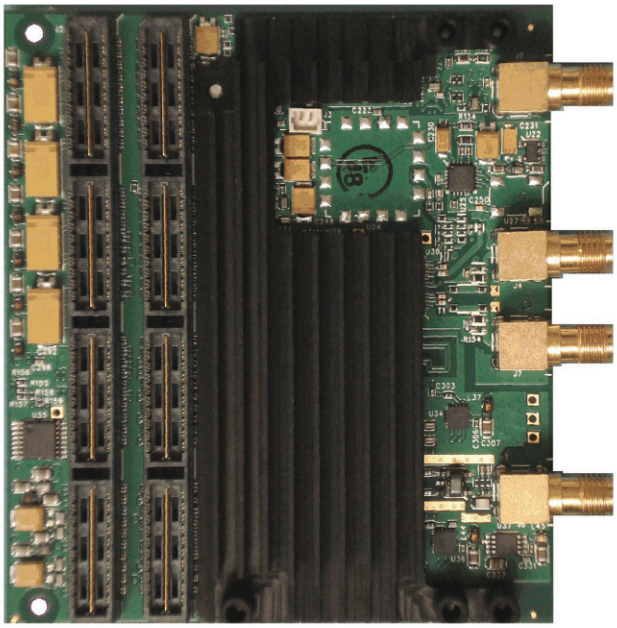
In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine supplies user-configurable real-time continuous sustained processing of the full data stream. Up to two A/D and up to two serial I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS or IBM Blade main board or up to one A/D and up to one serial I/O card on each PCI-X or PCIe main board.

Our boards run on many different operating systems. We support our boards with a standardized set of drivers, APIs, and VHDL simulation models. VHDL source is provided for the interfaces to A/Ds, D/As, DRAM/SRAM, LAD bus, I/O bus, and PPC Flash. CoreFire™ users will have the usual CoreFire Board Support Package.

The combination of our COTS hardware and our CoreFire FPGA Application Development tool allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed.



FEATURES

- One e2v AT84AS004 (2.0 GHz, 10-bit) A/D
- Four SMA front panel connectors: one 50-ohm analog input, one single-ended 50-ohm clock input, or differential 1.65 V LVPECL clock input
- One high-precision trigger input with Fs precision; high-precision trigger input – 1.65 V LVPECL, 2.5 V LVPECL, 3.3 V LVPECL
- Analog input bandwidth is 100 KHz-3.0 GHz
- I/O card plugs onto WILDSTAR 4 or 5 VME/VXS/PCI-X/PCIe/ IBM Blade main boards
- JTAG, ChipScope, and Serial Port access
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for board-level interfaces
- Proactive thermal management system
- Includes one-year hardware warranty, software updates, and customer support
- We offer training and exceptional special application development support, as well as more conventional customer support
- Designed and manufactured in the USA

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p36021**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

Four Channel Clock Synchronization Board

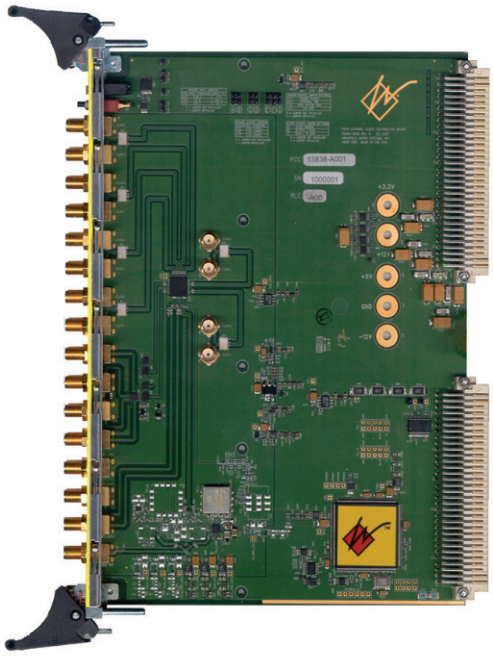
The Four Channel Clock Distribution Board distributes a common clock and synchronized control signal triggers to multiple cards in the system. This 6U VME64x/VXS board provides four high-speed, ultra-low jitter, ultra-low skew differential bulkhead mounted clock outputs, two ultra-low skew differential vertical SMA onboard clock outputs, and four ultra-low skew and clock synchronized single-ended bulkhead mounted control signal triggers.

A jumper set at board installation time or via optional P2 serial port determines which one of the two installed clock sources is active. Manufacturing options for Clock Source 0 are single-ended or differential external clock, a PLL ranging from 700 MHz to 3 GHz with an onboard reference oscillator, or a PLL ranging from 700 MHz to 3 GHz with a 10 MHz external reference. Manufacturing options for Clock Source 1 are a PLL ranging from 700 MHz to 3 GHz with an onboard reference oscillator, a PLL ranging from 700 MHz to 3 GHz with a 10 MHz external reference, or an onboard low frequency oscillator ranging up to 800 MHz.

The four control trigger outputs can originate from a high-precision external source via front panel SMA, from a manual push button on the front panel, or from software via an optional Backplane P2 Connector Serial Port. These trigger outputs are synchronized to the distributed clock to provide precise output timing relationships.

Annapolis Micro Systems is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed. We offer training and exceptional special application development support, as well as more conventional support.



FEATURES

- Four synchronized differential front panel clock outputs up to 3 GHz with typical skew of 5 ps
- Ultra-low clock jitter and phase noise – 275 fs with 1,280 MHz PLL and external 10 MHz reference
- Onboard PLL's manufacturing options provide fixed frequencies of 700 MHz to 3 GHz, locked to internal or external reference
- Onboard low frequency oscillator provides fixed frequencies up to approximately 800 MHz
- Four synchronized trigger outputs, always synchronized with the output clock, with typical skew of 5 ps
- Jumper selectable trigger output levels of 3.3 V PECL, 2.5 V PECL, or 1.65 V PECL
- Source trigger from front panel SMA, push button, or optional P2 serial port
- Cascade boards to provide up to 16 sets of outputs
- Compatible with standard VME64x and VXS 6U backplanes
- Universal clock input supports wide range of signal options, including signal generator sine wave
- Differential clock input permits multiple standards including: LVDS, 3.3 V PECL, 2.5 V PECL, and 1.65 V PECL
- Clock and trigger outputs compatible with all Annapolis Micro Systems, Inc. WILDSTAR™ 2 PRO I/O Cards and WILDSTAR™ 4/5 Mezzanine Cards

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p33661**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

SFPDP UNI6 I/O

Annapolis Micro Systems Inc.'s FPGA-based WILDSTAR family provides 24 SFPDP channels per VME slot.

The Annapolis SFPDP cards (UNI3 or UNI6) come with an easy to use Serial FPDP interface supporting up to 12 lanes of 2.5 Gb full duplex data. Three frame types are supported: Normal Data Fiber Frame, Sync Without Data Fiber Frame, and Sync with Data Fiber Frame in Point-to-Point Mode.

The card has three individually configurable, industry-standard 4X connectors, providing four lanes per connector, with dedicated signal conditioners to ensure clean communication. It supports up to 7.5 GB full duplex per I/O card and a wide variety of readily available copper and fiber cables.

Up to two serial I/O cards and two LVDS I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS main board, with half that number for the PCI-X or PCIe. The SFPDP card (UNI6) supports RocketIO protocol at up to 75 Gb full duplex per I/O card, three ports of 10 G full duplex InfiniBand per I/O card, or 10 G full duplex Ethernet per I/O card.

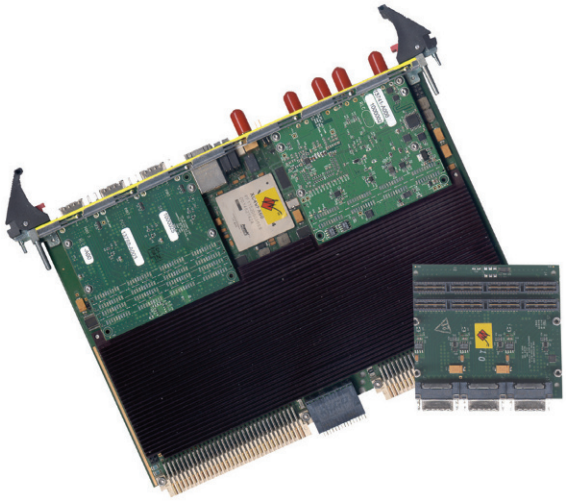
No other FPGA board vendor can match the volume of data we can send straight into the heart of the processing elements and then straight back out again.

An FPGA-based high-performance processing engine thrives on data streaming in and out at high rates of speed. The FPGAs should be part of a balanced and unified system architecture, providing maximum performance, with memory, processing power, and I/O speeds designed and integrated for performance, scalability, and growth.

Annapolis Micro Systems, Inc.'s WILDSTAR 4 (Xilinx Virtex-4 based) and WILDSTAR 5 (Xilinx Virtex-5 based) families of FPGA-based processing boards also support an extensive set of extremely high-quality A/D and D/A boards.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed.



FEATURES

- Three individually configurable 4X connectors – four lanes per connector
- Up to four 2.5 Gb full duplex Serial FPDP ports per connector
- Up to 25 Gb full duplex RocketIO per connector
- Up to 10 Gb full duplex InfiniBand per connector
- Up to 10 Gb full duplex Ethernet per connector
- Optional onboard oscillators for other line rates like Fibre Channel
- I/O card plugs onto WILDSTAR 4 or 5 VME/VXS/IBM Blade Chassis/ PCI-X/PCI Express main board
- JTAG, ChipScope, and Serial Port access
- Proactive thermal management system; available in both commercial and industrial temperature grades
- Includes one-year hardware warranty, software updates, and customer support
- We offer training and exceptional special application development support, as well as more conventional customer support
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for hardware interfaces

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p35968**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

Tri XFP I/O Card

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

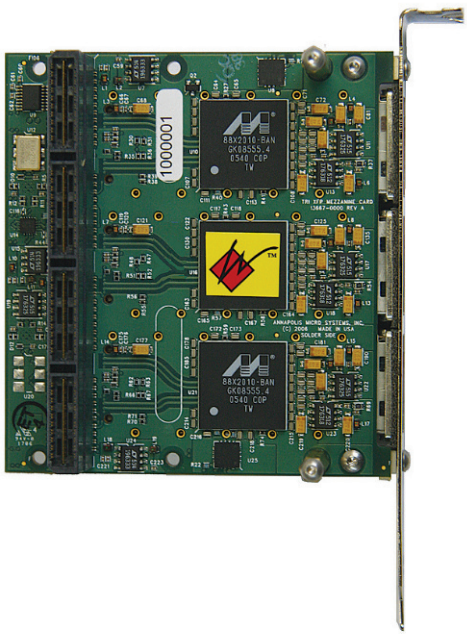
The Annapolis Tri XFP I/O Card, which works with the WILDSTAR 4/5 Family Architecture, has three 10 Gb individually configured XFP connectors, each with its own XAUI to XFI converter. Industry-standard pluggable fiber optic transceivers can be purchased from Annapolis or from other vendors. The Tri XFP provides up to 30 Gb full duplex I/O directly between the outside world and the RocketIO pins on the Xilinx Virtex-II Pro or Virtex-4 I/O FPGA on the WILDSTAR 4 main board. No other vendor provides that volume of data straight into the heart of the processing elements and then back out again.

Two I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VXS or PCI-X/PCI Express board, with up to 30 million user reprogrammable gates.

The Tri XFP card will support 10 Gb Ethernet, 10 Gb Fibre Channel, and OC-192. Although the protocols will be provided as black box solutions with few modifications by users allowed, more adventurous users who choose to develop their own communications protocols from the basics already have access to all the board resources through VHDL source for the interfaces to SRAM, signal conditioners, LAD bus, I/O bus, and PPC Flash. CoreFire™ users will have the usual CoreFire Board Support Package.

The Tri XFP is the first of many I/O cards Annapolis will be releasing for its new WILDSTAR 4/5 Architecture Family, which uses Xilinx Virtex-4 and Virtex-5 FPGAs for processing elements. WILDSTAR 4 is the tenth generation of Xilinx FPGA processing-based COTS boards from Annapolis.

Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed. We offer training and exceptional special application development support, as well as more conventional customer support.



FEATURES

- Up to 10 Gb Full Duplex Ethernet per connector
- Up to 10 Gb Fibre Channel
- OC-192
- Three 10 Gb XFP connectors
- Accepts industry-standard pluggable transceivers
- Available in both commercial and industrial temperature grades
- Includes one-year hardware warranty, software updates, and customer support
- One or two I/O cards fit on a single WILDSTAR 4/5 processing board
- New I/O form factor for improved thermal performance
- First of many WILDSTAR 4/5 Family I/O cards, including superior performance A/D, D/A, and additional high-speed communication cards
- Save time and effort; reduce risk with COTS boards and software
- Achieve world-class performance; WILD solutions outperform the competition

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p35857**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

WILDSTAR 5 for IBM Blade

Perfect Blend of Processors and Xilinx Virtex-5 FPGAs. Eleventh Annapolis Generation.

Direct Seamless Connections –
No data reduction between: external sensors and FPGAs, FPGAs and processors over InfiniBand or 10 Gb Ethernet backplane, FPGAs and standard output modules.

Ultimate Modularity –
From zero to six Virtex-5 processing FPGA/memory modules, and two Virtex-5 I/O FPGAs. Accepts one or two standard Annapolis WILDSTAR 4/5 I/O mezzanines: Quad 130 MSps through Quad 500 MSps A/D, 1.5 GSps through 2.2 GSps A/D, Quad 600 MSps DAC, InfiniBand, 10 Gb Ethernet, SFPDP.

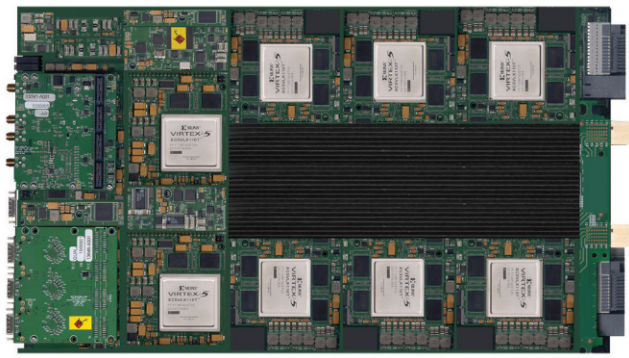
Fully Integrated into the IBM Blade Management System –
Abundant power and cooling for maximum performance.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

Develop your application very quickly with our CoreFire™ FPGA Application Builder, which transforms the FPGA development process, making it possible for theoreticians to easily build and test their algorithms on the real hardware that will be used in the field. CoreFire, based on dataflow, automatically generates distributed control fabric between cores. Our extensive IP and board support libraries contain more than 1,000 cores, including floating point and the world's fastest FFT. A graphical user interface for design entry supports hardware-in-the-loop debugging and provides proven, reusable, high-performance IP modules.

WILDSTAR 5 for IBM Blade, with its associated I/O cards, provides extremely high overall throughput and processing performance. The combination of our COTS hardware and CoreFire allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.

Achieve world-class performance; WILDSTAR solutions outperform the competition.



FEATURES

- From two to eight Virtex-5 FPGA processing elements – LX110T, LX220T, LX330T, FX100T, FX130T, or FX200T; six are pluggable with power module and memory
- Up to 10.7 GB DDR2 DRAM per WILDSTAR 5 for IBM Blade Board
- 144 x 144 crossbar; 3.2 Gb per line; two external PPC 440s – 1 per each I/O FPGA
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for hardware interfaces and ChipScope access
- Available in both commercial and industrial temperature grades
- Proactive thermal management system – board-level current measurement and FPGA temperature monitor, accessible through Host API
- Includes one-year hardware warranty, software updates, and customer support
- Blade management controller; USB, RS-485, Ethernet, KVM, 16 RIO, switch to 1 GbE over backplane
- Save time and effort; reduce risk with COTS boards and software
- We offer training and exceptional special application development support, as well as more conventional support
- Famous for the high quality of our products and our unparalleled dedication to ensuring that the customers' applications succeed

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p35882**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

WS4 Quad 250/400/500 MSps A/D

The Annapolis Quad Channel 250/400/500 MSps A/D I/O Card provides 4 A/D inputs with converter speeds of up to 250, 400, or 500 MHz and resolutions of 13, 14, or 12 bits, respectively. The board has four A/D converters from TI (ADS5444, ADS5474, or ADS5463) fed by onboard analog input circuits that convert the single-ended, 50-ohm SMA input into differential signals for the ADC.

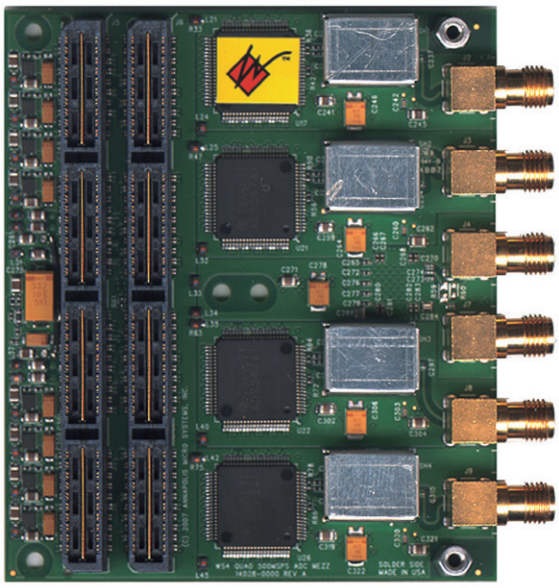
There is an onboard ultra-low jitter and skew clock distribution circuit to allow all four channels on a single A/D I/O board to be synchronized together. There is also an external clock input and a trigger input allowing multiple A/D I/O cards to be synchronized together. Synchronization of A/D I/O cards can be facilitated by the Annapolis 4 or 8 Channel Clock Distribution Boards.

In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine board supplies user-configurable real-time continuous sustained processing of the full data stream. Up to two A/D I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS or IBM Blade main board or reside on one A/D I/O card on each PCI-X or PCIe main board.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Our boards run on many different operating systems. We support our boards with a standardized set of drivers, APIs, and VHDL simulation models. VHDL source is provided for the interfaces to A/Ds, D/As, DRAM/SRAM, LAD bus, I/O bus, and PPC Flash. CoreFire™ users will have the usual CoreFire Board Support Package.

The combination of our COTS hardware and our CoreFire FPGA Application Development tool allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.



FEATURES

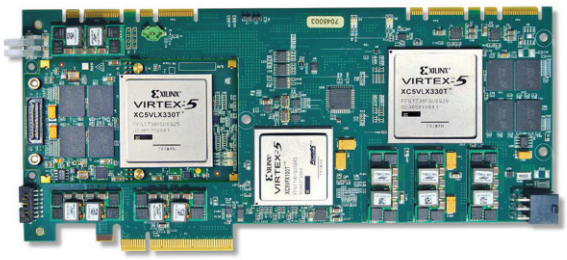
- Four TI A/D converters of one of the speed and bit size types: ADS5444 250 MSps 13 bits, ADS5474 400 MSps 14 bits, ADS5463 500 MSps 12 bits
- Analog input bandwidths of up to: 500 MHz for the 250 MSps A/D board, 1,400 MHz for the 400 MSps A/D board, 2,000 MHz for the 500 MSps A/D
- Six SMA front panel connectors: four 50-ohm analog inputs, one single-ended 50-ohm clock input, one trigger input
- Onboard ultra-low jitter and skew clock distribution circuit to allow synchronization of all four channels on a single I/O card
- I/O card plugs onto WILDSTAR 4 or 5 VME/VXS/PCI-X/PCIe/ IBM Blade main boards
- JTAG, ChipScope, and Serial Port access
- Proactive thermal management system; available in both commercial and industrial temperature ranges
- Full CoreFire Board Support Package for fast, easy application development and technology refresh
- VHDL model, including source code for hardware interfaces
- Includes one-year hardware warranty, software updates, and customer support; reduce risk with COTS
- We offer training and exceptional special application development support, as well as more conventional customer support
- Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p35976**

COTS collection: Boards, Carriers, Mezzanines – FPGA/Reconfigurable computing

Nallatech

759 Flynn Road • Camarillo, CA 93012 USA
805-383-8997
www.nallatech.com



COTS and Custom FPGA Accelerated Computing

Nallatech has delivered FPGA solutions for more than 18 years to thousands of customers. Design and customer support centers are located in CA & MD, USA (ITAR registered) and the U.K.

- Rugged-environment embedded VME/XMC products.
- PCI-104 and PCIe 1.1 & 2.0 compatible solutions.
- Miniaturized modules for SWaP constrained applications.
- Analog and digital I/O modules.
- Near-sensor processing solutions.

FEATURES

- Nallatech's comprehensive suite of IP, firmware, and software significantly reduces development time.
- Extensive in-house manufacturing capabilities facilitate cost effective, expedited production schedules.
- Customer choices include engaging with Nallatech on a turnkey or co-development basis.
- COTS-based memory and processor solutions can be optimized and miniaturized to fit the most demanding applications.

For more information, contact: contact@nallatech.com **www.mil-embedded.com/p45779**

COTS collection: Boards, Carriers, Mezzanines – Networking

Parvus Corporation

3222 Washington Street • Salt Lake City, UT 84115 USA
800-483-3152
www.parvus.com

DuraNET 1268

Rugged 10-Port Gigabit Ethernet Switch, Lightly Managed

The DuraNET® 1268 is a rugged Layer 2 Gigabit Ethernet switch subsystem equipped with ten (10) triple-speed 10/100/1000Mbps ports for connecting IPv4 and IPv6 compatible computing devices onboard demanding network-centric (un)manned vehicle and aircraft platforms. This stand-alone unit features an onboard microprocessor for local/remote control and port monitoring, as well as support for Quality of Service (QoS) traffic prioritization, Virtual Local-Area Network (VLAN) trunking, and Rapid Spanning Tree Protocol (RSTP) redundancy. To enhance security and system management, the unit integrates recoverable data zeroization capabilities for declassifying switch data, along with RS-232 Command Line Interface (CLI) and Ethernet management ports. Status LEDs indicate zeroization signal, power, and port link/speed/activity.

FEATURES

- Layer 2 10-Port Gigabit Ethernet Switch
- Management via Web Browser / Serial CLI
- Port-based/802.1Q tagged VLAN
- 801.p QoS/CoS, STP/RSTP Fault Tolerance
- Small Form Factor: <5 lbs Weight, <4" Height
- Designed to MIL-STD-810G and MIL-STD-461E
- MIL-STD 704E & 1275 Compliant (Power)
- -40 °C to +71 °C Fanless Operation

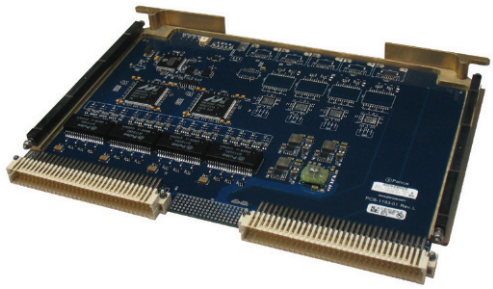
For more information, contact: sales@parvus.com **www.mil-embedded.com/p40230**

Parvus Corporation
3222 Washington Street • Salt Lake City, UT 84115 USA
800-483-3152
www.parvus.com

COM-8000

18-Port VME Ethernet Switch, Conduction Cooled, Unmanaged

The COM-8000 is an ultra-rugged conduction-cooled 6U single-slot VME Ethernet Switch card compliant with IPv6 traffic and developed for command & control / situational awareness subsystems based on VMEbus architecture. Designed for continuous extended temperature operation over the range of -40 °C to +85 °C and MIL-STD-810G shock and vibration profiles per jet-helo aircraft conditions, the COM-8000 incorporates a reliable mechanical design with an integrated heatsink/board stiffener, wedgelocks, and injector/ejector handles. Featuring a non-blocking Ethernet switch architecture, the COM-8000 supports simple plug-and-play operation with auto-MDI-MDIX network installation for up to 18 computing devices.



FEATURES

- 6U Conduction Cooled (IEEE 1101.2) VME w/ Aluminum Stiffener Plate, Wedgelocks, and Injector/Ejector Handles
- Conformally Coated, Conduction Cooled
- Extended Temperature Operation: -40 °C to +85 °C
- Designed to Meet MIL-STD-810G Environmental for Thermal, Shock, Vibration for Jet-Helo Profile
- 16x 10/100 Fast Ethernet - VMEbus P2 Connector
- Optional 2x 10/100/1000 Gigabit Ethernet - Front Panel RJ-45 or Locking Molex Connectors

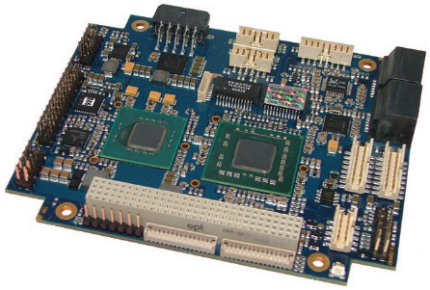
For more information, contact: sales@parvus.com **www.mil-embedded.com/p45145**

Advanced Digital Logic, Inc.
4411 Morena Blvd., Suite 101 • San Diego, CA 92117 USA
858-490-0597
www.adl-usa.com

Intel Core 2 Duo/Celeron M 1.20GHz-2.26GHz PCI/104-Express

The ADLGS45PC is based on the Intel® Core 2 Duo/Celeron® M Small Form Factor (SFF) processors and the Intel® GS45 Express (Cantiga) chipset. Built on the 45nm process, the ADLGS45PC sets a superior performance standard in an embedded PCI/104-Express form factor. The Intel® Core 2 Duo and Celeron® M SFF processors guarantee the benefits of genuine Intel® architecture to SFF and thermally constrained markets in PCI/104-Express and 3.5" form factors.

The Intel® graphics controller drives a CRT to 2048x1536 and/or 18/24/36/48-bit LVDS LCD to 1600x1200 resolution. Memory is added via a SODIMM204 socket that accepts up to 4GB of DDR3-1066 DRAM. Besides ACPI/APM functions, the ADLGS45PC has several features: 8x USB 2.0, 2x RS-232/422/485 COM ports, PS/2 keyboard and mouse, LPT, AC'97 sound, and 2x 10/100/1000Mb LAN. The ADLGS45PC also offers 4x SATA II ports with RAID 0/1/5/10 support.



FEATURES

- Intel® Celeron® M/Core 2 Duo (SFF)
- Intel® GS45/ICH9M-E chipset/DDR3-1066MHz DRAM – up to 4GB
- LAN controllers 2x 1Gb LAN/CRT/LVDS INTF, 8 ch. HDA
- 4x SATA 3GB/s with RAID support
- 8x USB 2.0 ports, 2x COM, LPT, SMBus TPM
- RTC, watchdog timer, HW monitoring, ITPM
- For high performance, extended temp/rugged applications
- PCI/104-Express v1.0
- Serving the PC/104 industry for over 15 years!

For more information, contact: sales@adl-usa.com **www.mil-embedded.com/p43638**

COTS collection: Boards, Carriers, Mezzanines – PC/104

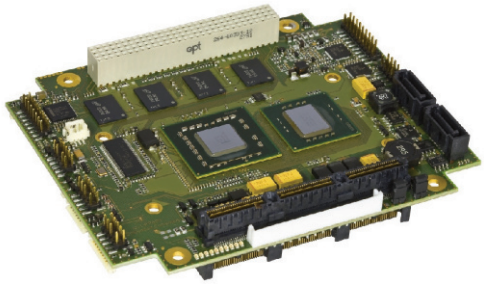
LiPPERT Embedded Computers, Inc.
5555 Glenridge Connector • Atlanta, GA 30342 USA
404-457-2870
www.lippertembedded.com

Cool XpressRunner-GS45 PCI/104-Express CPU Board

The Cool XpressRunner-GS45 is one of the fastest PCI/104-Express CPU boards available. An Intel Core 2 Duo processor provides plenty of computing power for even the most demanding mobile embedded PC applications. Using fast DDR3-RAM increases the board's performance rating further.

There is a fast, chipset integrated graphics controller that drives VGA or LVDS display monitors. With an HD audio subsystem, the board handles multimedia applications with ease. The Cool XpressRunner-GS45 comes with LiPPERT Enhanced Management Technology (LEMT) functions. These include not only housekeeping tasks, like proper power sequencing at startup and shutdown, but also provide support functions for condition monitoring and security features.

The board has been designed with mobile applications in mind, where low power consumption and high computing performance are the key requirements. Optionally, models qualified for the extended temperature range are available.



FEATURES

- Intel Core 2 Duo Processor
- 1 GB soldered DDR3-1066 RAM
- SXGA: 2048 x 1536 pixel
- Dual channel LVDS and CRT
- Gigabit Ethernet
- 8 x USB 2.0
- 2 x RS232, RS485
- High definition audio
- 2 x SATA
- LiPPERT Enhanced Management Technology (LEMT)
- Opt. ext. temperature range @ 1.2 GHz

For more information, contact: ussales@lippertembedded.com **www.mil-embedded.com/p41280**

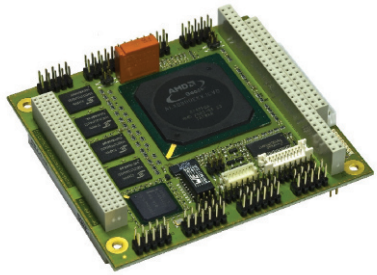
COTS collection: Boards, Carriers, Mezzanines – PC/104

LiPPERT Embedded Computers, Inc.
5555 Glenridge Connector • Atlanta, GA 30342 USA
404-459-2870
www.lippertembedded.com

Cool SpaceRunner-LX800 PC/104-*Plus* CPU Board

The Cool SpaceRunner-LX800 is a fully self-contained, rugged single board computer. It is a stand-alone embedded computer, complete with soldered RAM and solid state disk. With a power consumption of a mere 5 watts, the board needs no cooling. The board is specified for the extended temperature range of -40 °C to +85 °C.

The Cool SpaceRunner-LX800 uses the LiPPERT Enhanced Management Technology (LEMT). It handles the board's housekeeping tasks like power sequencing and watchdog, and provides useful utility functions for the application. It also enables remote condition monitoring. With its soldered RAM, the solid state disk, the very low power consumption, and the rugged through-hole connectors, the Cool SpaceRunner-LX800 is the best choice for devices that need to operate in adverse environments. Applications like remote data processing, security and medical devices, and many industrial controllers profit from its special features, as do all kinds of mobile appliances.



FEATURES

- AMD Geode LX800 @ 0.9W, 500 MHz
- 256 MB soldered DDR SDRAM
- Graphics up to 1920 x 1440 pixels
- CRT, LVDS, with backlight
- 100/10BASE-T Ethernet
- 4 x USB 2.0
- 2 x RS232/RS422/RS485
- IDE Ultra ATA100
- 2 GB Solid State Disk
- Low power consumption
- Extended temperature range -40 °C to +85 °C

For more information, contact: ussales@lippertembedded.com **www.mil-embedded.com/p37901**

LiPPERT Embedded Computers, Inc.

555 Glenridge Connector • Atlanta, GA 30342 USA
404-457-2870
www.lippertembedded.com

LiPPERT
THE EMBEDDED PC COMPANY

Cool LiteRunner-ECO PC/104 CPU

The PC/104 Cool LiteRunner-ECO is designed to be a carrier board for a CoreExpress advanced computer on module (COM). The board specifically supports LiPPERT's ultra small "CoreExpress-ECO." Intel's Atom processor family Z5xx and US15W chipset power this first and well-established CoreExpress-ECO module. With 1.1 GHz to 1.6 GHz and various memory configurations, the module stays in a TDP range of 5 W max. It actually provides the best performance per watt ratio on the market. With the integrated video acceleration hardware, it even plays full HD videos with a CPU load of less than 15%. A heat spreader can cool the whole stack passively without blocking the stackability on the top side.

The PC/104 carrier is internal, using the PCI Express infrastructure to add I/O functionalities, which are not natively supported by the core processor module.

The system is supported by various operating systems like Win CE, Win XP/XP Embedded, VxWorks, QNX and Linux.

FEATURES

- Intel Atom Z510 or Z530
- 2 GB RAM max.
- VGA and LVDS (w/backlight)
- 2 x Gigabit LAN
- 2 x SATA
- 7 x USB 2.0
- 2 x RS232/RS422/RS485
- HD Audio
- Micro-SD slot, bootable
- Mini-PCIe slotLow power consumption
- Optionally, extended temperature range -40 °C to +85 °C

For more information, contact: ussales@lippertembedded.com **www.mil-embedded.com/p45794**

COTS collection: Boards, Carriers, Mezzanines – PC/104

LiPPERT Embedded Computers, Inc.

5555 Glenridge Connector • Atlanta, GA 30342 USA
404-459-2870
www.lippertembedded.com

LiPPERT
THE EMBEDDED PC COMPANY

Cool LiteRunner-LX800 PC/104 CPU Board

The Cool LiteRunner-LX800 is an affordable PC/104 single board computer, featuring an AMD Geode LX800 processor. The board comes complete with soldered RAM and graphics. Either VGA monitors or digital TFT panels can be used. Two independent Fast Ethernet controllers are on-board, making the Cool LiteRunner-LX800 the selection of choice for applications like managed bridges and industrial automation. There are serial ports and general purpose I/O signals allowing connection to specialized peripheral devices.

A CompactFlash adapter and a built-in mini-PCI slot allow easy addition of functionality, without the need for a system stack. Supervision LEDs show the board's status and assist troubleshooting. The board is optionally available for the extended temperature range.

The low-power Cool LiteRunner-LX800 CPU board runs Windows XP, XP Embedded, Windows CE, Linux, VxWorks.

FEATURES

- AMD Geode LX800 @ 0.9W, 500 MHz
- 256 MB soldered DDR400 RAM
- Graphics up to 1920 x 1440 pixels
- CRT, TFT, LVDS, with backlight
- 2 x LAN
- 4 x USB 2.0
- 2 x RS232/RS422/RS485, 1 x RS485/Irda
- IDE Ultra ATA100
- CompactFlash socket
- Low power consumption
- Opt. ext. temperature range -40 °C to +85 °C

For more information, contact: ussales@lippertembedded.com **www.mil-embedded.com/p45810**

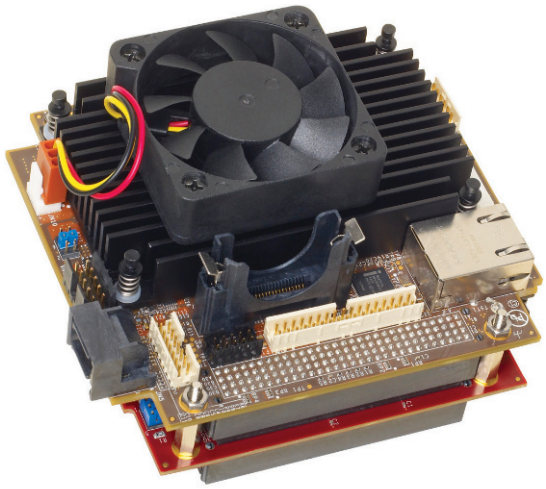
VersaLogic Corp.
4211 W. 11th Ave. • Eugene, OR 97402 USA
800-824-3163
www.VersaLogic.com/products

Leopard (VL-EPM-35)

The Leopard is an embedded computer featuring an Intel® Core™2 Duo processor. Based on the PC/104-*Plus* industry standard form factor, the Leopard supports PCI and ISA stackable expansion buses on a 4.21" x 3.78" footprint. With its combination of ultra-high performance (up to 2.26 GHz), mid-range power consumption (21.3 W typ.), ruggedness, and compact size, the Leopard is an ideal embedded computer solution for medical, security, defense, transportation, and industrial markets. Potential applications include flight navigation, guidance systems, and evolving applications that rely on fast onboard processing of large amounts of data.

Like all VersaLogic products, the Leopard is designed to support OEM applications where high reliability and long-term availability are required. From application design-in support, to its 5+ year production life guarantee, the Leopard supports serious embedded applications. The Leopard is manufactured and tested to the highest quality standards and is fully RoHS compliant. Customization is available, even in low OEM quantities.

The Intel Core 2 Duo processor features enhanced Intel SpeedStep® technology, which provides dynamic processor frequency scaling to meet instantaneous performance needs while minimizing power draw and heat dissipation. This allows users to fine-tune the balance of power conservation and performance to suit their application needs.



FEATURES

- **PC/104-*Plus* form factor**
  Industry-standard expandable, compact, highly rugged format.
- **Intel® Core™2 Duo processor**
  Up to 2.26 GHz performance.
- **High-performance video**
  3D video acceleration (Gen 5.0). Analog and LVDS flat panel outputs.
- **Network support**
  Dual Gigabit Ethernet with remote boot support.
- **System RAM**
  Up to 4 GB DDR3 RAM for system flexibility.
- **USB I/O**
  Six USB 2.0 ports support keyboard, mouse, and other devices.
- **Device I/O**
  Five serial ports, dual SATA interface, and HD audio.
- **Flash memory**
  MiniBlade™ socket and eUSB interface for high-reliability flash storage.
- **Extended temperature version**
  -40 °C to +85 °C operation for harsh environments.
- **MIL-STD-202G**
  Qualified for high shock/vibration environments.
- **SPX™ expansion**
  Supports expansion with versatile SPX add-on I/O modules.
- **OS compatibility**
  Windows XP, Windows Embedded XPe/CE, Linux, VxWorks, QNX, DOS

For more information, contact: sales@versalogic.com **www.mil-embedded.com/p45445**

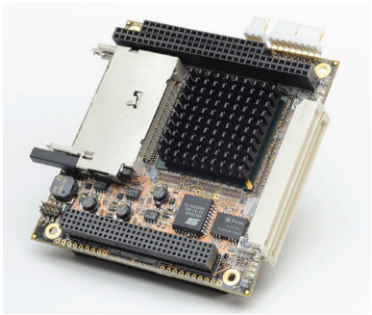
COTS collection: Boards, Carriers, Mezzanines – PC/104

WinSystems, Inc.
715 Stadium Drive • Arlington, Texas 76011 USA
817-274-7553
www.WinSystems.com

-40°C to +85°C PC/104-*Plus* SBC with Video and Ethernet

The PPM-LX800-G is a highly integrated PC/104-*Plus* Single Board Computer (SBC) designed for space-limited and low-power applications. It is a full-featured SBC that includes the AMD LX800 x86-compatible CPU. Its low power dissipation permits fanless operation over a temperature range from -40°C to +85°C. This board is well suited for rugged applications requiring excellent processor performance in an embedded PC design.

The PPM-LX800-G has x86 PC software compatibility, which assures a wide range of tools to aid in your application's program development and checkout. It supports both Windows® XP Embedded and Linux operating systems and other real-time operating systems. WinSystems provides free technical phone support to assist customers with system integration of our SBCs and I/O modules in their designs.



FEATURES

- AMD LX800 CPU; x86-compatible
- Small size: 90mm x 96mm
- Video with CRT resolutions to 1920 x 1440 and flat panel resolutions to 1600 x 1200
- Custom splash screen on start-up
- 10/100 Mbps Ethernet controller
- Two USB 2.0 ports with overcurrent protection
- Four serial RS-232/422/485 channels with FIFOs
- 16 digital I/O lines with event sense supported
- AC'97 audio, LPT, mouse, and keyboard controllers
- -40°C to +85°C operating temperature
- Long-term PC/104-*Plus* product availability

For more information, contact: Info@WinSystems.com **www.mil-embedded.com/p46015**

COTS collection: Boards, Carriers, Mezzanines – PCI/PCIe

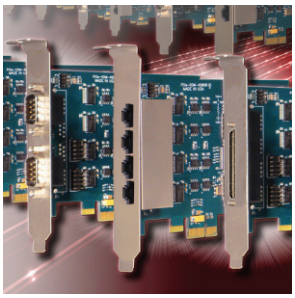
ACCES I/O Products, Inc
10623 Roselle Street • San Diego, CA 92121 USA
858-550-9559
www.accesio.com/pcie

PCI Express Serial Communication Cards

The PCIe-COM family of PCI Express serial communication cards features both DB9 and RJ45 connectivity. The cards feature a selection of 8, 4, or 2-ports of software selectable RS-232, RS-422, and RS-485 serial protocols. A x1 lane PCIe connector can be used in any available x1, x2, x4, x8, x12, or x16 PCIe expansion slot. The PCIe-COM product line has been designed for use in retail, hospitality, automation, gaming, and defense industries along with applications such as point of sale systems and kiosk design.

Each RS-232 port can support data communication rates up to 921.6 kbps and implements full modem control signals for compatibility with a broad variety of serial devices. RS-422 and RS-485 modes support data communication speeds up to 3 Mbps. Existing serial peripherals can connect directly to industry standard DB9M or RJ-45 connectors onboard each card or via a breakout cable.

For more information, view a data sheet and manual for the new PCIe-COM family at www.accesio.com/pcie.



FEATURES

- 8, 4, and 2-port PCI Express serial communication cards (20 models to choose from)
- Software selectable RS-232, RS-422, and RS-485 protocols, per port
- High performance 16C950 class UARTs with 128-byte FIFO for each TX and RX
- Supports data communication speeds up to 3 Mbps simultaneously (RS-232 up to 921.6 kbps)
- ± 15kV ESD protection on all signal pins
- Full modem control signals in RS-232 mode
- Software compatible with all operating systems
- On-board industry-standard DB9M or RJ45 connectivity (3' DB9M breakout cable also available)

For more information, contact: cpersidok@accesio.com **www.mil-embedded.com/p46201**

COTS collection: Boards, Carriers, Mezzanines – PCI/PCIe

Areca Technology Corporation

8F., No.22, Lane 35, Ji-Hu Road • 114 Taipei, Taiwan, R.O.C.
886-2-87974060
www.areca.com.tw

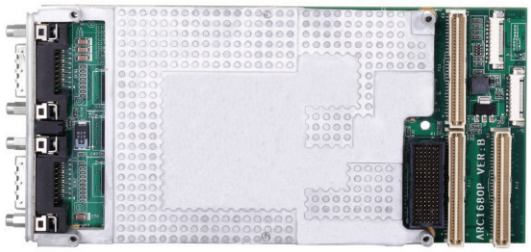
areca®

ARC-1680P SAS RAID PMC/XMC Module

The ARC-1680P is a high-performance reconfigurable PMC/XMC (PCI Mezzanine Card) SAS RAID adapter that is ideal for ruggedized systems requiring high-bandwidth storage. It is based on the Intel IOP348 controller, equipped with 512MB DDR2-533 memory and two SFF-8470 connectors 3Gb/s SAS/SATA ports.

Since the ARC-1680P is offered as a hybrid PMC/XMC, it can be used with the carrier boards that have PMC sites on-board, as well as newer carrier boards that offer XMC sites. A heat-sink provides adequate cooling for the Intel IOP348 I/O controller and conducts heat to the front bracket.

The 1680P SAS RAID controller supports Linux (Open Source), FreeBSD (Open Source), Windows 7/2008/Vista/2003/XP/2000, Solaris (Open Source) and more. It contains an embedded McBIOS RAID manager that can access via hot key at BIOS boot-up screen. Its firmware contains a browser-based McRAID storage manager, which can be accessed through the ArcHttp proxy server.



FEATURES

- Intel dual core 1200MHz IOP348 I/O processor
- 512MB on-board DDR2-533 SDRAM with ECC protection
- One PMC/XMC site supporting PCI-X or PCIe x8
- Dual SFF-8470 front panel connectors
- A set of 8 LEDs for activity/fault status on the board backside
- Global activity/fault LEDs on the front panel
- Supports up to 8 external 3Gb/s SAS/SATA ports
- RAID level 0, 1,1E, 3, 5, 6, 10, 30, 50, 60, Single Disk or JBOD
- API, CLI, McBIOS and browser-based McRAID manager
- Windows, Linux (open source), FreeBSD (open source), Solaris (open source) and more systems

For more information, contact: www.areca.com.tw **www.mil-embedded.com/p44124**

COTS collection: Boards, Carriers, Mezzanines – PMC

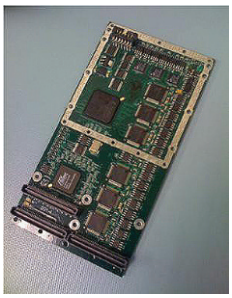
Sterling Electronic Design

27240 Turnberry Lane Ste. 200 • Valencia, CA 91355 USA
661-295-7145
www.sterlingelectronicdesign.com

STERLING ELECTRONIC DESIGN

PMC AIO

The PMC AIO is a rugged conduction-cooled PMC with 34 single-ended or 17 differential 16-bit analog inputs. All inputs are simultaneously sampled at rates up to 406 KHz. The PMC AIO has 11 16-bit analog outputs that can be set simultaneously. Adjustable input and output ranges up to ± 10V and flexible frame clocking make the card an optimum fit for a wide variety of control system applications. All Sterling Electronic Design products are 100% designed, built and tested in the U.S.A. for the rigors of aerospace and defense applications. For complete product specifications please visit our website www.sterlingelectronicdesign.com.



FEATURES

- Conduction-cooled per VITA 20
- PCI: 32 bit & 33/66 MHz
- Analog Inputs: 34 Single-ended or 17 Differential channels, Up to 400 kSPS, Multiple Input Ranges
- Simultaneously sampled
- Flexible Frame Clocking
- 11 Analog Outputs
- 8 Discrete I/O
- Rear I/O
- VxWorks Driver

For more information, contact: info@sterling-edc.com **www.mil-embedded.com/p45130**

Pinnacle Data Systems, Inc.
6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

PMC-SD18 and XMC-SD18 SATA HDD/SSD Storage Modules

These new SATA Storage Modules are offered in both PMC and XMC formats. Both provide high capacity SATA storage using compact 1.8 inch hard disk (HDD) or solid state drives (SSD) – up to 160GB of storage is available with either drive type. Whether configured with an economical rotating HDD or with a highly shock-resistant SSD, these low profile modules fit comfortably into VITA 42.3-compatible VME, CompactPCI®, AdvancedTCA®, and PCI Express processor boards without risk of mechanical interference.

The onboard 4-port SATA controller provides 3 additional external drive interfaces. OS support includes Windows, Linux, Solaris x86, and Solaris SPARC. Critical military and aerospace applications will appreciate the high operating shock resistance (1000+ G) and high MTBF (over 1 million hours) when configuring these modules with the latest SSD technology.

FEATURES

- High-capacity 1.8" SATA storage PMC and XMC
- Low-cost rotating HDD for normal uses
- Rugged SSDs available for high shock and vibration
- Up to 160GB SSD storage capacity
- Featuring Intel advanced SSD technology (80GB and up)
- 3 additional SATA channels
- Windows, Linux and Solaris support
- RoHS compliant
- Customization and third-party integration welcomed; extended availability assured

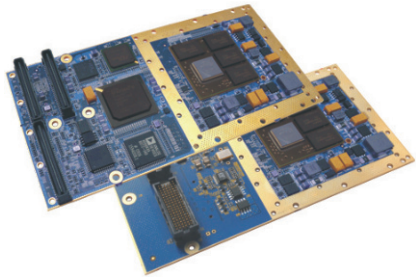
For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p45802**

WOLF Industrial Systems Inc.
5 Foxfire Chase, Uxbridge, Ontario, L9P 1R4 Canada
Toll free: 1-800-931-4114 Fax: 905-852-1735
www.wolf.ca/products

PMC and XMC E4690-Based Plug-In Graphics Upgrades

Wolf announces new PMC and XMC embedded graphics boards for VME, PMC, XMC, VPX, CompactPCI, PCIe and VME64 architectures. Military, aerospace, industrial and medical OEMs may now specify Wolf plug-in replacement graphics boards that offer greatly increased performance. Based on an embedded version of AMD's new E4690 graphics chip, they offer more than 10 times the 3D rendering speed of earlier solutions, with low CPU utilization and brilliant picture quality. Select modules offer up to 50 standard combinations of dual independent display output and up to 19 combinations of dual channel input. All Wolf video graphic products conform to MIL-810 environmental shock, vibration and extended temperature operation and offer 10-plus years of availability.

For more information on high-performance video graphic boards, visit www.wolf.ca/products.



FEATURES

- Plug-in high performance video upgrade for OEMs
- 10x faster 2D and 3D rendering than previous generation
- Three versions available: (1) Frame Grabber, (2) Multiple Video I/O and (3) Video Output only
- 50 combinations of dual independent video output
- 19 combinations of dual independent video input
- Low CPU utilization and brilliant picture quality
- Extended temp -40°C to +85°C operating environment
- Embedded memory version of AMD E4690 (512MB) graphics chip
- Reduced power modes and improved conductive cooling
- OpenGL drivers, DO-178B and real-time operating systems support supplied from ALT Software

For more information, contact: sales@wolf.ca **www.mil-embedded.com/p45465**

COTS collection: Boards, Carriers, Mezzanines – Proprietary small form factor

LiPPERT Embedded Computers, Inc.
5555 Glenridge Connector • Atlanta, GA 30342 USA
404-459-2870
www.lippertembedded.com

CoreExpress®-ECO Computer-On-Module

The CoreExpress-ECO is a tiny Computer-on-Module (COM) in a 58 mm x 65 mm format. Based on SFF-SIG's CoreExpress specification, CoreExpress modules are legacy-free, meaning they come with digital interfaces only. Applications requiring analog signals can implement these on the carrier board. The module's low power requirements minimize cooling needs, decreasing the total dimensions of the solution further. The CoreExpress-ECO utilizes an Intel Atom processor and System Controller Hub US15W.

The computer module comes complete with up to 2 GB of SDDR2 RAM soldered to the board, graphics, MPEG2/4 support, LVDS and SDVO display ports, as well as HD audio streams. Two PCI Express lanes are available for external I/O and graphics. There are eight USB 2.0 ports, IDE, SDIO/MMC interface, SMBus, and LPC bus available for even further expansion. All these signals are made available on a tiny 220 pin connector.

A starter kit is available for evaluation.

FEATURES

- Intel® Atom™ Processor
- 512 MB, 1 GB, 2 GB SDDR2 soldered RAM
- 2 PCI Express Lanes
- SDIO/MMC
- SMBus, GMBus/DDC, LPC bus
- 2 Graphics Ports (LVDS & SDVO)
- HD Audio
- 8 USB 2.0
- IDE
- Only 58 mm x 65 mm and 28 grams
- 5 V only supply, 5 Watts

For more information, contact: ussales@lippertembedded.com **www.mil-embedded.com/p45795**

COTS collection: Boards, Carriers, Mezzanines – Proprietary small form factor

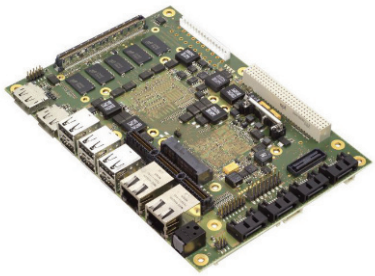
LiPPERT Embedded Computers
5555 Glenridge Connector • Atlanta, GA 30342 USA
404-559-2870
www.lippertembedded.com

Hurricane-QM57 EPIC Express CPU Board

Especially well suited for military, industrial, medical, and traffic applications is LiPPERT Embedded Computers' Intel Core i7 embedded PC CPU board.

The EPIC Express Board targets mission-critical systems. This means applications having high requirements for non-stop operation reliability, extreme ambient temperatures and variations, as well as high shock and vibration durability, are more easily developed. Processor and chipset are placed on the board's bottom side, allowing simple construction of stacked systems. The EPIC standard places the extension connectors on the top of the PCB; thus, peripheral extension boards are often a hindrance when mounting cooling devices on the same side. Unlike other boards, the Hurricane-QM57's construction allows the cooling device to be simply attached.

The Hurricane-QM57 comes with a maximum of 4 GB soldered down DDR3 ECC memory. Using a specially designed Rugged RSOMM memory module, it can be expanded to 8 GB.



FEATURES

- Intel Core i7 processor
- 8 GB DDR3 ECC RAM max.
- Graphics Controller integrated
- 2 DisplayPorts
- LVDS (dual channel)
- 2 x Gigabit LAN
- 10 x USB 2.0 host ports
- 4 x SATA with RAID support
- PCI Express Mini Card Slot
- LEMT (LiPPERT Enhanced Management Technology)

For more information, contact: ussales@lippertembedded.com **www.mil-embedded.com/p46027**

Dynatem

23263 Madero, Suite C • Mission Viejo, CA 92691 USA
949-855-3235
www.dynatem.com

VPQ Intel Quad Core VPX SBC with 24-port 10 Gb ENET Switch

The VPQ is a high performance Single Board Computer (SBC) based on the 6U VPX (VITA 46) form factor. Offered in both convection-cooled and ruggedized conduction-cooled variants, the VPQ will meet the needs of numerous commercial and military applications.

At the heart of the VPQ is one quad-core Intel L5408 Xeon Processor, an Intel 5100 Memory Controller Hub (MCH), and an Intel ICH9R I/O Controller Hub (ICH), forming the central processing backbone of the design. Up to 4 GBytes of DDR2 SDRAM are supported with the MCH running at up to 1066 MHz double data rate speeds.

The VPQ provides unparalleled data processing capabilities. It supports two fully capable PMC/XMC Sites with extensive User I/O. An on-board Fulcrum FM3224 24-Port 10 Gigabit Ethernet Switch provides full-mesh backplane data-layer interconnectivity, allowing up to eight VPQ SBCs to be integrated into a single chassis without the use of an additional switch board. A PLX PEX8624 PCI Express Switch provides connectivity to the XMC Sites and an Intel 82599EB Dual 10 Gigabit Ethernet controller.

FEATURES

- Intel® Quad Core L5408 Processor @ 2.13 Hz
- Supports VITA 46.21 for full mesh 10 Gb XAUI interconnect up to 5 boards on backplane
- Can support full mesh XAUI up to 8 boards with custom backplane
- On-board Fulcrum 24 port 10 Gb Ethernet XAUI switch (also available without switch)
- On-board SVGA Controller
- Front panel SFP+ 10 Gb copper or optical for chassis to chassis interconnect
- Supports two PMC sites, both of which optionally support XMC modules x8 PCIe
- Available in conduction cooled versions for rugged applications
- On-board 4 GB DDR2 and 16 GB bootable Flash disk
- OS support for Linux, VxWorks, Windows, Solaris, LynxOS, QNX

For more information, contact: sales@dynatem.com **www.mil-embedded.com/p46018**

COTS collection: Boards, Carriers, Mezzanines – VITA 46 VPX

Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

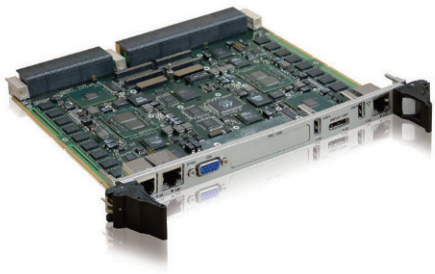
6U VPX Processor Board VX6060

Intel® Core™ i7 SBC

VX6060 is the computing tool that MAG HPEC users have been waiting for. Combined with the power of 6U VPX backplane technology, a new range of rugged embedded computers is appearing, which allows outstanding applications to emerge.

Implemented as two independent computing nodes, attached to a powerful Ethernet and PCIe infrastructure, the Kontron VX6060 is the ideal building block for intensive parallel computing loads.

Any number of Kontron VX6060 boards can be used together in full mesh or switched OpenVPX environments.



FEATURES

- VPX (VITA 46), OpenVPX (VITA 65) and VPX REDI (VITA 48)
- Air-Cooled and Conduction-Cooled Versions
- Two Intel® Core™ i7 processors with integrated DDR3 Memory Controller
- Rugged Conduction-Cooled version (-40°C to +85°C) under 100W power
- Ideal for high performance embedded computing and multi-processor systems for radar, sonar and imaging systems
- Improved time-to-market with ready to go system solutions

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45806**

COTS collection: Boards, Carriers, Mezzanines – VITA 46 VPX

Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

VPX Processor Board VX3230

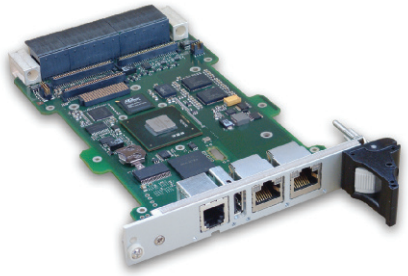
Ultra Low Power 3U VPX Single Board Computer

Kontron's VPX 3U product family is the ideal solution for rapid deployment of 3U VPX embedded computers.

The Kontron VX3230 and its 1 GHz 8544 PowerPC processor give you the coolest implementation of an E500 core with plenty of features.

With a requirement as low as 15 Watts (typ.) between -40°C and +85°C, the Kontron VX3230 is a major breakthrough for small form factor rugged computers.

Applications targeting Vetronics and onboard UAV, which operate on a tight power budget, will welcome its innovative design.



FEATURES

- Standard Air and Rugged Conduction-Cooled builds with VPX (VITA 46), and OpenVPX (VITA 65) pinout options
- 1 GHz Freescale MPC8544 32-bit PowerPC Processor
- PCI Express (4x), SATA, and Gigabit Ethernet on the VPX Backplane
- Easy Bring Up: Turnkey 3U VPX Computer Offering

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45808**

COTS collection: Boards, Carriers, Mezzanines – VITA 46 VPX

Xembedded LLC

1050 Highland Drive, Suite E • Ann Arbor, MI 48108 USA
734-975-0577
www.xembedded.com

XVPX-9400 VPX RAID Controller Card

The **XVPX-9400** is a 3U VPX controller module capable of supporting up to eight SAS/SATA hard drives. It accommodates on-board storage of user-defined parameters, BIOS and mirroring data. The module includes a PMC / XMC site using PCIe, as well as status indicator lights for each supported drive located on the front panel for easy recognition.

See our latest VPX family of products at our website www.xembedded.com, **including our:**

XVPX-9750 VPX Data Storage

XVPX-9425 VPX XMC/PMC Carrier

XVPX-6300 VPX Processor with Intel™ Core i5/i7

FEATURES

- 3U VPX with Conduction Cooled option
- Up to eight SATA / SAS drives supported
- 3GB per second / per drive transfers
- Front panel indicators for attached drives
- Heartbeat LED indicator
- Works with RAID format SATA and SAS drives
- Supports RAID 0, 1, 1E and 10E
- Features an XMC site with rear I/O option
- Supports the LSI 1068e Mega RAID software utility
- PCIe 1x, 4x, 8x
- Microsoft, Linux and Solaris software supported

For more information, contact: sales@xembedded.com **www.mil-embedded.com/p45813**

Pentair Technical Products
7328 Trade Street • San Diego, CA 92121 USA
858-740-2400
www.calmark.com

Series 223 & Series 224 Torque-Limiting Card-Lok

Pentair Technical Products' Calmark® brand Series 223 and 224 Card-Lok retainers are now available for cold plate-heat exchanger applications. Available in a 5.72 mm x 6.60 mm (.225 in. x .260 in., Series 223) profile and a 5.33 mm x 6.99 mm (.210 in. x .275 in., Series 224) profile, these series of card-loks feature a patent-pending torque-limiting design to eliminate the need for a torque wrench. The torque-limiting feature is designed so a standard hex wrench locks the board module assembly into the cold wall, providing a safe clamping force without the need for a torque wrench and preventing damage to the card-lok or the board module assembly due to over-tightening.

These highly reliable card-loks are secured with a screw actuated wedge action, locking the board module assemblies into place. They deliver maximum thermal transfer as well as maximum resistance to shock and vibration. The design delivers maximum contact between thermal paths on the board module assembly and heat sinking surface, and locks the board module assembly in place to resist shock and vibration.

Pentair Technical Products, a Pentair global business unit, is the leading provider of worldwide product and service solutions for enclosing, protecting and cooling electrical and electronic systems. Its industry-leading brands – Hoffman®, Schroff®, McLean® Cooling Technology, Calmark®, Birtcher®, Aspen Motion Technologies™ and Taunus™ – provide a broad variety of standard, modified and engineered solutions to the commercial, communications, energy, general electronics, industrial, infrastructure, medical, and security and defense markets.

FEATURES

- Torque-Limiting Action – A standard hex wrench locks the board module assembly into the cold wall providing a safe clamping force without the need for a torque wrench
- High Reliability – Screw actuated wedge action locks board module assemblies into place
- Maximum Thermal Transfer – Wedge action design provides maximum contact between thermal paths on board module assembly and heat sinking surface
- Maximum Resistance to Shock & Vibration – Wedge action design locks board module assembly in place to provide maximum resistance to shock and vibration
- Zero Insertion & Extraction Forces – Screw actuation provides zero insertion and extraction force on board module
- Alignment Spring Feature – Returns wedge bodies to relaxed position when unclamping

For more information, contact: sebastien.buzit@pentair.com **www.mil-embedded.com/p45796**

Pentair Technical Products
7328 Trade Street • San Diego, CA 92121 USA
858-740-2400
www.calmark.com

3U VPX Clamshell

Pentair Technical Products' Calmark® brand 3U VPX Clamshells are available with either primary or secondary side cooling formats, and also with optional connector protection, offering compatibility with VITA 48.2.

These robust clamshells are designed for Two-Level Maintenance, which is an essential requirement for success in avionics applications. This method replaces the time-consuming and costly use of Line Replaceable Units (LRUs), which require the complete unit to be removed and returned to base for repair when a problem occurs. 3U VPX Clamshells paired with a Torque-Limiting Card-Lok can be used to manage problem electronics on-site, allowing components to be replaced at a modular level. The Type 1 plug-in unit is designed to the highest level of mechanical ruggedness and is in compliance with ANSI/VITA 47 ESD requirements.

Pentair Technical Products clamshells are supplied complete with high-performance wedge-loks and an extractor handle. They are available in standard configurations or machined to the contours of a board's topography. The new 3U VPX Clamshells are part of Pentair Technical Products' complete conduction cooled solutions at the module level, which include standard, off-the-shelf conduction cooled assemblies for the following platforms: VME, cPCI, VPX, AMC (MTCA.3).

Pentair Technical Products', a Pentair global business unit, is the leading provider of worldwide product and service solutions for enclosing, protecting and cooling electrical and electronic systems. Its industry-leading brands – Hoffman®, Schroff®, McLean® Cooling Technology, Calmark®, Birtcher®, Aspen Motion Technologies™ and Taunus™ – provide a broad variety of standard, modified and engineered solutions to the commercial, communications, energy, general electronics, industrial, infrastructure, medical, and security and defense markets.

FEATURES

- Available with either primary or secondary side cooling formats
- Offer optional connector protection
- Designed for Two-Level Maintenance, saving repair time and costs
- Strong: 061-T6 aluminum for high thermal conductivity and lightweight support
- Robust: Machined from a single piece for high heat transfer and structural support
- Large selection: Available in black anodize, chemical film, electroless nickel plating or custom silkscreen
- Reliable: Locking helicoils secure board fasteners in extreme vibration environments, and extractors provide ample force to disengage board connectors easily

For more information, contact: sebastien.buzit@pentair.com **www.mil-embedded.com/p45797**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

WILDSTAR 6 for OpenVPX

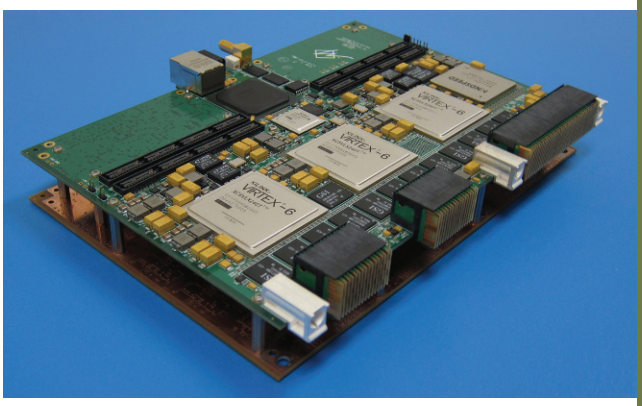
Annapolis Micro Systems is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Our 14th-generation WILDSTAR 6 for OpenVPX uses Xilinx's newest Virtex-6 FPGAs for state-of-the-art performance. It accepts one or two I/O mezzanine cards in one VPX slot or up to 4 in a double wide VPX slot, including Single 1.5 GHz 8-bit ADC, Quad 250 MHz 12-bit ADC, Single 2.5 GHz 8-bit ADC, Quad 130 MHz 16-bit ADC, Dual 2.3/1.5 GSps 12-bit DAC, Quad 600 MSps 16-bit DAC, Universal 3Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OS 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows, Linux, Solaris, IRIX, ALTIX, and VxWorks. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

Develop your application very quickly with our CoreFire™ FPGA Application Builder, which transforms the FPGA development process, making it possible for theoreticians to easily build and test their algorithms on the real hardware that will be used in the field. CoreFire, based on dataflow, automatically generates distributed control fabric between cores.

Our extensive IP and board support libraries contain more than 1,000 cores, including floating point and the world's fastest FFT. CoreFire uses a graphical user interface for design entry, supports hardware-in-the-loop debugging, and provides proven, reusable, high-performance IP modules. WILDSTAR 6 for OpenVPX, with its associated I/O Cards, provides extremely high overall throughput and processing performance. The combination of our COTS hardware and CoreFire allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.

Annapolis is famous for the high quality of our products and for our unparalleled dedication to ensuring that the customers' applications succeed. We offer training and exceptional special application development support, as well as more conventional support.



FEATURES

- Up to three Virtex-6 FPGA processing elements – XC6LX240T, XC6LX365T, XC6LX550T, XC6SX315, or XC6SX475
- Up to 7 GB DDR2 DRAM in 14 banks or up to 448 MB DDRII or QDRII SRAM
- OpenVPX backplane
- 80 x 80 crossbar connecting FPGAs and VPX backplane
- 1 GHz 460EX PowerPC onboard host
- 4X PCIe controller
- Programmable Flash to store FPGA images and for PCI controller
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for hardware interfaces and ChipScope access
- Host software: Windows, Linux, VxWorks, etc.
- Available in both commercial and industrial temperature grades
- Proactive thermal management system – board-level current measurement and FPGA temperature monitor, accessible through Host API
- Save time and effort and reduce risk with COTS boards and software
- Achieve world-class performance – WILD solutions outperform the competition
- Includes one-year hardware warranty, software updates, and customer support; training available

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p45439**

COTS collection: Boards, Carriers, Mezzanines – VITA 65 OpenVPX

Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

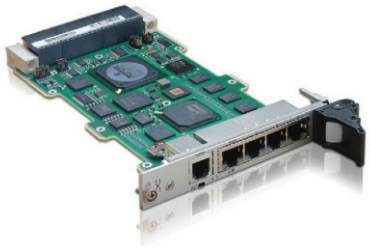
Kontron Gigabit Ethernet Switch VX3910 – NEW!

High-performance IPv4/IPv6 OpenVPX™ Switch

The Kontron Gigabit Ethernet Switch VX3910 is a new member of Kontron's embedded switching product range implementing Kontron Embedded Network Technology. Providing a unified advanced feature set and operational interfaces across multiple form factors, it enables an efficient reuse of switching expertise and improves time-to-market.

The Kontron VX3910 allows for flexible implementation of network-centric situational-awareness and High Performance Embedded Computing (HPEC) applications in markets including military, medical, energy, and in autonomous systems such as UAVs and AUVs.

Other target applications include Vetronics (Vehicle Electronics), extremely rugged embedded multiprocessing systems, Rapidly Deployable Networks in VPX, and mixed VPX/VME environments.



FEATURES

- High End OpenVPX Switch
- Non blocking Gigabit Ethernet Switch
- Fully managed L2 solution (L3 upgradable)
- A total of 28 Gigabit Ethernet ports
- Quad 1000BASE-T Uplinks on front panel, with 2 reroutable on backplane
- Enterprise Class switching functions
- 10/100/1000BASE-T Management Port
- Available in standard air- and rugged conduction-cooled version

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45798**

COTS collection: Boards, Carriers, Mezzanines – VITA 65 OpenVPX

Themis Computer

47200 Bayside Parkway • Fremont, CA 94538 USA
510-252-0870
www.themis.com

TGA-300X™

The TGA-300X is designed for a wide variety of high-performance graphics, video and GPGPU mission-critical applications requiring flexibility in video input and output formats. Based on the AMD E4690, the TGA-300X™ has the latest graphics features and includes hardware acceleration of H.264, VC-1 High-Definition video, as well as MPEG-2. Most of the processing is done in the GPU, off-loading the target system's CPU to maximize system performance.

The TGA-300X has two digital DVI and OpenLDI, as well as analog VGA or STANAG outputs available on the rear connector. The card is also configurable to enable NTSC or PAL outputs.

The TGA-300X has two video inputs that can support various formats including RGB, STANAG, NTSC, PAL and HDTV. The inputs can be processed and passed through to the outputs under program control. Graphics overlays can be generated to allow symbology to be superimposed on input video.

FEATURES

- 3U VPX Graphics processor with AMD E4690 GPU
- VITA 65 OpenVPX compliant
- 0.8" air cooled, 0.85" and 1" conduction cooled pitch available
- 2D and 3D graphics
- Up to 1920 X 1200 resolution
- 2x TV, HD, RGB, DVI inputs
- External Sync input
- 2x DVI and VGA outputs
- Operating temperature: -40 °C to +85 °C

For more information, contact: info@themis.com **www.mil-embedded.com/p45776**

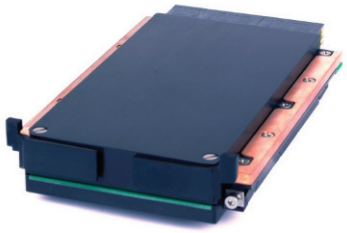
COTS collection: Boards, Carriers, Mezzanines – VITA 65 OpenVPX

Themis Computer
47200 Bayside Parkway • Fremont, CA 94538 USA
510-252-0870
www.themis.com

TSBCi7-300X™

The TSBCi7-300X 3U VPX Single Board Computer is designed for high-performance and rugged applications. High performance, combined with IO flexibility, is assured through the use of Intel® Core® i7 processors and the highly integrated IBEX Peak QM57 Platform Controller Hub (PCH) Chipset. The TSBCi7-300X has a full complement of PCIe buses, configurable as X1, X2, X4, X8 and X16 interfaces. All common serial interfaces are supported, including USB, RS-232, RS-422 and RS-485.

The TSBCi7-300X processor is ideally suited for Mission Computer, Display Processor, Payload Controller, Sensor Management, EW and SIGINT applications, as well as high-speed Data Storage Units. A high-resolution video graphics interface is standard, allowing use of VGA, HDMI and DVI displays. An on-board MIL-STD-1553 interface is optionally available. The SBC is provided in several ruggedization grades from Commercial Air Cooled to full MIL Conduction Cooled.



FEATURES

- 3U VPX Intel® Core™ i7 CPU-based SBC
- Intel IBEX Peak QM57 PCH chipset
- 3U VPX per VITA 46; VITA 48 VPX-REDI; VITA 65 OpenVPX compliant
- 0.8" air cooled, 0.85", 1" conduction cooled pitch available
- 16x PCI Express lanes
- 2x IEEE-1588 GigE ports
- Supports USB, RS-232, RS-422 and RS-485 interfaces
- 4x USB 2.0, 1x SATA
- 2x Audio In/Out
- On-board MIL-STD-1553 interface option
- High-res video graphics interface supports VGA, HDMI and DVI displays
- Operating Temperature: -40 °C to +85 °C

For more information, contact: info@themis.com **www.mil-embedded.com/p45774**

COTS collection: Boards, Carriers, Mezzanines – VMEbus/VME 64

Themis Computer
47200 Bayside Parkway • Fremont, CA 94538 USA
510-252-0870
www.themis.com

LV1™

Themis Computer's LV1™ is a new 6U VMEbus computer based on the Intel® Core™ 2 Duo processor. Operating system support includes Windows® and Linux®. The LV1 is designed for customers who require the low-power Intel Core 2 Duo processor to provide efficiency and high performance for their demanding applications. The LV1 single slot configuration enables workstation levels of performance in a VME form-factor. The LV1 and its two-slot XMC expansion board are fully RoHS compliant.

The base configuration includes three Gigabit Ethernet ports, three SATA ports, and four USB 2.0 ports. Two on-board XMC/PMC slots allow for expansion using a wide variety of PMC and XMC cards. Themis' new LV1 boards are ideal for compute-intensive embedded, storage, and commercial applications as well as a wide range of military and aerospace applications.

FEATURES

- Intel Core 2 Duo SL9400 processor running at 1.86 GHz
- Up to 8 GBytes with SoDIMM expansion
- Error Detection/Correction: 8-bit ECC
- CompactFlash™ Type I & II socket
- Dual Gigabit Ethernets off P0
- One 64-bit/66MHz PMC slot on-board
- VITA 41 compliant
- Cooling: -5 °C to +55 °C (ambient temperature)
- OS Support: Linux® and Microsoft® Windows®
- Shock: 30G peak, 20ms

For more information, contact: info@themis.com **www.mil-embedded.com/p45775**

COTS collection: Boards, Carriers, Mezzanines – VMEbus/VME 64

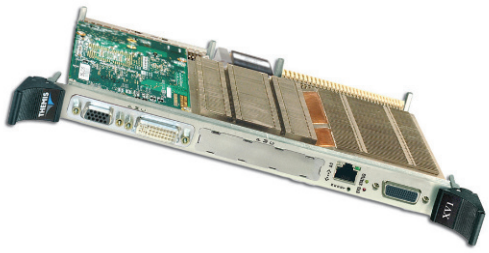
Themis Computer

47200 Bayside Parkway • Fremont, CA 94538 USA
510-252-0870
www.themis.com

XV1™

Themis Computer's XV1™ is a 6U VMEbus computer that makes use of the Intel® Quad-Core L5408 Xeon® processor. The XV1 provides high performance and is designed to meet the needs of customers who require quad-core performance for their demanding applications. Themis' XV1 boards target compute-intensive embedded, storage and communications applications as well as a wide range of commercial and military applications.

The XV1 base configuration includes: two GBytes of DDR II memory, three Gigabit Ethernet ports, three SATA II ports, four USB 2.0 ports and two XMC/PMC slots. Storage can be provided through the use of an onboard CompactFlash or with an optional on-board 2.5 inch SATA drive. The board includes VITA 41 dual-Gb Ethernet to support highly networked environments.



FEATURES

- Quad-core Intel® Xeon® processor, clocked at up to 2.13 GHz, and Intel's 5100 chipset used in high-performance Xeon servers
- Up to 8 GBytes DDRII SDRAM memory; Flash Memory: 1 MByte
- Error Detection/Correction: 8-bit ECC
- CompactFlash™ slot
- XMC/PMC single expansion slot
- Up to 3 Gb Ethernet ports; (4) USB ports & (3) SATA II ports
- VITA 41 compliant
- Cooling: -5 °C to +55 °C (ambient temperature)
- OS Support: Linux® and Microsoft® Windows®
- Shock: 30G peak, 20ms

For more information, contact: info@themis.com **www.mil-embedded.com/p39525**

COTS collection: Boards, Carriers, Mezzanines – VMEbus/VME 64

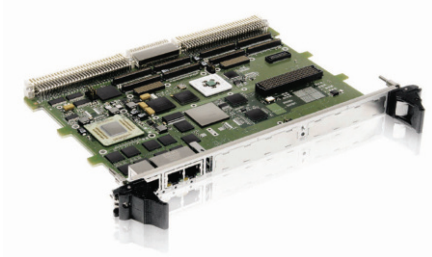
Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

Kontron VME processor board VM6250

6U VME PowerPC SBC with AltiVec™

The Kontron VM6250 single or dual-core processor board offers scalable performance, high data throughput, low power dissipation, and easy extensibility via XMCs, PMCs and FMCs (FPGA mezzanine cards), according to VITA 57. The Kontron VM6250 upgrades VME based air or conduction-cooled applications with extraordinary processing performance and innovative features. When VME applications require Intel™ processors, the Kontron VM6250 is 100% I/O compatible with PENTXM2 Xeon based SBCs (same backplane and front panel connectors), a unique value proposition to the VME market.



FEATURES

- Up to 1.33 GHz Freescale Dual-Core MPC8641 with AltiVec
- Extreme flexibility via XMCs, PMCs and FMCs sites and optional PMC carrier
- Linux Fedora 9 and VxWorks 6.6 support
- Air- and conduction-cooled version
- Multi-year supply through Kontron Long Term Support offering
- Improved time to market with ready to go system solutions

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45581**

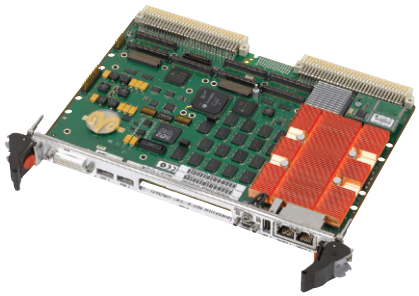
Emerson Network Power

2900 S. Diablo Way, Suite 190 • Tempe, AZ 85282 USA
1 800 759 1107 or +1 602 438 5720
Emerson.com/EmbeddedComputing

iVME7210 Dual-Core VMEbus SBC

The iVME7210, with Intel® Core™ i7 processor variants and the mobile Intel® QM57 Express chipset, is designed for a range of industrial, medical and military/aerospace applications. The dual-core processor has integrated memory and graphics controller. On-board memory includes up to 8GB DDR3 soldered memory and 256KB non-volatile Ferroelectric Random Access Memory (F-RAM). F-RAM does not require batteries or periodic refreshes, and offers much greater read/write cycles and faster performance than flash.

The iVME7210 has additional storage of 64Mb of SPI boot flash, up to 8GB of embedded USB flash, and an 80GB SATA hard drive accessory option. Connectivity includes four Gigabit Ethernet ports, up to five USB 2.0 ports, five serial ports, two SATA ports and dual XMC sites or one XMC site with DVI port and SATA port. Compatible operating systems include Wind River VxWorks, Linux, Green Hills INTEGRITY, and LynuxWorks LynxOS. Extended temperature and rugged versions will be available via Emerson alliance partners.



FEATURES

- Intel® Core™ i7 dual-core processor (1.06 ULV or 2.0 GHz LV) with integrated memory controller
- Intel® Ibex-M Peak Platform Controller Hub (PCH)
- 4GB or 8GB ECC-protected DDR3-1066 memory
- 4GB or 8GB eUSB flash module
- 256K non-volatile F-RAM (NVRAM)
- Ideal for industrial, medical and military/aerospace applications including robotics, image processing, radar/sonar, C4ISR and signal intelligence

For more information, contact: EmbeddedComputingSales@Emerson.com **www.mil-embedded.com/p45778**

COTS collection: Boards, Carriers, Mezzanines – VMEbus/VME 64

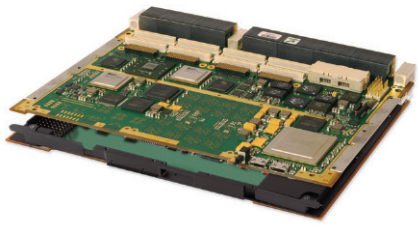
GE Intelligent Platforms

Rt 29 North & Rt 606 PO Box 8106 • Charlottesville, VA, 22911-8300 USA
www.ge-ip.com

VPXtreme6 SBC612

The SBC612 is the first Freescale QorIQ-based product to join GE Intelligent Platforms' VPXtreme6 family of rugged 6U VPX Single Board Computers. Based on the P4080, the rugged SBC612 offers a huge leap in processing performance, providing up to eight processing cores within the power envelope of previous dual core boards. Combined with an extensive and flexible range of I/O options, the SBC612 is ideal for a wide range of high performance Mil/Aero applications.

For Ruggedization Levels, please see the configuration guide under the downloads tab.



FEATURES

- P4080 processor
- Eight e500mc cores @ up to 1.5GHz
- Dual-channel DDR3 (up to 8GB)
- 512MB NOR Flash
- 4GB NAND Flash Solid-State Drive
- 512kB non-volatile MRAM
- 4off x4 SRIO links fr VPX P1 & 4off x4 PCIe Gen2 links fr VPX P2
- 2x PMC/XMC Sites and one
- 2x 10/100/1000BASE-T Ethernet + 2x 10/100/1000BASE-T / 1000BASE-X

For more information, contact: www.ge-ip.com **www.mil-embedded.com/p46020**

COTS collection: Boards, Carriers, Mezzanines – VMEbus/VME 64

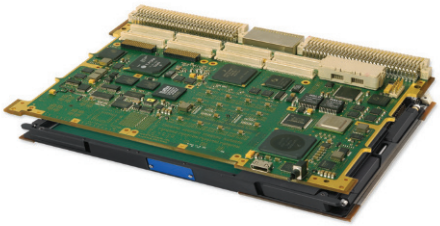
GE Intelligent Platforms

Rt 29 North & Rt 606 PO Box 8106 • Charlottesville, VA, 22911-8300 USA
www.ge-ip.com

PowerXtreme PPC9B

GE Intelligent Platforms PPC9B is the first Freescale QorIQ P2020-based single board computer to join the PowerXtreme family of rugged 6U VMEbus processors. By preserving the same hardware interfaces as previous PowerXtreme family members, the PPC9B provides an ideal opportunity for state-of-the-art technology insertion into both upgrade programs and new platforms alike. But for the first time a dual core Single Board Computer is now available in the power envelope of previous single core solutions.

For Ruggedization Levels, please see the configuration guide under the downloads tab.



FEATURES

- Freescale QorIQ P2020 processor up to 1.2 GHz – Two e500 cores – Shared 512 KB L2 Cache with ECC
- Integrated DDR3 memory controller with ECC
- Up to 2 GByte soldered DDR3 SDRAM with ECC
- Up to 1 GByte Flash
- 2x128 KB of NVRAM
- Two on-board expansion sites
- One XMC/PMC and one PMC only

For more information, contact: www.ge-ip.com **www.mil-embedded.com/p46019**

COTS collection: Boards, Carriers, Mezzanines – Legacy

Xembedded LLC

1050 Highland Drive, Suite E • Ann Arbor, MI 48108 USA
734-975-0577
www.xembedded.com

Legacy VME, CompactPCI or COTS replacement service

Utilize our 30+ years of CPU board design experience to provide a replacement solution to your EOL problem.

Based on COTS designs that we have already done, Xembedded can provide you with a replacement that is pin-4-pin compatible, the option to leverage newer technologies and capture the same form-fit-function of the product being replaced.

We provide solutions for the following markets:

- Commercial Products
- Extended Temperature Products
- Military Products

Let Xembedded help you replace the end-of-life product in your systems, keeping profitable solutions running longer for less!

FEATURES

- COTS Based
- "Pin-4-pin" compatible
- The option to leverage newer technologies
- BIOS modifications available
- Capture the same form-fit-function of the product being replaced
- SOM (System On Module) implementation to allow for future technology upgrades
- Optimize your exisitng project lifespan
- Reduce expensive field upgrades

For more information, contact: sales@xembedded.com **www.mil-embedded.com/p45814**

Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065 USA

www.innovative-dsp.com

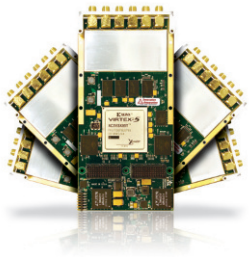
Innovative Integration
... real time solutions!

PCI Express X5 & X3 XMC Product Family

The X3 and X5 module families feature high-performance analog and digital I/O on a standard PMC module format with a flexible PCI Express host interface bus. Each one has a powerful user-programmable FPGA computing core that is used for data acquisition and connects the I/O to the PCI Express host interface.

The X3 group provides an extremely cost-effective combination of analog or digital I/O plus a user-programmable FPGA plug-and-play, yet customizable solution for common data acquisition, waveform generation, and servo/control applications.

The X5 module family provides a state-of-the-art combination of the newest generation, high-density, user-reprogrammable Virtex-5 FPGA logic meticulously integrated with ultra-high-speed analog or digital I/O to address the most demanding radar, wireless RF, and communications applications. Customize COTS X5 Modules for your application.



FEATURES

- Virtex-5 FPGA – SXT or LXT
- QDR SRAM and DDR2 DRAM memory pools
- PCI Express, 8 lane interface
- Analog and digital I/O integrated with FPGA
- >1 GB/s dedicated secondary host interface
- Compact IEEE 1386 card format (75x150mm)
- Integrate into any VITA 42.3 PCI Express system
- >30 GMACs/s (SX95T) integrated with memory blocks and logic
- Real-time memory performance to 4 GB/s for FPGA data buffering and computation
- >1 GB/s transfer rates to host eliminates custom hardware requirements

For more information, contact: sales@innovative-dsp.com

www.mil-embedded.com/p45484

COTS collection: Boards, Carriers, Mezzanines – XMC

Pinnacle Data Systems, Inc.
6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

XMC-GBX Quad Gigabit Ethernet Adaptor

This new quad gigabit Ethernet XMC is a high-performance, low-latency network adaptor providing four high-speed Ethernet interfaces for use with VITA 42.3-compatible VME, PCI Express, CompactPCI®, and AdvancedTCA® processor boards. It is available in three configurations offering a mix of front and rear port access.

Wide internal data paths eliminate performance bottlenecks. The parallel and pipelined logic architecture is optimized for Gigabit Ethernet and efficiently handles packets with minimum latency. Using widely accepted Intel 82571EB Ethernet controllers, this adaptor offers up to four 10BASE-T/100BASE-Tx/1000BASE-T copper ports with front-mounted RJ-45 connectors and full status indicators. Alternatively, up to four SERDES ports are accessible through the Pn4 connector for use via an appropriate copper or fiber-based rear transition module.

Pinnacle Data Systems, Inc.

FEATURES

- Quad Gigabit Ethernet interfaces – Copper or SERDES
- Up to 4 10BASE-T/100BASE-Tx/1000BASE-T ports with RJ-45 front connectors with status indicators
- Up to 4 rear-accessible SERDES ports via Pn4
- Low-latency data handling
- Efficient packet prioritization
- Enables use of jumbo frames
- Maximum system performance and throughput
- Windows, Linux and Solaris x86 support
- VITA XMC-compliant interfaces for high bandwidth
- Customization welcomed, extended availability assured

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p45800**

COTS collection: Boards, Carriers, Mezzanines – XMC

Pinnacle Data Systems, Inc.
6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

XMC-E24D/PMC-E24D Dual-Display Graphics Module

PDSi offers these high-performance dual-display graphics modules in both XMC and PMC form factors. Using the ATI Radeon™ E2400 graphics controller from AMD, these modules enable VME, cPCI, and AdvancedTCA systems to take full advantage of AMD's embedded advanced graphics technology. They provide simultaneous independent support of either one digital DVI and one VGA analog display or two VGA displays at 32-bit color and up to 2048 x 1536 resolution.

This module provides the high performance, low power, flexibility, and long life-cycle availability required by many real-world embedded applications in industries such as military/aerospace, industrial control and instrumentation, telecom/datacom, and medical imaging.

Pinnacle Data Systems, Inc.

FEATURES

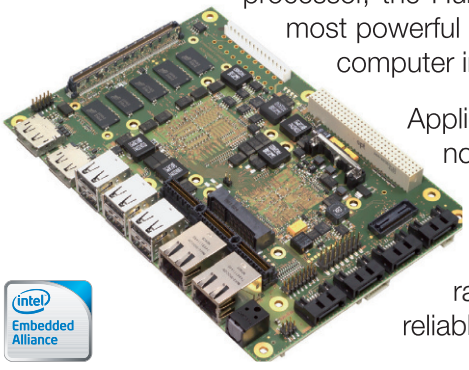
- Based on ATI Radeon E2400 graphics processor
- Superior 2D and 3D graphics acceleration
- On-chip GDDR3 video memory
- Dual independent high-performance display interfaces
- DVI-I and analog VGA (full size connectors)
- Dual integrated triple 10-bit DACs for dual RGB output
- Supports analog displays up to QXGA (2048 x 1536)
- 32-bit color depth
- Low-power 65nm design
- Customization and third-party integration welcomed; extended availability assured

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p45803**

Mission Critical Embedded Computing

Compact, reliable and rugged EPIC Express SBC with Intel® Core™ i7 processor

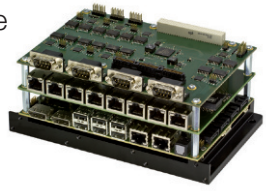
The new Hurricane-QM57 is especially designed for strategic mission-critical systems in industrial, medical, and traffic applications. Based on a Intel Core i7 processor, the Hurricane-QM57 is one of the first and most powerful EPIC Express formatted single board computer in the world.



Applications having high requirements for non-stop operation reliability (24/7), extreme ambient temperatures and temperature variations, as well as abnormal shock and vibration durability, can be developed easily and reliably.

Processor and chipset are both mounted on the PCB´s bottom side, allowing attachment of effective cooling devices for usage in extended temperatures.

In this arrangement it is possible to stack up the system with either PCI/104-Express peripheral cards or LiPPERT´s full size EPIC Express extension boards, offering 8 serial COM ports or 8 independent GBit Ethernet ports.



Highlights:

- Intel Core i7 processor
- 4 Gbyte DDR3-1066 ECC memory max.
- Dual DisplayPort
- Dual Channel 24 bit LVDS
- Dual Gigabit LAN
- 4 x SATA with RAID support
- 10 x USB 2.0 host ports
- Mini-PCIe Slot for WLAN
- PCI/104-Express extension
- Shock resistant according VITA47
- Passive cooling concept available
- Designed for extended temperature range -40°C ... +85°C
- LiPPERT Enhanced Management Technology (LEMT)

LiPPERT Embedded Computers Inc.
5555 Glenridge Connector, Suite 200, Atlanta, GA 30342
Phone (404) 459 2870 · Fax (404) 459 2871
ussales@lippertembedded.com · www.lippertembedded.com

LiPPERT
THE EMBEDDED PC COMPANY

Mass storage: Data recorder (system)

Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065 USA

www.innovative-dsp.com

Innovative Integration
... real time solutions!

Andale High Performance Turnkey Data Logging

Andale, a powerful data logging system, directly controls an NTFS disk subsystem to support gap-free storage or playback of analog or digital signals acquired. The included logging software moves data in real-time between the analog or digital I/O peripherals on any Innovative XMC module to/from dedicated SATA drives with minimal intervention from application software or Windows. A dedicated PCI Express SATA RAID controller interfaces to conventional hard disk drives supporting data flow rates up to 1000 MB/s, sustained. File sizes are limited only by the amount of disk storage available. Two TB of storage is available in the standard configuration; an optional 8 TB configuration is available and even larger storage is supported via external JBOD enclosures.

FEATURES

- Turnkey, high-speed data acquisition + storage
- Internal 2 to 8 TB hard disk array
- Expandable storage via external JBOD
- 1000 MB/s sustained performance from analog or digital I/O modules to standard NTFS disk files
- Supports all Innovative X3 and X5 I/O modules features including triggering and timing features
- Log anything from RF receivers to industrial control signals
- Rugged ATX enclosure with integrated cooling
- Autonomous or network-controlled operation via named pipe
- Excellent for high-speed recording playback and laboratory or factory instrumentation

For more information, contact: sales@innovative-dsp.com **www.mil-embedded.com/p37599**

InnoDisk USA Corporation
43130 Osgood Road • Fremont, CA 94539 USA
T: (510) 314-8393 • F: (510) 314-8394
www.innodisk.com

INNODISK®
Beyond your imagination

InnoRobust Ultra SSD

InnoDisk Corporation a DRAM & Flash Storage Solution Designer and Manufacturer introduces the InnoRobust Series, designed specifically for Military and Mission Critical Applications. When secure information needs to be stored, HDD is not an option, InnoRobust SSD is the answer!

InnoRobust, with Write Protect, Destroy, and Secure Erase supports the latest requirements demanded by the US Armed Forces. The InnoRobust series are designed for Raid Applications, Rugged Servers, Rugged Storage Unit, Submarines, Air, Sea, & Land Vehicles, and UAVs.

InnoRobust Specifications:

Performance:

Sustained Read/Write (MB/s):	175/90
Random Read/Write (IOPS@4KB):	2400/150

Power Consumption:

Read/Write mA (max.):	740/770
Idle:	460mA (max.)

Environmental:

Altitude:	80,000 feet
Operating Temp:	Industrial 0 to 70C, W/T -40 °C to +85 °C
Storage Temperature:	-55 °C to +95 °C
Shock (Operating):	1500G
Vibration (Operating):	20G
Humidity:	5-95%, non-condensing
Write Protect:	Support
Data Retention:	10 years
Dimension:	99.88mm x 69.63mm x 9.3mm (LxWxH)

InnoDisk is the leading manufacturer of industrial storage devices worldwide. The elite R&D team holds many product patents and is well experienced in designing industrial grade storage devices for embedded systems. InnoDisk provides comprehensive solutions for embedded systems and specialized applications. InnoDisk is among the most reliable and highest performing vendors globally.

For more information on the full line of InnoDisk products, including specifications, please visit our website at www.innodisk.com or contact us for more information.

InnoRobust 1.8" SATA SSD
Capacities: 8GB - 64GB

InnoRobust Ultra 2.5" SATA SSD
Capacities: 16GB - 256GB

FEATURES

- Capacity: 16GB to 256GB
- Single Level Cell (SLC) NAND Flash
- Compact Size: 2.5" SSD and 1.8" SSD
- Support SATA and PATA plug and play
- Hot Swappable
- Data Security/Protection: Quick Erase and Secure Erase, Write Protect/Destroy
- Conformal Coating: Preventing Corrosion/MIL 1-46058C silicon conformal coating
- Low Power Consumption, Operates in mA
- MIL STD 810F 503.4 Thermal Shock Procedure II; -40 °C to +85 °C, 10 Cycles
- MIL STD 810F 512.5C-1 Specification, Vibration 20G
- MIL STD 810F 516.5 Procedure IV Transit Drop Specification, Shock of 1500G 3 axis for XYZ
- 40g/11ms/18 shocks (3 shocks for = X, Y, Z axis)
- Quick Erase – Ability to erase all data, master boot records and write over in a known pattern in 35 seconds on a 128GB SSD
- Secure Erase complies with military data elimination standard
- The erase feature can be performed manually or by command
- Once the Erase Command has been engaged there is no stopping the device until the SSD has been fully erased and written over by a standard pattern.
- **InnoRobust complies to the below guidelines:**
  - USA-AF AFFSI 5020
  - DoD 5220.22.M
  - USA Navy NAVSO P-5239; NSA 9-12
  - USA Army 380-19
  - NISPOMSUP Chap 8, Sect. 8-501

For more information, contact: usasales@innodisk.com **www.mil-embedded.com/p46024**

Microsemi Power and Microlectronics Group
3601 E. University Drive • Phoenix, AZ 85034 USA
602-437-1520
www.whiteedc.com

GUARDIAN™ SATA SLC SOLID STATE DRIVE

Microsemi's new Guardian SSD is engineered specifically for defense applications. Manufactured and designed in our secure, trusted U.S. facility, this 2.5" SATA drive with SLC NAND flash provides unparalleled drive performance for applications where data integrity, security and extended environment performance are required.

The Guardian SSD realizes solid state technology's true potential with features that meet the stringent requirements of sensitive military applications, including a rugged small form factor, security options, sanitization protocols, obsolescence management and high reliability in extended environments.

Microsemi's exclusive design provides exceptional data integrity and endurance by focusing processing power on error correction, effective wear leveling, and eliminating drive corruption and unscheduled down time.

The Guardian's reliability, coupled with its SMART attributes (self-monitoring, analysis and reporting technology), enables the user to anticipate product end-of-life scenarios and prevent field failures.

The Microsemi Guardian is ideal for mission-critical applications, including surveillance, mission data recorders, field computers, digital map storage, avionics and GPS and communications systems.

FEATURES

- 50 or 100 GB densities
- Hardware-implemented AES-256 encryption
- Tamper resistant features available
- SnapPurge™ renders data irrecoverable in milliseconds
- Fast clear erases all blocks in seconds
- Hardware-based authentication
- Uncorrectable bit error rate of one sector per 10^{30} bits read
- MTBF greater than 2,000,000 hours
- Military and government agency sanitization protocols
- Built-In-Self-Test (BIST)
- Power interruption protection with over and under voltage detection and protection
- No super caps or batteries
- Self-monitoring analysis and reporting technology
- Industrial temperature operation with extended shock and vibration durability

For more information, contact: www.whiteedc.com **www.mil-embedded.com/p45811**

Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

Kontron Industrial Silent Servers (KISS) Family

Kontron offers a full line of configurable rugged-designed embedded industrial PCs with availability of up to 7 years.

Kontron has a full range of configurable Kontron Industrial Silent Server (KISS) products available for use as a tower, desktop or rack mount system. Each KISS system has an extremely low noise level of <35 db making these servers ideal candidates for noise-sensitive environments.

Benefits include:

- Designed for **high MTBF**. These COTS systems have chassis designs that are extremely rugged with boards and drives installed to support high shock and vibe environments.
- Kontron KISS systems are **designed for ease of field-level maintenance**. Some system deployments in harsh environments necessitate easy field repair. KISS systems make quick swap of hard drives, chassis fans and fan filters easy.

FEATURES

- **Configurable long life 1U, 2U & 4U systems**, with 1U, 2U and 4U short options so that your system will fit in the space allocated.
- Select **motherboard or SBC passive backplane with up to 14 slots**. With Kontron KISS systems you may configure systems for the capacity and performance needed for your application. Flexible CPU options with up to Intel® Core™2 Quad, up to 8 GB DDR3 memory, multiple TB drives and PCI and PCIe expansion options are pre-verified.
- **Low noise embedded industrial PCs** with <35dB. They are inaudible against normal conversation. KISS IPC servers are therefore ideal for most noise-sensitive environments, such as operating theatres, surveillance, simulations and other field IPC deployments.
- **Intel® vPro™ AMT ready, TPM available**.
- Assembled in the **San Diego** area for your convenience.

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p42376**

Other: Industrial systems

Trenton Technology

2350 Centennial Drive • Gainesville, GA 30504 USA
770-287-3100
www.TrentonTechnology.com

TCS4500 4U Rackmount Computer

Trenton's TCS4500 is a 4U rackmount computer with a shallow depth dimension that makes it an ideal choice for applications where computer mounting space is at a premium. The system is pre-configured with a high-performance, dual-processor Trenton JXT6966 single board computer and Trenton's BPC7041 backplane. The system's COTS SBC and backplane are both covered by Trenton's exclusive five-year factory warranty. The TCS4500 is a flexible system designed to support applications that require longevity, stability and the capability of supporting multiple PCI Express 2.0 or 1.1 option cards. This server chassis combines multiple hot swap/front access drive bays and optional card support with the JXT6966 dual-processor single board computer to deliver outstanding performance in rugged embedded computing applications.

A few typical applications for the TCS4500 are:

- Bridge navigation and telemetry
- Submarine control and airborne server
- Video wall displays and virtualization

FEATURES

- Shallow-depth chassis (17.8") is ideal for mounting in confined spaces
- 4U system with two quad-core Intel® Xeon® C5500 Series processors (Jasper Forest)
- Trenton's exclusive 5-year factory warranty on the system's JXT6966 SBC and BPC7041 backplane
- Supports up to 10 PCI Express 2.0/1.1 option cards for maximum system flexibility
- Four hot swap, front access 2.5" storage drive bays standard and multiple front and rear system interface ports
- Standard options include one optical media and one storage drive with up to three additional 2.5" HDDs

For more information, contact: jrenehan@trentontechnology.com **www.mil-embedded.com/p45433**

Packaging/Mechanical/Chassis: 19" rack

Pinnacle Data Systems, Inc.

6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

Pinnacle Data Systems, Inc.

ComputeNode™ CompactPCI Chassis Products

PDSi's ComputeNode line offers a range of NEBS Level 3-compliant CompactPCI chassis in sizes from 1U to 4U. These carrier-grade chassis include a horizontal design, superior air cooling, cPCI and cPSB (PICMG 2.16) backplanes, redundant hot-swappable fans, hot-swappable front-accessible AC or DC power supplies, and rear single or dual power feeds. All 2U and larger ComputeNode platforms include PDSi's unique Alert!Node™ (or Enhanced Alert!Node) alarm card, an intelligent chassis management controller for comprehensive fan and power monitoring. The Alert!Node card does not occupy a CompactPCI slot, front or rear.

OEMs and Independent Software Vendors (ISVs) can also take advantage of PDSi's design, integration, and support services, including custom board and system design, validation and certification, production assembly and test, as well as extended service programs.

FEATURES

- Proven NEBS Level 3-compliant design
- Designed for high availability applications
- Redundant hot-swap fans
- Redundant AC or DC power supplies
- Power filters and dual feed power
- Easily serviced
- Broad range of chassis choices
- 1, 2, 3, and 4U sizes
- cPCI and PICMG 2.16 (cPSB) backplanes
- Alert!Node intelligent chassis manager
- Customization and integration services available

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p44295**

Packaging/Mechanical/Chassis: ATR

LCR Electronics

9 South Forest Ave. • Norristown, PA 19401 USA
1-800-527-4362
http://www.lcr-inc.com/systems-backplanes/enclosure-atrstyle.html

LCR ELECTRONICS, INC.®
ENGINEERED PRODUCT SOLUTIONS IN A CUSTOMER FOCUSED CULTURE

MicroTCA ATR Chassis

LCR Electronics' new compact, rugged MicroTCA chassis provide design flexibility in a variety of industrial, commercial and military environments. The ATR chassis employ machined box construction. This enables LCR's enclosures to conform to rigorous, industry-leading MIL-STD specifications including 810F Methods 514.5, 513.5, 516.5, 507.4 and 509.4 for vibration, acceleration, shock, humidity and salt fog, respectively.

Additional MIL-STD specifications that the new chassis meet include 167 Type 1, Para. 5.1 for vibration, 901D lightweight hammer for shock and 461D for EMI. An optional shock-isolated card cage provides additional rigidity to internal electronics.

Each MicroTCA rugged enclosure can feature up to a 10-slot backplane and is configured to ARINC 404A. The chassis are air-cooled or conduction-cooled in a variety of standard and custom sizes to accommodate numerous application environments with customizable I/O also available.

FEATURES

- Complete Turnkey System
- Various Slot Configurations; Multiple Card Depth Options
- Front Panel Configurations as Required
- Front, Side and Top Loading Circuit Cards
- Fully Wired and Tested; Complete EMI Shielding and Filtering
- High MTBF, Low MTTR
- Operating Temperature: -40 °C to +85 °C
- Storage Temperature: -55 °C to +95 °C
- Available with 200 W and up Power Supplies
- Frequency: 47 to 63Hz (400Hz available)
- Voltage: 85 to 265 VAC (Auto Range Available) or Custom DC Input

For more information, contact: sales@lcr-inc.com **www.mil-embedded.com/p43956**

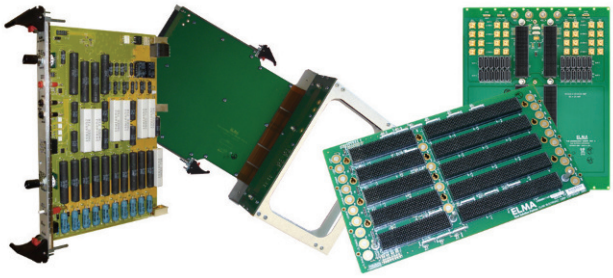
Packaging/Mechanical/Chassis: Backplane

Elma Bustronic

44350 Grimmer Blvd. • Fremont, CA 94538 USA
510-490-7388
www.bustronic.com

VPX Backplanes & Accessories

Bustronic offers the largest range of VPX/OpenVPX Backplanes and Accessories in the industry. Backplanes are offered in OpenVPX (VITA 65) compliant 3U and 6U heights, hybrid & development versions and a 2-slot test backplane. VPX System Accessories include load boards, extender boards, SerDes test modules, VPX cables and RTMs (VPX universal RTMs).



FEATURES

- Compliant to the latest VITA 46 and VITA 65 specifications
- OpenVPX and VPX Backplanes available in 3U and 6U and 6U Hybrids
- 2-slot test backplane makes development easy with wide slot spacing, rear IO/RTM access, SMA contacts, and more
- Load boards in 3U and 6U, standard and conduction-cooled formats
- Industry's only VPX Extender board solution
- Unique SerDes test device for VPX: Performs BER, pattern generation, and used for pre-emphasis tuning
- VPX cabling solution for development and deployment
- Unique VPX Universal RTM solution

For more information, contact: sales@elmabustronic.com **www.mil-embedded.com/p46023**

Packaging/Mechanical/Chassis: Box-level purpose built

Curtiss-Wright Controls Electronic Systems

28965 Avenue Penn • Santa Clarita, CA 91355 USA
800-352-3468
cwcelectronicsystems.com/enclosures

OpenVPX Development Chassis

The Hybricon OpenVPX Development Chassis products include a range of 3U and 6U air cooled desktop/tower and Open Frame enclosures. These high-performance development chassis are able to cool up to 150W per slot. These chassis are designed to the latest VITA 46.0, 46.3, 46.10, 48.0, 48.1, 65.0 and 68.0 specifications. The card cage is designed to support 7x 1.0" pitch or 9x 0.8" pitch cards and includes a 3U/6U x 80 mm Rear Transition Module area. A selection of Power Supplies is available, up to 1200W. High-performance fans provide > 19 CFM per slot cooling.

The Open Frame models offer open sides and top support access so that engineers and test personnel can easily reach board components while debugging.

Custom configurations and integration services are available.

FEATURES

- 3U/6U x 160 mm card cage with (7) 1.0" pitch positions or (9) 0.8" pitch positions
- 3U/6U x 80 mm Rear Transition Modules (RTMs)
- Advanced Cooling design for cooling up to 150W per slot (> 19 CFM per slot)
- Up to 1200W Power Supply
- Support for backplanes for OpenVPX, VPX, VPX-REDI, CompactPCI and VME

For more information, contact: systeminfo@curtisswright.com **www.mil-embedded.com/p45786**

Packaging/Mechanical/Chassis: Cables/Connectors

Tyco Electronics

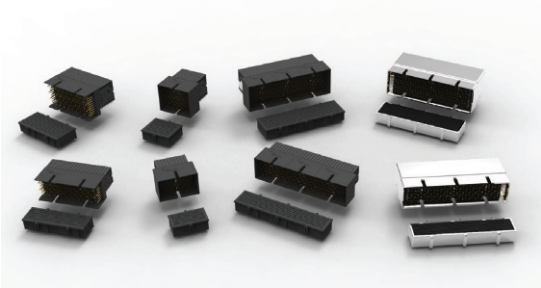
PO Box 3608 • Harrisburg, PA 17105 USA
800-522-6752
www.te.com/ADM

Tyco Electronics
Our commitment. Your advantage.

Fortis Zd Connector

As demands on systems with real-time intelligence intensify, the importance of high-performance interconnection becomes critical. Tyco Electronics understands the ever-increasing demands and has engineered a new standard in high-performance backplane connector systems.

This modular backplane connector system combines the highest performance mil/aero and commercial technologies in a user configurable platform.



FEATURES

- Allows 10 GB/s+ data rates
- Extreme mechanical and electrical performance
- Modular design allows for user configurability and modular evolution
- Proven compliant pin board attach facilitates manufacturing efficiency, repairability and superior electrical performance
- 500 mating cycles durability
- High-performance copper alloy contacts and high-temperature thermoplastic housings

For more information, contact: gregory.powers@te.com **www.mil-embedded.com/p45812**

Packaging/Mechanical/Chassis: Electronics packaging

Hypertronics Corp.

16 Brent Drive • Hudson, MA 01749 USA
978-568-0451
www.hypertronics.com

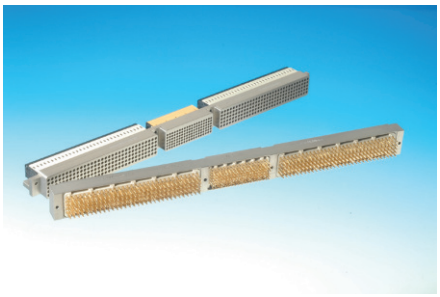
HYPERTAC
HYPERTRONICS

VME64x

Hypertronics' ruggedized VME64x interconnect solution comprises optimized contact lead traces to provide superior performance in high-speed signal applications.

VME64x connectors are mechanically compliant with IEEE-1101.2-1992, supporting the premier embedded bus architecture, and offer a significantly improved interface for immunity to shock and vibration and low mating forces.

The physical demands of critical applications require a higher standard of reliability. Hypertronics' VME64x solution removes weakness of the electrical interface from the standard VME COTS architecture, reducing the costs of development, manufacturing, and ownership.



FEATURES

- Designed for severe environments with high levels of shock and vibration
- Compatible with IEEE-1101.2-1992
- Complies with ANSI/VITA 1.7 high-current standard for VME64x
- Stackable design of high-speed modules features round pins to mate with Hypertac contacts
- Optimized lead traces within modules provide superior performance in high-speed applications tested up to 3.125 Gb/s
- Aluminum frames for ruggedness and conduction cooling
- Keying feature ensures proper mating

For more information, contact: info@hypertronics.com **www.mil-embedded.com/p43693**

Tri-M Engineering

100-1407 Kebet Way • Port Coquitlam, BC V3C 6L3 Canada
604-945-9565
www.tri-m.com

CanTainer – Rugged PC/104 Enclosure

The CT104 CanTainer is a rugged PC/104 enclosure system constructed of .125" aluminum and designed for hostile and mobile environments. It features a dual system of shock and vibration isolation: The PC/104 modules are mounted axially in the enclosure with four internal rubber corner rails to absorb high-frequency vibrations, while the entire enclosure is mounted on the host platform with a thick rubber pad that absorbs low-frequency G-forces. The rubber pad may be removed for optional mounting solutions such as hard mounting, flange endcap, or fluidic mount assembly.

The CanTainer cross section measures 6.00" wide by 5.45" high (not including mounting pad) and is designed to mount PC/104 boards axially along the entire length of the enclosure body. The enclosure is available in standard lengths from 2" to 12" with custom lengths up to 48".

FEATURES

- Dual shock and vibration protection system
- PC/104 mounting
- Available as a complete kit
- Passively cooled
- Easily customized: length, coating, etching, milling, mounting
- 6063-T5 extruded aluminum
- .125" thick
- High-grade extruded rubber
- Black anodized coating
- Standard lengths from 2" to 12"

For more information, contact: info@tri-m.com **www.mil-embedded.com/p44299**

Optima EPS

1775 MacLeod Dr. • Lawrenceville, GA 30043 USA
770-496-4000
www.optimaeps.com

Seismic and MIL Cabinets

All M series Optima cabinets are designed and tested to withstand an earthquake Seismic Zone 4 event as defined in GR-63-CORE without displaying any permanent set or deformation to impair performance or operation. The M1 (single wall extrusion) meets NEBS Level 3 requirements, and its modular construction makes it ideal for customization to specific customer needs.

Hostile environments often require rugged COTS cabinets that can meet or exceed MIL-STD: 810E, 167, 901D, 461D and Tempest. Optima's M series MIL-SPEC Cabinet System is a unique modular construction designed to exceed military standards and can adapt to the equipment-mounting and protection needs of virtually any electronic system.

Optima EPS
Cabinets & Enclosures
An ELMA Company

FEATURES

- SEISMIC CABINETS
- Meets Seismic Zone 4 per GR-63-CORE
- Strong fit for rugged, mobile or seismic applications
- Customized Engineering review based on customer specific load requirements
- EMC and NEMA rated versions
- MIL RUGGED CABINETS
- Designed to meet MIL-STD: 461D, 810E, 167, 901D
- 4 x crane lifting eyes rated to 1,000 lbs each

For more information, contact: sales@optimaeps.com **www.mil-embedded.com/p46022**

Vector Electronics & Technology, Inc.
11115 Vanowen Street • North Hollywood, CA 91605 USA
800-423-5659
www.vectorelect.com

VECTORPAK™ "Slimline" CHASSIS

ITAR REGISTERED NUMBER M26764

19" rackmount, rugged aluminum construction with left to right air-flow. Fans installed on left/right for maximum cooling of 6U x 160mm front cards and 6U x 80mm rear transition cards. 1U, 2U, 3U, 4U and 5U (2-10 backplane slots), IEEE 1101.1, .10 & .11 compliant.

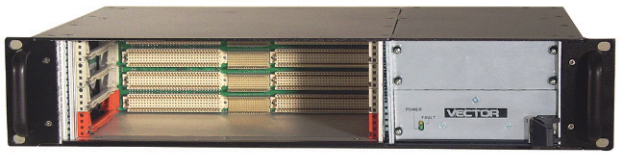
Plug-in, hot-swap power supplies or embedded ATX:

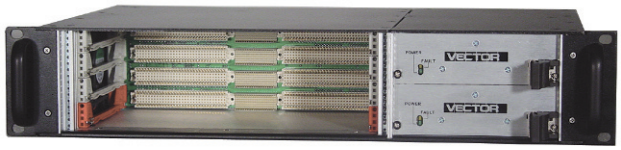
- 200W plug-in power supply will provide 5V@25A; 3.3V@35A; +12V@8.0A and -12V@1.5A, AC/DC or DC/DC
- 250W high output plug-in power supply will provide 5V@40A; 3.3V@40A; +12V@5.5A and -12V@2.0A, AC/DC or DC/DC
- 300W embedded ATX-type power supply will provide 5V@30A; 3.3V@20A; +12V@16A and -12V@0.8A

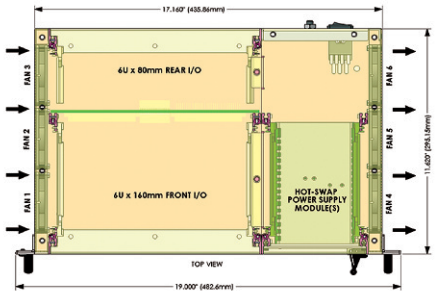
Backplane options:

- cPCI 64-bit/66MHZ PICMG 2.0, Rev 3
- cPCI H110
- VME64x with EBG (Electronic Bus-Grant)

Our units are made at our U.S. facility, and we offer short lead times and custom configurations upon request. Many color options are available. Please call us at 1-800-423-5659 or e-mail us at inquire@vectorelect.com.







FEATURES

- CompactPCI or VMEbus
- 1U, 2U, 3U, 4U and 5U 19" rackmount
- Push-pull fans for maximum airflow
- Dual-redundant hot-swappable power supplies
- Wide choice of factory colors

For more information, contact: inquire@vectorelect.com **www.mil-embedded.com/p45781**

Packaging/Mechanical/Chassis: Rugged chassis

Curtiss-Wright Controls Electronic Systems

28965 Avenue Penn • Santa Clarita, CA 91355 USA
800-352-3468
cwcelectronicsystems.com/enclosures

Small Form Factor (SFF-4) Conduction Cooled Chassis

The Hybricon SFF-4 Small Form Factor Baseplate Conduction Cooled Chassis was designed for rugged airborne and ground mobile applications. It offers extended temperature, shock and vibration tolerance. This open architecture solution supports 4 payload slot 1" pitch OpenVPX, VPX, VPX-REDI and CompactPCI backplanes. It utilizes a 200W military power supply for MIL-STD-704 aircraft and MIL-STD-1275 vehicle use.

Custom configurations and integration services are available.

FEATURES

- ATR-style small form factor chassis (7.62" h x 6.0" w x 7.0" d)
- 4 slot 1" pitch payload slot conduction cooled card cage
- 3U OpenVPX, VPX and cPCI backplane options
- Conduction cooled baseplate
- 200W 28V DC Power Supply compliant to MIL-STD-704F and MIL-STD-1275

For more information, contact: systeminfo@curtisswright.com **www.mil-embedded.com/p45787**

Packaging/Mechanical/Chassis: Rugged chassis

Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.us.kontron.com

CG2100 Carrier Grade Server

The CG2100 Carrier Grade Server combines performance, ruggedness, reliability, and long life in a NEBS-3 and ETSI-compliant 2U chassis, with dual socket support for the Intel® Xeon® processor 5600 series.

This high-performing, rugged server is ideal for the demanding environment and limited space of the Telco central office. It is also an excellent choice for network data centers and for Military applications, where meeting tough environmental requirements is critical.

In addition to the many benefits long associated with the Kontron Carrier Grade Server family, the CG2100 introduces several new valuable capabilities such as support of PCIe Gen2, Power Management Bus, DDR3 memory, hot-swap/redundant fans, and increased memory and storage capacity.

FEATURES

- NEBS-3/ETSI compliant
- Long life support (3-5 years)
- 20-inch depth, ruggedized 2U chassis
- Dual, redundant AC or DC power option
- Telco alarm management
- Hardware RAID option
- Industry-leading performance/watt
- Improved serviceability with hot-swap capability

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45583**

Packaging/Mechanical/Chassis: Rugged chassis

Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com

COBALT – High Performance Embedded Computer

This highly scalable embedded computer system is available with a wide selection of processor, storage, power and interface options. The small footprint and low power makes it the ideal solution for applications requiring both performance and reduced SWAP (Size, Weight & Power).

COBALT provides reliable operation and full compliance in a wide range of rugged environments:

- Military ground vehicles
- UAVs
- Military and commercial aircraft
- Shipboard and submarines

Compared to VME or cPCI backplane based systems, COBALT is the best value in the embedded computing market. The flexibility in processing power data throughput, storage and interface options make it the clear choice for demanding military and commercial applications.

FEATURES

- Small Form Factor (6.5" x 9.725" x 2.95")
- Intel® Core™2 Duo & Atom™ processor options
- Dual Ethernet ports for network connectivity
- Optional interfaces – ARINC429, MIL-STD-1553, RS-232, RS-422, GPS, GPIO
- AC & DC power supply options for operation in airborne, ground vehicle and shipboard environments
- Delivered with Linux or Windows operating systems installed

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p45807**

Power: "Bricks"

Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008 USA
1 888 412 7832 or +1 760 930 4600
Emerson.com/DCDC

PFC & High Voltage DC-DC Modules

Emerson Network Power offers a series of board-mount Power Factor Correction (PFC) and High Voltage DC-DC modules that can all be employed as building blocks to provide AC-DC power solutions for high power, high density and mission critical applications.

These "bricks" are full-featured modules that come with various monitoring/alarm functions, protection against abnormal conditions, wide output adjustment, current sharing, synchronization and more. The modules are suitable for harsh temperature conditions (-40 °C startup; -20 °C to 100 °C operating temperature). They also have full international safety approvals and are EU 2002/95/EC compliant for RoHS.

These building block modules enable users to build high performance, low profile power supplies with minimal non-recurring engineering costs and fast turnaround times.

FEATURES

- Full power up to 100 °C maximum baseplate temperature
- Industry standard "brick" form factors

PFC Modules (AIF, AIT, AIQ Series)

- Scalable power solution from 65W up to 1600W
- 85-264 Vac wide input availability

High Voltage DC-DC Modules (AIF & AIH Series)

- 250-420 Vdc PFC ready input range
- Scalable power offering from 65W up to 600W available in various output voltages

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.mil-embedded.com/p45790**

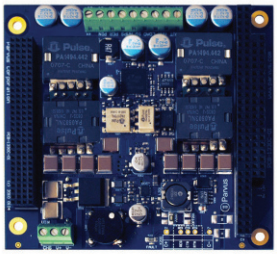
Parvus Corporation

3222 Washington Street • Salt Lake City, UT 84115 USA
800-483-3152
www.parvus.com

ACS-5180

PC/104-*Plus* 80 Watt Isolated DC/DC MIL-704/1275 Power Supply, Vin=18-33VDC, Vout=+5,+3,+12VDC

The ACS-5180 is a rugged PC/104-*Plus* isolated power supply capable of supplying up to 80 Watts of power output over extended temperature ranges to embedded computing devices in demanding military/civil ground vehicle, shipboard, and aircraft applications. Designed for extended temperature operation (-40 °C to +85 °C per MIL-STD-810G) and demanding power conditions found on board military ground vehicles (MIL-STD-1275D) and aircraft (MIL-STD-704F) installations, this highly efficient (90%+), filtered DC/DC converter supplies DC voltage outputs (+3.3V, +5V, +12V) over the PC/104 (ISA) bus, PC/104-*Plus* (PCI) bus, or onboard screw clamp terminal. Featuring an onboard MIL-STD-461E EMI filter and rugged mechanical design, this small form factor (3.550" x 3.775") card is designed to be used as the bottom card in a PC/104 system stack, operate without heatsinking or any active cooling, and provide resistance to high levels of shock and vibration.



FEATURES

- 80 / 40 Watt PC/104-*Plus* Power Supply
- 18V to 33VDC Input Range
- +3V, +5V, +12V DC Output
- High Efficiency: ~90%
- Extended Temperature: -40 ºC to +85 ºC
- MIL-STD-704E & MIL-STD-1275D Compliance
- MIL-STD-461E EMI Filter
- Designed for MIL-STD-810G Environments

For more information, contact: sales@parvus.com **www.mil-embedded.com/p45654**

Power: DC/DC converter

Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008 USA
1 888 412 7832 or +1 760 930 4600
Emerson.com/LGA

LGA C Series Non-Isolated DC-DC Converters

Emerson Network Power's LGA C Series is among the latest product additions to its high-density, non-isolated board-mounted module offerings. Available in 3A, 6A, 10A and 20A modules, the LGA C Series comes with an adjustable output from 0.59 to 5.1Vdc through external resistor trimming. The LGA C Series of power converters offers users a cost-effective, surface-mount power solution capable of delivering footprint compatible 15-100W of scalable power.

Its Land Grid Array (LGA) packaging offers low apparent thermal resistance when mounted on typical circuit boards, making the modules attractive for power applications such as regulator circuits that drive ASICs, memory and FPGAs common in telecom/computing networking environments. Its low profile also offers less airflow disruption; space savings, as it can be mounted on either the top or bottom side of the board; and compatibility with common automated circuit board assembly processes.

FEATURES

- Wide input range: 3.0-14.0Vdc (4.5Vdc minimum input for 20A module)
- 3, 6, 10 & 20A module offering
- Adjustable output (0.59 to 5.1Vdc)
- -40 °C to +85 °C operating ambient temperature range
- Enable pin, power good signal, differential remote sense, margin control
- Low profile (3.2 mm typical) with 16.26 x 16.26 mm LGA package
- Excellent derating with minimal airflow requirement
- High efficiency (92% typical)
- Excellent transient response

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.mil-embedded.com/p45791**

Power: DC/DC converter

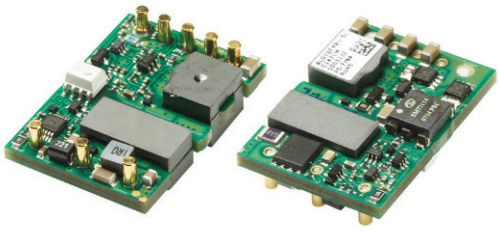
Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008 USA
1 888 412 7832 or +1 760 930 4600
Emerson.com/ALD15

ALD Series Sixteenth-Brick DC-DC Converter

The low profile ALD series of sixteenth-brick DC-DC converters from Emerson Network Power is ideal for use with telecom-standard 48V power supplies. They are capable of achieving up to 92% efficiency at full load and are extremely cost-effective when used in applications requiring up to 35W of output power. With an installed height of just 0.35", they are ideal for systems that require tight inter-board spacing or where sufficient separation between the converter and adjacent boards is needed.

Offered in seven output voltages (12V @ 2.75A, 5V @ 7A, 3.3V @ 10A, 2.5V @ 11A, 1.8V @ 13A, 1.5V @ 15A and 1.2V @ 15A), they accept a wide input voltage range of 36-75Vdc and feature outputs that can be adjusted from 90-110% of nominal voltage via external trim resistors. Standard features deliver best-in-class performance: differential remote sense, remote on/off pin, undervoltage lockout and non-latching, autorecovery overvoltage; overcurrent and overtemperature protection. All models feature a compact 1.3" x 0.9" sixteenth-brick footprint.



FEATURES

- High efficiency
- High density
- High capacitive load limit on start-up
- Regulation to zero load
- Fixed frequency switching
- Through-hole or surface-mount termination
- Basic insulation
- EU Directive 2002/95/EC compliant for RoHS

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.mil-embedded.com/p45652**

Power: DC/DC converter

Tri-M Engineering

100-1407 Kebet Way • Port Coquitlam, BC V3C 6L3 Canada
604-945-9565
www.tri-m.com

HE104+DX

The HE104+DX is a high efficiency 108W DC-DC converter that can supply +3.3V, +5V, +12V, and -12V DC outputs. The HE104+DX is designed for low noise embedded computer systems, has a wide input range of 6V to 40V DC, and is ideal for battery or unregulated input applications. The HE104+DX is specifically designed for vehicular applications and has heavy-duty transient suppressors (9,000W on both main and secondary inputs) that clamp the input voltage to safe levels, while maintaining normal power supply operation. The HE104+DX is a MOSFET-based design that provides outstanding line and load regulation with efficiencies up to 90 percent. Organic Semiconductor Capacitors provide filtering that reduces ripple noises below 20mV. The low noise design makes the HE104+DX ideal for use aboard aircraft or military applications or wherever EMI or RFI must be minimized.

FEATURES

- 108W DC-DC converter
- +3.3V, +5V, +12V, and -12V DC output
- 6V to 40V DC input range
- Extended temperature: -40°C to +85°C
- PC/104-*Plus* compliant
- High efficiency up to 90 percent
- High transient suppression
- Low output ripple
- Remote on/off standard
- Removable connector blocks

For more information, contact: info@tri-m.com **www.mil-embedded.com/p16985**

Power: DC/DC converter

VPT, Inc.

11314 4th Avenue West, Suite 206 • Everett, WA 98204 USA
425.353.3010
www.vpt-inc.com

VPT
a HEICO company
Power Your Critical Mission Today.

DC-DC Power Converters and Accessories for Military Avionics

VPT delivers the hi-rel DC-DC power converters and accessories that fulfill the flight dreams of companies such as Boeing, BAE, GE, Honeywell, Honda, the US Air Force and many others. Ideal for applications such as commercial and military aircraft, weapons systems, and more, these DC-DC power converters are ready to fly when you are.

FEATURES

- Power outputs of 1.5-200W in single, dual, or triple output DC-DC converters
- Small size, light weight, full metal packaging
- Wide avionics temperature ranges with full performance from -55 °C to +100 °C and -55 °C to +125 °C
- Tested to JESD22, MIL-STD-810, and MIL-STD-883
- EMI filters, transient suppressors, and bus converters
- Fully hermetic, MIL-PRF-38534 products are also available
- Many modules available on DSCC SMDs

For more information, contact: vptsales@vpt-inc.com **www.mil-embedded.com/p46096**

Power: Stand-alone power supply

Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008 USA
1 888 412 7832 or +1 760 930 4600
Emerson.com/EmbeddedPower

EMERSON
Network Power

µMP Series Configurable Power Supplies

To complement the world class configurable portfolio of power supplies that Emerson Network Power offers in the 750-5000W range with the MP, iMP, and iVS series of products, the new microMP (µMP) focuses on the lower range (400-1200W), higher density 1U type power solutions. The new µMP series rivals the cost of non-configurable power supplies while providing market-leading density, efficiency, reliability and agency approvals.

The µMP series is ideal for a wide variety of OEM applications, including those in military and aerospace systems. Using the latest converter topologies, some µMP configurations can exceed 90% efficiency. The µMP is designed with custom modification in mind. Using state-of-the-art DSP control in the input section of the supply, changes to performance characteristics can be made with simple firmware changes. A free GUI download from the Emerson website can provide the user with interface and monitoring control of the µMP input section.

FEATURES

- Rugged MIL-STD-810E
- Full EN60950 ITE and EN60601 Medical Safety approvals
- Optional conformal coating
- Industrial temperature range (-40 °C to +70 °C)
- Industrial shock and vibration (>50G)
- Up to 12 outputs

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.mil-embedded.com/p45780**

Rugged computer systems: Mass storage

Phoenix International
812 W. Southern Ave. • Orange, CA 92865 USA
714-283-4800
www.phenxint.com

VS1-250-SS/SA-D

Phoenix International's new VME mass data storage plug-in module incoporates 6Gb/sec Serial ATA (SATA) or high performance dual port Serial Attached SCSI (SAS) interface support on a single storage blade.

This rugged 6U, single-slot module houses one or two each SAS or SATA storage devices. The blazing fast 15K RPM SAS and mega capacity SATA Hard Disk Drives (HDDs) offer storage capacity of up to 1.5TB per module and can be interfaced through its front panel connector or P2 connector. Their 2.5" form factor draws significantly less power than their 3.5" counterparts, generating less heat and lowering overall system temperatures.

Phoenix International is an AS 9100/ISO 9001-2008 Certified Service Disabled Veteran Owned Small Business (SDVOSB), HUBZone company.

FEATURES

- Can be configured with 6Gb/sec SATA and/or SAS Hard Disk Drives
- Up to 1.2TB capacity in a single VMEbus slot
- Individual point to point storage device connectivity
- Low power consumption
- Dual drive configurations may be mirrored for data redundancy or stripped for high data throughput
- Burst data transfer rate to 600MB/sec
- Advanced Error Correction Code
- TCG-compliant, Self-Encrypting Drive (SED) security option

For more information, contact: info@phenxint.com **www.mil-embedded.com/p45495**

Rugged computer systems: Mass storage

Phoenix International
812 W. Southern Ave. • Orange, CA 92865 USA
714-283-4800
www.phenxint.com

VC1-250-SSD

SATA interface Conduction Cooled VME Module delivers high capacity, high performance data storage for military, aerospace and industrial applications requiring rugged, secure and durable mass data storage.

This 6U, single-slot module houses one or two each 2.5" SATA Solid State Disks (SSDs) of up to 256GB per device. The high speed module will sustain R/W data rates of 220MB/sec with an access time of 0.5 msec. The VC1-250-SSD has an operating temperature range from -40 °C to 85 °C and functions at an altitude greater than 80,000 feet. The VC1-250-SSD also complies with current defense department security standards providing multiple levels of secure erase techniques. The VC1-250-SSD's outstanding performance and versatility are enabled by Phoenix International's state-of-the-art technology, which provides very high transfer and I/O rates, enhanced endurance and maximum data integity.

Phoenix International is AS 9100/ISO 9001-2008 certified.

FEATURES

- Conduction cooled
- Meets military and IRIG 106-07 declassification standards
- Individual point-to-point device connectivity
- Low power consumption
- Integrated SLC NAND flash
- Advanced flash management for enhanced reliability and durability
- 80,000 feet operational altitude
- 50g, 11ms operational shock
- 16g rms, 10-2000Hz random vibration
- Meets military and IRIG 106-07 declassification standards

For more information, contact: info@phenxint.com **www.mil-embedded.com/p45496**

Acromag

30765 S. Wixom Road • Wixom, MI 48393-7037 USA
877-295-7088
www.acromag.com/ioserver

I/O Server Industrial PC

Acromag's I/O Server Industrial PC is a fanless small box computer with truly integrated support for user I/O. A built-in carrier card interfaces up to four plug-in I/O modules to the CPU. A selection of more than 20 I/O modules provides mix and match flexibility with high channel density and a clean cable interface. With the I/O modules neatly stored internally and easy cable access to field devices through high-density connectors, the I/O Server maintains a small footprint while simplifying the wiring. The I/O Server's fanless design employs advanced thermal technology and high-performance components to accommodate a wide operating temperature range. Units are also shock/vibration resistant and sealed to IP40 standards to ensure long-term reliability in a variety of applications. The I/O Server is well-suited to harsh factory environments and outdoor installations. Typical uses include machine control, automation, defense, aerospace, security, transportation, test stand, and simulation systems.

FEATURES

- Intel Atom N270 1.6GHz CPU or AMD Geode LX800 500MHz CPU
- Slide-out carrier card holds four I/O modules
- Selection of 20+ plug-in I/O modules:
  - Analog I/O (A/D, D/A)
  - Digital I/O (TTL, CMOS, LVDS, high-voltage, differential)
  - Counter/timers
  - Communication (RS-232/422/485, CAN bus, MIL-STD-1553)
  - Configurable FPGA computing
- Interfaces: 2 x Ethernet, 4 x USB, 2 x RS-232/422/485, VGA, audio
- Windows Embedded or Linux
- -40 °C to +75 °C operating range

For more information, contact: solutions@acromag.com **www.mil-embedded.com/p45788**

Rugged computer systems: Mission computer

Creative Electronic Systems

Avenue Eugène-Lance 38 • 1212 Grand Lancy 1 • Geneva Switzerland
+41 (0)22.884.51.00
www.ces.ch

CES Mission Computer Suite

CES Mission Computers are installed in various platforms, including manned fixed wing, helicopters and UAV. Processing power is provided by one or more CES processor boards, which communicate over VME/VPX and/or high-speed serial links. A large variety of avionic and network interfaces is available from CES, including MIL-1553, ARINC 429, CANbus, serial lines, Ethernet, etc. Graphic and video processing capabilities include digital and analog video input and output, still image and streaming video compression, as well as custom processing in the CPU or FPGA. These systems use different types of enclosures such as sealed military ATR or VPX chassis, and are qualified to withstand the most severe environmental conditions.

CES offers a large portfolio of sub-systems and systems for aerospace applications including ground and flight test systems, ground station and radar sub-systems, mission computers and DAL A certified computers.

FEATURES

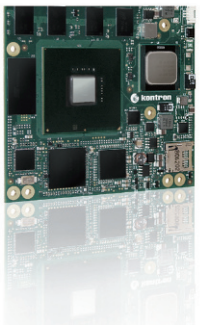
- Command, control and mission tactical systems
- Mission, flight, navigation, communication and payload management
- VME or VPX processors
- Network Interface (GETH) and High-speed serial links (PCIe, CES HYDRA)
- Avionic interfaces (MIL-1553, ARINC 429, CANbus, serial lines, analog I/O, digital I/O)
- Graphic and video interfaces (input, output, compression)
- ATR or VPX enclosures
- Integrity, Linux, VxWorks or VxWorks 653 software packages
- DO-178B / DO-254 certification

For more information, contact: ces@ces.ch **www.mil-embedded.com/p45649**

Rugged computer systems: Mission computer

Kontron

14118 Stowe Drive • Poway, CA 92064 USA
888-294-4558
www.kontron.com



Kontron Extended Temperature COMs and Small Form Factor SBCs

The demands placed on embedded appliances used in the field range from extreme temperature exposure to constant vibration and much more. Solutions for such appliances need to be designed to be reliable and survive under such conditions. Kontron offers computer-on-modules such as the microETXexpress-XL and the ETXexpress-PC-XT and small form factor single board computers including Intel® Atom™ and Core™ Duo processor offerings within the MICROSPACE® family that do just that. Kontron uses industrial grade components for by-design solutions that can withstand the harsh conditions. Additionally, 100 percent extended temperature tested solutions are available to ensure the solution meets the application-specific temperature requirements.

To learn more about the Kontron family of COMs and SFF SBCs that are well-suited for extreme environmental conditions and to download the Kontron Extended Temperature whitepaper, visit http://us.kontron.com/extendedtemp.

FEATURES

- Proven for use at extreme temperature ranges (-40°C to +85°C)
- Industry standard solutions: ETX, COM Express, PC/104-*Plus*, and PCI/104-Express
- Scalable solutions offering power efficiency and performance including the latest Intel® Atom™ and Core® Duo processor technology
- Support for onboard and expandable system memory
- Drop in replacements within the Kontron COM and SFF SBC product families
- Request a sample today and start evaluating immediately

For more information, contact: info@us.kontron.com **www.mil-embedded.com/p46017**

Rugged computer systems: Mission computer

Mercury Computer Systems

201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX SBC6120 Module

The Ensemble™ 6000 Series OpenVPX SBC6120 Single-Board Computer is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This module combines high-performance Power Architecture™ processing with balanced I/O from dual PMC/XMC sites and scalable Serial RapidIO® interconnect.

FEATURES

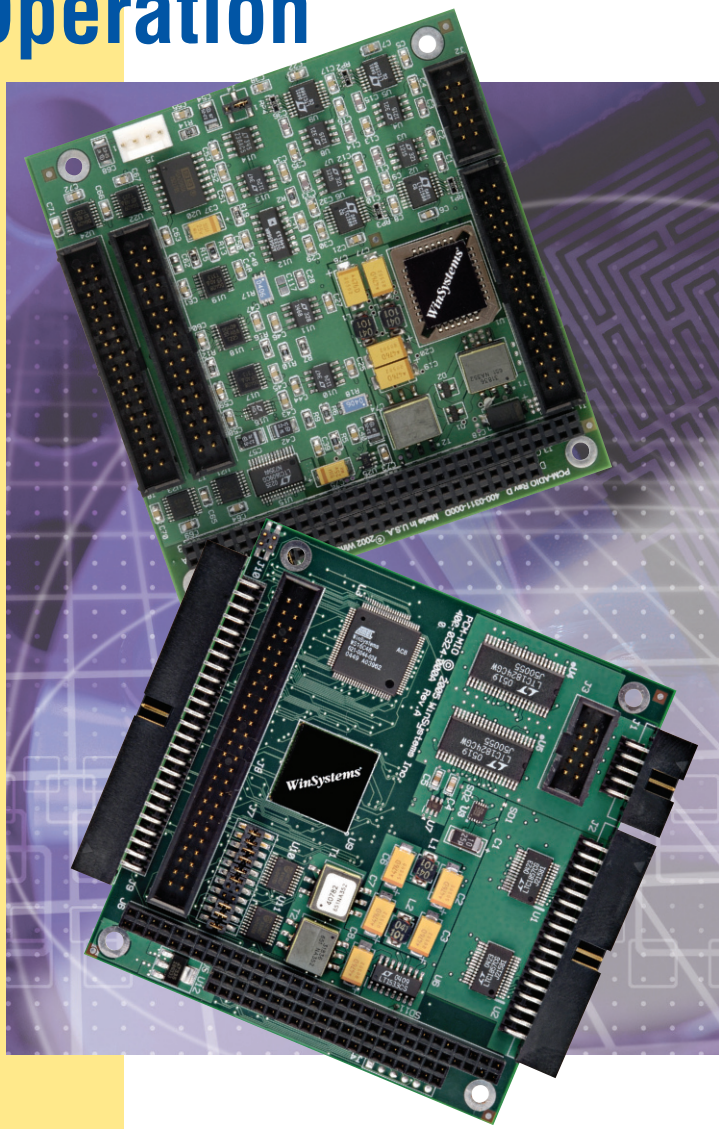
- Balanced I/O and processing in a single VPX slot
- VITA 46/48 (VPX-REDI) 6U Serial RapidIO-enabled module
- Dual-core MPC8640D or MPC8641D processor at up to 1.33 GHz
- Air-cooled and conduction-cooled models available
- Identical software across Mercury products
- Architected to meet OpenVPX™ design principles

For more information, contact: sales@mc.com **www.mil-embedded.com/p43736**

PC/104 Analog I/O Modules

No Calibration Required Plus -40°C to +85°C Operation

WinSystems' PCM-MIO and PCM-ADIO provide high-density analog and digital solutions for rugged industrial applications. Both offer easy set-up and no adjustments over multiple input voltage ranges, saving both time and money.



Features include:

- 16-bit analog-to-digital converter
  - 0-5V, 0-10V, ±5V, and ±10V input ranges
  - Each channel programmable for SE or DI and voltage range
  - Input overvoltage protection
- 12-bit digital-to-analog converter
  - 0-5V, 0-10V, ±5V, and ±10V output ranges
  - Output channels can be updated or cleared individually or simultaneously
- Supports industry standard isolated analog signal conditioning modules
- Up to 48 lines of bi-directional digital I/O
- Special OEM configurations available for 16-bit D/A and other analog and digital I/O combinations
- Software programmable interrupt control
- Free software drivers in C, Windows®, and Linux
- Onboard low noise DC/DC converter
- PC/104 compatible modules
- Small modular size: 90mm x 96mm
- +5V only supply voltage
- -40°C to +85°C temperature operation

Contact us for additional information or OEM pricing. Our helpful and knowledgeable factory application engineers look forward to working with you.

M2M 100 COMPANIES 2009

Linux

EMBEDDED PC PC/104 MODULES

Microsoft® Windows® Embedded Partner

Extended Temperature

Call 817-274-7553 or Visit www.winsystems.com/Analog-104

Ask about our 30-day product evaluation

WinSystems®

An Employee-Owned Company

715 Stadium Drive • Arlington, Texas 76011
Phone 817-274-7553 • FAX 817-548-1358
E-mail: info@winsystems.com

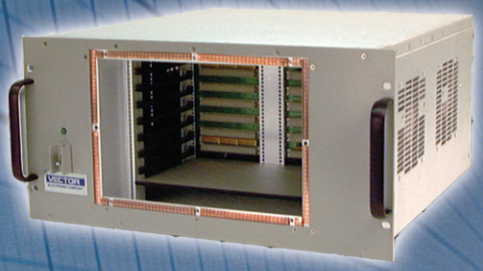
ITAR REGISTERED
NO. M26764

VECTOR

ELECTRONICS & TECHNOLOGY, INC.
A FINE TECHNOLOGY GROUP

VME / cPCI® Ruggedized Chassis

- Well suited for Military / Aeronautics
- VME64x, VME64 or cPCI® compatible
- Mil 461-D, E for shock/vibration, EMI/RFI
- CE and FCC class B, Part 15
- Many power options



790 Chassis

792 Chassis

Series 445, Modified
Full EMI/RFI

VECTOR SPECIALIZES IN:

UNPARALLED FACTORY SUPPORT
CUSTOM CONFIGURATIONS
SHORTER LEAD TIMES

Made in U.S.A

(800)423-5659

www.vectorelect.com

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/3uopenvpx

Ensemble 3000 OpenVPX SCH3000 Module

The Ensemble™ Series OpenVPX SCH3000 System Controller Hub (SCH) is designed as a VITA 46 VPX-compliant module in a 3U form factor, also compatible with OpenVPX™ system architecture design principles. This module provides mission-critical system management control while functioning as both a control plane Ethernet switch and a system management communications hub/controller.

FEATURES

- Application and system management control for 3U VPX systems
- Supports control-plane and management-plane communications
- Provides application flexibility via GigE control-plane switch
- Enables sophisticated system management via industry-standard IPMI communications

For more information, contact: sales@mc.com **www.mil-embedded.com/p44275**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
886-627-6951
bit.ly/3uopenvpx

Ensemble 3000 OpenVPX System

The Ensemble™ 3000 Series OpenVPX System delivers high-density, high-performance real-time processing in a 3U form factor, suitable for use in applications with Space, Weight and Power (SWaP) limitations.

FEATURES

- Scalable computing power in a small form factor
- Suitable for operation in next-generation sensor platforms
- Rugged versions for deployment in harsh environments
- Systems flexibility from five types of communications planes
- Architected to meet OpenVPX™ design principles

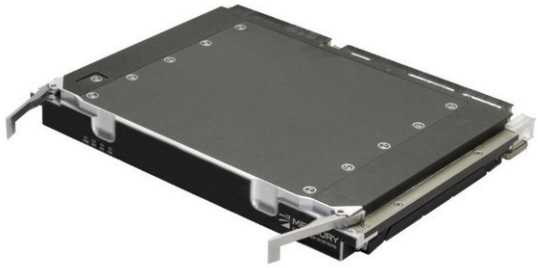
For more information, contact: sales@mc.com **www.mil-embedded.com/p44277**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX SMM6100 Module

The Ensemble™ 6000 Series OpenVPX SMM6100 Switch and Management Module is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This module is a VITA 46/48 switch board that provides full interboard control plane Gigabit Ethernet connections in a 6U VPX system, as well as sophisticated system management capabilities.



FEATURES

- Versatile switching, system management, and front-panel I/O in a single slot
- Intelligent system manager/chassis manager
- Control plane Ethernet switching
- Air-cooled and conduction-cooled variants available
- Architected to meet OpenVPX™ design principles

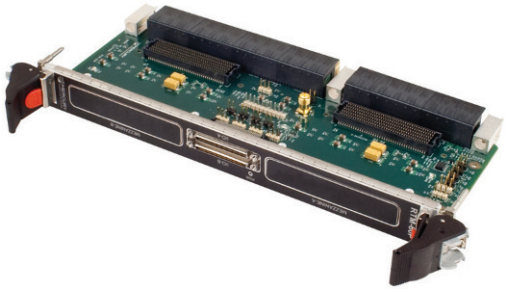
For more information, contact: sales@mc.com **www.mil-embedded.com/p44274**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX RTM-60P Module

The Ensemble™ 6000 Series OpenVPX RTM-60P Rear Transition Module is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This module is an innovative design intended to support Ensemble 6000 Series 6U VPX payload modules.



FEATURES

- Brings I/O to the Ensemble 6000 Series
- Supports Ensemble 6000 Series Payload Modules
- Breakout cable for standard I/O
- Support for PMC/XMC user I/O via standard FMC connector
- Architected to meet OpenVPX™ design principles

For more information, contact: sales@mc.com **www.mil-embedded.com/p44272**

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
886-627-6951
bit.ly/3uopenvpx

Ensemble 3000 OpenVPX FCN3110 Module

The Ensemble™ 3000 Series OpenVPX FCN3110 FPGA Compute Node Module is designed as a VITA 46 VPX-compliant module in a 3U form factor, also compatible with OpenVPX™ system architecture design principles.

FEATURES

- High-performance, high-bandwidth, low-latency processing and I/O
- Integrated, powerful FPGA compute node
- I/O flexibility via industry-standard XMC site
- Rugged versions for harsh environments
- Designed and architected for OpenVPX™ interoperability

For more information, contact: sales@mc.com **www.mil-embedded.com/p43708**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
886-627-6951
bit.ly/3uopenvpx

Ensemble 3000 OpenVPX HCD3200 Module

The Ensemble™ 3000 Series OpenVPX HCD3200 Processing Module is designed as a VITA 46 VPX-compliant module in a 3U form factor, also compatible with OpenVPX™ system architecture design principles. This module delivers significant real-time processing power from a Freescale™ MPC8640D dual-core processor and a Xilinx® Virtex™-5 FPGA.

FEATURES

- Flexible compute power for 3U VPX systems
- High-bandwidth off-board and on-board communications
- Multi-stage processing on a single module
- Rugged versions for harsh environments
- Designed and architected for OpenVPX™ interoperability

For more information, contact: sales@mc.com **www.mil-embedded.com/p43702**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX RTM-60S Module

The Ensemble™ 6000 Series OpenVPX RTM-60S Rear Transition Module is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This module is an innovative design intended to support Ensemble 6000 Series 6U VPX payload modules.

FEATURES

- Brings I/O to the Ensemble 6000 Series
- Supports Ensemble 6000 Series Switch Modules
- Provides standard I/O to the rear transition
- Architected to meet OpenVPX™ design principles

For more information, contact: sales@mc.com **www.mil-embedded.com/p44273**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble I/O Mezzanine IOM-120/140 XMC

The Ensemble™ I/O Mezzanine Series IOM-120 and IOM-140 (IOM-1x0) sFPDP XMC brings enhanced performance and flexibility to external I/O in a Serial RapidIO®-based streaming I/O XMC (Switched Mezzanine Card, VITA 42.2-2006).

FEATURES

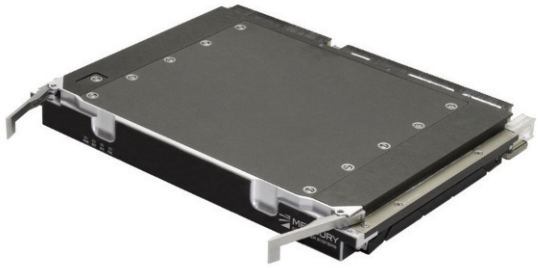
- Quad- or dual-channel fiber-optic serial Front-Panel Data Port (sFPDP)
- High levels of speed and connection density
- Support for all four Front-Panel Data Port (FPDP) data modes
- Ideal for streaming sensor input or data output
- Configuration flexibility with two DMA engines per channel (send and receive)
- Programmable for data distribution without processor intervention

For more information, contact: sales@mc.com **www.mil-embedded.com/p45527**

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX SWM6100 Module

The Ensemble™ 6000 Series OpenVPX SWM6100 Switch Module is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This module is a VITA 46/48 switch board that provides full interboard control plane Gigabit Ethernet connections in a 6U VPX system.



FEATURES

- Versatile control plane switching and front panel I/O in a single slot
- Control plane Ethernet switching
- Air-cooled and conduction-cooled variants available
- Architected to meet OpenVPX™ design principles

For more information, contact: sales@mc.com **www.mil-embedded.com/p44271**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX SFM6100 Module

The Ensemble™ 6000 Series OpenVPX SFM6100 Module is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This switch module provides full interboard Serial RapidIO® and Gigabit Ethernet connections in a VPX system.

FEATURES

- Versatile switching, system management, and front-panel I/O in a single slot
- High-bandwidth Serial RapidIO switch fabric at 3.125 Gbaud data rates
- Intelligent system manager/chassis manager
- Control plane Ethernet switching
- Air-cooled and conduction-cooled variants available
- Architected to meet OpenVPX™ design principles

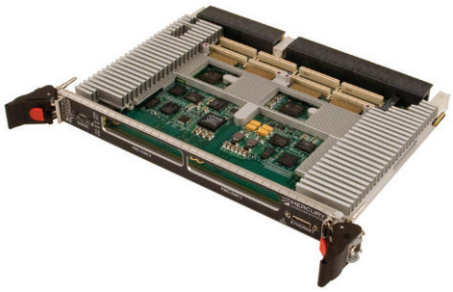
For more information, contact: sales@mc.com **www.mil-embedded.com/p43737**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX HCD6220 Module

The Ensemble™ 6000 Series OpenVPX HCD6220 Module is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This module combines high-performance Power Architecture™ processing with balanced I/O from dual PMC/XMC sites and the scalable Serial RapidIO® interconnect.



FEATURES

- Balanced I/O and processing in a single VPX slot
- VITA 46/48 (VPX-REDI) 6U Serial RapidIO-enabled module
- Two dual-core MPC8640D or MPC8641D processors at up to 1.33 GHz
- Air-cooled and conduction-cooled models available
- Identical software infrastructure across Mercury products
- Architected to meet OpenVPX™ design principles

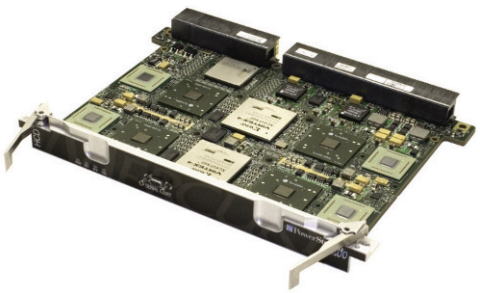
For more information, contact: sales@mc.com **www.mil-embedded.com/p43735**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/6uopenvpx

Ensemble 6000 OpenVPX HCD6410 Module

The Ensemble™ 6000 Series OpenVPX HCD6410 High Compute Density Module is designed as a VITA 46 VPX-compliant module in a 6U form factor, also compatible with OpenVPX™ system architecture design principles. This module is a quad 8640D processing module that combines high-performance Power Architecture™ processing with various I/O capabilities and the scalable Serial RapidIO® interconnect.



FEATURES

- High-density processing plus I/O in a single VPX slot
- VITA 46/48 (VPX-REDI) 6U Serial RapidIO-enabled module
- Four dual-core MPC8640D processors at 1.06 GHz
- Air-cooled and conduction-cooled models available

For more information, contact: sales@mc.com **www.mil-embedded.com/p43734**

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
866-627-6951
bit.ly/3uopenvpx

Ensemble 3000 OpenVPX CCM3010 Module

The Ensemble™ 3000 Series OpenVPX CCM3010 Carrier Module is designed as a VITA 46 VPX-compliant module in a 3U form factor, also compatible with OpenVPX™ system architecture design principles. This module is a critical component within Mercury's powerful Ensemble™ 3000 Series 3U VPX systems, functioning as a high-performance I/O carrier.

FEATURES

- Flexible configurations for high-performance I/O
- I/O flexibilty via industry-standard XMC site
- Rugged versions for harsh environments
- Designed and architected for OpenVPX™ interoperability

For more information, contact: sales@mc.com **www.mil-embedded.com/p43709**

Rugged computer systems: Mission computer

Mercury Computer Systems
201 Riverneck Road • Chelmsford, MA 01824 USA
886-627-6951
bit.ly/3uopenvpx

Ensemble 3000 OpenVPX SFM3000 Module

The Ensemble™ 3000 Series OpenVPX SFM3000 RapidIO® Data-Plane Switch Module is designed as a VITA 46 VPX-compliant module in a 3U form factor, also compatible with OpenVPX™ system architecture design principles.

FEATURES

- High-bandwidth fabric switching for 3U VPX systems
- Supports low-latency, deterministic RapidIO communications
- Provides a 10 Gbps full-duplex channel to each of the eight payload slots
- Rugged conduction-cooled version for deployment in harsh environments
- Designed and architected for OpenVPX™ interoperability

For more information, contact: sales@mc.com **www.mil-embedded.com/p43710**

Rugged computer systems: Mission computer

Parvus Corporation

3222 Washington Street • Salt Lake City, UT 84115 USA
800-483-3152
www.parvus.com

DuraCOR 810-Duo

MIL-COTS Rugged Vehicle Mission Computer Platform w/Core 2 Duo

The DuraCOR® 810-Duo is a rugged multi-core mission processor subsystem designed for Size, Weight, and Power (SWaP)-constrained aircraft, ground vehicle and maritime platform modernization programs that require MIL-STD-810G compliance with extreme temps, shock/vibe, and ingress. Based on a modular, open architecture COTS design with an Intel Core 2 Duo CPU, solid state disk, MIL-704/1275 power supply, and conduction-cooled chassis, the DuraCOR 810-Duo is an ideal computing solution for harsh mobile military and homeland security C4ISR deployments. Up to six expansion slots are available to support Commercial Off-the-Shelf (COTS) PCI-104 or PC/104-*Plus* modules.

FEATURES

- 1.5GHz Intel Core 2 Duo Processor, 2GB RAM
- MIL-STD-1275 / 704 Power Supply
- SATA / IDE SSD, Removeable Media Support
- Dual Ethernet, Video, Serial, and 6x USB
- 6x PCI-104 / PC/104-*Plus* Expansion Slots
- Designed to MIL-STD-810G and MIL-STD461E
- Conduction Cooled Chassis w/ MIL Connectors
- -40 ºC to +71 ºC Operating Temp, Fanless

For more information, contact: sales@parvus.com **www.mil-embedded.com/p40229**

Rugged computer systems: Mission computer

Pinnacle Data Systems, Inc.

6600 Port Road • Groveport, OH 43125 USA
Tel: (614) 748-1150 • Fax: (614) 748-1209
www.pinnacle.com

SKiNET M3000 Mobile Satcom System

PDSi offers a range of innovative services specifically targeted at the mobile satellite communications market space. PDSi works closely with satellite equipment providers to develop specific turn-key solutions to help accelerate their time to market, improve their overall operating cost structure, and provide a flexible and responsive support mechanism to meet their rapidly changing field deployment requirements.

The AMD™ COM Express technology offers a compact computing core designed around AMD's x86-based Socket S1 Sempron™ 2100+ processor in a rugged system built around the CPU module that provides both secure and non-secure communication capabilities, with a decent battery runtime and a wide range of AC and DC operating voltages. The SKiNET M3000 system provides exceptional operational flexibility for first responder or mission-critical field communication needs.

FEATURES

- Carry-On Case, Desert Tan
- Case Dimensions: 22.00"L x 13.81"W x 9.00"H
- Case Weight: 35.30 lbs. (1 unit), 50.20 lbs. (2 units)
- SKiNET M3000 Unit, Desert Tan
- Unit Dimensions: 11.55"L x 10.66"W x 3.25"H
- Unit Weight: 11.95 lbs. (1 unit)
- Unit CPU: Dual-core AMD Sempron™ 2100+, 2GB Memory
- Switching: CISCO Mobile IP Routing (3200 MAR)
- Input Voltages: 10-36 VDC/96-264 VAC, 50~60Hz
- Designed to operate 0˚C to +50˚C
- BGAN support: Thrane and Thrane EXPLORER 500
- Inline Network Encryptor support: Harris SecNet 54 EMOD

For more information, contact: info.sales@pinnacle.com **www.mil-embedded.com/p45809**

Rugged computer systems: Mission computer

RadiSys Corp

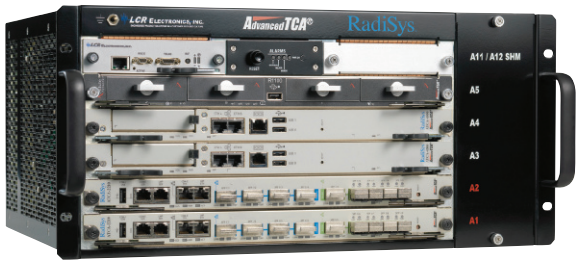
5445 NE Dawson Creek Drive • Hillsboro, OR 97124 USA
503-615-1100
www.radisys.com

RadiSys Promentum® C2 Server

RadiSys Promentum® C2 Server is the industry's first pre-integrated, portable ATCA platform designed specifically for the Mil/Aero market.

Up until now, Military IT professionals working in the field had to rely on proprietary, traditional server solutions to support their operations. Everything from data processing, communications, remote command and control and storage relied on closed architectures and traditional rack mount server solutions. This approach can be fraught with numerous challenges including limited field support for hardware, issues with both the physical size and weight of the servers themselves and limited software support. RadiSys recently announced the Promentum® C2 Server, a new product offering targeted at military field operations based on the company's award-winning AdvancedTCA (ATCA) platform. RadiSys provides a lightweight, rugged and flexible computing solution that can support even the most demanding military field operations.

ATCA was developed to withstand vibration from earthquakes, high temperatures and other extreme conditions in the public space. The Promentum® C2 Server takes those tolerances to a whole new level. The pre-integrated platform has been designed to meet the demanding environment requirements of MIL–STD-810 and can quickly be deployed and serviced in the field. The computing modules are certified with VMware ESXi, which enables the use of multiple operating systems for consolidation of applications and the use of



VSphere, to provide cost effective fault tolerance for critical applications. The platform supports up to eight Intel 5600 series server-class processors and 4TB of storage. A more balanced configuration will support two compute processing blades and two storage blades with total platform storage of 8TB. Both configurations support redundant 10G switches.

SUPPORTING RESOURCES:

- For information and videos about RadiSys' Promentum C2 Server, visit the RadiSys Promentum C2 Server solutions webpage
- Visit the RadiSys website: http://www.radisys.com

For more information, contact: info@radisys.com **www.mil-embedded.com/p46025**

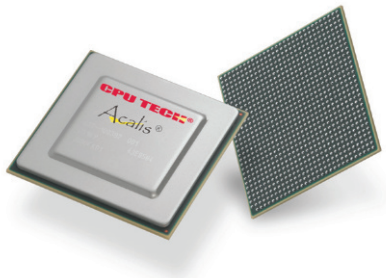
Rugged computer systems: Secure processors

CPU Tech

5731 W. Las Positas Blvd. • Pleasanton, CA 94566 USA
925-224-9920
www.cputech.com

Acalis CPU872 Secure Processor

The Acalis CPU872 Secure Processor provides unique and unprecedented anti-tamper protection for software and system IP. The CPU872 contains dual high-performance PowerPC® 440 and FPU cores, dual embedded DRAMs and numerous other functions. The CPU872 also contains intrinsic features that prevent tampering and reverse-engineering to protect valuable intellectual property contained in the software and system.



FEATURES

- Multi-Core Device with Integrated Security Processor & Offload Engines
- Extensive, Multi-Layered Security to Protect Against Reverse Engineering
  - Targeted for Level 4+
  - Under ATEA assessment
- Fabbed at IBM Trusted Foundry
- Acalis Anti-Tamper Applications:
  - Secure Anchor Point
  - Secure Communications
- Supported by Trust-Oriented Design Environment

For more information, contact: Acalis@cputech.com **www.mil-embedded.com/p45793**

RadiSys Corp
5445 NE Dawson Creek Drive • Hillsboro, OR 97124 USA
503-615-1100
www.radisys.com

RadiSys®

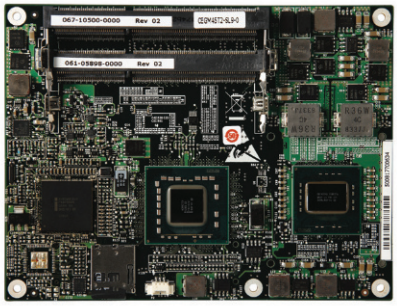
The RadiSys COM Express Family of Extended Temperature, Ruggedized Products

Procelerant® CEQM57XT – Next Generation Performance

This module features the next generation performance of Intel® Core™ i5 and i7 processors and the Mobile Intel® QM57 chipset with RadiSys -25 °C to +70 °C extended temperature ranges – providing breakthrough processing performance on a ruggedized basic size COM Express module.

Procelerant® CEGSXT – Extended Temp Core™ 2 Duo Processor

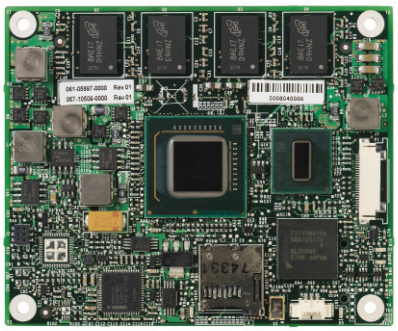
The Procelerant CEGSXT combines the next generation performance of Intel® Core™ 2 Duo, Celeron® M processors and the GS45 chipset with RadiSys-designed dual channel memory.



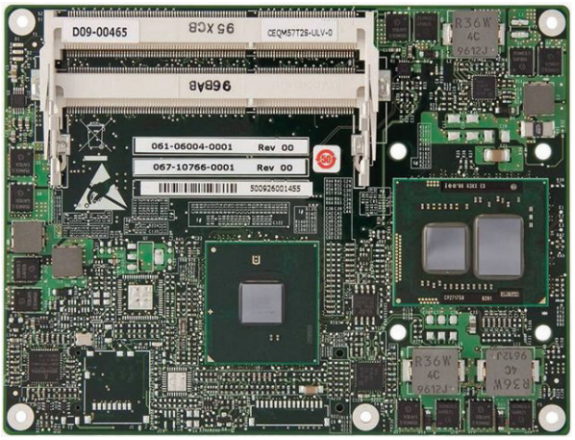
Procelerant CEGSXT

Procelerant® CEZ5XT – Extended Temp Intel® ATOM Small Form Factor – Low Power, High Performance

The Procelerant™ CEZ5XT is based on Intel's low power 1.6 GHz ATOM™ processor on an 85mm x 70mm standardized pin-out COM module.



Procelerant CEZ5XT



Procelerant CEQM57XT

FEATURES

› Procelerant CEQM57XT

- -25 °C to +70 °C temperature range with a -40 °C to +85 °C custom SKU option
- Intel® Core™ i5 and i7 Processor options
- Intel Core i7 610E 2.53 GHz
- Intel Core i7 620LE 2.0 GHz
- Intel Core i7 620UE 1.06 GHz
- Intel Core i5 520E 2.4 GHz
- Mobile Intel® QM57 Express chipset
- Dual-channel DDR3, up to 8 GB
- Type 2 and Type 3 pin-out options
- TPM
- Six PCI Express x1 ports, one PCI Express x8 port
- Single or dual Gigabit Ethernet options
- Conformal Coat Option – Humiseal 1B31

› Procelerant CEGSXT

- Core™ 2 Duo and Celeron® M processor options
- 2.26 GHz Intel Core™ 2 Duo SP9300
- 1.86 GHz Core™ 2 Duo SL9400
- 1.2 GHz Intel Core™ 2 Duo SU9300
- 1.2 GHz Intel Celeron® M processor 722
- GS45 Express chipset and ICH9M
- Dual-channel DDR3, up to 8 GB
- Type 2 and Type 3 pinout options
- -25 °C to +70 °C temperature range with a -40 °C to +85 °C custom SKU option

› Procelerant CEZ5XT

- 1.6G Hz and 1.1G Hz Intel® ATOM™ processor
- 85mm x 70mm
- Up to 2GB DDR2 memory down
- Type 2 COM Express pinout
- Gigabit Ethernet
- Onboard microSD Socket
- -25 °C to +70 °C operating temperature range

For more information, contact: info@radisys.com **www.mil-embedded.com/p45815**

SmallPC.com

1-877-505-5022
www.smallpc.com

SC240MIL

- IP67 cables included
- 10.5" x 7.5" x 3.75"
- Up to 4 drives
- Suited to extreme environments

Applications

- Military
- Marine
- Transportation
- Public Security
- Industrial Automation
- Medical
- Mobile PC Solutions

FEATURES

- No moving parts
- Sealed & waterproof
- Low power consumption
- Extreme temperature tolerance
- Core 2 Duo/Quad
- Up to 4 drives

For more information, contact: salesinfo@smallpc.com

www.mil-embedded.com/p46033

Sensors and RF: Wireless

Innovative Integration

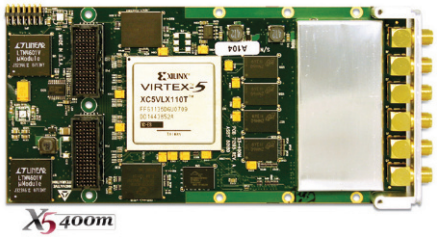
2390 Ward Avenue • Simi Valley, CA 94065 USA

www.innovativedsp.com

X5-400M

The X5-400M is an XMC I/O module featuring two 14-bit, 400 MSPS A/D and DAC channels with a Virtex-5 FPGA computing core and PCI Express host interface on a standard XMC module. A Xilinx Virtex-5 LX110T (SX95T when available) with 1 GB DDR2 DRAM and 4 MB QDR-II memory provides a very high performance DSP core for demanding applications such as emerging wireless standards.

The close integration of the analog IO, memory and host interface with the FPGA enables real-time signal processing at extremely high rates exceeding 300 GMACs per second. The X5 XMC modules couple Innovative's powerful Velocia architecture with a high performance, 8-lane PCI Express interface that provides over 1 GB/s sustained transfer rates to the host. Get Pricing and Data Sheets online now.



FEATURES

- Two 400 MSPS, 14-bit A/D channels – Two 400 MSPS, 14-bit DAC channels
- ±1V, 50 ohm, SMA inputs and outputs – Xilinx Virtex-5, LX110T FPGA (SX95T coming) 1 GB DDR2 DRAM
- 4 MB QDR-II SRAM8 RocketIO private links, 2.5 Gbps each >1 GB/s, 8-lane PCI Express Host Interface
- Power Management features – XMC Module (75 mm x150 mm) PCI Express (VITA 42.3)
- Applications include: Wireless Receiver and Transmitter – WLAN, WCDMA, WiMAX front end RADAR
- Electronic Warfare – High Speed Data Recording & Playback – High speed servo controls – IP development

For more information, contact: sales@innovativedsp.com **www.mil-embedded.com/p33936**

Sensors and RF: Software-Defined Radio (SDR)

Innovative Integration

2390 Ward Avenue • Simi Valley, CA 94065 USA

www.innovativedsp.com

X6-RX PCIe XMC Module

X6-RX PCIe XMC Module – Four 160 MSPS 16-bit A/Ds, DDC ASIC supporting up to 24 Narrowband or 8 Wideband Channels & Virtex-6 FPGA

The X6-RX is a flexible receiver that integrates IF digitizing with signal processing on a PMC IO module. The module provides up to 24 configurable receiver channels with a powerful Xilinx Virtex-6 FPGA signal processing core, and high performance PCI Express/PCI host interface. With the X6-RX, IF recorders can log both the digitized raw data and channels real-time sustaining rates over 2 GB/s.

Applications include:

- Wireless Receiver
- WLAN, WCDMA, WiMAX front end
- RADAR
- Medical Imaging
- High Speed Data Recording and Playback
- IP Development

FEATURES

- Four 160 MSPS, 16-bit A/D channels
- Down-Converter ASIC supporting up to 24 Narrowband or 8 Wideband Channels
- +/-1V, AC-Coupled, 50 ohm, SMA inputs
- Xilinx Virtex 6 SX315T/SX475T or LX240T 4 Banks of 128MB DRAM
- Ultra-low jitter programmable clock
- x8 PCI Express Gen2, providing 2 GB/s sustained transfer rates
- PCI 32-bit, 66 MHz with P4 to Host card
- PMC/XMC Module (75x150 mm)
- < 15W typical
- Conduction Cooling per VITA 20
- Ruggedization Levels for Wide Temperature Operation
- Adapters for VPX, CompactPCI, desktop PCI and cabled PCI Express systems

For more information, contact: sales@innovativedsp.com **www.mil-embedded.com/p45059**

Sealevel Systems, Inc.
2779 Greenville Highway, PO Box 830 • Liberty, SC 29657 USA
864-843-4343
www.sealevel.com

ACC-188 USB Synchronous Serial Radio Adapter

The ACC-188 USB synchronous serial radio adapter and free software from the Defense Information Systems Agency (DISA) upgrades tactical radios with the capability to send and receive IP data such as email, text messages, GPS maps, images, and coordinates.

The ACC-188 operates in conjunction with standard PDA-184 software developed by and available from DISA. The PDA-184 software provides a Graphical User Interface (GUI) that allows radio users to transmit and receive a variety of data types at much higher speeds than is possible with comparable, proprietary solutions.

A key advantage of the ACC-188 is that it enables interoperability among the various radio brands and models used by the defense community. The ACC-188 is compatible with any tactical radio that has a synchronous communication port using MIL-STD-188-184. This includes the most prevalent brands and models: Raytheon AN/PSC-5D and ARC-231; Harris AN/PRC-117F and AN/PRC-150; Thales AN/PRC-148; Rockwell Collins ARC-210; Motorola LST-5B and LST-5C.

The PDA-184 software is government-developed, government-owned by DISA and includes these features:

- Saves thousands of dollars per radio compared to upgrading hardware and purchasing expensive proprietary software
- Interoperable (send/receive data with different radio models and brands)
- Implements MIL-STD-188-184 Data Waveform
- High-speed data throughput
- Easy-to-use Java-based GUI
- Runs in Microsoft Windows Vista / XP / 2000

FEATURES

- Interoperable (send/receive data with different radio models and brands)
- Implements MIL-STD-188-184 Data Waveform
- High-speed data throughput
- Easy-to-use Java-based GUI
- Runs in Microsoft Windows Vista / XP / 2000
- Overall cable length is 60 inches
- USB cable segment is 12", cable segment with military connector is 43.8", and plastic over-mold is 4.2" in length
- PDA-184 software is available from DISA

For more information, contact: sales@sealevel.com **www.mil-embedded.com/p45651**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401 USA
410-841-2514
www.annapmicro.com

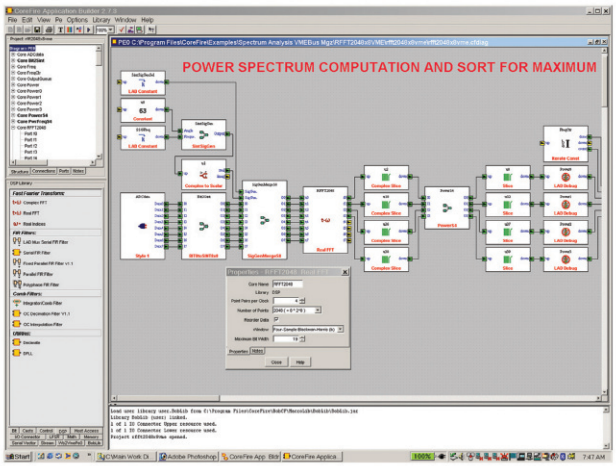
CoreFire

Develop your application very quickly and easily with our CoreFire™ FPGA Application Builder, which transforms the FPGA development process, making it possible for theoreticians to easily and quickly build and test their algorithms on the real hardware that will be used in the field.

Use CoreFire's graphical interface to drag and drop library elements onto the design window. Modify your input and output types, numbers of bits, and other core variables by changing module parameters with pull-down menus. The modules automatically provide correct timing and clock control. Insert debug modules to report actual hardware values for hardware-in-the-loop debugging. Hit the Build button to check for errors and as-built core sizes and to build an encrypted EDIF file. Use the Xilinx ISE tool to place and route each FPGA design. Modify and use the jar file or the C program created by the CoreFire Build to load your new file into your WILDSTAR and I/O card hardware. Use the CoreFire Debugger to view and modify register and memory contents in the FPGA and to step through the dataflow of your design running in the real physical hardware.

Our extensive IP and board support libraries contain more than 1,000 proven, reusable, high-performance cores, including FIR and CIC filters, a channelizer, and the world's fastest FFT. We support conversion between data types: bit, signed and unsigned integers, single precision floating point, integer and floating point complex, and arrays. A few of the newly added array cores include array composition and decomposition; slice, parallelize, serialize, repack, split, merge, reorder, rotate, and concatenate transformations; matrix math, sliding windows, and convolutions.

The combination of our COTS hardware and CoreFire enables our customers to make massive improvements in processing speed while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.



FEATURES

- Dataflow-based – automatically generates intermodule control fabric
- Drag-and-drop graphical interface
- Work at high conceptual level – concentrate on solving algorithmic problems
- Hardware-in-the-loop debugging
- More than 1,000 modules incorporate years of application experience
- Reduce risk with COTS boards and software
- Save time to market
- Save development dollars
- Easily port completed applications to new technology chips and boards
- Training and custom application development available
- Achieve world-class performance; WILD solutions outperform the competition
- Annual node locked or networked license; includes customer support and updates

For more information, contact: wfinfo@annapmicro.com **www.mil-embedded.com/p33544**

SYSGO

Am Pfaffenstein 14 • 55270 Klein-Winternheim, Germany
www.sysgo.com

SYSGO
EMBEDDING INNOVATIONS

ELinOS Industrial Grade Linux

ELinOS is a comprehensive development environment for embedded Linux software development. Unlike traditional Linux implementations, SYSGO's ELinOS is purpose-built for use in demanding industrial applications. SYSGO brings 15+ years of field expertise to make an embedded Linux offering well suited for real-world complex applications, and to back it up with world-class support. Many BSPs corresponding to the most successful boards on the market are included as well as BSPs for virtualization engines such as QEMU and VMware, or for the other SYSGO flagship product PikeOS. Besides the widely used x86 version, ELinOS also supports PowerPC-, ARM-, MIPS-, and SH-platforms. ELinOS includes CODEO, the Eclipse based development environment that provides guided configuration, remote debugging (often down to the hardware instruction level), target monitoring, remote application deployment, and timing analyses in addition to standard application development features such as compilers and assemblers.

FEATURES

- Industrial Grade
- Integrated eclipse based development environment
- Real-time extensions support
- Target configuration editor
- Runs out of the box
- One year support included
- Validated and tested for PPC(60x, 4xx, E500), x86, ARM, SH-4, MIPS
- BSPs for major embedded boards and chip vendors included

For more information, contact: Jacques.Brygier@sysgo.com **www.mil-embedded.com/p45773**

SYSGO

Am Pfaffenstein 14 • 55270 Klein-Winternheim, Germany
www.sysgo.com

SYSGO
EMBEDDING INNOVATIONS

PikeOS Safe and Secure Virtualization

PikeOS is an innovative OS providing an embedded systems platform where multiple virtual machines can run simultaneously in a secure environment. The Safe and Secure Virtualization (SSV) technology allows multiple operating systems APIs to run concurrently on one machine. PikeOS provides the widest range of "personalities" on the market. Its microkernel architecture allows it to be used in cost-sensitive, resource-constrained devices as well as large, complex systems. The simplicity, modularity, and compactness of the PikeOS design results in real-time performance that competes head-to-head with conventional proprietary RTOS solutions while offering innovations in platform independence. PikeOS includes CODEO, an Eclipse-based integrated development environment that provides guided configuration, remote debugging (often down to the hardware instruction level), target monitoring, remote application deployment, and timing analyses in addition to standard application development features such as compilers and assemblers.

FEATURES

- Based on separation microkernel
- Strict time and resource partitioning
- Combines paravirtualization and hard real-time
- MILS compliant
- Eclipse-based development environment
- Certification to safety-critical standards (DO-178B, IEC 61508, and EN 50128)
- Personalities examples: Linux, legacy RTOS, ARINC 653, POSIX, RTEMS, PikeOS Native, OSEK, C/C++, Java, Ada
- Available for PowerPC, x86, ARM, MIPS, SPARC V8/LEON, and others
- Single and multicore processor support

For more information, contact: Jacques.Brygier@sysgo.com **www.mil-embedded.com/p45653**

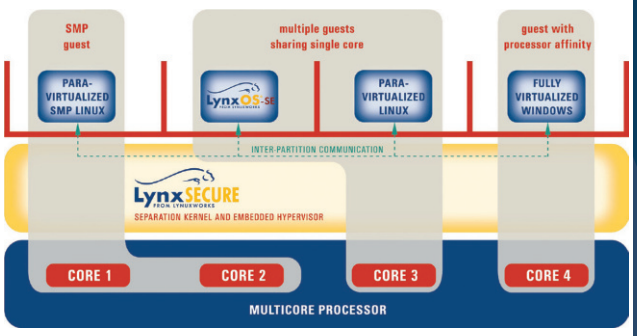
LynuxWorks, Inc.
855 Embedded Way • San Jose, CA 95138 USA
800-255-5969
www.lynuxworks.com

LynxSecure Embedded Hypervisor and Separation Kernel

With the introduction of the new LynxSecure separation kernel and embedded hypervisor, LynuxWorks once again raises the bar when it comes to superior embedded software security and safety. LynxSecure has been built from the ground up as a real-time separation kernel able to run different operating systems and applications in their own secure partitions.

The LynxSecure separation kernel is a virtual machine monitor that is certifiable to (a) Common Criteria EAL 7 (Evaluated Assurance Level 7) security certification, a level of certification unattained by any known operating system to date; and (b) DO-178B Level A, the highest level of FAA certification for safety-critical avionics applications.

LynxSecure conforms to the Multiple Independent Levels of Security/Safety (MILS) architecture. The embedded hypervisor component of LynxSecure allows multiple "guest" operating systems to run in their own secure partitions. These can be run in either paravirtualized or fully virtualized modes, helping preserve legacy applications and operating systems in systems that now have a security requirement. Guest operating systems include the LynxOS family, Linux and Windows.



FEATURES

- Optimal security and safety – the only operating system designed to support CC EAL 7 and DO-178B Level A
- Real time – time-space partitioned RTOS for superior determinism and performance
- Virtualization technology – supports multiple heterogeneous operating system environments on the same physical hardware using Intel VT hardware
- Highly scalable – supports Symmetric MultiProcessing (SMP) and 64-bit addressing for high-end scalability
- Support for open standards – supports 100% binary compatibility for Linux or POSIX-based software applications to migrate to a highly robust, secure environment
- Support for latest Intel Quad Core i7 Nehalem processors

For more information, contact: inside@lnxw.com **www.mil-embedded.com/p30051**

Objectivity, Inc.
640 West California Avenue, Suite 210 • Sunnyvale, CA 94086 USA
408-992-7100
www.Objectivity.com

Objectivity
Innovate with Confidence

Objectivity/DB Release 10

objectivity/db10

This technology enables some of the most advanced embedded devices and deployments, supporting the requirements and innovations of today and tomorrow.

Objectivity/DB provides embedded system designers and integrators with the data solution they need to develop real-time systems that simply cannot fail. Our patented enterprise- and government-proven technology supports deployments ranging from the fusion of countless thousands of distributed sensors to stand-alone devices upon which lives depend.

Our data management or object persistence layer is embedded in numerous applications including medical devices and instruments, process control equipment, exploration systems, advanced sensor networks, telecommunications and satellite systems. Our clients include Dräger Medical, SIEMENS, WesternGeco, Ericsson, NEC, Motorola, Emerson, Citibank, Boeing, the U.S. Department of Defense, Lockheed Martin, Northrop Grumman and Raytheon.

FEATURES

- **Reliability:** Designed for embedded stand-alone systems that simply must work all the time.
- **Flexibility:** Design and deploy the systems you want, with complete interoperability among heterogeneous operating systems and language bindings, including C#, C++, Java, Python and Smalltalk on Linux, Windows and most hardware.
- **Performance:** Near real-time performance on vast volumes of complex interrelated data. Objectivity/DB improves performance by orders of magnitude.

For more information, contact: info@objectivity.com **www.mil-embedded.com/p45584**

RUGGED RACK MOUNTED SERVERS
from Z Microsystems

Built to thrive in harsh environments

- Choice of 1U, 2U, and 3U systems
- Incorporates latest Intel or AMD CPUs
- Supports up to 6 removable hard drives
- 20" deep to save valuable space

Z Microsystems

MISSION-READY

For more information, visit www.zmicro.com/zx or call 858.831.7054.

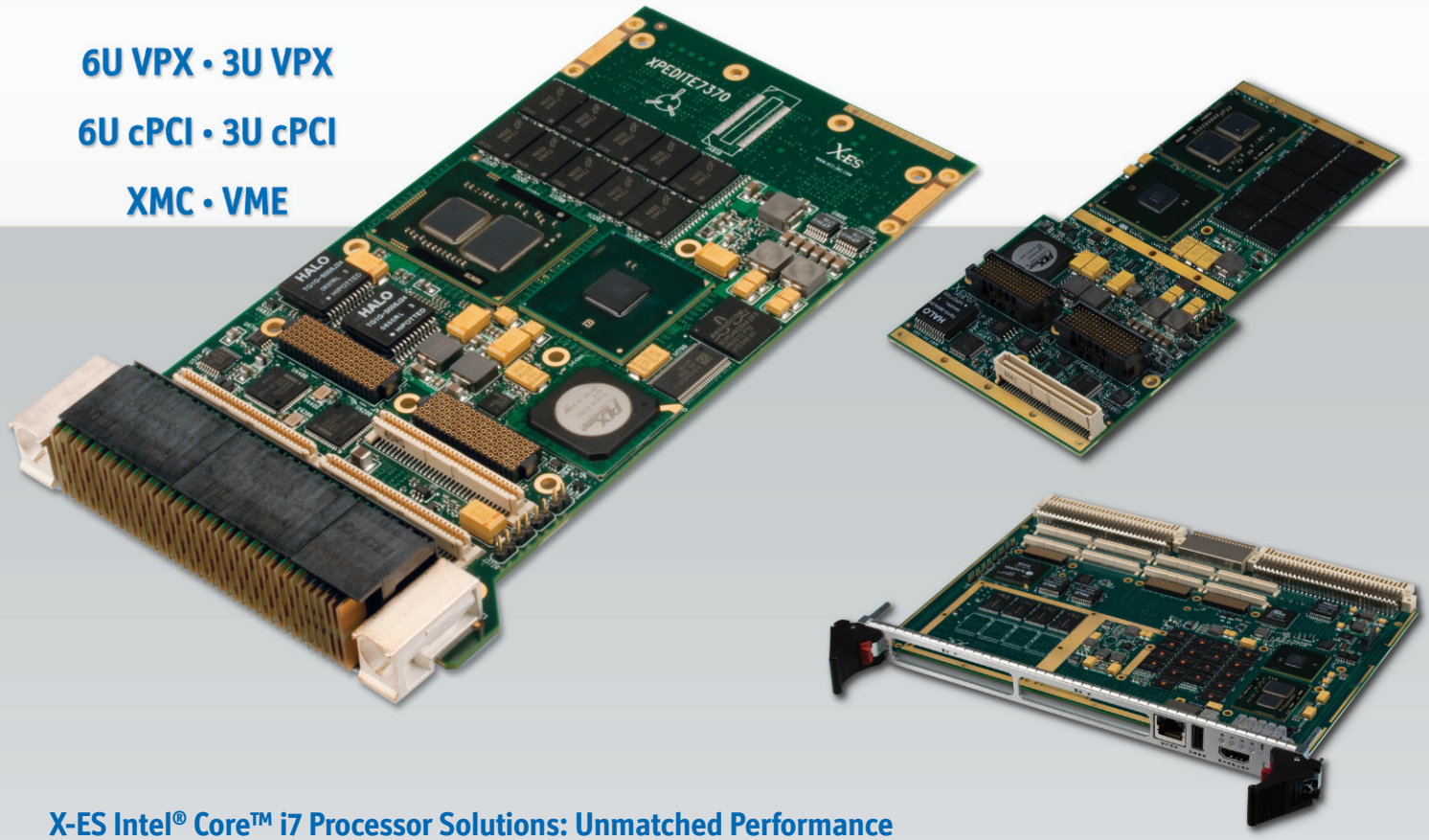
Intel® Core™ i7
Processor Solutions

Optimized For Embedded Computing Applications.

6U VPX • 3U VPX

6U cPCI • 3U cPCI

XMC • VME



X-ES Intel® Core™ i7 Processor Solutions: Unmatched Performance

Extreme Engineering Solutions, Inc. (X-ES) unleashes the performance of the Intel Core i7 processor for embedded computing. By utilizing a processor with integrated graphics, PCIe, and ECC DDR3 memory controllers, the X-ES solutions deliver unmatched power savings and processing performance for compute intensive commercial and military applications.

X-ES offers an extensive product portfolio that includes commercial and ruggedized single board computers, high-performance processor modules, multipurpose I/O modules, backplanes, enclosures, and fully integrated systems.

Intel Core i7 processor solutions available now in a variety of form factors. Call or visit our website today.

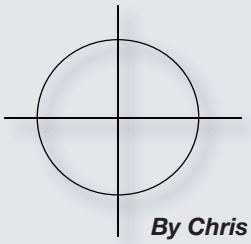
X-ES
Extreme Engineering Solutions

608-833-1155 • www.x-es.com

Military EMBEDDED SYSTEMS

RESOURCE GUIDE PROFILE INDEX

Crosshairs Editorial



Survey says: VPX is the new VME

By Chris A. Ciufo, Editor

OpenSystems Media is a voting member of VITA's VSO, so we've been involved in OpenVPX (VITA 65) since it was preceded by VPX (VITA 46). With the industry's longest-running magazine dedicated to all things VME, we think we've got a pretty good handle on the VME market. That was why VITA's VPX Marketing Alliance came to my publisher[1] to help facilitate a formal survey between April 23 and July 31 of this year. Digital survey forms were sent to thousands of our subscribers, with 234 respondents, signifying a 65.8% completion rate (154). The results were both predictable and surprising.

The bottom line results

By a huge margin, 57.3% of the respondents are in the A&D market, with the next largest segments being Industrial (12%) and Communications (10.3%). While Motorola et al originally conceived VME for all kinds of industries, including European transportation, the bus/board/backplane/chassis market primarily has stuck with cost insensitive applications with long life cycles. Today, most nonportable markets choose low-cost boards without backplanes. VME's just too damned expensive. VPX and OpenVPX aren't much cheaper: Even though higher-density boards replace multiple 6U VME cards, modern gigabit serial interfaces and multicore Core i7 or PowerPC CPUs tend to be a bit spendy.

On the other hand, harsh environments tend to be where VME and VPX play best. VME has won favor in rugged military systems for decades. Of the 18 questions in the survey, number 12 dealt with Board Formats and Cooling. For 3U sizes, 57.1% of the respondents said that they'd use conduction-cooled boards within 12-18 months; the answer was 47.1% for 6U.

Toss in liquid cooling – a built-in capability for some of VITA 46's dot specs and accommodated by the Tyco backplane connector shell with Quick Disconnects (QDs) – and the percentages change to 58.3% for 3U and 51.7% for 6U. By comparison, convection cooling in both sizes was only 22.6% and 29.9%, respectively. What does this mean? VME and VPX, in 3U and 6U, lend themselves well to rugged environments where air cooling isn't very popular. It's no surprise that A&D – and to a lesser extent, Industrial – tends to eschew convection cooling. Blowing a fan across a fire control box mounted in a Bradley in the Iraqi desert isn't going to achieve much cooling. Similarly, impinging ram air at 40,000 feet trying to cool hot electronics doesn't work so well in a fighter when the air is so thin.

Technical gotta haves … or not

The early days of VME offered pretty poor I/O density, but VPX and OpenVPX are all about moving data around the system. Switched serial fabrics are the foundation of VPX. Survey respondents ranked *high computational density, scalable architecture for expansion,* and *capable of high-speed backplane signaling* all between 65% and 80% of the time. So VPX will be used in the high-performance, multiprocessing systems for which it was intended. In fact, 51% of the respondents identified *2-4 processing modules* in their system, with a whopping 27.1% identifying *10 or more.*

Some of the surprises in the survey results dealt with I/O pin count and the ability to replace modules. From the get-go, VPX was designed to offer maximum I/O pinout, though the exact number of user-defined pins varies with module type, size, and OpenVPX profile. A mere 40% of the 98 survey respondents said that *I/O pin count greater than 200 contacts* was important, but more than 90% said it was a "nice to have." Still, the question becomes: Was VPX overengineered? Or do serial switched fabrics capable of speeds up to 5 Gbps obviate the need for so many extra I/O pins?

Also, the whole VITA 48/REDI effort (Mechanical Specification using Ruggedized Enhanced Design Implementation) is meant to be a two-level maintenance version of VPX. That is, sealed LRUs are supposed to be yanked from A&D service by technicians and sent back to the depot or manufacturer for repair or replacement, with new LRUs plugged into service – possibly right on the battlefield. With only 40% of the respondents identifying this capability as important, I'm also wondering if VPX/REDI really isn't ready. The spec was heavily promoted by Boeing, so it's possible it will have a limited industry following.

For further study

There's still lots of confusion in the industry as to the differences between VME, VXS (VITA 41), VPX, and OpenVPX. At least 40% of the survey respondents gave answers to several choices that said they need more information, more understanding of differences, or more details on suppliers and the overall bus and board ecosystem.

Future technologies identified by the survey include optical backplanes, box-level standardization (such as the three new Small Form Factor proposals being worked right now in VSO), system management (a la PICMG's AdvancedTCA), or signal integrity compliance test definition.

Most of the survey answers were predictable. VPX and OpenVPX are still new, with the lion's share of activity to date occurring with the vendors working on the standards. Except for the VITA-participant major military primes, the word is only now propagating into the marketplace. VPX is resonating with its targeted user base, as the survey underscores most of what the spec's creators had envisioned from the start. The Survey has spoken.

Chris A. Ciufo, Editor
cciufo@opensystemsmedia.com

[1] To be fair, other industry groups also participated, including M&AE, COTS Journal, Tech Briefs, Extension Media, and others.

GE
Intelligent Platforms

You can only target what you can track.

As the deployment of unmanned vehicles has increased, so has the demand for high-performance video tracking capabilities. In response, GE Intelligent Platforms has developed a full range of cutting-edge, real-time COTS video tracking, compression and image processing technology that is ruggedized and low power.

We support simultaneous compression of multiple channels of high-resolution video in rugged environments. Simply connect your video inputs and begin streaming HD at full frame rates for superb tracking performance and reduced operator workload. No additional integration or software development is required.

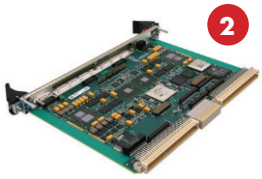
For more information, visit:
www.ge-ip.com/image-processing

imagination at work

SPEED YOUR TIME-TO-MARKET

YOUR TOTAL SOLUTIONS PARTNER

1 Signal Acquisition
Analog & Digital I/O
ADC510 (FMC) & FMC-XCLK2



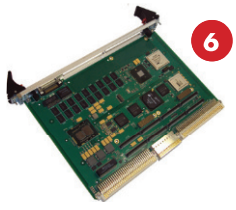
2 Radar Processing
Digital Signal Processors
CHAMP-AV5

3 Flight Control
Multi-Platform Mission Computers
MPMC-9350 & MPMC-9310 (VPX, VME or CompactPCI)

Do you need innovative solutions or complete integration services for high-density data processing now? From board-level products to fully integrated systems, we provide advanced technology solutions that perform under the most rugged operating conditions. Speed your time-to-market and lower your overall program development costs utilizing our leading edge, commercial-off-the-shelf products, or modified COTS (MCOTS) and engineering services. **Ask your representative about the new VPX System specification, OpenVPX.**

4 Graphics Display
Video Input & Output
XMC-710

5 System Connectivity
Ethernet Switches
VPX6-684 FireBlade



6 Command & Control
Single Board Computers
VPX6-187 & VME-1905

CURTISS WRIGHT Controls
Embedded Computing

sales@cwcembedded.com cwcembedded.com

BOARDS & SYSTEMS ABOVE & BEYOND

MIL/COTS DIGEST

The Defense Electronic Product Source

Fall 2010

In This Issue

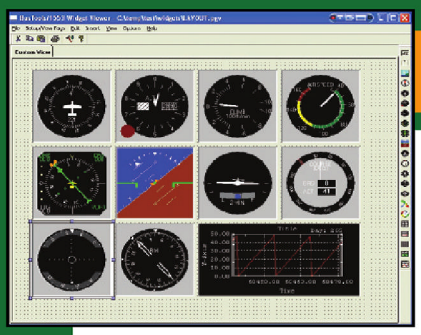
VME's VPX progeny will dominate in 2011

In the past 12 months, the high end of the VME ecosystem has gone from the latest FPGA-based PMC/XMC mezzanines on conduction-cooled 6U VME boards to deployed 10 GbE 3U VPX and OpenVPX switches. In October 2009, the OpenVPX Working Group handed its collaborative work over to VITA, giving rise to the official VITA 65 OpenVPX standard. Earlier this year, it was ratified by ANSI and is now an international standard. With so much accelerated effort by so many individuals and companies, as well as millions of dollars of engineering investment, the VME ecosystem now consists of countless VPX and OpenVPX boards, backplanes, and systems. Presented herein are 32 new VME, VXS, VPX, and OpenVPX products. Watch for VPX to dominate new products in 2011.

As always, PMC and XMC mezzanine modules provide additional capabilities onto baseboards. You'll find two PMC products and one XMC – the latter an interesting mix of A/D and D/A input/output ports. There are also many dedicated fabric "switch" cards (not counting fabric I/O already included on other boards). The most popular choices are Serial RapidIO and Fast Ethernet. You'll find two chassis – increasingly these are VPX chassis – along with two VPX development systems that include chassis. You'll also find several purpose-built systems and SBCs, including one from Mercury Computer Systems designed solely for ISR applications and one certifiable to DO-254.

And lastly, one of my favorites isn't a VME, VXS, or VPX product at all. It's a proprietary Atom-based Small Form Factor (SFF) module. I chose this one because VITA sees itself getting into the SFF business within the next 24 months with a completely new board size. I hope you enjoy these 32 selections.

Chris A. Ciufo, Editor
cciufo@opensystemsmedia.com



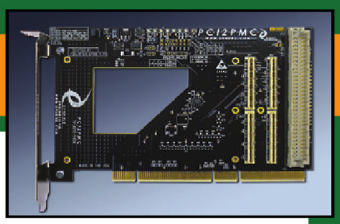
"Intuitive" GUI for 1553 data bus traffic

GE Intelligent Platforms' BusTools-1553 version 7 "Intuitive" GUI simulates, tests, and analyzes 1553 data bus traffic on CompactPCI, PCI, VME, VXI, PC/104, and PC/104-*Plus* form factors, among others. It hastens bus traffic analysis and monitoring and facilitates fast message modification and creation. It enables simultaneous multiple-bus control in addition to error detection/injection and speedy filtering for either recorded or live displayed data. The Dynamic Bus Monitor stop/start feature enables users to achieve efficient on-the-fly 1553 bus traffic routing. Additionally, a one-page bus list editor replaces the multi-page editor. Meanwhile, a Selective Data Watch feature lets readers choose different data words from any bus message to identify elusive system issues, thanks to integrated high/low limit checking, automatic limit event logging and corresponding snapshot feature, and DDE output.

www.ge-ip.com

GE INTELLIGENT PLATFORMS

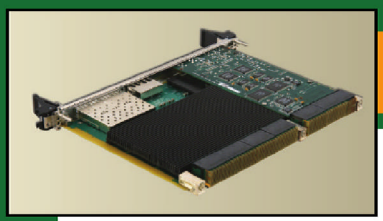
PCI-to-PMC adapter



Dynamic Engineering's PCI2PMC PCI-to-PMC adapter enables PMC card installation into either a half-length or standard PCI slot at 6.600" per the PCI specification, meaning it's an adaptable half-length ware with universal voltage. The adapter provides a passive design and 33/66 MHz bus operation, along with 32-/64-bit data transfers. PCI2PMC supports 3.3 and 5 V PCI bus signaling, and +3.3, +5, +12, and -12 V can be supplied from the PCI backplane to the PMC with an optional jumper for PCI or a regulator at 3.3 V. Front- and rear-accessible connectors including a rear DIN64/SCSI connector are also proffered, and a cut-out design enables increased airflow. The adapter operates at -40 °C to + 85 °C and renders 4.6 million hours of MTBF. Additionally, an RoHS version is available.

www.dyneng.com

DYNAMIC ENGINEERING



VPX Serial RapidIO Gen-2 switch

Curtiss-Wright Controls Embedded Computing's VPX6-6902 6U VPX Serial RapidIO Gen-2 Switch is a combined management, control, and data plane switch. Its 6U VPX/OpenVPX form factor supports star and dual-star topologies, and it is available with Serial RapidIO switch fabric alone or as combined Serial RapidIO and Ethernet switches in a single slot. It has 20/24x Serial RapidIO 4-lane (x4) ports to the VPX backplane + 4x ports to the front (AC only). Additionally, each Serial RapidIO port can operate at Gen-1 speeds of 1.25, 2.5, and 3.125 Gbaud or Gen-2 speeds of 5 and 6.25 Gbaud. Also proffered are 16x SERDES GbE and 2x 1000BASE-T to the back and 2x 10 GbE and 1x 1000BASE-T to the front. An onboard management processor for both Serial RapidIO and GbE fabrics is also provided.

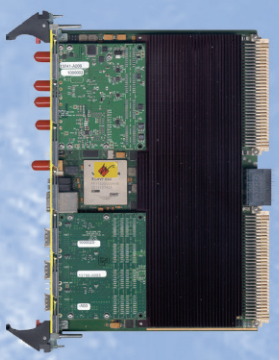
www.cwcembedded.com

CURTISS-WRIGHT CONTROLS EMBEDDED COMPUTING

Annapolis Micro Systems

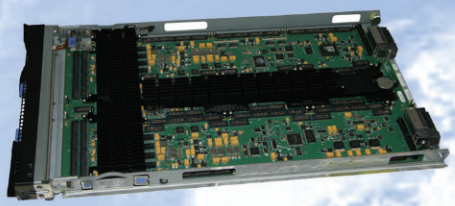
The FPGA Systems Performance Leader

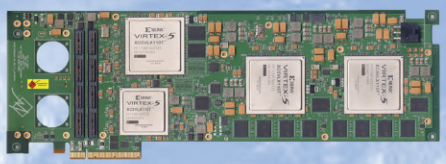
High Performance Signal and Data Processing in Scalable FPGA Computing Fabric



GEOINT, Ground Stations, SDR, Radar, Sigint, COMINT, ELINT, DSP, Network Analysis, Encryption, Image Processing, Pattern Matching, Oil & Gas Exploration, Financial Algorithms, Genomic Algorithms

Direct Seamless Connections with no Data Reduction
Between External Sensors and FPGAs
Between FPGAs and Processors over IB or 10GE
Between FPGAs and Standard Output Modules
Between FPGAs and Storage Arrays





Annapolis Micro Systems

Ultimate Modularity
From 1 to 8 Virtex 4, 5 or 6 FPGA/Memory Modules
Input/Output Modules Include:
Quad 130 MSPS thru Quad 550 MSPS A/D
1.5 GSps thru 5.0 GSps A/D, Quad 600 MSps D/A,
Dual 1.5 GSps thru 4.0 GSps D/A
Infiniband, 10G, 40G or 100G Ethernet or SFPDP

VME/VXS/VPX, IBM Blade, PCI-X/PCI Express, PMC/XMC, MicroTCA

No Other FPGA Board Vendor Streams This Volume of Data Real Time Straight Into the Heart of the Processing Elements and Then Straight Back Out Again

190 Admiral Cochrane Drive, Suite 130, Annapolis, Maryland USA 21401
wfinfo@annapmicro.com USA (410) 841-2514 www.annapmicro.com

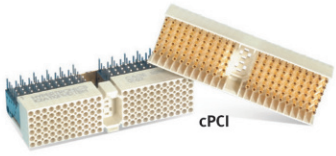
NEW LEVELS OF INTERCONNECT RELIABILITY

For lengthy space missions tasked with discovering the effects of atmospheric phenomena on vital communication transmissions and data gathering, it's critical that equipment be long lasting and impervious to damaging effects. Hypertronics interconnect solutions featuring the Hypertac® hyperboloid contact technology offer the reliability and dependability that are required in making space discovery possible. Hypertronics is the choice of engineers worldwide for mission critical systems.

Hypertac Features	Benefits
Low Insertion/Extraction Forces	High Density Interconnect Systems
Long Contact Life	Low Cost of Ownership
Lower Contact Resistance	Low Power Consumption
Higher Current Ratings	Maximum Contact Performance
Shock and Vibration Immunity	Reliability Under Harsh Conditions

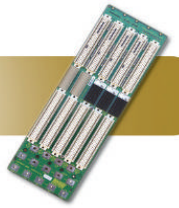
Maintain your system integrity with Hypertronics reliable connectors and dependable solutions.

www.hypertronics.com/discover



HYPERTRONICS: WHEN FAILURE IS NOT AN OPTION

smiths
bringing technology to life



VITA News

By Ray Alderman

It is time for an optical architecture road map

At the risk of irritating all the copper-based creatures in the embedded backplane and board business, it is time for us to start thinking about optical architectures. The semiconductor folks keep upping the data transfer frequencies with every next-generation chip: The 2.5G is now old technology, 5G is being deployed, and 10G is developing rapidly. And we are heading to 100G connections in a few years. Every time the frequency goes up, the backplane folks pull their hair out trying to make it work consistently and reliably on copper. We are near the end for copper-based links running more than a few inches, so it is time to develop an optical road map.

And, as many of my readers know, I have been advocating the transition to optical architectures and hexagonal board formats in high-performance computing machines at the VSO for about four years now. Figure 1, a futuristic concept of an optically connected computing cluster, shows how both these concepts would look.

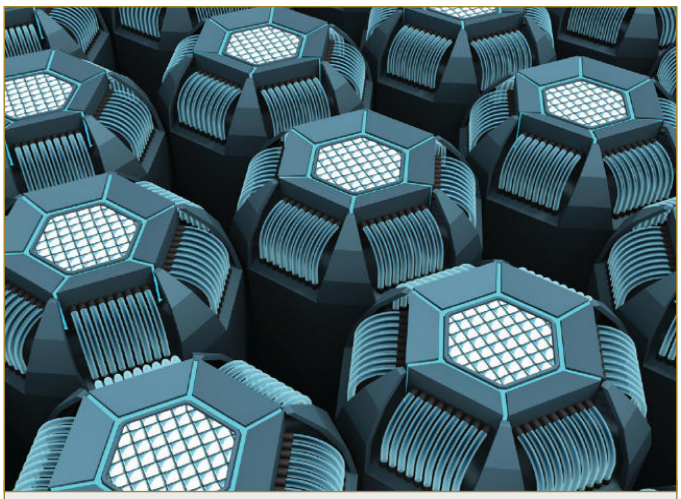


Figure 1 | A xenomorphic optically interconnected computing cluster using hexagonal boards.

An attempt at a road map

The primary way to look at optical architectures is the domain perspective: chip-to-chip, board-to-board, and box-to-box. IBM and others have been working on optical chip-to-chip interconnect technology, but it is currently in the nascent phase (see http://domino.research.ibm.com/comm/research_projects.nsf/pages/photonics.index.html). The market driving this semiconductor research and component development is the data center where bandwidth requirements rise every day. But many embedded market segments can benefit from these new opto chips aimed at data centers.

Knitting together an optical backplane

Boards are already being interconnected in backplanes using fibers. Just look at the backplane as a patch panel of holes where the fibers pass through to the connectors (see www.vita.com/vaofiles/FlexPlane.pdf). So there are many ways to interconnect boards in backplanes using fibers, with different connectors and layouts. We have already seen numerous programs implementing OpenVPX (VITA 65) boards, and they are using discrete fiber cables (with ferules) plugged into the optical connector block on the backplane defined in the VITA 66 specification.

Here is a better way

These backplane patch panels (using fiber cables) work, but they are fairly low tech. Many companies are now developing polymer reflective optical waveguides embedded in the backplane PCB material (www.springerlink.com/content/3871227217103847/fulltext.pdf). This concept holds the most promise for board-to-board optical interconnects and for the introduction of true optical backplanes in the near future. Imagine building an eight-slot mesh with fiber cable connections through a backplane [that is n(n-1) or 56 fiber cables and 112 connectors]. For a 10-board optical mesh, there are about 90 fibers and 180 connectors. As one can see, building large-scale centralized systems with optical fiber patch panel backplanes is expensive and squirrelly. Optical waveguides in the PCB material make much more sense and are cheaper and more reliable.

Optical networks between boxes

Box-to-box optical connections have been used for quite some time. These cabled connections are used heavily in the data centers now, but those applications are already moving from 10G optical Network Interface Cards (NICs) to 40G optical connections. And they want to move to 100G optical as quickly as possible. In the embedded mil/aero space, we have seen a number of optical connections used in data recorder and sensor interfaces. The components (fibers, connectors, and silicon) are mature but very slow compared to the newer developments in the data center. The increased interest in small "cubes" of electronics – Line Replaceable Units (LRUs) in Unmanned Aerial Vehicles (UAVs) and ground vehicle applications – will probably move to high-speed optical interconnections instead of copper. All distributed system interconnects will migrate to optical connections in the near future and eliminate the copper cables.

So a lot of the basics are already in place. Now the silicon engineers need to move their developments into mass production, the PCB makers need to establish a bulletproof process for embedding optical waveguides in the laminate for backplanes and daughtercards, and the connector folks need to integrate the silicon into highly reliable connectors. That should all happen in the next 18 to 24 months.

For more information, contact Ray at exec@vita.com.

VITA Standards Update

By John Rynearson

VITA 48.0, 48.1, and 48.2 recognized as American National Standards

VSO ANSI accreditation

Accredited as a Standards Development Organization (SDO) in June 1993 by the American National Standards Institute (ANSI), the VITA Standards Organization (VSO) meets every two months to address vital embedded bus and board industry standards issues. Information on ANSI/VITA standards is available on the VITA website at www.vita.com.

VSO study and working group activities

Standards within the VSO may be initiated by a study group and developed by a working group. A study group requires the sponsorship of only one VSO member. A working group requires the sponsorship of at least three VITA members.

VITA 46.4, PCI Express on the VPX Fabric Connector

Objective: To standardize the implementation of PCI Express fabric in a VITA 46 (VPX) environment and define the mapping of PCI Express links on the VPX connector.

Status: VITA 46.4 has been released by the VITA 46 working group as a VITA Draft Standard for trial use for a period of 18 months and is available from the VITA Online Store. The draft standard may be withdrawn any time before the end of the 18-month trial period and may be revised before submission to ANSI.

VITA 46.9, PMC/XMC/Ethernet Signal Mapping to 3U/6U on VPX User I/O

Objective: This VITA 46 (VPX) subsidiary standard defines PMC or XMC mezzanine rear I/O pin mappings to VITA 46.0 plug-in module backplane connectors.

Status: The VITA 46 Working Group has voted to move 46.9 to ANSI ballot. Anyone with a direct and material interest in 46.9 should contact the VITA technical director at techdir@vita.com and request to be part of the 46.9 balloting group.

VITA 48.0, 48.1, 48.2

Objective: Establish a set of mechanical specifications for embedded modules.

Status: VITA 48.0, 48.1, and 48.2 have been recognized as American National Standards. Copies are available from the VITA website.

E-cast

Editor's note: *This update is based on the July 2010 VSO meeting. Additional 2010 VSO meetings are scheduled for September and November.*

Be sure to check out our online E-cast archives for the latest video and audio updates on VITA 41, 46, 48, and 65. See www.opensystemsmedia.com/ecast.

VITA 51.2, Physics of Reliability Failure

Objective: Establish uniform practices, take advantage of current developments, and clarify reliability prediction expectations using physics of failure methodologies.

Status: VITA 51.2 is currently in working group ballot. Once the ballot is completed, the draft will be revised based on comments received.

ANSI/VITA 65, OpenVPX

Objective: To provide a standard for commonly used VPX profiles.

Status: The OpenVPX working group has adopted a set of procedures for revising the document every six months as required. Proposed new profiles were reviewed at the July VSO meeting.

VITA 68, VPX Compliance Channel

Objective: Develop a compliance channel standard to ensure interoperability for embedded modules.

Status: The VITA 68 working group continues to work on defining the characteristics for channel compliance. A statement of work is also being prepared to guide upcoming simulation efforts.

VITA 71, New Generation Mezzanine

Objective: To define a new mezzanine standard for embedded modules.

Status: This effort is in the exploratory phase. The working group plans to start with a blank sheet of paper and define a mezzanine standard from the ground up, specifically designed for use in embedded modules.

For more information, e-mail John at techdir@vita.com.

PDF – *This column and the accompanying table are available at www.vmecritical.com, then click on VITA Standards.*

VITA Standards Activity Chart

JULY MEETING

Standard *Reaffirmed	Title	Status	*VME and CS* edition
ANSI/VITA 1.0 *2002	VME64 Standards	Released	
ANSI/VITA 1.1 *2003	VME64 Extensions	Released	Aug. 2004
ANSI/VITA 1.3 *2003	9U x 400 mm Format	Released	
ANSI/VITA 1.5	2eSST	Released	Feb. 2004
ANSI/VITA 1.6 *2005	Keying for Conduction-cooled VME	Released	
ANSI/VITA 1.7	Increased Connector Current Level	Released	
ANSI/VITA 3 *2002	Board Level Live Insertion	Released	
ANSI/VITA 4.0 *2002	IP Modules	Released	
ANSI/VITA 4.1 *2003	IP/I/O Mapping to VME64x	Released	
ANSI/VITA 5.1 *2004	RACEway Interlink	Released	
VITA 5.2	RACEway++	Withdrawn	Aug. 2004
ANSI/VITA 6.0 *2002	SCSA	Released	
ANSI/VITA 6.1 *2003	SCSA Extensions	Released	
ANSI/VITA 10 *2002	SKYchannel Packet Bus	Released	
ANSI/VITA 12 *2002	M-Modules	Released	
ANSI/VITA 13	Pin Assignments for HIC on VME	Withdrawn	
ANSI/VITA 17.0 *2004	Front Panel Data Port	Released	
ANSI/VITA 17.1	Serial Front Panel Data Port	Released	Feb. 2004
VITA 17.2	Serial Front Panel Data Port (SFPDP) Channel	Working Group	Dec. 2009
VITA 19.0	BusNet Overview	Withdrawn	
ANSI/VITA 19.1	BusNet MAC	Withdrawn	
ANSI/VITA 19.2	BusNet LLC	Withdrawn	
ANSI/VITA 20 *2005	Conduction-cooled PMC	Released	Apr. 2005
ANSI/VITA 23 *2004	VME64x Extensions for Physics	Released	
ANSI/VITA 25	VISION	Withdrawn	
ANSI/VITA 26 *2003	Myrinet-on-VME	Released	
ANSI/VITA 29	PC•MIP	Released	
ANSI/VITA 30.0 *2005	2 mm Connector Practice on Euroboard	Released	
ANSI/VITA 30.1	2 mm Conduction-cooled Euroboard	Released	
VITA 30.2	Power Connector Equipment Practice	Released	Apr. 2007
ANSI/VITA 31.1	GbE on VME64x Backplanes	Released	Feb. 2004
ANSI/VITA 32	Processor PMC	Released	Feb. 2004
VITA 34	A Scalable Electromechanical Architecture	Working Group	Apr. 2004
ANSI/VITA 35 *2005	Pin Assignments for PMC to VME	Released	
VITA 36	PMC I/O Modules	Withdrawn	Apr. 2004
ANSI/VITA 38	System Management on VME	Released	
ANSI/VITA 39	PCI-X Aux. Std. for PMCs and PrPMCs	Released	Feb. 2004
ANSI/VITA 40	Status Indicator	Released	Dec. 2009
ANSI/VITA 41.0	VXS: VME Switched Serial	Released	Oct. 2006
ANSI/VITA 41.1	VXS: InfiniBand Protocol Layer	Released	Oct. 2006
ANSI/VITA 41.2	VXS: RapidIO Protocol Layer	Released	Oct. 2006
VITA 41.3	VXS: GbE	Working Group	Apr. 2006
VITA 41.4	VXS: PCI Express	Working Group	Apr. 2006
ANSI/VITA 41.6	VXS: 1x GbE Control Channel Layer	Released	Sept. 2009
VITA 41.7	VXS: Processor Mesh Topology	Working Group	
VITA 41.8	VXS: 10 GbE Protocol Layer	Working Group	June 2009
VITA 41.10	VXS: Live Insertion Requirements for VITA 41 Boards	Working Group	Apr. 2006
VITA 41.11	VXS: Rear Transition Modules	Working Group	Apr. 2006
VITA 42.0	XMC	Released	Feb. 2009
ANSI/VITA 42.1	XMC: Parallel RapidIO	Released	Oct. 2006
ANSI/VITA 42.2	XMC: Serial RapidIO	Released	Oct. 2006
ANSI/VITA 42.3	XMC: PCI Express	Released	Oct. 2006
VITA 42.4	HyperTransport	Working Group	Apr. 2005
ANSI/VITA 42.6	XMC: 10 GbE 4-Lane Protocol Layer	Released	June 2009
VITA 42.10	XMC: General Purpose I/O	Working Group	

Defining Standards

VITA 71: Revolutionary mezzanine standard aims to replace PMC, XMC standards

By Dean Holman, Greg Rocco, and Dan Toohey

The VITA 71 "Rugged Mezzanine" standard will define the next-generation mezzanine cards that will allow products to be developed with electrical interfaces supporting higher-power, -speed, and -performance applications. The need for this standard has become increasingly evident in the markets that VITA serves, as requirements intensify for a standardized mezzanine solution that supports the protocols, power requirements, physical interfaces, and thermal management technologies of future mezzanine cards while optimizing system Size, Weight, and Power (SWaP). The VITA 71 Working Group comprises more than 20 companies including board, system, and connector vendors and large prime contractors.

The scope of the VITA 71 Working Group is to define a groundbreaking mezzanine standard to replace the existing PMC and XMC standards. Whereas the migration from PMC to XMC was evolutionary, VITA 71 will be revolutionary. It will begin with a clean slate rather than being burdened with support for older mezzanine standards and will deliver denser processing solutions in lower weights that can be cooled more efficiently. VITA 71 will support:

- Next-generation multi-Gigabaud signaling rates (targeting up to 12+ Gbaud)
- Convection and conduction cooling
- Module front-panel and backplane connector I/O interfaces
- User-defined I/O
- System management

VITA 71 will optimize:

- Mezzanine and carrier board real estate utilization
- Power system distribution
- Mezzanine and carrier board cooling capabilities with support for convection and conduction cooling
- Allocation of pins, leveraging OpenVPX (VITA 65) Slot Profiles experience for uses such as management and fabric connection to the carrier card and user I/O to the backplane

Currently, PMC and XMC connectors are not rated for operation at the next-generation baud rates, for example

>5 Gbaud, and they require significant real estate on the carrier and the mezzanine cards. The PMC/XMC sites do not bound power consumption beyond pin limits or provide adequate guidance or mechanisms for appropriate thermal management of the site. Additionally, the PMC/XMC sites require up to six unique voltage rails if there is a PMC/XMC site and support 3.3V_AUX as a separate rail. These and other factors – including the integration of more processing power and capabilities per square inch, and the need to locate sensor input closer to processors in smaller deployed systems – underscore the need for a revolutionary standard.

VITA 71 standard's road map

Today, rules are bent and a mezzanine/motherboard pair is often customized to optimize the pair for increased power or thermal performance, moving away from existing standards and creating interoperability challenges even for the same vendor. The VITA 71 standard will address this and deliver better interoperability between mezzanine and carrier vendors. It will provide increased interface speeds as well as thermal and power capacity, which will enable higher-speed processing capabilities on a mezzanine and higher-performance I/O in a SWaP-optimized setting.

With the VITA 71 standard, prime contractors will have the flexibility to change vendors as needed with fewer thermal and mechanical interoperability concerns, aligning with customers' goals of modeling upgrades and executing shorter design cycles.

VITA 71 progress

The VITA 71 Working Group was established last January. The first draft of the standard is expected to be complete by January 2011. Once published, it is expected that this standard will generate revisions in other VITA standards such as VITA 65, OpenVPX; VITA 46.11, VPX: System Management; and VITA 49, VITA Radio Transport (VRT).

Dean Holman *is Manager of Sustaining Engineering at Mercury Computer Systems and Chairman of the VITA 71 Working Group. He can be contacted at dean@mc.com.*

Greg Rocco *is Consulting Systems Engineer in the System Architecture Group at Mercury Computer Systems. He can be contacted at rocco@mc.com.*

Dan Toohey *is a Consulting Hardware Engineer at Mercury Computer Systems. He can be contacted at dtoohey@mc.com.*

Standard *Reaffirmed	Title	Status	*VME and CS* edition
VITA 42.20	XMC: Dual Fabric I/O	Working Group	
VITA 43S	Hot Swap NextGen Mezzanine	Inactive	Feb. 2004
VITA 45S	Serial VME	Canceled	Apr. 2004
ANSI/VITA 46.0	VPX: Base Specification	Working Group	Feb. 2009
ANSI/VITA 46.1	VPX: VMEbus Signal Mapping	Working Group	Feb. 2008
VITA 46.3	VPX: Serial RapidIO on VPX Fabric Connector	Trial Use Standard	Summer 2010
VITA 46.4	PCI Express on the VPX Fabric Connector	Working Group	Fall 2010
VITA 46.5	VPX: HyperTransport	Inactive	
VITA 46.6	VPX: GbE	Working Group	Spring 2010
VITA 46.7	10 GbE on VPX	Trial Use Standard	Summer 2010
VITA 46.9	PMC/XMC/Ethernet Signal Mapping to 3U/6U on VPX User I/O	Working Group	Fall 2010
ANSI/VITA 46.10	Rear Transition Module for VPX	Released	Dec. 2009
VITA 46.11	System Management on VPX	Working Group	Spring 2010
VITA 46.12	Fiber Optic Interconnect	See VITA 66	Dec. 2009
VITA 46.14	Mixed Signal VPX	See VITA 67	Dec. 2009
VITA 46.20	VPX Switch Slot Definition	See VITA 65	June 2009
VITA 46.21	Distributed Switching on VPX	See VITA 65	June 2009
ANSI/VITA 47	Env., Design and Const., Safety, and Qual. for Plug-in Units	Released	June 2006
VITA 47r1	Revisions to ANSI/VITA 47	Released	Feb. 2008
VITA 47r2	Revisions to ANSI/VITA 47	Working Group	Dec. 2009
VITA 48.0	REDI: Ruggedized Enhanced Design Implementation	Working Group	Fall 2010
VITA 48.1	Mechanical Specs for Microcomputers Using Air Cooling	Working Group	Fall 2010
VITA 48.2	Mechanical Specs for Microcomputers Using Conduction Cooling	Working Group	Fall 2010
VITA 48.3	Mechanical Specs for Microcomputers Using Liquid Cooling	Working Group	
ANSI/VITA 49.0	VITA Radio Transport (VRT)	Released	May 2009
ANSI/VITA 49.1	VITA Radio Link Layer (VRL)	Released	May 2009
VITA 50	Best Practices for Electronic Module Cooling	Inactive	Dec. 2007
ANSI/VITA 51.0 *2008	Reliability Prediction	Released	Aug. 2008
ANSI/VITA 51.1 *2008	Reliability Prediction: MIL-HDBK-217 Daughter	Released	
VITA 51.2	Physics of Reliability Failure	Working Group	Fall 2010
ANSI/VITA 51.3	Qualification and Environmental Stress Screening	Released	Spring 2010
VITA 52	Lead-free Practices	Working Group	Oct. 2006
ANSI/VITA 53	Commercial Technology Market Surveillance	Released	Summer 2010
VITA 54	Embedded Platform Management Architecture (EPMA)	Inactive	Aug. 2005
VITA 55	Virtual Streaming Protocol	Inactive	Feb. 2009
VITA 56	Express Mezzanine Card (EMC)	Inactive	Oct. 2007
ANSI/VITA 57 *2008	FMC: FPGA Mezzanine Card	Released	Feb. 2009
VITA 57.1	FPGA I/O Mezzanine Pin Assignments	Working Group	June 2009
ANSI/VITA 58.0	Line Replaceable Integrated Electronics Chassis	Released	May 2009
VITA 59	RSE: Rugged System-on-Module Express	Working Group	Dec. 2008
VITA 60	Alternative Connector on VPX	Working Group	Dec. 2009
VITA 61	Alternative Connector for XMC	Working Group	Dec. 2009
VITA 62	Power Supply Modules	Working Group	Dec. 2009
VITA 63	KVPX	Working Group	Feb. 2009
VITA 64	Optimized Footprint for VITA 60	Working Group	Feb. 2009
ANSI/VITA 65	OpenVPX	Released	Fall 2010
VITA 66	Fiber Optic Interconnect (Formerly 46.12)	Working Group	Spring 2010
VITA 67	Analog/RF Interconnect (Formerly 46.14)	Working Group	Spring 2010
VITA 68	VPX Compliance Channel	Working Group	Fall 2010
VITA 69	Common Glossary	Working Group	
VITA 70	Common Standard Template	Working Group	
VITA 71	New Generation Mezzanine	Working Group	Fall 2010
VITA 72	Connector Comparision Testing	Working Group	
VITA 73	Small Form Factor-v73	Working Group	Summer 2010
VITA 74	Small Form Factor-v74	Working Group	Summer 2010

For corrections or suggestions, contact Chris Ciufo, *VME and Critical Systems* magazine, at cciufo@opensystemsmedia.com.

By Ron Huizen

OPENVPX INTERCONNECTS...

Reconfigurable boards ease OpenVPX's protocol and interconnect challenges

OpenVPX's (VITA 65's) primary goal is to increase interoperability for VPX (VITA 46) technologies. And while OpenVPX is certainly a large step in the right direction, the many differing requirements across various applications make it impossible to standardize on a single high-speed serial protocol and associated interconnect topology. However, by providing for adaptable I/O, a reconfigurable OpenVPX board can allow system designers to explore different protocols and topologies – and mix and match them – providing a flexible interface to the rest of the system.

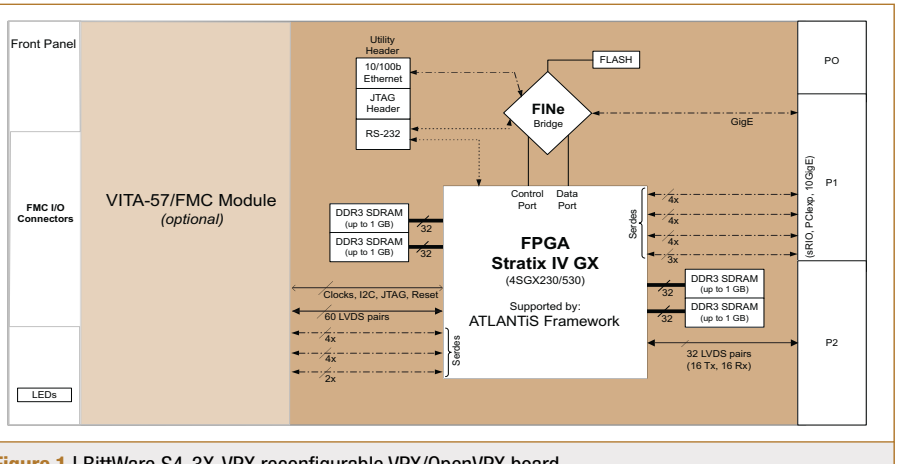


Figure 1 | BittWare S4-3X-VPX reconfigurable VPX/OpenVPX board

So many protocols, so little time

While initial versions of VME were standardized, as bandwidth needs grew, special secondary buses and data paths were added, often relegating the VMEbus to a simple control plane. High-speed switched serial protocols attempt to satisfy both the bandwidth needs of the data plane and the connectivity needs of the control plane, but the problem of too many different available protocols remains. There were hopes that the user community would eventually settle on one, but instead there are now three dominant protocols – PCI Express, Serial RapidIO, and 10 GbE – each with its own strengths and heritage.

While PCI Express provides ease of use from a software and system point of view, Serial RapidIO can't be beat for data throughput and low latency. And 10 GbE is a natural fit in a networking-based application. All of these switch fabric protocols typically assume a backplane topology where each board is connected to a switch, and hence can access any other board in the system. These topologies can be single or dual star, with redundant switch slots.

While the switch fabrics and switched backplanes provide flexibility, they do come at a cost, both for the switch board itself and in terms of resources on each board for running the protocol. If all the application really needs is pure board-to-board data flows, the lightweight protocols – including SerialLite and Aurora – are perfect when combined with a point-to-point backplane topology like a ring. These lightweight protocols provide high throughput and low resource usage by not requiring the overhead of switched protocols.

Amidst so many switch fabrics and protocols, OpenVPX provides some help in figuring this all out by defining standard backplane and slot profiles covering the major topologies. But OpenVPX does not dictate one particular high-speed serial protocol or interconnect topology, instead enabling them all. This is where a reconfigurable OpenVPX board can truly provide a remedy.

Reconfigurable OpenVPX boards to the rescue

A reconfigurable OpenVPX board uses FPGA technology to allow adaptation to virtually any OpenVPX backplane, and hence system. With the ability to run any of the serial protocols – including PCI Express, Serial RapidIO, and 10 GbE, as well as the lightweight point-to-point protocols – a reconfigurable OpenVPX board can make use of the protocol that best fits the application. These boards can also be used to create systems that utilize multiple protocols, acting as a bridge between them. To get the best of both worlds, backplane topologies can even be mixed, for example combining a single switched fat pipe with a ring of board-to-board fat pipes. Along with the multi-gigabit interfaces, a reconfigurable OpenVPX board should also provide standard I/O, such as LVDS, to enable interfacing to other parts of the system. Besides direct backplane connections, a great way to do this is with a VITA 57 FPGA Mezzanine Card (FMC), which can provide tremendous system flexibility. With multi-gigabit transceivers and LVDS connected to both the VPX backplane and an FMC site, such an OpenVPX board can be easily adapted to meet system-interfacing needs.

A reconfigurable OpenVPX board is shown in Figure 1. This board has 15 multi-gigabit serial connections to the OpenVPX backplane and 10 to the VITA 57 FMC site. A single Ethernet interface is used for board control and setup, including reconfiguring the FPGA and burning FPGA images into the flash. With multiple FPGA images stored, these boards can be reconfigured with a simple command over Ethernet to match numerous OpenVPX profiles.

Ron Huizen, *VP of Technology at BittWare, Inc., can be contacted at rhuizen@bittware.com.*

Stroke of Genius

Introducing the NEW Cobalt Series of Virtex-6 Modules!

Unleash your inner genius with Pentek's new 71620 Cobalt™ Virtex-6 XMC module. Built to optimize high-performance, wideband, communications, SIGINT, radar, beamforming and telemetry applications, this high-speed module includes:

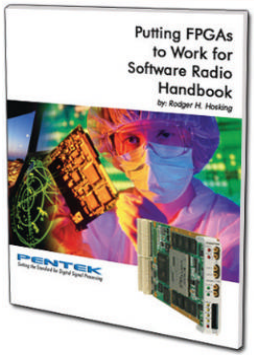
- Three 200 MHz 16-bit A/Ds
- Dual 800 MHz 16-bit D/As
- Intelligent chaining DMA engines
- High dynamic range
- PCI Express x8
- Dedicated memory for each I/O stream
- Secondary x8 XMC for gigabit serial I/O
- Advanced gating and triggering modes optimized for radar applications
- Multi-channel, multi-board synchronization
- GateFlow® FPGA Design Kit
- VPX, XMC, PCI, PCIe, VME/VXS, cPCI, conduction-cooled XMC

With extensive resources and new enhancements in DSP engines, block RAM, logic and clocking technology, the Virtex-6 family represents the industry's most advanced FPGAs.

Now Available in VPX!

COTS & Rugged Versions

Call 201-818-5900 or go to www.pentek.com/go/vmecobalt for your FREE *Putting FPGAs to Work in Software Radio Handbook*, technical data-sheets and price quotations.



Cobalt

PENTEK
Setting the Standard for Digital Signal Processing

Pentek, Inc., One Park Way, Upper Saddle River, NJ 07458 Phone: 201.818.5900 Fax: 201.818.5904 e-mail:info@pentek.com www.pentek.com

Implementing system management in OpenVPX

By Mark Overgaard

The high-energy campaign to complete the OpenVPX standard has been complemented by a parallel effort to define a generic system management layer for use in OpenVPX and other VPX systems. The resulting VITA 46.11 architecture and corresponding implementation considerations are presented.

System management in OpenVPX (VITA 65) refers to the combination of software, hardware, and firmware responsible for administrative tasks associated with maintaining an OpenVPX system. Such functions include sensor monitoring, hardware inventory management, and firmware installation/upgrades. Historically, this set of functions, which is present in some form within any substantial VME-based system, has been implemented as part of the application layer. There has not been a distinct, VITA-architecture-defined layer that handles it.

With increased emphasis on interoperability, reduced integration effort, and time-to-market in the OpenVPX initiative, this layer needs to be architected and specified so that system integrators can combine platform elements for their applications as quickly and efficiently as possible, while implementing the level of such management that is suitable for their applications.

These challenges are being addressed within the VITA Standards Organization (VSO) through development of VITA 46.11, the System Management on VPX standard, which is currently in the early draft state. OpenVPX allocates pins in backplane slots and on modules for system management connections and mandates VITA 46.11 compliance on those pins if they are used. VITA 46.11 can be applied to any compatible VPX-based architecture.

The following discussion introduces the VITA 46.11 architecture, including the levels of management and the tiers within those levels that it defines. Possible approaches to implementing VITA 46.11 at the module level are also presented.

Levels of management for OpenVPX in VITA 46.11

VITA 46.11 identifies three levels of management: module, chassis, and system. At the module level, an Intelligent Platform Management Controller (IPMC) handles the local module management responsibilities, representing that module to the Chassis Manager. Using an I^2C-based Intelligent Platform Management Bus (IPMB) link, the Chassis Manager monitors the collection of modules in a chassis and represents the entire chassis to a System Manager. The System Manager is a logical entity that is typically linked to the Chassis Manager via some higher-speed connection such as Ethernet; it monitors and supervises the operation of one or more chassis that combine to form an OpenVPX-based system.

VITA 46.11 defines the responsibilities and interfaces of the IPMC and Chassis Manager blocks, but defers definition of the System Manager to the application. Figure 1 shows this architecture with two example IPMC-equipped modules and the Chassis Manager monitoring them.

Here is a simple example of how the VITA 46.11 facilities could contribute to the operation of a real OpenVPX system. Each OpenVPX module in the system would have one or more temperature sensors, perhaps monitoring key temperature-sensitive sites on that module. For each of those sensors, the module developer or system integrator would define temperature thresholds of increasing severity for higher temperatures, based on the temperature operating profile for the device(s) at a given site on the module. Any temperature measurement that crosses one of those thresholds would trigger an event message to the Chassis Manager. By monitoring and integrating such event messages, the Chassis Manager could identify the need to change the speed of the fan(s) for all or a subset of the modules in the chassis, for instance, and monitor the effects of such changes on the temperatures in the chassis.

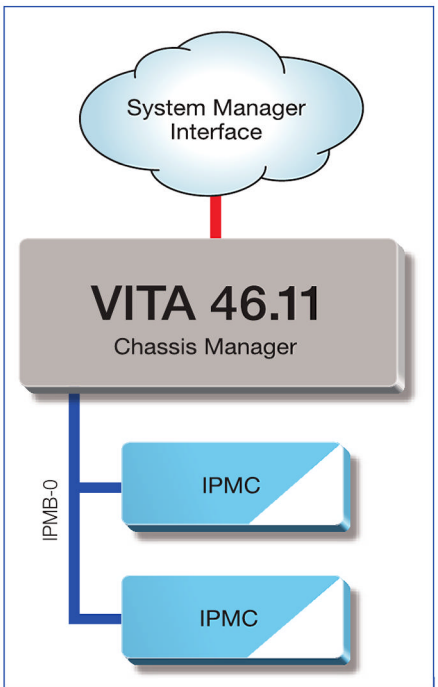


Figure 1 | Overall architecture for VITA 46.11 system management

Like AdvancedTCA, VITA 46.11 leverages the Intelligent Platform Management Interface (IPMI), which is widely used in the PC and server industry for hardware platform management facilities. For example, IPMI provides a rich infrastructure for defining and monitoring analog and digital sensors in an implementation-independent and consistent way. These facilities allow independently implemented elements of an OpenVPX system from different suppliers (including chassis vendors,

module vendors, and system integrators, for instance) to be monitored by a single Chassis Manager that has a unified view of the state of the chassis and all the analog and digital sensors that its elements include.

Functional tiers provide architectural flexibility

One challenge for VITA 46.11 system management is to provide the appropriate extent of these services to fit the needs of a given application. Different applications and different system integrators can have very different views regarding the partitioning of management functions between application layers and underlying infrastructure layers. VITA 46.11 addresses these challenges by defining functionality tiers for both the IPMC and the Chassis Manager: tentatively three tiers for each level. This approach allows chassis and module suppliers, as well as their customers, to choose the appropriate tier level for the management infrastructure layer, while still gaining the interoperability and cost effectiveness that result from standardization.

For instance, the tier 1 IPMC provides minimal management functionality, such as inventory data and a few simple sensors, but is designed to interoperate successfully on a module in a chassis with other modules that include more sophisticated (higher tier) IPMCs and a Chassis Manager. Furthermore, the tier 1 IPMC is being defined so that it can be implemented with no firmware at all – potentially just with logic in a flash-based FPGA, for instance.

A tier 1 IPMC could be a good choice for a simple module or for a module where avoiding firmware might simplify formal certification. Alternatively, modules with tier 1 IPMCs might be chosen by a system integrator who decides that the great majority of the system management layer should be implemented as part of the application, not by an underlying infrastructure.

Tier 1 IPMCs have disadvantages, however. For instance, their support for analog and digital sensors is severely restricted: As currently planned, tier 1 IPMCs will support only a handful of simple sensors, and the Chassis Manager will have to poll every one of those sensors to get updates on state changes. Higher-tier IPMCs will have full-function sensor capabilities (among other substantial benefits), enabling much more effective operation of the platform management layer.

Leveraging AdvancedTCA's hardware platform management layer

Another key decision in the VITA 46.11 initiative has been to leverage the widely used hardware platform management layer in PICMG's proven AdvancedTCA framework. This decision allows the OpenVPX community to take advantage of AdvancedTCA's years of specification development and field experience, while still adapting the AdvancedTCA management architecture to the different needs and constraints that characterize OpenVPX applications. For instance, OpenVPX modules, by architectural choice, are not hot-swappable in a live system, which allows considerable simplifications in the system management architecture.

Adapting the AdvancedTCA management architecture for the OpenVPX context yields a second benefit as well: minimizing the needed investments for OpenVPX vendors who also develop products in the AdvancedTCA form factor. Such vendors can potentially spread the benefits of management investments across both communities.

Implementation options for IPMC on an OpenVPX module

One way to implement a VITA 46.11 management controller, especially a higher-tier IPMC (that is, above tier 1), is with a generic microcontroller. The CPU in such a device implements the controller firmware and uses the available integrated peripherals (such as voltage and temperature monitors) to provide key management data.

If the microcontroller includes an Ethernet port, it can potentially connect with in-chassis Ethernet, such as an OpenVPX Control Plane, for substantial performance benefits in IPMC firmware upgrades and other operations.

Another way to implement a full-function VITA 46.11 IPMC is with an intelligent mixed signal FPGA, such as Actel's SmartFusion device. The microcontroller and analog subsystems of such an FPGA implement the IPMC firmware and analog sensors, possibly with significantly more capabilities in the analog area; the 10/100 Mbps Ethernet interface can implement a LAN connection. Figure 2 provides a high-level block diagram of an example VITA 46.11 full-function IPMC based on an intelligent mixed signal FPGA.

The FPGA fabric in such an IPMC adds customizability, both for management architecture additions – such as an IPMI-defined interface between the IPMC and a main processor on the module or extra I^2C ports – and for board-specific logic that might otherwise require a separate programmable logic device.

Implementing an example VITA 46.11 IPMC

Creating a compliant and interoperable VITA 46.11 IPMC is no small project, however. One challenge is that the standard itself is not yet complete. In addition, the specifications leveraged by VITA 46.11 (such as AdvancedTCA hardware platform management and IPMI) encompass more than 1,000 pages of management-focused specification content. Most OpenVPX module developers who want to support VITA 46.11 choose to use an existing management controller implementation, such as one from the Pigeon Point Board Management Reference (BMR) family. If the existing controller supports the requirements of an AdvancedTCA IPMC, the likelihood

"Creating a compliant and interoperable VITA 46.11 IPMC is no small project ... The specifications leveraged by VITA 46.11 (such as AdvancedTCA hardware platform management and IPMI) encompass more than 1,000 pages ... "

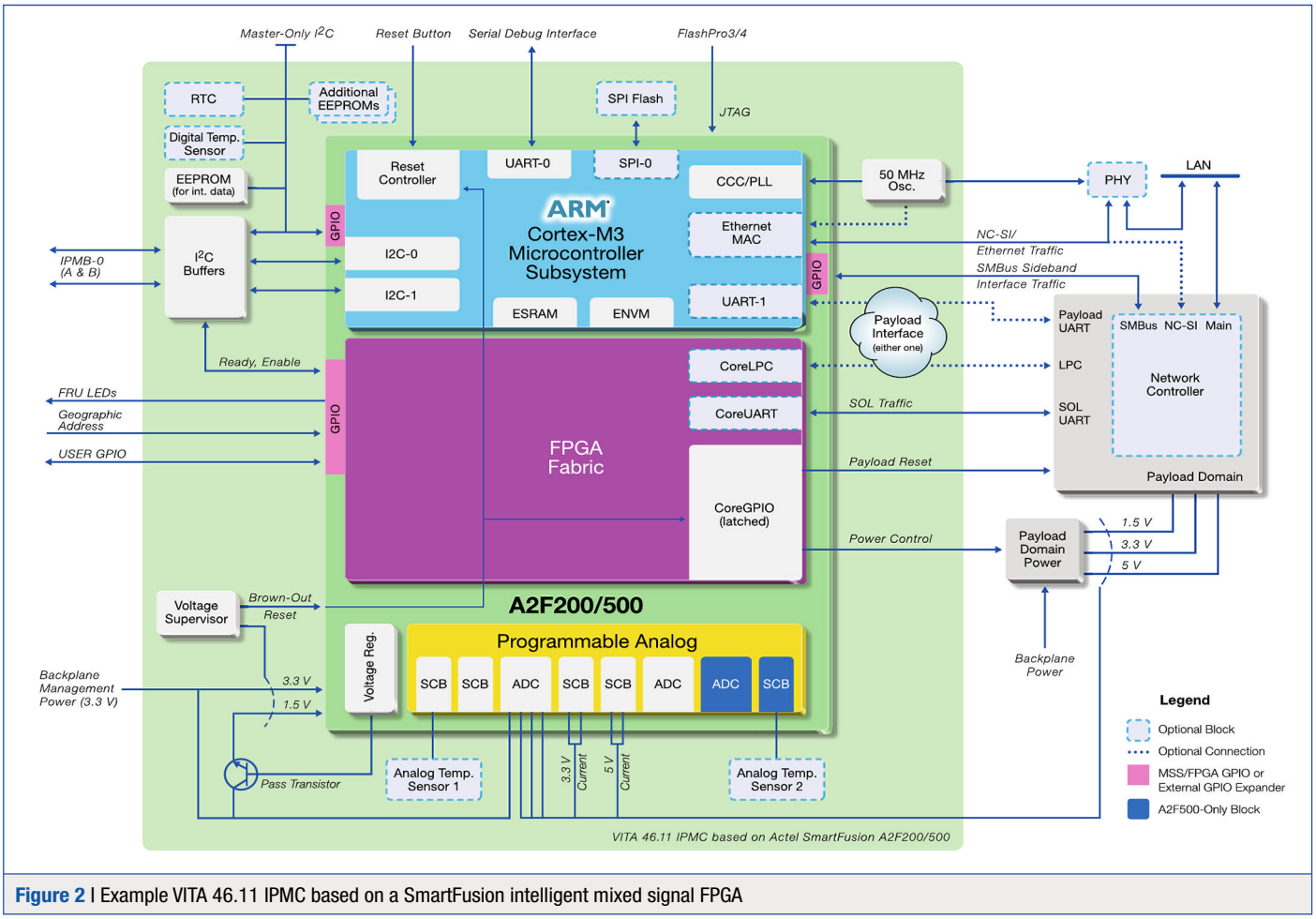


Figure 2 | Example VITA 46.11 IPMC based on a SmartFusion intelligent mixed signal FPGA

is high that it can support VITA 46.11 IPMC requirements with some level of firmware updates once the VITA 46.11 standard is finalized.

In addition to the normal management functions implemented by the microcontroller and analog and FPGA subsystems of the example intelligent mixed signal FPGA, this IPMC can implement advanced facilities based on a connection with a network controller that is part of the payload domain of the module (that is, the portion of the module not focused on system management). Through a connection to an Ethernet-based OpenVPX Control Plane, for instance, such an IPMC can support the following:

- Serial Over LAN (SOL): Access via a Control Plane LAN to serial ports that are either on the IPMC or on the major processor(s) implemented on the module: Such LAN-based serial port access can be a big benefit compared to attaching physical serial cables to every serial port of interest in a system.
- Upgrading IPMC firmware or IPMC-accessible programmable logic devices via LAN: For modules and systems that implement such upgrades, using a LAN connection can yield 15x or more speedups, compared to doing them via the IPMB links.

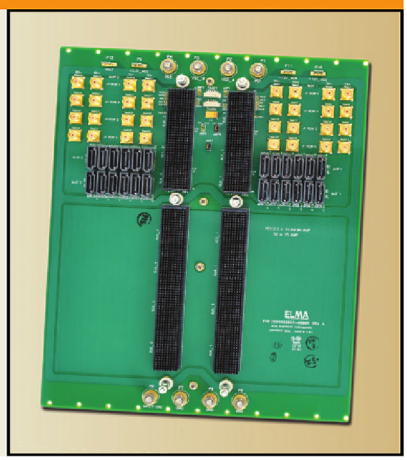
System management for OpenVPX is catching on

The benefits of a system management layer for OpenVPX are gaining increasingly wide recognition. Adopting a proven management solution for that subsystem of an OpenVPX module can save time and money and preserve scarce development resources for value-added functionality of the module. With careful implementation choices, VITA 46.11-based system management for OpenVPX can deliver a standardized implementation of the hardware platform management layer that saves development and integration time, plus offers improved interoperability. This layer also preserves the flexibility for system developers and integrators to decide how to partition the system management function between the standardized layer and their application subsystems. **CS**

Mark Overgaard *is founder and President of Pigeon Point Systems (PPS), now an Actel company. Mark is a leader in PICMG technical subcommittees, including those addressing hardware platform management of AdvancedTCA, AdvancedMC, and MicroTCA. He also actively participates in the VITA 46.11 working group. Prior to founding PPS in 1997, Mark was VP, Engineering at Lynx Real-Time Systems and TeleSoft. He can be contacted at mark@pigeonpoint.com.*

Pigeon Point Systems
831-438-1565
www.pigeonpoint.com

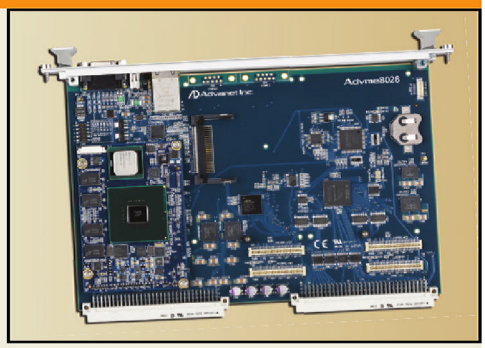
Test backplane for VPX boards



The 2-slot Test Backplane renders convenient VPX board testing. Designed to the latest VITA 46.0 VPX specifications, it accepts 6U cards and 3U is supported by use of a shelf divider. A wider slot pitch allows more space for attaching to probes. The J1 "A" channel is broken out to 16 SMA connectors for each slot (32 total), and J1 "B," "C," and "D" channels are each broken out to 4 SATA II cable headers for a total of 12 headers per slot (24 total). The test backplane allows simultaneous access of J1 fabric signals with a standard VPX RTM module for J2-J6 signals. And more than 2 VPX modules may be interconnected by using additional 2-slot test backplanes.

www.elma.com **ELMA BUSTRONIC**

Atom-based VME board



The EUROTECH Advme8028 Atom 6U VME board is ideally suited for rugged, mobile applications requiring exceptionally low power. Specifically, the board utilizes the Intel Atom processor Z500 series at 1.1, 1.33, or 1.6 GHz, in addition to onboard DDR2-533 SDRAM (512 MB or 1 GB). Accoutrements include front-panel GbE, a CompactFlash slot, 2x 32-bit/33MHz PMC slot, VGA and USB connectors, plus two optional COM ports. The board is available in a range of versions sporting multiple CPU clock frequencies and memory sizes. Operating temperatures range from 0 °C to +70 °C or -40 °C to +85 °C. Multiple operating systems, such as Win7, Windows XPe, VxWorks, and Linux, are supported.

www.eurotech-inc.com **EUROTECH**

VPX development system

The DEV-4200 VPX development system for 3U boards provides a capability of configuring up to an 8-slot system that supports any mix of 3U convection- or conduction-cooled boards, in addition to 3U transition modules on .8" or 1.0" centers. Backplane profiles and topologies are or will be available to test any board configuration, and power-supply choices support 12 H- and 5 VH-based systems. Optional "VEN" power systems are available for cost savings if desired. Cooling is delivered equally at each slot with up to 700 LFM across the boards with no dead spots. Chassis side panels are removable for side-board access and probing. Airflow through the board area affords adequate cooling for even high-power boards, and legacy wedge-lock or VITA 48.2-style card guides are available as an option.

www.dawnvme.com
DAWN VME PRODUCTS, INC.

VPX/CompactPCI 1/2 ATR chassis

The XPand4200 is a 1/2 ATR forced-air-cooled chassis featuring reduced height and length for conduction-cooled modules. It features forced-air-cooled sidewall heat exchangers and supports increased cooling through an external cold plate. Physical dimensions are 4.88" (W), 6.0" (H), and 13.5" (L) without the removable memory module attachment. Meanwhile, the chassis footprint is 4.88" (W) x 9.6" (L). Six slots support conduction-cooled 3U VPX, 3U CompactPCI, or power supply modules, and 3U VPX and CompactPCI backplanes are available. The chassis has configurable front-panel I/O connectors and an optional removable memory module attachment and consumes up to 200 W from a MIL-STD-704 28 VDC or 115 VAC source.

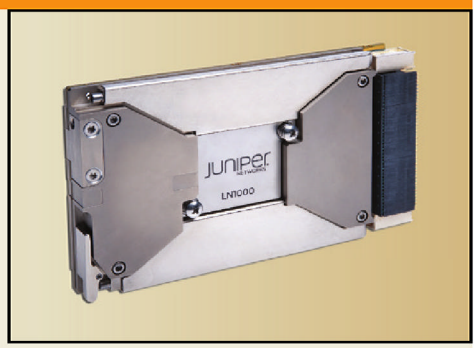
www.xes-inc.com
EXTREME ENGINEERING SOLUTIONS

Atom-based SBC

General Micro Systems, Inc.'s Atom XPC40x is a new rugged, Intel Atom-based, conduction-cooled SBC. Powered by a high-performance 1.6 GHz Intel Atom processor with 512 KB of L2 cache, the SBC is about the size of an iPhone and delivers high performance and ultra-low power consumption: 10 W max, 3 W typical. It is ultra-lightweight at less than three-tenths of a pound, and has an ultra-small footprint: 2.5" x 3.3" x 0.5". It is available in a conduction-cooled version (-40 °C to +85 °C) or a standard version (0 °C to +60 °C).

www.gms4sbc.com
GENERAL MICRO SYSTEMS, INC.

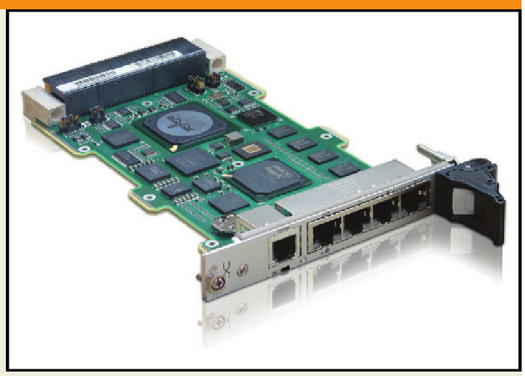
VPX mobile secure router



The LN1000 is a VPX mobile secure router used in the U.S. Army's Warfighter Information Network-Tactical (WIN-T) program, now available for use in industries such as defense, public safety, utilities/energy, smart grid, and others. The router, which measures 4" x 6" x .85" and weighs 1.5 lbs, provides transmission of data, video, and audio traffic for data aggregation, surveillance, or communications applications. It securely interconnects platforms such as remote monitoring or sensor stations, UAVs, and so forth to their operations centers or central command. It offers high performance with low power consumption of 35 W. LN1000 operates at -40 °C to +85 °C, and a conduction-cooled design eliminates the need for external power. Notably, the router can be deployed onto existing platforms.

www.juniper.net **JUNIPER NETWORKS, INC.**

Non-blocking OpenVPX GbE switch



The VX3910 is a high-end OpenVPX non-blocking GbE switch. It allows for flexible implementation of network-centric situational awareness and High Performance Embedded Computing (HPEC) applications in markets that include military, medical, and energy. It is also highly suitable for autonomous systems such as UAVs and AUVs. The switch is a fully managed L2 solution (L3 upgradable) with a total of 28 GbE ports. VX3910 has quad 1000BASE-T uplinks on the front panel, with 2 reroutable on the backplane, in addition to a 10/100/1000BASE-T management port. It also provides Enterprise Class switching functions and is available in standard air- and rugged conduction-cooled versions.

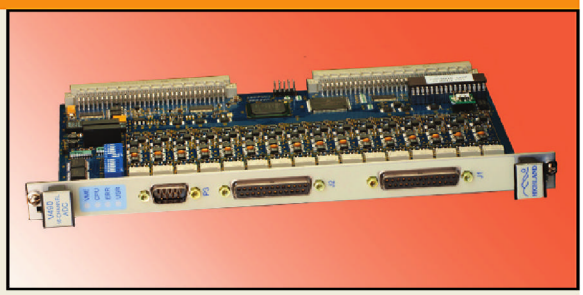
www.kontron.com **KONTRON**

SATA interface, conduction-cooled VME module

Phoenix International's VC1-250-SSD is a SATA interface, conduction-cooled VME module. The 6U, single-slot module houses one or two each 2.5" SATA Solid State Disks (SSDs) of up to 256 GB per device. The high-speed module will sustain R/W data rates of 220 MBps with an access time of 0.5 msec. It has low power consumption rates and integrated SLC NAND flash. VC1-250-SSD features an operating temperature range from -40 °C to 85 °C and functions at an altitude greater than 80,000 feet. It also withstands 50 *g*, 11 ms operational shock and 16 *g* rms, 10-2,000 Hz random vibration. VC1-250-SSD additionally meets military and IRIG 106-07 declassification standards and provides individual point-to-point device connectivity.

www.phenxint.com **PHOENIX INTERNATIONAL**

VME-based analog signal digitizer

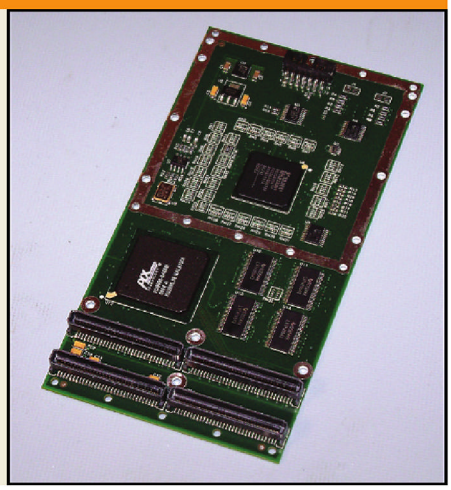


Highland Technology, Inc.'s V490 analog signal digitizer is one in a series of high-precision VME data acquisition modules. V490 features 16 channels of independently programmable differential analog input acquisition, and input is ±10.24 mV to ±40.96 V with 16-bit resolution. Common-mode rejection is 120dB typical, with a ±10 V common-mode range. The digitizer is overload protected to ±250 V on all ranges, with a sample rate up to 500 Ksps per channel. DSP filter modes range from 1 Hz to 200 KHz, and real-time and FIFO-buffered data are supported. V490 also includes handshake-free dual-port memory, in-crate calibration check via a dedicated test connector, and a DIPswitch-set VME address with no jumpers, headers, or trimpots. BIST is optionally provided.

www.highlandtechnology.com

HIGHLAND TECHNOLOGY, INC.

Rugged conduction-cooled PMC

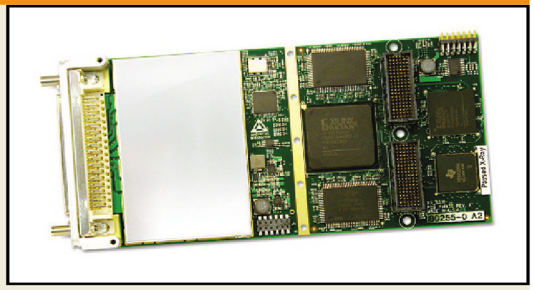


Sterling Electronic Design's PMC DIO 64 is a rugged conduction-cooled PMC with 64 TTL I/O channels. It is configurable for 33 or 66 MHz and 32- or 64-bit PCI. With all 64 I/O channels and more than 95 percent of PCI signals utilized, the PMC DIO 64 is an ideal test asset for PMC host sites. The PMC includes eight 8-bit banks, with each bank selectable as input/output and 1 bank configurable as ground. Also included are 8 KB SRAM and PCI and DIO tolerance for 3.3 V or 5 V operation. Additional notables include an extended temperature range, PCI I/O voltage detection, rear I/O, and a VxWorks driver.

www.sterlingelectronicdesign.com

STERLING ELECTRONIC DESIGN

PCI Express XMC I/O module

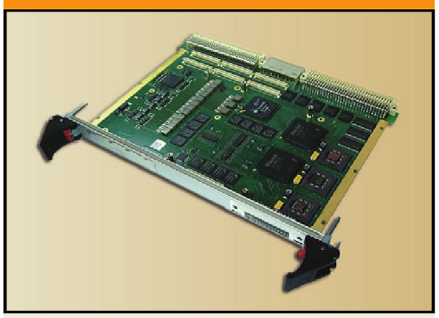


Innovative Integration's X3-SD16 is a PCI Express XMC I/O module featuring sixteen 144 KHz, 24-bit A/D channels; sixteen 192 KHz, 24-bit DAC channels; 15.8-bit ENOB; and 110 dB SFDR A/Ds. Also included are differential instrumentation inputs with programmable 2, 10, and 20 V ranges, in addition to a ±10 V output range. The module is DC coupled for instrumentation applications and performs via a Xilinx Spartan-3A DSP 1.8 M or 3.4 M FPGA and 4 MB SRAM. X3-SD16 has a programmable or external sample clock, along with synchronized system sampling using a common reference clock, triggers, and sync.

www.innovative-dsp.com

INNOVATIVE INTEGRATION

Triple-redundant 6U VME64 SBC

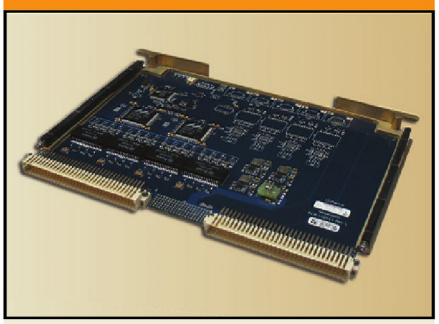


The A602 is a triple-redundant 6U VME64 SBC, developed according to DO-254 especially for plane (up to DAL-A) or train (up to SIL 4) applications. The SBC features a lock-step architecture and has 3x redundant PowerPC 750 at up to 900 MHz. Also included is 3x redundant 512 MB DDR RAM; 2x redundant 256 MB flash, ECC; and 1x 1 MB FRAM, ECC. It also has redundant local PSUs and a 1x standard PMC slot in addition to a 1x PMC slot for AFDX PMC (rear I/O only). Also proffered are 1x RS-232 via front and rear I/O and PMC I/O. Operating temperature is -40 °C to +50 °C with qualified components.

www.menmicro.com

MEN MICRO ELEKTRONIK GMBH

VME Ethernet switch



The COM-8000 is a 6U conduction-cooled VME Ethernet switch. It is a non-blocking, Layer 2 unmanaged Ethernet switch with auto-MDI/MDIX, autonegotiation, and speed autosensing. It features 16x 10/100 Fast Ethernet (VMEbus P2 connector) and optional 2x 10/100/1000 GbE front-panel RJ-45 or locking Molex connectors. It provides extended-temperature operation of -40 °C to +85 °C and is designed to meet MIL-STD-810G environmentals for thermal, shock, and vibration for the Jet-Helo profile. It also has RFC 2460 IP protocol support for IPv4 and IPv6 addressing.

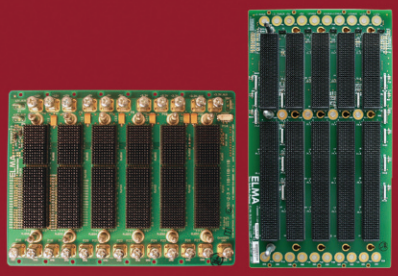
www.parvus.com

PARVUS CORPORATION

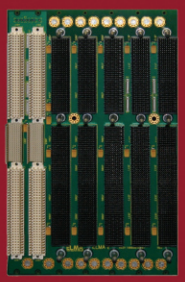
VPX: Admire the Collection

Elma Bustronic
The VPX Collection
c. 2009
Gold, silver, PCB on canvas

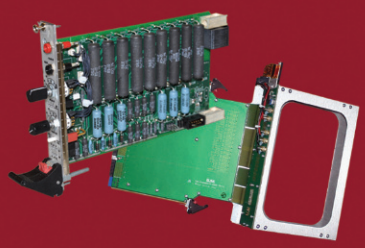
The VPX collection depicts the variety and expertise found only at Bustronic. These masterpieces exemplify Bustronic's precision design and innovative creativity in the VPX milieu. The designer uses the full range of VPX products – from 3U, 6U, 6U Hybrid backplanes as well as unique VPX accessories such as load boards, test modules, extender boards, air baffles, and RTMs. This artist has really mastered the VPX realm. To see more, visit bustronic.com



OpenVPX Backplanes



OpenVPX
Hybrid Backplanes



VPX Load Board &
Extender Board

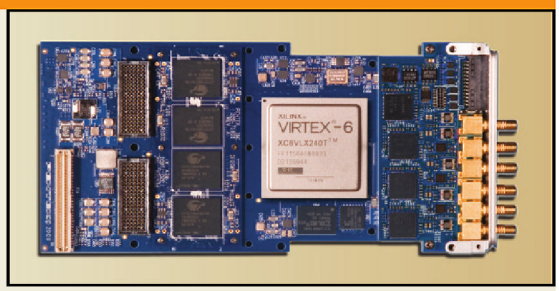
VPX SerDes Test Modules,
RTMs & Air Baffles

bustronic
Elma Bustronic

Tel: 510.490.7388 www.bustronic.com info@bustronic.com

ELMA
Your Solution Partner

Virtex-6 data acquisition XMC module



Pentek, Inc.'s Model 71660 is a Virtex-6 FPGA Cobalt quad-channel data acquisition and processing XMC (VITA 42.0) module. It has four 200 MSps, 16-bit data acquisition channels that deliver nearly 90 dB of spurious free dynamic range, enabling users to detect small signals of interest. It is designed as a radar and software radio interface and supports Xilinx Virtex-6 LXT and SXT FPGAs. The module has LVDS connections to the Virtex-6 FPGA for custom I/O and provides up to 2 GB of DDR3 SDRAM or 32 MB of QDRII+ SRAM plus sample clock synchronization to an external system reference. Model 71660 Cobalt also proffers LVPECL clock/sync bus for multimodule synchronization, along with PCI Express (Gen 1 and 2) interfacing up to x8 wide. It is additionally offered in a conduction-cooled version.

www.pentek.com **PENTEK, INC.**

3U DC/DC converter for airborne apps

The "Power Supply: 3U DC-DC Converter" by HDL Research Lab, Inc. is designed for U.S. military airborne applications. It uses "proven low-risk" circuits that can easily be modified for other applications. Because it is designed for airborne applications, the rail-cooled power module features true N+1 capability. The converter provides high power (200 W) and features multi-output (4) [5 V, 3.3 V, ±12 V]. The 3U PICMG-compliant converter is startup sequenced and includes embedded DSP/BITE and a temperature sensor, in addition to serial interfacing and output voltage adjustable remote sense circuits. Operating temp is -54 °C to + 85 °C, and the 6.57" (L) x 3.937" (W) x 0.97" (H), <1.2 lb converter meets MIL-STD-461 and MIL-STD-704.

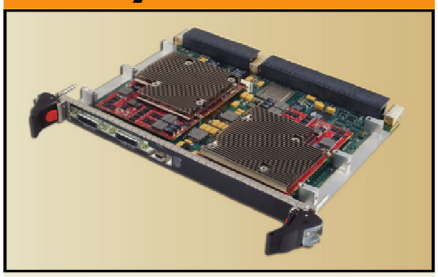
www.HDL.CC **HDL RESEARCH LAB, INC.**

Dual-Virtex-4 PMC/XMC digitizer

The AD484 is a quad-channel dual-Virtex-4 PMC/XMC digitizer. It has four A/D channels and a 10 MHz to 125 MHz sampling range, plus 14-bit data resolution. Also provided are custom clock and trigger inputs via external connectors, as is onboard clock generation in steps of 0.5 MHz. The digitizer performs high-speed DSP processing via two Xilinx Virtex-4 FPGAs (XC4VSX55, XC4VLX40, XC4VLX60, XC4VLX80, XC4VLX100, and XC4VLX160; or XC4VFX20 or XC4VFX60 with an embedded PowerPC RISC processor). Off-the-shelf IP cores are proffered, and FPGA firmware design services are available upon request. Meanwhile, AD484 has 2x 32M x 16 DDR2 SDRAM (128 MB), 4x 2M x 32 QDR2 SRAM devices (32 MB), and a 128 Mb flash device. 4x 2.5 Gbps optical transceivers for SFPDP, Fibre Channel, GbE, and InfiniBand applications are additionally included.

www.4dsp.com **4DSP**

OpenVPX ISR subsystem



Mercury Computer Systems, Inc.'s OpenVPX ISR subsystem executes Processing, Exploitation, and Dissemination (PED) within the ISR realm. It is a "high-end" image- and signal-processing subsystem for heightening warfighters' situational awareness and providing parallel data stream computing capabilities. The subsystem includes Mercury's Ensemble 6000 Series GSC6200 OpenVPX-based GPU processing module. This GPU incorporation renders SWaP advantages, and the MxM GPU form factor expedites ATI or NVIDIA GPU integration or upgrades. Additionally, the OpenVPX ISR subsystem uses open standards-based APIs, simplifying the process of mixing and matching with other technologies.

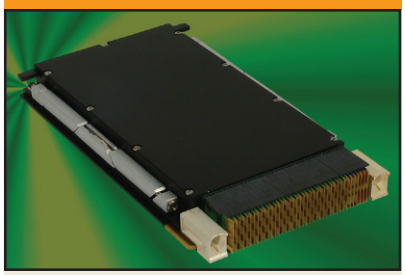
www.mc.com
MERCURY COMPUTER SYSTEMS, INC.

6U VME/VPX 3/4 ATR chassis

The High Performance 3/4 ATR Chassis from CM Computer is a sealed, contaminant-free enclosure incorporating six air-to-air heat exchangers (SixHex series). The MIL-STD-810F and MIL-STD-461E chassis has 7 universal slots for VME, VPX, and CompactPCI conduction-cooled or air-cooled 6U boards, along with thermal characteristics up to 150 W per slot. It is a single, stand-alone, low-weight solution at 13 kg and includes an integrated Temperature Supervisory Unit (TSU). An 800 W PSU accepts all military standard input voltages, and easily customizable front panel and flexible top and bottom I/O wiring is provided.

www.cmcomputer.com
CM COMPUTER

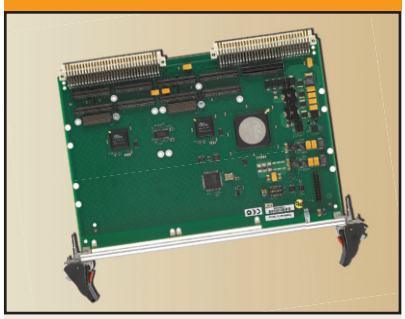
OpenVPX/ VPX-REDI SBC



Concurrent Technologies, Inc.'s TR 501/36x is an OpenVPX-compliant 3U VPX-REDI single board computer based on a 1.86 GHz Intel Core 2 Duo SL9400 processor. It is designed to VPX-REDI Type 1 Two Level Maintenance (an 0.85" pitch unit – VITA 48.2). The SBC also comprises the Intel GS45 graphics memory controller hub and Intel ICH9M-E I/O controller hub, in addition to up to 8 GB DDR3-1066 soldered SDRAM. An XMC site supports an x4 PCI Express link and Pn6 XMC rear I/O. The SBC also has OpenVPX slot profiles from 8 x1 PCIe ports through to a 1 x8 PCIe port.

www.cct.co.uk
CONCURRENT TECHNOLOGIES, INC.

6U VME expansion module



The XMCspan expansion module from Emerson Network Power Embedded Computing provides a flexible, scalable expansion framework compatible with the newest Emerson VMEbus single board computers. The module is available in a single-slot 6U VMEbus format. It includes a PLX PEX8533 PCI Express 6-port switch and Tundra Tsi384 PCI Express to PCI-X interface bridges. Support for two single-wide or one double-wide XMC or PMC is also proffered, as are stacking capability and front-panel I/O.

www.emersonnetworkpower.com/embeddedcomputing
EMERSON NETWORK POWER EMBEDDED COMPUTING

VME/VXS microwave tuner

The SI-9155 is an open-architecture, high-performance 6U VME/VXS microwave tuner used for multi-function SIGINT, COMINT, or FISINT surveillance and monitoring operations. The single-slot microwave tuner supports a frequency range of 250 MHz to 24.5 GHz and provides low phase noise, high dynamic range, and fast tuning. It supports multiple bandwidths – 1 GHz, 500 MHz, and 100 MHz – and is capable of independent or coherent operation. Other highlights include 50 W of power maximum, a weight of 4 lbs, high signal fidelity, and conduction- or air-convection-cooled versions.

www.drs-ss.com **DRS SIGNAL SOLUTIONS, INC.**

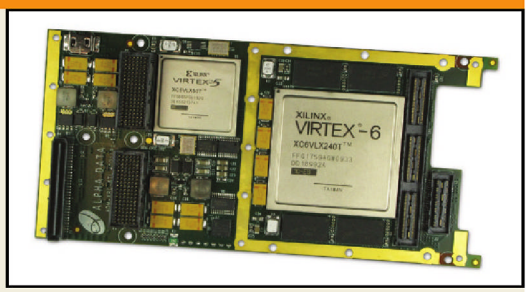
Rugged power supply for VME, VPX, and CompactPCI

Aitech Defense Systems' P230 is a rugged 3U, conduction-cooled, high-efficiency power supply measuring 3.93" high x 6.60" deep x 1.14" wide (100 mm x 168 mm x 29 mm) and weighing less than 1.65 lbs (750 g). It operates over a continuous input voltage range of 18 to 36 VDC and provides isolated voltage levels of +3.3 V, +5 V, +12 V, and -12 V at up to 10 A, 20 A, 9 A, and 1 A, respectively, or a combined total power capacity output of up to 150 W, with an efficiency of better than 85 percent. P230 is ideal for use in rugged VME-, CompactPCI-, and VPX-based subsystems. Rugged models are rated for -40 °C to +71 °C, and the power supply complies with MIL-STD-461, MIL-STD-1275, MIL-STD-704, and MIL-STD-810E.

www.rugged.com

AITECH DEFENSE SYSTEMS

Virtex-6-based reconfigurable design platform

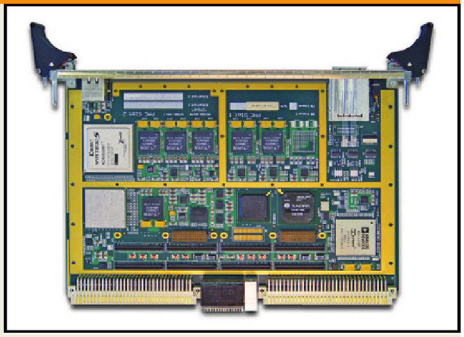


Alpha Data's ADM-XRC-6TL is a Xilinx Virtex-6 FPGA-based reconfigurable design platform on a VITA 42.3 (PCI Express) XMC card form factor. It features a flexible board architecture that supports the larger Xilinx Virtex-6 devices, including the LX240T, LX365T, LX550T, SX315T, and SX475T. The platform is supplied with 1 or 2 GB of DDR3 SDRAM supporting transfer rates of up to 3.2 GBps and arranged in 4 independent banks for maximum flexibility. It also has up to 146 LVCMOS/LVDS I/O and 8 high-speed serial links to the front connectors. Meanwhile, 12 high-speed serial links, an x4 PCI Express I/F and 24 General Purpose IO (GPIO) are provided as standard to the rear connectors. Application-specific I/O options are available via a comprehensive range of front-panel adapter products, including LVDS, high-performance analog, Cameralink, and optical and copper RocketIO.

www.alpha-data.com

ALPHA DATA

FPGA/PowerPC VXS multiprocessor



Nallatech's VXS-620 is an FPGA and PowerPC VXS multiprocessor designed to meet the signal-processing needs of modern signals intelligence, Software-Defined Radio, and radar applications. It features an onboard Xilinx Virtex-5 FPGA for the implementation of high-performance DSP applications. The FPGA processing is supplemented by a PowerPC for stand-alone operation, communications management, and user applications. Notably, the VXS-620 maximizes sensor I/O density with two PMC/XMC sites. These sites can support additional FPGAs, multiple channels of analog or digital I/O, and additional network interfaces. The VXS-620 is also supported by comprehensive Development Kits available for Linux and Wind River VxWorks. These include a Software Development Kit (SDK) with all necessary software drivers and libraries required to run the operating systems on the PowerPC. They also include an FPGA Development Kit (FDK).

www.nallatech.com

NALLATECH

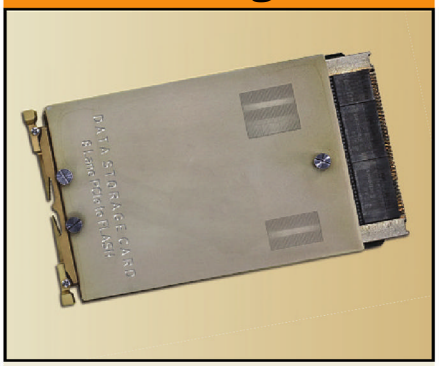
OpenVPX/ VPX-REDI/VPX SBC

General Dynamics' PX3030 is a 3U VPX-REDI/OpenVPX/VPX SBC. Conduction-cooled and military-rugged, it is designed for harsh-environment combat vehicle applications and supports 2-Level Maintenance applications. It features a Montevina platform Core 2 Duo CPU and the GS45/ICH9Me Express chipset. It offers scalable performance from low-power 1.2 GHz to high-performance 2.26 GHz processors, along with up to 8 GB DDR3 RAM. An extensive I/O complement – 2x GbE, 2x eSATA, 6x USB, 4x serial, 8x GPIO, RGB, and audio – is also provided, as is flexible expansion via a VITA 42.3 XMC site.

www.gdcanada.com

GENERAL DYNAMICS

3U VPX/OpenVPX RAID storage card

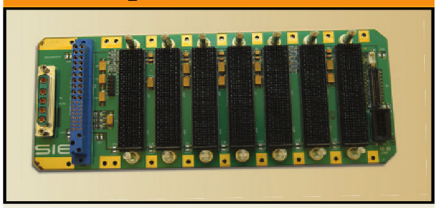


The 3U VPX cc SSD Raid is a rugged 3U VPX/OpenVPX conduction-cooled, high-speed SSD RAID storage card. It offers PCIe x8 lanes, along with burst write at 1.2 GBps and burst read at 1.3 GBps. Capacity is 4 TB or 8 TB, and power for 4 TB is <12.5 W typical, 17.5 W maximum. The RAID storage card withstands environmentals of 1,500 *g* shock, 16 *g* vibration, and -40 °C to +85 °C temp. MTBF is 1,500,000 hours, with 10-year data retention and 64-bit LBA support.

www.pcisystems.com

PCI-SYSTEMS INC.

3U VPX vetronics backplane



The I/O PLUS 3U VPX Full Mesh Backplane's "I/O PLUS" enables fit within a wide span of VPX applications and provides two front-edge, high-speed VPX connectors along with two interchangeable I/O daughtercards. The backplane is highly suited for the needs of aerospace and vetronics applications. Moreover, it utilizes more than 200 W for each VPX slot. J1 and J2 specifics include: J1 – 10 high-speed differential channels and fat pipes; and J2 – 20 single-ended signals and 16 fat pipes.

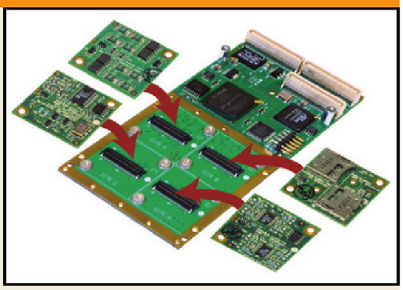
www.sie-cs.com
SIE COMPUTING SOLUTIONS, INC.

3/4 ATR forced-air chassis

Hybricon's 3/4 ATR Chassis takes customers from development to deployment with the same rugged 3/4 ATR 3U forced-air chassis. The chassis also offers support of 3U conduction-cooled payload for VPX/OpenVPX or CompactPCI bus architectures. Card cage choices include 6-slot 1.0" pitch or 10-slot 0.8" pitch plus 2-slot 0.8" pitch (power supplies). A Low Cost Development Version supports a standard backplane, cabled I/O, industrial-grade fans, and an external commercial-grade power supply; meanwhile, the Deployment Version supports a custom backplane, cableless I/O panel, MIL-grade fans, and 1 or 2 MIL-grade 200 W, 28 VDC-input power supplies.

www.hybricon.com
HYBRICON CORPORATION

Conduction-cooled PMC carrier



Technobox, Inc.'s 5918 is a conduction-cooled, PMC form factor carrier for the Technobox Micro Mezzanine System (MMS). The industrial temperature, RoHS-compliant FPGA-based carrier can accommodate up to four MMS Electrical Conversion Modules (ECMs) for assorted I/O interfaces. It is powered by an Altera EP3C16F484I7N with 16 K logic elements and easily configurable using Quartus and SoPC Builder. The carrier has 8 Kb memories, 18 x 18 multipliers, and PLL support, in addition to a 32-bit 66 MHz PCI interface at 3.3 V or a 5 V PCI interface (PLX PCI9056 PCI to 32-bit local bus).

www.technobox.com **TECHNOBOX, INC.**

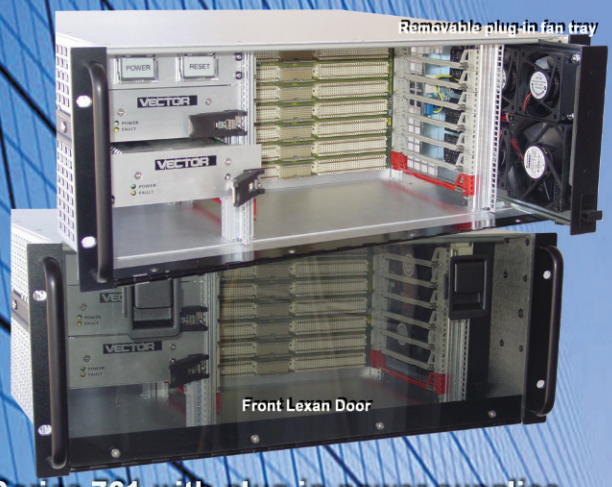
ITAR REGISTERED
NO. M26764

VECTOR

ELECTRONICS & TECHNOLOGY, INC.
A FINE TECHNOLOGY GROUP

VME and cPCI® SYSTEM PACKAGING

Full 6Ux80mm
Rear Transition Slots

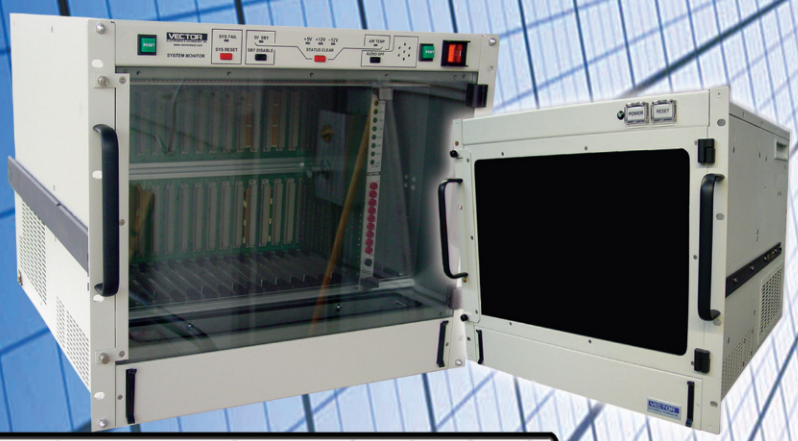


Series 761 with plug-in power supplies

Series 815 Tower
with 4 slot cPCI® or
5 slot VME 64x Backplane

Model 2272 2U Chassis
with single or dual
plug-in power supply

With front power switch



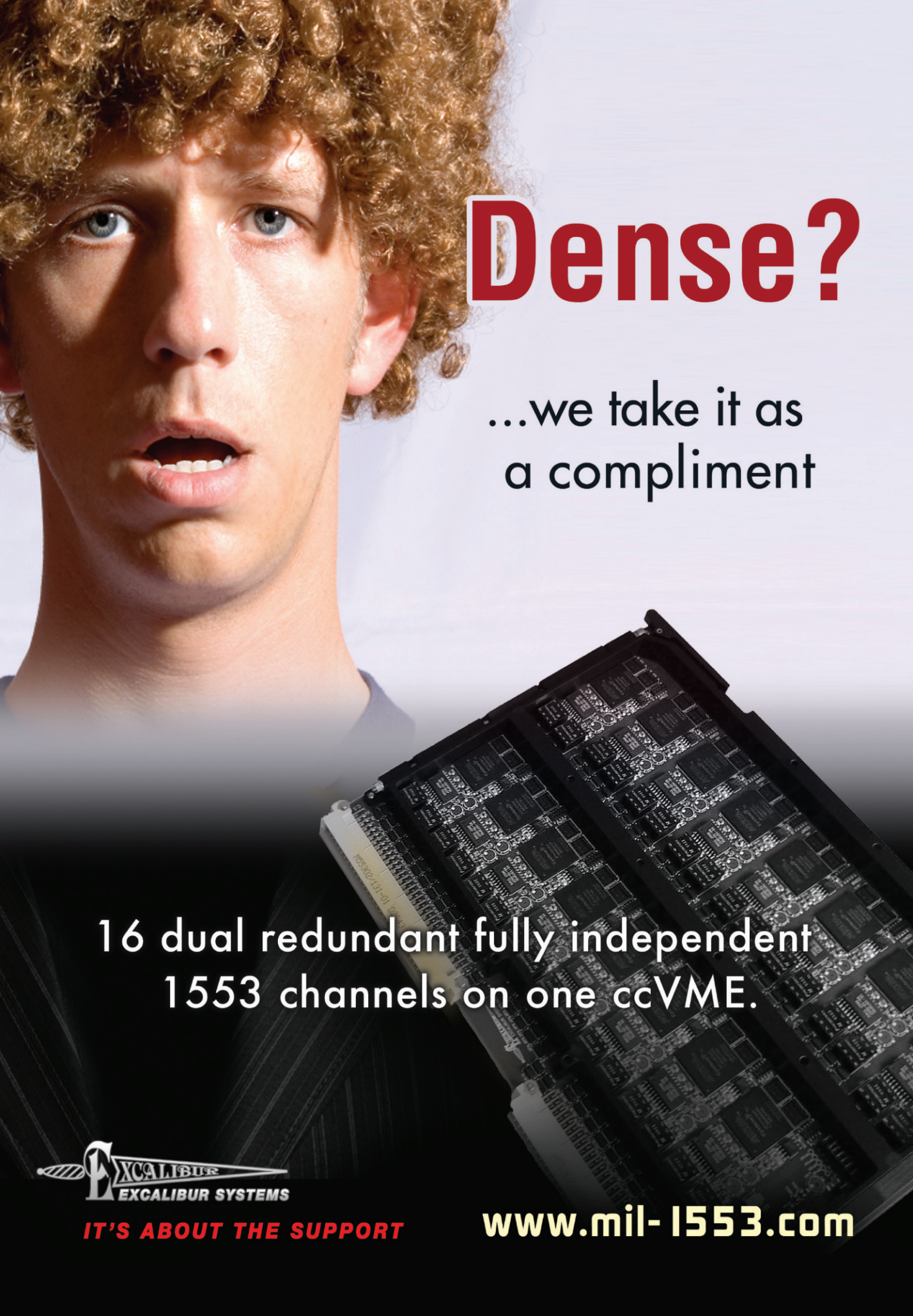
VME /VME64X/
cPCI® Rackmount
Enclosures

Made in U.S.A

(800)423-5659

www.vectorelect.com

Short Lead Times **Custom Configurations** **Factory Support**


Dense?
...we take it as a compliment
16 dual redundant fully independent 1553 channels on one ccVME.
EXCALIBUR SYSTEMS
IT'S ABOUT THE SUPPORT
www.mil-1553.com

kontron

» How can I reduce my time-to-deployment? «

Kontron provides a unique blend of COTS and specialized systems, custom-tailored to meet the most demanding requirements of our customers.

» Kontron's expertise goes beyond compliance, providing systems that fully address the complex needs of customers with application specific hardware and software elements.

» With a long track-record of engineering excellence, Kontron is able to mitigate risk and reduce time-to-deployment.

» Experienced program management allows Kontron engineers to work seamlessly within complex programs and multi-partner development scenarios.

CRITICAL QUESTIONS ... ANSWERED

FS-5985

1/2 ATR Conduction Cooled Rugged Chassis - cPCI, VPX

» Suitable for MIL-STD-5400 Class I environments

» 5 Conduction Cooled 3U slots to IEEE 1101.2, 0.8" pitch

Cobalt™

Reduced SWAP - High Performance Embedded Computer

» Small Form Factor (6.5" x 9.725" 2.95")

» Intel® Core™2 Duo or Atom™ processor options

» Custom I/O option

VX3020

High Performance 3U VPX Rugged PC

» Implements VITA 46.0, 46.4, 46.7, 46.9

» 1.5 GHz Dual Core® Core™2 Duo processor

CONTACT US

Call, Email or Visit today.

Call: 1-888-294-4558
Email: info@us.kontron.com
Visit: kontron.com/military

intel Embedded Alliance Premier

If it's embedded, it's Kontron.