Engineers’ Guide to VME, VPX & VXS

VME Gathers No Moss

VPX: Heir Apparent to VME

Wide-Area Airborne Surveillance Applications for VPX

Annual Industry Guide
Solutions for VME, VPX & VXS system engineers

EECatalog www.eecatalog.com/vme

Featured Products

Elma’s VME RAIDStor brings conduction cooled network attached storage (NAS) with RAID capability into a single 6U slot.

The IPN250 from GE Intelligent Platforms is the world’s first single slot, 6U OpenVPX GPGPU COTS multiprocessor for rugged Mil/Aero applications.

SIE Computing Solutions VPX backplanes are designed to the latest VITA 46, 48, 65 and OPEN VPX standards.
From proposal to deployment in record time.

Our new COTS Rugged Systems are ready whenever the development clock is ticking.

More often than not, you need to be able to pull your next rugged system off the shelf. Our new line of integrated COTS Rugged Systems provides the quick delivery time most developers need for their UAV, ground vehicles or manned aircraft systems. These fully integrated computing platforms can be built around Freescale or Intel processors with a variety of 3U slot configurations to provide enough options to handle most applications. The CRS series takes the risk out of rugged system development with a fully tested computing platform that integrates with our own wide range of COTS products as well as those of third-party providers.

Finally, a rugged system that puts “off-the-shelf” back into COTS.

For more information, visit: defense.ge-ip.com/systems

For more information about QRcodes, visit www.ge-ip.com/qrcodes
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
Welcome to the 2011 Engineers’ Guide to VME, VPX & VXS

“VME is healthy – quite healthy.” That’s the word from VDC Research senior analyst Eric Gulliksen, who continues, “Based on projected market shares of various flavors of VME, VPX is the one to watch.” But how to keep track of all those flavors? Jerry Gipper, director of marketing for VITA explains, “VPX is the over-arching term for technology defining a 3U/6U form factor computer system that uses a variety of widely accepted switch fabric interconnects.”

Here’s a quick look at the three specifications that form the VPX family:

- VPX breaks from traditional VME to merge the latest in connector and packaging technology with the latest in bus and serial fabric technology. VPX defines 3U and 6U format boards and systems with a choice of several high-speed serial fabrics.
- OpenVPX manages and constrains module and backplane designs, including defining pin-outs, and sets interoperability points within VPX while maintaining full compliance.
- VPX REDI(Ruggedized Enhanced Design Implementation) describes how to implement layout techniques to better support cooling methodologies on specific board form factors and addresses the use of ESD covers on both sides of the board.

As for VXS? VMEbus Switched Serial, or VXS, combines parallel VMEbus with enhancements to support switched serial fabrics including PCI Express, RapidIO, StarFabric and InfiniBand over a new high-speed P0 connector. Backward compatibility is maintained with existing backplanes without a conflicting P0 scheme.

In this issue, we show you the trends and predictions for VME and its relatives, an overview of the VXS ecosystem, and in-depth look at one VPX design process. And our virtual roundtable takes input from several industry experts to help you anticipate what’s coming next.

Going forward, we’ll be watching the new small form factor (SFF) developments currently in VITA workgroups. PCI-Systems’ VITA-73 can be used as a mezzanine in VPX and OpenVPX systems and in the new VPX! – a VPX version for instrumentation. The PCI-Systems product is already shipping, based on specifications and pin-outs by current customers. Themis’s VITA-74 design was based on “a need to develop some technology that would attract a following from the existing COTS community, as well as being ‘transformational’ in the marketplace,” and has also already been selected by several manufacturers, according to Bill Ripley, director of business development for Themis Mission & Payload Systems. In contrast to these customer-centric approaches, the VITA-75 approach from Curtiss-Wright started from scratch to create essentially a smaller form-factor, VITA-46-compatibleboard that accommodates higher power. We’ll be eager to see this ecosystem evolve.

We hope you enjoy the 2011 Engineers’ Guide to VME, VPX & VXS. As always, we’d love to hear your feedback, thoughts and comments. Send them to info@extensionmedia.com.

Cheryl Berglund Coupé
Editor
EECatalog.com

P.S. To subscribe to our series of Resource Catalogs for developers and other professionals, visit www.eecatalog.com

Engineers’ Guide to VME, VPX & VXS 2011

www.eecatalog.com/vme
VP/Associate Publisher
Clair Bright
cbright@extensionmedia.com
(415) 255-0390 ext. 15

Editorial
Editorial Director
John Blyler
jeblyler@extensionmedia.com
(503) 614-1082

Editor
Cheryl Coupé
ccoupe@extensionmedia.com

Creative/Production

Graphic Designers
Keith Kelly
Nicky Jacobson

Production Coordinator
Spyre Heithecker

Online Director
Jeff Cheney

Advertising/Reprint Sales

VP/Associate Publisher
Embedded Electronics Media Group
Clair Bright
cbright@extensionmedia.com
(415) 255-0390 ext. 15

Sales Manager
Marny Carnerie
mcarnerie@extensionmedia.com
(510) 919-4788

Marketing/Circulation
Jenna Johnson

to Subscribe
www.eecatalog.com/subscribe

Extension Media
Corporate Office

President and Publisher
Vince Ridley
v Ridley@extensionmedia.com

Vice President, Sales
Embedded Electronics Media Group
Clair Bright
cbright@extensionmedia.com

Vice President, Marketing and Product Development
Karen Murray
kmurray@extensionmedia.com

Vice President, Business Development
Melissa Sterling
msterling@extensionmedia.com

Special Thanks to Our Sponsors

ELMA
ten Power
X-ES

The Engineers’ Guide to VME, VPX & VXS 2011 is published by Extension Media LLC. Extension Media makes no warranty for the use of its products and assumes no responsibility for any errors which may appear in this Catalog nor does it make a commitment to update the information contained herein. The Engineers’ Guide to VME, VPX & VXS is Copyright ©2011 Extension Media LLC. No information in this Catalog may be reproduced without expressed written permission from Extension Media @ 1786 18th Street, San Francisco, CA 94110-2943

All registered trademarks and product names included in this Catalog are held by their respective companies. Every attempt was made to include all trademarks and registered trademarks where indicated by the companies.
TSY-305X Series

- ATR Style or Footpad Mounting
- Standard 3U VPX Backplane
- Natural Air Convection Cooled
- I/O Transition Board
- 28 VDC Power Supply Unit
- 150 Watts
- 5 x 1.0” Pitch Slots

Applications
- Data Recording
- Display Processing
- Digital Mapping
- SIGINT / Electronic Warfare
- Mission Computing
- Network Attached Storage
- Payload Controllers
- Sensor Management
- Image Processing
- Fire Control
- Command and Control
- Data Link Processing
- Network Processing

Available 3U VPX Cards
- TSBCI7-300X
  3U VPX Single Board Computer with Intel CoreTM-i7 CPU
- TIOC-300X
  3U VPX XMC/PMC Carrier Module
- TSC-300X
  3U VPX 8-Port SATA/SAS RAID Module with PMC/XMC Site
- TSM-300X
  3U VPX SATA/SAS Mass Storage Drive Module
- TGA 300X
  3U VPX Graphics Processor with AMD E4690 GPU

Benefits
- LOWER PRICE
  • Design-to-cost goals
  • Better value
- SHORT LEAD TIME
  • Components ready for prototype builds
  • 60 Days for pre-configured rugged systems
- STATE-OF-THE-ART
  • Efficient thermal management
  • Outstanding shock and vibration
- SMALL PROGRAMS ARE OK
  • Use preconfigured systems for IRAD, prototypes, and small programs

©2010 Themis Computer. All rights reserved. Themis Computer, Themis and the Themis logo are trademarks or registered trademarks of Themis Computer. All other trademarks are the property of their respective owners.

www.themis.com
(510) 252-0870
## Contents

**VME Gathers No Moss**  
By Cheryl Coupé ................................................................. 6

**Elma Electronic Systems Division**  
By GE Intelligent Platforms .................................................. 12

**Cost-Effective COTS Rugged Systems Shorten Development Time**  
By GE Intelligent Platforms .................................................. 13

**XCalibur4331 Intel® Core™ i7 Processor-Based Conduction- or Air-Cooled 6U VME SBC**  
By Extreme Engineering Solutions, Inc. ................................. 15

**Extreme Engineering Solutions (X-ES)**  
By Extreme Engineering Solutions, Inc. ................................. 16

**VPX: Heir Apparent to VME**  
By Cheryl Coupé .................................................................. 18

**Wide-Area Airborne Surveillance (WAAS) application is ideal for VPX**  
By Cheryl Coupé .................................................................. 20

**Online & Offline → VME & VPX Resources** .......................... 22

## Products and Services

### Chips and Cores

**Protocol Analysis Tools ICs**

- **LeCroy Corporation**
  - LeCroy's PCI Express® Protocol Analysis and Test Tools ........ 25

### Hardware

**Backplanes**

- **Elma Bustronic**
  - What is OpenVPX? .......................................................... 26

- **SIE Computing Solutions**
  - VPX Backplanes ............................................................. 27

**Card Rack Hardware and Accessories**

- **Elma Electronic**
  - VPX/VXS Handles & Panels .............................................. 28

**Connectors**

- **Tyco Electronics**
  - Fortis Zd Connector ......................................................... 29
  - Mezalok Connector ............................................................ 29

**CPU or Single Board Computers**

- **CES - Creative Electronic Systems SA**
  - RIOV-2478 ....................................................................... 30

- **Dynatem, Inc**
  - VPQ Intel Quad-Core based VPX SBC with 24-port 10Gb ENET switch ................................................................. 31

- **Emerson Network Power**
  - Extended Temp VMEbus SBCs ........................................... 32
  - Industry-leading VME Support and Longevity .................... 32
  - iVME7210 Dual-Core VMEbus SBC .................................. 33
  - MVME2500 VME64 Processor Board ................................. 33

- **Kontron**
  - Single Board Computers .................................................. 34

**Enclosures**

- **Schroff**
  - Varistar - Versatile Cabinet Platform ................................. 35

- **SIE Computing Solutions**
  - 716 Conduction Cooled ATR Enclosures .......................... 36
  - 720 Liquid Cooled ATR Enclosures ................................. 37

**Mass Storage**

- **Elma Electronic**
  - VME RAIDStor ................................................................ 38

**Video**

- **GE Intelligent Platforms**
  - IPN250 ......................................................................... 39
  - MAGIC1 ......................................................................... 39
Elma’s solid foundation of core capabilities is based on decades of hardware design expertise, extensive thermal management techniques, and in-depth knowledge of all the building blocks required for an application ready platform. We leverage that experience along with the long term relationships built with best in class partners to deliver truly interoperable COTS based platforms.

Call us to find out how to navigate through the new OpenVPX standard to design the right high performance platform you need.

Call us or visit our website for more details

www.elmasystems.com  www.elma.com
215.956.1200  510.656.3400
Despite more than three decades since its introduction, VME continues to roll, picking up speed and market share with a variety of new and under-development standards. To understand these developments, EE Catalog went to the experts. We talked to Jerry Gipper, director of marketing for VITA, the international standards organization that promotes and manages VME and related open standards; Justin Moll, the VXS Marketing Alliance chair for VITA and director of marketing for Elma Bustronic; James B. Doyle, congressional affairs liaison and director of Military, Aerospace & Government Embedded Computing for Emerson Network Power; and Bill Ripley, director of business development for Themis, Mission & Payload Systems.

**EE Catalog:** Two key transitions seem to be the evolution to small form factors and optical interconnections. How are these changes impacting embedded developers?

**Jerry Gipper, VITA:** A key role of VITA’s Standards Organization (VSO) is to look to the technology needs of the future. To that end, the VSO has initiatives that are evaluating small form factor and optical interconnection options for critical embedded systems.

The evolution to smaller form factors has been underway for many years. As computing technology increases in functional density, smaller boards can do the work that required much larger boards in the past. We saw this in the late 1980s with VME when single board computers incorporated the features that initially required multiple VME slots. Today, entire systems that took large VME racks can now be built on a small form factor board or system. Systems-on-chip or module technology continues to improve in functional density and the resulting boards can also be smaller. The small form factor initiatives are developing standards now as well as stepping back and looking closer at the big picture of various options suitable to our markets.

The move to optical interconnections for critical embedded systems is in the formative stage. VITA 66 is defining blind mate fiber optic interconnects for use with VPX backplanes and plug-in modules. There are still many details to be worked out by the industry before there will be widespread deployment of systems with optical interconnections at the backplane.

Developers using small form factor boards and systems are already doing so. The VSO work will eventually give them better options for use in critical embedded systems. Developers planning to use optical interconnections at the backplane have to remain patient as the technology and specifications are developed.

**Justin Moll, Elma Bustronic:** The VME family is not necessarily making any transitions to small form factors and optical interconnects – yet. The jury is still out on how they will impact VITA standards and member products. It is clear that some applications will benefit from small form factors (SFF) due to size, weight, and power (SWaP). The VITA-based concepts are all new and will address certain niche requirements initially. Which of these solutions will succeed in the market remains to be seen. However, many applications will continue to be able to use the established architectures like 3U VPX. SFF will likely gain the most traction in areas where 3U VPX is not a strong fit or where COM Express or PC/104 do not meet performance requirements. Optical interconnections over the backplane (mainly pass-through) have been around for a long time, but the increased density and modular nature of the backplane interface will make this an increasingly interesting solution. There are new concepts like VITA 66 which are being explored today. These are two areas to watch.

Perhaps the biggest impact that the transition to VPX offers is the interconnect speed; VPX backplanes today offer speeds of up to 6.125 Gbps per lane, higher than anything else currently offered in the embedded market space.

**James B. Doyle, Emerson Network Power:** Smaller user equipment and reduced power consumption are driving the standardization of more small form factor embedded boards, such as Nano-ITX and smaller Computer-on-Module (COM) formats. User expectations, especially younger users, have changed. These customers expect the total mobility of applications. This is the iPhone generation. They expect embedded equipment to keep pace with improved user interfaces and smaller, better industrial design.”

“This is the iPhone and netbook generation. They expect embedded equipment to keep pace with improved user interfaces and smaller, better industrial design.”
Dynamic Engineering is the choice when critical systems and development are needed. Engineers, Developers, Systems Integrators, Scientists and Innovators from all industries rely on companies that provide quick, accurate, and easily modifiable hardware for their embedded transportation solutions. Our response times are rapid, with knowledgeable Engineers providing guidance, designing, and implementing to deliver ASAP. We provide solutions from developmental test beds to fully integrated system solutions. Minimize size, weight, and power with efficient, user-friendly designs. We have highlighted a few of the sectors and areas of abilities, functionality and resources at Dynamic Engineering. We always strive to think outside the technology box.

### Flight Controls & Embedded Aerospace Systems
Requiring the latest technology, expanded capabilities, complex state machines, and above all else, speed. Dynamic Engineering’s hardware provides solutions for the avionics environments: airborne, ground and test support. Created with our most complex business sectors in mind, limitless designs provide: Ruggedization, Encoding (Manchester/Miller/etc.), Interfaces (serial/parallel, analog/digital (differential (LVDS/485/422)/single ended)). Memory coupled with FPGA’s enable the most complex state-machines. A complete solution demands integrated bus interfaces, DMA support and high speed driver based software. Conduction cooled options available, providing peace of mind for equipment that must perform in rugged and heat intense environments. With proven adaptability and performance, our hardware delivers. [www.dyneng.com/embeddedsolutions.html#avionics](http://www.dyneng.com/embeddedsolutions.html#avionics)

### Radar and Tracking Equipment
Dynamic Engineering hardware can interact with your system, and simulate a target system such as an airplane, missile or other vehicle. Many times having a computer based interface is more convenient than having the actual target application. Test, debugging and diagnostics can be computer driven more easily than the “real” system in many cases. Dynamic Engineering’s high speed hardware can interact with your equipment and respond back to simulate or process and forward data. [www.dyneng.com/embeddedsolutions.html#radar](http://www.dyneng.com/embeddedsolutions.html#radar)

### Alternative Energy
Industries are researching and developing within the alternative energy sector at a fast pace. For each industry the requirements, timeline and tools vary, yet the need for leading edge technology, quick solutions and low cost development tools remains consistent. In a sector with constantly moving targets, getting embedded solutions rapidly is key. Dynamic Engineering is a leader in cutting edge technology; our Engineers are readily available as a resource for your development, concept visualization, and designs. Quick turn requirements with high reliability, time tested solutions is our standard. [www.dyneng.com/embeddedsolutions.html#energy](http://www.dyneng.com/embeddedsolutions.html#energy)

### Advanced Communication Network — SpaceWire
Designed for communication and used in many sectors and business arenas, this protocol can be configured using routers to create a hierarchical point-to-point system with high speed parallel paths. SpaceWire is for high-speed links and networks to ease the interconnection of sensors, mass-memories, processing units, and telemetry subsystems (commonly used onboard spacecraft). Enable communication with NASA and ESA equipment utilizing the SpaceWire specification. Solutions are available for any form factor. Hardware is highly adaptable and easily programmed to implement your functions. Channelized SpaceWire nodes each with PLL support, up to 200 MHz, independent DMA. Complete packages including test equipment for link testing plus cables and drivers. [www.dyneng.com/embeddedsolutions.html#space](http://www.dyneng.com/embeddedsolutions.html#space)

### Planes, Trains, Automobiles...
Transportation systems share a requirement for highly reliable network controls, which, from a specification point of view, tend to be significantly more developed than in other industries. MIL-STD-1553, ARINC 429, SpaceWire and CAN interfaces are examples of “high reliability” networks. MIL-STD-1553 is still the interface of choice for defense-critical applications while ARINC 429 is more common for commercial avionics applications (aircraft instrumentation and control). Many devices utilize “1553 & ‘429 including: navigation devices, instrumentation, sensors and more. SpaceWire on the other hand is typically used for spaceborne and ground support equipment (NASA/ESA). CAN (Controller Area Network) is becoming the interface of choice in automotive and trucking applications. Dynamic Engineering’s embedded solutions are used in commercial aircraft, military transportation, tanks, avionics, freight carriers, automobiles, the Space Shuttle, and related support equipment. [www.dyneng.com/embeddedsolutions.html#interface](http://www.dyneng.com/embeddedsolutions.html#interface)

### Satellites, Observatories, and Weather Forecasting
Employ systems utilizing innovative science and technology, relying on embedded hardware to deliver the functionality, accuracy and longevity necessary in parallel with an easy point-and-shoot interface. Observatories have been making use of Dynamic Engineering’s popular and extensively proven hardware in their telemetry systems. IndustryPacks™ in particular are widely used by observatories. Our designs are feature rich and easily modified to include programmable counter timers, complex state machines, memory, symmetrical/asymmetrical TX/RX, Manchester and other encoding. Affordable, customizable, easy-to-use and ideal for quick deploy solutions. [www.dyneng.com/embeddedsolutions.html#telemetry](http://www.dyneng.com/embeddedsolutions.html#telemetry)
and netbook generation. They expect embedded equipment to keep pace with improved user interfaces and smaller, better industrial design. Concern over climate change and the cost of energy are making power consumption a major factor in the choice of form factor as well as processor. The Intel Atom processor has brought a widely adopted processing environment to smaller embedded boards.

Bill Ripley, Themis: Last year, Themis made a conscious decision to enter the small form factor (SFF) market. We did an extensive study of what was in the marketplace, both from commercial-off-the-shelf (COTS) market perspective, and the custom marketplace as well. We saw a need to develop some technology that would attract a following from the existing COTS community, as well as being “transformational” in the marketplace. We developed a framework around an architecture that took features from a variety of VITA and PICMG standards and rolled them into a new SFF proposed standard, VITA-74. We believe that this standard offers the optimal trade-off between space, weight, power and price. The standard has already been selected as a way forward by several manufacturers, so it appears that this ecosystem will continue to quickly evolve.

EE Catalog: Which optical interconnect technologies seem to have the most traction, and what issues should embedded developers consider in investigating these options?

Jerry Gipper, VITA: VITA members recognize the need for higher density, higher performing interconnect technologies to meet the speeds of 10 gigabit serial channels and higher that will be used in next-generation critical embedded systems. As the transfer rates continue to increase, it is clear that optical technology offers many advantages. Since optical interconnects work best as a point-to-point connection, future systems are going to need much higher density supporting hundreds of connections in a single board or line-replaceable unit (LRU).

Achieving the projected level of combined performance and connector density is no easy challenge. The lead time to develop technologies and supporting specifications is very long. To that end, VITA launched a study group, VITA Architectures for Optical (VAO) Study Group, to research potential technologies and propose an architecture that could become part of future solutions. At this stage, it is very premature to determine which optical interconnect technologies have established themselves.

The mission of the VITA Architectures for Optical Study Group is to research and determine the feasibility of developing a standard architecture for optical interconnects suitable for deployment in critical embedded systems. The study group will focus on high-density options for backplanes and connections between line-replaceable units, mezzanines and daughter cards. The study group will explore various cooling and maintenance strategies specified by VPX REDI.

Jerry Gipper, VITA: The Ruggedized Enhanced Design Implementation (REDI) laid out in VPX REDI describes how to implement layout techniques to better support cooling methodologies on specific board form factors such as VPX. Currently, it covers enhanced forced-air cooling (using baffles and plenums), advanced conduction cooling (using larger and more efficient thermal interfaces), and liquid cooling. It also addresses the use of ESD covers on both sides of the board, a necessary feature for military two-level maintenance strategies. Both board and system developers need to be familiar with the various cooling and maintenance strategies specified by VPX REDI.

Developers interested in backplane optical interconnect technology and specifications are encouraged to join or monitor the study group and participate in future forums on this technology.

Justin Moll, Elma Bustronic: A key question for optical interconnects across the backplane is whether they will use polymer waveguides. These have shown heavy signal losses in some early testing, but improvements continue to emerge. However, it is again still way too early to understand the impact of optical interconnects on VITA standards and products. One that is making some inroads is being considered under the VITA 66 Working Group. It is still early in its development, and very expensive in terms of implementation right now.

“Being the “best” technology doesn’t guarantee success; being “good enough” technically and having a broad ecosystem of support is more likely to win in the long term.”

Doyle, Emerson Network Power: Emerson is an active participant in the VITA standards organization, which is currently looking at optical interconnect technologies for embedded systems. History shows us that the technology which succeeds will balance technical and commercial issues. Being the “best” technology doesn’t guarantee success; being “good enough” technically and having a broad ecosystem of support is more likely to win in the long term.

EE Catalog: What do developers need to know about the recently ratified VPX REDI standard?

Jerry Gipper, VITA: The Ruggedized Enhanced Design Implementation (REDI) laid out in VPX REDI describes how to implement layout techniques to better support cooling methodologies on specific board form factors such as VPX. Currently, it covers enhanced forced-air cooling (using baffles and plenums), advanced conduction cooling (using larger and more efficient thermal interfaces), and liquid cooling. It also addresses the use of ESD covers on both sides of the board, a necessary feature for military two-level maintenance strategies. Both board and system developers need to be familiar with the various cooling and maintenance strategies specified by VPX REDI.
VME and cPCI®
SYSTEM PACKAGING

Full 6Ux80mm Rear Transition Slots
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
10 Engineers’ Guide to VME, VPX & VXS 2011

**Justin Moll, Elma Bustronic:** One thing they should know is that the front panel width of VPX REDI deviates from the traditional IEEE 1101.10 mechanical standard. VPX front panels are set up at .85-inch, 1.0-inch, or 1.2-inch widths, and offer module covers to support Level 2 maintenance and rear extensions to protect the connector.

**Bill Ripley, Themis:** In my mind, the VPX REDI initiative enhances the 3U and 6U VPX standards by significantly improving the cooling and handling performance of the modules. It was a bit of a paradigm shift for me (personally) to recommend a card that has a built-in weight and space penalty for the REDI covers, but after seeing the improved thermal performance and tidy packaging with not much real penalty, I have become a solid believer in the initiatives. Our standard 3U VPX systems are built around VPX REDI, and our 3U VPX modules come standard with VPX REDI covers. For those that have not jumped on the VPX REDI bandwagon, we still offer the cards “the old fashioned way”.

**EE Catalog:** What are the opportunities for VME/VPX in traditional markets (e.g., mil/aero) as well as new markets such as smart grid, healthcare and others?

**Jerry Gipper, VITA:** Growth is going to come from all sectors that use embedded computing technology. Developers will continue to find new and innovative ways to use computing technology to enhance their existing products. The best growth sectors for VITA’s technologies will remain the mil/aero markets, industrial and communications. Each will have different growth curves and timing as external influences impact their market opportunities. Short-term growth is stifled for the time being as the global economy struggles to get back on track.

**Justin Moll, Elma Bustronic:** VME was ubiquitous in many markets prior to the PC becoming more widely adopted. Any requirements for image or signal processing that also require a more rugged solution could benefit from the new 3U and 6U VPX solutions. These applications could include factory automation, security, remote surveillance and outdoor inspection. Markets that might have such applications may include energy, research/education, healthcare, outdoor/mobile computing, and homeland security markets.

**Bill Ripley, Themis:** From my perspective, I see VPX as a solid contender for both upgrade programs and new programs alike. We have seen solid support in programs needing scalable computing and I/O, where the system is being built to meet the current requirements, but has provisions for expansion and upgrade in the future. A solid roadmap is the key. Customers want to know that their COTS suppliers have a firm grasp on what they are doing now, as well as where they are headed with the “design-after-next.” We have worked very hard taking cost out of our VPX designs, which translates to lower average sales price. This allows us to be more competitive in the commercial marketplace, particularly on programs where high performance or high compute density is key. We see a lot of potential for lower performance VPX applications migrating to VITA-74, since we have preserved the VPX electrical connectivity, but taken a lot of cost out of the modules by changing to a different connector and simplifying the cooling solutions.

**Cheryl Berglund Coupé is Editor of EECatalog.com. Her articles have appeared in EE Times, Electronic Business, Microsoft Embedded Review and Windows Developer’s Journal and she has developed presentations for the Embedded Systems Conference and ICSPAT. She has held a variety of production, technical marketing and writing positions within technology companies and agencies in the Northwest.**
I really need a one-to-one meeting to discuss business challenges.

Brian Hillen, Manufacturing Director
(Would benefit from attending this marcus evans’ summit)
Elma Electronic Systems Division

Elma Electronic Inc. supplies a first class offering of VITA standards based products for standard and rugged COTS electronics packaging and sub-systems integration: chassis, boards, backplanes, mechanical components, and cabinets. Elma’s Embedded Computing products and services make the company a leading supplier of VME, VXS and VPX based integrated embedded boards and sub-systems. System architecture, hardware, and software design services enable delivery of complete solutions. For rugged requirements, we take COTS products, such as single board computers, then enhance and qualify them to meet certain MIL Standards.

Our extensive chassis product offering is unparalleled in the industry: rugged COTS 19” rackmount chassis, ATR boxes, and non-rugged and lab appropriate chassis and enclosures. The 12R2 series is an extrusion-based modular design, which provides a cost-effective way to customize designs. Elma’s rugged chassis platforms meet the EMI/RFI requirements for MIL-STD-461D, and shock and vibration according to MIL-STD-167, MIL-STD-810F and MIL-STD-901D. Our popular Type 32 towers and E-Frame chassis are perfect for new board-level and system development in the lab.

Elma is capable of quickly turning projects from initial system architecture through to specification, design, manufacturing and test. We also work with you to manage the entire project including EOL issues, spares inventory and lifecycle management. Elma is truly qualified to offer the widest range of best of class products and by teaming with our partners, we provide complete standard or custom integrated embedded sub-system platforms to meet your requirements.

19” and Portable VME, VXS and VPX Chassis
- Modular designs with rugged, high quality construction
- 19” rack-mount, desktop or portable tower versions designed to meet a wide range of applications
- 1U – 15U heights are available with depths from 15” to 24”
- Vertical or horizontal card cages accommodate 3U and 6U board heights
- All systems come fully assembled, wired and tested prior to shipment
- Horizontal and vertical card mounting configurations
- Backplanes are available in 3U and 6U sizes using single star, dual star, mesh, or custom fabric implementations

Rugged COTS Chassis
- High quality, cost-efficient rugged package
- Tested for shock, vibration, and structural integrity per MIL-STD-810F, MIL-STD-167 and MIL-STD-901D
- Integrates standard off-the-shelf parts to reduce lead time
- Uses MIL-grade components
- Powerful, efficient cooling system
- Lighter weight 12R1 line of chassis for applications where weight is a major factor.

ATR (Air Transport Rack)
- Conduction or convection cooled
- Available in sizes 1/2, 3/4, 1, or 1 1/2 ATR per ARINC 404A
- Built with a modular design to ensure easy customization with reduced cost and lead time
- Short and Long chassis depths available
- Advanced airflow distribution, removable front panels, rear panels, and top and bottom covers
- Designed to meet MIL-STDs 5400, 810E, 461E, 704A, 275A

VME, VXS, and VPX Embedded Computing Boards
- COTS and rugged Single Board Computers and FPGA Processing Engines
- Ethernet switches
- Storage – Direct Attached, Network Attached, RAID, Arrays
- FPGA based and mezzanine based I/O solutions
- Application ready development bricks (AppliPaks) and platforms (SystemPaks)
- Deployable embedded subsystems per customer configuration requirements

CONTACT INFORMATION
Elma Electronic
44350 Grimmer Blvd
Fremont, CA 94538
USA
510-656-3400 Telephone
sales@elma.com
www.elma.com
Cost-Effective COTS Rugged Systems Shorten Development Time

Custom rugged subsystems in the defense and aerospace market are focused on specific application requirements and are often built from the ground up. Because they are custom designed to the customer’s requirements, custom rugged systems incur high design and engineering costs and long delivery times.

Qualification testing, documentation, and I/O pin out for custom systems are driven by the customer, who pays for those necessary elements with longer lead times and higher costs. With a COTS packaged solution, this all comes standard and it saves the customer both time and money.

A large percentage of system applications often do not require custom subsystems. A standard COTS packaged system equipped with a flexible array of I/O and storage configurations can offer system designers a quicker start on their application at a lower cost.

GE Intelligent Platforms’ new COTS Rugged Systems offer a packaged solution that reduces non-recoverable engineering (NRE) expenses and still have the flexibility to meet various I/O requirements all with a shortened lead time. Now more than ever, project engineers need an inexpensive solution designed for various control and data processing applications for UAVs, manned and unmanned ground vehicles, and launch vehicles.

GE’s new CRS series of COTS packaged computer systems can be deployed in the field as soon as the customer’s application is ready, or as a starting point from which GE can make modifications to meet the specific needs of the application. The arduous task of integrating off-the-shelf boards has already been done for the customer, whose time to project completion is greatly shortened. To further help reduce program risk, the customer has one point of contact for purchase and a single part number, not a collection of parts numbers.

The CRS series successfully integrates GE’s wide selection of COTS products into subsystems that are tested and designed for rugged systems deployment in harsh environments such as extreme temperatures and high humidity.

GE Intelligent Platforms’ Mil/Aero Group is fully compliant with AS9100 processes and brings years of experience designing rugged systems to defense and aerospace projects. Our world-class program management competencies are tailored to help mitigate program risk.

GE maintains a parts, materials and processes plan, and performs design, manufacturing, and testing in accordance with industry standards including IPC (Class 3) and ANSI/VITA and applicable military standards. For systems containing MIL-STD-1553 or ARINC interfaces, we include the Integrated Avionics Library with a full suite of C functions to help reduce software development cycle time.

To help jump start mil/aero projects, GE offers Engineering Development Units, or starter kits, preconfigured for development purposes. Based on the required system controller architecture, GE can provide the appropriate development system for customers’ specific needs.

In addition, GE offers its proven Product Lifecycle Management (PLM) program of innovative Long-Term Support services to reduce the overall cost of ownership and provide industry-leading safeguards against component obsolescence. We are committed to supporting customer programs throughout their lifecycles.

To learn more about GE Intelligent Platforms COTS Rugged Systems go to: www.defense.ge-ip.com/systems

CONTACT INFORMATION

GE Intelligent Platforms
2500 Austin Drive
Charlottesville, VA 22911
USA
1-800-433-2682 Toll Free
1-888-433-2682 Telephone
www.ge-ip.com

www.eecatalog.com/vme
Nürnberg, Germany
March 1 – 3, 2011

embedded world 2011
Exhibition & Conference
... it’s a smarter world

Register now for your free entrance ticket:
www.embedded-world.de

Programmed for success.
With more than 730 exhibitors, embedded world is the most important pioneering exhibition for embedded technologies in the world. Make a note of the date now!

Exhibition organizer
NürnbergMesse GmbH
Tel. +49 (0) 911 86 06-49 12
visitorservice@nuerbergmesse.de

Conference organizer
WEKA FACHMEDIEN GmbH
Tel. +49 (0) 81 21 95-13 49
info@embedded-world.eu

Media cooperation
elektroniknet.de
DESIGN & ELEKTROHNIK
Elektronik
automotive
embedded

Markt & Technik
NÜRNBERG MESSE
The XCalibur4331 is a high-performance 6U VME single board computer that is ideal for ruggedized systems requiring high bandwidth processing and low power consumption. With the Intel® Core™ i7 processor, the XCalibur4331 delivers enhanced performance and efficiency for today’s network information processing, military, industrial, and medical imaging embedded computing applications.

The XCalibur4331 provides two separate channels of up to 16 GB (8 GB each) DDR3-1066 ECC SDRAM, two PrPMC/ XMC slots, 32 MB of boot flash and up to 128 GB of user flash. The XCalibur4331 also supports four Gigabit Ethernet ports, one DVI graphics port, I²C, PMC I/O, XMC I/O, and RS-232/RS-422/RS-485 serial ports out the back panel.

The XCalibur4331 is a powerful, feature-rich solution for the next generation of compute intensive embedded applications. Operating system support for Wind River VxWorks, QNX Neutrino, Linux, and Windows is available.

The XIt1010 is a Rear Transition Module (RTM) that supports XCalibur4331 rear I/O. The XIt1010 routes three 10/100/1000BASE-T Ethernet ports to RJ-45 connectors, two RS-232 ports to a micro DB9 connector, four USB ports to type A connectors (three via on-board USB hub), and a SATA port to an eSATA connector. An additional SATA port and two Mini-HDMI (DVI) ports are made available by mounting an optional XIt1071 PIM onto the XIt1070.

**Features & Benefits**

- Intel Core i7-610E, i7-620LE, and i7-620UE processors
- Dual-core with hyper-threading technology
- VME 6U module
- Conduction or air cooling
- Two channels of up to 16 GB (8 GB each) DDR3-1066 ECC SDRAM
- 32 MB of boot flash
- Up to 128 GB of user flash
- Four Gigabit Ethernet ports
- Two x8 Gen2 at 2.5 GT/s PCI Express lanes from CPU to XMC sites
- One DVI graphics port
- Three USB 2.0 ports (one front-panel and two backplane)
- Two RS-232/RS-422/RS-485 serial ports
- Two PrPMC/XMC interfaces
- VxWorks, Integrity, and Linux BSPs and Windows drivers
Extreme Engineering Solutions (X-ES)

X-ES has an extensive portfolio of rugged VPX products. Designed for conduction- and air-cooled applications, X-ES provides single board computers (SBCs), switch cards, carriers, storage modules, power modules, backplanes, RTMs, and platforms and enclosures.

**Single Board Computers**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Form Factor</th>
<th>Rugged Level</th>
<th>Processor</th>
<th>Max CPU Speed</th>
<th>Memory</th>
<th>NVRAM</th>
<th>Mezzanines</th>
<th>Ethernet</th>
<th>USB</th>
</tr>
</thead>
<tbody>
<tr>
<td>XCalibur1541</td>
<td>6U VPX</td>
<td>1,3,5</td>
<td>MPC8572E</td>
<td>1.5 GHz</td>
<td>4 GB DDR2-800</td>
<td>256 MB NOR</td>
<td>2 PMC/XMC</td>
<td>4 1000BASE-T</td>
<td>3 USB 2.0</td>
</tr>
<tr>
<td>XCalibur4341</td>
<td>6U VPX</td>
<td>1,3,5</td>
<td>Core i7</td>
<td>2.53 GHz</td>
<td>16 GB DDR3-1066</td>
<td>32 MB NOR</td>
<td>2 PMC/XMC</td>
<td>2 1000BASE-BX or 1000BASE-T</td>
<td>3 USB 2.0</td>
</tr>
<tr>
<td>XPedite5170</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>MPC8640D</td>
<td>1.25 GHz</td>
<td>4 GB DDR2-533</td>
<td>256 MB NOR</td>
<td>1 PMC/XMC</td>
<td>2 1000BASE-T</td>
<td></td>
</tr>
<tr>
<td>XPedite5370</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>MPC8572E</td>
<td>1.5 GHz</td>
<td>4 GB DDR2-800</td>
<td>256 MB NOR</td>
<td>1 PMC/XMC</td>
<td>2 1000BASE-T</td>
<td></td>
</tr>
<tr>
<td>XPedite5470</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>P4080</td>
<td>1.5 GHz</td>
<td>8 GB DDR3-1333</td>
<td>256 MB NOR</td>
<td>1 PMC/XMC</td>
<td>2 1000BASE-T or 1000BASE-BX</td>
<td>2 USB 2.0</td>
</tr>
<tr>
<td>XPedite5570</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>P2020</td>
<td>1.2 GHz</td>
<td>4 GB DDR3-800</td>
<td>256 MB NOR</td>
<td>1 PMC/XMC</td>
<td>2 1000BASE-T</td>
<td>1 USB 2.0</td>
</tr>
<tr>
<td>XPedite7170</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>Core 2 Duo</td>
<td>1.8 GHz</td>
<td>4 GB DDR2-400</td>
<td>4 MB NOR</td>
<td>1 PMC/XMC</td>
<td>1-2 1000BASE-T</td>
<td>0-2 USB 2.0</td>
</tr>
<tr>
<td>XPedite7172</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>Core 2 Duo</td>
<td>1.8 GHz</td>
<td>4 GB DDR2-400</td>
<td>2 MB NOR</td>
<td>1 PMC/XMC</td>
<td>2 1000BASE-T or 1000BASE-BX</td>
<td>2 USB 2.0</td>
</tr>
<tr>
<td>XPedite7370</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>Core i7</td>
<td>2.53 GHz</td>
<td>8 GB DDR3-1066</td>
<td>32 MB NOR</td>
<td>1 PMC/XMC</td>
<td>2 1000BASE-T or 1000BASE-BX</td>
<td>2 USB 2.0</td>
</tr>
<tr>
<td>XPedite7371</td>
<td>3U VPX</td>
<td>1,3,5</td>
<td>Core i7</td>
<td>2.53 GHz</td>
<td>8 GB DDR3-1066</td>
<td>32 MB NOR</td>
<td>1 PMC/XMC</td>
<td>2 1000BASE-T or 1000BASE-BX</td>
<td>2 USB 2.0</td>
</tr>
</tbody>
</table>

**Platforms and Enclosures**

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Form Factor</th>
<th>Chassis Type</th>
<th>Dimensions</th>
<th>Chassis Cooling</th>
<th>Supported Modules</th>
<th>Backplane</th>
<th># of slots</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADP</td>
<td>3U VPX</td>
<td>Development</td>
<td>11.5”D x 5.5”W x 16.5”H</td>
<td>Air</td>
<td>Conduction</td>
<td>3U VPX</td>
<td>10</td>
</tr>
<tr>
<td>XPand1000</td>
<td>3U VPX</td>
<td>Development</td>
<td>8.3”D x 4.2”W x 8.5”H</td>
<td>Air</td>
<td>Conduction</td>
<td>3U VPX</td>
<td>2</td>
</tr>
<tr>
<td>XPand1010</td>
<td>6U VPX</td>
<td>Development</td>
<td>13.6”D x 4.2”W x 8.5”H</td>
<td>Air</td>
<td>Conduction</td>
<td>6U VPX</td>
<td>2</td>
</tr>
<tr>
<td>XPand1200</td>
<td>3U VPX</td>
<td>Development</td>
<td>11.5”D x 5.5”W x 8.5”H</td>
<td>Air</td>
<td>Conduction</td>
<td>3U VPX</td>
<td>10</td>
</tr>
<tr>
<td>XPand1300</td>
<td>3U VPX</td>
<td>Development</td>
<td>11.5”D x 5.5”W x 16.5”H</td>
<td>Air</td>
<td>Air</td>
<td>3U VPX or 3U cPCI</td>
<td>15</td>
</tr>
<tr>
<td>XPand3200</td>
<td>3U VPX</td>
<td>ATR</td>
<td>8.75”D x 4.88”W x 5.62”H</td>
<td>Conduction</td>
<td>Conduction</td>
<td>3U VPX or 3U cPCI</td>
<td>6</td>
</tr>
<tr>
<td>XPand4200</td>
<td>3U VPX</td>
<td>ATR</td>
<td>13.5”D x 4.88”W x 6”H</td>
<td>Air</td>
<td>Conduction</td>
<td>3U VPX or 3U cPCI</td>
<td>6</td>
</tr>
</tbody>
</table>
Storage Solutions
To address the storage requirements of deployed embedded applications, X-ES offers high density Solid State Disk (SSD) storage solutions and removable SSD storage options. X-ES can build removable storage options into system-level solutions, such as the XPand4200 sub-1/2 ATR box.

- XPort6192 3U VPX Removable SSD Carrier
- XPort6170 Small Form Factor 256 GB Removable SATA Solid State Drive (SSD) with 256-bit Encryption

Switches and Carriers
To facilitate system integration, X-ES provides a number of switch and carrier options. All are available in both conduction- and air-cooled versions.

- XChange3000 3U VPX PMC/XMC carrier card
- XChange3010 3U VPX four-port VPX PCI Express switch with bridging to cPCI
- XChange3011 3U VPX conduction- or air-cooled redundant Gigabit Ethernet switch
- XChange3012 3U VPX PCI Express and Gigabit Ethernet Integrated Switch with XMC and Management Support

Backplanes, Power Modules, and Rear Transition Modules (RTMs)
Design margins for VPX backplanes are much narrower than traditional backplane due to the number and the speed of the signals on the backplane. Power requirements of VPX systems can be much higher than with traditional systems. To ensure robust system designs, X-ES develops VPX backplanes and power modules. X-ES provides RTMs to support air-cooled applications and development efforts.

- XTend41310 3U VPX development backplane with centralized switching for single or dual star topology
- XTend4131 3U VPX development backplane with centralized switching and expansion plane support
- Xpm2020 MIL-STD-704 28V input to ±12V, 5V, and 3.3V output 3U VITA 62.0 VPX power supply with integrated MIL-STD-461E filtering
- XIt1040 6U VPX rear transition module with Gigabit Ethernet, SATA, USB, Serial, and DVI
- XIt1070 3U VPX rear transition module with Gigabit Ethernet, SATA, USB, Serial, and DVI
- XIt3012 3U VPX rear transition module (RTM) for the XChange3012
Despite a still-sluggish economy, the worldwide VME market remains quite healthy. In a recent report, VDC Research projected a compound annual growth rate of more than 9% in the period from 2009-2014 for all VME single board computer (SBC) incarnations. This is due in large part, of course, to VME’s continued stronghold in military and aerospace applications. And while mil/aero activity doesn’t appear to be slowing down, VDC senior analyst Eric Gulliksen also doesn’t expect VME to have a serious impact in any other industry outside of it. “VME is an excellent technology but it’s also an expensive one, and the bullet-proof nature that it has for mission-critical applications isn’t needed for other applications,” said Gulliksen. VME’s second largest market is industrial automation and control, but that share is less than 10 percent of mil/aero, and its share in other markets such as telecom and medical drops another order of magnitude from there.

Within the VME market, Gulliksen sees traditional shared multidrop-bus VME rapidly declining, while newer standards such as VPX is expected to see tremendous growth. VPX (ANSI/VITA 46) breaks from the traditional VME connector scheme with a 7-row, high-speed connector rated up to 6.25 Gbps and support for a variety of switch fabric technologies in different form factors. VPX systems can have 3U and 6U format blades. The growth of VPX will also be supported by OpenVPX, the architecture framework that defines system-level VPX interoperability for multi-vendor, multi-module, integrated system environments. And VPX REDI – the Ruggedized Enhanced Design Implementation (REDI) laid out in VITA 48 – extends VPX with layout techniques to better support enhanced forced-air, conduction cooling, and liquid cooling methodologies, as well as the use of ESD covers on both sides of the board.

While VPX emerges as the next generation of VME, VXS (ANSI/VITA 41, VMEbus Switched Serial) will see only modest growth. VXS offers backward compatibility to standard VME systems by combining parallel VMEbus with enhancements to support switched serial fabrics including PCI Express, RapidIO,
StarFabric and InfiniBand over a high-speed P0 connector. But the connectors are expensive and space-consuming, so VXS makes sense only if the system truly demands backwards compatibility. “If you don’t need that backward compatibility, you don’t want to bring all that baggage with you,” says Gulliksen. He sees growth in the VXS market, but it’s minimal in comparison to VPX. For perspective: in 2009 VPX represented less than five percent of the VME market and VXS less than one percent. By 2012, VPX will represent more than 20 percent of the overall VME market while VXS is expected to comprise less than two percent.

“VPX is expected to see tremendous growth.”

From an architecture standpoint, VME’s traditional Power Architecture domination seems to be on the decline, being replaced by multicores Intel architecture. In 2009, Power represented 65 percent of the market in SBCs, with an expected share of 48 percent in 2012. While this is significant, the market will continue to grow, so this is a decline specifically in market share, not overall growth. On the operating system side, VxWorks continues to dominate but is losing share to Linux. From 2009 to 2012, VxWorks’ share is expected to drop from 57 percent to 52 percent, while Linux moves from 27 percent to 35 percent in the same time period.

The board market overall has continued to undergo consolidation, with acquisitions occurring even during the height of the recession. Kontron, the biggest embedded board supplier overall in VDC’s research, has been acquiring in VME to emerge with about eight percent VME market share today, but still trailing VME leaders GE Intelligent Platforms and Curtiss-Wright. Gulliksen believes the majority of the market consolidation is done at this point. As a result, he expects to start seeing more board start-ups in future, although that’s less likely for VME – a market that’s expensive to break into and tricky to crack the military hierarchy. As investments begin to flow again, Gulliksen expects to see more new companies building ATCA boards as well as smaller form factors other than rack mount.

On the topic of VME small form factor (SFF) development, Gulliksen is waiting to see what emerges. Last year, PCI-Systems, Themis Computer and Curtiss-Wright each proposed separate small form factor standards and were each granted working group status. Since then, each company has introduced small cube-like systems that seem primarily aimed at unmanned aerial and ground vehicle applications. Gulliksen sees this development akin to the evolution from AdvancedTCA to MicroTCA, and says, “I wouldn’t be surprised if there’s a market for it. VITA doesn’t waste a lot of time if there’s not a market.” Gulliksen expects these SFF systems, with several small cards plugged into a cube enclosure, will help combat the inroads that MicroTCA has been making into VME’s avionics market. The development is taking a different approach than that taken by PICMG with MicroTCA, however. Gulliksen explains: “MicroTCA evolved because they developed a mezzanine card that could be used as a blade. VITA doesn’t have a mezzanine card that they can quickly adapt to a ‘microVPX’ system, so they’re starting from scratch. It may lead to the same place that PICMG went but in the other direction. They’ll start with a small form factor system and once they have these little blades in a ‘microVPX’ system, why not use them as mezzanine cards in a full-size system? It’s a very logical thing to do and can multiply the market opportunities.”

Cheryl Berglund Coupé is Editor of EECatalog.com. Her articles have appeared in EE Times, Electronic Business, Microsoft Embedded Review and Windows Developer’s Journal and she has developed presentations for the Embedded Systems Conference and ICSPAT. She has held a variety of production, technical marketing and writing positions within technology companies and agencies in the Northwest.
Wide-Area Airborne Surveillance (WAAS) application is ideal for VPX

By Cheryl Coupé

Richard Lourette, chief scientist and principal investigator for ITT, worked closely with Dynatem to develop a VPX board for a payload sensor processing application that he describes as similar to the US Air Force’s “Gorgon Stare” program deployed last year. That program is a wide-area airborne surveillance (WAAS) system that supports multiple cameras and gives ground operators access to imagery from up to 12 different angles at the same time, at rates of 16 MegaPixels per second for each camera. For the new system, demands were high and the project was underway at the same time that the draft standard for VPX was being developed. Together, Dynatem and ITT started the design, tracked changes as the standard developed, and spun the final board to meet the ratified standard.

The resulting VPX single board computer (SBC) (which Dynatem dubbed “VPQ”) includes a 24-port, 10 Gigabit Ethernet switch that allows full-mesh backplane data-layer interconnectivity and up to eight VPQ SBCs to be integrated into a single chassis without the use of an additional switch board. The board is based on a quad-core Intel Xeon processor for high performance, and a PCI Express switch provides connectivity to two fully capable PMC/XMC sites with extensive user I/O.

Despite the challenges of designing the board in parallel with the standard, Lourette explains why VPX was the way to go for this demanding sensor application:

“Looking forward, Lourette is watching new VME technologies, including small form factor and optical developments.”

Intel Friendly

With support for PCI Express and 10 Gigabit Ethernet, VPX is inherently Intel CPU-friendly and Lourette needed the processing power of the high-performance quad-core Intel Xeon processor. When Apple bought P.A. Semi (in 2008), Lourette abandoned all efforts around Power Architecture. “I looked at that and said I’m not going to wait around for someone else to come up with something more powerful,” he stated. “At that point, all my designs were based on the Intel platform and I’ve never looked back.”

Signalining in Backplane

At the time, VPX was the only mil/aero backplane that could accommodate up to 6 Gigahertz of digital signaling in the backplane. ITT used XAUI, following the Open VPX standard for the VPX P1 connector for 10 Gigabit Ethernet. The additional slot...
width in the design also allows room for more cooling fins and higher signal integrity for the XMC sites.

**GPGPU Friendly**
The VPX platform lends itself well to utilizing general-purpose computing on graphics processing units (GPGPU) technology. ITT and Dynatem repurposed NVIDIA and ATI graphics controllers for very high-performance number-crunching.

**Cluster-capable**
The 10 Gigabit Ethernet switch built into the board supported flexible data flow topologies. Lourette was able to gang multiple CPUs in a system to create a supercomputing cluster that can process massive amounts of sensor data. The predecessor system to this design used a CompactPCI board that was limited to Gen 1 SATA IO signaling and had reached capacity at 65 watts per slot. The new VPX board can go up to 150 watts per slot for plenty of payload processing.

Developing the VPX board was not without its challenges:

**Cooling.** Thermal design is somewhat less of a challenge now that the standard is ratified, but ITT and Dynatem worked closely with backplane and chassis vendors to develop a reference design that software developers could use that was electrically and software equivalent to the final system. Plenty of advanced thermal analysis ensured that ITT could power a system with seven boards and provide both air- and conduction-cooled designs depending on the final application’s mission.

**Mechanical.** One of biggest – and unexpected – challenges was seating the cards in the backplane. Lourette explains, “It takes 250 pounds of force to insert a VPX card into the backplane. As thick as a 20-layer backplane is, it would bow like a credit card.” Reinforcements had to be applied to the backplane to make sure all the contacts were made. ITT and Dynatem also had to find metal front panel ejectors that were robust enough to handle the cards and adapted conduction-cooled levers to air-cooled cards so they could get them in and out without special tooling.

Looking forward, Lourette is watching new VME technologies, including small form factor and optical developments. ITT has worked with Dynatem on 3U VPX and will be interested to watch developments in smaller form factors. About new small form factor developments he says, “It needs to be a little bit more mature before I can stand up a project on it, but I would certainly entertain that.” As for optical developments, he says, “Everything I work on is always pushing the envelope on data processing.” He continues, “I’m already saturating the VPX bus with data. VPX is only good to 20 gigabits per channel and then it runs out of steam. Right now I’m at 10 gigabits per channel. There’s technology available for us to go faster but the limit is 20 gigabits and then you have to go to optical.”

---

Cheryl Berglund Coupé is Editor of EECatalog.com. Her articles have appeared in EE Times, Electronic Business, Microsoft Embedded Review and Windows Developer’s Journal and she has developed presentations for the Embedded Systems Conference and ICSAPAT. She has held a variety of production, technical marketing and writing positions within technology companies and agencies in the Northwest.
Online & Offline ➔ VME & VPX Resources

Websites and Blogs

www.eecatalog.com/vme
Your guide to the most essential news, blogs, videos and other essential content for VME, VPX and VXS system engineers

www.vita.com
VITA is the international standards organization for VME and related technologies and is the first stop for information.

www.op-comp.com
VITA is also providing guidance in the formation of OpComp, a technical forum to discuss optical computing technologies for critical embedded computing systems. A forum event is being planned for 2011.

http://www.iccmedia-vcon.com/conference/technical-trends-vme-technologies
This FREE virtual conference does not purely focus on the traditional VMEbus market, but will discuss advanced technologies and “hot” topics too.

www.vdcresearch.com
VDC Research provides custom and standard research reports on embedded markets and technologies.

www.emsoft.org
Embedded Systems Week brings together conferences, tutorials, and workshops centered on various aspects of embedded systems research and development.

Events

The Aerospace and Defense Manufacturing Summit
February 9-11, 2011 – Hollywood, FL
www.aerospacedefensesummit.com

Embedded Systems Conference
May 2-5, 2011 – Silicon Valley.
http://esc-sv09.techinsightsevents.com/

6th International Conference on Embedded and Multimedia Computing (EMC-11)
August 11-13, 2011 - Enshi, China
http://grid.hust.edu.cn/EMC2011/

Embedded Systems Conference
Boston 2011, registration will open April 4
http://esc-boston.techinsightsevents.com/

www.rtecc.com
Real-Time Embedded & Computing Conference (RTECC) offers one-day embedded computing events in cities worldwide.

AeroCon
February 8-10, 2011 – Aneheim;
March 16-17, 2011 – Orlando;
September 20-22, 2011 – Chicago;
March 14-15, 2012 – Forth Worth
http://www.aeroconshows.com

MILCOM 2011
November 7-10, 2011 - Baltimore, MD
www.milcom.org
WE DESIGNED THIS WEBSITE FOR YOU...

A datasheet directory to find the solutions you need

Blogs from Industry Thought Leaders

Valuable Company and Product Information

www.eecatalog.com
RTECC
TRANSPORTING ENGINEERS INTO THE WORLD OF EMBEDDED
ARE YOU BEING LEFT BEHIND?

UPCOMING LOCATIONS

Santa Clara
1/27/11
Huntsville, AL
2/15/11
Melbourne, FL
2/17/11

Can you afford to miss it? FREE admission, lunch, parking and prize drawing entries at each event. RTECC is your best opportunity to discover a new world of possibilities within the embedded market.

ANNOUNCING
Distinguished Speaker @ RTECC
Don't Miss this Keynote...

Santa Clara - January 27th
David Francis Doody, Lead Engineer
Realtime Flight Operations, JPL

Register for a FREE Guest Pass Today!

www.RTECC.com
LeCroy’s PCI Express® Protocol Analysis and Test Tools

Compatible Operating Systems: Windows 7/XP/Vista
Specification Compliance: PCI Express Standards: 1.1, 2.0, and 3.0

Whether you are a test engineer or firmware developer, LeCroy’s Protocol Analyzers will help you quickly identify, troubleshoot and solve all your protocol problems. LeCroy works closely with industry standards groups such as the PCI-SIG®, PICMG, VITA and the Intel Embedded Communication Alliance to help developers rapidly bring to market high performance and reliable PCI Express protocol test solutions.

LeCroy’s products include a wide range of probe connections to support VPX, XMC, AMC, ATCA, microTCA, Express Card, MiniCard, ExpressModule, HP Blade Server Modules, PCIe external cable, MidBus connectors and flexible mult-lead probes for PCIe® 1.0a, 1.1(“Gen1” at 2.5GT/s) , PCIe 2.0(“Gen 2” at 5 GT/s) and PCIe 3.0(“Gen 3” at 8 GT/s).

The high performance SummitTM T3-16 Protocol Analyzer features the new PCIe extensions for NVMHCI 1.0(SSD devices), SR-IOV, MR-IOV, and in-band logic analysis.

LeCroy offers a complete range of protocol test solutions, including analyzers, exercisers, protocol test cards, and physical layer testing tools that are certified by the PCI-SIG for ensuring compliance and compatibility with PCI Express specifications.

FEATURES & BENEFITS

◆ One button protocol error check. Lists all protocol errors found in a trace. Great starting point for beginning a debug session.
◆ Flow control screen that quickly shows credit balances for root complex and endpoint performance bottlenecks. Easily find out why your add-in card is underperforming on its benchmarks.
◆ LTSSM state view screen that accurately shows power state transitions with hyperlinks to drill down to more detail. Helps identify issues when endpoints go into and out of low power states.
◆ Full power management state tracking with LeCroy’s Interposer technology. Prevents loosing the trace when the system goes into electrical idle.
◆ LeCroy’s Data View shows only the necessary protocol handshaking ack/naks so you don’t have to be a protocol expert to understand if root complexes and endpoints are communicating properly.
◆ Real Time Statistics puts the analyzer into a monitoring mode showing rates for any user term chosen. Good for showing performance and bus utilization of the DUT.

◆ Zero Time Search provides a fast way to search large traces for specific protocol terms.
◆ Config space can be displayed in its entirety so that driver registers can be verified.
◆ Test Arcs in the exerciser let PCIe 3.0 devices to be tested at any speed and link width.

TECHNICAL SPECS

◆ Analyzer
  Lanes supported: X1,x2,x4,x8,x16
  Speeds: 2.5GT/s, 5GT/s and 8GT/s
  Probes/Interposers: active and passive PCIe slot, VPX, XMC, AMC, expresscard, expressmodule, minicard, MidBus, multi-lead, and others.
  Form factor: Card, Chassis
◆ Exerciser
  Lanes supported: X1,x2,x4,x8,x16
  Speeds: 2.5GT/s, 5GT/s, 8GT/s
  Emulation: root complex and endpoint emulation
◆ Protocol Test Card
  Speeds: 2.5GT/s and 5GT/s operation
  Tests: Add-in-card test
  BIOS Platform Test
  Single Root IO Virtualization Test

APPLICATION AREAS

Mezzanine Boards, Add-in Cards, Host Carrier Systems, System Boards, Chips

CONTACT INFORMATION
LeCroy Corporation
3385 Scott Blvd.
Santa Clara, CA, 95054
USA
1 800 909-7211 Toll Free
1 408 727-6622 Fax
PSGsales@lecroy.com
http://www.lecroy.com
Elma Bustronic

What is OpenVPX?

VME bus Variant: VPX
Compatible Architecture: VPX, VPX-REDI

OpenVPX has opened up new definitions for VPX backplanes and systems. This includes defined Module Profiles, Slot Profiles, backplane & chassis configurations, secondary expansion fabrics and control planes, and higher speed fabric options.

The VPX Modules and Slots across the backplanes have been given definitions so that similar Modules will work within certain Slot configurations. The backplane Configurations have been defined to show the collection of Slot profiles it entails, including information on the data rate, routing topology, and fabric used. Now, the integrator can determine that a daughter card Module from “X” company can be used in the same backplane slot as “Y” company’s, when both Module Profiles specify the same Slot Profile.

TECHNICAL SPECS

● The backplane slot profile table describes the height, type of slot (centralized, distributed or hybrid), the pitch, RTM connector, the corresponding payload and switch cards that plug in, and the control and dataplane data rates.

www.eecatalog.com/vme

Explore...

➔ Directory of leading PCI Express solution providers
➔ Top Stories and News
➔ White Papers
➔ Expert Opinions (Blogs)
➔ Exclusive Videos
➔ Valuable Articles
➔ Ask the Experts

Sign up for the quarterly VME, VPX & VXS E-Product Alert
VPX Backplanes

VITA 46/48/65 Backplanes

SIE Computing Solutions VPX backplanes are designed to the latest VITA 46, 48, 65 and OPEN VPX standards. The 5-slot I/O PLUS(TM) 3U VPX Full Mesh Backplane is designed for a wide array of VPX applications. The highly configurable backplane offers high-bandwidth in a compact size and provides greater I/O flexibility through I/O PLUS(TM), an innovative use of configurable I/O daughter cards to accommodate an array of VPX applications.

FEATURES & BENEFITS

◆ 5 slot full mesh
◆ 2 dedicated I/O daughter card slots
◆ Over 200 watts per slot
◆ 28 layer board

TECHNICAL SPECS

◆ J1: 10 fat pipes/high-speed differential channels
◆ J2: 16 fat pipes/high-speed differential channels
◆ J2: 20 single-ended signals

AVAILABILITY

Now

APPLICATION AREAS

Military/Aerospace, Industrial, Transportation
Elma Electronic

VPX/VXS Handles & Panels

VME bus Variant: VPX and VXS

Elma offers highly ergonomic latching handles for the higher insertion forces of VPX and VXS systems. Elma’s VPX handles and panel solutions come in 1.0”, 0.85”, and 0.80” widths for the various card sizes of the architecture. The VPX specification calls for the handle to be slightly offset from typical IEEE handle/panel placement. The handles feature Elma’s two-step latching process and are highly ergonomic. Elma also offers long versions of its IEEE and low profile VPX handles for increased leverage.

FEATURES & BENEFITS

- Designed for VXS and VPX systems. Offset formats specific to VPX designs available.
- Highly ergonomic, in IEEE or low-profile styles.
- Two-step latching process. Pushbutton activates optional microswitch telling board ready to plug/unplug.
- Panels feature various widths for VPX board pitch (.80”, .85” and 1.0”). 3U, 6U, and custom heights.
- Panels are front anodized for scratch-resistance and back alodined for electrical continuity.
**Fortis Zd Connector**

Tyco Electronics advanced FORTIS ZD high-speed backplane connector is designed for military and commercial aerospace applications. As demands on systems for real-time intelligence intensifies, the importance of high performance interconnection becomes critical. Tyco Electronics set out to design a new connector system that supports increasing bandwidth requirements in a ruggedized format to withstand the increased shock and vibration requirements of emerging military applications.

**FEATURES**

- Allows 10 Gb/s+ data rates
- Extreme mechanical and electrical performance for the most demanding applications
- Modular design allows for user configurability and modular evolution
- Three shell varieties for application versatility
- Mini-Box contact system provides 4 points of contact for ultra reliability

**Mezalok Connector**

Compatible Architecture: XMC

Tyco Electronics Mezalok connector is a high-reliability mezzanine connector that more than doubles the speed and durability of competing technology, making it the most viable option for today’s military and commercial aerospace applications.

The need for embedded electronic systems in rugged platforms has been continually increasing and driving more stringent requirements for board-to-board connectivity. TE engineers responded to these needs by developing a super-fast, super-durable and super-redundant mezzanine connector ideal for extreme environments.

**FEATURES**

- 60 and 114 positions
- Mini-Box contact system provides 4 points of contact for ultra reliability
- LCP plastic housings offer superior thermal stability and are low-outgassing
- 114 position footprint compatible to XMC footprint
- 500 mating cycles durability
RIOV-2478

VME bus Variant: OpenVPX
Compatible Operating Systems: Linux, VxWorks
Compatible Architecture: 3U OpenVPX, XMC

The RIOV-2478 combines a multi-core processor with modern interconnect high-speed links and an onboard crosspoint switch. It features a QorIQ P4080 processor designed for combined control and dataplane processing. The 8-core processor design is well suited for applications, which are highly compute-intensive, I/O intensive or both. The crosspoint permits flexibility of the payload profile configuration in accordance to OpenVPX, therefore allowing support of PCIe, sRIO and 10GE over VPX and XMC. A Board Management Controller is also integrated, providing high-speed system status monitoring, logging and dynamic reload (processor and FPGA) functions in real-time for exceptional mission back-up strategies for the entire system.

TECHNICAL SPECS

- 3U OpenVPX (VITA 65) single board computer with a Freescale QorIQ P4 processor
- Onboard interconnect with crosspoint switch for programmable payload profile configuration (PCIex4 Gen2, sRIOx4, 1GE, 10GE)
- Ultra-high-speed advanced memory subsystem (Dual 1, 2 or 4 GBytes DDR3, as well as NAND, NOR and NVRAM)
- One onboard XMC slot (VITA 42.2, 42.3, 42.6)
- Integrated board management controller and debugging environment
VPQ Intel Quad-Core based VPX SBC with 24-port 10Gb ENET switch

**VME bus Variant:** Open VPX compatible profile MOD6-PAY-4F2T-12.2.2.4  
**Compatible Operating Systems:** Linux, VxWorks, Windows, Solaris, LynxOS, QNX  
**Compatible Architecture:** VPX, XMC, PMC

VPQ is based upon 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. This allows up to eight VPO SBC’s 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, which connects to the 10 Gigabit Ethernet Switch. The Intel 82599EB supports the IEEE 1588 Precision Time Protocol standard allowing all node boards to be synchronized in the sub-microsecond range. An 82571EB Dual 1Gigabit Ethernet controller provides 1000Base-T or 1000Base-KX connectivity to the backplane via the VPX P4 connector.

For convection cooled applications, the VPQ provides a front panel SFP+ port supporting CX4 copper and Fiber applications for chassis-to-chassis and rack-to-rack communications.

On-board non-volatile storage includes a 16 GByte Solid State Flash Drive, 16 Mbit SPI flash memory, and a 16 Mbit Firmware Hub. Four SATA, two USB, VGA, and an RS232 or RS485 Console port complement the VPQ I/O through the backplane or rear transition module.

**FEATURES & BENEFITS**

- Open VPX compatible profile MOD6-PAY-4F2T-12.2.2.4  
- Intel® Quad Core L5408 Processor @ 2.13 Hz  
- Support for full mesh 10 Gb XAUI interconnect up to 8 boards on backplane (Ethernet on VPX Fabric Connector)  
- On board Fulcrum 24 port 10 Gb Ethernet XAUI switch (also available without switch)  
- On-board PCI express SVGA Controller  
- Front panel SFP+ 10 Gb copper or optical for chassis to chassis interconnect  
- Supports two fully capable PMC/XMC Sites with PCI-X speeds of up to 133MHz and PCIe x8. Additionally, each XMC site provides a 10G XAUI lane to the on-board 24-port switch enabling an XMC card to be part of the 10G fabric  
- Available in conduction cooled versions for rugged applications  
- On board 4 GB DDR2 and 16 GB bootable Flash disk

**TECHNICAL SPECS**

- On-board PCI express SVGA Controller  
- Front panel SFP+ 10 Gb copper or optical for chassis to chassis interconnect  
- Supports two fully capable PMC/XMC Sites with PCI-X speeds of up to 133MHz and PCIe x8. Additionally, each XMC site provides a 10G XAUI lane to the on-board 24-port switch enabling an XMC card to be part of the 10G fabric  
- Available in conduction cooled versions for rugged applications  
- On board 4 GB DDR2 and 16 GB bootable Flash disk

**AVAILABILITY**

Now shipping

**APPLICATION AREAS**

Military surveillance, RADAR, data collection, high performance processing

---

**CONTACT INFORMATION**

Dynatem, Inc  
23263 Madero, Suite C  
Mission Viejo, CA 92691  
USA  
800-543-3830 Toll Free  
949-855-3235 Telephone  
949-855-8569 Fax  
sales@dynatem.com  
www.dynatem.com
Emerson Network Power

Extended Temp VMEbus SBCs

The Emerson Network Power MVME4100 and MVME7100 product lines are available in extended temperature range (-40°C to +71°C) variants and support a wide range of operating and storage temperatures in addition to increased tolerances for shock. This enables them to operate in harsh environments while maintaining structural and operational integrity. In addition, both products utilize the 2eSST VMEbus protocol which enables 320MB/s transfer rate across the VMEbus.

The MVME4100 features the Freescale 8548E processor with industry-leading storage options and 512KB non-volatile MRAM. It also has dual PMC and up to four optional XMC sites. The MVME7100 utilizes the system-on-chip MPC864xD processor, which provides power/thermal, reliability and lifecycle advantages over alternative architectures.

OEMs in the industrial automation, medical, defense and aerospace markets can continue to keep their VMEbus infrastructures in tact while improving performance and extending lifecycles with Emerson VME products.

FEATURES

- Extended temperature range (-40°C to +71°C)
- 2eSST VMEbus protocol enables 320MB/s transfer rate across the VMEbus
- Board support packages available
- Product support and longevity from the leader in VMEbus technology

Industry-leading VME Support and Longevity

Emerson Network Power continues to provide industry-leading support and product longevity for its VME single-board computer product lines. VMEbus technology continues to be employed by OEMs around the world in a variety of highly demanding industrial automation, medical, defense and aerospace applications.

The MVME6100 is designed with the Tundra Ti148 VMEbus interface chip enabling 2eSST performance (enabling the VMEbus to run at a bandwidth of 320MB/s).

The MVME3100 utilizes the system-on-chip MPC8540 processor, which offers power/thermal, reliability and lifecycle advantages over alternative architectures, and 2eSST VMEbus interface.

The MVME5100/5110 uses the PowerPlus II Architecture to support full PCI throughput without starving the processor from its memory.

The MVME5500 features the MPC7457 processor which is ideal for data intensive applications by providing balanced performance from the processor, memory, dual independent local buses and I/O subsystems.

FEATURES

- High performance, rugged and modular construction
- Broad industry support and use
- Continued technology enhancements
- Supported by a range of compatible hardware and software

CONTACT INFORMATION

Emerson Network Power
2900 S. Diablo Way, Suite 190
Tempe, AZ 85282
USA
1 800 759 1107 Toll Free
1 602 438 5720 Telephone
EmbeddedComputingSales@Emerson.com
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 including robotics, image processing, radar/sonar, C4ISR and signal intelligence. The dual-core processor has integrated memory and graphics controller. On-board memory includes up to 8GB DDR3 soldered memory and 256KB non-volatile F-RAM, which 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 4GB of embedded USB flash, and an 80GB SATA hard drive accessory option. Connectivity includes four GbE 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.

P0 connectivity includes dual GbE, one USB 2.0 and two SATA ports. Compatible operating systems include Wind River VxWorks, Linux, and Green Hills Integrity.

FEATURES

- Compliant with the VITA 41.3 VXS specification
- Dual-core Intel® Core™ i7 processor (1.06 ULV or 2.0 GHz LV)
- Intel® Ibex-M Peak Platform Controller Hub (PCH)
- 4GB or 8GB ECC-protected DDR3-800/1066 memory
- 4GB eUSB flash module; 256K non-volatile F-RAM (NVRAM)
- Optional HD & mounting kit

MVME2500 VME64 Processor Board

The Emerson Network Power MVME2500 SBC features the latest Freescale QorIQ™ processors -- the single-core P2010 and dual-core P2020. The e500 v2 core QorIQ processor uses 45 nanometer technology which delivers an industry-leading performance-to-power ratio with single-core or dual-core frequencies up to 1.2 GHz at less than 8W.

On-board memory includes up to 2GB DDR3 memory and 512KB non-volatile MRAM making it ideal for critical non-volatile data storage, data logs, dynamic program updates, and dynamic security. Connectivity includes three Gigabit Ethernet ports, one USB 2.0 port, five serial ports, one internal SATA port and one XMC site. A hard drive mounting kit is available for SATA rotating or solid-state hard drives. The extended temperature models feature an operating temperature range of -40° C to +71° C and acceptable storage temperatures have been increased to safely accommodate environments from -50° C to +100° C.

FEATURES

- 800 MHz or 1.2 GHz Freescale QorIQ™ P2010 and P2020 processors
- 1GB or 2GB DDR3-800, soldered down

FEATURES

- Three on-board Gigabit Ethernet interfaces
- USB 2.0 port, five serial ports and one PMC/XMC site
- Extended temperature (-40° C to +71° C) and rugged variants
- Hard drive mounting kit and optional rear transition module available

CONTACT INFORMATION

Emerson Network Power
2900 S. Diablo Way, Suite 190
Tempe, AZ 85282
USA
1 800 759 1107 Toll Free
1 602 438 5720 Telephone
EmbeddedComputingSales@Emerson.com
Emerson.com/EmbeddedComputing

www.ecatalog.com/vme
Kontron

Single Board Computers

VME bus Variant: VPX, OpenVPX, VPX-REDI, VME
Compatible Operating Systems: VxWorks, Linux, LynxOS, Windows, ElinOS, QNX
Compatible Architecture: XMC, PMC, FMC

With over 20 years experience in VME COTS products for rugged embedded applications, Kontron offers VME-VPX products and services ideally suited to military applications. Our products are designed and qualified to MIL and ANSI/VITA standards to fit the most stringent requirements. Kontron Long Term Supply (LTS) allows building efficient program support throughout their extended lifetime.

Kontron is at the forefront of embedded technology for military applications and brings together a strong set of in-house engineering and manufacturing capabilities, plus an array of specialized product and system designs that can be readily adapted to meet the demands of new programs, applications and emerging technologies. This allows us to engage with our customers and partners at any level that works best for them.

Kontron military products cover VME, VPX and include high performance single board computers and accessories such as backplanes, mezzanine carriers and enclosures. Turnkey development systems allow customers to slash their development schedules.

FEATURES & BENEFITS

- Straightforward VME-VPX migration and PowerPC-Intel Migration across product portfolio
- Turnkey development platforms for easy board evaluation and software development
- Long Term Supply (LTS) gives extended lifetime program support up to 15 years
- Standard air- and rugged conduction-cooled versions for all products
Varistar - Versatile Cabinet Platform

Schroff’s new Varistar cabinet Platform features a modular, flexible design and a comprehensive range of accessories that allow it to be tailored to meet specific performance requirements in a broad range of electronic enclosure applications including communications, general electronics, medical, and test and measurement equipment.

Varistar’s innovative frame profile, constructed from a welded, corner reinforced, roll formed steel enables it to have a high load carrying capacity (1800 lb static). It is designed to meet seismic requirements, in a standard configured offering.

Varistar truly excels when it comes to managing heat dissipation with options ranging from passive to active to fully enclosed liquid cooled systems, and everything in between. Varistar is able to remove up to 20KW of heat.

Varistar is supported with a comprehensive line of accessories including a variety of top covers, solid, louvered, and plexiglass doors, side panels with quick release locks and screw in options, standard and seismic bases, telescoping and fixed shelving, slide rails, depth members, panel slide mounts, joining kits, casters, leveling feet, combined casters and leveling feet, lifting eyes, tip over protection, and a wide range of cable management including D-rings, C channels, cable ties, and brackets as well as many options for removing heat.

Varistar applies the same concept used in achieving EMC performance to an IP rated gasketing system. A UL94VO HB rated rubber gasket with adhesive tape is used to encompass the entire frame, rubber corner pieces then complete the gasketing seal.

With today’s electronic systems and instruments using high speed processors the need to shield components from electromagnetic interference is critical. The medical center manager needs to have components that not only do not interfere with other electronics in the cabinet but needs to ensure that the cabinet itself does not radiate interference.

Additional colors, features, and accessories are available individually or combined as part of a standard configured cabinet.

FEATURES & BENEFITS

- Extremely rugged construction for heavy load and seismic concerns
- Excellent EMI shielding and thermal management performance to protect sensitive equipment and instruments
- Flexible and versatile platform to meet your current unique designs and future needs
- Aesthetically pleasing design that compliments existing equipment
- An economic solution for your electronic enclosure needs

AVAILABILITY

Available now

APPLICATION AREAS

Electronic systems, controls and power cabinets for diagnostic imaging equipment and diagnostic instrumentation
SIE Computing Solutions

716 Conduction Cooled ATR Enclosures

VME bus Variant: VME, VME64X, VXS, VPX, OPEN VPX

716 Conduction Cooled ATR Enclosures

Engineered for strength, lightweight, and maximum cooling in a conduction cooled environment, the 716 Series incorporates a unique frame and configurable conducting walls that allow the ATR to be tailored to meet a wide range of thermal requirements.

FEATURES & BENEFITS

- Expansive range of ARINC sizes
- Easily configurable for custom sizes
- Modular power supply
- AC or DC filtered inputs

TECHNICAL SPECS

- System Performance Monitoring
- Multiple Bus Architectures
- Cold Start Heaters
- Avionics Isolation Tray
- Configurable I/O Panel

AVAILABILITY

Now

CONTACT INFORMATION

SIE Computing Solutions
10 Mupac Drive
Brockton, MA 02301
USA
800.926.8722 Toll Free
508.588.6110 Telephone
508.588.0498 Fax
www.sie-cs.com
720 Liquid Cooled ATR Enclosures

**VMEbus Variant:** VME, VME64X, VXS, VPX, OPEN VPX

720 Liquid Cooled ATR Enclosures

Engineered to provide the ultimate in thermal cooling performance, the 720 Series is capable of utilizing a variety of cooling fluids such as Polyalphaolefin (PAO) and Ethylene or Propylene glycol/water (EGW) or (PGW). The conducting walls are uniquely designed for either front or rear fluid access and can be configured with a mating avionics tray that provides a blind mate/quick disconnect feature. The liquid panels are also configured as a Line Replaceable Unit (LRU) for field upgrades.

**FEATURES & BENEFITS**

- Expansive range of ARINC sizes
- Easily configurable for custom sizes
- Modular power supply
- AC or DC filtered inputs

**TECHNICAL SPECS**

- System Performance Monitoring
- Multiple Bus Architectures
- Cold Start Heaters
- Avionics Isolation Tray
- Configurable I/O Panel

**APPLICATION AREAS**

Industrial, Transportation, Military/Aerospace

**AVAILABILITY**

Now
Elma Electronic

VME RAIDStor

Elma’s VME RAIDStor brings conduction cooled network attached storage (NAS) with RAID capability into a single 6U slot. Suitable for a multitude of applications, the module provides as much as a quarter terabyte of solid-state flash per slot. Within a typical 19” chassis, network access is available for up to 18 slots in dual star networks; here, the VME RAIDStor is a client/server model for highly reliable storage access in today’s network centric applications.

The VME RAIDStor is designed to use a multi-tasking kernel providing network services via TCP/IP. Network Attached Storage is supported through NFS. Logical drives are available to clients via NFS export.

FEATURES & BENEFITS

◆ A much smaller footprint than conventional box level RAID storage
◆ Extended temperature range from –40° C to +85° C
◆ Configurable to RAID levels 0, 1 and 5
◆ Automatic data re-sync with no impact to the top level application
◆ Heartbeat support for seamless fail over

TECHNICAL SPECS

◆ Form Factor: 6U by 4HP (single slot)
◆ Processor Core: MPC7448
◆ Two Gigabit Ethernet ports out the backplane
◆ Disks: Two 2½” SATA flash drives
◆ Power: +5V @ 3.0 A

CONTACT INFORMATION

Elma Electronic
44350 S. Grimmer Blvd.
Fremont, CA 94538
USA
215-956-1200 Telephone
215-956-1201 Fax
sales@elma.com
www.elma.com
The IPN250 is the world’s first single slot, 6U OpenVPX GPGPU COTS multiprocessor for rugged Mil/Aero applications. This innovative processor delivers unprecedented levels of computing performance for size, weight and power (SWaP)-constrained platforms at lower cost, creating new application opportunities that were previously unthinkable. It enables system integrators to deploy a single COTS module where previously multiple disparate modules would have been required—undertaking, for example, front end processing of sensor-acquired data, digital signal processing, backend processing and graphics/video processing while delivering high-resolution, mission-critical data more rapidly than has previously been possible.

IPN250
VME bus Variant: OpenVPX
Compatible Operating Systems: BIOS, Linux, Windows

Using the latest in desktop performance technology, GE Intelligent Platforms’ MAGIC1 Rugged Display Computer delivers unprecedented graphics performance demanded by military and aerospace customers.

Combining the processing power of the Intel Core 2 Duo with the NVIDIA G73, connected together with 16-lane PCI Express™, the MAGIC1 Rugged Display Processor is capable of driving the industry’s most demanding visual applications such as embedded training, digital mapping, and terrain visualization.

The processing node consists of an Intel T7400 Core 2 Duo CPU running at 2.16 GHz with 4 Mbytes of L2 cache. The graphics processing node is based on the dual channel NVIDIA G73 graphics processing unit, as featured on the NVIDIA GeForce™ 7600GT, and incorporates 256 Mbytes of GDDR3 SDRAM arranged in two banks.

MAGIC1
Compatible Operating Systems: BIOS to support Windows XP, Linux, VxWorks, OpenGL, DirectX

FEATURES
◆ High-performance CPU and wide OS support
◆ Latest 96 core GPU with CUDA/OpenCL/OpenGL
◆ Fast interprocessor communication and I/O
◆ Scalable computing platform
◆ Wide deployed computing application space—ideal for SWaP-constrained applications

CONTACT INFORMATION
GE Intelligent Platforms
2500 Austin Drive
Charlottesville, VA 22911
USA
1-800-433-2682 Toll Free
1-800-433-2682 Telephone
www.ge-ip.com

GE Intelligent Platforms

TECHNICAL SPECS
◆ 2.16 GHz Intel® Core™ 2 Duo processor
◆ NVIDIA® G73 graphics processor
◆ Multiple video standards (DVI, VGA, TV)
◆ Dual channel video output
◆ Up to 64 GBytes solid state disk

CONTACT INFORMATION
GE Intelligent Platforms
2500 Austin Drive
Charlottesville, VA 22911
USA
1-800-433-2682 Toll Free
1-800-433-2682 Telephone
www.ge-ip.com

www.eecatalog.com/vme
Introducing the new conference and exhibition for the aerospace and defense industries

Featuring suppliers for the design and production of aerospace and defense products, including:

- Software
- Machinery
- Materials
- Components
- Sub-Assemblies
- Contract Services
- Electronics
- ...and much more!

For more information on attending or exhibiting, visit:

AeroConShows.com
Promo Code: AB
VPX Solutions: X-ES Is The VPXpert

Extreme Engineering Solutions (X-ES) has the broadest range of proven VPX solutions available for rugged COTS applications. From systems to single board computers, switches, storage, graphics, and I/O, look to X-ES for industry leading VPX support.

VPX systems are revolutionizing rugged COTS applications and delivering extreme performance in extreme environments. As a proven supplier of rugged VPX components and systems, X-ES has the hardware, software, and experience to deliver VPX to your most demanding applications and custom COTS solutions.

Come discover why X-ES is the VPXpert. Call or visit our website today.