TE Connectivity Overview for ESA SpaceWire Working Group

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AEROSPACE, DEFENSE & MARINE

October 2012

The World Leader Enabling Connectivity

Serving Large Attractive Markets

Consumer





Products



SubCom

Energy

Industrial Equipment

Industrial and Infrastructure

Aerospace

& Defense



Medica

With a Wealth of Technology Platforms



Transportation

Connectors



Fiber Optics

Touch Systems



Circuit Protection



Sealing & Protection





Precision Wire & Cable

And Extensive Global Resources7,500 Engineers
Close to Our Customers5,625 Salespeople
Advising Our Customers150 Countries
Served97
Manufacturing Sites
Serving Every Region



Well Positioned in Industries That Are Growing



TE Connectivity



Net Sales by Region





Tyco Electronics is Now TE Connectivity World-Class Product Brands

ADC Agastat **AMP** AMP NETCONNECT Axicom Augat Bowthorpe EMP CII **ChipCoolers** Comacc Corcom

Crompton Deutsch Elcon Elo TouchSystems Hartman HTS **Kilovac** Lumawise Madison Cable **Microdot** Molded Interconnect Device (MID)

Nanonics OEG Potter & Brumfield (P&B) Precision Interconnect **Products Unlimited** Raychem **Rochester Cable** Schrack Simel **Stappard Howes** Transpower

Supporting Aerospace & Defense customers for over 50 years.



Deutsch Portfolio



- Rectangular Connectors
- Circular Connectors
- Filtered Connectors
- Fiber Optic Connectors
- Hermetic Connectors
- High Speed (Copper) Connectors
- Engine (High Temp) Connectors
- Terminal Blocks
- Feed-throughs
- Contacts
- Backshells







TE Connectivity Space Focus

• Wire, Fiber Optics, Wireless

Product Segments

- Interconnect
 - Board Level (eg VPX), I/O
- Harnessing & 1553 Databus
 - Hook-up Wire, Multicore, Harnessing
- Relays, Solenoids & Power Distribution
 - Signal level, Mid-Range, High Amperage/ Voltage, PDUs
- Sensors
 - Positional
- Connectivity Integration & Specialty Solutions
- Advanced Materials

Applications

- Spacecraft
- Launch Vehicles
- Ground Support



Space Products Overview





VPX Ecosystem Expansion

Emerging Initiatives

Small Form Factors

- Emulate VPX I/O
- Driven by extreme SWaP-C applications
 - eg man portable, small aircraft, ground vehicle
- Box Form Factor & I/O Draft Specifications
 - VITA 73 PCI Systems
 - VITA 74 Themis Computer
 - VITA 75 Curtiss Wright, Mercury, GE IP & more

VITA 78 Study Group - NGSIS

- Next Generation Space Interconnect System (NGSIS)
- Space implementation of VPX
 - Rapid I/O
 - Merging of Space & VPX nuances

VPX Super Computing Working Group

- Launched March 2012
- Exploring VPX based hypercube architectures for extreme computing applications – radar, SIGINT, etc

VITA Architectures for Optical (VAO) Study Group

Forum for Optical Implementation







VME Technology Roadmap www.vita.com





VITA Member Roster May 1, 2012





GE Intelligent Platforms

Huntzville, AL

THEMIS

Themin Computer

Fiemant, CA / Gieres, Fishce

Curtiss-Wright Controls Defense Solutions

Autoburn, VA



Mercury Computer Systems

Chairmafood, MA

- · 4DSP, Inc., Austin TX
- · Acromag, Inc., Wotorn MI
- ADLINK Technology Inc., Tappai, Taiwan
- AdvancedIO Systems, Inc., Vancouver, B.C., Canada
- · Aitech, Chatsworth CA
- Alpha Data Parallel Systems Ltd, Edeburgh, UK
- Alphi Technology, Tempe AZ
- American Avionic Technologies, Medford NY
- Amphenol, Nashua NH
- Annapolis Micro Systems, Inc., Annapolis MD
- BAE Systems EI&S, Nashua NH
- Ballard Technology, Inc., Everett, WA
- Bechtel Marine Propulsion Corporation, West Miffle PA
- Behlman Electronics, Hauppeuge NY
- · Beijing UCAS Space Technology Co. Ltd., Beijing, China
- · BittWare, Inc., Concord NH
- · Boeing, Seattle WA
- CES-Creative Electronic Systems, Geneva, Switzerland
- CM Computer, Sevila, Spain
- Comtel Electronics GmbH, Grashrunn, Germany
- Concurrent Technologies Pic, Colchester, UK / Ann Arbor MI
- · Critical I/O, Invine CA
- · CSP, Inc., Ellerica MA
- · Dawn VME Products, Inc., Fremont CA
- Digital Receiver Technology, Germantown MD
- DRS Signal Solutions, Inc., Gaithersburg MD
- Dynamic Engineering, Santa Cruz CA
- EADS Deutschland GmbH, Ulm, Germany
- Ecrin Systems Ltd., Croles, France
- Elbit Systems Ltd., Hafa, Jurad
- Elisra Electronic Systems, Bene-Berag, Israel
- Ema Bustronic Corporation, Fremont CA
- Elma Electronic, Inc., Fremont CA
- Elta Electronic Industries Ltd., Ashdod, Israel
- Emerson Network Power Embedded Computing, Temps AZ
- · ept, Inc., Chester VA
- · ERNI, Adelberg, Germany
- ESD Electronic System Design, Hannover, Germany
- Eurotech Group, Amaro, Italy
- Extreme Engineering Solutions (X-E5), Middleton WI
- · Fastwel Co. Ltd., Moscow, Russis
- Foxconn Electronics, Cypress CA
- Galleon Embedded Computing AS, Oslo, Norway
- · GDCA, Inc., Livermone CA
- · GECO, Mesa AZ

VMEbus International Trade Association

General Dynamics Advanced Information Systems , Bioomington MN

- General Micro Systems, Rancho Cucamonga CA
- General Standards Corporation, Huntsville AL
- GosNIIAS: State Research Institute of Aviation Systems, Moscow, Russ
- Harris Corporation/GCSD, Melbourne FL
- Harting, Inc. of North America, Eluin IL.
- Hartmann Electronic, Springfield OH
- HDL Research Lab, Inc., Brenham TX
- Highland Technology, San Francisco CA
- Honeywell Defense Avionics Systems, Albuquerque NM
- Hypertronics Corporation, Hudson MA
- Hytec Electronics Ltd, Reading, Berkshire, England
- IEH Corporation, Brankdyn NY
- Innovative Integration, Inc., Simi Valey CA.
- Integrated Device Technology (IDT), San Jose CA.
- Interface Concept, Briec de L'Odet, France
- Kontron, Kaufbeuren, Germany / Pittsburgh PA
- L-3 Integrated Systems, Greenville TX
- LCR Electronics Inc., Norristown PA
- LeCroy, Chestnut Ridge NY
- LIPPERT Embedded Computers, Inc., Mannheim, Germany and Atlanta GA
- Lockheed Martin Systems and Sensors (MS2), Moorestown, NJ
- Lockheed Martin Corporation Missiles and Fire Control, Orlando FL
- Lockheed Martin Corporation Space Systems, Sunnyvale CA
- · Lyrtech RD, Quebec City, Quebec, Canada
- · Macrolink Inc., Anaheim CA
- MEN Mikro Elektronik GmbH, Numberg, Germany
- Meritec / Joy Signal Technology, Painesville OH
- MIT Lincoln Laboratory, Lexington MA
- Molex Incorporated, Lisle II.
- · N.A.T. GmbH, Sankt Augustin, Germany
- Naval Surface Warfare Center, Crime IN
- North Atlantic Industries, Inc., Bohemia NY
- Northrop Grumman Electronic Systems, Baltimore MD
- OpenSystems Media, St. Clair Shores, MI
- Parker Hannifin Corporation, Mentor OH
- Paul Scherrer Institut, Wigen, Switzerland
- · PCI-Systems, Inc., Sunnyvale CA
- Pentair Electronic Packaging Schroff, Warwick RI
- Pentek, Inc., Upper Saddle River NJ
- Pigeon Point Systems, Oceanside CA
- · Polyrack Electronic-Aufbausysteme GmbH, Straubenhardt, Germany
- Rastergraf, Inc., Berkeley CA
- Raytheon Company, Space & Airborne Systems, El Segundo CA
- ReFLEX CES, Evity, France RPKB, Rameskoye, Russia

Rastergraf, Inc., Berkeley CA

Samter, Inc., New Albany IN

SELEX Galileo, Luton, UK

StreamDSP, Columbos OH

Technobox, Inc., Mt. Laurel NJ

TE Connectivity, Harrisburg PA

Thales, Meudon-la-Foret, France.

VadaTech Inc., Henderson NV

Xembedded, Inc., Ann Arbor MI

· Xilinx, San Jose CA

VITA Standards Organization

Sandia National Labs, Albuquengue NM

SIE Computing Solutions, Brockton MA

Tracewell Systems, Inc., Westervile OH

VTI Instruments Corporation, Invine CA

TTTech Computertechnik AG, Vienna, Austria

TechwaY, Vilebon-sur-Yvette, France

SEAKR Engineering, Centennial CO

Scan Engineering Telecom, Voronezh, Russin

 TEK Microsystems, Incorporated, Chelmsford MA TEWS Technologies GmbH. Haistenbek, Germany

Tokyo Electron Device Ltd., Yokohama City, Japan

W-IE-NE-R, Plein & Baus GmbH, Berscheid, Germany

www.vita.com

Rockwell Collins Deutschland GmbH, Hedeberg, Germany

RTD Embedded Technologies, Inc., State College PA

VPX – Extending the Performance Envelope

- More Functionality:
 - Utilizes the latest switch fabric technologies
 - Full-Mesh Topology slots communicate with each other
 - Choice of high speed serial fabrics
 - 3U and 6U formats
 - 7-row high speed connector rated up to 6.25 Gbps
 - PMC and XMC mezzanines
 - Hybrid backplanes to accommodate VME64, VXS and VPX boards











Standard Ruggedized Connectivity

Addressing Bandwidth, SWAP, Open Architecture

Bandwidth

Processing Power Signal Integrity Protocols

SWaP

Functional Density Scalability Modularity

Open Architecture VPX Initiative OpenVPX VITA 65

Attribute	VME64x	VPX
Bandwidth	320 MB/s using 2eso Mb/s	VME: 320 MB/s using 2eSST Fabric: up to 192 differential periods or signaling 10 GB/s @ 3.125 Gbpt GDS 30 GB/s @ 10 Gbps
Switch Fabric	Requires P0 implementation of VITA 31 or VITA 41 (VXS)	Multiple protocols with multiple topologies; Mesh, Star, Dual-Star, Ring, Daisy Chain
Faceplate User I/O	Yes	Yes
Backplane User I/O	205 pins 205	48 single-ended pins + 624+ 192 differential pairs 624+
User I/O for 3U	None	80 pins on J2 contacto
Defined PMC Mapping	Single-ended only	Single-ended and differentoptions
Existing VME64x compatibility	Yes	Yes, with hybrid backplane
Slot Pitch	0.8"	0.8" 0.85" and 1.0" with REDL Dackaging
Available Power	5V: 90W 3.3V: 66W	VITA 48 Standard For ESD
Cooling	Air, conduction	REParon, liquid w/REDI enhancements

Large Vendor Base, Interchangeability, Modularity, Upgradeability, Longevity

Comparison table courtesy of Mercury Computer



Application



VPX Framework

- The OpenVPX framework defines the allowable combinations of interfaces between the Module, Backplane and Chassis.
- The OpenVPX framework acknowledges, but does not define the interfaces between the Application and the Module or Chassis (gray text and lines).



VITA 61 XMC 2.0 Mezzanine Connector – New, Rugged, Fast VPX Building Blocks

XMC 2.0 – Enabling 2nd & 3rd Generation Protocols with Mechanical Integrity





VITA 62 Power Module - draft **VPX Building Blocks**

3U

6U

6U

- COTS modular power supplies
- Standard defines mechanical and electrical requirements
- Compatible with the VPX specifications
- Building block for complete VPX system
- Eliminates need for ad hoc or afterthought solutions
- Set of rules for industry power supply vendors
- New optimized connector system has been defined
- Fits within the envelope defined 3U and 6U plug-In modules

P0 6450849-7 J0 1-6450869-4 P0 6450843-6 J0 6450863-5 VITA 62 3U P0 P1 6450849-6 Connector J0 1-6450869-0

Hybrid Signal / Power Connector



3U VITA 62 power supply XPm2120 Image courtesy of Extreme Engineering Solutions



VITA 66: Optic Interconnect on VPX VPX Building Blocks

VITA 66.0 Released

VITA 66.1: MT Ferrule

- Extreme density & light weight
- Up to 24 fibers (12 per ribbon) per ferrule
- 2 ferrules: up to 48 fibers per module

VITA 66.2: ARINC 801 - draft

- Provides excellent single-mode performance
- Enables single-fiber reparability
- Up to 4 Ferrules per Module

VITA 66.3: Expanded Beam - draft

- Non-contacting optical interface
- >3000 Mating Cycle Durability, up to 4 fibers
- Adverse (high-vibration, dirty) environments

All capable of SM & MM





VITA 67 Coaxial Interconnect on VPX VPX Building Blocks

VITA 67.0 Released

Multiposition RF Modules

- Designed for VITA 67
 - SMPM Based
 - 0-6GHz in Compliant Pin Version
 - 0-40GHz in Cabled Version
- Allows Multiple Contact Blind Mating in Backplane Application
- Disconnectable at both Front and Rear of Backplane
- VITA 67.0 = Base Spec
- VITA 67.1 = 4 SMPM contacts
- VITA 67.2 = 8 SMPM contacts
- Additional "Dot" Specs Proposed



VITA 67.1 4 Position 3U



RF Cable Assemblies



VITA 67.2 8 Position 6U



RF Modules







www.te.com