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COTS (kots), n. 1. Commercial off-the-shelf. Terminology popularized in 1994 within U.S. DoD by SECDEF Wm. Perry’s “Perry Memo” that changed military industry purchasing and design guidelines, making Mil-Specs acceptable only by waiver. COTS is generally defined for technology, goods and services as: a) using commercial business practices and specifications, b) not developed under government funding, c) offered for sale to the general market, d) still must meet the program ORD. 2. Commercial business practices include the accepted practice of customer-paid minor modification to standard COTS products to meet the customer’s unique requirements.

—Ant. When applied to the procurement of electronics for U.S. Military, COTS is a procurement philosophy and does not imply commercial, office environment or any other durability grade. E.g., rad-hard components designed and offered for sale to the general market are COTS if they were developed by the company and not under government funding.
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Talking Space

This issue of COTS Journal has a section devoted to space-qualified electronics where we highlight some key rad-tolerant products and get some insights from our friends at Aitech on what “space-qualified” really means. I’ve always been fascinated by space travel both real and fictional. As a kid in the 70s I was very much a pre-Internet child. But my best friend knew an address at NASA’s public relations department you could write to and request a stack of photos of spacecraft images for free—an exciting day at the mailbox for me when they arrived.

Fast forward to adulthood and more recently I had the opportunity to attend a Shuttle launch in person. Over the years my friends, Pete and Warren—both co-founders of COTS Journal—attended more Shuttle launches than they could count. And they invited me to join them for the Shuttle Discovery’s last launch (STS-133) in February 2011. It truly is unforgettable that feeling of the vibration in my chest, and the bright blast of engine exhaust experienced from the three-mile-away Press/VIP area at the Kennedy Space Center. In January of this year the annual Embedded Tech Trends event was held in Houston right near Johnson Space Center, and I got to do the tour with my industry colleagues and see many amazing sites like the original Mission Control room, the sprawling Vehicle Mock-Up Facility and more.

In comparison to space exploration, discussions about acquisition reform can seem about as exciting as watching paint dry, but especially in this era when budgets are under high scrutiny no one can argue that it’s not an important topic. And in the space segment of U.S. DoD acquisition there are some unique challenges. The DoD relies on space systems to provide critical capabilities that support military and other government operations, including but not limited to communications; missile warning; positioning, navigation, and timing; and intelligence information. These systems can be very challenging to develop and expensive to acquire and field.

DoD space systems are acquired under the same acquisition policies as other weapons systems. But there are some ways that space systems are different from other acquisitions: Space has more programs of joint interest than other areas, and includes varied stakeholders, such as civil agencies and multiple services. Unlike other systems when you’re developing space systems you have one shot to get it right. Once a satellite is launched, if there are problems it is essentially impossible to change the hardware, and software changes may not be an option.

Even given all those challenges a decades-old issue with defense space acquisition is the fragmented bureaucracy. As is their role, the GAO has reported over the last 20 years about how the fragmentation and overlap in DoD space acquisition management and oversight have contributed to program delays and cancellations, cost increases, and inefficient operations. In 2012 the GAO for example reported that fragmented leadership contributed to a 10-year gap between the delivery of GPS satellites and user equipment. The list of stakeholders that are involved in defense space acquisition is a real eye chart, with over approximately 60 stakeholder organizations across DoD, the Executive Office of the President, the Intelligence Community, and civilian agencies.

As a result of several studies on this topic there have been 28 recommendations related to management and oversight of national security space, according to the GAO. These can be grouped into six categories: Space as a national security priority; Unified leadership and authority; Improved coordination between defense space entities; Budget issues; Planning and Acquisition process. Changes have been put in place to improve in all those areas, and DoD claims it’s too soon to see the results of those changes yet.

In a recent report the GAO did grant that there’s one of those areas where progress is clear. According to the report, the DoD, Congress, and the executive branch have made significant progress on the recommendations related to establishing space as a national security priority. In recent years, space has become a more visible national security issue. The two most recent National Space Policies (2006 and 2010) identified free access to and use of space as a vital national security issue. The two most recent National Space Policies (2006 and 2010) identified free access to and use of space as a vital national security interest, reemphasized the foundational contributions of space capabilities in supporting overall U.S. interests, and established overarching national policy for the conduct of U.S. space activities.

According to the DoD, space is now the only standing topic in DoD’s annual Strategic Portfolio Review process, whereas before it was only included occasionally. The department’s 2016 budget submission added over $5 billion in new investments in space. Recent public comments from high level DoD officials have also shown this increased emphasis on space protection. And the National Defense Authorization Act for Fiscal Year 2016 included a few provisions highlighting the importance of space, including directing DoD to establish a major force program for national security space programs and establish a Principal DoD Space Control Advisor.

Because it’s your job, you readers are well aware that the development and acquisition of military systems is a complex process. There’s no doubt that space-based military systems have whole different levels of challenges to deal with. Fortunately on the acquisition reform side of things, space acquisition is moving the right direction. 

Editor, Jeff Child
High Performance Computing Appliances

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Raytheon Awarded $104 Million to Modernize UAV Ground Controls

Raytheon Company has been awarded a subcontract valued up to $104 million to modernize the ground segment for the U.S. Air Force RQ-4 Global Hawk autonomous aircraft. Raytheon partners with Northrop Grumman as the ground integrator for Global Hawk contracts. Raytheon and Northrop Grumman have a long history of providing end-to-end Global Hawk solutions. Northrop Grumman builds the Global Hawk, the U.S. Air Force’s high-altitude, long-endurance platform used to gather a variety of intelligence, surveillance and reconnaissance, or ISR, data.

Raytheon provides modernized ground controls to enhance capabilities, safety and cybersecurity of Global Hawk operations worldwide. Global Hawk’s modernized mission control stations will use an open architecture to give the U.S. Air Force flexibility for adding different mission payloads and new platforms. Proven safety features are combined with Raytheon’s cybersecurity for a safe and secure system. The Raytheon and Northrop Grumman team delivers solutions that help the Air Force develop critical battlefield intelligence capability. According to Raytheon, the team modernizes systems with a unique approach that enhances the mission and reduces overall costs.

Sensor Concepts Selects Acromag Board to Embed in Scanning Gear

Sensor Concepts (SCI), a manufacturer of dedicated inspection equipment used by the DOD for maintenance of their Stealth fleets, is in development of a new line of integrated measurement systems known as the InfiniSCAN family (Figure 2). The first entry for this product line is a handheld variant that is designed to be used in and around aircraft hangars with fueled aircraft present. As such, the design of this equipment must be evaluated to meet stringent US (Class I, Division 2) and European Union (CE ATEX) requirements for hazardous locations.

The design required adherence to hazardous location requirements that drove SCI to choose a conduction cooled XCOM-6400 COM Express board a product from Acromag. Although the original intent was to use the power management system to reduce processor throughput and keep the board operating under 20 W per hazardous location requirements, SCI chose to proceed with a design based on the XCOM-6400-108E-LF that allows full processor throughput. The XCOM-6400-108E-LF board features a tight heatsink integration for conduction-cooled applications.

ADLINK and Wind River Team up on Joint R&D Center

ADLINK and Wind River announced the establishment of joint lab facilities in Shanghai, China and San Jose, CA, US, to promote the adoption of Network Functions Virtualization (NFV). The Research & Development centers will feature Wind River Titanium Server software running on ADLINK’s hardware platform based on the Modular Industrial Cloud Architecture (MICA) open framework. The combination of technologies will offer a platform for software manufacturers, system device suppliers and service providers to test software rapidly through preliminary platform verification and system optimization.

Wind River Titanium Server is a complete, commercial NFV infrastructure (NFVI) software platform that delivers carrier grade reliability and performance for NFV applications. By integrating Titanium Server with ADLINK’s rugged hardware platforms, NFV can be achieved at the network edge or in the data center, providing users with greater opportunities to maximize the performance and capacity of...
The MS-177 is an advanced sensor that supports GA-ASI's effort to equip Avenger with a long-range imaging capability.

their NFV implementation and reduce operating expenses.

ADLINK Technology
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www.adlinktech.com

Wind River
Alameda, CA
(510) 748-4100
www.windriver.com

Cubic Awarded $80 Million from Navy's FTSS IV IDIQ Contract

Cubic Global Defense (CGD) has announced the award of a five-year, approximately $80 million task order to support aviation training for the U.S. Navy and Marine Corps under the Navy's Fielded Training Systems Support (FTSS) IV Indefinite Delivery Indefinite Quantity (IDIQ) Multiple Award Contract (MAC). This is the first award by the Naval Air Warfare Center, Training Systems Division (NAWCTSD) using this fourth-generation IDIQ program — that has an estimated ceiling value of $1.75 billion.

Under the task order awarded by NAWCTSD in Orlando, Florida, Cubic will provide operations and maintenance support of F/A-18 and EA-18G aviation training devices and simulators at Naval Air Station (NAS) Oceana, Marine Corps Air Station (MCAS) Miramar, NAS Lemoore, NAS Whidbey Island and MCAS Beaufort. In addition, Cubic instructors will provide simulator and academic classroom training for Navy and Marine Corps pilots and other aircrew at NAS Lemoore, MCAS Miramar, and NAS Whidbey Island. In an earlier FTSS II task order, Cubic provided F/A-18 Pilot Instructors at MCAS Beaufort.

Air Industries Group Secures $3.1 Million Award for M1A1 Abrams

Air Industries Group announced today that it will begin first deliveries of component kits under a contract totaling a $3.1 million awarded by the US Government, Defense Logistics Agency. Eur-Pac, a wholly owned subsidiary of Air Industries Group and unit of its Aerostructures and Electronics segment, will supply 35 complete kits each containing 220 parts for the US Army (Figure 4).

The first deliveries will commence in late September with the balance completed in the fourth quarter of 2016. This single contract represents more than 50% of the annual revenue of Eur-Pac.

Many of the individual parts of this project are manufactured by other units of Air Industries, validating the company's strategy of leveraging its group of operating companies. According to Dan Godin, President and CEO of Air Industries Group, the award is also consistent with its diversification strategy supporting a ground-based military system, rather than its traditional aerospace or ground power platforms."

Air Industries Group
Hauppauge, NY
(631) 881-4920
www.airindustriesgroup.com

Cubic Defense Systems
San Diego, CA
(858) 277-6780
www.cubic.com

Figure 4
Eur-Pac will supply 35 complete M1A1 Abrams kits each containing 220 parts for the US Army.
SPECIAL FEATURE

Linking Development to Deployed Systems
now that defense budgets and schedules are both tighter than ever the stakes are raised for military system designers get from development phase to deployment phase as quickly and as smoothly as possible. An ability to do so can make or break the chances of a contract win—especially when complete working demos are often the requirement. To help the situation a number of box-level system developers have crafted development systems designed specifically to be aligned with the all the same key aspects of the final deployed system. Starting with VPX, the mix of these system solutions has broadened to other standard architectures—like CompactPCI and FMC. Board-level carriers have also emerged to accomplish the same things. Meanwhile a variety of more application-specific development systems have joined the game.

Marrying Development and Deployment

For its part Extreme Engineering Solutions (X-ES) was among the earliest to marry box-level development systems with comparable deployable systems. The company provides development platforms designed to enable developers to start their development quickly with a pre-integrated system. Since many VPX systems are deployed, X-ES provides development platforms that accept conduction-cooled boards in an air-cooled lab chassis. Rear Transition Modules (RTMs) can be used to allow developers to quickly and easily prototype system I/O.
Figure 1
The XPand1508 I/O breakout stations support two standard VITA 46.10 RTM slots for accessing the I/O from the corresponding 3U VPX modules installed in the XPand6200 Series.

An example along those lines is X-ES’s XPand6200 Series Development Kit. The kit breaks out the XPand6200 Series’ I/O to development-friendly commercial connectors and includes power supplies for powering the unit from standard 120 VAC wall outlets. The Development Kit includes the XPand1508 I/O breakout stations. The XPand1508 supports two standard VITA 46.10 RTM slots for accessing the I/O from the corresponding 3U VPX modules installed in the XPand6200 Series. The Development Kit includes the cables needed to connect the XPand6200 Series to the XPand1508 (Figure 1). These cables also break out some commonly used high-speed interfaces directly to standard commercial connectors.

Creative Electronic Systems (CES) meanwhile addresses the development to deployment issue with solutions like its ROCK-2: a rugged, modular, open-architecture, pre-qualified, application-ready, safety-certifiable, featured avionic system. The system takes an approach where basic functions such as I/O or video/graphics are designed on carriers while the SBC function is designed on XMC. The XMC are then installed on the carriers saving space but also offering easy, low-cost system upgradability. That gives ROCK-2 a really short time to mission. The transition from air-cooled laboratory to conduction-cooled airborne environment is straightforward thanks to the cross-compatible laboratory and airborne chassis. In fact, software engineers and system integrators can start working with ROCK-2 out-of-the-box using the very same boards.

The OpenVPX compliant and 3U VPX based, ROCK-2 adopts an Integrated Modular Avionics (IMA) architecture. This makes it well suited for airborne applications with a central mission computer managing several functions of different Design Assurance Level (DAL). ROCK-2 is built upon safety-certifiable building blocks and can be optionally delivered with all the documentation, certification evidences and artifacts required for a DO-178C/DO-254 certification up to DAL-C. That said, ROCK-2 is not limited to safety-certifiable applications and is affordable to a wide variety of applications according to CES.

Embedded Software Development Solutions

Another trend is the emergence of more powerful embedded software development tools to speed along military system projects. Abaco Systems this summer for example announced AXIS DataView, an innovative extension to the company’s AXIS software development environment. DataView is unique in the market, and allows system developers to rapidly develop graphical user interfaces (GUIs) for their embedded applications deployed on Abaco Systems hardware. Designed for displaying data and adding controls to signal- and image processing applications as well as any system control or communications application, DataView significantly reduces the time, cost and risk of developing sophisticated software solutions and speeds time-to-deployment.

By addressing the development costs associated with developing and porting GUIs to multiple platforms while also addressing performance overhead issues DataView makes adding a GUI to a broad range of applications both practical and valuable. According to Abaco Systems In-house tests performed by their engineers show that, using DataView,
a reduction of over 90 percent in the lines of code required to create a typical signal generator GUI or signal processing GUI is achievable when compared with alternative approaches. In addition to development time and cost savings the DataView tool creates code that is considerably easier to maintain and enhance.

Building Blocks for Avionic Prototyping

Among the most interesting development aids from Curtiss Wright Defense Solutions is an approach that is aimed specifically for avionics systems. Curtiss-Wright “AviBlocks” are designed as one common architecture, addressing multiple avionics requirements and a Joint Development Approach that supports developers through prototyping, definition, qualification and long-tail production. The four key elements are the Rugged Mount FDAU, Multirole Airborne Recorders Flight Data Management FDAU/DMU/QAR and Custom Remote Electronic Units DCU/RIU.

Using those, avionics developers who have the ability rapidly prototype and adapt to evolving requirements, are able to quickly validate multiple design iterations in hardware, dramatically reducing program risks and costs. AviBlocks technology is an evolution of the Curtiss Wright Acra KAM-500 data acquisition system. Within the AviBlocks framework, the extensive collection of KAM-500 interface modules act as “Avionics building Blocks” which allow for rapid prototyping of new systems as well as low risk development of production units. According to the company, the AviBlocks paradigm retains the adaptability of the KAM-500 system allowing unique specification FDAUs, MRSs, DMUs, DCUs, and RIUs to be realized without the costs typically associated with new bespoke developments.

From One Carrier to Another

Exemplifying the carrier board approach to linking development and deployment, Pentek’s latest offering includes new members to its FlexorSet series of preconfigured solutions: The FlexorSet Model 5973-313 for 3U VPX and Model 7070-313 PCIe platforms consist of an FMC installed on either of two Flexor FMC carriers with Virtex-7 FPGAs. The Flexor Model 3312 FMC features four 250 MHz, 16-bit A/Ds and two 800 MHz, 16-bit D/As, which are supported with matching digital down converters (DDCs) and interpo-
S42LB69s. A single TI DAC5688 provides a
digital upconverter and two 800 MHz, 16-bit
D/As. Four banks of DDR3 SDRAM provide a
generous 4 GB of storage for data processing.
In addition to supporting PCIe Gen. 3 as a na-
tive interface, the Model 5973-313 and Model
7070-313 include optional copper and optical
gigabit serial connections to the Virtex-7
FPGA for custom I/O.

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as a platform for developing and deploying
custom FPGA-processing IP. Each includes
four 250 MHz, 16-bit A/Ds using two TI AD-

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Ask about our product evaluation!
Selecting electronic components and subsystems for space-based platforms continues to be a challenge. Even since the Space Shuttle program ended and the commercial space industry filled its gap, the space electronics industry has been going through a period of transition. Fortunately a variety of vendors of space-qualified products has kept tuned in to the concerns facing space designers. Space-based semiconductors and board-level systems must be capable of withstanding everything from intense radiation due to high-energy atoms, to bombardments from neutrons and other particles. A steady crop of radiation-hardened boards and subsystems continues to emerge as well as ASICs, FPGAs and power components designed for space applications.

When the entire commercial semiconductor industry some years ago made the switch over to lead-free technology, military and aerospace industries were left scrambling to cope with a landscape of lead-free devices. The tin-whiskering and other phenomena that occur in lead-free chips is no problem for the short lifecycle consumer electronics realm. But for the ultra-long development times of defense programs, lead-free is a risky prospect. And for space applications that problem is multiplied by the fact that space-based systems literally cannot be physically accessed to be repaired once launched. The good news is that the space electronics industry is keeping pace with products and logistics services that mitigate those issues.

For this month’s Editor’s Pick section COTS Journal evaluated several space-qualified electronic products on three aspects: technology leadership, design innovation and market relevance. This month’s Jeff’s Pick is Total-Space ACE from Data Device Corp. (Figure 1). Total-Space ACE offers full 1553 BC, RT, MT, and RT/MT functionality to interface directly to a host processor. It boasts 300 Krad total dose and >85 MeV·cm²/kg SEE radiation hardening.

Highly Integrated Space Solutions

Integrating the transformers into the hybrid guarantees a match between the 1553 transceivers and transformers, as the transceivers are trimmed while paired with their respective transformers. These hybrids minimize PC board area, weight, and power while maximizing reliability (MTBF), all important parameters for the designers of space borne systems. In addition, DDC’s latest generation of 1553 hybrids are fully hardware and software compatible with the earlier SP’ACE and SP’ACE II hybrids. DDC has served the space industry for more than 3 decades as an approved supplier to NASA, ESA and JAXA.

Data Device Corp.
Bohemia, NY
(631) 567-5600
www.ddc-web.com
3U cPCI SBC Fully Characterized Via NASA-Approved Proton Cyclotrons

The SP0 from Aitech Defense Systems is space-qualified 3U SBC that has been fully tested and characterized at the NASA-approved UC Davis proton and Texas A&M heavy ion cyclotrons. The low overall power consumption of only 10 W is ideal for high performance, in-orbit systems. The SP0 is fully qualified and radiation characterized to over 100 kRad (Si) and is latch-up immune to greater than 37 MeV-cm²/mg to reliably operate in LEO (low) and MEO (medium) orbits as well as show a high confidence for use in GEO (geostationary) orbits (Figure 2).

In addition to the 8 Gbytes of ECC user NAND flash, the board offers up to 512 Mbytes of fast DDR SDRAM, also with ECC protection, for high data integrity. The board uses the radiation-tolerant Freescale Silicon-on-Insulator (SOI) MPC8548E PowerQUICC-III 1.17 GHz processor that provides 333.3 MHz of core complex bus (CCB) and an e500 SoC. The board features two Gigabit Ethernet ports, four asynchronous, high-speed serial communications ports and up to five general purpose discrete I/O channels. An industry-standard PMC slot as well as up to eight PCI Express lanes and dual PCI buses add even more on-board functionality and performance to the SP0.

Development Kit is Made for Rad-Tolerant FPGA System Designs

Microsemi has announced the availability of its RTG4 Development Kit with its recently announced RTG4 PROTO FPGAs. As the industry’s first radiation-tolerant FPGA kit providing space designers a comprehensive evaluation and design platform, the new kit is ideal for the development of applications such as data transmission, serial connectivity, bus interface and high speed designs, using the company’s RTG4 radiation-tolerant high-speed FPGAs (Figure 3).

The new kit includes Microsemi’s RTG4 PROTO FPGAs, enabling lower cost prototyping and design validation while offering the only reprogrammable prototyping solution of their kind delivering the same timing and power characteristics as space flight units. The development kit provides all necessary reference to evaluate and adopt RTG4 technology quickly, without the need to build a test board and assemble the device onto the board. The RTG4 Development Kit board features a RT4G150 device offering more than 150,000 logic elements in a ceramic package with 1,657 pins. Its reprogrammable flash configuration is unique to the space industry, making prototyping faster and easier than other radiation-tolerant FPGAs. The kit also features Microsemi’s Libero SoC Design Suite, offering high productivity with its comprehensive, easy to learn, easy to adopt development tools for designing with Microsemi’s radiation-tolerant FPGAs.
Check Out These Rugged Display Products Too…

The Smart Backplane chassis from Curtiss-Wright Defense Solutions a rugged DAU (Data Acquisition Unit) that has been designed with space-related data acquisition, data processing and recording in mind. It allows the use COTS modules in a radiation-intensive environment.

Curtiss-Wright Defense Solutions
Ashburn, VA
(703) 779-7800
www.cwcdefense.com

Intersil’s ISL70617SEH is a radiation tolerant 36V instrumentation amplifier (in-amp) featuring an integrated differential ADC driver. It enables higher common-mode rejection ratio (CMRR) and power supply rejection ratio (PSRR) than the competing devices, at all gain settings.

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The new anti-static space wire and cable products from TE Connectivity (TE) help remove issues of concern for static discharge buildup for outer space-based systems associated with the normal installation of electrical wiring systems in the spacecraft.

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Phoenix-developed state-of-the-art enabling technology provides users with products that ensure the highest performance storage and data network systems. These systems range in size and application from multi-terabyte Fibre Channel RAID, NAS and Storage Area Network (SAN) configurations to conduction cooled plug-in Open VPX solid state disk storage modules.

Rugged, Deployable Data Storage Solutions

Intersil’s ISL70617SEH is a radiation tolerant 36V instrumentation amplifier (in-amp) featuring an integrated differential ADC driver. It enables higher common-mode rejection ratio (CMRR) and power supply rejection ratio (PSRR) than the competing devices, at all gain settings.

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With the recent shift in space electronics to look towards using ruggedizing commercial components as a cost-efficient alternative to ‘space-qualified’ devices, the question of reliability has been asked repeatedly. But the answer isn’t simply “yes” or “no” as there are just too many variables to consider when factoring in the effects of space on non-qualified components. Depending on the program’s mission requirements, some limits may be OK to push, while others may yield catastrophic failures.

Another, and equally as important, question to ask is, why did the space industry look towards commercial components in the first place? The answer is two-fold. First, designers were looking to emulate the functionality they can employ on their desktop PCs in the space environment, but more often than not, space-qualified components were limited in certain abilities. Only so much could be done with the traditional set of components earmarked for in-orbit applications. Second—as its moniker suggests—a space-qualified component has undergone rigorous, and therefore costly, testing and validation. With research and development budgets being cut tremendously across several areas of defense and military programs, ways to reduce overhead and extend the value of each dollar was high on the designers’ priority list. And not having to wait for testing results would certainly speed up time to market.

Ruggedizing less expensive, yet more feature-rich, commercial components for space seemed like the Holy Grail. And commercial components themselves had advanced in form and function, making them potentially viable alternatives to qualified components. So theoretically, the answer is yes-commercial components should be able to be used in space applications, but let’s actually look at this concept in application.

Why Does Qualification Exist?

Space is not only one of the harshest environments that electronics need to operate in, but it’s also one of the hardest to replicate. Testing and validation of mission critical systems used in space exist for a reason. Success in a space system is defined by its continued reliability, autonomous operation and unwavering communication within its network. (Figure 1)

The system essentially needs to survive wholly on its own, without manual inter-
vention. When a problem arises, tech support can't exactly take the unit out of orbit and into the shop for testing and repair. And launching a satellite or other space system has its own associated costs and timeframe, so it just isn’t feasible to send a system into space to ‘test the waters.’ Once it’s deployed, it needs to function as designed. Period. So, although commercial components may not undergo the rigors of space-qualification, there is still a litany of aspects to consider before specifying something into a system destined for orbit. Screening is still paramount to ensure the components meet a minimum level of quality and reliability.

Commercial Components in Space

One of the biggest attributes of components that can reliably operate in space is their resistance to radiation. Fortunately, some components are inherently radiation-resistant, which is extremely critical when evaluating commercial components for space applications. Most diodes and crystal oscillators as well as GaAs technologies and bipolar devices with low dose characterization offer properties of radiation resistance that can give a certain edge to components being validated for space use.

Take, for example, Silicon on insulator (SOI) technology. The inherent transistor construction of SOI-based microprocessors eliminates the parasitic SCR and therefore the effects of total dose radiation and single event upsets. This is extended during full cache utilization, since the radiation tolerance applies to the L1 instruction and data caches as well as the L2 cache on the die. And the cache arrays feature error correction mechanisms that minimize data corruption from single event upsets. Risk associated with these types of components is further reduced through derating and screening processes that tighten the design margins.

Of course, all of the components discussed still need to be verified and tested to ensure proper operation, but this is typically done to a far lesser (and less costly) degree than components that are truly space-qualified. Commercial components not only save costs in testing and validation, but also in implementation, since commercially-available software tools and real-time operating systems can then be employed. This lowers NRE, while providing more advanced design functionality. Designers are provided with more cost-effective tools and components that allow them to build complex designs in a much shorter timeframe and with far reduced expenses.

Assessing the Challenges

So if commercial components seem to have the capabilities to withstand the harsh environment of space, why is there this big question about their use in space? It’s because along with these benefits, there are challenges that need to be considered as well. Once a space program has been defined (e.g. Earth Orbital, Deep Space, etc.), its specification are pretty well set in stone. And many times there are extremely unique circumstances that have been considered and evaluated to ensure the system can properly accommodate them.

Space, weight, functionality, extended operating temperature, EMI/EMC and radiation shielding and a host of other attributes are all taken into account when specifying components for a space system. One small shift in a component’s internal functional thermal envelop and the entire system architecture can be sent out of whack.

Because they are used in the rapidly changing world of consumer electronics, commercial components are much more dynamic by nature. Frequently, technology changes happen with barely enough time for designers to learn the full part numbers of the parts they are using. And the sheer quantity of components produced precludes many manufacturers from employing a decent traceability system. Are the parts being produced from the same facility/fabrication line or are there multiple fab sources of the same part located in different countries from the same company? If so, how can you be sure of the integrity of one batch of products from the next? And with product development and release happening at a breakneck pace, obsolescence is the norm for many a component in the commercial world.

Space programs are designed for far longer life spans than today’s smart phones. How can a system that defines itself on long-term availability, backwards compatibility and reliable operation manage these risks associated with commercial components?

Radiation’s Impact on Electronics
Back to the initial question—can commercial components successfully be deployed in space systems? We’ll hedge a tentative yes, with a few caveats. But important to note is that radiation tolerance in space components defines the success or failure of a mission, so accounting for the proper levels before launch is critical.

Radiation has one of the largest impacts on Earth orbital systems, and two of the most important aspects to consider are the length of the mission and which orbit will the system operate in, since these determine the type and quantity of radiation that a system will be exposed to. The criticality of the mission is also a key area to consider (Figure 2).

The majority of CMOS-based processors available today have shown dismal results in TID (total ionizing dose) that severely limits their viability in long-term space missions. With most coming in with a TID of only 400 Rads(Si) when tested at heavy ion cyclotrons, these components might last a month in a low earth orbit platform. A system designer needs to weigh this information against the known radiation resistance of the SOI microprocessor noted earlier.

And as more processor cores are added, the radiation tolerance numbers may get even worse. A heavy ion can do far worse damage to a smaller transistor or gate since even in space, $F=ma$. On the brighter side, since the transistors and gates are smaller, the probability of them taking a hit by the same ion is lower, so there are always trade-offs to be made.

**Cumulative Radiation Effects**

Another area to consider is overall radiation exposure and its cumulative effect—how much can a component ‘soak in’ before it just fails. The typical range that radiation tolerant electronics need to meet is 15 to 50K Rads(Si), with rad hard reaching over 100K Rads(Si) and more. Yet most unqualified commercial components top out at maybe 1K Rads(Si)—again a number that will be reached before the system has been in orbit for one month.

If the needed time in flight will be short, say less than 3 years, and in low earth orbit, some commercial components will reasonably withstand radiation effects for a decent amount of time if properly shielded. Of course, orbital altitude and angle of inclination are always factors to consider when designing a system for space, as is looking for new ways to ensure reliable operation incorporating redundancy.

For example, the trend to launch satellite clusters, instead of one large unit, helps to spread the burden of reliability across multiple units. If one satellite in the cluster fails, and if the system is designed as such, another can pick up where the failed unit left off, so there is no loss in communication and the ‘constellation’ stays operational. This is a shift from the traditional method of launching one super rad-hard mega-satellite solely responsible for the mission’s entire operation.

Most clusters are launched in low earth orbit, so commercial components may make sense in this environment. But for longer missions, and deeper space applications, these components have not been proven to possess the needed endurance to withstand repeated and prolonged exposure to harmful radiation.

**Proper Implementation**

Techniques employed to adequately prepare electronics for space include modified circuit designs, supporting real-time software and cache validation as well as scrubbing techniques, qualified EEE Grade 2 or Grade 3 component selection and appropriate testing and certification. These methods are applied to COTS single board computers, mezzanine cards, and other subsystem solutions that can then deliver cost-effective performance with the functionality demanded by manned and unmanned/robotic space applications (Figure 3).

The key comes down to proper EEE component selection and appropriate validation for the space mission at hand. It won’t be worth the short term cost savings if your system doesn’t hold up for the long term, due to a premature component failure.  

**Figure 2**

Electronics used in space applications need to accommodate the specific orbit, mission length and critical nature of the flight.

**Figure 3**

This space-qualified, radiation-hardened SBC uses a standard 3U conduction-cooled CompactPCI form factor with a conduction-cooled PMC I/O expansion slot to withstand both the thermal and radiation effects of space environments.

Aitech Defense Systems  
Chatsworth, CA  
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Established platform parallel bus protocols like VMEbus and CompactPCI still have their place in today’s and tomorrow’s harsh environment, real-time/hard-deadline embedded sub-system applications...especially when these products are upgraded and maintained to keep pace with the newest, fastest processor and memory technologies.

While there are some applications where high speed serial fabrics like VPX are ideal, there are others where VMEbus or CompactPCI still rule the roost.

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www.rugged.com
High Capacity Storage Systems Look to PCI Express

Defence applications today have an enormous appetite for data storage. With legacy form factors and interfaces playing a role, PCIe SSDs are the future.

Steve Gudknecht, Product Manager, Elma Electronic

Massive, data-intensive applications are becoming a fixture in today’s C4ISR platforms. Fewer boots on the ground means more electronic eyes and ears filling in the gaps and coordinating information. C4ISR systems need to juggle huge amounts of signal and imaging data from incoming intelligence, surveillance and reconnaissance sources, drawn from radar, sonar, high definition video and infrared sensors to name just a few.

Data-intensive applications continuously drive demand for high volume local storage capacity. High bandwidth incoming data streaming into the front end of advanced systems can create a number of challenges with regard to the storage array on the back end. By definition, SWaP (size, weight and power) considerations in deployed equipment increasingly demand that on-board systems economize on all three metrics. Ensuring sufficient storage volumes in the space allowed is a pretty basic idea.

SSDs Fill Storage Gap

Fortunately, advancements in the density of solid state drive technology are helping to greatly alleviate that space problem for now. Additional concerns, such as read/write speeds, security, redundancy, signal integrity and ease of access, can be addressed by system and board designers who are well versed in storage subsystem architecture tradeoffs and connectivity options.

The simplest and most common way to architect local storage using today’s wide selection of slot card form factors in VPX, VME and cPCI is to take advantage of SATA ports on new single board computers (SBCs) offered by leading board manufacturers. While this is not necessarily new, many things have changed over the past several years that make this connection method even more desirable for building high capacity arrays.

The two most notable are that drive density has grown in leaps and bounds, and the number of SATA ports supported by new CPU silicon has increased—and board manufacturers are making use of them. Leading edge drive density has grown by a factor of 10 over the last five years and four SATA III ports are common on a 6U board, and even some 3U VPX boards. A SATA III drive with its 6 Gbps top end data rate provides the bandwidth needed for higher speed application needs. And these drives are hitting their stride now with numerous suppliers offering a wide range of form factors.

Figure 1

A storage subsystem connected via four SATA III backplane ports resulting in an ample 20 Terabyte storage array across just three slots, including the CPU board.
### A Variety of Form Factors

It’s no surprise that VPX is the most capable board standard when it comes to taking advantage of these new developments. Central to the discussion is overcoming bandwidth bottlenecks and the “gotchas” along the signal path. As with any OpenVPX system design, it helps to work with a company able to provide the board, backplane and chassis end of the equation, since oftentimes a new backplane design may be needed to support the system requirements.

CPU speeds and multi-core processing have advanced to the point of supporting the new data speeds, but getting from the CPU to the drives includes passing through at least one backplane connector pair. Multi-gig connectors in OpenVPX backplanes can handle signal speeds up to 12 Gbps providing acceptable signal integrity – far more than required for SATA III drive connectivity. Systems are becoming more integrated and offering far higher densities in on-board storage arrays (Figure 1).

Here, each storage carrier contains two 5 Gbyte SSDs. An advantage to 3U form factors is, of course, system size, since SWaP is king in defense applications—especially in systems destined for air frames. Conduction and air cooled systems in OpenVPX have an advantage with an option for direct slot-to-slot connections through the backplane with no cables or transition modules.

#### Older Form Factors Too

Even older form factors find homes in applications requiring an ever-increasing need for more storage capacity. This basic architecture can be applied to VME or cPCI systems, as well. Although they operate at reduced data speeds, these older systems can be upgraded as missions evolve to support higher storage volumes, if slower data rates are not the paramount concern. It’s important to note that backplane architecture and connectors in cPCI and VME systems are limited in terms of signal speed and top out at SATA 1 (1.5Gbps) and SATA II speeds (3 Gbps) respectively.

Regardless of form factor, all that capacity usually requires some form of data redundancy, and until recently, hardware RAID controllers were the preferred method over software RAID solutions. Software RAID methods slowed down yesterday’s CPUs to the point where other processes suffered.

But higher clock speeds and multi-core processors have almost eliminated this issue in many applications. As a result, high capacity storage arrays can be RAID-protected using Linux-based software RAID, reducing hardware without bogging down the CPU. One-to-N SATA ports internal to the CPU provide sufficient aggregate bandwidth to support the number of SATA III ports offered—up to their theoretical maximum speed. Other factors impact actual data rates, which is what then limits the data rate performance.

### Enter PCI Express

Another way to amplify the amount of storage within an array is to use the PCIe ports now proliferating on SBCs. And OpenVPX is best suited for this methodology. Newer SBC designs can provide four PCIe Gen 3 x8 ports with configuration options to create subsets consisting of multiple x4 or x2 pipes as well.

Using an off-the-shelf controller supporting PCIe Gen 2 x 8 inputs with outputs to eight SATA III ports can, for example, yield aggregate data rates across a PCIe Gen 2 x8 pipe up to a theoretical 32 Gbps. This is 30 percent higher than the theoretical aggregate maximum of 24 Gbps across four SATA III ports coming straight out of the CPU to the SATA III drives. Elma Electronic’s 3U VPX Model 5336/6 controller/dual drive SATA carrier card and 5332/3 dual drive SATA carriers are designed for this type of approach (Figure 2).

The bigger benefit is storage arrays up to 8 SATA ports enabled by the available PCIe-to-SATA controllers. In addition, multiple PCIe ports can be used in the same way with each supporting separate arrays. Consider multiple PCIe SBC ports with each driving data to up to eight SATA III drive volumes. In Figure 2, high bandwidth sensor data is pulled into the system front-end via an FPGA for preprocessing.

The resulting data is then processed through the SBC to a controller/carrier card for break out to eight separate drive volumes across four carrier cards. This approach makes use of known SATA drive technology, while tapping into PCIe connectivity. A PCIe-to-SATA controller approach for establishing a storage array has added flexibility when it comes to RAID solutions, since RAID can either be applied
via software or via built-in RAID options in the controller itself. In terms of current and time-tested technology, straight SATA and PCIe-connected SATA arrays are the norm, and take advantage of a large ecosystem of software and hardware products.

**PCIe SSDs: The Next Frontier**

Using a PCIe-to-SATA controller—essentially an interface protocol converter—has its ups and downs. As we’ve seen, it opens up new and creative ways to build storage arrays, as it lends another use for PCIe ports. It also adds hardware to the system, but there is a data rate penalty to pay almost any time a conversion takes place due to its overhead and management. Also, choices of newer PCIe-to-SATA controllers on the market are currently limited.

Given these various points, and since the embedded industry is always looking for new and better ways to improve performance, the next logical frontier revolves around developing straight PCIe-connected SSDs to take advantage of the quantum data rate leaps they provide and the flexibility offered in the PCIe architecture. This would eliminate the controller between the CPU and the array and replace it with a PCIe switch. The result is an increase in the top-end aggregate data rate as well as higher native data rates per SSD (Figure 3).

Several SSD manufacturers are now beginning to sell the devices in various sizes featuring native PCIe connectivity. Soligen now offers its Triton 2.5” SSD with a PCIe Gen 2 x 4 interface. Other manufacturers are joining in, with products boasting PCIe Gen 3 capability and, as a result, raw drive data rates can climb to as much as four times the SATA III interface rate of 6 Gbits/s.

**Advantage of Faster Speeds**

Consider a leading CPU that is driving a PCIe Gen 3 x 8 pipe through a PCIe switch at a maximum theoretical data rate of 64 Gbits/s. The implication is that for systems where fast data rates are the priority over capacity, fewer drives are needed due to the increase in per drive bandwidth. VPX board designs that support PCIe SSDs are forthcoming and will enable larger and faster extensible storage arrays than have been available in the embedded computing industry. As with the initial storage architectures discussed, RAID strategies for data redundancy and protection are supported via the PCIe fabric.

Beyond RAID protection, nearly all SSD products targeting defense applications now offer 256 AES-compliant data encryption as well as multiple levels of date erasure methods specific to various DoD agency requirements. Write-protection is a given with custom implementations, as required by end users.

**Rich Set of Choices**

With the evolution of connectivity choices and SSD technology comes a rich selection of architectural options to build local storage arrays, and data hungry applications will continue to push the boundaries of storage technology. Architecting a high capacity custom storage array as part of an overall computing platform requires a holistic approach taking into consideration the system level requirements. SATA and PCIe-based strategies will likely co-exist for years to come as each has its place, and balancing the system in terms of bandwidth and performance is key.

Choosing the right connectivity method is crucial, such as the use of cabling for inter-and intra-chassis communication, rear transition module usage or backplane slot-to-slot connectivity vs. front panel connections. VPX systems, by design, rely primarily on backplane slot-to-slot communications. In HPEC systems, designers must work within the given SWaP envelope—often with seemingly mutually exclusive design targets.

Software challenges abound when sorting through driver issues to obtain optimal performance, as do board interoperability challenges. Heat dissipation issues at the chassis level require keen attention to detail and experience with thermal management issues and rugged chassis designs must hold up to high levels of shock and vibration as required in the end application. While selecting the right storage for a system design is key, choosing a competent supplier with proven expertise in both storage and system definition enables faster time to market, streamlined project management and satisfied end users.

![Figure 3](image.jpg)

*The 533x Series high capacity storage modules enable extensible SATA storage arrays.*
Why Should Researching SBCs Be More Difficult Than Car Shopping?

Today’s systems combine an array of very complex elements from multiple manufactures. To assist in these complex architectures, ISS has built a simple tool that will source products from an array of companies for a side by side comparison and provide purchase support.

INTELLIGENTSYSTMSSOURCE.COM is a purchasing tool for Design Engineers looking for custom and off-the-shelf SBCs and system modules.
Although Computer-on-Module (COM) notion has a long legacy, when it became married with PCI Express the resulting COM Express brought it to a new level. COM Express adds high-speed fabric interconnects to the mix, enabling a complete computing core that can be upgraded when needed, leaving the application-specific I/O on the baseboard. In contrast to other COM standards like ETX, ITX and EBX—COM Express was conceived by an open standards effort and ratified by PICMG. Those other COM offerings are open but they are creations of sole vendors. COM Express is a sure bet in many ways but especially because continual progression of semiconductor integration means that a single computing module like COM Express will only get more powerful. Meanwhile the argument for a two-board solution—COM module and baseboard—becomes stronger and stronger as complete system electronics are possible on a single baseboard. With that in mind, highly compact or mobile military applications in particular are looking to COM Express solutions.

Another advantage of COM Express is the open creation of its spec plans where inherent for the expansion of video and display capabilities, and it provides standard connector access for a variety of high-speed interfaces. The COM Express connector supports multiple video interfaces including DisplayPort, VGA, SDVO, HDMI and DVI. On the I/O side COM Express provides an added advantage in that it enables users to deal with transitions from legacy connectors. It offers native interface support for modern-day I/O interfaces. On top of offering more PCI Express and USB ports than PC/104-Express modules, additional connectors can be added for LAN, SATA, video, audio, USB and PCI Express, delivering maximum I/O flexibility to meet specific application requirements. Because signals don’t have to pass through multiple connectors, the signal integrity remains intact.

A variety of processors are represented in the product Roundup displayed on the next couple of pages. Intel Atom and Core i7-based COM Express cards are well represented, along with “Skylake” Celeron and Freescale PowerPC QorIQ processor-based offerings. Also this year since the first emergence of Intel Xeon-D processors on COM Express. A handful of vendors however had no new COM Express products in the past 12 months and are therefore absent from this year’s roundup.

In an example COM Express application, Roboteam chose a COM Express board from Kontron to use in its product ROCU-7 (Ruggedized Operator Control Unit): a handheld controller with a 7-inch monitor for operating ground robotic systems.

Figure 1
Roboteam chose a COM Express board to use in its product ROCU-7 (Ruggedized Operator Control Unit): a handheld controller with a 7-inch monitor for operating ground robotic systems.
Type 10 COM Express Module Sports NVIDIA Tegra K1 SoC

Based on the NVIDIA Tegra K1 system-on-chip (SoC), Abaco Systems’ Mini COM Express module delivers 326 Gflops of performance in a 10 Watt budget, well beyond the performance typically associated with COM Express, to SWaP-constrained environments. The mCOM10K1’s on-board components are specifically selected for their reliability in demanding conditions. Unlike solutions designed for benign environments, the processor and memory are soldered to the board for maximum resistance to shock and vibration.

- COM Express mini, Type 10 form factor.
- NVIDIA Tegra K1 SoC.
- Up to 2 GB DDR3L SDRAM memory.
- Audio, Gbit Ethernet, GPIO, HDMI or DVI, SATA and Serial USB.
- Suited for rugged, video and graphics applications.
- Air cooling and conduction cooling available.
- Conformal coating optional.

Abaco Systems
Huntsville, AL
(866) 652-2226
www.abaco.com

Type 6 COM Express Core i7 Card Features Programmable Power

Acromag’s XCOM-6400 is a basic size platform (95 x 125mm) processor module with Type 6 interconnects. Several models are available with the 4th generation (Haswell) Intel Core i7 or i5 CPUs. Programmable power limit feature allows user to “dial-down” the maximum power consumption of the CPU in systems where power is a concern.

- Intel 4th Gen (Haswell) Core i7 or Core i5.
- Programmable CPU power.
- Intel 8-Series QM87 PCH chipset
- Up to 16 GB of DDR3L DRAM.
- Advanced heat management technologies.
- Up to -25 to 85 degrees C operating range.
- 7 ports of PCIe x1, SPI bus, LPC bus, SMBus, I2C.
- VGA Interface, 3x Digital Display Interface, eDP Interface (x2), HDA Audio Interface.
- Gbit Ethernet Media Dependent Interface (MDI), 8 USB ports, 4 SATA III Ports, 4 GP I/O.

Acromag
Wixom, MI
(248) 624-1541
www.acromag.com

16-Core Xeon-D SoC Rides COM Express Type 7 Board

The Express-BD7 is ADLINK’s first computer-on-module based on the latest PICMG COM Express 3.0 specification with new Type 7 pinout. The COM Express standard’s new Type 7 pinout, as compared to the Type 6 pinout, does away with all graphics support and replaces it with up to four 10GbE ports and an additional eight PCIe ports, bringing the total PCIe support to up to 32 PCIe lanes. The Express-BD7 targets customers building space-constrained systems that require high density CPU cores balanced by reasonable power consumption.

- Up to 16 cores Intel Xeon D Series SoC (formerly codename: Broadwell-DE).
- Up to 32 Gbytes of dual channel DDR4 with ECC.
- Two 10G Ethernet and NC-SI support.
- Up to eight PCIe x1 (Gen2), one PCIe x16 (Gen3); GbE, two SATA 6 Gbits/s, four USB 3.0/2.0.
- Supports Smart Embedded Management Agent (SEMA) functions.
- Extreme Rugged operating temperature: -40 to +85 degrees C.

ADLINK Technology
San Jose, CA
(408) 360-0200
www.adlinktech.com

COTS Journal | August 2016
COM Express Basic Module Serves up Xeon-D-1500 Processor

Advantech’s SOM-5991 is a COM Express Basic Module designed around the Intel Xeon Processor D-1500 family. This COM Express powered by a server-grade processor that boasts up to 16-core scalability; with integrated 10GbE Ethernet supporting KR and KX4 interfaces, it provides high bandwidth interfaces for data transmission-reception, and all within a basic form-factor of 125 x 95 mm with a Type 6 compliant pin-out. The computing capability and low thermal design power deliver better power efficiency and make it very suitable for microservers, networking, and cloud storage.

- Intel Xeon Processor D-1500 Product Family.
- COM Express R2.1 Basic Module Type 6 pin out compatible.
- Up to 16 core with TDP 45W.
- Dual DDR4 2400, 1.2V Low Power Memory, up to 32 Gbytes.
- PCIe x16, 8 PCIe x1, 2 x 10GBASE-KR interface.
- Supports iManager, SUSIAccess and Embedded Software APIs.

Advantech
Irvine, CA
(949) 519-3800
www.advantech.com

Xeon-D COM Express Card Features 48 Gbytes of DDR-2133 SDRAM

American Portwell’s PCOM-B634VG is designed with Intel Xeon Processor D Product Family with 8 CPU cores, 10GbE Ethernet supporting KR and KX4 interfaces, and up to 48 Gbytes of DDR4 ECC SDRAM, delivering powerful computing and excellent Ethernet performance. Gen3 PCIe x16 feature supports high-speed I/O card for extensive applications. With VGA and legacy interface support, customer can upgrade system easily and fast.

- Intel Xeon Processor D Product Family (codename Broadwell DE).
- Basic Form Factor COM Express Module.
- Up to 48 Gbytes of DDR4-2133 ECC SDRAM on three SODIMM slots.
- Supports VGA, HDMI and 10GbE interface.
- 4x SATA3, 4x USB 3.0, 7x USB 2.0.
- 1x Gen3 PCIe x16 and 8x Gen2 PCIe x1.
- Operating Temperature: 0 to 60 degrees C (optional -40 to 85 degrees C).

American Portwell
Fremont, CA
(510) 403-3399
www.portwell.com

COM Express Compact Module Has 15W Celeron Processor

Congatec’s COM Express Compact module conga-TC170 features the 2GHz dual-core Intel Celeron Processor 3955U with a configurable Thermal Design Power (cTDP) of 10-15W, which facilitates adapting the application to the energy concept of the system. The processor is based on the latest Intel 14nm microarchitecture (formerly codename Skylake). The module combines cost efficient dual-core CPU performance with state of the art features such as 4k multiscreen support, high-speed DDR4 RAM with increased bandwidth and four USB 3.0 ports.

- Intel Celeron 3955U (2 x 2.0 GHz, 2 M Cache, 15W).
- Intel Gen9 HD Graphics with HEVC (H.265) support.
- Up to 32 Gbytes of Dual-Channel DDR4 memory.
- 5 x PCI Express, 4 x USB 3.0 (XHCI), 8 x USB 2.0 (EHCI), 3 x SATA III.
- LPC bus, I²C bus, 2 x UART.
- Digital High Definition Audio Interface.
- High performance hardware MPEG-2 decoding support.
- Operating temperature 0 to +60 degrees C.

Congatec
San Diego, CA
(858) 457-2600
www.congatec.com
COM Express Module Serves up NXP QorIQ T4240 Processor

The XPedite5850 from Extreme Engineering Solutions is a ruggedized COM Express module that complies with the COM Express Basic form factor (95 mm x 125 mm) and supports an enhanced Type 5-based pinout. COM Express provides a standards-based form factor to bring processing to a wide range of applications. Available in both conduction- and air-cooled versions, the XPedite5850 supports the NXP (formerly Freescale) QorIQ T4 processors.

- NXP QorIQ T4240 processor with 12 dual-threaded Power Architecture e6500 cores at up to 1.667 GHz.
- COM Express Basic form factor (95 mm x 125 mm).
- Conduction- or air-cooled; Extended shock and vibration tolerance.
- Up to 16 Gbytes of up to DDR3-1866 ECC SDRAM in two channels.
- x4 and x8 PCI Express interfaces, 4 Ten Gbit Ethernet ports, 8 Gbit Ethernet ports, 2 serial ports, 2 USB 2.0 ports, 2 SATA ports.

Extreme Engineering Solutions
Middleton, WI
(608) 833-1155
www.xes-inc.com

COM Express Core and Xeon Modules Feature Embedded Security

The COMe-bSL6 (shown) and COMe-bSL6R E2S from Kontron are COM-modules based on the COM Express Basic standard form factor (125 x 95mm) and Intel 6th Generation Core / Xeon E3 v5 Family processors. Integrated high performance Intel HD Graphics or Intel Iris Pro Graphics with 128M of on-package cache memory, can support three independent displays with up to 4K resolution. The modules are equipped with Kontron’s standard hardware-based embedded Security Solution Approtect.

- Intel 6th Generation Core series / Xeon E3 v5 family with CM236/QM170 PCH.
- COM Express Basic, Pin-out Type 6.
- 2x DDR4-2133 SO-DIMM up to 2x 16 Gbytes (non-ECC/ECC).
- Rapid Shutdown offers an extremely fast shutdown to minimize data tampering.
- 4 SATA3 6 Gbit/s interfaces.
- 4x USB 3.0; 4x USB 2.0, 1x USB Client, 6x USB 2.0 and 8x PCIe x1.

Kontron
Poway, CA
(888) 294-4558
www.kontron.com

Type 6 Compact COMe Board Sports 5W Quad-Core Atom Processor

MSC Technologies’ MSC C6C-BW module family based on Intel’s current Atom processor platform (codenamed “Braswell”) has got a new member based on the Intel Atom x5-E8000. This quad-core processor has an extremely low power dissipation of maximum 5 W. It operates at a nominal clock rate of 1.04 GHz and can achieve 2.0 GHz in burst mode.

- Intel Atom x5-E8000 quad-core 1.04/2.0GHz, 2MB Cache, 5W TDP.
- Integrated Intel HD graphics Gen. 8.
- Up to 8 Gbytes of DDR3L (1333), 2x 204 pin SO-DIMM.
- Two SATA 6 Gbit/s mass storage interfaces.
- Two DisplayPort/HDMI/DVI interfaces; 1x Embedded DisplayPort interface.
- LVDS and CRT interface.
- Optional hardware based security compliant to Trusted Computing Group.
- 5 PCI Express x1 lanes. 4 USB 3.0 and 4 USB 2.0 interfaces.

MSC Technologies
San Bruno, CA
(650) 616-4068
www.mscembedded.com
Pentek has today announced the Onyx Model 71791 XMC module. The board is an L-Band RF tuner with two 500 MHz A/Ds based on the high density Xilinx Virtex-7 FPGA. The Model 71791 is designed for connection directly to SATCOM or communications system L-band signals. A front panel SSMC connector accepts L-Band signals between 925 MHz and 2175 MHz, typically from an L-Band antenna or an LNB (low noise block). With its programmable LNA, the Maxim MAX2121 tuner directly converts these L-Band signals to IF or baseband using a broadband I/Q analog downconverter followed by 123 MHz low pass anti-aliasing filters.

The two analog tuner outputs are digitized by two Texas Instruments ADS5463 500 MHz 12-bit A/D converters to capture the full 123 MHz bandwidth, three times that of Pentek's previous L-Band tuners. The Model 71791 features two Acquisition IP modules to easily capture and move data. Each module can receive data from either of the two A/Ds or a test signal generator. Architectural enhancements in the Onyx family include 4 Gbytes of 1600 MHz DDR3 memory and a Gen 3 PCIe interface, delivering peak transfer rates up to 8 Gbytes/s.

The Pentek GateFlow FPGA design kit gives users access to the complete factory installed IP at the source code level. Pentek's GateXpress PCIe configuration manager supports dynamic FPGA reconfiguration through software commands as part of the runtime application. This provides an efficient way to quickly reload the FPGA to slash development time. The Cobalt Model 71791 XMC is designed for commercial, rugged or conduction cooled operating environments. It is also available in several form factors, including 3U and 6U VPX, 3U and 6U cPCI; AMC and PCIe. The Model 71791 XMC module with 4 Gbytes of memory starts at $16,995. Additional FPGA, A/D and LVDS FPGA I/O options are available.

Pentek, Upper Saddle River, NJ
(201) 818-5900. www.pentek.com

### Rugged Horizontal Rails
**Target High Insertion Force Systems**

In OpenVPX the extreme board force can cause many standard horizontal rails, which provide the frame of the enclosure, to bend or crack. The new Pixus rails feature a thicker contact point and hardened design to protect against the extreme forces. Designed for modularity, the Rittal brand horizontal rails offered by Pixus meet IEC 60 297-3 and IEEE 1101.10 specifications. The rails have a .1 HP (horizontal pitch) hole pattern to allow the precise installation of guide rails in various increments. The rails are standardly 84 HP without machining on the end faces, and Pixus offers them cut in any length.

Pixus Technologies
Waterloo, Ontario, Canada
(519) 885-5775
www.pixustechnologies.com

### 100 Gbps ATCA Backplane
**Meets IEEE802.3bj Specifications**

Pentair has introduced its first 100 Gbps Schroff AdvancedTCA backplane, verified according to the design requirements of the IEEE802.3bj specifications for 100 Gbps Ethernet. The IEEE802.3bj specification defines two encoding techniques for 100 Gbps: 100BASE-KR4 (NRZ=PAM2 encoding) and 100BASE-KP4 (PAM4 encoding). The IEEE802.3bj specification for 100 Gbps Ethernet details the requirements for a 100 Gbps transmission path in printed circuit boards. Since its adoption, PICMG has defined the 100 Gbps requirements for AdvancedTCA backplanes and blades. The first backplanes have been delivered and are already being used in ATCA systems.

Pentair Technical Solutions
Warwick, RI
(401) 732-3770
www.pentairequipmentprotection.com
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MIL-STD-810G
MIL-STD-901D
MIL-STD-167
MIL-STD-461
DO-160
IP66
Half-Size VITA 66.4 Module Supports VITA 66.1 and 66.4 Standards

TE Connectivity (TE) has announced a new Ruggedized Optical Backplane interconnect systems that provide a high-density, blind-mate optical interconnect in a backplane/daughtercard configuration. The half-sized connectors are fully compliant to the ANSI/VITA 66.4 standard. The new fiber optic ribbon cable interconnect feeds through the backplane to removable system modules using MT ferrules. The VITA 66.1 modules are full width and accommodate two MT ferrules, and the VITA 66.4 modules are half width and hold a single MT ferrule. Two VITA 66.4 modules can fit into the same space as a VITA 66.1 module.

Designed for rugged embedded computing applications, the optical modules are compatible with VPX and other high-performance standards. The protective cover is made of anti-static material, and the connector mounting screws contain a pre-applied anti-vibration material to help withstand vibration. The modules have an operating temperature range of minus 20 degrees Celsius to 85 degrees Celsius and can withstand 100 cycles, as tested per EIA-455-21.

Three FMC Carrier PCIe Cards Feature High Performance FPGAs

VadaTech has launched three new FMC carriers in the PCI Express form factor. The PCI516, PCI592 and PCI595 cards are ideal for bringing PCIe systems up to date with the latest FPGAs, or for integrating high-end FMCs. All three cards provide direct connections to neighboring cards, avoiding the need to stage data through the host processor, so optimizing throughput and minimizing latency for high-performance applications. Active cooling is provided for both the FPGA and FMC, making the modules ideal for power-hungry applications or those requiring temperature stability for good performance.

The PCI516 features a Xilinx Virtex-7 690T FPGA, which provides 3,600 DSP slices, 52,920Kb RAM and 690,000 logic cells. The PCI592 features a Xilinx Kintex UltraScale XCKU115 FPGA, which provides 5,520 DSP slices, 75.9 Mbit RAM and 1,451,000 logic cells. The PCI595 features the Xilinx Virtex UltraScale XCvu440 FPGA, which provides 2,880 DSP slices, 886 Mb RAM and 5,541,000 logic cells. The FPGAs on these new PCIe cards are supported by 64-bit wide memory banks, which allow for large buffer sizes to be stored during processing as well as for queuing the data to the host. VadaTech provides BSP support and royalty-free VHDL code to support developers in bringing up systems.

Vadatech, Henderson, NV
(702) 896-3337. www.vadatech.com
**Xeon D SBC Family Boasts Up to 16 Cores and Extended Temp Support**

Extreme Engineering Solutions’ Intel Xeon D-1500 family processor-based single board computers now support up to 16 Xeon-class cores in a single, power-efficient, System-on-Chip (SoC) package with native extended temperature support on four, eight, and twelve core-count SKUs. Originally available with up to eight cores, the Intel Xeon D processors are now available with support for 12 and 16 cores in a single processor. Intel Xeon D processors have built-in hardware virtualization that facilitates dynamic provisioning of services, enabling communication service providers to extend network functions virtualization (NFV) further than had been possible previously.

Intel now offers native extended temperature support for Intel Xeon D processors with up to 12 cores. Intel designed these processors to operate between -40 to 85 degrees C, reducing the need for X-ES engineers to perform independent temperature screening. Thermal Monitoring Technologies protect the processor package and system from thermal failure by means of several thermal management features. An on-die Digital Thermal Sensor (DTS) detects the core’s temperature, and when required, thermal management features reduce package power consumption to lower temperatures and remain within normal operating limits. These thermal stress mitigating features help extend the life of deployed single board computers by reducing the likelihood of overheating and associated component fatigue. X-ES can integrate any of its Intel Xeon D processor-based 3U VPX or 6U VPX single board computers into a reliable, long-term, embedded solution. Choices include the 3U VPX XPedite7670, XPedite7672 (shown), XPedite7674, or XPedite7676 or the 6U VPX XCalibur4640 or XCalibur4643.

*Extreme Engineering Solutions*
Middleton, WI
(608) 833-1155
www.xes-inc.com

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**High Efficiency VITA 62, 3U DC/DC VPX Supply Provides 500 Watts**

North Atlantic Industries (NAI) has announced the availability of its latest 3U rugged VPX power product the VPX55H-3. The VPX55H-3 provides up to 500 W of power (CC4 temperature range, full load) with six outputs and is compliant with MIL-STD-704F. Other features include current share, remote error sensing and a built-in EMI filter compliant with MIL-STD-461F—all within a single slot 0.8-inch pitch, 3U package. The VPX55H-3 is designed to meet standard 3U VPX mechanical requirements and has VITA 62 compatible keying, outputs and signaling, user programmability, FC communications, geographical addressing, programmable over-temperature monitor, and a five-state, status LED. Basic pricing configuration starts at $2,906 each in quantities of 100.

*North Atlantic Industries*
Bohemia, NY
(631) 567-1100
www.naii.com
Inverter Delivers 1200 Watts of Clean, Regulated AC Power

Behlman Electronics has upgraded its INV-1200 Inverter in response to customer requests. In the past, Behlman rated the power output of its INV-1200 Inverter as 1200 VA, which required some users to do the math to come up with output Watts (960 Watts at a pf of 0.8 or 840 Watts at a pf of 0.7). Now, with the new INV-1200 Gen 2 Inverters, there is a 25 percent increase in output power to 1200 W at 55 degrees C (133 degrees F) with no derating. In addition, when including Option D1 or A1 (AC bypass and Alarms), the transfer time is less than 30 milliseconds.

The new Behlman INV-1200 Gen 2 DC to AC Inverter delivers 1200 Watts of clean, regulated AC power in a 3.5 inch high (2U) rack-mount chassis. It provides numerous features that support industrial, commercial and military operation of sensitive electronics. These include sine wave output; low total harmonic distortion; unique overload protection; excellent line and load regulation; short circuit and thermal protection; optional bypass with alarms and LEDs for DC IN and INVERTER OK.

Behlman Electronics
Hauppauge, NY
(631) 435-0410
www.behlman.com
EIZO Rugged Solutions (formerly Tech Source) has announced the Condor 4107xX conduction-cooled XMC graphics card with OpenCL support. Based on the AMD E8860 GPU and designed for seamless integration with VPX SBCs, the low-power, SWaP-optimized Condor 4107xX XMC graphics/video card provides 3G-SDI video capture capability with dual 3G-SDI video inputs and outputs on the rear XMC I/O connector. The 3G-SDI interface supports the HDTV resolution (1080p) at the full refresh rate of 60 Hz. It can also carry video up to 100 meters on thin coaxial cables that are far smaller and lighter compared with RGB and DVI interfaces.

The AMD GPU on the Condor 4107xX supports OpenGL, DirectX, and OpenCL and can be used for high-performance GPGPU applications. This enables developers to capture video data from a camera or other SDI source, perform video tracking or analysis on the data using the GPU, and then send the 3G-SDI video to a compatible display device. Applications can access video streams in the form of raw frames for processing, 360 degree stitching, frame/video analysis, compression, or video streaming. All decoding, scaling, video combining, and format conversions can be performed in the GPU with minimal impact on the CPU.

EIZO Rugged Solutions
Altamonte Springs, FL
(407) 262-7100
www.eizorugged.com

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Superior Rugged Metal Claw

If you are ready for a more robust handle/panel solution, come to Pixus! Our OpenVPX handles feature a metal engagement claw and rugged design that ensures the highest reliability. Ask about our new rugged horizontal extruded rails with thicker material for OpenVPX and high insertion force systems today!

sales@pixustechnologies.com
pixustechnologies.com
Fanless Embedded Computer Features Quad Core Atom E3800

DFI Tech offers a higher performance quad core processor in its rugged EC series fanless computing systems. The EC700-BT Fanless Embedded System from features an Intel Atom E3845 quad core 1.91 GHz processor and 4 Gbytes of DDR3L ECC on-board memory. The lightweight fanless system is rugged, conforming to MIL-STD-810F (514-5C-2) for vibration and can handle 15G half sine wave of shock for 11 ms in 3 axes. The EC700 can be wall-mounted or VESA-mounted and supports expansion for 3 Mini PCIe, 1 mSATA storage, 1 SIM card, and 1 microSD. There is also I/O of 8-bit DIO, 4 serial ports, 5 USB, 2 WiFi antenna holes, 1 VGA, 1 HDMI, and 2 LAN.

DFI Tech
Sacramento, CA
(916) 568-1234
www.dfitech.com

I/O Platform Adds a Reconfigurable Xilinx Artix-7 FPGA Module

Acromag’s new APA7-200 series provides a user-customizable FPGA on an AcroPack mezzanine module. The module plugs into a connector on an AcroPack carrier to add up to 48 TTL or 24 EIA-485/422 I/O signals or a mix of both types. Mix and match I/O combinations in a single slot for embedded applications. The APA7-200 offers a wide operating range of -40 to 85 degrees C. Reconfiguration of the FPGA is possible via a direct download into the flash configuration memory over the PCIe bus. APA7-200 modules begin at $900 each along with a recommended one-time purchase of the $310 Engineering Design kit software.

Acromag
Wixom, MI
(248) 295-0310
www.acromag.com

Keyboard/Mouse Switch Enables Seamless Use of Four Computers

Adder has announced the CCS-PRO4, a keyboard/mouse switch that enables users to interact with up to four computers using a single mouse and keyboard where normally four sets of mice and keyboards would be required (one per computer). The operator can simply move the cursor across screen borders to instantly select the computer they need to control, providing the experience of a single desktop, all in a hardware solution with no software required. The system is perfect for applications that require data from computers to be always visible and accessible, such as Command and Control rooms and 911 applications. It is currently being used on AC-130 gunships, Navy ships and Army 911 Call Centers.

Adder
Newburyport, MA
(888) 932-3337
www.adder.com
Curtiss-Wright’s Defense Solutions has announced its first quad-core, 5th generation, Intel Core i7 (Broadwell) processor-based, small form factor (SFF), modular mission computer, the Parvus DuraCOR 80-42. The DuraCOR 80-42 features an integrated Intel Iris Pro Graphics GPU to support OpenGL-based graphics-intensive applications. It also supports OpenCL on the 40-core GPU, providing up to 640 GFLOPS of performance for data processing-intensive applications. Its powerful Advanced Vector Extensions accelerate math-intensive algorithms.

The highly rugged mission computer supports the full -40 to +71 degrees C military operating temperature range without active cooling or moving parts such as fans. The DuraCOR 80-42 is designed to meet extensive qualification testing, including MIL-STD-810G, MIL-STD-461G, MIL-STD-1275D, MIL-STD-704F and RTCA/DO-160G conditions for environmental, and power (thermal, shock, vibration, dust, water, humidity, altitude, power spikes/surges). The unit’s test regimen also includes expanded conducted/radiated emissions and susceptibility EMI qualification testing, including CS114, CS115 and CS116, to pre-validate the design and reduce risk. For demanding aircraft power transfer requirements, the unit also supports 50 ms power hold-up under MIL-STD-704 and 200 ms for DO-160. For enhanced reliability, the unit adds comprehensive built-in-test (BIT) self-diagnostics for critical failure identification and can support N+1 failover power supply redundancy requirements for mission critical applications.

Curtiss-Wright Defense Solutions
Ashburn, VA
(703) 779-7800
www.curtisswrightds.com

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For more information on any of these products, or assistance please contact us and we will help you the best we can.

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cots@sundance.com • www.sundance.com

Photo: U.S. Air Force / Sr. Airman Nathanael Callon

Digital-to-Analog Converter Delivers 14-Bit 125 MHz Performance

Datel has introduced the DAC-1412 series, a new line of Digital-to-Analog converters that offer 14-bit resolution and are housed in 28-pin plastic TSSOP package. It is offered in two enhanced Commercial off the Shelf (COTS) grades, DAC-1412SE (-40 to +105 degrees C) and DAC-1412SM (-55 to +125 degrees C). Each unit features no missing codes, ±1.5 LSB of Differential Non-Linearity, ±2.0 of Integral Non-Linearity and is 100 percent tested for performance across temperature range listed above. The DAC-1412 requires only one supply voltage for operation; ranging from +2.7 to 5.25 V, and consumes only 30mA of supply current. It has a “sleep mode” feature that reduces power consumption only 20µA.

Datel, Mansfield, MA
(508) 964-5397. www.datel.com

COM Express Card Has 6th Gen Core Processor and Embedded Security

Kontron has announced the first product in the company’s new embedded hardware security solution product line. The first product in its Security Solution line is the Kontron Approtec, a hardware and software solution that includes an embedded hardware security module and a software framework that provides full protection features. Beginning with the 6th generation Intel Core processor, all Kontron products will be equipped with hardware-based embedded security as a “Kontron Standard”. The first Kontron product with the Kontron Security Solution is the COM Express card COMe-cSL6, which is available now. Additional products to follow include the COM Express basic form factor and all of Kontron’s motherboard products.

Kontron America, Poway, CA
(858) 677-0877. www.kontron.com

Photo: U.S. Air Force / Sr. Airman Nathanael Callon

Digital-to-Analog Converter Deliver 14-Bit 125 MHz Performance

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(508) 964-5397. www.datel.com

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Kontron America, Poway, CA
(858) 677-0877. www.kontron.com

Photo: U.S. Air Force / Sr. Airman Nathanael Callon

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For more information on any of these products, or assistance please contact us and we will help you the best we can.

Sundance Multiprocessor Technology Ltd.
cots@sundance.com • www.sundance.com

Photo: U.S. Air Force / Sr. Airman Nathanael Callon
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From concept to production, we aim to partner with you at every level to help you meet the challenges of your industry.

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**High-Density 1500 W Front End Power Supplies Deliver 1,500 Watts**

Murata Power Solutions has announced the D1U54P-W-1500-12 series of 1500 W power supplies. Packaged in an industry-standard 1U format measuring 54.5 x 40 mm (2.15 x 1.57 inches), it has a length of 12.65 inches. It offers a power density of more than 35 W per cubic inch and exceeds the 80 PLUS Platinum efficiency requirements. Featuring a 12 VDC main output, it also provides optional standby outputs of 12 VDC, 5 VDC, or 3.3 VDC output. These hot-pluggable units are capable of N+1 redundancy and feature active current sharing (ORING FET) permitting connection of up to eight in parallel.

Control and monitoring features include an PC compatible PMBus interface and front panel LED status indicators. Overvoltage, overcurrent, and over temperature protection is included across the range. Forced air cooling is facilitated by a low noise, variable speed fan; the direction of air flow, front to back or back to front, can be specified at the time of order. The D1U54P-W-1500-12-HxTC is an AC input unit accommodating the full universal input range from 90 to 264 VAC. The D1U54 series is targeted for distributed power architecture applications and is ideal for use with networking equipment and server and storage systems.

*Murata Power Solutions*
*Mansfield, MA*
*(508) 339-3000*
*www.murata-ps.com*
VTI Instruments has introduced its SentinelEX PXI Express (PXIe) Switching Series, the latest addition to its SentinelEX PXIe Test and Measurement Suite. The PXIe Switching Series includes 11 multiplexer modules, 4 matrix modules, 2 general-purpose switching modules, 1 power switching module, 16 RF multiplexer modules, 2 RF matrix modules, and 11 microwave switching modules. They are compatible with 18-slot and 9-slot 3U PXI Express mainframes and a 4-slot portable PXI-hybrid mainframe, as well as digitizer, arbitrary waveform generator, programmable resistor, digital I/O, embedded controller and remote controller modules, all included in the SentinelEX PXIe Test and Measurement Suite.

VTI Instruments, Irvine, CA. (949) 955-1894. www.vtiinstruments.com

4DSP’s VPX370 is a second generation VPX development platform in a compact 3U VPX form factor. The VPX370 is a 6-slot system with a modular architecture that enables users to add high performance FPGA and I/O to the base configuration addressing many application requirements such as digital RF memory (DRFM), synchronous multi-channel MIMO systems, software defined radio (SDR) and more. All 4DSP FPGA, I/O technology, and backplanes used in the VPX370 can be configured for rugged conduction cooled form factors making the system an ideal platform for developing IP and technology with an easy migration path to a deployed rugged system such as the VPX362.

4DSP, Austin, TX. (800) 816-1751. www.4dsp.com

TEWS Technologies has added PCI Express carriers to its product portfolio. The TPCE278 is a standard height PCI Express Revision 3.0 compatible module that provides one slot for a single-width XMC module. It provides a versatile way to upgrade well known XMC I/O solutions to the PCI Express signaling standard used to build modular, flexible and cost effective I/O solutions for all kinds of applications. The PCI Express x4 link from the host board to the XMC module is enhanced by a PCIe Gen3 Redriver, allowing safe operation of XMC modules on PCIe mainboards.

The TPCE278 supports XMC front panel I/O, and also P14 and P16 rear I/O independently.

XMC P14 rear I/O is provided through a Tyco AMPMODU System 50 0.050x0.100 flat ribbon cable connector. The I/O lines are routed differential. XMC P16 rear I/O is implemented through two Samtec QTH-DP 0.50mm Q Pairs High Speed Ground Plane Socket Strip, Differential Pair connector providing access to all P16 I/O lines. The PCIe edge card connector provides:+12V and +3.3V. The TPCE278 uses the +12V of the PCIe edge card connector to generate all power supply voltages for the XMC slot (+3.3V, VPWR and +12V).

For increased power requirements of an XMC module, TEWS offers TPCE278 variants with a PCIe Graphics Power Connector to supply the +12V for generating all the power supply voltages for the XMC slot providing power of up to 75W. A 10-pin JTAG header is available for XMC module debugging purposes. All five JTAG signals are routed directly to the XMC slot. Designed for demanding environments, the TPCE278 operates from -40 to +85 degrees C.

TEWS Technologies
Reno, NV
(775) 850-5830
www.tews.com
LXI Digitizers Deliver Fully Synchronous Multi-channel Acquisition

Spectrum Instrumentation has expanded its popular LXI-based digitizer NETBOX series by releasing eight new DN6.49x digitizers offering from 24 to 48 fully synchronized channels. The instruments are ideal for applications where a large number of signals need to be acquired and analyzed with speed and precision. Each channel of a DN6.49x series digitizer is equipped with a high precision 16 bit analog-to-digital converter (ADC) and a versatile front-end amplifier that features six input ranges from ±200 mV up to ±10 V, switchable input impedance (50 Ω and 1 MΩ) and programmable offset. Users can choose between models that offer maximum sampling rates of 10 or 60 MS/s with on-board acquisition memory of either 64 Msamples (128 Mbytes) or 128 Msamples (256 Mbytes) per channel.

All the ADCs are clocked synchronously to ensure signal timing and inter-channel phase relationships are always preserved. The flexible front-end and clocking system are complemented by advanced trigger circuitry to capture the widest range of input signals. The 16 bit ADCs typically offer much better resolution than other measuring systems, such as scopes or analyzers, and optimized digitizer performance allows the finest signal details to be detected.

EIZO Rugged Solutions
Altamonte Springs, FL
(407) 262-7100
www.eizorugged.com

Rugged H.265 (HEVC) Video Encoder Boasts Dual 3G-SDI Inputs

EIZO Rugged Solutions (formerly Tech Source) has introduced the Tyton VS2—a low-latency, high-efficiency rugged H.265 (HEVC) video encoder with dual 3G-SDI inputs. The Tyton VS2 is a ruggedized small form factor box-level video encoding and streaming solution designed to serve video transmission needs in harsh field environments. The MIL-STD-810G and IP67 compliant Tyton VS2 is capable of capturing two 3G-SDI inputs simultaneously and encoding them using the highly versatile H.265 (HEVC) or H.264 (AVC) video encoding standards.

Both video inputs can be internally split and routed to each of the product’s eight built-in dynamic encoding engines (1080p60 encoding utilizes two engines and HD utilizes a single engine); each individually configurable to different bitrates. Each of the Tyton VS2’s eight dynamic encoding cores can individually be configured to encode to H.264 or H.265 standards using software API settings, allowing true future proofing of existing installations looking to utilize H.265 in the future. The Tyton VS2 also features an internal video (3G-SDI) bypass and overcomes the need for an external video splitter. The Tyton VS2 features a hardware implementation of CoT (Cursor on Target) and KLV (Key Length Value) metadata insertion.

EIZO Rugged Solutions
Altamonte Springs, FL
(407) 262-7100
www.eizorugged.com

50-Foot Dual Outlet Extension Cord Boasts Explosion-Proof Operation

Larson Electronics has announced a heavy duty extension 50-foot cord equipped with two twist lock receptacles designed to provide secure connection of explosion proof equipment in hazardous locations. The EPEXC-50-2X20A-12.3 explosion proof extension cord from Larson Electronics is designed to extend the reach of equipment in hazardous locations where power receptacles are not in close proximity to the work space. This cord is fitted with two explosion proof twist lock receptacles constructed of non-sparking aluminum for connection of equipment. It is terminated with a 20 amp explosion proof plug on the other end for safe and secure connection to power receptacles.

Larson Electronics
Kemp, TX
(903) 498-3363
www.larsonelectronics.com

COTS Journal | August 2016

FIND the products featured in this section and more at intelligentsystemssource.com
Tech Recon: Update/Review from Intel Developer Forum 2016 (IDF16) San Francisco

Intel technologies ranging from processing to connectivity to visual intelligence have become staples for today’s military system designs. The annual Intel Development Conference (IDF 2016) in San Francisco showcases the latest innovations of the world’s largest silicon supplier along with its future roadmap. In this era where the PC is less of a sole driver of Intel’s universe, a greater focus is now on vertical markets like virtual reality, drones, intelligent things and big data. COTS Journal’s staff was there and this section examines the key technology topics and product exhibits we saw at IDF 2016.

Special Feature: Cooling Options for Rugged Box Systems

Because military system developers are risk-adverse by nature, it’s taken years for acceptance of any kind of cooling technique more exotic than clever heatsink configurations. But as demand for more computing power continues, methods like liquid cooling, spray cooling and even fan-based cooling are being designed in and deployed by some, and at least considered by others. This section looks at the tradeoffs and technology choices out there for cooling rugged box systems.

System Development: Open Standards for Navy Modernization

Military shipboard computing systems have quite different requirements than their air- and land-based counterparts. In today’s modernization programs space is usually less of an issue, but the goals of highly automated systems and advanced ISR gear keep the demand for compute density high. And recently cloud computing and virtualization are part of this discussion. Rackmount systems, ATCA and other bladed solutions are attractive. This section looks at the technology trends of some of the key Navy modernization programs.

Data Sheet: Rackmount Systems Roundup

When the goal is packing in as much compute density into a system as possible, it’s hard to beat a rackmount blade-computer architecture. Naval platforms need such technology to increase their levels of automation aboard ships. A wealth of product and system solutions is available targeting military applications with these requirements. This Data Sheet section updates readers on these trends and provides a product album of representative rackmount system products.
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Number of JASSM cruise missile Lockheed has delivered to the U.S. Air Force. The company recently delivered the 2,000th Joint Air-to-Surface Standoff Missile (JASSM) completed under the 12th production lot. Lot 12, which began production in January 2016, includes 150 baseline JASSM cruise missiles and 60 JASSM-Extended Range (ER) missiles. Armed with a penetrating blast-fragmentation warhead, JASSM and JASSM-ER can be used in all weather conditions. These cruise missiles employ an enhanced digital anti-jam GPS receiver and infrared seeker to dial into specific points on targets.

Length of Unmanned Surface Vessel ARCIMS that will be part of the Royal Navy’s Unmanned Warrior exercise where it will demonstrate its unmanned mine hunting capability. The unmanned mine hunting element of the exercise will feature Northrop Grumman’s AQS-24B towed mine hunting sensor operated from an Atlas Elektronik UK ARCIMS USV. The AQS-24B, which is a towed mine hunting sensor used by the U.S. Navy, features the world’s only high speed synthetic aperture sonar for mine detection, localization and classification, and an optical laser line scan sensor for mine identification.

Driving distance for Textron Systems Canada’s Tactical Armoured Patrol Vehicle (TAPV) as part of a very rigorous Reliability, Availability, Maintainability and Durability (RAMD) test program during which it faced multiple operational tests, including driving on challenging terrain representing operational profiles prescribed by the Canadian Army. Textron has announced the delivery of the first TAPV to the Canadian Army. The TAPV is a 4x4 wheeled armored vehicle specifically engineered and designed to provide survivability, mobility and versatility over the full spectrum of operations.

The number of aging CH-53E helicopters to be repaired as part of a three year effort. U.S. Marine Corps has begun a full reset of its CH-53E Super Stallion heavy lift helicopters, an effort aimed at significantly increasing the number of operationally fit aircraft and addressing systemic issues. The issue first came to light following the 2014 crash of an MH-53E Sea Dragon—the Navy’s version of the aircraft—during a training exercise. Three sailors onboard were killed. The crash prompted an inspection of all CH/MH-53s for signs of chaffing between cabin fuel tubes and electrical wiring.
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