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2014

RESOURCE GUIDE

Schroff offers a family of PICMG 3.0 Rev 3.0 compliant 40 Gbps systems, in Dual Star, Dual-Dual Star, and Full Mesh configurations with cooling up to 450 W per slot.



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The Annapolis Micro Systems WILDSTAR 6 for AMCs leverages a Xilinx Virtex-6 FPGA and Freescale P1020 or P2020 in a full-size AdvancedMC form factor.

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FOUNDING OF PICMG

1994

PICMG 1.0 RELEASE

1994

COMPACTPCI RELEASE

1995

ADVANCEDTCA RELEASE

2002

ADVANCEDMC RELEASE

2004

COM EXPRESS RELEASE

2005

40G ADVANCEDTCA ENHANCEMENT

2012

The Centellis 8000 Series from Artesyn Embedded Technologies is a suite of PICMG 3.1 Rev. 2.0-compliant 40G AdvancedTCA systems.



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20 years of technology from the PCI Industrial Computer Manufacturers Group (PICMG) has yielded more than a dozen specification families with more sure to come. The 2014 *PICMG Systems & Technology Resource Guide* highlights these specifications with products such as the WILDSTAR 6 for AMCs from Annapolis Micro Systems, Inc.; Schroff's 450/40 Series ATCA chassis; and the Centellis 8000 series of 40G ATCA platforms from Artesyn Embedded Technologies.

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The big Embedded World

By Joe Pavlat

 jpavlat@opensystemsmedia.com

While we have tended to focus on high-end platforms like AdvancedTCA (ATCA) over the last couple of years, the embedded computer world is much broader than that and a recent trip to a very large, non-telecom-oriented trade-show made that very clear.

The Embedded World tradeshow and conference was held February 25-27 in Nuremberg, Germany. Over 850 exhibitors from 35 countries exhibited their products and technologies, and more than 26,000 people attended. The show occupied six exhibit halls at NürnbergMesse, and is now the world's largest that is strictly devoted to embedded technologies. There was very little telecom equipment, as most of those suppliers were at Mobile World Congress in Barcelona, which was held the same week.

Jessica Isquith, Vice President of Marketing at PICMG, attended the show with me. We spoke about PICMG at a press conference organized by MEN Mikro Elektronik GmbH, and visited the more than 50 PICMG member companies exhibiting there. Jessica and I were absolutely amazed at how many PICMG-compliant products were on display, which made it clear just how global the PICMG organization has truly become; just about everyone we talked to knew about PICMG.

Two things were especially surprising to me. First, virtually every vendor who builds CompactPCI (CPCI) – which remains very popular – was showing CompactPCI Serial (CPCI Serial) products: boards, chassis, and complete systems. We saw CPCI Serial gear in dozens of booths, making it fairly clear that this technology, which was developed largely in Europe, is being adopted more broadly there than in the U.S. and Asia. Its successes are based on its roots in the trusted CPCI

platform, as well as much faster serial interfaces that allow CompactPCI Serial to compete with technologies like VPX, but at a much lower cost.

The CompactPCI Serial specification was released in March 2011 and is being adopted more quickly than the five or so years it takes most embedded technologies to reach widespread deployment. The technical committee that developed the specification was headed by Manfred Schmitz of the aforementioned MEN Mikro Elektronik, and that committee is now ready to release Revision 2 of the spec that will allow for increased innovation by incorporating more user-defined rear I/O pins and a more flexible way to use Ethernet, which can be used for external communications or to interconnect up to eight CPUs in the same chassis.

The second thing that struck us was that COM Express seemed to be everywhere. There are dozens and dozens of Small Form Factors (SFFs) in existence,

but COM Express seems to be the most popular with the broadest support. That a mature organization like PICMG is managing its evolution – and not just a few companies – was mentioned by quite a few people.

Most attendees we spoke with believe the global COM Express board market to be in the 2-4 million units per year range. The development of Rugged COM Express, which provides surfaces on all four edges of the board that can be clamped to a metal clamshell, will open COM Express to more aerospace and defense and rugged industrial and transportation applications. Rugged COM Express is a mechanical adaptation of the core PICMG COM Express standard, the mechanics of which are being developed in the VITA Standards Organization (VSO) under the specification name VITA 59. This joint effort represents the second time PICMG and VITA have worked together, the first being the adoption of ATCA platform management technology in OpenVPX. 





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Pitted against pizza boxes: AdvancedTCA in the “datacom” environment

Q&A with Jacques Houde, Pixus Technologies

As telecom and data center requirements continue to merge, AdvancedTCA (ATCA) has found itself vying for position with small pizza box servers in the new “datacom” environment. Although new technologies such as Software-Defined Networking (SDN) and Network Functions Virtualization (NFV) have some industry experts forecasting that arrays of inexpensive 1U servers will handle the compute in future data center settings, Jacques Houde of Pixus Technologies explains how ATCA’s mechanical benefits and enhancements in AdvancedTCA Extensions (PICMG 3.7) will afford the specification roles in data aggregation. Edited excerpts follow.

How are the packaging requirements for communications platforms shaping up in the new ‘datacom’ environment?

HOUDE: Certainly from a historical perspective, both the Network Equipment-Building System (NEBS) and European Telecommunications Standards Institute (ETSI) standards have proven to be instrumental in providing a structured framework for operators and providers of telecom systems. Thus far, these standards have managed to find traction in the “datacom” center. Like everything in the technology world, things continue to evolve and it is no different here. This is extremely evident in efforts by Google and Facebook, such as Open Rack,

to start the process of defining new equipment rack and compute frameworks for datacom.

“... ATCA is designed to handle 7000 W-plus in a single shelf, which is not a likely scenario in a pizza box.”

How are predictions that network processing will be handled by arrays of pizza box servers in the near future affecting NEBS- and ETSI-compliant systems?

HOUDE: AdvancedTCA (ATCA) is, by specification, compliant to NEBS and to a large extent ETSI standards. Pizza boxes are not driven by any specification other than mechanical form factor.

From a compute perspective, pizza boxes provide for a better size versus compute density than NEBS and ETSI systems. Where the pizza boxes fall down is in their ability

to provide for large amounts of I/O, and they are more typically designed to fail-over at the box level.

As stated previously, pizza boxes are very much likely to take over the compute aspect, be it in datacom or telecom. Those data crunchers are going to require access to a lot of data, and that is where we see ATCA migrating. It is easy to imagine an ATCA 3.7 dual-sided shelf replete with boards whose front panels are stacked with fibers (Figure 1). Even as a data aggregation box these systems will dissipate large amounts of power, and ATCA is designed to handle 7000 W-plus in a single shelf, which is not a likely scenario in a pizza box.

How do the cable management schemes of ATCA benefit datacom deployments?

HOUDE: Again, this is where the ATCA specification shines. Cable management is part of the specification, and over the years vendors have devised fantastic methods of dealing the hoard of cables and fibers that can be present. Being compliant to NEBS and ETSI also means that the shelves are designed, for the most part, to be serviced while in operation. The downside to all of this is invariably cost and size, as a lot of circuitry, connectors, software, and mechanics go into making this possible.

There is finite amount you can do with ATCA as far as size goes. Boards are a specific size and you need to live within that. In fact, the upcoming 3.7 Extensions will allow for boards to span multiple slots. That will allow for higher power density within each board, which will help somewhat with cost and power reduction.

How are packaging companies working to improve power efficiency in ATCA as industry moves towards "green computing" implementations?

HOUDE: The ATCA infrastructure has, from the beginning, allowed for the availability of information that can allow system developers to minimize power usage. A board's power budget can be increased or decreased and the cooling system can be throttled up or down to meet changing demands, both of which allow for minimum power use.

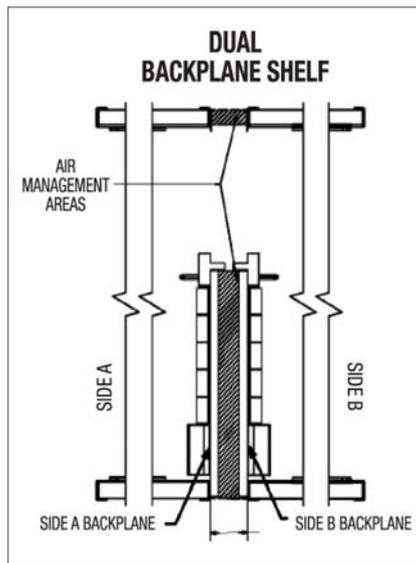


Figure 1 | AdvancedTCA Extensions (PICMG 3.7) allows for double-sided shelves and extended Rear Transition Modules (eRTMs) to equip more density in a single chassis for data aggregation applications.

The upcoming 3.7 Extensions takes this even further by encouraging the use of more sensors to allow for better power monitoring and control.

At what point will datacom environments require a cooling method other than air?

HOUDE: Datacom is probably not an issue at present given the controlled environment.

In telecom that point is probably now unless certain restrictions are reduced – specifically noise and temperature rise. Unless unless you lower the intake air temperature you need to move a tremendous amount of air. That requires larger air movers, which require more space and result in more noise. There is a point where the size of the unit will no longer be an effective use of space. The easiest way to overcome this is with the use of local air conditioners that are designed to handle the racks on both sides of the unit. You also have to factor in that telcos are designed to dissipate a certain amount of heat per square foot of floor space.

Jacques Houde is President of Pixus Technologies.

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SWaP and ease of integration keep CompactPCI deployed in unmanned vehicles

By Brandon Lewis

The MQ-8B Fire Scout employs 3U CompactPCI boards for its Payload Interface Unit (PIU). U.S. Navy photo by Mass Communication Specialist 2nd Class Alan Gragg/Released.

The growing number of autonomous and semi-autonomous platforms require a diverse range of technology subsystems, prompting engineers to select 3U CompactPCI (CPCI) for unmanned systems deployments because of its low power and ease of use.

This year's announcement that the number of active-duty Army personnel would be reduced to pre-World War II levels has positioned unmanned systems technology for a much larger role within the Department of Defense (DoD). Throughout the wars in Iraq and Afghanistan, unmanned systems were leveraged heavily for Intelligence, Surveillance, Target Acquisition, and Reconnaissance (ISTAR) missions, and advancing sensor technology only affirms their place in the Pentagon's tactical situational awareness strategy.

However, while the sophisticated sensors of an RQ-4 Global Hawk or MQ-9 Reaper require the best processing performance and bandwidth capacity available, the fact is those larger platforms represent only a small fraction of the DoD's Unmanned Aerial Systems (UASs) inventory (Table 1). For smaller unmanned vehicles the Size, Weight, and Power (SWaP) of systems like VME

and VPX are simply too great, and represent an overkill for less compute-intensive applications in vehicle management and Payload Interface Units (PIUs). As a result, engineers continue to leverage CompactPCI (CPCI) technology for its low power and expansion capabilities, among other benefits.

"In the ever slow-changing defense market there's still plenty of demand out there for lower power, management-type vehicle applications where CPCI – because it doesn't consume nearly as much power as a VPX system does – is still looked to as advantageous."

"In the ever slow-changing defense market there's still plenty of demand out there for lower power, management-type vehicle applications where CPCI – because it doesn't consume nearly as much power as a VPX system does – is still looked to as advantageous," says Mac Rothstein, Systems Product Manager at GE Intelligent Platforms in Huntsville, AL (defense.ge-ip.com). "There is still a good demand for CPCI out there, and we really see it more in non-processing intensive types of applications where a more low-power processor is sufficient to communicate and process the data as it comes across."

Total DoD Unmanned Aircraft Inventory, July 1, 2013			
	Platform	Platform Total	Group Total
Group 1	Raven – RQ-11	7332	9765
	WASP	990	
	Puma	1137	
	T-Hawk – RQ-16	306	
Group 2	Scan Eagle	206	206
Group 3	Shadow – RQ-7	499	537
	Expeditionary UAS	18	
	Small Tactical UAS	20	
Group 4	Predator/Gray Eagle	237	309
	Hunter – MQ-5	44	
	Fire Scout – MQ-8	28	
Group 5	Reaper – MQ-9	112	147
	Global Hawk – RQ-4	35	

Table 1 | The Department of Defense (DoD) employs five Groups of Unmanned Aerial Systems (UASs), each with different tactical roles and technology requirements. Source: Unmanned Systems Integrated Roadmap FY2013-2038.

“CPCI has served unmanned vehicle applications well when backplane data rates are reasonable, outperforming VME in this regard,” says Rodger Hosking, Vice President and Cofounder of Pentek, Inc. in Upper Saddle River, NJ (www.pentek.com). “When high-speed data transfers between boards are necessary, however, VPX and MicroTCA (mTCA) both offer major advantages because dedicated gigabit serial links replace a common, shared data bus.

“Nevertheless, XMC modules with new technology still can be installed on CPCI carriers or CPU boards,” Hosking continues. “By using the ubiquitous PCI bus, CPCI can accommodate thousands of different custom and standard I/O modules in both PMC and XMC format (Figure 1).”

Mike Horan, CEO of Dynatem, Inc., a Eurotech subsidiary headquartered in Mission Viejo, CA (www.dynatem.com), concurs that support for PMC, XMC, and FMC mezzanine expansion on CPCI enables the use of specialized memory cards from a variety of vendors, such as the PMCR-SATA2 RAID controller designed for unmanned vehicle applications (Figure 2, page 12).

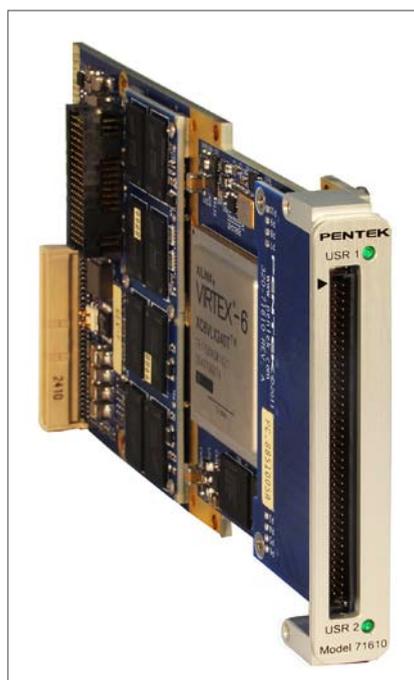


Figure 1 | The Pentek 71610 is an XMC digital I/O module for control and data acquisition applications based on the Xilinx Virtex-6 FPGA.

PCI eases custom I/O integration in unmanned

Beyond mezzanine expansion, the PCI bus provides development and integration benefits when using CPCI technology because its universality often



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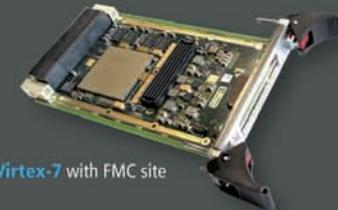


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simplifies customization. In addition to eliminating complexities of PCI Express (PCIe) that result from functions such as Peer-to-Peer (P2P) communications, this can result in a lower Total Cost of Ownership (TCO) for CPCI-based subsystems, Rothstein says.

“We have a standard set of CPCI boards and they won’t always meet our customers’ specifications. A lot of times it comes down to making modifications to the backplane or the I/O interface with the 38999 connector to be able to route our customer-specific I/O out through the system,” says Rothstein.

“With the VPX world, normally you have to spin both the backplane and the I/O interface to accomplish that,” he continues. “A lot of times with CPCI we’re able to reuse the backplane due to the parallel interface and only modify the I/O interface. From that perspective, it’s a lower cost of ownership to make those types of modifications if they’re needed, and therefore really gives you a more

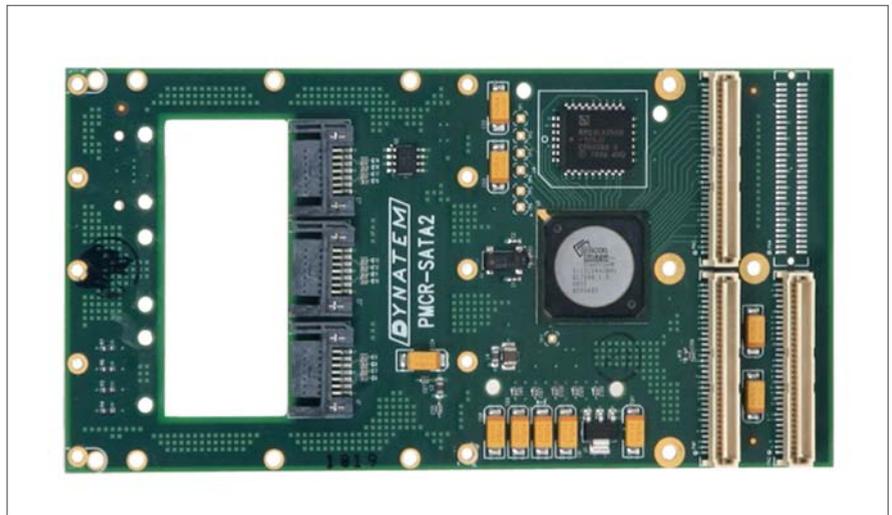


Figure 2 | Mezzanine modules such as the Dynatem PMCR-SATA2 RAID controller can be installed to insert new technology onto CompactPCI (CPCI) carriers or CPU boards.

proven solution in that there are a fewer number of parts that need to be modified to meet those demands.”

“CPCI system architectures are far simpler to integrate than VPX, with its vast number of different backplane topologies, data lane widths, and protocols,” says Hosking. “Because it uses a synchronous backplane bus, CPCI may also be easier to use than the asynchronous VME backplane. So, CPCI probably wins the ease-of-integration race.”

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Figure 3 | The Aitech C925 is a Freescale PowerQICC III-based 3U CompactPCI (CPCI) Single Board Computer (SBC), that features high radiation tolerances for high-altitude Unmanned Aerial Vehicles (UAVs) and uses the CAN bus for control applications.

"Pricing is lower than VPX with a number of vendors offering specialized boards compatible with the backplane. This gives CPCI many advantages for unmanned systems," says Horan. "PCI is universal and does not require special software drivers. Board-to-board communication [in CPCI] is usually simple CPU-to-I/O, and usually not more complex multiprocessing as seen in VMEbus or VPX. This is one of CPCI's key benefits."

"Based on the industry-standard PCI bus, CPCI boards can communicate across the backplane using standard drivers supported in virtually all Operating Systems (OSs)," says Hosking. "New technology insertions usually mean adding a new driver, but often much of the application software can be preserved for similar functions."

CompactPCI alleviates UAS SWaP sensitivities

Unlike VME, CPCI is common in a 3U form factor, which is critical for SWaP-sensitive unmanned systems with strict weight and thermal limitations. Along with lightweight Conduction-Cooled Aluminum (CCA) housing options, this has enabled CPCI to carve out a niche in some lower category UASs, says Doug Patterson, Vice President, Military and Aerospace Business Sector at Aitech in Chatsworth, CA (www.rugged.com).

"Generally, 3U CPCI has fared well in some of the smaller UASs compared to the larger 6U formats due to smaller SWaP and sufficient backplane pins for

the 3U size to bring I/O to the outside world interfaces," Patterson says. "From Aitech's point of reference, 3U CPCI tends to do well in the platform management and control segments of the platform (Figure 3)."

"We have some programs that we sell 6U CPCI subsystems into, but by and large – mostly driven by SWaP and that you can get the system more than half as small – 3U environments are where we see most of the demand and where our product offerings are based around,"

Rothstein says. "From the power standpoint, in most of our CPCI Single Board Computers (SBCs) you might see 20 W or so per board whereas VPX you're looking at more 30-40 W just because we realize that in VPX systems it's more processing intensive, and from that standpoint it does call for more power to be provided to a system.

"Thermal is nearly always the biggest challenge, even if it's a low-power system," he says. "That's one of the reasons our mechanical engineers love CPCI





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because normally they're dealing with a subsystem that's less than 100 W, and it's a lot easier to dissipate that heat than say a 200-300 W VPX system. You have to get rid of that heat somehow. Really it's just making sure that you've got really good thermal contact between the sidewalls of the chassis and the conduction-cooled board to be able to move the heat off (Figure 4).

"In CPCI systems, if we can stay in the 50-60 W, and sometimes even 70 W range, we can get by with just natural convection, which is just a thin chassis and if there's enough air movement within the vehicle the heat can be moved away from the system sufficiently enough," Rothstein continues. "Certainly that's where our customers prefer to be because all they have to do is mount it and use it, and don't have to worry about having a fan blowing right behind it or maintaining a cold plate."

CompactPCI also uses a rugged pin and socket connector, and provides options for extended ruggedization with soldered memory, ECC memory, and thermally



Figure 4 | The CRS-C2I-3CC1 Rugged COTS System from GE Intelligent Platforms is a conduction-cooled, two-slot control computer based on 3U CompactPCI (CPCI) that is well-suited for military Unmanned Aerial Vehicles (UAVs).

Can Serial maintain the CompactPCI legacy of service?

Though trends indicate that 3U VPX-based subsystems will eventually displace CompactPCI (CPCI) systems in unmanned and other defense applications, the recently released CompactPCI Serial (CPCI-S.0) specification offers many of the same advantages of its predecessor in addition to serial data links (Figure 1). Available in 3U formats, an ecosystem of CPCI-S.0 products is being driven by many European vendors at price points that are a fraction of VPX.

"Especially in light of the full family of CPCI specifications, we anticipate an upswing in the use of CPCI for a variety of applications, including unmanned systems," says Michael Plannerer, Technical Director at MEN Mikro Elektronik GmbH, which opened its Ambler, PA production facilities in 2013 (www.men.de). "Many of the competing platforms have inherent issues that have not yet been addressed, such as being much more expensive and complex to implement as well as maintain."

The CPCI-S.0 specification allows for low-power, small form factor systems that are loosely coupled via Ethernet and can support high-performance CPUs. In addition, Conduction-Cooled Aluminum (CCA) housings maintain the low-cost conduction cooling options available in traditional CPCI systems.

"These are extremely effective and interesting because they replace the parallel bus backplane on CPCI with gigabit serial links, which is the major limitation of CPCI," says Rodger Hosking, Vice President and Cofounder of Pentek, Inc. in Upper Saddle River, NJ (www.pentek.com). However, Hosking adds that

"superior technology is often not enough to drive a new standard into wide-spread, multi-vendor support to convince military and government customers of its longevity."

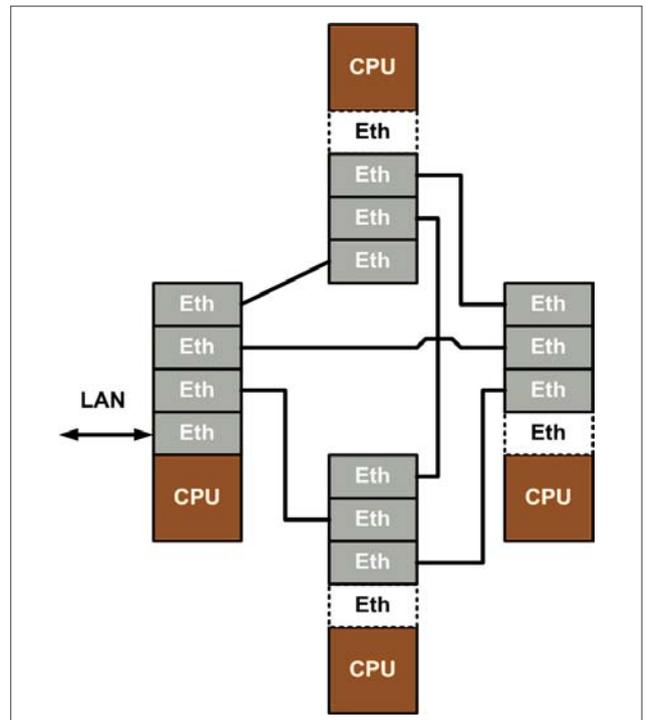


Figure 1 | This diagram depicts a Full Mesh CompactPCI Serial (CPCI-S.0) system comprised of four boards, each based on three Ethernet channels.

screened components, which are essential for harsh unmanned environments, adds Horan.

Prospects for CompactPCI in unmanned systems

Though it is unlikely that CPCI subsystems will be leveraged in many new deployments, long military lifecycles and the shortage of new defense contracts should extend the technology's service. For current design ins, CPCI will continue to benefit from low cost and wide vendor support (see sidebar "Can Serial maintain the CompactPCI legacy of service?").

"Let's not bury CPCI just yet; CPCI still has plenty of horsepower for smaller, machine control applications when power and throughput are measured in multiples of milliseconds, not picoseconds where ISR lives today," Patterson says. "Like 3U VME and some 6U CPCI, [3U CPCI] will remain in military service for years to come and either be enhanced with technology insertions or

"Let's not bury CPCI just yet; CPCI still has plenty of horsepower for smaller, machine control applications when power and throughput are measured in multiples of milliseconds, not picoseconds where ISR lives today."

be replaced with some newer, new-fangled something or other technology du jour. It all comes down to mission definition and profiles, service personnel to be put into or taken out of harm's way, collateral damage assessments, cost, and program lifecycles.

"Over the fullness of time, CPCI-based hardware platforms will become displaced by PCIe-based and distributed parallel processing solutions as the chip interconnect architectures move from the older parallel bus chip interconnects to multiple high-speed serial architectures – and as the Real-Time Operating System (RTOS) providers adapt to multi-processor, multi-threaded applications processes," he adds.

"I was looking through a market study I received at the beginning of the year with respect to both system- and board-level components broken down by architecture," says Rothstein. "The results there were similar to what my feelings are: I think we'll see a steady decline in CPCI. It's never going to be like you have a lot of it today and tomorrow you have none, just because of the market we live in. Once CPCI is designed into a platform, the likelihood of that being replaced within the next 10-15 years is pretty small." 

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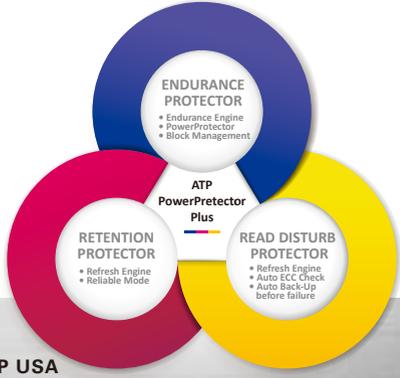
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System Host Boards maintain presence in industrial automation as factory floors advance

By Bruce Tsai

Industrial automation is at the heart of the global manufacturing community, with leading companies facing enormous pressure to automate and integrate processes for maximum output, improved cost efficiencies, and tangible competitive value. As industrial computing evolves to embrace enterprise-level automation, embedded system designers are challenged by the environmental rigors of manufacturing deployments, as well as the need to provide connected, fault-free performance on the factory floor. Today's standards-based System Host Boards (SHBs) benefit from continued improvements in mechanical engineering and performance-to-power capabilities in the latest generation Intel Core processors in order to provide a viable solution for applications in motion control, machine vision, and automation.

Today we've entered an era of intelligent systems with networked equipment collecting massive amounts of data in order to fully understand and optimize process interactions. This connected environment enables full factory automation, with acquired data available to analyze efficiencies and look for patterns to implement predictive operations. These intelligent industrial systems rely on embedded platforms that continue to decrease in size while increasing in performance.

While processing power requirements heighten, lower power consumption and thermal output is expected. Include additional rugged requirements to accommodate the shock, vibration, humidity, and temperature extremes of a factory environment, and system designers are faced with a considerable challenge.

Standards-based embedded design

A significant amount of effort is being made to move to high-speed switched interconnects like PCI Express (PCIe). The reality is that many embedded and industrial control applications that exist today and in the future can be served by standards-based compute solutions available now. In looking to architect next-generation applications, engineers should not forget about these market-tested and time-proven compute solutions.

The PICMG 1.3 standard, System Host Board (SHB) Express, is a Single Board Computer (SBC) specification designed to interface with PCIe peripherals on a backplane. The SHB Express PCIe interconnects with the backplane can operate at x1, x4, x8, x16, and others depending on the capabilities of both the SHB and the backplane.

Reliability and longevity requirements for the factory floor

Automated, industrial solutions are made up of many moving parts. In addition, as is the case for wafer cutting or electronics assembly, enclosed environments are required to prevent contamination. However, all of these moving parts require computing power, and that computing power generates heat. These moving parts also generate vibration and can run 24 hours a day, seven days a week.

Upon initial analysis, an SHB might not be a top choice for rugged application deployment. SHBs are not inherently rugged like a motherboard and generally have large CPUs with massive heatsinks that generate significant heat. However, more sophisticated CPU coolers and Thermal Design Power (TDP) improvements in processor generations

have helped to lower heat output from SHBs. The 4th generation Intel Core processor family has shown up to 13 percent CPU performance improvements and 12 W TDP reduction compared to its predecessor. In addition, SHBs are secured within enclosures to limit vibration. There are two typical enclosures widely adopted in industrial sites: a wall-mount enclosure, which is similar to a generic desktop PC in terms of size; and a rackmount enclosure, which provides a standard mounting method with lower hardware costs, as users can source related COTS components to easily build up the system.

A few more important reasons to consider deploying SHB-based platforms in industrial environments are shorter Mean Time To Repair (MTTR), ease of deployment, and scalability. Industrial automation applications generally include extremely long deployment cycles, so simple fixes and upgrades are critical features for system longevity. In the unlikely event of a system crash, simply remove the failed SHB, replace

it with another, and be up and running with minimal downtime; no need to pull I/O cards, unplug cables, re-image hard drives, and so on. Such a simple fix does not exist with a failed motherboard, which could have a system down for days.

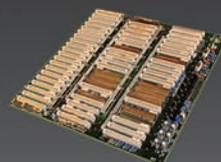
In addition, machine makers are generally under time pressure with limited resources available to deploy their series of machines. For the machine maker, the critical piece of their system is the application-specific software effort, which requires building a dedicated Operating System (OS) image with corresponding add-on card drivers and Board Support Packages (BSPs), and fine-tuning the software. By using a standards-based PICMG system, machine makers can shorten their development cycle and leverage fewer engineers by choosing a single SHB and integrating it into several different chassis, backplanes, or add-on card combinations that share the same OS image (including software); this allows them to expand their product line in a short time.

Dynamic power management, core by core

Power-saving features on the 4th generation Intel Core processors have been refreshed from the ground up, with Intel considering silicon enhancements at logic and process levels; IP block modularity, variable cache, and a range of graphics subsystems; and system-level power management including both hardware and software elements. In doing so, Intel has effectively reduced processor power consumption in idle mode, while also substantially improving transition times from idle to active mode.

The 4th generation Intel Core processor improves existing C-states and adds new, deeper C-states, further speeding the transition from one to the other by up to 25 percent. The latest Core processor's newly defined S0xi state is of particular value to embedded applications, reducing idle mode processor power consumption by 20x compared to earlier processor generations, with no performance drawbacks during transition into active mode.

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The 4th generation Intel Core processor architecture further includes Intel Turbo Boost Technology 2.0, a series of algorithms that consistently manage current, power, and temperature to ensure maximum performance and energy efficiency. Active power is reduced, as Turbo Boost automatically enables individual processor cores to run faster than base operating frequencies, as long as they are operating below power, current, and temperature specification limits.

This dynamic increase in performance of individual cores is an important first in power management, and is unique to 4th generation Intel Core processors; the increase is activated when the system's OS requests the highest processor performance state (P0). The amount of time the processor spends in Turbo Boost mode depends simply on the workload and operating environment.

For maximum performance, Intel Turbo Boost Technology 2.0 allows the processor to operate at power levels higher than its rated upper TDP limit for short durations, overclocking as needed in order to complete more processing quickly. Applications run faster through intelligent use of available thermal headroom for the system to run at higher frequencies. Intel Hyper-Threading Technology works in conjunction with Turbo Boost, delivering two processing threads per physical core, allowing more work done in parallel. Automated power management increases energy efficiency, and further enables low-power states to adjust system power based on real-time processor loads.

Low-power revolution

The 4th generation Intel Core processor family features a one-chip U-series (Ultra Low Power) processor with a 15-watt TDP. U-Series products integrate both CPU and Platform Controller Hub (PCH) in a smaller package, bundling higher performance processing into a smaller chip package and enabling smaller form factors in compute-intensive industrial control applications.

Improved performance in a small footprint supports equipment manufacturers in addressing new industrial environments and reducing space requirements on the factory floor. The 4th generation Intel Core processors also incorporate greater scaling of voltage and frequency, which reduces core voltage in proportion to the CPU's clock speed. Lower voltage results in lower current, which in turn ensures significantly lower power consumption and requirements for heat dissipation. Coupled with gating techniques – where unused cores are switched on and off as needed to handle processing loads – scaled voltage plays a key role in the 4th generation Intel Core processors' proven low power consumption.

Parallel processing improvements enable speed

Automation, motion control, and machine vision applications require multi-tasking capabilities, high computing power, and high-speed data transfer rates. Today's SHBs have the advantage of Intel's latest processor-line enhancements. The



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Figure 1 | ADLINK Technology NuPRO-E42 System Host Board (SHB) is based on 4th generation Intel Core U series processors and the Intel Q87 Express chipset to provide multitasking capabilities and high-speed data transfer rates.

4th generation Intel Core platform incorporates an upgrade to the Intel Advanced Vector Extensions (Intel AVX) instruction set that improves integer/matrix-based calculation abilities, including wider vectors, new extensible syntax, and rich functionality. By fusing multiply and add functions, AVX 2.0 advances the original AVX instruction set handling Single Instruction, Multiple Data (SIMD) parallel processing functions to provide twice the floating-point performance for multiply-add workloads, 256-bit integer SIMD operations, in contrast to previous 128-bit gather operations and bit manipulation instructions. Other support integrated into AVX 2.0 simplifies code vectorization, enabling vector elements to load from noncontiguous memory locations. As a result, the latest Core processing engine is fed very effectively, as system tasks

that previously required two clock cycles can now be completed in a single clock cycle. This level of performance enhances industrial imaging applications that require increased vectorization.

AVX 2.0 also drives better management of data and general-purpose industrial applications, optimizing demanding processing environments such as 3D modeling, imaging or analysis, or scientific simulations. For example, faster calculations enable rapid and accurate machine vision on an industrial line.

New generation PICMG 1.3 SBCs

Multiple vendors offer SHBs that take advantage of the new performance and power enhancements offered by 4th generation Intel Core processors. ADLINK's NuPRO-E42 is one example (Figure 1).

Developed as a ready-made solution, its aim is to offer a High-Performance Computing (HPC) platform for automation applications, including those used in Printed Circuit Board (PCB), Light-Emitting Diode (LED), and semiconductor fabrication plants, as well as those used by solar, printing, Surface-Mount Technology (SMT), and laser cutting service providers (see sidebar "SHB focus on motion control"). These applications require powerful embedded computing products with PCI Express (PCIe) for frame grabbing and PCI expansion options for motion capture and I/O ports.

As industrial automation applications further embrace the integration of processes and the connection to the ever-present Internet of Things (IoT) concept, the need for intelligent, embedded computing platforms with high-speed interface support and extensive expansion capabilities will only increase. The answer to the industrial computing challenges faced by system designers is in scalable technology platforms that optimize operations while enabling a long-term vision of sustainable, integrated manufacturing. 

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SHB focus on motion control: Laser processing and printing

PICMG 1.3 form factor Single Board Computers (SBCs) can offer tremendous performance and strong I/O capacity to perform multifunctional operations, with versatile I/O functions that enable the integration of off-the-shelf PCI or PCI Express (PCIe) cards such as frame grabbers, motion controllers, and I/O cards. This allows the System Host Board (SHB) to act as the base computing platform in a multitude of industrial automation and control applications.

Precision laser processing and cutting are widely used in silicon wafer slicing for solar cells, cell phone screen cutting, semiconductor wafer slicing, and Computer Numerical Control (CNC) machines, among others. High-end motion control products for laser equipment must accommodate micro-scale precision in contour cutting and adjusting released energy to cope with different materials while yielding the best possible results. Automation requirements include a PCI expansion platform for advanced motion control cards using state-of-the-art DSP and FPGA technologies to offer high-speed and highly efficient hybrid analog and pulse command types.

In the world of printing, flying shear applications cut a specific length from media moving through a high-speed continuous feed system, and are often implemented in textile, medical, and food packaging applications. The flying shear's carriage supports the cutting tool (shear), which must be accelerated to match the speed of the media conveyor before the cut occurs. Once cutting is complete, the shear rapidly decelerates and reverts to the starting position to repeat the cutting cycle.

High-performance SHB computing platform supports 4/8-axis advanced motion controllers that incorporate up-to-date floating-point DSP and FPGA technology, enabling high-speed and high-performance hybrid analog and pulse-train motion command to ensure the precision of each piece of equipment during flying shear operations.

The 2014 PICMG Systems & Technology Resource Guide is the industry's largest collection of technology products based on specifications from the PCI Industrial Computer Manufacturers Group (PICMG). Over the last two decades, PICMG has produced over a dozen specifications that supply embedded engineers with Commercial Off-The-Shelf (COTS) solutions for complex Communications & Networking, Military & Aerospace, and Industrial Control & Automation designs. From complete 40G AdvancedTCA systems to PICMG 1.3 System Host Board (SHB) building blocks, the team at PICMG Systems & Technology hopes that what follows can make a difference in your upcoming development efforts.

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- › Application-ready configurations shorten time-to-market
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- › Two Intel® Xeon® processor E5-2600 v2 family (10C/20T)
- › Two Intel® Communications Chipsets 8920; Intel® C604 PCH
- › Eight memory sockets support VLP DDR3-1866; REG/ECC up to 128 GB
- › Quad 40GBASE-KR4 Fabric Interface channels
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aTCA-N700 40G Ethernet AdvancedTCA® Processor Blade

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The aTCA-N700 is designed to provide high performance, security enabled intelligent deep packet inspection and processing functions that are required by high-end network appliances, security appliances, switches, and servers.



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- › Two Cavium OCTEON II CN6880 processors, each with 32 cnMIPS64 V2 cores
- › Eight memory sockets support VLP DDR3-1600 REG/ECC up to 128 GB
- › Onboard Ethernet switch BCM 56842 provides connectivity to RTM, OCTEON II processor and backplane (Fabric) with L2 and L3 switch management software
- › Dual 1000BASE-T Fabric Interface channels
- › Powerful Local Management Processor – Freescale QorIQ P2041, quad-core @ 1.2GHz
- › Flexible RTM support on 12 x10G SFP+ ports (RTM-RN710) or 2x 40G QSFP+ and 4x 10G SFP+ (RTM2-RN720)
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ATCA-7310 Dual Cavium Octeon CN6880 ATCA Blade with 40G Switch

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- › Dual Cavium Octeon II CN6880 1.0 GHz with 32 cnMIPS™ II processor cores
- › Up to 64 GB DDR3 1066 MHz DIMMs; 32 GB for each CN6880
- › 40GbE (KR4) and four 10GbE (KR) FI support
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DSPA-8901 AdvancedTCA® DSP Blade

With its 20 onboard TMS320C6678 DSPs at 1.0GHz core frequency, the DSPA-8901 provides 160 cores of processing power to reach the levels of performance density needed to build the highest capacity media gateways. The DSPA-8901 significantly reduces overall system power dissipation and system cost, and frees up valuable slots in gateway elements for additional subscriber capacity and throughput. The DSPA-8901 includes a high-performance Freescale QorIQ P2020 processor. A Broadcom BCM56321 switch terminates the 10 Gigabit Ethernet fabric connections and distributes traffic to the 20 DSPs. The DSPA-8901 offers unrivaled packet and media processing capabilities. For increasing demand in high-end video conferencing, broadcasting and tele-presence fields, the DSPA-8901 ATCA blade also offers unmatched image processing performance for compression and decompression, image analysis, filtering and format conversion.



FEATURES

- › 20 Texas Instruments TMS320C6678 DSPs
- › 512 MB - 2 GB DDR3 memory per DSP
- › BCM56321 10GbE switch for both Fabric Interface and Base Interface
- › Freescale® QorIQ® P2020 for Local Management Processor (LMP)
- › IDT Tsi577 Serial RapidIO switches
- › Pigeon Point Systems IPMI 2.0
- › Wind River Linux PNE-LE 4.0 support for P2020
- › Single-slot PICMG 3.0/3.1 compliant

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ATCA-9112 40G Switch with Processor AMC Application Blades

ATCA-9112 40G Switch Blade with AMC slot

The ATCA-9112 switch blade provides 10/40GbE switching for up to 16 slots and 8 front panel uplinks with a 640Gbps non-blocking fabric switch from Broadcom. Designed for network security, LTE and DPI-centric applications, the ATCA-9112 offers the highest aggregate switching bandwidth within an ATCA chassis, enabling support for up to 16-slot systems. A Broadcom BCM56846 ensures seamless integration through open standard hardware supporting 40GbE or 10GbE ATCA node blades. A Broadcom BCM56321 provides ATCA base interface connectivity.

The switch offers a flexible approach to hub blade functionality via a mid-size AMC site to host control plane, application processing, acceleration or offload functions. Advantech's Freescale P4080-based AMC-4201 or x86-based MIC-5603 PrAMC can be used to consolidate processing requirements.

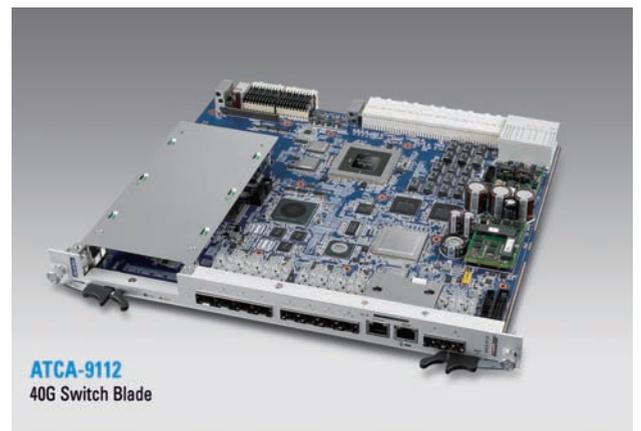
MIC-5603 Processor AMC

The MIC-5603 is a single-width mid-size processor AMC. Its design is based on 3rd generation Intel® Core™ processors in a BGA package combined with the Intel® QM67 chipset. The card supports processors with integrated memory and graphics controllers, and a maximum L3 cache of 4MB. It can support up to 8GB, dual-channel, on-board DDR3 memory with ECC at 1600 MHz, making it ideal for switching applications requiring low latency and reliable memory access.

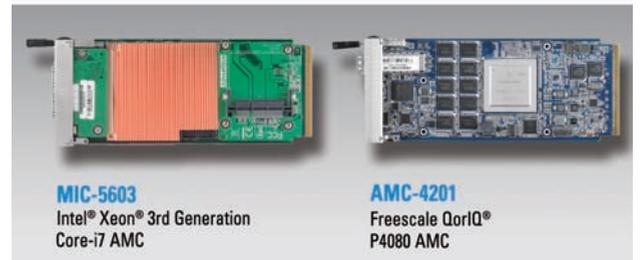
A standard feature, external Ethernet connectivity, is provided on two dedicated GbE front panel ports, one each from the Intel® QM67 PCH and the onboard Intel® 82580 quad-port LAN controller, which also provides two additional GbE ports to the AMC base fabric. The Intel® PCH brings remote management capabilities with KVM-over-LAN, and introduces faster I/O than previous generation designs with SATA III to AMC ports 2..3 and PCIe x4 Gen 2 to ports 4..7. This module can also be configured to boot from the network, local CFast CompactFlash or flash disk, or external storage media such as HDD or USB drives.

AMC-4201 Processor AMC

The AMC-4201 is a single-width, mid-size AMC based on the Freescale P4080 processor. It combines eight Power Architecture® e500-mc Cores operating at frequencies up to 1.5 GHz with



ATCA-9112
40G Switch Blade



MIC-5603
Intel® Xeon® 3rd Generation
Core-i7 AMC

AMC-4201
Freescale QorIQ®
P4080 AMC

FEATURES

- › 40GbE switch blade provides 10/40GbE switching for up to 16 slots
- › 10/40GbE fabric interface with eight 10GbE uplinks
- › Fabric interface bandwidth up to 640Gbps
- › Separate base and fabric interface switching for enhanced security and protection
- › Mid-size AMC site for host application processing, acceleration or offload functions

high-performance, datapath acceleration logic, extensive networking I/O, and peripheral bus interfaces. It combines powerful multicore Power Architecture performance with network processing capabilities, and builds on the communications ubiquity of Freescale's QorIQ® product family. AMC-4201 provides 4 and 8 GB build options for onboard DDR3 memory at 1333 MHz with ECC support. One front-panel 10GbE SFP+ connector provides network access in addition to a front panel console and debug port.

The unique SERDES design supports up to four different AMC port configurations for a mix of SRIO, PCIe, XAUI and SGMII channels. This makes the AMC extremely versatile and caters to a wider range of MicroTCA or ATCA carrier topologies beyond just telecom applications. 4 MB SPI Flash and 2 GB NAND Flash provide onboard options for software and storage. The AMC also provides 8 KHz and 19.44 MHz telecom clock synchronization support.

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MIC-5333 AdvancedTCA Dual Intel® Xeon® E5 Series Blade

The MIC-5333 is a 40G dual processor blade based on the Intel® Xeon® Platform for Large-Scale Communications Infrastructure Systems. It enables the highest network and packet processing performance available on ATCA, with up to 20 cores of processing power, hardware acceleration for encryption and compression based on Intel® QuickAssist technology, and support for up to four 40G fabric ports. PCIe Gen. 3 at 8Gbps per lane and best-in-class virtualization combined with superior thermal design make it ideal for high performance workload consolidation. Two QPI interfaces between CPUs improve memory throughput and latencies when one processor needs to access resources hosted by the other socket. Four DDR3 DIMMs per socket in a quad channel design running up to 1600 MT/s offer superior memory bandwidth over 3-channel designs, and support memory densities up to 256GB using the latest LR-DIMMs. It outperforms previous-generation designs while maintaining similar thermal characteristics through balanced airflow resistance.



FEATURES

- › Two 10-Core Intel® Xeon® E5-2600 v2 processors
- › Intel® Communications Chipset 89xx Series
- › Eight DDR3 VLP DIMMs with ECC support
- › Up to four 40GBASE-KR40 ports on the Fabric Interface to support Dual-Dual Star Topology
- › Other fabric configurations supported via two Fabric Mezzanine sites (type I)
- › Two 10/100/1000BASE-T front panel ports
- › One Fabric Mezzanine Module (type II) for optional front I/O or additional acceleration
- › Fully managed, hot swappable RTM with 36 PCIe Gen. 3 lanes

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AdvancedTCA: Boards and Blades

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EMBEDDED TECHNOLOGIES

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ATCA-8320 Media Processing Blade

The Artesyn Embedded Technologies **ATCA-8320** is a DSP-based media processing blade for use in AdvancedTCA systems. It offers a very high density of IP voice and video transcoding, including H.264 at up to 1080p, for use in communications applications.

By employing efficient Octasic OCT2224 Digital Signal Processors (DSPs) to provide the transcoding functions, the ATCA-8320 media processing blade can take the place of many additional server blades when adding voice or video processing to an application.

The blade can be used as an offload function for a standard server blade, but can also be used as the basis for a standalone media processing function. In addition to the DSPs, the ATCA-8320 blade features an integrated multicore CPU to provide advanced IP flow management and distribution, and a mobile x86 CPU for local application hosting. This "Gateway on a Blade" architecture allows a high degree of scalability from very small systems up to very large.

ATCA-8320 brings multi-core DSPs and the powerful Vocallo MGW voice and video software stacks together with Artesyn's leading ATCA system heritage and thermal design skill.



FEATURES

- › Up to 24 power-efficient Octasic OCT2224M DSPs on two mezzanine sites
- › Comprehensive voice and video processing firmware and programmers interface
- › 8 core Freescale QorIQ P4080 for blade management plus packet processing and load balancing of IP streams
- › Dual core Intel® Core™ i7 processor for local control and management application
- › Local Ethernet switching network with full switch management utilities
- › Rear transition module supports 10G + 4 x 1G Ethernet cable terminations
- › Designed for NEBS Level 3 and ETSI telecom standards compliance in a CP-TA B.4 class enclosure

Artesyn Embedded Technologies | +1 (888) 412-7832

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www.asis-pro.com

High-Performance Chassis with Integrated Switch

The ASIS 6-slot MaXum400S ATCA chassis is the first high power front-to-back chassis with horizontal blades. The chassis is an 8U, carrier-grade system featuring integrated, fully-featured 10G/40G fabric switches. Our patent-pending Sphere Flow™ technology allows for a front-to-back cooling capacity of 375W per slot. Integrated Redundant AC N+N or DC input options offer the flexibility to meet telco and enterprise requirements.

The Asis INTERA™ switch slots free-up 2 payload slots, allowing for 50% more processing power than other 6-slot solutions. This greatly increases the performance in terms of power, real estate and cost/byte, whilst shortening time to market through simplified integration. Available from leading switch vendors, each of the 2 front-panel hubs supports 60G-400G with flexible I/O flavors (SFP+/QSFP), and up to 960G supported on the backplane.



FEATURES

- › Patent-pending “Sphere Flow” front-to-back cooling with capacity of 375W per slot
- › Integrated INTERA switch slots for greater processing power
 - Total 120G-800G front-panel bandwidth
 - Up to 960G supported on the backplane
 - Flexible I/O (SFP+/QSFP)
 - Available from multiple ATCA switch vendors
- › Integrated redundant AC N+N/N+1 and DC power options
- › 40G Dual Star, Dual Dual Star or Triple Replicated Mesh backplane configurations
- › Redundant ShMM 700 shelf managers
- › PICMG 3.3 R2 compliant
- › Designed to meet NEBS Level 3
- › Applications: IT Security, Government, Defense, DPI

ASIS | 1-888-327-4787

Contact: sales@asis-pro.com



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MaXum™ DC/AC ATCA Series with up to 600W/slot

The ASIS MaXum™ family of next-generation ATCA chassis brings to the market a range of innovative solutions created to support the most demanding of mission-critical applications. Featuring a superior front-to-back cooling capacity of up to 600W per slot for Next-Gen blades, the MaXum range incorporates 40G backplane technology with Dual Star, Dual Dual Star or Full Mesh topologies. Our unique Power Dock system enables in-rack conversion of DC chassis to AC, greatly simplifying our customers' operations and logistical planning for systems targeting both telecom and enterprise.

Part of the Trans Innovation Group, Asis has 30 years of experience in backplane and chassis development. Our team draws upon their wealth of expertise in the fields of thermal design and HA system architecture to develop energy-efficient, future-proof systems.



FEATURES

- › Available in 1, 2, 3, 6, 8 and 14-slot configurations
- › Optional integrated switch/hub for increased processing power (3-slot and 6-slot chassis)
- › Front-to-back cooling, even with horizontal blades
- › Scalable cooling supporting 250W - 600W per slot
- › Redundant AC and DC power options
- › Dual Star, Dual Dual Star or Full Mesh 40G backplane configurations
- › 100G backplane technology
- › Support for N+N/N+1 AC redundancy
- › PICMG 3.3 R2 compliant
- › Designed to meet NEBS Level 3
- › Applications: Telecom, Enterprise, HPC, LTE, Aerospace and Defense

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AdvancedTCA: Storage



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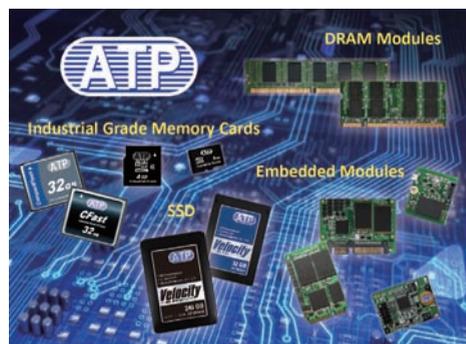
ATP DRAM and Flash Memory Products

ATP DRAM Products

ATP DRAM products are designed for high-performance mission critical applications where high levels of technical support, operating consistency, and wide operating temperature ranges are required. The ATP DRAM family includes a full spectrum of form factors including VLP, UDIMM, RDIMM, SODIMM, and mini-DIMM, as well as multiple generations of DRAM technologies.

Industrial-Grade Flash Products

ATP Industrial Grade Flash Products (CF cards, Embedded Modules, SSDs) are designed to perform under conditions of extreme temperature, shock, vibration, and humidity. ATP's SIP (System in Package) manufacturing process encapsulates all exposed flash components to protect against extreme environmental conditions.



FEATURES

DRAM Products

- › JEDEC compliant
- › Extensive support on all form factors
- › Industrial-grade temperature (-40 °C to +85 °C, -40 °C to +105 °C)
- › Conformal coating for environmentally rugged applications
- › Long-term supply chain commitment upon module qualification

FLASH Products

- › **Power Protector Technology** – Data integrity during a sudden power down
- › **Smart Life Monitor Technology** – Flash health status feedback to host
- › **Secure Erase Technology** – Systematic elimination of original data
- › **Industrial Grade Temperature Range** (-40 °C to +85 °C)

ATP Electronics | 408-732-5000

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Netarium ATCA Reference Systems

Advantech's Netarium™ series of ATCA Reference Systems are specifically targeted to help network equipment providers reach superior levels of performance over traditional rackmount servers or appliances used to extend their product range at the high end. The series represents a new generation of systems that offers superior performance, scalability and flexibility with the latest 40G backplanes, switches and application blades. We optimize the systems to achieve the highest possible density at the rack level, with a maximum number of payload blades, network ports and switching capacity. Each system is tailored for customers to rapidly deploy in applications that require faster and deeper packet processing, such as PCEF, network security, real-time traffic monitoring, load balancing, subscriber analytics and content optimization, among others. The systems integrate the chassis, cooling, power distribution and shelf management into an off-the-shelf platform solution capable of superior 5 NINES availability and reliability.



FEATURES

- > **14 SLOT:**
 - 19" wide, 13U high AdvancedTCA Shelf fully integrated
 - Up to 12 MIC-5333 or MIC-5332 Dual Intel® Xeon® blades
 - Dual-Star backplane with 40G Switches
- > **6 SLOT:**
 - 19" wide, 6U high AdvancedTCA Shelf fully integrated
 - Up to 4 MIC-5332 or MIC-5333 Dual Intel® Xeon® blades
 - Dual-Star backplane with 40G Switches
- > **2 SLOT:**
 - 19" wide, 3U high, AdvancedTCA Shelf fully integrated
 - 2 MIC-5333 Dual Intel® Xeon® blades and RTM-5104

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450/40 and 300/40 Series ATCA Systems

Schroff's® 450/40 and 300/40 ATCA chassis are designed to support the next generation of ATCA board requirements, minimizing the time to market for critical, high-availability applications where high performance is crucial.

With superior physical construction, optimal cooling, reliable power supplies, efficient data distribution and secure system management, Schroff ATCA solutions are your choice for a dependable solution.

Schroff's 450/40 series ATCA systems offer generous head room for power and cooling capabilities. Both product families feature Schroff's leading edge 40 Gbps backplane design, shelf management and proven hardware quality.

Deploying these chassis – ensure your integrated solutions will continue to perform at the highest level as network requirements grow and higher performing ATCA boards become available.



FEATURES

- > 2, 6 and 14 slot backplanes
- > 40 Gbps (10GBASE-KR) transmission rate
- > Up to 450 watts/slot cooling
- > AC & DC power entry modules
- > Various cooling configurations available
- > Designed to meet NEBS, PICMG 3.0
- > Proven performance, test reports available

Schroff | 800-451-8755

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716 Series Conduction Cooled ATR Enclosures

716 Series offers a wide range of COTS solutions from a rugged precision-machined design. Engineered for strength, light weight, and maximum cooling in a conduction-cooled environment, the 716 Series incorporates a unique frame and configurable conducting walls that allow the ATR to be tailored to meet a wide range of thermal requirements. The conducting walls can be precision-machined in a variety of patterns to optimize the surface area for maximum heat transfer. Though designed as a straight conduction-cooled chassis, the 716 Series can also be configured as an air-over conduction-cooled ATR. This air-over conduction cooling method keeps the channeled air outside of the ATR, allowing the cards within to remain in a sealed environment and protected from the elements. The 716 Series is engineered to meet the stringent weight requirements of airborne applications. For additional durability, the 716 Series can also be configured with an optional avionics tray for isolation from airborne, vehtronics and shipboard shock and vibration.



FEATURES

- > Precision-machined construction
- > Available in 3U or 6U card formats
- > Rugged deployment
- > Expansive range of ARINC sizes
- > Modular power supply
- > AC or DC filtered inputs
- > High altitude fan offering
- > System performance monitoring
- > Multiple bus architectures
- > Cold start heaters
- > Configurable I/O panel

SIE Computing Solutions, Inc. | 508-588-6110

Contact: info@sie-cs.com

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www.sie.com

717 Series Air-Over Conduction Cooled ATR Enclosures

The 717 Series is available in standard ARINC sizes that include 1/2 ATR Short to 1-1/2 ATR Long and any custom form factor. From bus standards to application-specific custom designs, the 717 Series provides an expansive offering of ATRs for platforms such as the VME, VME64x, VXS, VPX and CPCI architectures. Designed specifically for rugged deployment and to direct air over the thermal conducting walls, its cooling can be configured to meet application requirements by either drawing air through the walls and out a rear exhaust plenum or forcing air down the walls and directing it away from the equipment. When configured for unpressurized environments, the 717 Series can be configured with a high-altitude cooling scheme to permit ultimate performance at altitudes up to 50,000 feet. The 717 Series can be configured with an optional avionics trays for isolation from shock and vibration environments common to airborne, vehtronics and shipboard applications. For applications where stringent weight requirements are an issue, SIE Computing Solutions offers a light-weight composite solution.



FEATURES

- > Dip-brazed construction
- > Expansive range of ARINC sizes
- > Modular power supply /AC or DC filtered inputs
- > Cold start heaters & high altitude fan offering
- > Configurable I/O panel

TECHNICAL SPECS:

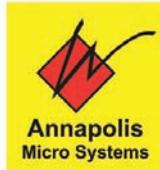
- > Storage Temp (-40°C to +85°C; MIL-STD-810F)
- > EMC (MIL-STD-461D)
- > Input Power (28VDC, 115VAC/400Hz 1Ø, 115VAC/400Hz 3Ø-
- > MIL-STD-704A Thru 704E, MIL-STD-1275A)
- > Wiring (Low Toxicity – MIL-C-24643)
- > Vibration (15 to 2,000Hz At 0.1g/ Hz (RMS~12g) MIL-STD-810F Method 514.5) & Shock (20g for 11ms MIL-STD-810F Method 516.5)

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WILD OpenVPX Twelve Plus 3 Slot Switched Chassis

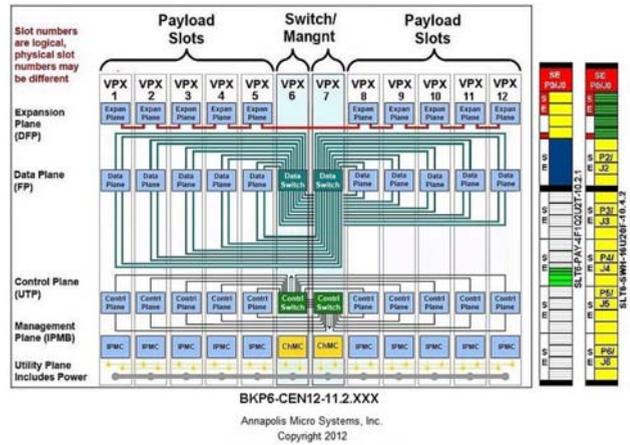
Annapolis enters the OpenVPX market with WILDSTAR 6 Xilinx Virtex-6 and WILDSTAR A5 Altera Stratix 5 FPGA Processing Boards, an 8 TB per slot WILD Storage Solution, a WILD Switch, a Four Slot and a Twelve Plus Three Slot Chassis.

With Ten Payload Slots and Two Switch Slots, and an option for Three VME/VPX Slots, the Twelve OpenVPX Plus 3 Chassis has a particularly powerful Backplane Configuration, as shown in the diagram.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing intensive applications. Annapolis provides I/O mezzanine cards, including Single 1.5 GHz 8 Bit ADC, Quad 250 MHz 12 Bit ADC, Single 2.5 GHz 8 Bit ADC, Quad 130 MHz 16 Bit ADC, Dual 2.3/1.5 GSps 12 Bit DAC, Quad 600 MSps 16 Bit DAC, Universal 3Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OC 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows and Linux. We support our board products with a standardized set of drivers, APIs and VHDL simulation models.

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

Our extensive IP and board support libraries contain more than 1,000 cores, including floating point and the world's fastest FFT. CoreFire uses a graphical user interface for design entry, supports hardware-in-the-loop debugging, and provides proven, reusable, high-performance IP modules. WILDSTAR A5 for OpenVPX, with its associated I/O Cards, provides extremely high overall throughput and processing performance. The combination of our COTS hardware and CoreFire allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.



FEATURES

- › 19" Rack Mount Chassis with Front Mounted OpenVPX Card Cage
- › Primary Twelve Slot 6U OpenVPX High Speed Switched Backplane with Rear Transition Module Support
- › 10+GBps on Data Plane for 10GBase-KR Ethernet, 40GBase-KR4 Ethernet, 10GBase-KX4 XAUI or SDR, DDR and QDR 4x InfiniBand
- › 8x PCIe Gen 1, 2 or 3 on Expansion Plane
- › 1000Base-X on Control Plane
- › Secondary Three Slot VME/VPX Backplane for Power Only Payload Cards
- › Very Large Power Supply
- › Chassis Management, including Voltage, Temperature and Fan Monitoring and Control and a Front of Chassis Display Panel
- › High Performance Convection Cooling with Replaceable and Cleanable Fan Tray and Filter
- › Front Panel Power Switch, System Rest Switch and Maskable Reset Switch, all with Safety Covers
- › Electromagnetic Shielding
- › Includes one year hardware warranty

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

Save time and effort and reduce risk with COTS boards and software. Achieve world-class performance – WILD solutions outperform the competition.

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ATCA7365 Application Ready Mobile Computing Platform

The High Performance multiprocessing capability of this integrated ATCA platform provides the processing power to meet Comm on the Move requirements, such as Datacenter Virtualization and network centric applications in rugged environments.

The ATCA7365 is a high performance Open Standards ATCA COTS based system that is transportable in rugged ground environments. It is designed to address compute-intensive signal processing, voice and video processing, and high data rate streaming applications. The system is mounted in a tough lightweight transit case satisfying rugged non-operational capabilities of MIL-STD transportation requirements including drop test.



SYSTEM COMPONENTS INCLUDE:

- > Elma Type 11A, 6U, 6-slot chassis in a transit case
- > Fully replicated mesh backplane
- > Single system management card (provision for dual)
- > Three ATCA processor blades with multiple Intel processors
- > One Storage carrier card with up to 4 drives
- > One fabric switch blade with RTM
- > Redundant cooling and power supplies
- > Optional Red Hat Enterprise Linux OS
- > Optional virtualization software configurations

Elma Electronic Inc. | 510-656-3400

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<http://defense.ge-ip.com/products/crs-48-5/p3736>

CRS 48.5 High Performance Embedded Computing VITA 48.5 Rugged Subsystem

The CRS 48.5 is a High Performance Embedded Computing (HPEC) Rugged Subsystem. A complete, integrated, tested, ready-to-run subsystem, it uses the most advanced VITA 48.5 compliant air-flow through-cooling to allow the integration of up to eight quad core Intel® Core™ i7 processing nodes, dissipating up to 1,200 watts. This makes it capable of satisfying the most demanding rugged embedded computing requirements such as ISR and electronic warfare (EW) in the harshest, most challenging environments.

The CRS 48.5 ATR features GE's DSP280 multiprocessor with two quad core Intel Core i7 processors, capable of more than 260 gigaflops, delivering main memory bandwidth of up to 21GBytes/sec per CPU node. It can also take advantage of the even more powerful DSP281 multiprocessor for a total peak performance in excess of 2.4 teraflops. It includes the GBX460 fully managed 10 Gigabit Ethernet switch as the data plane.



FEATURES

- > Ruggedized VITA 48.5 ATR subsystem
- > Designed for data-intensive applications
- > Up to 4 multiprocessor boards (32 cores):
 - Two quad core i7-2715QE BGA @ 2.1GHz
 - 6Mbytes shared L3 Cache
 - 8 or 16GBytes DDR3 SDRAM per CPU
 - 8 or 16GBytes NAND Flash Disk per CPU
- > Communication via 10GigE switch
- > Up to four Fiber 10Gigabit Base-SR ports
- > Up to 8 TB solid state drive memory
- > Performance of up to 2.46 TFLOPS

To speak with a GE Intelligent Platforms representative, please call 1-800-433-2682 or International: Country Code + 1 (780) 401-7700.

GE Intelligent Platforms, Inc.

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www.acromag.com/comexpress

XCOM-6400 Rugged COM Express Type 6 Module

Acromag's XCOM-6400 COM Express modules provide a high-performance processor in a COTS package that is small, light, and very power-efficient. A variety of models are available with your choice of Intel 4th generation Core i7 or i5 CPU for enhanced graphics, security, and power management capabilities. Each unit is designed to withstand the shock and vibration of extreme industrial and defense applications with extra rigid circuit boards, extended temperature support, and conduction-cooled rails.

The XCOM-6400 features a SODIMM lock-down mechanism allowing up to 16GB of memory to be securely fastened without the limitations of soldered-down memory. Meeting the higher standards of MIL-STD-202G shock and vibration testing, a screw-down latch holds the memory in place without a loss of connection and also serves as a conduction plate to dissipate heat.



FEATURES

- › Intel 4th Gen (Haswell) multi-core i7/i5 processor
- › Intel 8 Series QM87 PCH chipset
- › Up to 16GB of high-speed DDR3L removable memory with SODIMM lock-down mechanism
- › Advanced heat management technologies: heat spreader plates and optional fan
- › Optional conduction-cooled frame for extreme temperatures
- › Up to -25 to 85°C extended operating range

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CompactPCI: Boards and Blades

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www.adlinktech.com

cPCI-3510 Series 3U CompactPCI® Processor Blade with ECC

ADLINK's cPCI-3510 is the latest 4th generation Intel® Core™ i7 3U CompactPCI processor blade, supporting the quad-core Intel® Core™ i7-4700EQ @ 2.4GHz, 8GB of DDR3L-1600 Error-Correcting Code (ECC) memory soldered onboard, and 32GB of SATA NAND flash.

The cPCI-3510 is designed to meet MIL-STD-810G, supporting wide temperatures from -20°C to 70°C and withstanding high vibration environments of 5Grms under operation. The cPCI-3510 Series is a reliable solution for applications in military and transportation, with integrated Intel® HD 4600 graphics that benefit video transcoding applications.

The cPCI-3510 Series supports three independent displays with two dual-mode DisplayPorts and one DVI-I output.



FEATURES

- › Quad-core 4th generation Intel® Core™ i7 processor
- › Up to 8GB DDR3L-1600 ECC soldered memory onboard
- › Supports three independent displays
- › Available in Extreme Rugged™ version with -40°C to +80°C operating temperature range without forced air flow
- › System/peripheral slot operation
- › PICMG 2.30 CompactPCI Plus/I/O-compliant
- › Onboard 32GB NAND flash

ADLINK Technology, Inc. | 408-360-0200

Contact: info@adlinktech.com

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ADLINK
TECHNOLOGY INC.

www.adlinktech.com

cPCI-6530 6U CompactPCI® Processor Blade

ADLINK's cPCI-6530 offers enhanced graphics, computing intensity, power efficiency, system manageability and data security to create an intelligent platform for mission-critical defense, aviation and transportation applications – applications that require the best CPU/GPU performance-per-watt, multiple displays, ruggedized design, and remote management.

The cPCI-6530 features a quad-core or dual-core 4th generation Intel® Core™ i7 processor with energy-efficient soldered DDR3L/ECC memory up to 16GB. The 4th generation Intel Core processor's enhanced Gen8 HD core and built-in visual features enable the cPCI-6530 to offer rich, interactive 2D and 3D graphics for compelling media experiences without the need of an add-on card. Each cPCI-6530 is able to provide up to three symmetric independent displays via DVI-I port in front and VGA and DVI in rear.



FEATURES

- > Quad-core 4th generation Intel® Core™ i7 processor with ECC
- > Dual channel DDR3L ECC memory, soldered and SO-CDIMM, up to 16GB
- > Supports three independent displays
- > Dual PMC/XMC sites
- > Remote management and TPM support
- > Conduction-cooled version available, CT-6530
- > Superior CPU/graphics performance
- > Enhanced manageability intelligence
- > Flexible connectivity
- > Rugged design

ADLINK Technology, Inc. | 408-360-0200

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www.advantech.com/nc

CPCI-8220 6U CompactPCI Freescale® QorIQ® P2040 Ruggedized Processor Board

The CPCI-8220 is a ruggedized 6U CompactPCI board based on the Freescale P2040 QorIQ communications processor with dual PMC/XMC slots designed to support high performance mezzanine cards. The board supports higher frequency P2041 processors when higher performance is required. The CPCI-8220 is designed for deployment in rugged environments where extended temperature ranges and low thermal design power are required. Soldered ECC memory makes it deployable in mission critical applications where memory reliability is mandatory, supporting 1GB soldered DDR3 ECC memory, with 2GB or 4GB build options. 2 x 4MB Redundant SPI Flash and 2 x 128MB of NOR Flash enable backup and update capabilities. A further 4GB NAND Flash serves as a boot device while an onboard 32GB SD eMMC offers application and storage capacity for a broad range of embedded applications.



FEATURES

- > Freescale QorIQ P2040 at 1.2 GHz or optional P2041 at 1.5 GHz
- > Up to 4GB DDR3 with ECC; Supports on-board 32GB eMMC
- > Two PMC/XMC, one 100/1000BASE-T LAN and three USB 2.0 interfaces
- > Supports optional extended operating temperature range
- > Redundant Flash Storage: 2 x 128MB NOR Flash and 2 x 4GB NAND Flash
- > CPCI-8220 RTM with four 100/1000BASE-T LAN, four RS232/422/485 and two USB 2.0 interfaces
- > 66 MHz 64-bit PCI interface to J1 and J2

Advantech | 800-866-6008

Contact: NCG@advantech.com

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MIC-3396 6U CompactPCI Blade with 4th Generation Intel® Core™ i3/i5/i7 Processor

Using Intel's 4th generation Core i3/i5/i7 processors supporting up to 4 cores/8 threads and 6MB last level cache, the MIC-3396 blade boosts computing performance deploying the latest virtualization techniques and CPU enhancements. Onboard soldered low voltage DRAM (1.35V) with ECC support and optional memory expansion via SO-DIMM socket extend the memory to a maximum of 16GB to support the most demanding applications in high-performance or virtualized environments, supporting up to 4GB per virtual machine. Dual channel design and memory speeds up to 1600MT/s along with increased cache size and cache algorithms guarantee maximum memory throughput. An onboard XMC/PMC site with PCIe x8 Gen. 3 connectivity can host high-speed offload or I/O mezzanines such as the MIC-3666 dual 10GbE XMC card. Check out our website for a full description of features and benefits.



FEATURES

- › Supports 4th generation Intel® Core™ i3/i5/i7 processors and Intel® QM87 PCH with embedded graphics (up to 3 independent displays)
- › Up to 16 GB (DDR3 1600) low voltage ECC memory (max 8GB on-board; socket SO-UDIMM x1, max 8GB)
- › Optimized single-slot SBC with 2.5" SATA III HDD/CFast socket/on-board flash (optional)
- › Two SATA ports, 1x USB 3.0, four USB 2.0 ports, two DVI ports, two RS-232 ports, one PS/2 connector, and PCIe x8 interfaces to the Rear Transition Module (RTM)
- › Five Gigabit Ethernet ports for PICMG 2.16, front and rear connectivity
- › PICMG 2.16 R1.0, PICMG 2.1 R2.0, PICMG 2.6 R1.0 compliant

Advantech | 800-866-6008

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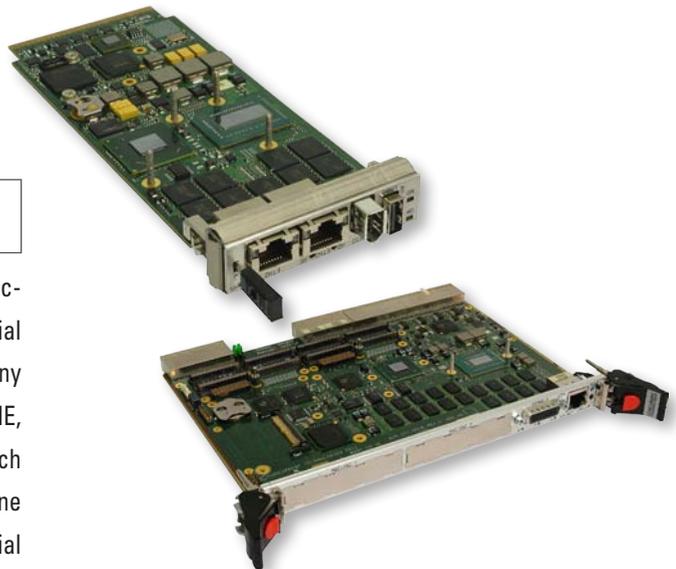
CONCURRENT TECHNOLOGIES

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Commercial-off-the-shelf and custom designed industrial computer boards for critical embedded applications

Concurrent Technologies specializes in the design and manufacture of commercial-off-the-shelf and custom designed industrial computer boards for critical embedded applications. The company has a wide range of high-performance Intel® processor based VME, VXS™, OpenVPX™, CompactPCI® and AdvancedMC™ products, which are complemented by an extensive offering of PMC (PCI Mezzanine Card) and XMC (Express Mezzanine Card) products. Commercial and ruggedized variants available.

Visit us at AUVSI's Unmanned Systems 2014:
 Booth 423



Concurrent Technologies' latest products feature the high-performance 4th Generation Intel® Core™ i7 processor or the low-power 22nm Intel® Atom™ processor.

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Intermas – InterRail

Intermas develops electronic enclosure systems:

Cabinets, housings, subracks, and an extensive range of accessories for the 19" rack systems used in the fields of PCI, VME/VME64x, cPCI, IEEE, and communication applications with state-of-the-art EMI- and RFI-shielded protection.

Intermas has an extensive product range of more than 10,000 separate components and more than 30 years' experience.

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FEATURES

- > InterRail® products meet tough physical demands and vibration proofs used for railway engineering, traffic engineering, and power station engineering.
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- > EMI- and RFI-shielded protection using stable stainless steel contact springs ensuring permanent and reliable bonding
- > Connectors and wiring accessories
- > Customization available

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www.mapsuka.com.tw

CompactPCI Platforms

Mapsuka rolled out a full line of cPCI enclosures from 1U to 9U in 2003. With vast achievements as a professional engineering group and a variety of configurations within its product family, Mapsuka has gone further to provide standardized and custom cPCI platform solutions, including chassis, power supply, backplanes, CPU boards, customized front panels with ejector handles and installations, etc. Mapsuka's full list of card rack hardware and mechanical design team enable custom requirements to be realized in 3-6 weeks.



FEATURES

- > Professional manufacturing and mechanical design team to realize custom chassis in 3-6 weeks.
- > Tool-built Construction, not NCT, to ensure precision and stability.
- > Utilization of lightweight, weather resistant aluminum materials that ensure high resistance to corrosion and increased EMI/ENC protection.

Mapsuka Industries Co., Ltd. | +886-2-22690567

Contact: mapsuka@mapsuka.com.tw



www.vectorelect.com

cPCI, PXI, VME, Custom Packaging Solutions

VME and VME64x, CompactPCI, or PXI chassis are available in many configurations from 1U to 12U, 2 to 21 slots, with many power options up to 1,200 watts. Dual hot-swap is available in AC or DC versions. We have in-house design, manufacturing capabilities, and in-process controls. All Vector chassis and backplanes are manufactured in the USA and are available with custom modifications and the shortest lead times in the industry.

Series 2370 chassis offer the lowest profile per slot. Cards are inserted horizontally from the front, and 80mm rear I/O backplane slot configuration is also available. Chassis are available from 1U, 2 slots up to 7U, 12 slots for VME, CompactPCI, or PXI. All chassis are IEEE 1101.10/11 compliant with hot-swap, plug-in AC or DC power options.

Our Series 400 enclosures feature side-filtered air intake and rear exhaust for up to 21 vertical cards. Options include hot-swap, plug-in AC or DC power, and system voltage/temperature monitor. Embedded power supplies are available up to 1,200 watts.

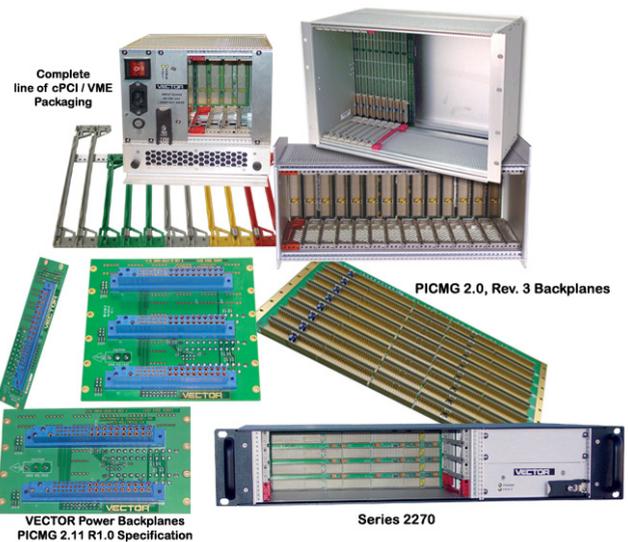
Series 790 is MIL-STD-461D/E compliant and certified, economical, and lighter weight than most enclosures available today. It is available in 3U, 4U, and 5U models up to 7 horizontal slots.

All Vector chassis are available for custom modification in the shortest time frame. Many factory paint colors are available and can be specified with Federal Standard or RAL numbers.

For more detailed product information,
please visit www.vectorelect.com

or call

1-800-423-5659 and discuss your application
with a Vector representative.



FEATURES

- › Made in the USA
- › Most rack accessories ship from stock
- › Modified 'standards' and customization are our specialty
- › Card sizes from 3U x 160mm to 9U x 400mm
- › System monitoring option (CMM)
- › AC or DC power input
- › Power options up to 1,200 watts

Vector Electronics & Technology, Inc. | 800-423-5659

Contact: inquire@vectorelect.com



www.mapsuka.com.tw

Front panels

Since 1997, Mapsuka has manufactured its series of CompactPCI/VME ejector handles and supplied cPCI/VME/AMC front panels and PMC bezels to customers worldwide. Customized cutout, silk-screening and mechanical assistance are welcome and our specialty.

Located in Taiwan and China, Mapsuka has the strength to provide customers with efficient service and very competitive pricing. Growing steadily, Mapsuka has been chosen by an increasing number of industry leaders throughout the world as their CompactPCI manufacturer. Choose Mapsuka as your CompactPCI partner and gain the flexibility your company needs to maintain a leading edge:

- Card Rack Hardware
- CompactPCI Chassis and Backplanes
- cPCI Front Panel and PMC Bezels
- Customization



FEATURES

- > Standard sizes of front panels are available with EMC gaskets: 2/4/5/6/8/12/16/20/24/32 HP.
- > Customized silk-screening, cutout and surface treatments are available.
- > Complete hardware includes ejector handles, PCB holders, microswitch, captive screws, sleeves, gaskets, etc.
- > Anti-contaminant surface treatment on the front side of front panels.

Mapsuka Industries Co., Ltd. | +886-2-22690567

Contact: mapsuka@mapsuka.com.tw

CompactPCI: Systems



NIU1A – Embedded I/O System – Nano Interface Unit

I/O Interface with optional ARM1 Processor

Configure to Customize

The NIU1A is a small, rugged, low-power system. It consists of an integrated power supply, one function slot that can be configured with a field-proven NAI intelligent I/O and communications function module and an optional ARM Cortex-A9 processor. Ideally suited for rugged Mil-Aero applications, the NIU1A delivers off-the-shelf solutions that accelerate deployment of SWaP-optimized systems in air, land and sea applications.

Architected for Versatility

NAI's Custom-On-Standard Architecture™ (COSA™) offers a choice of over 40 intelligent I/O and communications options. Pre-existing, fully-tested functions can be selected to quickly and easily meet system requirements. Individually dedicated I/O and communications processors allow mission computers to manage, monitor and control via single or dual Ethernet.

All products are designed to operate under extreme temperature, shock, vibration and EMI environments. EMI filters and gaskets meet or exceed MIL-STD-461F and MIL-STD-810G requirements.



FEATURES

- > Supports 1 Intelligent I/O function module
- > 2x 10/100/1000 Base-T Ethernet
- > 1.5"H x 1.7"D x 6.8"L @ 16 oz. (454 g) with 3 mounting options
- > 128 MB DDR3 SDRAM
- > Optional ARM Cortex™-A9 Dual Core 800MHz Processor
- > 4 GB SATA II NAND Flash (up to 32 GB option)
- > < 15 W power dissipation
- > Wind River® Linux, VxWorks®, Altera Linux OS Support
- > 1x RS232
- > Continuous Background BIT
- > Operating temp: -40°C to +71°C conduction cooled
- > 28 VDC input



North Atlantic Industries, Inc. | 631-567-1100

Contact: www.naii.com



www.menmicro.com/products/02G051-.html#t=overview

MEN Micro G51 3U CompactPCI Serial SBC

MEN Micro now offers the G51, a 3U CompactPCI Serial SBC equipped with a high performance QorIQ processor and a multitude of standard I/O interfaces on both the front and rear of the board.

The board's combination of exceptional connectivity, flexible configurations and multi-core computing provides a strong backbone for many types of communications and processing systems requiring intense, reliable data throughput.

The new G51 is ideal for a number of high computing functions including data acquisition and encryption as well as simulation and process control. Soldered components, high shock and vibration tolerance and a -40°C to +85°C operating temperature enable its use in harsh environments typically found in railway, automation, avionics and power and energy applications.

The flexible SBC is easily customized to meet user I/O and application requirements, as additional CompactPCI Serial peripheral cards can be added to provide specialized functionality.

Using CompactPCI Serial's full mesh architecture, all of the board's eight Gigabit Ethernet channels – three on the front and five on the back – can be switched to the backplane, if needed, without hardware modification.

The board provides solid connectivity. Additional rear I/O includes four PCIe ports and two SATA II ports, one of which can control an mSATA disk, as well as six USB 2.0 ports. Two additional USB 2.0 ports on the front can also be led to the backplane. Other design options include M12 Ethernet front connectors as well as conformal coating for use in dusty and humid environments.

Based on Freescale's P3041 QorIQ quad-core processor, the G51 offers up to 1.5 GHz of processing speed with or without encryption as well as four high performance Power Architecture e500mc cores. The SBC offers up to 8 GB of soldered DDR3 SDRAM system memory with ECC as well as several board management functions and a Linux BSP. The G51 is compliant to EN 50155 (railway) and is prepared for ISO 7637-2 E-mark compliance (automotive).



FEATURES

- › 3U CompactPCI Serial SBC
- › P3041 Freescale QorIQ quad-core processor
- › 8 Gb Ethernet interfaces: 3 on front, 5 on rear, or 8 on rear
- › Additional rear I/O: 4 PCIe ports, 6 USB 2.0 ports, 2 SATA II ports
- › Additional front I/O: 2 USB 2.0 ports
- › Up to 8 GB soldered DDR3 ECC SDRAM
- › -40°C to +85°C operating temperature
- › Compliant to EN 50155 (railways)
- › Prepared for ISO 7637-2 compliance (E-mark for automotive)

MEN Micro Inc. – Profile and Mission

Embedded Solutions – Rugged Computer Boards and Systems for Harsh, Mobile and Mission-Critical Environments

Established in 1998, MEN Micro is the United States subsidiary of MEN Mikro Elektronik with sales, technical support, and production. Since the founding of the headquarters in 1982 – and with more than 250 employees worldwide – MEN has focused on innovation, reliability and flexibility to develop and produce standard and custom computing solutions that employ the highest technology levels. The company provides a robust offering of highly reliable embedded COTS boards and devices widely used in extreme environmental conditions found in industrial and safety-critical applications.

MEN Micro | 215-542-9575

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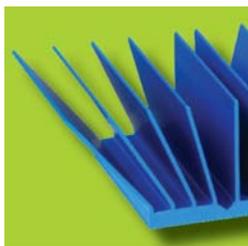


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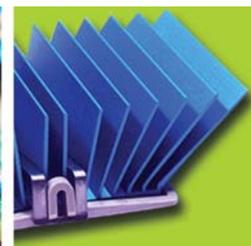
Innovations in Thermal Management



maxiFLOW™



pushPIN™



superGRIP™

ATS is world renowned for its advanced air and liquid cooling solutions with over 5,000 high- and ultra-performance heat sinks. ATS' extensive portfolio of high-performance cooling solutions is ideally suited to address the most demanding thermal challenges on the market. Additionally, ATS offers an extensive array of standard, off-the-shelf cooling solutions to meet all your thermal management requirements.

- > ATS offers over 108,000 push pin heat sink configurations – the largest offering on the market
- > maxiFLOW™ heat sinks feature a low profile, spread fin array to maximize surface area for more effective convection (air) cooling; reducing junction temperatures by more than 20%
- > ATS' unique maxiGRIP™ and superGRIP™ heat sink attachments apply a steady, even pressure to the component and does not require holes to be drilled in the PCB

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LCR

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3U VPX ATR Integrated System

LCR Embedded Systems is a global leader in standard and custom chassis, backplanes and systems. We are an approved supplier of airborne, shipboard and defense ground vehicle equipment to many of the world's leading OEMs.

*To learn more about **LCR Embedded Systems** and our products, go to www.lcrembeddedsystems.com contact us at (800) 527-4362 or sales@lcrembedded.com.*



Highlights of our 3U VPX ATR Integrated System:

- > (2x) Core i7 processor blades (2.5GHz) 8GB DDR3 1600MHz memory per blade
- > (2x) 28 VDC 400W power supplies
- > (1x) 28 VDC Inputs (MIL-STD-38999)
- > (2x) 55 Pin I/O Connectors (MIL-STD-38999)
- > 7.5" W x 12.62" D x 7.62" H in dimension
- > Aluminum Frame, convection over conduction cooled
- > (2x) VITA 62 conduction cooled power supplies
- > (5x) VITA 48.2 conduction cooled modules

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WILDSTAR 6 for OpenVPX

Annapolis Micro Systems is a world leader in high-performance, COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing intensive applications. Our 14th-generation WILDSTAR 6 for OpenVPX uses Xilinx's newest Virtex-6 FPGAs for state-of-the-art performance. It accepts one or two I/O mezzanine cards in one VPX slot or up to four in a double wide VPX slot, including Single 1.5 GHz 8 Bit ADC, Quad 250 MHz 12 Bit ADC, Single 2.5 GHz 8 Bit ADC, Quad 130 MHz 16 Bit ADC, Dual 2.3/1.5 GSps 12 Bit DAC, Quad 600 MSps 16 Bit DAC, Universal 3Gbit Serial I/O (Rocket I/O, 10 Gb Ethernet, InfiniBand), and Tri XFP (OC 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows, Linux, Solaris, IRIX, ALTIX, and VxWorks. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

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

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

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

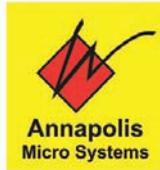


FEATURES

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

Annapolis Micro Systems, Inc. | 410-841-2514

Contact: wfinfo@annapmicro.com



www.annapmicro.com

WILDSTAR 6 for AMCs

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications. Our fourteenth generation WILDSTAR 6 for AMC uses Xilinx's newest Virtex-6 FPGAs for state-of-the-art performance. It accepts one FMC I/O Card. Our boards work on a number of operating systems, including Windows, Linux, Solaris, IRIX, ALTIX, and VxWorks. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

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

Our extensive IP and board support libraries contain more than 1000 cores, including floating point and the world's fastest FFT. CoreFire uses a graphical user interface for design entry, supports hardware-in-the-loop debugging, and also provides proven, reusable, high-performance IP modules. WILDSTAR 6 for AMC, with its associated I/O Cards, provides extremely high overall throughput and processing performance. The combination of our COTS hardware and CoreFire allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.

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

Save time and effort and reduce risk with our COTS boards and software. Achieve world-class performance – WILD solutions outperform the competition.



FEATURES

- › One Xilinx Virtex-6 FPGA I/O Processing Elements – LX240T, LX365T, LX550T, SX315T or SX475T
- › On board Host Freescale P1020 or P2020 PowerPC
- › Up to 2.5 GBytes DDR2 DRAM in 5 memory banks or
- › Up to 80 MB DDRII or QDRII DRAM in 5 memory banks
- › Programmable FLASH to store FPGA image
- › 4X PCI Express Bus Gen 2 between PPC and FPGA
- › Supports VITA 57 FMC I/O Cards
- › Full CoreFire Board Support Package for fast, easy application development
- › VHDL model, including source code for hardware interfaces and ChipScope access
- › Available in both commercial and industrial temperature grades
- › Proactive Thermal Management System – current, voltage, and temperature monitoring sensors via Host API
- › Includes one year hardware warranty, software updates, and customer support. Training available.

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

Save time and effort and reduce risk with COTS boards and software. Achieve world-class performance – WILD solutions outperform the competition.

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Contact: wfinfo@annapmicro.com



www.annapmicro.com

2.0 GSps 10-bit A/D

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

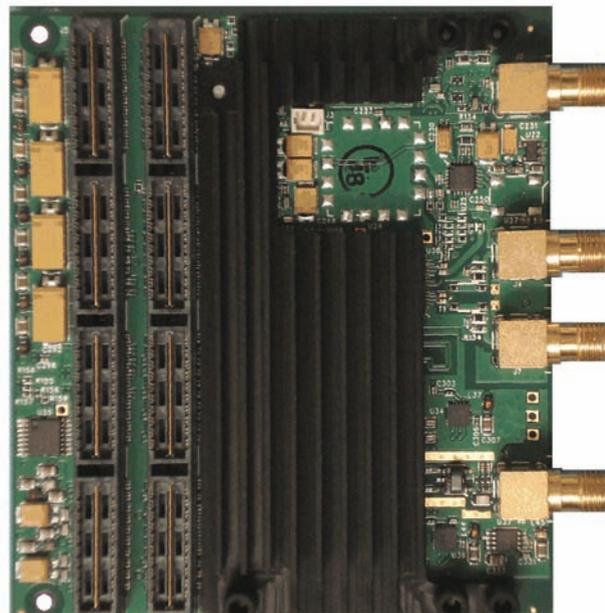
In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine board supplies user-configurable real-time continuous sustained processing of the full data stream. Up to two A/D and up to two Serial I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS or IBM Blade main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

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

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

Annapolis Micro Systems, Inc. is a world leader in high-performance COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, Digital Signal Processing, FFTs, communications, software radio, encryption, image processing, prototyping, text processing, and other processing intensive applications.

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



FEATURES

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

Annapolis Micro Systems, Inc. | 410-841-2514

Contact: wfinfo@annapmicro.com



www.annapmicro.com

Dual 4.0 GSps DAC

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

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

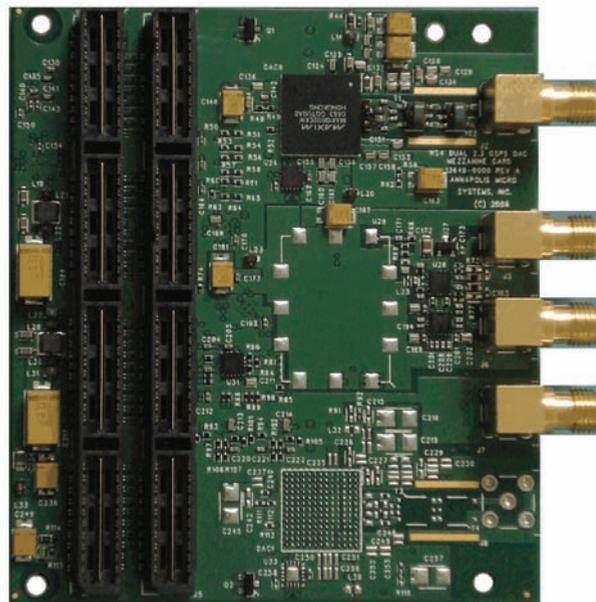
In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine board supplies user-configurable real-time A to D conversion and digital output. Up to two A/D or D/A and up to two serial I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS or IBM Blade main board, or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

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

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

Annapolis Micro Systems, Inc. is a world leader in high-performance COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, Digital Signal Processing, FFTs, communications, software radio, encryption, image processing, prototyping, text processing, and other processing intensive applications.

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



FEATURES

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

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Contact: wfinfo@annapmicro.com



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WILDSTAR 5 for IBM Blade

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

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

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

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

Annapolis Micro Systems, Inc. is a world leader in high-performance COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, Digital Signal Processing, FFTs, communications, software radio, encryption, image processing, prototyping, text processing, and other processing intensive applications. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

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

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

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



FEATURES

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

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Four Channel Clock Synchronization Board

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

A jumper set at board installation time or via optional P2 Serial Port determines which one of the two installed clock sources is active. Manufacturing options for Clock Source 0 are Single Ended or Differential External Clock, a PLL ranging from 700 MHz to 3 GHz with an On-Board Reference Oscillator, or a PLL ranging from 700 MHz to 3 GHz with a 10 MHz External Reference. Manufacturing options for Clock Source 1 are a PLL ranging from 700 MHz to 3 GHz with an On-board Reference Oscillator, a PLL ranging from 700 MHz to 3 GHz with a 10 MHz External Reference or an On-Board Low Frequency Oscillator ranging up to 800 MHz.

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

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

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FEATURES

- › Four Synchronized Differential Front Panel Clock Outputs up to 3 GHz with Typical Skew of 5 ps
- › Ultra-low Clock Jitter and Phase Noise – 275 Fs with 1,280 MHz PLL and external 10 MHz Reference
- › On-board PLLs Manufacturing Options provide Fixed Frequencies of 700 MHz to 3 GHz, Locked to Internal or External Reference
- › On-board Low Frequency Oscillator provides Fixed Frequencies up to approximately 800 MHz
- › Four Synchronized Trigger Outputs, always Synchronized with the Output Clock, with Typical Skew of 5 ps
- › Jumper Selectable Trigger Output Levels of 3.3 V PECL, 2.5 V PECL, or 1.65 V PECL
- › Source Trigger from Front Panel SMA, Pushbutton, or Optional P2 Serial Port
- › Cascade boards to provide up to 16 sets of outputs
- › Compatible with standard VME64x and VXS 6U backplanes
- › Universal clock input supports wide range of signal options, including signal generator sine wave
- › Differential clock input permits multiple standards including: LVDS, 3.3 V PECL, 2.5 V PECL, and 1.65 V PECL
- › Clock and Trigger Outputs Compatible with all Annapolis Micro Systems, Inc. WILDSTAR™ 2 PRO I/O Cards and WILDSTAR™ 4/5 Mezzanine Cards

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WILD OpenVPX Storage Board

Annapolis leads the OpenVPX market with the 8 Terabyte per slot WILD Storage Solution with 4GBps Write and 8GBps Read Bandwidth. The Storage Board has a Hot Swappable Canister containing up to 16 Pluggable 1.8" SSD SATA 3.x Drives, with 2, 4 or 8 Terabytes per Board.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing intensive applications. Annapolis provides I/O mezzanine cards, including Single 1.5 GHz 8 Bit ADC, Quad 250 MHz 12 Bit ADC, Single 2.5 GHz 8 Bit ADC, Quad 130 MHz 16 Bit ADC, Dual 2.3/1.5 GSps 12 Bit DAC, Quad 600 MSps 16 Bit DAC, Universal 3Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OC 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows and Linux. We support our board products with a standardized set of drivers, APIs and VHDL simulation models.

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

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FEATURES

- > 4 GBps Write and 8 GBps Read Bandwidth
- > Up to 40Gb Ethernet or QDR InfiniBand on each of Four Fat Pipes on P1 for a total of 20GBps on P1
- > PCI Express 8x Gen 1, Gen 2 or Gen 3 on P2 and P5 of the OpenVPX Backplane
- > 2, 4 or 8 Terabytes per OpenVPX Slot
- > Hot Swappable Canister
- > Up to 16 Pluggable 1.8" SSD SATA 3.x
- > API for Command and Control of the Storage Process
- > Includes one year hardware warranty

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WILD OpenVPX Switch Board

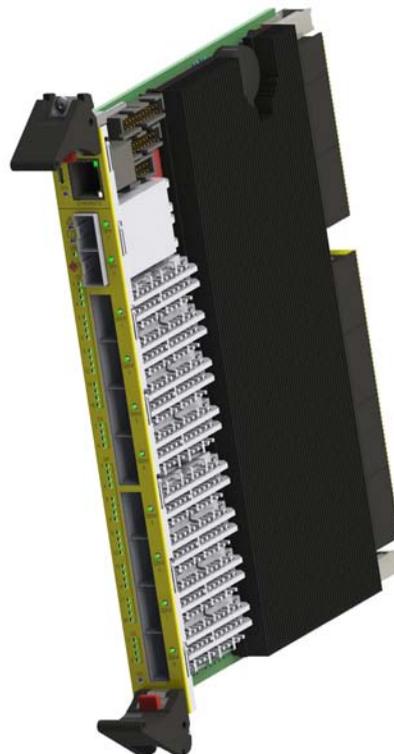
Annapolis leads the OpenVPX market with the WILD 6U OpenVPX (VITA 65.0 Compliant) Switch Board, with up to 4 Tbps non-blocking switching capacity with up to 8 switch partitions.

Supports OpenVPX Switch Profiles: SLT6-SWH-20U19F-12.4.1: 20 Control Plane and 19 Data Plane Backplane Ports; SLT6-SWH 16U20F-12.4.2: 16 Control Plane and 20 Data Plane Backplane Ports; SLT6-SWH-24F-12.4.3: = 24 Data Plane Backplane Ports

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FEATURES

- > 6U OpenVPX Board
- > Up to 4Tbps Non-Blocking Switching Capacity with up to 8 Switch Partitions
- > Multiprotocol Switch – SDR/DDR/QDR/FDR InfiniBand and 1/10/20/40 Gb Ethernet
- > Each Backplane and Front Panel Port can be Configured for either InfiniBand or Ethernet
- > Front Panel: Up to 8 QSFP+, Up to 2 SFP+, RJ45 Management Port, USB USART, LED Status
- > Supports OpenVPX Switch Profiles
- > InfiniBand and IP Routing
- > Ethernet Gateways
- > ChMc Management Plane Support
- > Includes one year hardware warranty

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WILDSTAR A5 for OpenVPX

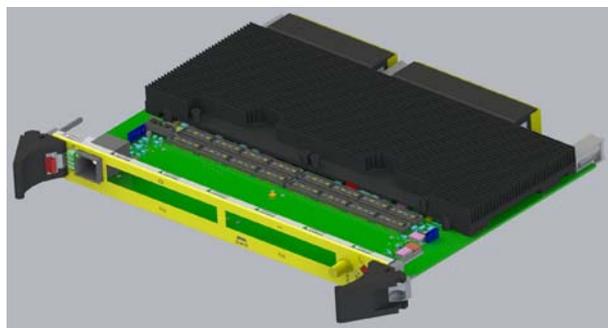
Supports up to Twenty-four 14G InfiniBand, Six 40Gb Ethernet, or Twenty-four 10G Ethernet Connections.

WILDSTAR A5 for OpenVPX uses Altera’s newest Stratix V FPGAs for state-of-the-art performance. This is one of a series of Altera Based FPGA Processing Boards from Annapolis.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing intensive applications. It accepts up to four I/O mezzanine cards, including Single 1.5 GHz 8 Bit ADC, Quad 250 MHz 12 Bit ADC, Single 2.5 GHz 8 Bit ADC, Quad 130 MHz 16 Bit ADC, Dual 2.3/1.5 GSps 12 Bit DAC, Quad 600 MSps 16 Bit DAC, Universal 3Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OC 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows and Linux. We support our board products with a standardized set of drivers, APIs and VHDL simulation models.

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FEATURES

- › Supports up to Twenty-four 14G InfiniBand, Six 40Gb Ethernet, or Twenty-four 10G Ethernet Connections
- › Up to Three Altera Stratix V FPGAs Processing Elements – GSD4, GSD5, GSD6, GSD8, GXA3, GXA4, GXA5, GXA7, GXA9, GXAB
- › Up to 8 GBytes DDR3 DRAM in 4 Memory Banks and Up to 80 MBytes QDRII + SRAM in 5 Memory Banks per WILDSTAR A5 for OpenVPX Board
- › Programmable FLASH for each FPGA to Store FPGA Images
- › APM86290 PowerPC on Board Host
- › PCI Express Bus Gen 1, Gen 2, or Gen 3 to P2 Expansion Plane through On Board PCIe Switch
- › Full CoreFire Board Support Package for fast, easy application development
- › VHDL model, including source code for hardware interfaces and ChipScope Access
- › Available in both commercial and industrial temperature grades
- › Proactive Thermal Management System – Board Level current measurement and FPGA temperature monitor, accessible through Host API
- › Includes one year hardware warranty, software updates, and customer support
- › Training available

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Save time and effort and reduce risk with COTS boards and software. Achieve world-class performance – WILD solutions outperform the competition.

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ELMA

Your Solution Partner

http://bit.ly/MTCA4_Crate

12-Slot MicroTCA.4 Platform

Elma has developed a family of MicroTCA.4 development platforms that support up to 12 slots front and rear single/double Mid-sized AMCs. The powered chassis features full IPMI support, switched GigE, and direct SATA/SAS connections. We offer system-level integration with board-level selections from our industry partners.

Elma MicroTCA.4 platforms are currently used in prominent physics labs around the world.



FEATURES

- › 19" rackmount crate meets MicroTCA.4. R1.0 specification
- › Supports up to 12 single/double mid-size AMC slots and μ RTMs
- › Front-to-rear cooling with IPMI support
- › Supports one or two full-size MCHs
- › Switched GigE ports
- › Direct connections for SATA/SAS and other I/O

Elma Electronic Inc. | 510-656-3400

Contact: sales@elma.com

LinkedIn: [linkedin.com/company/elma-electronic](https://www.linkedin.com/company/elma-electronic)

Twitter: twitter.com/elma_electronic

PCI Express: I/O Cards

ALPHI

TECHNOLOGY CORPORATION

www.AlphiTech.com

PCIe-Mini-DA4 – 4 Ch 16-bit D/A Software Programmable 2 μ Second DACs

The PCIe-Mini-DA4 is a PCI Express Mini board with a total of 4 voltage outputs D/A. Each output is followed by a buffer able to provide \pm 30 mA.

Special function code allows global updates of all channels or by a group at a time. Standard ping-pong output registers for each channel or optional data RAM allows waveform generation with minimum processor involvement.

An internal register sets the sampling rate of the internal sampling rate generator. The card operates in one of 3 modes:

- State machine providing automatic update and load on sampling clock
- Manual load with update on sampling clock
- Manual load and update

FEATURES

- › 16-bit D/A converter
- › Settling time 2 μ sec, 0-5V range
- › 500 KSPS throughput
- › Six Programmable Output Ranges per channel
- › Up to 30 mA Output Drive requires \pm 12V External Power Supply
- › Unipolar: 0V to 5V, 0V to 10V
- › Bipolar Mode: \pm 5V, \pm 10V, \pm 2.5V, -2.5V to 7.5V, \pm 10 mA continuous, \pm 30 mA max
- › Multiple output spans available
- › Temperature monitoring function
- › Simultaneous or single update of D/A converter outputs
- › Power-On Reset to 0V
- › Two stage buffers
- › Global output buffer with internal or external triggering



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Contact: sales@AlphiTech.com



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WILDSTAR 6 PCIe

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications. Our fifteenth-generation WILDSTAR 6 for PCI Express uses Xilinx's newest Virtex-6 FPGAs for state-of-the-art performance. It accepts one or two I/O mezzanine cards, including Single 1.5 GHz 8 Bit ADC, Quad 250 MHz 12 Bit ADC, Single 2.5 GHz 8 Bit ADC, Quad 130 MHz 16 Bit ADC, Dual 2.3/1.5 GSps 12 Bit DAC, Quad 600 MSps 16 Bit DAC, Universal 3Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OC 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows, Linux, Solaris, IRIX, ALTIX, and VxWorks. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

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

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

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Save time and effort and reduce risk with COTS boards and software. Achieve world-class performance – WILD solutions outperform the competition.



FEATURES

- › Up to three Xilinx Virtex-6 FPGA I/O processing elements – LX240T, LX365T, LX550T, SX315T, or SX475T
- › Up to 8 GBytes DDR2 DRAM or DDR3 DRAM in 14 memory banks per WILDSTAR 6 for PCI Express board or up to 480 MBytes DDRII+/QDRII DRAM in 15 memory banks
- › Programmable FLASH for each FPGA to store FPGA images
- › 8X PCI Express Bus Gen 1 or Gen 2
- › Supports PCI Express standard external power connector
- › High-speed DMA Multi-Channel PCI controller
- › Full CoreFire Board Support Package for fast, easy application development
- › VHDL model, including source code for hardware interfaces and ChipScope access
- › Available in both commercial and industrial temperature grades
- › Proactive Thermal Management System – Board Level current measurement and FPGA temperature monitor, accessible through Host API
- › Includes one year hardware warranty, software updates, and customer support
- › Training available

Annapolis Micro Systems, Inc. | 410-841-2514

Contact: wfinfo@annapmicro.com



www.annapmicro.com



WILDSTAR A5 for PCI Express

Supports up to Three 56G FDR InfiniBand, Three 40Gb Ethernet, or Twelve 10Gb Ethernet Connections.

WILDSTAR A5 for PCI Express uses Altera’s newest Stratix V FPGAs for state-of-the-art performance. This is the first of a series of Altera Based FPGA Processing Boards from Annapolis.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based processing for radar, sonar, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing intensive applications. It accepts one or two I/O mezzanine cards, including Single 1.5 GHz 8 Bit ADC, Quad 250 MHz 12 Bit ADC, Single 2.5 GHz 8 Bit ADC, Quad 130 MHz 16 Bit ADC, Dual 2.3/1.5 GSps 12 Bit DAC, Quad 600 MSps 16 Bit DAC, Universal 3Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OC 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows and Linux. We support our board products with a standardized set of drivers, APIs and VHDL simulation models.

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FEATURES

- › Supports up to Three 56G FDR InfiniBand, Three 40Gb Ethernet, or Twelve 10Gb Ethernet Connections
- › Up to Three Altera Stratix V FPGA Processing Elements – GSD4, GSD5, GSD6, GSD8, GXA3, GXA4, GXA5, GXA7, GXA9, GXAB
- › Up to 4 GBytes DDR3 DRAM in 2 Memory Banks and Up to 192 MBytes QDRII + SRAM in 12 Memory Banks per WILDSTAR A5 for PCI Express Board
- › Programmable FLASH for each FPGA to Store FPGA Images
- › 16X PCI Express Bus Gen 1, Gen 2, or Gen 3 to Host PC through On Board PCIe Switch
- › Supports PCI Express Standard External Power Connector
- › Multi Channel High Speed DMA
- › Full CoreFire Board Support Package for fast, easy application development
- › VHDL model, including source code for hardware interfaces and ChipScope Access
- › Available in both commercial and industrial temperature grades
- › Proactive Thermal Management System – Board Level current measurement and FPGA temperature monitor, accessible through Host API
- › Includes one year hardware warranty, software updates, and customer support
- › Training available

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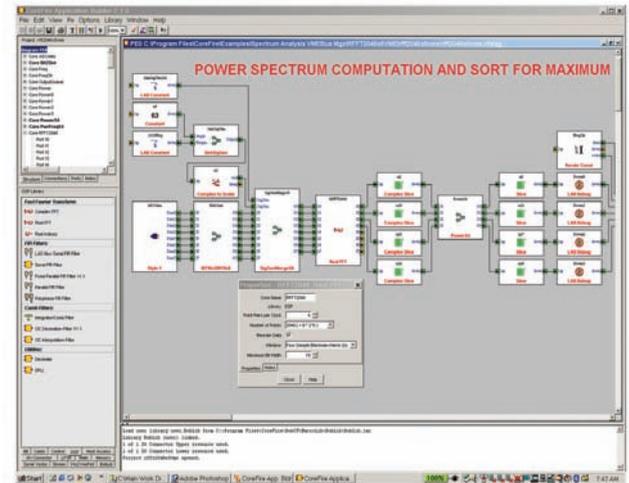
CoreFire

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

Use CoreFire's graphical interface to drag and drop library elements onto the design window. Modify your input and output types, numbers of bits, and other core variables by changing module parameters with pull-down menus. The modules automatically provide correct timing and clock control. Insert debug modules to report actual hardware values for hardware-in-the-loop debugging. Hit the Build button to check for errors and as-built core sizes and to build an encrypted EDIF file. Use the Xilinx ISE tool to place and route each FPGA design. Modify and use the jar file or the C program created by the CoreFire Build to load your new file into your WILDSTAR and I/O card hardware. Use the CoreFire Debugger to view and modify register and memory contents in the FPGA and to step through the dataflow of your design running in the real physical hardware.

Our extensive IP and board support libraries contain more than 1,000 proven, reusable, high-performance cores, including FIR and CIC filters, a channelizer, and the world's fastest FFT. We support conversion between data types: bit, signed and unsigned integers, single precision floating point, integer and floating point complex, and arrays. A few of the newly added array cores include array composition and decomposition; slice, parallelize, serialize, repack, split, merge, reorder, rotate, and concatenate transformations; matrix math, sliding windows, and convolutions.

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



FEATURES

- › Dataflow-based – automatically generates intermodule control fabric
- › Drag-and-drop graphical interface
- › Work at high conceptual level – concentrate on solving algorithmic problems
- › Hardware-in-the-loop debugging
- › More than 1,000 modules incorporate years of application experience
- › Reduce risk with COTS boards and software
- › Save time to market
- › Save development dollars
- › Easily port completed applications to new technology chips and boards
- › Training and custom application development available
- › Achieve world-class performance; WILD solutions outperform the competition
- › Annual node locked or networked license; includes customer support and updates

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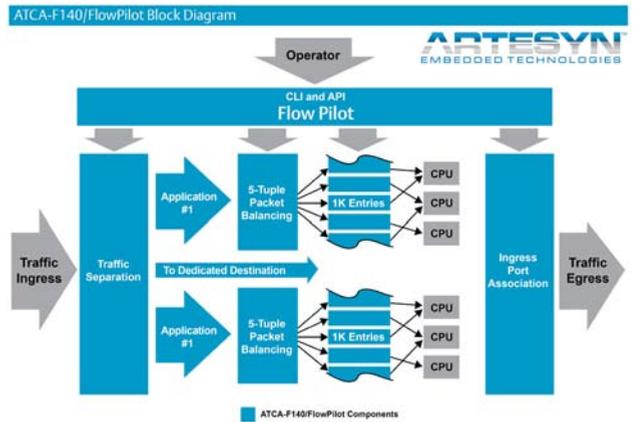


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FlowPilot™ Packet Balancing Software for ATCA Platforms

Artesyn's **FlowPilot™** software adds packet forwarding techniques beyond the standard switching and routing protocol support built-in to its ATCA-F140 high performance 40G ATCA hub blade. As a high bandwidth traffic flow separator and load balancer, FlowPilot can maintain flow context and packet sequence while separating traffic into application groups. FlowPilot allows you to manage the switching hardware to achieve lowest latency, full wire speed packet, and flow context aware packet distribution to and from all processing blades in your AdvancedTCA platform.

The ability to monitor and process data streams on the fly is appealing in many application areas. Wireline and wireless carriers have an interest to provide contractually agreed services and quality. Enterprises extend their classical firewalls with highly sophisticated intrusion prevention systems. Service providers are interested in statistics about subscriber behaviors.



FEATURES

- › High bandwidth traffic flow separator and load balancer
- › Balance traffic to multiple AdvancedTCA® blades for packet monitoring and processing
- › Maintain flow context and packet sequence
- › Fully transparent for external network elements
- › Separate traffic into application groups
- › Redundant 160G external Ethernet connectivity
- › 480Gbit/s internal bandwidth for packet processing

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System Host Boards: PICMG 1.3

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NuPRO-E42 PICMG® 1.3 Full-Size SHB

ADLINK NuPRO-E42 is the latest PICMG® 1.3 full-sized System Host Board (SHB), which utilizes the 4th generation Intel® Core™ processor at core speeds up to 3.1GHz combined with the Intel Q87 Express Chipset, and provides high-speed data transfer interfaces such as USB 3.0 and SATA 6 Gb/s (SATA III). The ADLINK NuPRO-E42 provides a wide range of storage, I/O, and expansion connectivity, including one PCI Express x16, four PCI Express x1 and four PCI, six COM ports, 12 USB ports (6 USB 3.0), and four SATA 6Gb/s RAID 0, 1, 5, 1+0 supported by Intel® Rapid Storage Technology. With dual-channel DDR3 1333/1600 MHz memory up to 16GB in two DIMM sockets, the NuPRO-E42 SHB is ideally suited to applications requiring multi-tasking capabilities, high computing power, and high-speed data transfer rates, such as industrial control, machine vision, and automation.



FEATURES

- › 4th generation Intel® Core™ i7/i5/i3 or Pentium® processor
- › Intel® Q87 Express Chipset supporting PCI Express 3.0
- › Intel® Rapid Storage Technology, supports RAID 0/1/5/1+0
- › 6x COM ports (including 1x RS-232/422/485)
- › Supports USB 3.0 with 5 Gb/s data transfer rate
- › Supports Serial ATA with 6 Gb/s data transfer rate on SHB

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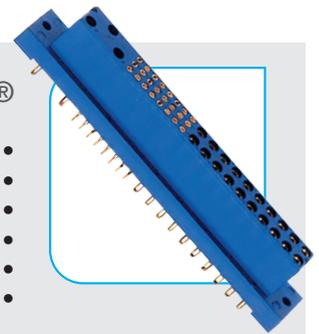
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MicroTCA (μTCA)®

- Compliant to MTCA.0, MTCA.1 & MTCA.3 specifications
- High reliability, precision machined contacts
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- Minimized height above printed circuit board
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- Power contacts carry 50 amps minimum at a 30°C temperature rise (prior to derating)

PICMG 3.8

- Compliant to PICMG 3.8 requirements
- Intended for power and system management use
- Blind mating capability
- 19.8 mm wide



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