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AUGUST 2008 VOLUME 6 NUMBER 6

2008 Resource Guide

SPECIAL

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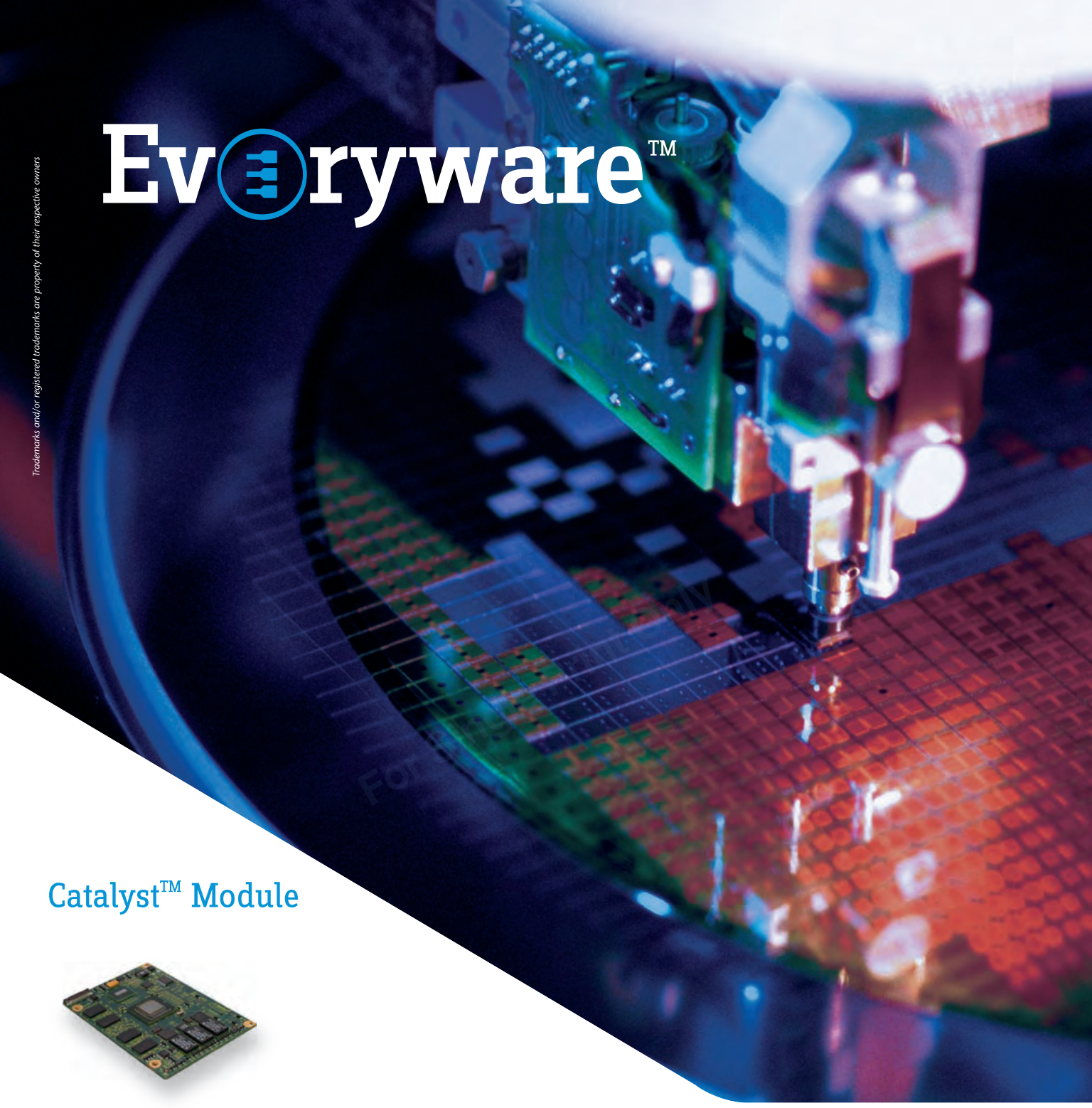

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Editor's Foreword

Jerry Gipper

On with the show

The fall trade show season is quickly approaching. I am tracking more than two dozen trade shows, conferences, expos, and developers' forums on my calendar for the remainder of 2008 (see www.opensystems-publishing.com/events). Some I will attend and others I will monitor for news and announcements.

As embedded computing systems developers, do you find these events beneficial? What are your expectations when you attend an event? Are you looking for new products and new technologies, or just trying to establish or reinforce contact networks? Do you go for the conference material or the product exhibitions? Do you take time to seek out product experts that can listen to your comments and give you insight into future product advancements? Or do you just go for the T-shirts?

For me, traveling to trade shows is a great way to get a feel for what is generating buzz in the embedded computing industry. You can get a better sense of the embedded community's interest level in certain products while attending a live event than you can surfing the Web. Crowded booths often indicate a hot new product or technology, something that is capturing developers' attention. Sometimes it's a sign of a great giveaway! You just can't perceive that excitement on the Internet, other than from some blog activity, but in general, the embedded industry doesn't blog well.

I also use these events to gain a deeper understanding of the industry. I look for who is exhibiting and who is absent. Exhibitor lists can tell you a lot about what is happening in the industry. Are the big names at the show? Are exhibitors making a strong impression, or sitting in the background away from the main entrances? What messages are they putting out? Are their booths large or small? What is the event traffic and attendance like? Is it as crowded as a Trekkie convention, or a candidate for a bowling alley?

There are all types of events ranging from traditional big show exhibitions with conferences to smaller developer events sponsored by larger companies and their ecosystems. Each serves a distinct purpose. The larger events are more general purpose, covering a wide variety of topics. They tend to have more sales and marketing people in attendance. The smaller events are more personal and focused. Sponsors often bring in key engineering staff to meet with attendees.

When I visit a show, I like to walk the floor searching for products or services that I think might have an impact on embedded computing designs. Sometimes I have to look closely, and things don't always catch my eye on my first pass by. Only after getting further into the show, talking to other attendees, or giving something more thought do I start to see the significance of certain products. Some companies make it especially difficult because their messages are unclear or confusing. Sometimes the best stuff is hidden in the clutter. I enjoy challenging booth staff with questions that make them explain the problems that their products or services solve for potential buyers.

Many companies use trade shows to launch new products. At the shows, you get to check out new products up close and talk to technical experts. But the Internet is changing the way companies make product announcements. In the old days, new products were launched at live events. Now many companies launch products days or weeks before a major show and then use the show to give attendees a chance to kick the proverbial tires. But nothing beats a real hands-on feel for the product and the opportunity to talk to product experts in person.

Trade shows ebb and flow with the times. I urge you to keep on the lookout for new events. Give them a test run. Watch for company-sponsored developer forums, consortia forums, and specialized events. Review the agenda beforehand and check for special sessions scheduled throughout the event. Don't always stick to the main drag; look for the sideshows. Do some homework before you go so that you know what to look for and where to find it. Your show experience will be greatly enhanced if you are prepared well before you arrive at the registration desk.

I would like to hear your opinions on these industry events. Feel free to share your comments through e-mail or visit our blog at www.embedded-computing.com to add your comments.

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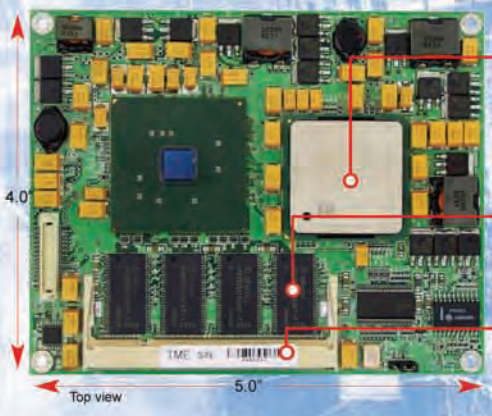

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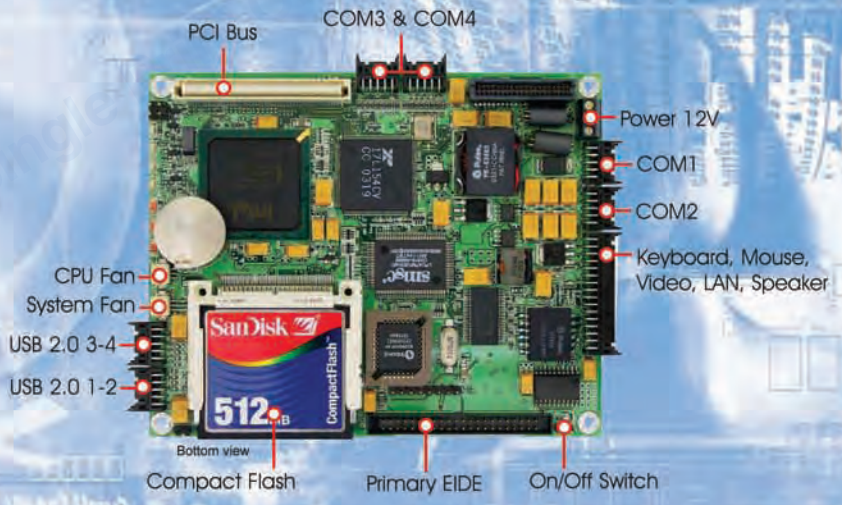

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Telematics take tolls on the Autobahn

Truck-tracking units

While there are no speed limits or tolls collected for cars traveling on the Autobahn, trucks are required to follow speed restrictions and pay tolls. Because German highways do not have tollgates, most trucks carry electronic onboard units that register the distance traveled and calculate the fees. Structures similar to road sign arches span the Autobahn, using electronic and photographic equipment to register trucks as they pass at full speed.

The TU-500 onboard unit from Garz & Fricke, Germany, pictured in Figure 1 exchanges data between the truck and stationary scanners on the highway. This unit is equipped for telematics control, enabling trucking companies to know exactly where their trucks are at any given moment. If a truck is late because of traffic congestion, the company can rearrange the meeting or transshipping point to shorten wait times. The company's internal fleet server performs similar time and location control duties as the toll-collecting government agency and determines if cargo is on the road, in the warehouse, or at the customer's location.

Used on the road since 2003, the TU-500 terminal is based on the Garz & Fricke MiniModule DOWN UNDER Series with Renesas Technology SH3 or SH4 microprocessors as well as Sharp LH7A404 microprocessors and other models using an ARM9 microprocessor CPU from NXP Semiconductors. The onboard unit was built for Euro Telematik AG, Germany, which manufactures telematic systems that monitor and control mobile units for transportation, logistics, and aerospace companies.

The TU-500's hardware and Windows CE operating system can be customized for requirements through its modular design. Basic features include:

- Integrated GPS receiver with external antenna
- Four serial interfaces (RS-232) for connecting modems, mobile telephones, or similar peripherals
- One CAN fieldbus interface to query vehicle data
- USB 2.0 interface
- One PCMCIA slot for memory expansion or additional interfaces
- LVDS interface for connecting a vehicle-proven TFT display and touch-screen operation
- Complies with all standards for worldwide vehicle use

Figure 1

After the TU-500 terminal makes the electronic connection to the data center via GSM, GPRS, WLAN, or other interfaces, it transmits vehicle status and receives new orders or messages from the central office. If a driver cannot be reached, messages are stored in a mailbox. Onboard navigation also can be implemented on the device, eliminating the need to install additional devices and simplifying the driver's job. In calculating tolls, the onboard unit and the software at the central office allocate fees according to partial distances and the respective customers.

Embedded statistics and events

The worldwide market for embedded systems is estimated at €160 billion (U.S. $250 billion), according to Roland Berger Strategy Consultants. The expected annual growth rate is 9 percent from now until 2010. Germany is ranked third in this market, close behind the United States and Japan. In Germany, a very high percentage of embedded products goes into cars. An average German car uses about 70 processors and roughly 10 million lines of code, which is twice the amount of code used in Windows XP.

The SENSOR+TEST 2008 conference and exhibition held May 5-8 in Nuernberg, Germany, attracted nearly 8,000 visitors and 562 exhibitors. A team of design engineers from InfraTec GmbH, Technical University of Chemnitz and the Fraunhofer Institute in Chemnitz won the €10,000 (U.S. $16,000) prize for an infrared detector with a Microelectromechanical Systems (MEMS)-based Fabry-Pérot filter.

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Spotlight on Mobile Linux, NFC, and processor benchmarks

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The LiMo Foundation is a dedicated consortium of mobile industry leaders working together in an open and transparent governance model with shared leadership and shared decision making. The organization aims to provide the mobile industry with an open and globally consistent handset software platform based on Mobile Linux.

To support Linux platforms' growing momentum in the worldwide mobile market, the Linux Phone Standards (LiPS) Forum announced that its activities and membership will be folded into the LiMo Foundation as of July 2008. This consolidation reflects the industry-wide trend toward unifying Linux-based mobile telephony platforms and helps accelerate the emergence of common Mobile Linux specifications and implementations. It is expected that this change will bolster the Mobile Linux developer community and support the creation of new applications, services, and end-user experiences.

NFC Forum

www.nfc-forum.org

Near Field Communication (NFC) is a short-range wireless connectivity technology that evolved from a combination of existing contactless identification and interconnection technologies. Products with built-in NFC, which operates at 13.56 MHz and transfers data at up to 424 Kbps, dramatically simplify the way consumer devices interact with one another, helping people speed connections, receive and share information, and even make fast and secure payments.

The NFC Forum is a nonprofit industry association that advances NFC technology. Through the NFC Forum, members work together to create NFC specifications based on standards that serve as the foundation for NFC product and service interoperability.

The NFC Forum recently announced the release of two specifications that stipulate action requests and the activation of alternative data transfer technologies between NFC-enabled devices. The Generic Control Record Type Definition specification provides a simple way to request a specific action, such as starting an application or setting a mode on an NFC-enabled device (destination device) from another NFC device, tag, or card (source device) through NFC communication. The Connection Handover specification defines the structure and sequence of interactions that allow two NFC-enabled devices to establish a connection using other wireless communication technologies, such as Wi-Fi or Bluetooth.

Embedded Microprocessor Benchmark Consortium (EEMBC)

www.eembc.org

EEMBC develops and certifies real-world benchmarks and benchmark scores to help designers select the right embedded processors for their systems. Every processor submitted for EEMBC benchmarking is tested for parameters representing different workloads and capabilities in communications, networking, consumer, office automation, automotive/industrial, embedded Java, and network storage-related applications. Members establish benchmark standards and provide certified benchmarking results through the EEMBC Technology Center.

In June, EEMBC announced that it has published the first certified benchmark scores obtained using OABench 2.0, the next-generation benchmark tests that approximate embedded microprocessors' performance in printers, plotters, and other systems that handle text and image processing tasks.

The OABench 2.0 suite consists of five benchmarks, each with its own data sets, including new Bezier and Ghostscript tests. The Bezier benchmark interpolates a set of points defined by the four points of a Bezier curve and stresses embedded microprocessors' ability to perform division, multiplication, and scalar processing tasks. The Ghostscript benchmark indicates an embedded processor's potential performance while running a PostScript printer engine.

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High-end graphics aren't just for high-performance computing platforms. With multimedia applications becoming more robust daily, users are demanding the same visual experience on their desktops, laptops, gaming consoles, and increasingly, on a new class of mobile devices.

solution

Scalable Graphics Processing Units (GPUs) with hundreds of cores, HD video processing, physics engines with realistic modeling of complex motion and textures, and C libraries for parallel application development are just some of the technologies advancing the visual experience.

Hand eye coordination

Expectations for the visual experience in all computing environments have increased immensely in recent years. Formerly the realm of high-performance scientific workstations, advanced graphics capabilities have become commonplace in desktop and gaming platforms and are now routinely available in laptop platforms. GPUs are delivering sophisticated realism using hundreds of cores coupled with fast memory, and graphics adapters are connected to the main computing platform using high-speed PCI Express.

With the onslaught of mobile devices and more multimedia content, attention has now turned to the visual experience in handheld devices. Users are looking to replicate much of the experience they get on their desktops while keeping a long battery life without raising the device's cost too much.

NVIDIA is addressing these expectations on all fronts, but of particular note is the company's recently launched Tegra processor line for mobile devices. Building on the GeForce GPU design, Tegra goes after a power and size optimized device with added video and image processor features. The Tegra APX applications processor has a 720p video processor, an imaging signal processor tied to a 12MP camera with image stabilization, and an ultra-low-power GeForce engine. The Tegra 650 adds full 1080p video playback and more to those features. Both are built on an efficient ARM11 processor core.

NVIDIA is hosting its first NVISION event August 25-27 in San Jose, where the company will showcase its visualization hardware and software technology. While this event will have the expected gaming track, it will also offer tracks on professional, mobile, and automotive computing featuring the Tegra lines.

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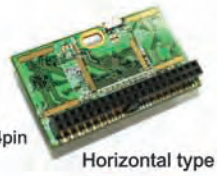

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When the factory talks, smart businesses listen

By Wade Patterson

For several decades, factories have been transforming themselves from the century-old models of mass-production facilities into flexible work centers that can deliver on the promise of 1:1 marketing. Yet few businesses have taken full advantage of what the latest communication technologies can provide – one-of-a-kind production. As more production machines gain the versatility to make a variety of individual consumer goods as well as the ability to sense their environment and "talk" to each other, businesses that learn to "listen" to their machines will attain a tremendous marketplace advantage.

Advances in communication technologies are benefiting businesses by providing intelligent communication that can be networked in production centers. Armed with a wide range of sensors, communication nodes can now be wirelessly and cost-effectively placed throughout a manufacturing facility to achieve an unprecedented level of monitoring and control. This not only enables wireless communication but also allows nondeterministic communication linkages to be formed, thus helping businesses manage the combinatorial complexity of a mass-customization process.

To illustrate this enhanced production process, consider a factory where most of today's modern practices have been deployed, such as design for manufacturability, electronic

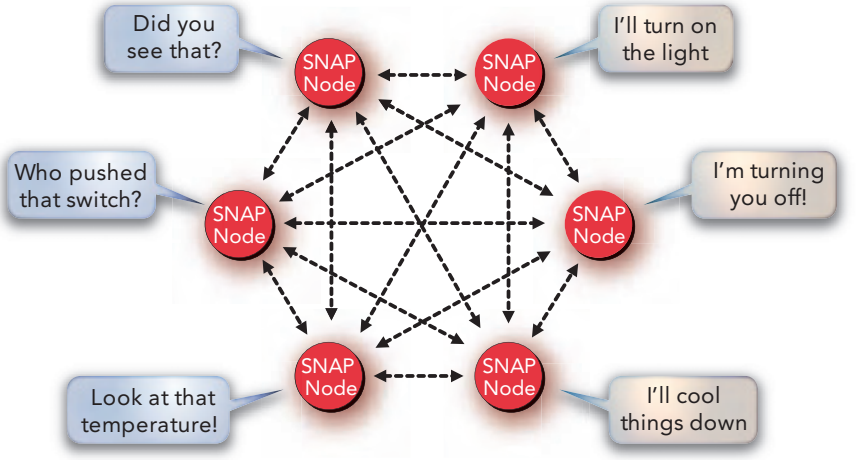

Figure 1

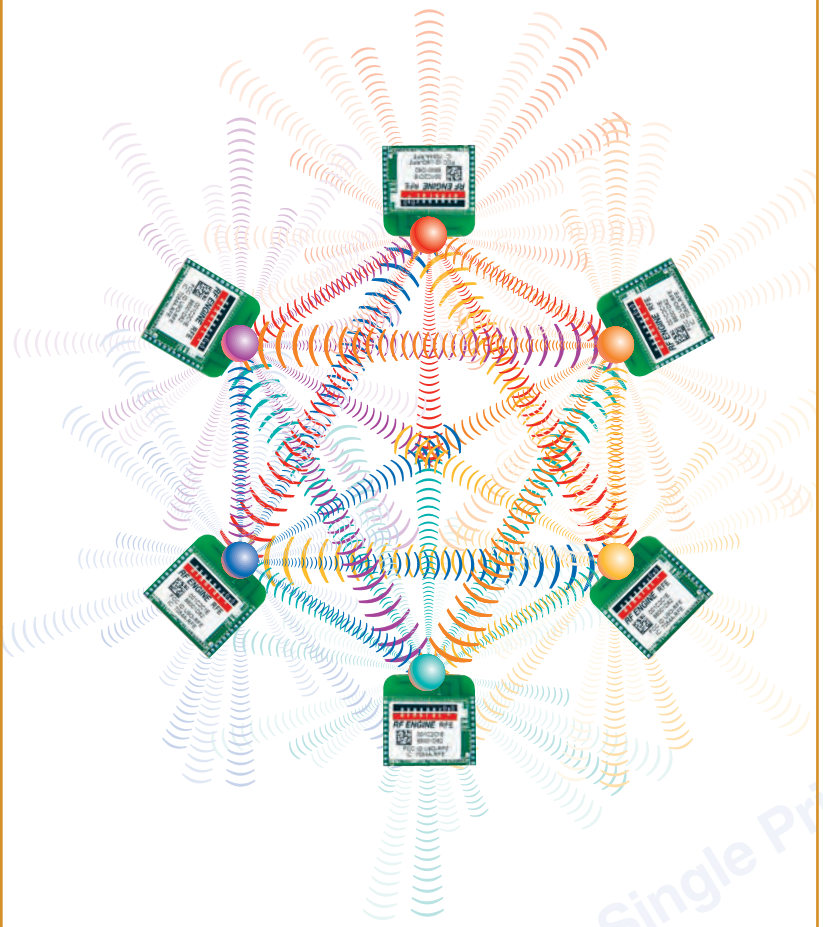

Figure 2

order-entry, computer numeric control programmable machines and tools, and kanban and just-in-time suppliers. Process control is typically done via wiring key points for monitoring. Machine health, compressor levels, and fluids also can be wired for monitoring. But cost and configuration problems pose barriers that limit the number of hardwired connections. And if a connection is not predetermined, it can be difficult to go back and reroute or install new wires for a change in configuration. Thus the foresight of what will be needed and cost to prewire the entire operation limit the granularity of what can be controlled.

Now consider the same modern factory, but with an installation of wireless programmable communication nodes that can intelligently monitor and control any point along a manufacturing process (Figure 1). This means that a specific customer order can enter the factory and be processed as if each work center understood exactly what to do for that particular product configuration. With local intelligence about its own operation, the ability to communicate to any other point in the factory, and the feedback that a growing variety of sensors can produce, each work center can efficiently produce unique work requests.

Mesh networking capabilities

This type of wireless mesh networking configuration supports mass customization in three significant ways. First, the system can build parts on demand from an available pool of components. Because every location that needs to call for parts belongs to the large network of communicating devices, a work center can easily monitor its current on-hand inventory level, store and act on a build list, and sense when any of its configuration parameters need adjustment or service. Furthermore, because the network is mesh, it can talk to any other node in the factory or send a request to a specific point or any node that is listening. The work center listens to the instructions that dictate what it is supposed to build and plans ahead to request the needed parts by talking to the right supply locations. With distributed RFID carried over this wireless network, part locations can be monitored and optimally routed.

Secondly, because the work center within a product process can know a build list ahead of time and call for parts as needed, it can also use its intelligence to decide to produce similar components or assemblies in anticipation of a coming set of similar orders. By talking to other dependent work centers, the work center can judge whether any delay for anticipatory component creation can be avoided given the current work schedule. This also addresses the need to reduce any setup time as much as possible.

Finally, because the mesh network allows communication among the intelligent nodes without having to predetermine the routing, factory configuration setup and changes can be as approachable as setting up an electronic spreadsheet; each cell knows how to perform its local operation and interacts and communicates with all other cells. Relationships and instructions throughout the process can be reprogrammed and/or reconfigured wirelessly over the air.

Intelligent mass production

Just like the amazing discoveries made possible through the evolution of ubiquitous computing, the evolution of intelligent factories can produce a single, custom product with the near efficiency of a mass operation. The pervasive infusion of intelligent wirelessly networked nodes like the mesh network pictured in Figure 2 will make this final step possible. Imagine what kind of factory businesses could build if they start with this technology. ECD

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OS strategies for power management in embedded devices

By Stephen Olsen

During the past decade, Operating Systems (OSs) for embedded devices have evolved significantly, addressing growing processor complexity and providing a more complete software platform for developing sophisticated applications. Yet power management has remained an afterthought until now. With power efficiency becoming one of the dominant issues facing the electronics industry today, OSs are playing a pivotal role in energy management.

Smarter OSs

The OS ultimately controls all devices and thus must decide what to shut down and when to do so. But power management raises a number of questions the OS must address. Which devices can be controlled? How much power is saved in the low power states, and does some context have to be saved when going into these states? How long does it take to go back to full power? The answers to these questions vary for each device, so the OS must be able to deal with a range of possibilities.

Consider the following practical scenarios. If the OS shuts down a device and that device is needed again quickly, an annoying delay might occur while it is restarted. On the other hand, if the OS waits too long to shut down a device, energy is wasted for nothing. The objective then is to find algorithms and methods that let the OS make sensible decisions about what to shut down and when.

Reactive methodology

Reactive power management represents the most basic approach to power management. Today's systems already contain the raw elements of power management. For instance, chip manufacturers have designed power management facilities in their devices for many years. Some are automatic and take little overhead to implement; others need software to manage the system.

However, not all Real-Time OSs (RTOSs) provide the necessary functionality to limit power use. Many embedded OSs are designed to boot the device and enable all the drivers and networking on the board. But when considering lack of power management as a cost, multiplying what it costs to power each device for a year times all the billions of devices in the world quickly results in hundreds of megawatt hours of wasted electricity.

It is evident that systems must become more power savvy, and reactive power management is the initial step to making this possible. Designers must first understand each device's role in the system, its usage life cycle, which other devices relate to it, what control it provides, and how they can minimize its power use by enabling a reactive method.

Implementing reactive power management involves a state machine for every power domain in the system. Power domains are regions of a chip or component that can be controlled to minimize power use. A chip is a power domain if it can be powered down or brought into a lower power state. All devices that are part of that domain are controlled by it. The power manager architecture in Figure 1 illustrates the concept of power domains and events.

If a power domain consists of an Ethernet controller and a USB controller and either one needs the power at full level, then the power domain must be on. But if neither one is using power, it can be powered down.

Additionally, power domains have associations with other devices. A classic example is the LCD and its backlight. Designers can monitor when nothing will be displayed on the LCD and can scale back the power consumed by the backlight by powering it off. But what about the keypad? It must be on at some level and may possibly be on all the time. When someone touches a key, they expect that the backlight that was at half power will be brought to full power. This is a power association.

Devices can have very simple state machines with associated timeouts and will react with an expiring timer to change

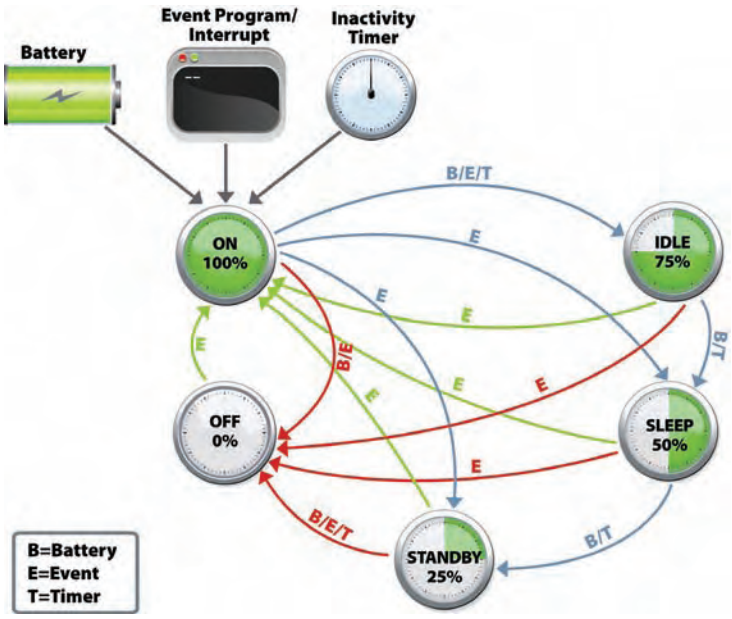

Figure 1

states. This is reactive power management; power decisions are made based on when the device was last used. Embedded system manufacturers that employ these techniques will immediately see power savings in their devices.

Proactive strategy

Proactive power management is the notion that designers can predict the future. Of course, this is impossible; however, designers can use complex scheduling techniques to predict what the power use will be when the system is in operation. This data can be discovered manually by programming the system with a power use scenario or by dynamically measuring which domains are active and when.

For example, if a system has 10 tasks and all are ready to run, designers can expect that the system will be busy for a while running these tasks. It makes sense to run the CPU at high power. However, which 10 tasks are running might make a significant difference. If designers can establish that every time a certain task is made ready to run (regardless of it actually being scheduled) the system will increase its power usage; then they can use Dynamic Voltage and Frequency Scaling (DVFS) to provide enough cycles to get the job done without wasting electrons. This demonstrates the reasons why in some cases, it is better to consume a bit more power now so as not to degrade the quality of user experience while waiting for power modes to change.

Ecodesign for a greener tomorrow

Device integrators must take a holistic approach to power conservation, starting with hardware and infrastructure enabled to scale back power use and employing software capable of controlling the device's overall power consumption. Core to this approach is a power-aware OS platform combining both reactive and proactive power management techniques. Manufacturers pursuing more power-efficient devices will benefit their customers by giving them improved battery life, all the while leaving a greener legacy to us all. ECD

Stephen Olsen *is currently product marketing manager in the Embedded Systems Division at Mentor Graphics, based in San Jose, California. Stephen has more than 20 years of embedded software experience, with a focus on consulting, system architecture, embedded software, and IP. He also cochaired the Virtual Socket Interface Alliance's Hardware-Dependent Software Design Working Group and published several papers on system design. Stephen holds a BS in Physics from Humboldt State University in California.*

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FPGAs evolve to meet changing computing needs

By Tom VanCourt, PhD

Reconfigurability – the ability to change a system's functionality after it has been deployed – not only helps designers react to last-minute design changes but also enables them to prototype ideas before implementation and upgrade designs in the field. In today's environment of rapid change, this capability offers a tremendous competitive advantage and often gets more computation done for each watt of system power. Tom explores how current trends in FPGA designs are providing greater flexibility and fulfilling the requirements of even the most demanding applications.

As applications become more complex, reconfigurable computing must evolve to address the industry's shifting needs. Flexibility is becoming all the more important to address fluctuating customer desires, and systems are required to be more powerful than ever before. Signal processing applications, for example, must progress to track and interpret signals from much longer distances and merge data from multiple types of sensors, such as infrared and ultraviolet.

These applications will require ever-increasing levels of image compression and compute power as well as enhanced intelligence for evaluating data. Of course, traditional performance computing applications such as weather modeling and computational chemistry also demand more computation power. And, with power and cooling becoming greater concerns, the 100 W or more required for a Graphics Processing Unit (GPU) can be problematic in traditional computing centers and prohibitive in other applications, including satellites and unmanned aircraft.

FPGAs directly address reconfigurable computing requirements by offering a flexible platform that can keep pace with emerging standards. Intellectual Property (IP) functions and configurable processors speed development while new, powerful software tools decrease latency, increase bandwidth, and reduce gate usage. FPGAs accomplish all this with a significant advantage over their alternatives in terms of low-power operation and heat dissipation.

IP cores boosting performance

Today, one of the easiest paths to reconfigurable computing is using IP cores such as configurable processors, which can offer adjustable cache size, multipliers, dividers, hard logic, and custom instructions. Some configurable processors also support accelerators that can be automatically converted to hardware, thus improving productivity and substantially increasing embedded software performance. Designers can simply add peripherals or processors to create the exact design that fits their needs.

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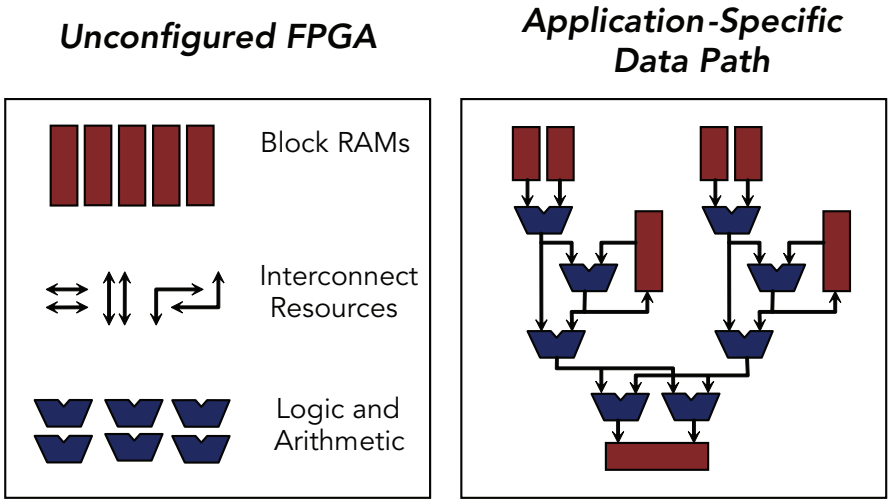

Figure 1

These processors have the added benefit of being obsolescence proof; the design can be ported to new silicon even if a device becomes obsolete, protecting the designer's investment in the software. However, these configurable processors were never meant to handle massive computations. They typically add value to reconfigurable computing applications as controllers, coordinating interactions between specialized blocks with dedicated computing functions.

Development is under way for other IP such as scalable, configurable processing and high-performance computing architectures that address the needs of customized data paths, protocol processing, digital signal processing, and image processing (see Figure 1). These functions allow engineers to replace sequential computations with customized pipelines and parallel data paths for higher performance and efficiency. Soft vector processors also are currently in development.

Acceleration via parallelism

Furthermore, FPGAs are now offering more compute power while consuming significantly less power than alternative solutions. Key to reconfigurable computing is the move away from the traditional model of computing algorithms one at a time in sequence to distributing algorithms spatially across the configurable computing fabric. Speed does not come from performing many operations in rapid succession, but rather from performing operations in parallel using pipelining, broadside parallelism, or a combination of both (see Figure 2). FPGAs also allow designers to customize pipelines and memory access models, capabilities not available with GPUs. The higher bandwidth is ideal for streaming data in communications applications.

Applications in FPGA accelerators typically run near 100 MHz, but higher clock speeds can be reached through more design effort. With optimization, FPGAs can achieve impressive speedups for applications that take advantage of their strengths, including:

- Fine-grained parallelism with 1,000-plus independent hardware multipliers and arithmetic units, all of which can run concurrently
- Low computation overhead, where indexing and fetches can be pipelined, operands can be stored in independent memory banks, and termination testing can occur in parallel with arithmetic functions
- Memory concurrency with 1,000-plus independently addressable RAM buffers
- Fast, fine-grained communication with on-chip communication running at full chip speed and typically with latencies of just a few cycles

Floating-point compilers increasing efficiency

In addition to hardware, new tools now resolve some of the challenges to using programmable logic in designs. FPGAs have always offered almost unlimited flexibility in data flow architectures and therefore provide an ideal method for implementing arithmetic functions or accelerating a system by offloading a data path that cannot be implemented optimally in a processor. However, FPGAs have previously experienced difficulty achieving the complexity and precision of floating-point operations, especially for double-precision applications.

A new floating-point compiler has been developed to efficiently map floating-point data paths to generic FPGA architectures. This floating-point compiler achieves efficiency gains by fusing together large subsections of a data path, clustering similar operations, and optimizing the interface between clusters of successive operators.

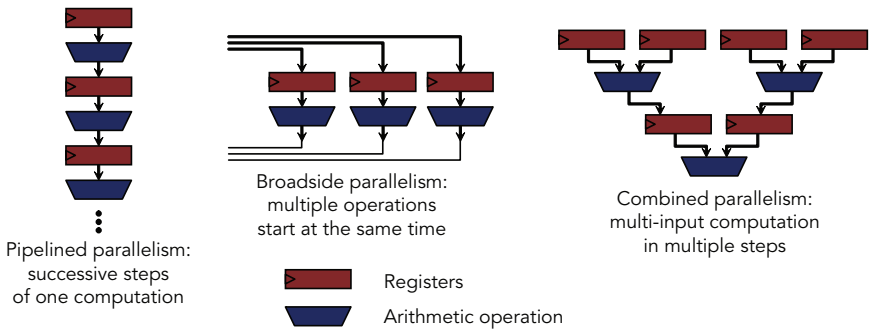

Figure 2

This allows multiple precisions – integer, single, and double – to exist within a single data path, giving generic FPGAs a significant efficiency advantage over simple component-based systems. With typical logic savings of 50 percent in logic utilization and a similar reduction in latency, generic FPGAs can easily support floating-point capability with the flexibility to implement a wider range of operator mixes (such as a larger ratio of adder/subtractor to multipliers), while maintaining the processing power to support an application using a data path.

The reconfigurable advantage

In today's world of rapidly changing technology and customer requirements, the ability to enhance functionality after a design has been deployed in the field is critical. With the latest advances in technology, including more compute power, higher bandwidth, decreased latency, and reduced gate usage, plus sustained double-precision GFLOPS per W up to 1.5 available now (with 2.0 GFLOPS per W expected in the next year), reconfigurable computing with FPGAs can make the difference in getting to market before the competition and ultimately, in ensuring a product's success. ECD

***Tom VanCourt** is a senior member of the technical staff at San Jose-based Altera Corporation, where he develops system-building tools and champions performance computing on FPGAs. Tom has spent more than 25 years in the industry with DEC, HP, and other companies, and taught at Boston University, where he earned his PhD in Computer Systems Engineering. His interests include FPGA-based computing in finance, life science, medical imaging, and other application areas.*

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Acceleration software brings supercomputing to the desktop

By Ryan Schneider

The advent of Graphics Processing Unit (GPU)-based acceleration for handling data-intensive computing tasks is creating a paradigm shift in daily workflows and the approaches scientists and engineers take to solve complex problems. Ryan presents two application examples in the medical device industry that demonstrate how a new type of supercomputer can improve design proc and accelerate time to market.

In the past, using a supercomputer was the only way to run complex simulations or data processing models. As no alternative was available, those who needed the ultimate in performance to compete in the marketplace shelled out huge sums of money to procure the ultimate in computing devices.

For many organizations, the cost of obtaining this type of computer is a prohibitive barrier to better product design, faster test results, higher-resolution data analysis, and the essential information needed to make appropriate business decisions. Fortunately, organizations now have other choices, including multicore processors, FPGAs, cell processors, and GPUs that deliver compelling performance gains to users across several applications. These alternatives provide increased processing capabilities while offering a more efficient, flexible, accelerated system for the most intensive data computations.

GPUs have been particularly successful as a result of their ability to run large simulations using parallel processing elements and their added advantage of high memory bandwidth. The latest GPUs have been redesigned to tackle computational tasks, offering multifold performance increases depending on the type of application.

Combined with acceleration software, the result is a peripheral device that functions as a *desk-side supercomputer* capable of supercharging computing applications by more than 35x, turning lengthy projects into real-time processes. As an additional benefit, the device reduces power consumption, ultimately lowering total cost of ownership. A simple desk-side computer workstation can effectively replace traditional clusters of CPUs, allowing complex calculations to be run at one's desk, reducing wait time, and increasing efficiency.

Faster medical imaging

As a new way of approaching data-intensive computations, the potential of GPU acceleration software is expanding rapidly.

Figure 1

One of the first companies to experience this transition is Boston Scientific, a medical device company based in Natick, Massachusetts.

Researchers at Boston Scientific are investigating how design parameters of pacemakers and other biomedical implants are affected by exposure to electromagnetic fields from MRIs and other diagnostic imaging tools. The design simulations that are required for this task are compute-intensive and take considerable time to run on standard computer clusters.

To boost performance, Boston Scientific implemented a proprietary simulation system from Acceleware that combines SPEAG's SEMCAD X software and an NVIDIA Tesla GPU. Using this system, engineers at Boston Scientific increased simulation runtime by up to 25x compared to the company's previous CPU-based system.

Additional applications benefiting from this simulation system include cell phone design, seismic data processing, PCB design, photonic/communications devices, drug discovery, oil reservoir simulation, lithography mask design, and biomedical image reconstructions.

In an example of the latter application, scientists at Robarts Imaging Research Laboratories in Ontario, Canada, have utilized AxRecon (Figure 1), a GPU-based desktop supercomputer, to accelerate CT reconstructions. Acceleware and Robarts collaborated to assess the supercomputer on the imaging institute's widely used micro-CT scanning system. The evaluation included refining certain 3D reconstruction algorithms, developing new methods for processing raw data, and finding ways to increase image reconstructions with the NVIDIA GPU's added processing capabilities.

Before implementing the supercomputer, researchers experienced slow image reconstruction times that ranged from 15 minutes up to several hours, depending on volume sizes. This significantly reduced the time researchers could devote to the workflow and hindered their processing.

Using the high-performance computer, testing at Robarts demonstrated a dramatically improved workflow in a preclinical setting. The reduced reconstruction times made the expensive scanners more accessible to researchers by allowing each job to be finished faster than what could be achieved using the institute's previous computing platform. The accelerated system has enabled researchers at the lab to attain 50x speedup, generating a more efficient workflow and allowing more image batches to be completed.

Speeding application development

The power of supercomputers is rapidly extending to new applications and markets. GPU-based acceleration supercomputers offer researchers, engineers, and clinicians the opportunity to improve their design processes and simulations as well as get products to market faster.

Developments in market verticals such as electronics, image reconstruction, and seismic data processing are benefiting from using GPU acceleration to handle data-intensive computations. Users are accomplishing more with their desk-side supercomputers than they ever thought possible, saving time and money while transforming the future of applications. ECD

Ryan Schneider *is CTO and cofounder of Acceleware, based in Calgary, Canada. Industrial and academic leaders have recognized Ryan for his innovative work in the acceleration of scientific computing applications. He has earned numerous elite national scholarships and awards, including the Engineering Internship Prize from the University of Calgary and the Alberta Science and Technology Leader of Tomorrow Award. Ryan has a B.Sc. and M.Sc. in Electrical Engineering from the University of Calgary.*

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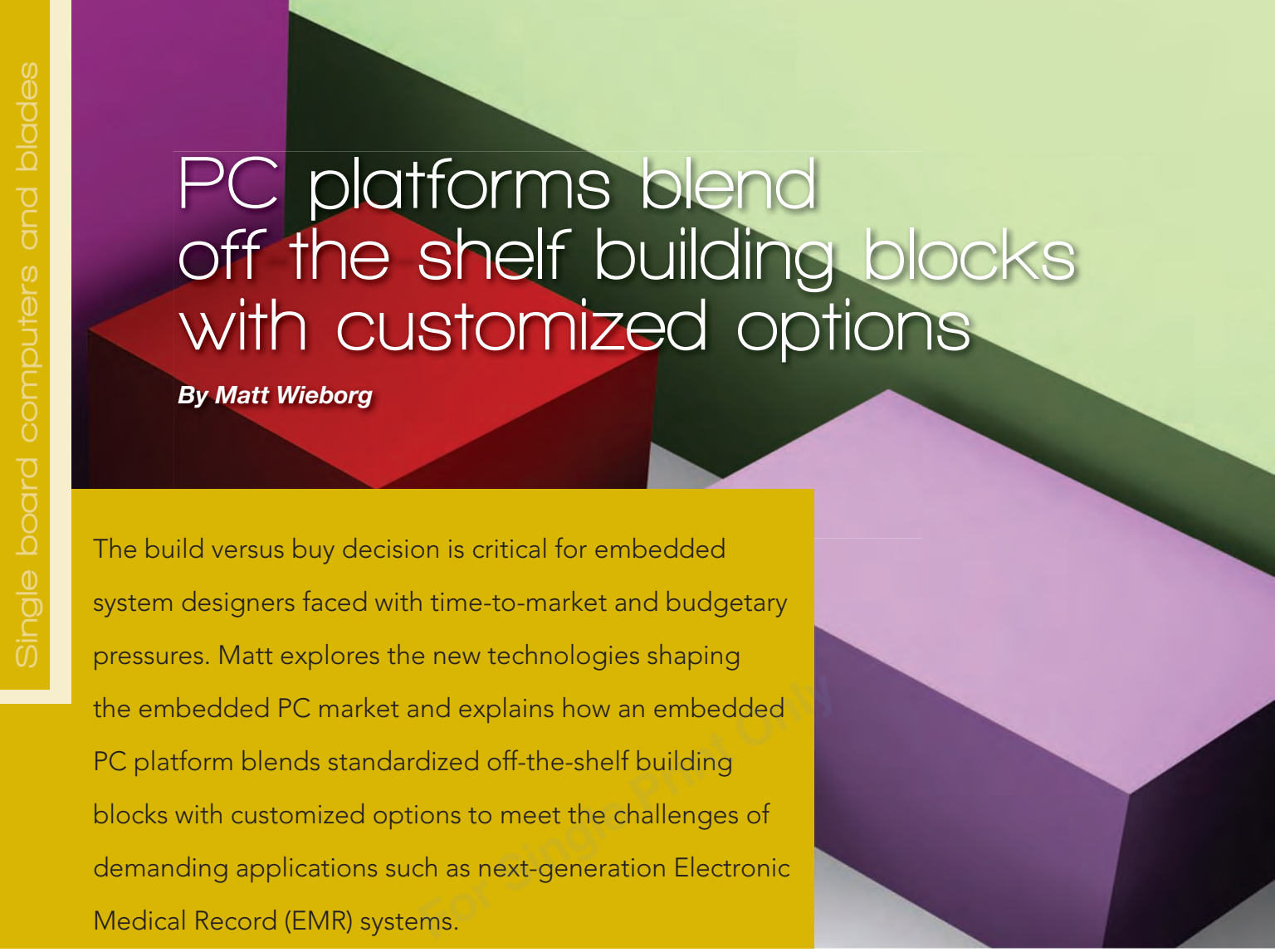
PC platforms blend off the shelf building blocks with customized options

By Matt Wieborg



The build versus buy decision is critical for embedded system designers faced with time-to-market and budgetary pressures. Matt explores the new technologies shaping the embedded PC market and explains how an embedded PC platform blends standardized off-the-shelf building blocks with customized options to meet the challenges of demanding applications such as next-generation Electronic Medical Record (EMR) systems.

Across many industries, embedded system designers are frequently confronted with the build versus buy predicament when choosing the right computing platform for their particular applications. This important decision can be overwhelming for designers trying to tackle time-to-market and budget pressures. Because each approach has its own set of advantages and disadvantages, a number of application-specific factors should be taken into consideration.

This dilemma presents substantial problems for medical applications designers facing stringent industry requirements for high reliability that meets regulatory approvals, longevity up to and beyond 10 years, and high performance to quickly transfer large amounts of data for analysis. And with the increasing need for mobility within hospital environments, added requirements include more compact form factors for use in space-constrained applications as well as enhanced power efficiency. Specific design requirements can include the need for specialized I/O, increased computing power density, a fanless system, strict revision control, fixed or frozen Bill Of Materials (BOMs), or customized enclosures. All the while, service and long-term support for the overall system remain imperative due to the critical nature of these applications.

Designers are noticing a definite trend within the embedded market: the shift toward PC-compatible systems. This makes sense, considering the benefits embedded PC boards can offer, from both a performance and time-to-market standpoint. When carefully selected, embedded PC boards can reduce design cycle time and improve system performance, resulting in enhanced, feature-rich products that get to market faster than ever before.

The ever-changing embedded PC market

Just like the desktop PC market, the market for embedded PCs is constantly transforming. However, embedded PCs are typically deployed in complex applications that require longer life cycles of 10-15 years, as opposed to a desktop PC's expected 5-year or less life span. In addition, embedded PCs are expected to perform flawlessly around the clock given the nature of the environments in which they are deployed. This puts strain on designers, as trends in the embedded PC market continually change and technologies evolve.

Several emerging trends are affecting the embedded PC market. The advent of multicore technology provides an attractive way to scale components and add features within embedded form factors without dramatically affecting such energy variables as thermal output and power consumption. This has enabled performance to increase exponentially, allowing for vastly improved functionality.

Shrinking component geometries have also allowed the number of features on a motherboard to increase significantly, making it possible to pack more functionality into smaller form factors.

Medical records go paperless

The need for portability and instant communication in the health care industry has spurred the development of Electronic Medical Records (EMRs). EMR systems allow health care professionals to access real-time patient records, medication schedules, radiological images, and physician orders from multiple points, including the patient's bedside, emergency room, or operation room. EMR systems save administrative time and costs, providing a more efficient way than using paper to store and handle records. What's even more important, EMR systems improve patient care by providing a safer, more efficient, and convenient health care system.

Despite these advantages, the health care industry has been slow to adopt EMR and other medical information technologies. According to the 2007 Survey of Electronic Medical Record Trends and Usage conducted by the Medical Records Institute, several barriers are curtailing EMR system implementation. These roadblocks include lack of adequate funding or resources, anticipated problems in switching to an EMR system, difficulty in creating a migration plan from paper, and the inability to find an EMR system at an affordable cost.

To increase EMR system adoption, the technology must be cost efficient, perform to expectations, and offer a path for seamless integration. In addition, the technology must meet many other design challenges. Medical records such as physician orders and test reports are legal documents that must be kept in unaltered form and authenticated by the creator. Therefore, the data processing system must be extremely reliable. These types of systems also tend to require very long technology life cycles and frozen BOMs to achieve the necessary regulatory approvals. Even the smallest changes in a system can require an engineering change notice and lead to further certification agency testing. In the hospital environment, the equipment must also be portable, compact, and rugged.

Besides the core requirements inherent in health care applications, each medical practice also has its own needs, and systems require a certain amount of customization. These custom specifications might include extra I/O, a customized enclosure, branding, or mechanical modifications.

Developing a complete customized system from the ground up is not practical in this instance because of cost constraints, not to mention time-to-market and validation issues. A more viable approach is an embedded PC platform that merges standards-based functionality with customized features that can be integrated to meet the particular application's unique requirements.

Benefits of the blend

Reducing time to market is one of the biggest reasons designers turn to off-the-shelf embedded PC platforms. In the past, adding custom circuitry was viewed as a showstopper because doing so significantly slowed the design process. Today, the ability to add new and advanced features on a prevalidated

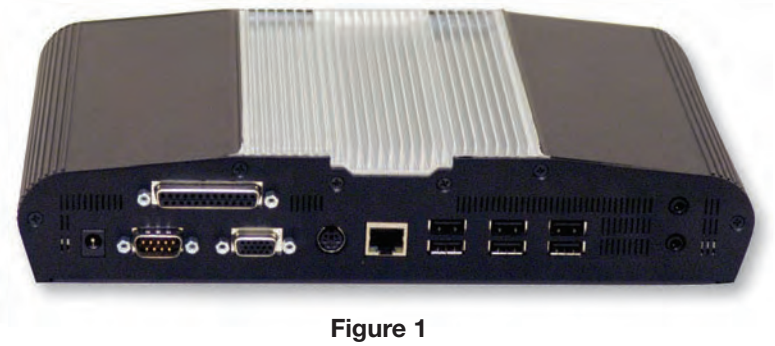


Figure 1

platfo
reason for designers to utilize embedded PC platforms for their applications.

To provide medical designers the best possible embedded PC platform to meet their specific needs, it has become necessary to combine standardized off-the-shelf building blocks with customized options. For example, as shown in Figure 1, Kontron incorporated an ETX embedded computing platform into its embedded PC to enable a smaller and more flexible platform that can be easily upgraded with faster processors by simply switching out the ETX module. Standard board form factors like ETX are structures to which designers can add advanced capabilities, such as full-color graphical interfaces or specialized I/O that is uniquely relevant to their applications.

Proven PC hardware and software standards also provide embedded systems designers with a foundation to utilize development tools, components, peripherals, and application software, which helps them reduce development costs and hasten time to market.

Evaluating an embedded PC platform for EMR

One case study involving an EMR application that evaluated whether to transition from an off-the-shelf white box PC to an embedded PC model illustrates the advantages of blending standard building blocks with customized features. In this situation, the customer, one of the largest hospital chains in North America, was in the process of upgrading its older, monochrome dumb terminal systems running text-based interfaces.

The new system needed to run a few key applications, including custom software to manage medical records, but not the latest and greatest office applications. This meant that it did not require a tremendous amount of computing power. However, the system needed to be small enough to be inconspicuous as well as reliable and rugged to endure a bustling hospital environment. Future design considerations included wireless networking capability, which would enable the units to be added to mobile nursing stations that could run from batteries rather than tethered to a wall-mount plug. Total system cost was also a critical factor.

This customer's IT group considered two approaches to achieve their goal: either

upgrade to an off-the-shelf PC system or switch to an embedded system. The off-the-shelf PC option limited the customer to processor and other features that were available at the time of the evaluation. In this particular case, the embedded system required less computing power than the power-hungry desktop systems on the market. Consequently, the embedded system could use a lower-power processor, which better suited the mobility requirements.

Another critical yet less obvious consideration was the customer's desire to move away from the look of a traditional PC. The customer's rationale was that if the system looked less like an ordinary PC, then patients and visitors would be less inclined to interfere with it. The customer wanted to design a unit that was small and flexible enough to be mounted in a variety of situations, such as the back of a display, a mobile station, or in a cabinet.

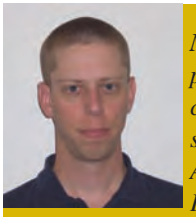
To address the need for reliability and ruggedness, the customer considered developing a unit that was completely solid state with no moving parts. This involved using a CompactFlash storage card or a solid-state drive priced at a point that met the cost constraints. An embedded system made more sense given these requirements. Two embedded computing platforms were evaluated: a Mini-ITX motherboard and an ETX Computer-On-Module (COM). Both options were fanless; however the customer selected the ETX board because it was smaller, more versatile, and could meet future enhancements such as possible processor upgrades. Designed to be inconspicuous with flexible mounting options, this embedded PC platform from Kontron (see Figure 2) met the requirements for EMR applications while offering simplified implementation for quick and easy deployment right out of the box.

The system incorporated an LCD plus an embedded computer preassembled in the box. This allowed the customer to simply pull out the unit, plug in the mouse and keyboard, power up, and start running in a matter of minutes. With a white box system, cables would have been individually wrapped and taken significantly longer to assemble, particularly for installations

Figure 2

with several units. This quicker deployment saved time and ultimately, money. Furthermore, because embedded computer companies often can handle smaller, more customized system shipment, this system offered custom operating system installations and branding options including a custom splash screen.

As demonstrated by this example, having a degree of customization available through off-the-shelf building blocks makes it possible to quickly address specific application needs while still meeting cost expectations. ECD



Matt Wieborg *is a product manager for custom/configurable systems at Kontron America, based in Poway, California, where he defines custom embedded computer hardware for OEM and key strategic accounts. Prior to this role, Matt spent time as a field application and technical support engineer. He holds a BS in Computer Science from San Diego State University.*

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The compounding effect of complexity on SoC design cost and predictability

By David P. Lautzenheiser

The Global Semiconductor Association (GSA, formerly known as the Fabless Semiconductor Association) and other organizations have recently highlighted how costs for designing Systems-on-Chip (SoCs) are rising rapidly. Though newer process technologies are partly to blame, this increase is mostly caused by the difficulties designers encounter when trying to deal with system complexity. David explains the reasons why SoC designs are risky projects to undertake.

Recent data shows that 89 percent of chip designs miss their deadlines by an average of 44 percent. Designers' ability to predict the time and resources a design will require to complete, how a device will perform, and when it will be ready for shipment to customers is suffering. Even with the best tools available, some SoC design trends are dramatically affecting predictability and therefore overall development cost, as illustrated in Figure 1.

The issues that cause this unpredictability crisis fall under four general categories:

- **System complexity:** Though designers understand individual IP cores, they struggle with system complexity, which comes from the multiplicative effects of IP cores' interactions and the flow of information associated with their operation.
- **Improper level of abstraction:** Languages and techniques used to describe functional blocks have no provisions for describing these functions' interactions in a system and how those interactions affect the overall system.
- **Advanced power management techniques:** Using dynamic voltage and frequency scaling places additional restrictions on traditional design methods.
- **Process variability:** Dealing with process variability as technology drops below 65 nm is very unpredictable, particularly with conventional techniques.

System complexity

Complexity is deceptively insidious, as it appears to be an easy issue to address given the capabilities of advanced process technologies. With the large number of transistors available today, it seems as though anything that can be imagined can be built. Why then is handling system complexity so hard? The reason is that while the number of available transistors goes up roughly linearly (not accounting for utilization), system interactions that introduce uncertainty and therefore a predictability challenge grow by a multiplicative effect. This multiplicative effect is based on several compounding trends in SoC design.

Multiprocessors

First, the move from single processor systems to multiple heterogeneous and homogeneous processors is multiplying system interactions, thus increasing complexity. Modern SoCs usually contain more than one or two processors. Aside from programming challenges, coordinating these multiprocessors' hardware-driven activities poses difficulties for designers. Design teams must understand a number of questions, including:

- What are the real demands placed on shared resources?
- What is a reasonable goal for using these shared resources?
- Is it possible to keep processors busy with a set of resource constraints?
- What is the overall impact of too much or too little local cache memory?
- Have all the intended applications been sufficiently modeled to assure that they will operate as intended on the collection of processors and shared resources that they require?

To understand and subsequently predict the impact of changes to shared resources, some of the most advanced SoC design

teams have built complete system models using SystemC or a similar language. The investment in building and maintaining this level of sophistication might be beyond the reach of mainstream SoC design teams. Even with this approach the ability to predict the underlying hardware's actual behavior, which is required to avoid the expensive iteration cycles that result from late implementation surprises, is restricted because of these modeling environments' limited accuracy.

Interfaces

Traditional SoCs with input and output driven by human interaction time and low performance data movement have changed dramatically. The number of interfaces on an SoC, type of I/O traffic, and I/O interactions with other functions in the system have become more involved.

For example, a device targeted for use in a connected home might have wireless networking, conventional wired networking, data movement to or from external storage, and video and audio output services operating simultaneously. Providing the maximum capability for each possible use – full-rate Gigabit Ethernet at the same time as full-rate access to a disk controller, wireless Ethernet controller, and USB 2.0 – is not unreasonable; the issue is how will these interfaces interact with complex processing functions? In this example, combining I/O with processing functions might involve 16 I/O streams operating concurrently with six major processing functions, all sharing common DRAM. This scenario is 100x more complex than any one interaction by itself. Determining if all these interactions can be managed properly leads to uncertainty and thus unpredictability.

IP reuse

Gone are the days when an SoC design team had the luxury of using a single standard interface for all the IP in a design. Virtually all SoC teams face the challenge of solving interoperability problems for legacy IP developed internally, new IP developed internally (generally by a different group or division), and externally sourced IP that might adhere to different interface standards.

For an IP reuse strategy to succeed, automating translations between various standards is critical. Achieving IP reuse, including test suites, design for manufacturing/design for yield, and reliability precludes modifying the IP for each system use. Modifying IP (including interfaces) adds too much risk to the design schedule. The design team must leave most of the IP as it is and instead make adaptations to other IP in the system, generally in custom bridges and bus adapters. However, doing this by hand makes the process unpredictable and not scalable. Interaction complexity rises quickly once interfaces reach greater than 1:1 correspondence.

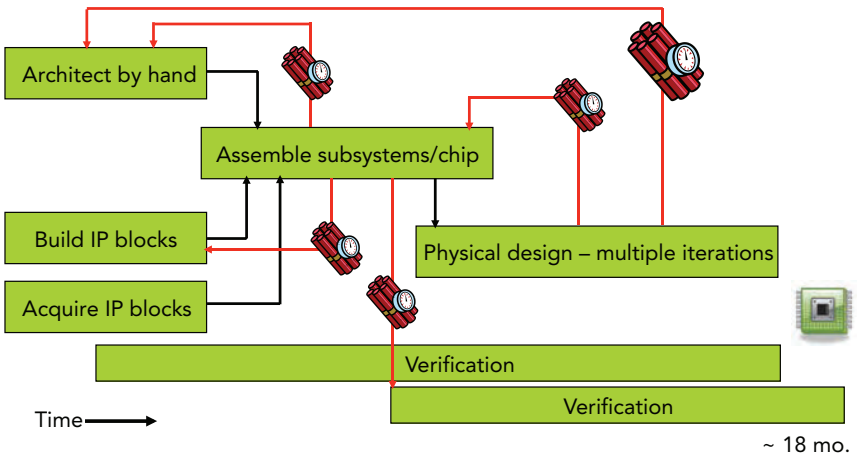

Figure 1

> "The current situation is somewhat analogous to designing a jet aircraft with the tools used by the Wright brothers – a bit risky."

A simple system with three types of interfaces (typical for most SoC teams) involves six translations: three for requests and three for responses. Variations in any of the interface characteristics multiply the six translations by the number of different characteristics that must be considered. Artificially constraining these characteristics is unrealistic because doing so causes either extreme overdesign in simpler functions or hampers performance in complex functions. Dealing with this complexity adds to the predictability challenge.

Traffic and bandwidth

The nature and amount of traffic managed within a complex SoC have also changed considerably. Rate-critical traffic such as video and audio is often intermixed with processor-oriented traffic, which tends to have much tighter latency requirements and comes in bursts. Add to this any real-time requirements, such as what might be imposed with networking traffic (Gigabit Ethernet must be served when it is available to avoid losing data). Serving these different traffic types across various functions interacting with one another is difficult.

This complication is then exacerbated by the amount of data; HD video requires at least 6x the bandwidth of SD video. Analyzing this in the context of the real hardware is very time-consuming, making it impractical to run simulations long enough to determine if a particular set of IP functions and their interactions can properly manage video frames, for example. As a result, SoC design teams focus on a few situations they believe to be the worst case and hope that everything will work. However, hope is not a predictable quantity in SoC design.

Operating modes

Virtually all SoCs operate in different modes. These operating modes generally involve a diverse set of critical IP functions interacting in unique ways. The number of different modes multiplies the complexity of analyzing and determining how to properly operate a particular set of interactions.

For example, a set-top box SoC might have a mode in which the media supplies two multimedia streams: one going to the display and audio systems for processing and the other being stored on a disk. This mode differs from one in which the hard disk supplies output functions, with one media input put into a picture window within the stored information. Another mode might supply information from the local disk to a networking port while decoding and displaying one or both media inputs. As can be readily seen, the number of modes dramatically expands the set of interoperating functions and data streams. Assuring that all these

modes will function properly compounds the task the SoC design team faces.

These system complexity problems build upon one another. Even if there is only a minimal chance that designers will need to repeat a portion of the design, implementation, or verification, that small percentage accumulated across all these issues makes multiple iterations through one or more steps in the design flow an almost certain requirement.

Improper level of abstraction

The SoC design community continues to depend on languages and tools built to describe individual functions composed of gates. This is a significant limitation, as those languages (Verilog or C/C++/SystemC) do not contain the syntax, concepts, and constructs necessary to describe IP functions' interactions within a complex SoC.

As noted earlier, systems are a combination of complex functions interacting in various ways depending on the overall functionality being provided. To properly describe and analyze system interactions, designers must have a means of describing the system-level aspects critical to proper operation. This might include bandwidth characteristics in important time windows, traffic concurrency within a particular operating mode, different interactions that make up an operating mode, and the ways in which interactions impinge on one another. Lack of a method for capturing these aspects as requirements that can be verified leads to considerable probability that the low-level representations of the hardware interpreted by hand will not perform as desired. The current situation is somewhat analogous to designing a jet aircraft with the tools used by the Wright brothers – a bit risky.

Advanced power management techniques

Sophisticated power management methods being deployed at 65 nanometers and below focus on controlling operation frequency while changing the supply voltage for portions of the SoC. Although this ability has tremendous benefits, a whole section might be shut

down completely to consume "zero" power, and the implications on the system-level design offer an additional degree of complexity.

Not only does this make clock distribution and management difficult, it also imposes restrictions on how data movement must be controlled depending on what sections of a device might be operating, not operating, or operating at a reduced rate. A portion of the device that can operate at two different rates in addition to being turned off complicates system interaction design and analysis by a factor of three. At minimum, the additional circuits required for subsystem isolation, clock management, power shutoff, and proper subsystem restoration complicate all aspects of the device design. Meanwhile, the supplementary operating points add complexity to the system analysis similar to or in concert with the operating mode complexity.

Process variability

As process technology continues to move below 65 nm, variability in individual device operation introduces uncertainty in circuit functionality and performance on a local basis and across the device. While statistical static timing analysis and other techniques help analyze variability effects, they do not offer solutions that reduce the impact of variability.

To accommodate variability, additional margin is used to assure that circuits will function in the face of variability. This additional margin reduces the performance or functionality gains that might otherwise be realized with a more advanced process. The net result is less assurance that the design team can meet the goals set out at the beginning of the design. Of course, this is not known until late in the design, potentially causing a costly iteration of some steps in the design flow.

In summation, the complexity introduced by these issues in current SoC designs increases the number of possible interactions and situations to be considered by a few orders of magnitude. That factor, coupled with the lack of a proper method for specifying system-level interactions and analyzing them at the proper level of abstraction, makes designing SoCs a very risky, unpredictable, and therefore costly business. ECD

David P. Lautzenheiser *is the VP of marketing at San Jose-based Silistix. He previously worked as VP of marketing at Sonics, an interconnect IP vendor, and Lightspeed Semiconductor, a structured ASIC manufacturer. David began his marketing career at Xilinx, where he held various marketing and sales roles and led the introduction of the first FPGAs. He holds a BSEE from Washington University in St. Louis.*

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Wireless testing: The critical link for reliable 4G communications

By Graham Celine

Today's mobile users are employing their handheld and wireless devices for far more than simple voice calls. Video streaming and other data applications that require greater bandwidth and better Quality of Service (QoS) are widely available, and bandwidth is growing continuously. To meet this demand for high-quality services, service providers are expecting their product manufacturers to develop and deliver products that give users the same access, user experience, and reliability from their portable wireless devices that they achieve with their wireline devices.

4G wireless technologies and standards including WiMAX and Long-Term Evolution (LTE) have become the future hope of the industry, promising throughput and range to support an expanded set of capabilities. These technologies will allow this new range of applications to operate on an evolving set of wireless devices.

Though beneficial, this evolution is not without challenges. To achieve the potential increase in functionality, 4G services and products must harness a complex Radio Frequency (RF) world, which requires smart antenna technologies based on Multiple Input/Multiple Output (MIMO) technologies.

A tricky testing environment

MIMO is the basis of emerging 4G wireless broadband technologies, including mobile WiMAX, LTE, and Ultra-Mobile Broadband (UMB). MIMO takes advantage of multiple transmit and receive antennas to employ techniques such as spatial multiplexing, adaptive antenna processing, and beamforming. As a result, products that employ MIMO technology provide higher throughput and range for voice, video, and data services. Figure 1 shows how a multiple antenna Base Station (BS) can steer the antenna in a specific direction to enhance range. The direction of the beam can change over time as the Mobile Station (MS) moves around. Channel emulation allows beamforming and other antenna techniques to be tested in the lab.

As MIMO-based 4G technologies evolve, product manufacturers and service providers are racing to find mechanisms that can test their services, infrastructures, and devices for carrier-grade reliability

before they deploy in the field. The physical layer and open access requirements of new MIMO-based 4G technologies place greater demands on RF performance/interface quality, making 4G testing more difficult than previous technologies. In addition, the complex RF environment produces potential chaos for traditional over-the-air testing because of the breadth of complex scenarios that needs to be validated, the lack of repeatability, and the high costs involved.

Multipath and fading effects are essential to operate MIMO technology, as well as a source of interference that might degrade wireless performance. Testing in real-world multipath and channel conditions evaluates wireless devices' robustness and performance and challenges their dexterity to adapt to changing conditions by adjusting data rate, modulation, coding, and other parameters to the conditions. Consequently, manufacturers are looking for reliable, predictable, and repeatable testing methods that can re-create fading and multipath conditions to test their 4G products.

The importance of channel emulation

Because virtually hundreds of unpredictable scenarios with variable field conditions including noise and interference are inherent in 4G technologies, manufacturers need to re-create real-world channel conditions in a lab to establish the best possible testing environment for 4G base stations and mobile devices. Channel emulation simplifies and streamlines the testing process by creating these conditions in the lab, dramatically shortening the time, resources, and ultimately, expense of 4G testing. Through sophisticated, dynamic channel-modeling technology, channel emulators re-create the effects of radio transmissions in real-world setups to realistically reproduce the effects of disturbances, interference, reflections, noise, motion, and more.

Ideally, a channel emulator will support different test topologies, including direct connect (point-to-point) and handoff or multiclient setups (point-to-multipoint). The emulation should be bidirectional, re-creating the real-world reciprocal

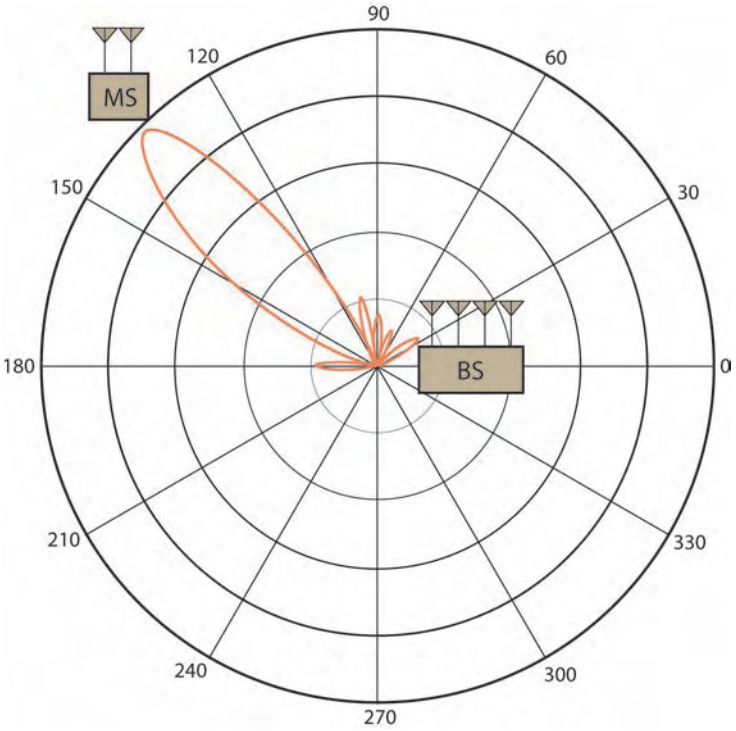

Figure 1

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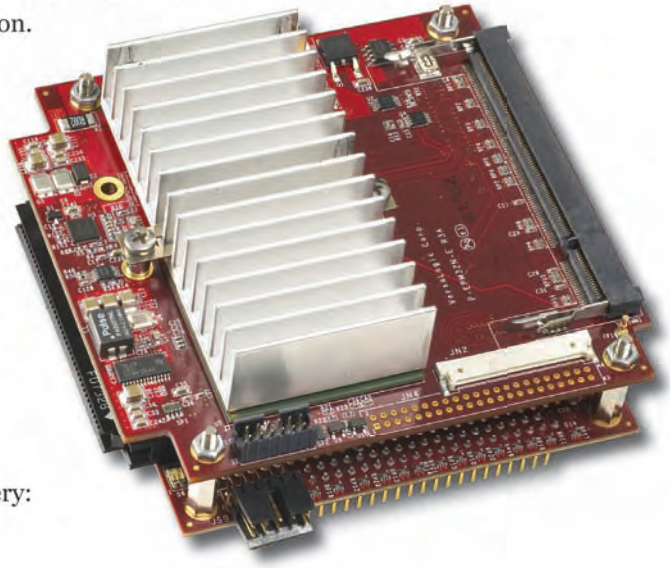

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mapping of forward and reverse channel conditions as it will be seen in the field. Because MIMO capability is the key component, the channel emulator must support 2x2 for WiMAX and 4x4 for LTE, Wi-Fi, and 802.16m testing, as well as provide access to standard and custom channel models and antenna correlations on these configurations.

Furthermore, because the channel emulator sits between the mobile and base station device, it is critical that the device itself does not become a limiting factor in the test; the channel emulator must have RF characteristics that guarantee that the highest-quality signal is passed through end to end. 4G wireless broadband uses state-of-the-art Orthogonal Frequency Division Multiplexing (OFDM) modulation and multi-antenna MIMO. The channel emulator must accommodate RF factors such as dynamic range, Error Vector Magnitude (EVM), and noise floor much higher than previously required for 2G/3G data and voice technology.

As applications such as video streaming are developed, designers must consider whether their applications can operate in both optimal and marginal RF conditions. They should also strive to meet quality expectations for all RF conditions. A 4G-compatible channel emulator capable of simulating the RF environment and the resulting channel fading can assist developers in recognizing how the applications perform under different fading conditions. Channel-fading testing will give developers a clear understanding of how applications and devices will behave in real-world conditions.

Through MIMO, 4G offers a new, more advanced generation of applications to meet users' ever-increasing demands. However, the challenges that service providers and equipment manufacturers must overcome to qualify these products and applications are far more complex than what they faced developing previous wireless access technologies. As a result, complete environmental testing with channel emulation has become a key factor in product and service development. ECD

Graham Celine *is senior director of marketing at Azimuth Systems, an Acton, Massachusetts-based provider of wireless broadband test equipment and channel emulators for Wi-Fi and 4G technologies. Graham has 15 years of high-tech experience, including product support with LANNET, a switching startup later acquired by Lucent. After Avaya's spin-off from Lucent, he became VP of solutions management, responsible for defining and developing Avaya's data solutions strategy for enterprises' converged IP networks. Graham has a BSc in Electrical Engineering from the University of the Witwatersrand in South Africa.*

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Why automation has failed in the past

By David Gehringer

Though automation can help increase efficiency and provide other benefits, many test organizations struggle with getting the most bang for their buck. David describes three considerations that organizations must address to realize the full value of test automation.

For the past 15-plus years, organizations have turned to automation as a way to improve efficiency among testers and developers. While some test organizations have reaped the value of automation, others have yet to achieve the ROI they were hoping for. Many also have found the work to be much more demanding than they had expected.

Why has automation failed at these organizations? Poor planning, deficient tools, and resistance to change are likely culprits. These three issues can undermine the potential of any automation strategy, resulting in more work with less payback. To help ensure a successful automation strategy now and in the future, test organizations need to take a critical look at their automation criteria, technology, and processes.

Deciding what to automate

Organizations sometimes jump into automation without carefully considering what to automate. For example, many decide to automate the most complicated items, such as a difficult test case, thinking that automation will free them of this headache. But soon they find themselves spending more time automating than testing.

Organizations can achieve greater ROI from automation simply by choosing to automate mundane, repetitious tasks. If an organization must decide between automating one test case that requires eight hours to run or 100 test cases that each require an hour to run, the choice should be clear. By opting to automate the 100 test cases, organizations would receive far better payback. This example illustrates why following someone's first instinct is not always the best approach.

When deciding what to automate, organizations should consider the following questions:

- How often do these items get used?
- How many people use them or rely on them?
- Are these components part of a test that everyone has to use?

> When building an automation strategy, teams must decide what to automate based on what will yield the greatest benefit overall, not simply aim for the most technically ambitious projects.

- Are they difficult to maintain?
- Which items do my customers add (or not add) value to?

Another reason for not automating the most challenging test cases is that human beings add value. The judgment, intuition, and experience that people bring to the job, particularly with *ad hoc* testing, can greatly enhance a difficult design. Although automation can be leveraged effectively for complex systems testing – for example, by helping run complex tasks simultaneously or replicating complex tasks – it might not be the best approach for test cases that rank among the top 5 percent in difficulty.

Bottom line: When building an automation strategy, teams must decide what to automate based on what will yield the greatest benefit overall, not simply aim for the most technically ambitious projects. As illustrated in Figure 1, organizations should put aside the desire to do the most difficult task first and focus on the tests that deliver immediate business value.

Evaluating technology against vendor claims

In the past, vendors have asserted that their automation software allows organizations to create robust and maintainable test assets. As many organizations have discovered after making their purchases, the technology behind these products often does not stand up to the claims. Worse yet, without future-proofing technology, organizations are realizing only half of automation's potential value.

These solutions often lack abstraction capability. Without this technology, testers cannot easily abstract away things that will likely change. For example, suppose test engineers build a test case that contains an IP address to test hardware and software. Now suppose that the hardware moves or test engineers decide to use the test on a different device, in which case they will want to abstract the IP to future-proof it. With abstraction technology, they can update these items in one place and instantly propagate the changes across all test cases. Without this capability, they must change every test case or build new ones.

Organizations therefore should evaluate an automation tool's ability to create robust, maintainable tests. In the next version of the software, they must consider how many test cases the tester will have to update to make hundreds of tests work.

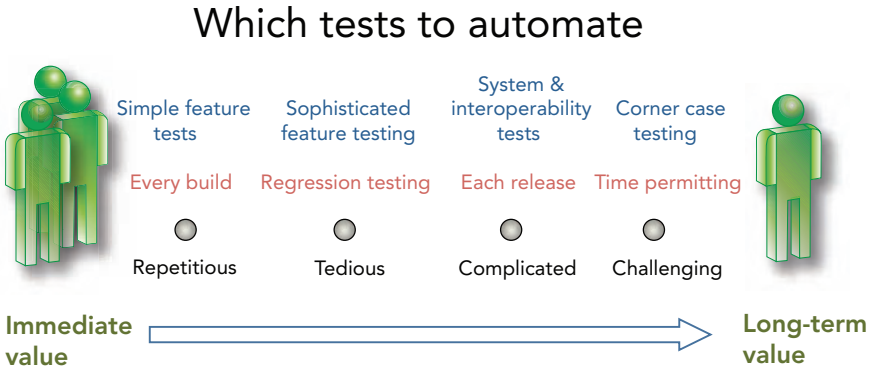

Figure 1

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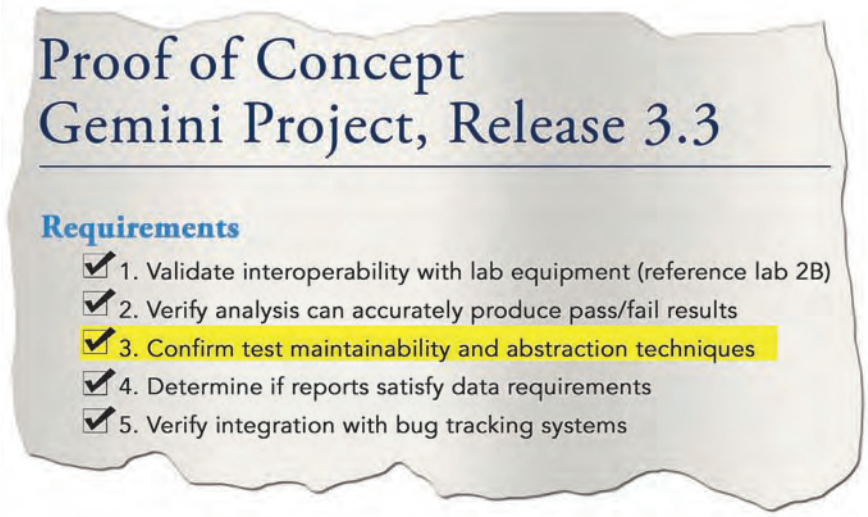

Figure 2

(Usually by a product's third release, 50 percent of test cases are "broken.") With the right automation tool, they should only have to change a few files, not edit every test.

Bottom line: When evaluating automation software, organizations should add maintainability to their list of requirements. Next, they should scrutinize the underlying technologies to determine if they live up to their promises of maintainability, as illustrated in Figure 2. Regardless if an organization's requirements are in a request for proposal or proof of concept, engineers should specifically call out abstraction as an area, think through real-world situations, use models, and validate the tools to solve them.

Rethinking processes from a team perspective

How organizations build and leverage tests across groups also can diminish the benefits of automation. For example, engineers might take a test case and run it as a personal regression test at their desktops. Yet they might never think to transform it into a robust test case so that it can later run in a lights-out regression system.

To realize the potential of automation and maximize its efficiencies, testers and developers need to think of themselves as part of an assembly line. If test engineers build test cases that they know will need to be automated, they can save the automation team a step by building in abstraction. Though it might require a little extra effort up front, this action can save the entire organization time throughout the testing process.

With the right technology, testers can start to build and run tests in a way that makes it easier for the rest of the team to move those tests through automation, as well as maintain tests for future releases. More importantly, the test organization can build a scalable framework for communication and asset sharing.

Bottom line: Organizations need to start taking an assembly-line approach to testing and development, with individuals focused on creating efficiencies that benefit the entire team. ECD

***David Gehringer** is the VP of marketing at Fanfare, based in Mountain View, California. He has more than 10 years of experience in the software industry, including his role as VP of marketing at Actional Corporation and various international marketing and product management positions at Mercury Interactive. David earned bachelor's degrees in Mechanical Engineering and Aeronautical Engineering, both from the University of California, Davis.*

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Editor's Choice

Atom-driven in-vehicle infotainment platform

In-vehicle electronics have made huge leaps in the past few years to the point where we can now economically put substantial computing power in our vehicles. These infotainment platforms provide navigation systems, audio and video players, and wireless connectivity, making the driving experience more pleasurable.

American Portwell Technology, Inc. recently announced its PCS-8230, a low-power in-vehicle embedded PC infotainment system. Utilizing the Intel Embedded Compact Extended (ECX) form factor SBC, Portwell's PCS-8230 is based on the Intel Atom Z510 series processor with an Intel System Controller Hub US15W chipset, delivering an excellent performance-per-watt ratio. Its fanless design, low-power output, and compact size make it suitable for in-vehicle infotainment as well as Point-Of-Sale (POS), medical, entry-level gaming, and digital signage applications.

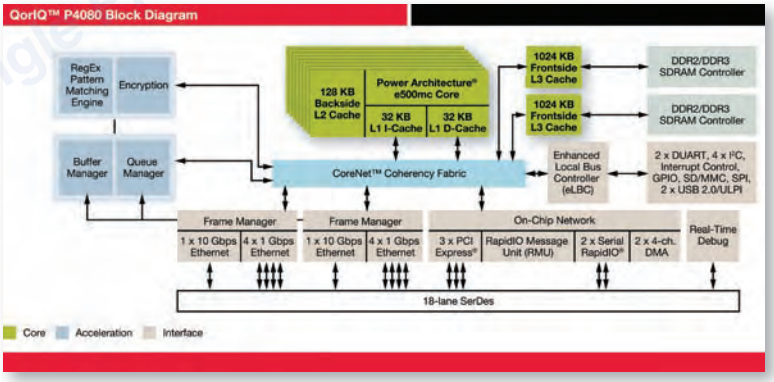
The PCS-8230 has all the necessary features for today's infotainment systems: DVB-T/FM tuner, Wi-Fi, two USB ports, three integrated SDIO sockets, support for dual-display (optional VGA or LVDS), standard multimedia audio and video functions, optional Trusted Platform Module (TPM) and USB-Disk Module (UDM), 5.1 channel audio, and open architecture for easy customization.

American Portwell Technology, Inc.
www.portwell.com
RSC# 38104

PowerQUICC evolves into QorIQ

Having a solid migration path with significant performance and functionality improvements in each successive generation of products is essential for embedded computing systems. In a move that fulfilled this requirement, Freescale Semiconductor recently introduced QorIQ, a new brand of communications platforms designed to enable the next era of networking and promote embedded multicore adoption.

The PowerQUICC series of communications processors has long been a successful product line for Freescale, with roots going back to the 68K processors. As the next-generation evolution of the PowerQUICC processor line, Freescale's QorIQ platforms are designed to help developers migrate to multicore with confidence.



QorIQ platforms include single, dual, and many-core processors based on Freescale's e500 Power Architecture technology. The platforms start with P1 and P2 levels, which consist of five package, pin, and software-compatible processors that can ease the transition from single- to dual-core processing. The 3 and platforms allow developers to move into he many core arena and address more advanced processing. This is an impressive-looking roadmap with product families that promise to have something for everyone.

Freescale Semiconductor
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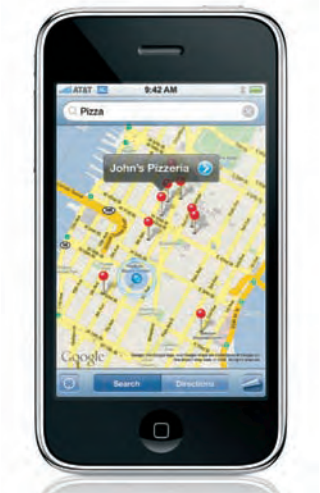

Ten radios in one handset

Apple never ceases to amaze with how much they can put into one small package and still have a human-machine interface unmatched by anyone in the industry.

The iPhone 3G delivers UMTS, HSDPA, GSM, Wi-Fi, EDGE, GPS, and Bluetooth 2.0 + EDR (10 radios total!) in one compact device using only two antennas. Clever iPhone engineering integrates those antennas into a few unexpected places: the metal ring around the camera, audio jack, metal screen bezel, and the iPhone circuitry itself.

Intelligent power management technology provides up to five hours of talk time over 3G networks. The GPS unit powers on and off quickly so it won't adversely affect battery life. An ambient light sensor automatically brightens the display in sunlight or a bright room and dims it in darker places. The proximity sensor immediately turns off the display to save power and prevent inadvertent touches. Apple accomplishes this with only four external buttons. All but the basic user interface is handled through a multitouch display that adapts to the particular application in use.

Apple
www.apple.com/iphone
RSC# 38106

Editor's Choice Products are drawn from OSP's product database and press releases. Vendors may add their new products to our website at www.opensystems-publishing.com/np and submit press releases at www.opensystems-publishing.com/news/submit. OSP reserves the right to publish products based on editors' discretion alone, and does not guarantee publication of any product entries.

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- Allows for modularity and expansion
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With over 47 years of engineering excellence, VPC provides **Mass InterConnect Solutions** for test and measurement applications in defense, aerospace, automotive, medical, contract manufacturing, and other high-volume testing environments. VPC's Mass InterConnect solutions are available for all major instrument platforms, GPIB, VXI, PXI, LXI, etc., delivering **rapid and reliable unit under test changeover, and reduced test costs.**

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PROFILE INDEX

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First 65-nm low-cost FPGA

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Cool off your system with Altera® Cyclone® III FPGAs. The market's first 65-nm low-cost FPGA features up to 120K logic elements—2X more than the closest competitor—while consuming as little as 170 mW static power. That's an unprecedented combination of low power, high functionality, and low cost—just what you need for your next power-sensitive, high-volume product. Very cool indeed.

ALTERA®

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Real Cost Savings in MicroTCA™ Begins with Performance Technologies.

Finding the cost savings promised with MicroTCA™ may seem like trying to pull a rabbit out of a hat. And while others may discuss low cost, Performance Technologies' revolutionary, 1U highly integrated MTC5070 delivers the true promise of MicroTCA in an affordable platform. With **volume prices under $2000,** this high-performance platform is available right now for your most demanding applications.

Industry Firsts for a 1U MicroTCA Chassis:

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It's no longer an illusion. Call Performance Technologies today to turn your MicroTCA project into a deliverable, cost-effective reality.

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MicroTCA™
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www.pt.com/mtc1

PERFORMANCE TECHNOLOGIES

Phone: 585.256.0200 • www.pt.com/mtc1 • E-mail: info-request@pt.com

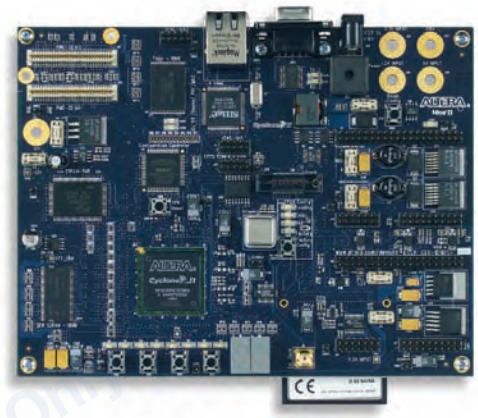
Altera Corporation
101 Innovation Drive • San Jose, CA 95134
408-544-7000
www.altera.com

Nios II Development Kit, Cyclone II Edition

Altera® Cyclone® II FPGAs are optimized for low cost, extending the reach of FPGAs further into cost-sensitive, high-volume applications and continuing the success of the first-generation Cyclone device family. Cyclone II FPGAs offer a customer-defined feature set, industry-leading performance, and low power consumption. They also offer greatly increased density and more features, all at significantly lower cost. Featuring up to 150 embedded 18 x 18 multipliers, Cyclone II FPGAs can be used alone or as Digital Signal Processing (DSP) coprocessors to improve price-to-performance ratios for DSP applications, including video and image processing, communications systems, and common DSP functions.

The Nios® II Development Kit, Cyclone II Edition, offers a variety of Intellectual Property (IP) cores to speed development, including three Nios II 32-bit RISC processors. The Nios II processors – fast, standard, and economy – are each optimized for a specific price and performance range, allowing designers to choose a system configuration that is an exact fit for their embedded needs. With these processors, you can upgrade system performance at any stage of the product life cycle without having to redesign the board or develop hand-optimized software. All three processors use the same instruction set architecture and are 100 percent binary code compatible. Nios II processors can be added to a designer's system using the SOPC Builder system development tool in the Quartus® II development software. The Nios II C-to-Hardware Acceleration (C2H) Compiler boosts performance of time-critical C subroutines, converting them to powerful hardware accelerators with a simple "right-click to accelerate" interface. This kit includes 12 months of upgrades so you can keep your system up-to-date with the latest enhancements to the Nios II processor, peripherals, and system design tools. This development kit is now RoHS-compliant.

Visit www.altera.com/nios for more information.



FEATURES

- Complete embedded FPGA development environment featuring the versatile Nios II embedded processor and the low-cost Cyclone II family
- Embedded software development tools:
  - Nios II Integrated Development Environment (IDE) and debugger, and the Nios II Instruction Set Simulator (ISS)
  - GNU tool chain, MicroC/OS-II real-time operating system, and NicheStack TCP/IP network stack
- Hardware design tools, including the Quartus II design software with the SOPC Builder system development tool
- Library of standard embedded IP cores and suite of pre-built hardware and software reference designs, including:
  - Three Nios II 32-bit RISC CPU cores (fast, standard, economy)
  - DDR, SRAM, timer, UART, SPI, JTAG UART, GPIO, DMA, 10/100/1000 Ethernet, interface-to-user logic, custom instruction, and more
- Complete embedded development board with Triple-Speed Ethernet PHY daughtercard featuring:
  - Cyclone II EP2C35 FPGA and 10/100 Ethernet PHY/MAC
  - 1-Mbyte SSRAM, 16-Mbyte DDR SDRAM, 16-Mbyte flash, JTAG connectors for FPGA and CPLD, Mictor trace/debug connector, 32-bit PMC headers
- No license or royalty fees when developing with the Nios II processor in Altera FPGAs and HardCopy® series structured ASICs

For more information, contact: nios_info@altera.com

RSC# 33543 @ www.embedded-computing.com/rsc

Altera Corporation
101 Innovation Drive • San Jose, CA 95134
408-544-7000
www.altera.com

Nios II Development Kit, Stratix II Edition

Altera® 90-nm Stratix® II devices are the industry's biggest and fastest FPGAs with an innovative logic structure packing more functionality into less area to dramatically reduce device costs. With internal clock frequency rates up to 500 MHz and typical performance > 250 MHz, these devices deliver on average 50 percent faster performance and more than 2x the logic capacity than first-generation Stratix FPGAs. Stratix II FPGAs deliver 50x higher multiplier bandwidth than single-chip, stand-alone Digital Signal Processors. The DSP blocks have the flexibility and performance to implement fast, arithmetic-intensive applications such as image processing, wireless communications, military, broadcast, and medical. Each DSP block has dedicated multiwidth multipliers to implement DSP algorithms and functions, including filtering, video and image processing, correlation, transforms, encryption, and error correction.

The Nios® II Development Kit, Stratix II Edition, offers Intellectual Property (IP) cores to speed development, including three Nios II 32-bit RISC processors. The Nios II processors – fast, standard, and economy – are each optimized for a specific price and performance range, allowing designers to choose a system configuration that is an exact fit for their embedded needs. You can upgrade system performance at any stage of the product life cycle without having to redesign the board or develop hand-optimized software. All three processors use the same instruction set architecture and are 100 percent binary code compatible. Nios II processors can be added to a designer's system using the SOPC Builder system development tool in the Quartus® II development software. The Nios II C-to-Hardware Acceleration (C2H) Compiler boosts performance of time-critical C subroutines, converting them to powerful hardware accelerators with a simple "right-click to accelerate" interface. This kit includes 12 months of upgrades so you can keep your system up-to-date with the latest enhancements to the Nios II processor, peripherals, and system design tools. This development kit is now RoHS-compliant.

Visit www.altera.com/nios for more information.

FEATURES

- Complete embedded development environment featuring the Nios II embedded processor and high-density, high-performance Stratix II FPGAs
- Embedded software development tools included:
  - Nios II Integrated Development Environment (IDE) and debugger, and the Nios II Instruction Set Simulator (ISS)
  - GNU tool chain, MicroC/OS-II real-time operating system, and NicheStack TCP/IP network stack
- Hardware design tools, including the Quartus II design software with the SOPC Builder system development tool
- Library of standard embedded IP cores and suite of pre-built hardware and software reference designs, including:
  - Three Nios II 32-bit RISC CPU cores (fast, standard, economy)
  - DDR, SRAM, timer, UART, SPI, JTAG UART, GPIO, DMA, 10/100/1000 Ethernet, interface-to-user logic, custom instruction, and more
- Complete embedded development board with Triple-Speed Ethernet PHY daughtercard featuring:
  - Stratix II EP2S60 FPGA and 10/100 Ethernet PHY/MAC
  - 1-Mbyte SSRAM, 16-Mbyte DDR SDRAM, 16-Mbyte flash, JTAG connectors for FPGA and CPLD, Mictor trace/debug connector, 32-bit PMC headers
- No license or royalty fees when developing with the Nios II processor in Altera FPGAs and HardCopy® series structured ASICs

For more information, contact: nios_info@altera.com

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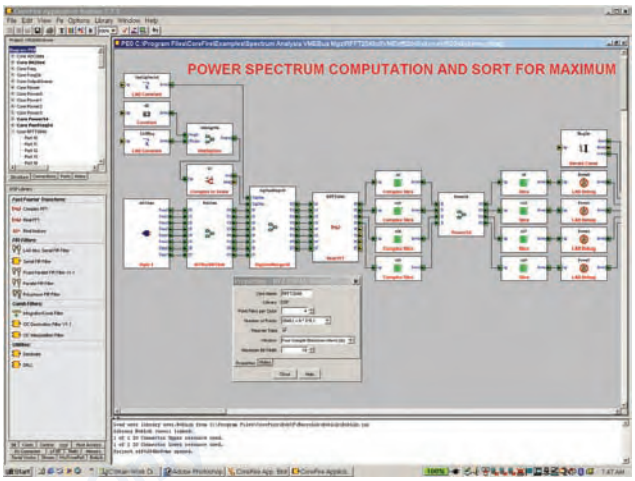
CoreFire

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 II and I/O card hardware. Use the CoreFire Debugger to view and modify register and memory contents in the FPGA and to step through the dataflow of your design running in the real physical hardware.

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

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



FEATURES

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

For more information, contact: wfinfo@annapmicro.com

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Industrial Strength Communications

FPGA & Digital I/O

CTI offers reconfigurable FPGA products to save time and money. Based on the Xilinx Virtex-5 and Spartan-3E FPGAs, FreeForm products provide a versatile FPGA platform for design flexibility.

FreeForm/PCI-104
Virtex-5 multi-platform FPGA, 3 million gates, 8 MB Flash, 128 MB DDR2-400 memory, 64 single-ended or 32 LVDS I/O 2 x 10/100 Ethernet, 2 x RS-485 serial interface.

FreeForm/104
Spartan-3E FPGA, 500,000 gates, onboard Flash memory, standard/custom cores, digital I/O, counter/timers, Opto-22 compatible, external 5 V power, LEDs, rotary switch, reset button.

Off-the-shelf flexibility and high speed processing cores within a rugged design make FreeForm products ideal for real-time applications where speed and accuracy are critical.

FEATURES

- Provides external 5 V power, should a stand-alone, single board solution be required
- Onboard Flash memory for run-time design changes
- Industrial temperature range models available (-40 °C to +85 °C)
- Free ISE Webpack for complete FPGA design
- Reconfigurable in the field or through CTI Engineering Services
- Lifetime warranty and free technical support

For more information, contact: sales@connecttech.com

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Innovative Integration
... real time solutions!

P25M

The P25M is a powerful and flexible DSP and FPGA for signal processing and real-time control in PCI systems. The P25M PCI card features a 300 MHz floating point DSP and 1M gate FPGA with 4 channels of 25 MSps, 16-bit A/D, and 4 channels of 50 MSps, 16-bit D/A. Supporting this open-architecture hardware platform, the Pismo software toolset provides target and host libraries, practical utilities, and numerous example programs that illustrate the use of all-board peripherals. The FrameWork Logic development tools provide comprehensive support for adding signal processing to the FPGA. The full-featured logic and DSP programming tools greatly accelerate all facets of the system development.

Data Sheets and Pricing Online!

FEATURES

- 300 MHz TMS320C6713 DSP. PCI 64-bit/66 MHz. >85 db SFDR analog I/O
- Xilinx 1M gate Spartan-3 FPGA. 65 bits digital I/O
- Precision, low jitter sample clock. Extensive software support in source form
- Custom logic development supported for FPGA DSP/BIOS peripheral drivers
- Applications: PCI based real-time control or high-end data capture and playback
- Applications: Industrial high-speed controls, stimulus-response measurements, or OEM instruments

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

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805-578-4260
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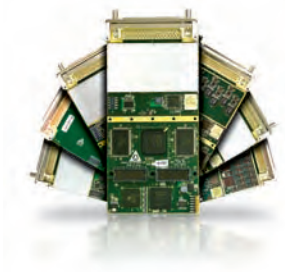
X3 XMC Family

The X3 PCI Express modules are industry-standard XMCe devices that deliver performance with lower system cost and less development effort than custom designs. Use X3 XMCe modules in any PCI Express system or any XMCe-compatible carrier card. Eliminate custom hardware by harnessing the power of PCI Express and customizable FPGAs.

Turn now to the MEZZANINE CARDS tab within this guide to view all of the X3 Family of products!



FEATURES

- XMC.3 module industry-standard COTS works with any PCI Express system or host card
- Xilinx Spartan-3 or -3A DSP, 2M gate FPGA
- Add DSP and customize features to meet unique requirements
- Two 2 MB SRAM. Data buffering supports high rates and large data sets for FFTs
- PCI Express with >150 MBps data rates. Fast, industry-standard host bus eliminates custom hardware
- Analog and digital I/O integrated with FPGA core
- Lower overall cost

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

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X5 XMC Modules

The X5 module family integrates high performance I/O with a Xilinx Virtex-5 FPGA computing core on an IEEE 1386 CMC mezzanine module with a PCI Express interface. The Virtex-5 SXT FPGA provides up to 640 DSP48 elements combined with memory blocks and logic that support a complete DSP system on a chip. QDR SRAM and DDR2 DRAM memory pools provide the FPGA with deep, fast memory that is critical to implementing efficient signal processing algorithms and data acquisition. X5 modules offer a new level of performance for data logging and system integration using either PCI Express or a private data link capable of over 1 GBps sustained transfer rates.

Turn now to the MEZZANINE CARDS tab within this guide to view all of the X5 Family of products!

FEATURES

- XMC Mezzanine Card XMC.3 PCI Express Module. Virtex-5 FPGA – SXT or LXT
- QDR SRAM and DDR2 DRAM memory pools. PCI Express, 8-lane interface. Analog and Digital I/O integrated with FPGA
- >1 GBps dedicated secondary host interface. >1 GBps transfer rates to host eliminate custom hardware
- Integrate into any VITA 42.3 PCI Express system
- >30 GMACs per second (SX95T) integrated with memory blocks and logic
- Real-time memory performance to 4 GBps for FPGA data buffering and computation

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

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Jacyl Technology
3909 Fourier Drive, Suite B • Fort Wayne, IN 46818
800-590-6067
www.jacyl.com

XG-5000K

The XG-5000K, the 5 million gate PC/104-*Plus* FPGA board
Centered around a 5 million gate Spartan-3 FPGA, the XG-5000K is the ultimate PC/104-*Plus* FPGA board that is ready to meet the most demanding of system designs. The board features a 5 million gate Spartan-3 FPGA, 256 MB of onboard Micron SRAM, 32 MB of onboard Intel flash, 264 user-programmable I/O, Type 1 CompactFlash connector, a secondary 500K gate Spartan-3 FPGA, 10/100BASE-T Ethernet interface, two RS-232 interfaces, PC/104 connector, PC/104-*Plus* connector, 0-25 MHz programmable DDS master clock source, 8 MB of secondary DataFlash, and a 25 MHz initial master clock.

The XG-5000K has the advanced feature of allowing the user to remotely reconfigure the entire board through the onboard JTAG connector, PC/104 connector, PC/104-*Plus* connector, 10/100BASE-T Ethernet interface, or any external interface connected to the XG-5000K. The XG-5000K has been developed with Xilinx's advanced design revisioning technology. This allows the XG-5000K to retain onboard as many as 16 partial or up to 4 complete design revisions for the 5 million gate Spartan-3 FPGA. Any one of these design revisions can be remotely programmed into the 5 million gate Spartan-3 FPGA, or the XG-5000K can be programmed to reconfigure itself based upon external or internal events.

The XG-5000K also incorporates a secondary 500K gate Spartan-3 FPGA. This second FPGA is initially configured to control remote reprogramming and control of the design revisioning features of the XG-5000K. But the secondary Spartan-3 FPGA can be reconfigured by the user to meet the requirements of a particular system design.

The XG-5000K can be powered from the PC/104 bus or can be powered from a single 5 VDC external source, allowing the board to be utilized as a stacked module in PC/104 applications or as a stand-alone product design platform. This allows the board to be ideal in embedded PC/104 applications or to be utilized in development platforms, design prototypes, or production products.

FEATURES

- 5 million gate Xilinx Spartan-3 FPGA on a PC/104-*Plus* platform
- Onboard 256 MB of Micron SRAM and 32 MB of Intel flash
- Four 66-pin VHDC connector banks providing a total of 264 user-programmable I/O
- CompactFlash Type 1 connector
- A secondary 500K gate Spartan-3 FPGA for remote reconfiguration and design revisioning of the XG-5000K or custom user configuration
- 10/100BASE-T Ethernet interface and two RS-232 interfaces
- Can be used in a PC/104 stack or as a stand-alone product design platform
- 0-25 MHz user-programmable DDS FPGA master clock source, along with a fixed 25 MHz FPGA master clock source
- Incorporates Xilinx's design revisioning technology and can retain onboard as many as 16 partial or up to 4 complete design BIT files
- Can be reconfigured through the configuration PROMs, JTAG, 10/100BASE-T Ethernet, PC/104, PC/104-*Plus* connectors, or the user I/O
- Available in industrial temperature range
- Can be powered from the PC/104 connector or an external 5 VDC source

For more information, contact: sales@jacyl.com

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Xilinx, Inc.
2100 Logic Drive • San Jose, CA 95124
408-559-7778
www.xilinx.com

Embedded Development HW/SW Kit – Spartan®-3A DSP S3D1800A MicroBlaze³ Processor Edition

Build Fast and Flexible Embedded Processing Systems with the Spartan®-3A DSP XC3SD1800A edition of the MicroBlaze™ development kit. Rapidly accelerate your embedded development utilizing comprehensive development kits with integrated hardware, design tools, IP, and pre-verified reference designs including a Linux 2.6 image for the MicroBlaze processor with Memory Management Unit (MMU).

Craft an embedded design with the perfect combination of feature set, performance, area, and cost for many applications targeting automotive, consumer, industrial, medical, military/aerospace, servers, storage, telecom/datacom, and wireless markets.

Learn more: www.xilinx.com/spartan3adsp.

FEATURES

- Full set of the award winning platform studio embedded tool suite
- Full set of ISE® WebPACK™ FPGA design software
- Powerful reference designs accelerate your development
- Communications cables and comprehensive documentation
- USB JTAG Probe, Regional Power Supply
- Cross-Over Ethernet and Serial cables, Flash Device

For more information, contact: lisa.hartman@xilinx.com

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Embedded Development HW/SW Kit – Virtex®-5 FX70T PowerPC & MicroBlaze™ Processor Edition

Develop High-Performance Embedded Systems on Virtex®-5 FXT FPGAs with embedded PowerPC 440 processor cores. This development kit makes it easy for designers to quickly develop full embedded system designs on a single device, utilizing immersed DSP, high-speed gigabit transceivers, and numerous IP cores as well as a new PowerPC block architecture optimized for high-performance processing applications targeting wired communications, wireless communications, audio video broadcast, military and aerospace, industrial, scientific, and medical markets.

Learn more: www.xilinx.com/virtex507.

FEATURES

- Xilinx Device: XC5VFX70TFFG1136
- Flexible Virtex®-5 FXT ML507 Development Board
- Full set of the award winning platform studio embedded tool suite and ISE® Foundation design software
- Communications cables and comprehensive documentation
- USB JTAG Probe, Regional Power Supply
- Cross-Over Ethernet and Serial cables, Flash Device

For more information, contact: lisa.hartman@xilinx.com

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Intel Corporation
intel.com/go/embedded

Intel® 5100 Memory Controller Hub Chipset with Quad-Core Intel® Xeon® Processors

The power-optimized Intel® 5100 Memory Controller Hub (MCH) chipset with high-performance, low-power 45nm Quad-Core Intel® Xeon® processors allows bladed and dense-bladed system designs to fit within a maximum 200 W power envelope. Platform power savings is derived from lower TDP in the MCH, the low-power Intel® ICH9R, and standard native DDR2 memory technology. High-perfomance DDR2 registered ECC memory helps safeguard data and improve reliability, providing customers the flexibility needed to optimize platform memory configurations.

When combined with the energy-efficient, low-voltage Quad-Core Intel® Xeon® processors L5408 and L5410, this platform delivers compelling performance-per-watt advantages for thermally constrained applications in communications, storage, and embedded market segments. It is ideal for a wide range of applications, such as storage area networks, network attached storage, routers, IP-PBX, converged/unified communications platforms, content firewalls, unified threat management systems, medical imaging equipment, military signal and image processing, and telecommunications (wireless and wireline) servers – particularly in AdvancedTCA® form factors.

These low-voltage Intel® Xeon® processors, with extended lifecycle support, utilize Intel's Hafnium-based Hi-k silicon process technology, which reduces power consumption, increases switching speed, and significantly increases transistor density to 820 million transistors (over 65nm technology). They range from 2.13 GHz to 2.33 GHz core speed, with 40 W to 50 W TDP, and are ideal for compliance with the AdvancedTCA® form factor and NEBS Level 3 thermal specifications.

These second-generation processors utilize a common microarchitecture and common socket with previous-generation 65nm Quad-Core Intel® Xeon® processors, providing a simplified path to upgrades.

FEATURES

- Energy-efficient 45nm Quad-Core Intel® Xeon® processors with reduced idle processor power reduces average power consumption
- High-performance DDR2 registered ECC memory, operating at 533 MHz or 667 MHz, helps safeguard data and improve reliability
- Configurable for single- or dual-independent channel operation
- Optimized performance/watt for ≤200 W bladed and dense-bladed form factors
- Supports x4 or x8 DDR2 memory technology, utilizing 512 MB, 1 GB, and 2 GB devices for up to six ranks/channel and maximum capacity of 48 GB
- PCI Express provides configuration flexibility with bandwidth necessary to support Quad-Core Intel® Xeon® processors
- PCI Express on the Intel® ICH9R has six x1 lanes that can be combined into one x4 and two x1 links, or six x1 links
- Integrated, industry-leading RAID (0, 1, 5, and 10) capability delivers performance and protection via Intel® Matrix Storage Technology
- FSB address, data, and command parity increase system reliability and availability
- BIOS boot from both FWH and/or SPI Flash increases BIOS capacity and user flexibility to support both legacy and UEFI BIOS.2
- Demand and patrol scrubbing proactively searches system memory, repairing correctable errors for enhanced system reliability
- x4 Single Device Data Correction can repair a failed x4 DRAM device on-the-fly, utilizing advanced ECC capabilities

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BittWare, Inc.
9 Hills Avenue • Concord, NH 03301
603-226-0404
www.bittware.com

F1/GX-AMC

Based on TI's TCI6487 DSP and Altera's® Stratix® II GX FPGA, the F1/GX-AMC is a full-size, single-width AdvancedMC that can be attached to AdvancedTCA carriers or other cards equipped with AMC bays and used in MicroTCA systems. The F1/GX-AMC features a high-performance TI DSP designed specifically for wireless infrastructure base-band applications and a high-density Altera Stratix II GX FPGA, creating a completely flexible, reconfigurable AMC. The board also provides BittWare's ATLANTiS™ framework implemented in the FPGA, a control plane interface via BittWare's FINe™ interface bridge, an IPMI system man-agement interface, a configurable 11 port AMC SerDes interface supporting a variety of protocols, and a front panel 3x SerDes interface supporting CPRI and OBSAI.

FEATURES

- High-performance multi-core TI TMS320TCI6487 DSP – 3.0 GHz of total raw DSP processing power
- High-density Altera® Stratix® II GX FPGA implementing BittWare's ATLANTiS™
- BittWare's FINe™ bridge provides control plane processing and interface via GbE, 10/100 Ethernet, and RS-232
- Over 1.5 GB of memory – three banks of DDR2 SDRAM at up to 512 MB each, one bank of QDR2 SRAM
- Full-size, single-width, fully connected Advanced Mezzanine Card
- Front panel I/O – 10/100 Ethernet, RS-232, JTAG port, 3x antenna interface supporting CPRI and OBSAI

For more information, contact: info@bittware.com

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Texas Instruments
12500 TI Boulevard • Dallas, TX 75243
972-644-5580
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DaVinci Technology

Accelerate development of your digital video application with DaVinci™ technology

TI's portfolio of digital media processors based on DaVinci technology leverages the TMS320C64x+™ DSP core and consists of scalable, programmable digital signal processing multicore SoCs, accelerators, and peripherals that are optimized for a broad spectrum of digital video end equipment.

Digital media processors are based on the industry's leading digital signal processing technology from TI and are scalable and programmable. The DaVinci portfolio includes DSP-based digital media processors, ARM® processors, and DSP-based multicore Systems-on-Chips (SoCs), which include accelerators and peripherals. All digital media processors are optimized to match the price, performance, and feature requirements for a broad spectrum of digital video end equipment.

Development Tools and Software

The DaVinci portfolio offers a set of development tools for a variety of application space and designs, including low-cost starter kits, complete development kits, and reference designs.

In addition to development tools, a complete software infrastructure ranging from low-level drivers to application APIs makes it possible for developers to implement digital video without having to focus resources on writing and optimizing codecs and programming. APIs mask the complex hardware and software details of implementing codecs from developers, enabling them to interchange multimedia codecs without having to modify application code.

When creating applications, developers are able to write to industry-recognized APIs for storage, networking, and video interfaces leveraging standard OS development environments such as Linux, MontaVista™ Linux, and Microsoft Windows® CE. OEMs are still empowered to access and develop directly on the DSP and/or ARM. The result is hassle-free SoC performance that allows designers to focus on developing value-added features.

To discover the full power of DaVinci technology, please visit www.ti.com/davinci.

FEATURES

- **TMS320DM6467** digital media processors are DSP-based multicore SoCs specifically tuned for real-time, multi-format, HD video transcoding at 10x the performance and 1/10th the price. The DM6467 consists of an integrated ARM9 core, C64x+ DSP core, High-Definition Video/Imaging Co-Processors (HD-VICP), a video data conversion engine, and targeted video port interfaces.
- **TMS320DM3x** digital media processors consist of an integrated video processing subsystem, an MPEG-4/JPEG co-processor, plus an ARM core and are available in clock speeds up to 270 MHz. The DM335 is pin to pin, software, and tools compatible with the DM355. The DM335 touts flexible capabilities on a low-cost platform with support for CCD/CMOS image sensors, resize capability, advanced image processing, video stabilization, and more.
- **TMS320DM644x** digital media processors are highly integrated SoCs based on an ARM926 core and the TMS320C64x+ DSP core. These processors are ideal for applications such as videophones, automotive infotainment, digital still cameras, streaming media, and IP set-top boxes.
- **TMS320DM643x** digital media processors, based on the C64x+ DSP core, are ideal for cost-sensitive digital media applications and include special features that make them suitable for in-flight entertainment systems, machine vision systems, robotics, video security, and video telephony, as well as automotive vision applications such as lane departure and collision avoidance.
- **TMS320DM647/648** digital media processors are based on the C64x+ DSP core and are optimized for multi-channel video security applications including Digital Video Recorders (DVRs), IP video servers, machine vision systems, and high-performance imaging applications.

For more information, contact: support@ti.com

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Traquair Data Systems, Inc.
114 Sheldon Road • Ithaca, NY 14850
607-266-6000
www.traquair.com

TRAQUAIR

micro-line C641x DSP/FPGA Boards

The micro-line series of embedded DSP/FPGA boards provides embedded systems developers with a tightly integrated suite of programmable DSP, FPGA, and I/O resources in small, stand-alone capable board formats.

micro-line C6412Compact and C641xCPU DSP/FPGA boards target high-performance integer DSP applications, using the Texas Instruments TMS320C6410, TMS320C6412, TMS320C6413, and TMS320C6418 DSPs.

The C6412Compact combines a powerful 720 MHz TMS320C6412 DSP processor, with up to 128 MB SDRAM, 8 or 32 MB boot program Flash ROM, and a high-density 1 MGate or 4 MGate Spartan-3 FPGA. The optionally programmable FPGA greatly expands processing as well as hardware interfacing possibilities. Two independent 400 Mbps 1394a FireWire interfaces are included, enabling simultaneous high-bandwidth video-in and video-out for a completely integrated video processing system. A 64-bit bus connects the DSP, FPGA, SDRAM, and FireWire resources. Onboard USB 2.0 and 10/100BASE-TX Ethernet interfaces round off the impressive array of features available on the C6412Compact.

The C641xCPU family of boards features a smaller (98 mm x 67 mm footprint) and leaner configuration, with up to 64 MB SDRAM, 8 MB boot program Flash ROM, and a high-density 500 kGate, 1 MGate, or 1.6 MGate Spartan-3E FPGA.

10/100BASE-TX Ethernet support is optionally provided using Windmill Innovations' eXpressDSP™-compliant bf3Net TCP/IP protocol stack and bf3Web embedded web server (SC100BASE-TX Ethernet daughtercard is required when using C641xCPU boards).

Optional Analog I/O daughtercards can also be used with the C6412Compact and C641xCPU boards:

ORS-112 (16-bit A/D/A)
• 4-ch A/D 2.5 MSps; 4-ch D/A 625 KSps

ORS-114 (14-bit A/D/A)
• 2-ch A/D 65 MSps; 2-ch D/A 125 MSps

ORS-116 (16-bit A/D/A)
• 12-ch A/D 250 KSps; 12-ch D/A 100 KSps

FEATURES

- C6412Compact Features:
  - 720 MHz TMS320C6412 integer DSP
  - 1 MGate or 4 MGate Spartan-3 FPGA
  - Up to 128 MB SDRAM; up to 32 MB boot program Flash ROM
  - Two independent IEEE 1394a FireWire interfaces for streaming data in/out simultaneously
  - 10/100BASE-TX Ethernet interface
  - USB 2.0 and RS-232 interfaces
  - 16-/32-bit host port interface
- C641xCPU Features:
  - 400 MHz TMS320C6410, 500 MHz TMS320C6413, or 500 MHz TMS320C6418 integer DSP
  - 500 kGate, 1.2 MGate, or 1.6 MGate density Xilinx Spartan-3E FPGA; up to 98 configurable digital I/O pins
  - Up to 64 MB SDRAM; 8 MB boot program Flash ROM
  - RS-232 interface
  - 98 mm x 67 mm footprint; ISO9001:2000 accredited production and CE certification

For more information, contact: sales@traquair.com

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Traquair Data Systems, Inc.
114 Sheldon Road • Ithaca, NY 14850
607-266-6000
www.traquair.com

micro-line C6713 DSP/FPGA Boards

The micro-line series of embedded DSP/FPGA boards provides embedded systems developers with a tightly integrated suite of programmable DSP, FPGA, and I/O resources in small, stand-alone capable board formats.

micro-line C6713Compact and C6713CPU DSP/FPGA boards target high-performance floating-point DSP applications, using the powerful Texas Instruments TMS320C6713 DSP.

The C6713Compact incorporates up to 64 MB SDRAM, 8 MB boot program Flash ROM, and an onboard, high-density 250 kGate, 500 kGate, or 1 MGate Virtex-II FPGA (optionally programmable). The FPGA greatly expands processing as well as hardware interfacing possibilities. A 400 Mbps IEEE 1394a FireWire interface is also included onboard, for communications with other embedded DSP resources, cameras, sensors, and PCs. Software APIs are available to utilize the FireWire interface for general purposes, video frame capture from cameras, and data storage to hard drives and CompactFlash memory.

The C6713CPU offers a smaller (98 mm x 67 mm footprint) and leaner configuration, with up to 64 MB SDRAM, 2 MB boot program Flash ROM, and a high-density 400 kGate or 1 MGate Spartan-3 FPGA.

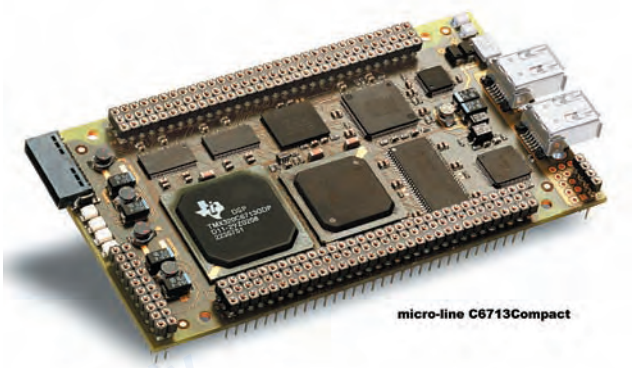
10/100BASE-TX Ethernet support is optionally available using Windmill Innovations' eXpressDSP™-compliant bf3Net TCP/IP protocol stack and bf3Web embedded web server (requires SC100BASE-TX Ethernet daughtercard).

Optional Analog I/O daughtercards can also be used with the C6713Compact and C6713CPU boards:

ORS-112 (16-bit A/D/A)
• 4-ch A/D 2.5 MSps; 4-ch D/A 625 KSps

ORS-114 (14-bit A/D/A)
• 2-ch A/D 65 MSps; 2-ch D/A 125 MSps

ORS-116 (16-bit A/D/A)
• 12-ch A/D 250 KSps; 12-ch D/A 100 KSps



FEATURES

- C6713Compact Features:
  - 300 MHz TMS320C6713 floating-point DSP
  - 250 kGate, 500 kGate, or 1 MGate Virtex-II FPGA; up to 160 configurable digital I/O pins
  - Up to 64 MB SDRAM; 8 MB boot program Flash ROM
  - Onboard 400 Mbps IEEE 1394a FireWire interface
  - RS-232 interface
  - External access to TMS320C6713 DSP I/O interfaces: 32-bit EMIF, XF0/1 pins, Timer input/output pins, McASP and McBSP ports, I2C, and HPI
  - 67 mm x 120 mm footprint; ISO9001:2000 accredited production and CE certification
- C6713CPU Features:
  - 300 MHz TMS320C6713 floating-point DSP
  - 400 kGate or 1 MGate Spartan-3 FPGA
  - 64 MB SDRAM; 2 MB boot program Flash ROM
  - RS-232 interface
  - 98 mm x 67 mm footprint; ISO9001:2000 accredited production and CE certification

For more information, contact: sales@traquair.com

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Xilinx, Inc.
2100 Logic Drive • San Jose, CA 95124
408-559-7778
www.xilinx.com

The XtremeDSP™ Development Kit – Virtex®-5 SXT FPGA Edition

The XtremeDSP™ Development Kit – Virtex®-5 SXT FPGA Edition includes hardware, design tools, IP, and pre-verified reference designs that can rapidly accelerate the development of your next DSP application. This unique combination of design technologies enables thousands of DSP algorithm and system designers who use MATLAB® and Simulink® (The MathWorks™) to create high-performance systems using Xilinx FPGAs.

Ideal for applications such as data transmission and manipulation for many markets including wireless, automotive, consumer, multimedia, video, imaging, industrial, medical, military/aerospace, broadcast, and security.

Visit: www.xilinx.com/virtex5fxtkit.

FEATURES

- Virtex®-5 SXT ML506 DSP Development
- Full license of XtremeDSP Development Tools Package
- Reference Designs (available online)
- Xilinx Platform Cable USB
- Universal power supply

For more information, contact: lisa.hartman@xilinx.com

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2100 Logic Drive • San Jose, CA 95124
408-559-7778
www.xilinx.com

The XtremeDSP™ Starter Kit – Spartan®-3A DSP 1800A FPGA Edition

The XtremeDSP™ Starter Kit – Spartan®-3A DSP 1800A FPGA Edition is a comprehensive development kit that includes hardware, design tools, IP, and pre-verified reference designs that can rapidly accelerate the development of your next DSP application. This kit is RoHS compliant and also includes the power adapters for US, UK, and Europe.

The Spartan-3A DSP FPGA platform is ideal for cost sensitive DSP algorithmic and co-processing applications requiring significant DSP performance and can be used in a variety of applications targeting wireless, automotive, consumer, multimedia, video, imaging, industrial, medical, military/aerospace, and security markets.

Visit: www.xilinx.com/spartandspkit.

FEATURES

- Spartan®-3A DSP 1800A XtremeDSP development board
- Power supply 100-240 V, 50/60 Hz with universal plug adapters
- USB Platform download cable for configuration and debug
- System Generator for DSP design software
- ISE® WebPACK™ 9.2i software
- CD containing design software, reference designs, documentation, and board schematics

For more information, contact: lisa.hartman@xilinx.com

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Xilinx, Inc.
2100 Logic Drive • San Jose, CA 95124
408-559-7778
www.xilinx.com

The XtremeDSP™ Video Starter Kit – Spartan®-3A DSP FPGA Edition

The XtremeDSP™ Video Starter Kit supplies you with everything you need to accelerate your video designs using reconfigurable hardware without requiring existing knowledge of VHDL/Verilog design flows.

Build Fast and Flexible Video Systems
This programmable platform provides you with just the right balance of hardware resources to enable you to craft the optimal combination of performance, flexibility, and cost for video applications. You can create custom accelerators for your existing video system that interface to digital media processors.

Platform FPGAs for Video
The kit helps you to meet all of your video system performance requirements. Hardware architectures can be tailored to meet your specific needs while fully leveraging the system features of the device.

Processor Friendly Design Flow That Does Not Require RTL
Complete video systems can be quickly constructed without requiring existing knowledge of VHDL/Verilog design flows. An embedded base system provides a familiar starting point from which existing processor-based video applications can be ported, or new designs created. Custom video accelerator blocks can also be created using the popular Simulink® modeling environment from The MathWorks™.

To learn more and order your XtremeDSP Video Starter Kit, visit www.xilinx.com/vsk_s3.

FEATURES

- Spartan®-3A DSP 3400A FPGA development board
- FMC-Video I/O daughtercard, a Micron VGA CMOS Camera Module, and a comprehensive set of Xilinx Tools
- One year entitlement to Xilinx EDK and System Generator
- The Spartan-3A DSP platform consists of two devices, the XC3SD3400A and the XC3SD1800A
- The XC3SD3400A device featured in the XtremeDSP Video Starter Kit delivers over 30 GMACps

For more information, contact: lisa.hartman@xilinx.com

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Birdstep Technology

2101 Fourth Avenue, Suite 240 • Seattle, WA 98121
206-748-5353
www.birdstep.com/database

RDM Product Family

The Raima Database Manager (RDM) Product Family is a suite of embedded database technologies that provides developers of embedded systems with reliable and proven solutions for managing data within all types of applications. With a proven track record spanning over 25 years, RDM database engines are embedded in thousands of applications amounting to tens of millions of deployed runtimes on all types of hardware. You can find RDM embedded in several applications within the telecommunications, defense and aerospace, consumer electronics, financial and banking, automotive, telematics, and business automation markets.

FEATURES

- Network and Relational Data Models – mix both data models for unmatched schema design flexibility
- 32- and 64-bit support – supports both 32- and 64-bit architectures and data types
- High Availability – sophisticated synchronous and asynchronous data mirroring and networked replication
- Concurrent Access – multi-thread and multi-process access with row level locking granularity
- Full and Hybrid In-Memory Modes – choose to store data and/or indexes in memory or on disk
- 128-bit data and communication encryption

For more information, contact: dbsales@birdstep.com

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Advanced Media, Inc.

1440 Bridgegate Drive, Suite 395 • Diamond Bar, CA 91765
909-861-2269
www.ritekusa.com

RIDATA COMPACTFLASH

Ridata's series of CompactFlash cards are based on NAND Flash memory technology and available with either SLC or MLC chips. CF cards can be used in a variety of portable devices that have CF card slots, such as digital or video cameras, notebook PCs, industrial controllers, embedded systems, PMP, and other multimedia devices that require high performance read and write speeds for mission critical data retrieval and storage. Ridata CF cards are designed for mass storage with a wide range of capacities up to 32 GB. Ridata CF cards can run in three basic modes:

1. PC Card I/O Mode
2. PC Card Memory Mode (CF Mode)
3. True IDE Mode (Fixed Mode). Ridata CF cards continue to build a reputation for high performance and reliability within the industrial market.

FEATURES

- High speed access of reading and writing. 266x: up to 40 MB; 233x: up to 35 MB; 150x: up to 22.5 MB
- Conforms to CFA Standard; PC Card Standard, PC Card ATA, True IDE Mode, I/O BIOS, and DOS/WIN systems compatible
- Controller supports Ultra DMA Mode up to Mode 4. Error Correction Code (ECC) embedded
- Low power consumption with automatic power management. Non-volatile memory, no battery required
- RoHS compliant
- Customized features: industrial temperature, write protection switch, SMART function, SLC or MLC chip

For more information, contact: flashmemorysales@ritekusa.com

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Advanced Media, Inc.

1440 Bridgegate Drive, Suite 395 • Diamond Bar, CA 91765
909-861-2269
www.ritekusa.com

RIDATA SOLID STATE

The Ridata Solid State Drives (SSDs), based on NAND Flash technology, provide durability, high speed performance, and power efficiency for a variety of applications. Ridata SSD has 1.8" and 2.5" form factors, plus IDE/ATA and SATA interfaces. Both the Ridata 2.5" SATA Ultra-S series and the 2.5" IDE Ultra-S series are available in 16 GB and 32 GB capacities. Ridata SSDs are resistant to extreme heat and cold, have a compact size, contain no moving parts, and are lighter weight than normal mechanical hard drives. Ridata SSDs are ideal for notebooks, ultra-mobile PCs, industrial equipment, mobile servers, military equipment, medical equipment, aviation equipment, and video systems. Learn how you can integrate Ridata SSDs in your system by contacting us.

FEATURES

- Highly durable – Mean Time Between Failure (MTBF) > 4 million hours. Enhanced endurance by static wear-leveling
- Low power consumption – Less than 50 percent compared to traditional HDDs: 1.0 W during active operation versus 2.4 W
- High performance – Fast bootup time; no seek or latency time. Fixed performance does not get worse as media fills up
- SLC NAND Flash technology. Error Correction Code embedded. RoHS compliant
- 2.5" IDE/ATA Ultra-S series with transfer speed read up to 68 MBps; write up to 50 MBps. Pin-to-pin compatible
- 2.5" SATA Ultra-S series with transfer speed read up to 118 MBps; write up to 78 MBps

For more information, contact: ssdsales@ritekusa.com

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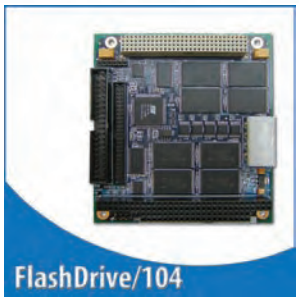
Connect Tech Inc.

42 Arrow Road • Guelph, ON N1K 1S6 Canada
519-836-1291
www.connecttech.com

Solid State Drives

FlashDrive/104 is the perfect storage solution for rugged applications. This Flash-based solid state drive uses the latest NAND technology and fits any PC/104 or PC/104-*Plus* stack.

To guarantee high performance, reliability, and endurance in any environment, FlashDrive/104 was engineered with harsh conditions in mind. Programs and files are stored without disruptions caused by extreme temperatures, shock, or vibration. FlashDrive/104's high-density Flash memory offers huge storage capacities and consequently reduces latency for rapid data transfer. Easily access the Flash using industry standard ATA or IDE interfaces. Protect your data from the damage or corruption that can occur using traditional hard drives with FlashDrive/104.



FEATURES

- Flash-based solid state storage, using the latest NAND technology (No mechanical failures!)
- Withstands extreme temperatures, shock, and vibration
- Industry standard ATA/IDE interfaces
- Read/write performance up to 10 Mbps
- Standard and 2.5" Hard Drive Connectors
- 4, 8, 16, or 32 GB storage (-40 °C to +85 °C)

For more information, contact: sales@connecttech.com

RSC# 35812 @ www.embedded-computing.com/rsc

Gigaram, Inc.

25 Empire Drive • Lake Forest, CA 92630
949-461-9999
www.gigaram.com

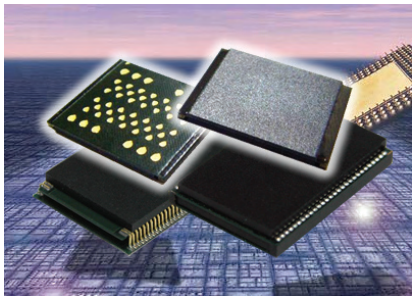
Memory

Gigaram has been an ISO 9001 certified manufacturer of memory since 1996, continuously delivering superior memory products and value-added manufacturing services.

Gigaram's extensive knowledge and experience in many leading-edge technology areas along with the ability to provide in-depth design support allow the custom tailoring of memory products to meet the specific application requirements unique to our customers' situations.

Gigaram's broad portfolio of quality JEDEC memory products include legacy SIMMs as well as the latest DDR3 DIMMs, with packages as small as our latest DDR2 VLP mini DIMMs.

Gigaram also offers in-house design, engineering, and contract manufacturing services utilizing multiple SMT lines, allowing customers a full turnkey solution.



FEATURES

- Materials procurement
- Engineering & Design Services
- PC Board Assembly including:
  - Lead Free RoHS manufacturing
  - Fine pitch surface mount, including SMD 0201
  - BGA, micro BGA and FPGA
  - Single or double-sided assembly
  - BGA Reballing & Stacking services
  - Functional and in-circuit testing

For more information, contact: r.rogers@gigaram.com

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SMART Modular Technologies

4415 East Cotton Center Blvd. • Phoenix, AZ 85040
602-735-0300
www.smartm.com

XceedUltraX, XceedSecure, and XceedSCSI SSDs

SMART Modular Technologies' XceedUltraX Solid State Drives (SSDs) deliver high performance, high capacity storage solutions optimized for embedded applications found in aerospace, industrial automation, transportation, medical, and telecommunications industries. Applications also benefit from the high reliability, durability, and ruggedness of SMART's true industrial-grade solutions.

SMART's XceedSecure 2.5" SSDs with EraSure® technology deliver high performance, high capacity storage solutions optimized for defense, aerospace, and other applications requiring durable, rugged, and secure storage. Designed to meet the needs of defense applications, EraSure technology complies with current military data elimination standards, providing multiple levels of secure erase techniques.

FEATURES

- Capacities up to 160 GB
- Sustained throughput up to 74 MBps
- True industrial-grade solutions
- Secure, ruggedized solutions for defense applications
- 1.8", 2.5", and 3.5" form factors
- 3 Gbps SATA, PATA, and SCSI interface

For more information, contact: FRE - MARKTING-PHX@smartm.com

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SiliconSystems, Inc.
26840 Aliso Viejo Parkway • Aliso Viejo, CA 92656
949-900-9402
www.siliconsystems.com

SiliconDrive II

SiliconDrive II advanced solid-state storage products provide embedded system OEMs in the netcom, embedded, industrial, military, and medical markets with fast read/write speeds, enhanced performance, and reliability across a wide range of host-system interfaces and form factors.

SiliconSystems' patented PowerArmor, SiSMART, and SiSecure technologies are integrated into every SiliconDrive II product to eliminate field failures from power disturbances, accurately forecast drive usable life, and protect application data and software IP, resulting in a lower total cost of ownership.

SiliconDrive II USB products are innovative storage solutions that combine the performance and compatibility of the USB interface with SiliconSystems' proven advanced storage technology. SiliconDrive II USB products save valuable board space in embedded system designs with no design compromises.

SiliconDrive II USB Blade is a breakthrough storage solution in an environmentally rugged and ultra-small form factor, providing improved storage design flexibility in applications where board space and performance are critical design considerations. This innovative, industry-first form factor features read and write speeds of 10 MBps, and is available in capacities from 512 MB to 2 GB.

The SiliconDrive II USB 10-pin module features an industry-standard form factor and delivers the high performance, high reliability, and multiyear product life cycle storage system required by OEMs. SiliconDrive II USB 10-pin modules feature read and write speeds of 20 MBps and 16 MBps respectively, and are available in capacities from 1 GB to 4 GB.

FEATURES

- PowerArmor technology eliminates the number one cause of storage system field failures – drive corruption resulting from power anomalies
- SiSMART technology eliminates unscheduled downtime by acting as an early warning system to forecast drive usable life
- SiSecure technology protects application data and software IP from theft, corruption, and accidental or malicious overwrites
- Advanced storage management algorithms offer industry-leading wear-leveling, ECC, and endurance
- SiliconDrive II USB Blade capacity range: 512 MB to 2 GB, standard and extended-range temperatures, fast data transfer rates, low power
- SiliconDrive II USB 10-pin capacity range: 1 GB to 4 GB, standard and extended-range temperatures, fast data transfer rates, low power
- High shock and vibration tolerances
- Multiyear product life cycle
- High data reliability
- Lightweight
- Zero DB noise
- 5 year warranty

For more information, contact: info@siliconsystems.com **RSC# 36483 @ www.embedded-computing.com/rsc**

SMART Modular Technologies

4415 East Cotton Center Blvd. • Phoenix, AZ 85040
602-735-0300
www.smartm.com

Xceed SSDs

XceedLite and XceedUltra SSDs

SMART Modular Technologies' XceedLite Solid State Drive (SSD) product offering is specifically targeted at the needs of OEM markets such as mobile and embedded computing, medical, automotive, and industrial applications. The small form factor, extremely low power consumption, and fast data throughput are major advantages of SMART XceedLite SSDs over traditional rotating hard drives.

SMART's XceedUltra Solid State Drives achieve sustained read speeds up to 135 MBps and write speeds up to 100 MBps. The XceedUltra level of SSD performance and reliability is primarily directed at high performance applications found in industrial, transportation, communications, and other embedded computing industries.

FEATURES

- Capacities up to 64 GB
- Sustained throughput up to 135 MBps
- Extremely low power dissipation
- Commercial (0 °C to +70 °C) and industrial (-40 °C to +85 °C) temperature
- S.M.A.R.T. features
- 1.8" and 2.5" form factors
- Ultrasonically welded enclosure
- SATA II and PATA interfaces

For more information, contact: FRE - MARKTING-PHX@smartm.com

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WDL Systems

220 Chatham Business Drive • Pittsboro, NC 27312
800-548-2319
www.wdlsystems.com

EE25 Hard Drives

WDL Systems, The Embedded Products Source, distributes the EE25 Series™ Ruggedized Hard Drives from Seagate. EE25.1 and EE25.2 Hard Drives offer OEMs new options for high-capacity HDD storage. RunOn Technology™ reliably delivers multimedia content under high-vibration, high-humidity, and extreme temperature conditions. EE25 Ruggedized Hard Drives are cost-effective solutions where large storage capacities are required in "extreme environments" such as automotive, industrial PC, field computing, and military applications. Seagate Design Service Centers offer manufacturers and system designers an array of services to assist in the design and testing of new HDD-capable systems. Contact WDL Systems for more information and to order EE25 Hard Drives.

FEATURES

- EE25.1 Series™ features 20, 30, and 40 GB capacities, PATA Interface
- EE25.2 Series™ features 30, 40, 60, and 80 GB capacities, PATA and SATA Interface
- High-humidity and high-altitude operation
- Up to 2.0 Gs operating vibration tolerance
- Long-duration shock of 110 Gs
- Extreme and rugged operating temperature ranges (-30 °C to +85 °C and -20 °C to +75 °C)

For more information, contact: sales@wdlsystems.com

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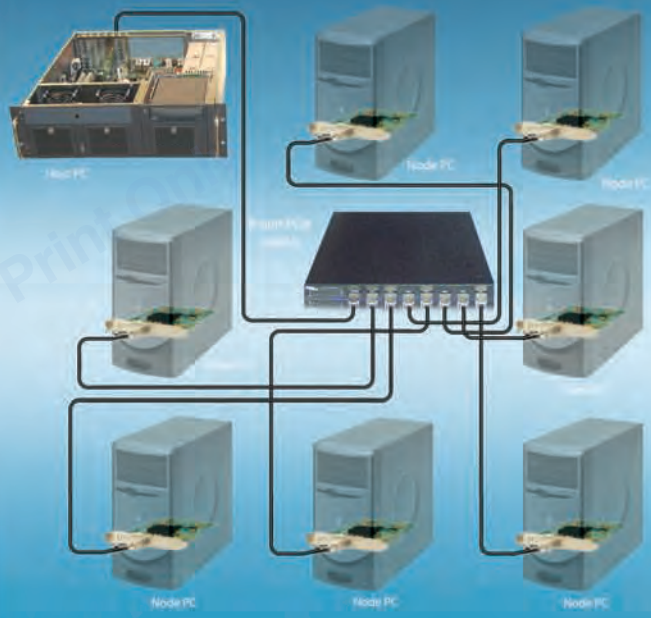
PCIe over Cable

I/O EXPANSION

- **PCIe x1, x4 and x8 adapters**
- **Transfer rate up to 20Gb/s**
  Gen 2 up to 80Gb/s
- **Software transparent**

HIGH-SPEED NETWORKING
with **SuperSwitch™**



- **x4 at 10Gb/s**
  Gen 2 up to 80Gb/s
- **ExpressNet™ Software**
  Direct data transfer
  TCP/IP

MAX EXPRESS™

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Trusted ePlatform Services

ADVANTECH

19" Medical PC

The POC-195 is a medical multimedia Panel Computer that is UL60601-1/EN60601-1 approved. The low-current leakage power supply of the POC-195 makes it an ideal and safe Point-Of-Care solution for patients and hospital practitioners. The POC-195 is specially designed to resist spills and water damage, and ensures dust resistance with its protected LCD sealed ports and card slots. The high-contrast ratio (1300:1) of the POC-195 makes it a perfect image terminal for PACS and DICOM applications. The POC-195 also has a book light, touchscreen on/off button, and optional features like an alarm light and trim knob for more user friendliness.

FEATURES

- UL60601-1/EN60601-1, CE and FCC Class B certified
- Point-Of-Care terminal for eHealthcare/medical applications
- 19" LCD display
- Spill and dust resistant (IPX1)
- 802.11b/g WLAN module and touchscreen (optional)
- Alarm light and trim knob (optional)

For more information, contact: ECGInfo@advantech.com

RSC# 37863 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Advantech Corporation
38 Tesla, Suite 100 • Irvine, CA 92618
949-789-7178
www.advantech.com

Trusted ePlatform Services

ADVANTECH

DVR System

The DVS-500 is an industrial-grade, PC-based Digital Video System (DVS), a DVR capture, storage, and analysis solution. It is designed to meet the requirements of today's modern security market in small- and medium-sized businesses, community security, retail operation, clinics, and others. It features the Intel® 945G Express Chipset with optional video capture modules, offering solutions ranging from MPEG-4 software encoding to MPEG-4 to H.264 hardware encoding. Advantech's advanced thermal design of both the hard disk and capture card, combined with compact size and low noise (less than 40 dB), allows the DVS-500 to operate reliably in environments with limited space or noise concerns. It meets strict demands for 24/7/365 high availability with zero-tolerance for downtime.

FEATURES

- Cost-effective platform supports Intel® Core™2 Duo/ Pentium® D/Pentium® 4/Celeron® D processors
- Compact, robust, and flexible configuration with ATX/ Micro ATX/Mini-ITX motherboards
- Compatibility and certification test for various video capture cards
- Advanced thermal and acoustic design for DVR
- Optional remote control module by direct keyboard mapping
- Supports 4/8/16 MPEG-4/H.264 video capture

For more information, contact: ECGInfo@advantech.com

RSC# 37862 @ www.embedded-computing.com/rsc

Jacyl Technology
3909 Fourier Drive, Suite B • Fort Wayne, IN 46818
800-590-6067
www.jacyl.com

Mission Workstation

The Mission Workstation is a multi-computer ruggedized workstation for applications that demand the best. The Mission Workstation features 4 completely independent computer systems housed in a single 19" 6U rack mount enclosure. The Mission Workstation can be ordered with a standard set of options for each computer, or each individual computer within the mission workstation can be custom configured from our factory for CPU processing capability, video processing capability, I/O capabilities, and/or OS configurations to meet your system requirements. The Mission Workstation can also be factory configured as a single cluster computer, harnessing the full potential of up to 16, 3 GHz Intel processors and 32 GB of DDR2 RAM. This parallel processing capability is available to meet the most demanding applications.

The Mission Workstation has been specially designed to be a ruggedized multi-computer system with unique features such as custom air filters located on all air cooling inlets, specially designed internal dual ball bearing fan cooling system for each individual computer, steel reinforced internal structure, anodized aluminum enclosure, removable ruggedized hard-drive caddies, full access to all CPU, video, and I/O ports from the front of the unit, and reinforced internal cable routing.

The Mission Workstation is designed to be utilized in the most demanding applications. Every production Mission Workstation is tested to a 3G NAVMAT vibration profile with the unit fully powered and subjected to full temperature range Environmental Stress Screening (ESS) with the unit fully powered. Other production testing is performed on each Mission Workstation such as 100% loaded CPU duration testing, 100% video processor duration test, performance verification testing, and burn-in testing all to ensure that the Mission Workstation is the most ruggedized and reliable multi-computer workstation available.

Jacyl Technology is the OEM of the Mission Workstation and provides an off-the-shelf or custom configuration of the Mission Workstation to meet the requirements of your system design.

FEATURES

- All CPU, video, and I/O connectors are located on the front of the unit for convenient access
- All air cooling intakes incorporate a ruggedized air/EMI filter system
- Every system is production tested to a fully powered 3G NAVMAT vibration test and Environmental Stress Screening (ESS) test
- Can be factory configured to be powered from a DC or AC input source
- All hard drives are removable and are enclosed within ruggedized caddies
- Each Mission Workstation is functionally tested from -10 °C to +60 °C
- Each computer can be independently configured with a Core 2 Duo or Core 2 Quad Intel processor and processor clock speeds up to 3 GHz
- Each individual computer has 2 PCI, 1 PCI x6 or 2 PCI x8, 2 Gb Ethernet, 4 SATA, up to 2 ESATA, up to 12 USB 2.0 ports, and up to 32 GB RAM
- Each of the 4 individual computers supports 32- or 64-bit and operating system configurations
- Can be factory configured as 4 individual computer systems or one cluster/parallel computer
- When factory configured as a cluster computer, the processing power would include 16, 3 GHz processors, 32 GB RAM, and 5.7 TB HDD space
- Each individual computer supports SATA II 300 (dependent upon CPU selection) and RAID 0, 1, 5, 10 controller implementations

For more information, contact: sales@jacyl.com

RSC# 37071 @ www.embedded-computing.com/rsc

Performance Technologies

205 Indigo Creek Drive • Rochester, NY 14626
585-256-0200
www.pt.com

MTC5070

The MTC5070 is a highly integrated MicroTCA™ compliant platform that can support up to six mid-size, single AdvancedMC™ (AMC) modules. Its powerful architecture maximizes payload slot density in a 1U form factor, while minimizing overhead costs by having non-payload functions such as the Ethernet switch, PCI Express switch, carrier/shelf manager, and power supplies, integrated into the rear of the chassis, and not designed as AMC-based modules. This fully deployable MicroTCA platform meets the needs for high-performance, cost-effective, and modular processing in low-profile, appliance-style applications. The MTC5070 is designed to be an optimized application-ready foundation for telecom, wireless, aerospace and defense, and commercial applications.

FEATURES

- 1U MicroTCA™ platform supporting up to six AdvancedMC™ modules
- Superior front-to-back cooling for up to 40 W per mid-size, single AMC
- Integrated Ethernet Switch with Dual GbE Uplinks, PCI Express® Switch, MicroTCA Carrier, and Shelf Managers
- Steel chassis
- Fully compliant with MicroTCA.0, AMC.0, AMC.1, AMC.2, and AMC.3
- Volume priced at under $2,000

For more information, contact: info@pt.com

RSC# 36463 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

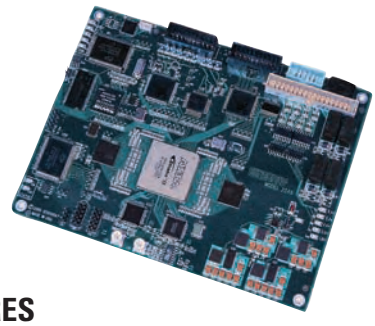
Sensoray

7313 S.W. Tech Center Drive • Portland, OR 97223
503-684-8005
www.sensoray.com

Sensoray 2246

1080i compatible HDTV image processor for embedded systems.

Sensoray's latest imaging system, Model 2246 enables full-size, 1920 x 1080 image capture without interrupting MPEG recording. It features five separate inputs and four simultaneous output formats. Real-time input is scaled to all outputs. It supports full screen, 16-bit color graphic and text overlays and has HD, SD, DVI, and composite formats. Select from low, medium, or high DVI-D monitor resolution. A high-speed USB 2.0 port receives external commands and sends MPEG streams and captured images to a host. Analog video outputs are included for displaying downscaled HDTV images on standard definition monitors. A Windows driver, API, and demo with source code are included for developers.



FEATURES

- One 1080i HDTV input and two analog inputs
- One HDTV output and one analog output
- Formats outputs for LCD displays and storage
- USB 2.0 to host computer interface
- Digital I/O for external controls
- Audio inputs

For more information, contact: info@sensoray.com

RSC# 22785 @ www.embedded-computing.com/rsc

ACCES I/O Products, Inc.

10623 Roselle Street • San Diego, CA 92121
858-550-9559
www.accesio.com

NANO I/O Server CD

The NANO I/O Server CD (Core Duo) fanless system is one of the smallest embedded systems available featuring an Intel Core Duo 1.66 GHz CPU. The system was designed to support an extensive collection of available COTS PC/104 modules and external USB I/O devices. This allows for added versatility and is useful in a wide variety of applications. The system is housed in a rugged, black anodized aluminum enclosure measuring only 5" wide, 6.25" deep and 3" high and features a bulkhead mounting provision. The unit is quietly powered by an included 12 VDC to ATX power supply with no fans. External connections include VGA, four USB 2.0 root ports, one RS-232 and one RS-232/422/485-selectable COM ports, PS/2 keyboard and mouse, 10/100 Ethernet, and standard PC sound.

FEATURES

- Wide range of ETX CPUs – fanless up to 1.66 GHz Intel Core Duo with full PC/104-*Plus* expansion
- Small size – only 5" W x 6.25" D x 3" H (127 mm x 159 mm x 76 mm)
- 2.5" laptop drive mount
- Accepts two PC/104, PCI-104, or PC/104-*Plus* I/O boards
- Flush side opening for CompactFlash card
- Rugged, black anodized aluminum enclosure

For more information, contact: contactus@accesio.com

RSC# 35256 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Advantech Corporation

38 Tesla, Suite 100 • Irvine, CA 92618
949-789-7178
www.advantech.com

Embedded Box PC

The ARK-4180 is the most powerful yet cost effective PCI-104-based solution with high vibration/shock resistance and wide temperature capability. With the Intel® Celeron® M 1.0 GHz processor, it can operate in temperatures from -40 °C ~ +75 °C, providing higher processing performance than similar products on the market. It is developed from PCI-104 stackable modules designed for the most demanding applications. It is housed in a specially cast and milled solid aluminum block with thermal fins that help dissipate heat. Special brackets on the aluminum enclosure itself allow additional enclosures to be stacked to add I/O and other functionality, making the ARK-4180 the most flexible rugged solution on the market.

FEATURES

- Intel® Celeron® M 1.0 GHz/600 MHz processor
- Two serial, six USB 2.0, VGA, LAN, audio, LPT, and KB/MS ports
- Embedded 1 GB industrial CF and 512 MB industrial DDR SDRAM
- Embedded Windows® XPe solution (WinCE optional)
- Modularized and stackable design, ultra small size, robust construction with fanless operation
- Dust and fungus resistant

For more information, contact: ECGInfo@advantech.com

RSC# 37042 @ www.embedded-computing.com/rsc

Advantech Corporation

38 Tesla, Suite 100 • Irvine, CA 92618
949-789-7178
www.advantech.com

Trusted ePlatform Services

ADVANTECH

Rugged Tablet PC

MARS-3100R is a 10.4" Industrial Tablet PC with fanless design suitable for applications such as manufacturing, warehousing, factory maintenance, field service, transportation and police, fire, or other emergency services. The rugged design of MARS-3100R resists shock and vibration to safeguard data while on the move. The whole MARS-3100R chassis is fully sealed to IP54 ratings to prevent water and dust damage in outdoor applications. In addition, the optional built-in WLAN, Bluetooth, and GSM/GPRS/EDGE modules facilitate data transfer and communication with others. With a -20 °C to +55 °C operating temperature, sunlight readable screen, and adjustable brightness features, it can tolerate extreme environments while showing a clear picture.

FEATURES

- Intel® Core™ Duo ULV U2500 1.2 GHz processor
- Rugged design protects system from shock/vibration damage
- IP54-rated, fully sealed chassis for water/dust resistance
- Powerful communication capabilities with optional built-in WLAN, Bluetooth, and GSM/GPRS/EDGE modules
- Supports Windows® XP for easy development
- Wide -20 °C to +55 °C operating temperature for extreme environments, such as ironworks or icehouses

For more information, contact: ECGInfo@advantech.com

RSC# 37682 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Parvus

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

EUROTECH GROUP

DuraMAR 1000

The DuraMAR™ 1000 is a rugged Mobile IP (Internet Protocol) router developed and qualified for use in harsh in-vehicle environments, including passenger and freight rail vehicles. Leveraging Cisco Systems' industry standard IOS® software and 3200 series Mobile Access Routing (MAR) technology, the DuraMAR supports the Mobile IP standard for seamless roaming through wireless networks. The system is wireless agnostic and can interface with most legacy and future data radios. A typical installation connects onboard applications to the enterprise back-office through public cellular, private VHF/UHF, 802.11, satellite, or any combination thereof. Encryption, authentication, and policy routing are standard features used to protect sensitive data from malicious attacks.

FEATURES

- Wide protocol support: Mobile IP, OSPF, IP Multicast, IGMP, IP Policy Routine, Cisco GPM, EIGRP-IP, RIP, etc.
- Ethernet: one L3 and two L2 E/FE ports; one Async and two Sync/Async serial ports
- Lightweight and compact (8" x 4" x 6" L-W-H) with +9 to +36 VDC power supply
- Cisco Systems' industry standard IOS® software
- Compliance with EN50155; Sealed IP67 connectors
- Extended temperature available

For more information, contact: sales@parvus.com

RSC# 37659 @ www.embedded-computing.com/rsc

Altera Corporation
101 Innovation Drive • San Jose, CA 95134
408-544-7000
www.altera.com

Nios II Embedded Evaluation Kit, Cyclone III Edition

The Nios® II Embedded Evaluation Kit, Cyclone® III Edition is a full-featured evaluation platform for the Nios II processor. This kit offers hardware components that support a wide range of applications, including networking, audio, and image processing. It provides a full evaluation of Altera's software development tools with several design examples.

This kit offers a variety of Intellectual Property (IP) cores to speed development, including three Nios II 32-bit processors supported by an Integrated Development Environment (IDE). The Nios II processors – fast, standard, and economy – are each optimized for a specific price and performance range, allowing you to choose a system configuration that is an exact fit for your embedded needs. With these processors, you can upgrade system performance at any stage of the product life cycle without having to redesign the board or develop hand-optimized software. All three processors use the same instruction set architecture and are 100 percent binary code compatible. The Nios II C-to-Hardware Acceleration (C2H) Compiler boosts performance of time-critical C subroutines, converting them to powerful hardware accelerators with a simple "right-click to accelerate" interface.

The low-cost Cyclone III FPGA family is the third generation in the Altera® Cyclone series. With unprecedented combination of low power, high functionality, and low cost, Cyclone III FPGAs broaden the number of high-volume, cost-sensitive applications that can benefit from FPGAs. Built on 65-nm low-power process technology, Cyclone III devices offer the lowest power consumption of any 65-nm FPGA and an optimal set of features to drive high-bandwidth parallel processing and many other cost- and power-sensitive applications. Cyclone III devices range from 5 K to 120 K logic elements, and offer up to 535 user I/O pins, up to 4-Mbit of embedded memory, 288 embedded 18x18 multipliers, dedicated external memory interface circuitry, Phase-Locked Loops (PLLs), and high-speed differential I/O capabilities.

Visit www.altera.com/nios for more information.

FEATURES

- Embedded software development tools:
  - Nios II Embedded Design Suite with Nios II IDE, compiler, debugger, C2H Compiler*, MicroC/OS-II RTOS*, and NicheStack TCP/IP Stack* (* licensed separately)
  - Software applications and tutorials inc. remote system update, picture viewer, hardware acceleration, and application selector utility
- Hardware design tools, including the Quartus® II design software with the SOPC Builder system development tool
- Library of standard embedded IP cores and suite of pre-built hardware and software reference designs, including:
  - Three Nios II 32-bit CPU cores (fast, standard, economy)
  - DDR, SRAM, timer, UART, SPI, JTAG UART, GPIO, DMA, 10/100 Ethernet, LCD controller, SD card interface, custom instruction, and more
- Complete embedded development board with color touch panel LCD featuring:
  - Cyclone III EP3C25 FPGA and 10/100 Ethernet PHY, 32-Mbyte DDR SDRAM, 1-Mbyte SRAM, 16-Mbyte flash, 128-Mbyte SD card and connector
  - Audio in, audio out, composite video input, VGA output, push buttons, LEDs, PS2, and embedded USB-Blaster™ for FPGA configuration
- No license or royalty fees when developing with the Nios II processor in Altera FPGAs and HardCopy® series structured ASICs

For more information, contact: nios_info@altera.com

RSC# 33953 @ www.embedded-computing.com/rsc

AMCC
215 Moffett Park Drive • Sunnyvale, CA 94089
408-542-8600
www.amcc.com

PowerPC 405EX AP

AMCC PowerPC 405EX Enterprise Access Point Reference Design Kit
Comprehensive software/hardware reference design based on PowerPC 405EX minimizes time-to-market for SMB, SOHO, and Enterprise WLAN access points.

AMCC's "Makalu" reference design kit provides customers with a solution for an enterprise Access Point, which is based on the PowerPC 405EX processor. The production-ready software and hardware design enables quick, low-risk development of Access Point products offering significant cost and technology performance advantages when compared to competing solutions.

Makalu customers receive a compact board in an Access Point enclosure. They can download the complete board design from the AMCC website, either using it to manufacture as-is or as the starting-point for their own hardware design.

The production-ready nature of this kit means that OEMs can replicate the Makalu system design and release an Enterprise Access Point product without developing any hardware, firmware, or management software themselves.

Makalu Board – The Makalu board, with an approximately 6" L x 10" W x 1.7" H form factor, is a custom-designed platform developed by Senao Networks.

Sample Applications and Utilities Included:

Makalu Software – Fully managed and branded 11n draft compliant solution.

Development Tools and Operating Systems – ELDK tools from Denx Engineering.

System Design Resources – Reference design to enable quick, low-risk development of Access Point products.

AMCC Partners Ecosystem
The Makalu reference kit may be ordered from AMCC or any authorized AMCC distributor using part number RD-405EX-KIT-01: www.amcc.com/sales.

For more information, contact Gilles Garcia:
ggarcia@amcc.com – 408-542-8600 OR please visit www.amcc.com/embedded.

FEATURES

- Highly integrated Access Point hardware/software reference design ready for production
- IEEE 802.11a, 802.11b, 802.11g, and 802.11n draft compliant wireless LAN Access Point technology
- Two dual band radios operating at frequencies of 2.4 to 2.484 GHz and 4.9 to 5.85 GHz
- Simple and intuitive web based interface
- PCI Express communication interface for higher throughput
- Support for 3 x 3 MIMO with spatial multi-plexing increases range and performance
- Integrated Turbo Security Engine acceleration in PowerPC 405EX
- U-Boot and Linux 2.6 in flash (source downloadable from AMCC website)
- TeamF1 best-in-class Managed Access Point Solution (MAPS) software in flash
- Resource CD with board schematics, layout files, data sheets, and software documentation; RoHS compliant
- Onboard JTAG, Trace connectors enable connection of any compatible external JTAG probe for run-control debugging
- Fully certified solution that meets industry standards and ensures full compatibility with any system in the market

Eurotech Inc.
10260 Old Columbia Road • Columbia, MD 21046
301-490-4007
www.eurotech-inc.com

VH-50R

The VH-50R is the ideal embedded operating panel for Windows CE and Linux based applications. Its major features are very low power consumption with very low heat dissipation. Thanks to these characteristics, the VH-50R can be used in applications where no ventilation is possible, such as a domestic home control panel, where the touch screen panel is mounted in a wall. The electronic parts, designed and built by Eurotech Group, are based on the Intel PXA255 processor at 400 MHz and include all the necessary functions of a modern touch screen panel. Two USB interfaces, an Ethernet 10/100, and three serial ports are available and can support all more common standards. It is equipped with expansion slots that can host Bluetooth and Wi-Fi adapters.

FEATURES

- PXA255 at 400 MHz processor
- 4-wire resistive touch screen display 5.7" (320 x 240)
- SSD Flash Disk: Two external CompactFlash sockets
- Serial ports: 1x RS-232, 1x RS-422, 1x RS-485
- LAN: Ethernet 10/100
- USB: 2 host plus 1 client

For more information, contact: sales@eurotech-inc.com

RSC# 37417 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Eurotech Inc.
10260 Old Columbia Road • Columbia, MD 21046
301-490-4007
www.eurotech-inc.com

VX-150P

The VX-150P is an extremely compact panel PC with a high brightness 15" TFT display, mainly indicated for applications based on XP/XP Embedded.

Three SBC (Single Board Computer) models use different processors offering a complete range covering most of the demands in the industrial sector and building automation.

It is available with Celeron M 600 MHz (with fanless processor), Celeron/Pentium® M up to 1.8 GHz, and Intel® Core Duo at 2 GHz.

Four USB interfaces and two Ethernet ports provide a link to any type of device; a slot Mini-PCI expansion for add-on cards is also available.

The 8-wire resistive touch screen uses an internal serial port connection (COM 3), ensuring over time a high stability calibration.

FEATURES

- Celeron M up to 1.5 GHz; Intel Pentium® M 1.8 GHz; Intel® Core Duo 2.0 GHz
- 8-wire resistive touch screen display 15" XGA (1,024 x 768)
- SSD Flash Disk: CompactFlash Type II socket
- 2x K/M PS/2, 3x RS-232, 4x plus 1x USB 2.0, VGA, Audio, Parallel
- 2x Ethernet 10/100 (Celeron/Pentium® M) 2x Ethernet 10/100/1000 (Core Duo)
- Slot: 1 Mini-PCI or 1 PCI half-size plus 1 Mini-PCI

For more information, contact: sales@eurotech-inc.com

RSC# 37416 @ www.embedded-computing.com/rsc

Moxa Americas, Inc.
3001 Enterprise Street, Suite 210 • Brea, CA 92821
888-MOXA-USA
www.moxa.com

IA261/262 Series

IA261/262 embedded computers come with 2 (IA262) or 4 (IA261) RS-232/422/485 serial ports, dual CANbus ports (IA262 only), dual Ethernet ports, 8 digital input channels, 8 digital output channels, VGA output, 2 USB hosts, and a CompactFlash socket. The computers are housed in a compact, IP40 protected, industrial-strength aluminum case.

IA261/262 computers use the Cirrus Logic EP9315 ARM9, 32-bit, 200 MHz RISC CPU. This powerful computing engine supports several useful communication functions, but will not generate too much heat. The built-in 32 MB NOR flash ROM and 128 MB SDRAM give you enough memory to run your application software directly on the IA261/262.

With its built-in VGA output interface, the IA261/262 is suitable for use with SCADA systems in industrial applications that require VGA and HMI features, such as manufacturing automation, production line process monitoring, and mining automation.

IA261/262 computers support RS-232/422/485, CANbus, and digital I/O, come with 2 KV isolation protection, and have dual LAN ports, making them ideal as communication platforms for industrial applications that require network redundancy. In addition to the standard models, wide temperature (-40 °C to +75 °C) models are available for use in harsh industrial automation environments.

IA261/262 computers come with Windows CE 6.0 preinstalled, and support general Windows and .NET 2.0 computing environments. This means that programs developed for standard PC operating systems with tools such Embedded Visual C++ or Visual Studio 2005 can run on the IA261/262 without much porting effort.

FEATURES

- Cirrus Logic EP9315 ARM9 CPU, 200 MHz
- 128 MB RAM onboard, 32 MB flash disk
- VGA interface for field site monitoring
- 2 KV digitally isolated RS-232/422/485 serial ports
- Dual 10/100 Mbps Ethernet for network redundancy
- Dual 2 KV digitally isolated CAN ports with CANopen protocol support
- 8+8 DI/DO with 3 KV optical isolation protection
- 12 VDC to 48 VDC redundant power input design
- Supports CompactFlash and USB 2.0 hosts
- Ready-to-run WinCE 6.0 platform
- -40 °C to +75 °C wide temperature models available
- RISC-based computers with 2 or 4 digitally isolated serial ports, dual LANs, VGA, CAN, DIO, CompactFlash, USB

For more information, contact: usa@moxa.com

RSC# 36484 @ www.embedded-computing.com/rsc

Octagon Systems
7403 Church Ranch Blvd. • Westminster, CO 80021
303-430-1500
www.octagonsystems.com

CORE Systems™

Rugged, ready-to-use systems with expansion via PC/104 and Mini PCI connectors.

Octagon has leveraged its 27 years of experience to develop a line of fully functional, powerful computing systems where reliable operation in harsh environments is the overriding requirement. These rugged, mobile servers operate fanless even at extended temperatures. The no-compromise design optimizes electrical, thermal, and mechanical components for maximum reliability. The XMB-S, RMB-S, and RMB-C1 are ideal for installation in police cars, buses, rail cars, taxis, trucks, mining equipment, and other harsh industrial environments.

FEATURES

- Integrated thermal system optimized for fanless operation
- Wireless friendly: GPS, GSM, GPRS, Wi-Fi
- Software drivers included for Linux and Windows® XPe
- Standard platform allows reuse of software from project to project
- Internal power supply immune to extreme transients

For more information, contact: sales@octagonsystems.com

RSC# 37046 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Octagon Systems
7403 Church Ranch Blvd. • Westminster, CO 80021
303-430-1500
www.octagonsystems.com

RMB-C1

Environmentally sealed, rugged mobile server.

The RMB-C1 is designed for applications where severe environment and high performance meet, requiring a COTS-level solution. Long-term reliability is the core of our COTS design philosophy. The RMB-C1 is one of our CORE Systems™ products, whose tightly integrated design ultimately combines the electrical, thermal, and mechanical components into a complete system with no compromise to any one segment.

The RMB-C1 packages an advanced computer/server system in an environmentally sealed enclosure. The unique thermal design allows fanless operation over the full temperature range with CPU speeds to 1.5 GHz. The RMB-C1 can be used as a central server, a stand-alone CPU, or a remote control.

FEATURES

- -40 °C to +85 °C operating temperature
- 1.5 GHz CPU
- Optional UPS module to protect data
- MIL-STD-810F available, meets CE Class requirements
- PC/104 and Mini PCI expansion, up to three (3) wireless devices supported
- 122 mm high x 170 mm wide x 340 mm deep

For more information, contact: sales@octagonsystems.com

RSC# 37041 @ www.embedded-computing.com/rsc

Octagon Systems
7403 Church Ranch Blvd. • Westminster, CO 80021
303-430-1500
www.octagonsystems.com

RMB-S

Rugged mobile server for extreme environments.
The RMB-S is an advanced mobile computer/server system with the most efficient fanless system available. This allows true industrial temperature range operation at CPU speeds of 1.5 GHz. The unit includes extra I/O connectors for user-defined signals as well as an option plate for antenna connectors, etc.

The interior electronics use high reliability interconnects rather than cables to minimize complexity and maximize reliability. Various heat-producing components are directly coupled to the case for maximum heat transfer. The RMB-S is designed to absorb the shock and vibration in transportation, mining, and other harsh environments.

FEATURES

- -40 °C to +85 °C operating temperature
- 1.5 GHz CPU
- 4:1 range on DC power supply
- MIL-STD-202G or MIL-STD-810F
- PC/104 and Mini PCI expansion, spare I/O connectors
- 103 mm high x 170 mm wide x 274 mm deep

For more information, contact: sales@octagonsystems.com **RSC# 37043 @ www.embedded-computing.com/rsc**

Embedded Computing Design Resource Guide 2008

Octagon Systems
7403 Church Ranch Blvd. • Westminster, CO 80021
303-430-1500
www.octagonsystems.com

XMB-S

Fanless mobile server with I/O expansion.
The XMB-S is a unique computer/server system designed to be both rugged and versatile. It fully integrates the electrical, thermal, and mechanical components into a complete system with no compromise to any one segment. The Pentium® platform operates equally well under a Windows® or Linux environment. It runs fanless over the extended temperature range. The optional panel allows rapid prototyping of custom units with added connectors.

FEATURES

- Rich set of standard I/O
- Shock: 30G per MIL-STD-202G
- Vibration: 5G per MIL-STD-214G
- 107 mm high x 153 mm wide x 280 mm deep

For more information, contact: sales@octagonsystems.com **RSC# 37044 @ www.embedded-computing.com/rsc**

Technologic Systems
16610 East Laser Drive, Suite 10 • Fountain Hills, AZ 85268
480-837-5200
www.embeddedARM.com

TS-TPC-7390 Touch Panel Computer

The TS-TPC-7390 is an industrial-grade WVGA touchscreen computer with audio codec and speaker. Utilizing a low-power EP9302 ARM9 CPU, it requires no fans or heat sinks. Reliability is enhanced through entirely solid-state operation with no moving parts. The rugged aluminum support elegantly frames the 7" TFT LCD, making an ideal solution for mounting on a wall or cabinet. The computer unit is mounted to the back of the panel, providing access to a wide variety of connectors including 2 10/100BASE-T Ethernet ports, 2 full-speed USB ports, DIO, and serial ports. The unit runs Debian Linux 2.6 and Debian Sarge out-of-the-box and is suitable for a wide range of HMI-type and simple GUI applications.

The TS-7390 SBC

The TS-7390 Single Board Computer powers the TS-TPC-7390 Touch Panel Computer. The TS-7390 features a multipurpose 200 MHz ARM9 CPU. It allows development of multifunction embedded applications through its multiple peripheral interfaces, which include onboard RAM, NAND Flash, dual 10/100 Ethernet ports, dual USB 2.0 host, serial ports, SD card socket, A/D channels, digital I/O lines, temperature sensor, real-time clock, audio codec and speaker, video frame buffer, touchscreen, and LCD video interfaces, etc.

The default load for the 5K LUT Lattice XP2 FPGA provides additional peripherals, such as SD card socket, extra serial ports, and an 800 x 480 Color TFT-LCD video core. The TS-7390 computer is extremely rugged and reliable. Temperature operation is fanless and range is industrial standard at lower CPU speeds. Power input range is flexible from 5 VDC to 28 VDC. The power supply for the LCD and the LCD backlight are controlled via software.

Linux 2.6, Debian, and Eclipse IDE support

The TS-7390 SBC product runs Linux 2.6 and Debian by default out of 512 MB onboard Flash or an SD card. Bootup time to a Linux shell-prompt in about 1 second, and the full Debian file system is available. The full-featured Debian Linux (version Sarge) distribution includes a complete GNU C/C++ embedded development environment installed. Custom Linux GUI applications can be developed using X Windows or QtEmbedded libraries.

$449 qty 1

FEATURES

- Powered by TS-7390 engine
- 200 MHz ARM9 CPU
- Up to 128 MB SDRAM
- 512 MB NAND Flash with Debian Linux
- Programmable 5K LUT Lattice XP2 FPGA
- Expansion bus for daughtercards
- Touchscreen and audio speaker
- 800 x 480 TFT-LCD core with video out
- 8 MB dedicated frame buffer with video core
- Dual 10/100 Ethernet ports
- 2 USB 2.0 (12 Mbps maximum)
- 1 SD card slot (up to 6 MBps DMA)
- 4 RS-232
- 2 TTL COM ports
- 40-pin header with ADC, SPI, I2C, DIO
- Industrial quality design
- Boots Linux 2.6 in about 1 second
- Unbreakable, boots from SD or NAND
- Runs X Windows GUI applications
- Eclipse IDE out-of-the-box

For more information, contact: info@embeddedARM.com

RSC# 37660 @ www.embedded-computing.com/rsc

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

Panel PC

WinSystems' Panel PC (PPC2) is a compact display subsystem that includes a TFT flat panel display, PC-compatible single board computer with Ethernet and touchscreen integrated into an open-frame enclosure less than 3" thick.

The combination of embedded PC functionality and industrial-grade construction makes the unit ideal for industrial automation and control applications with tight system integration and minimal space requirements. The unit will operate over a temperature range of -20 °C to +70 °C.

The flat panel display is ideal for factory automation use. The display supports a wide-viewing angle of 65° horizontal and 75° vertical. This wide viewing angle permits easy panel placement with maximum operator viewing flexibility. Also, its contrast ratio is 550:1, ensuring color fidelity and superior gray scaling.

The PPC2's resistive touchscreen allows all kinds of touch input devices to activate the screen, including fingers, fingernails, styluses, and gloved hands, all the while maintaining an exceptional tactile feel. A keyboard and mouse can be used for input as well.

It is shipped with a wired Ethernet connection plus it supports expansion with 802.11 wireless Ethernet and/or CDMA/GSM cellular modems, making the Panel PC perfect for networked applications as well.

The PPC2 supports operating systems such as Linux and Windows® XP embedded, plus real-time kernels compatible with the x86 architecture. WinSystems offers a 30-day evaluation program.

FEATURES

- Compact 12.1" or 15" AM TFT flat panel display
- Includes PC-compatible single board computer with PC/104 I/O expansion capability
- Supports Linux, Windows® XP embedded, and other x86-compatible operating systems
- Resistive touchscreen supported
- Rugged and reliable construction will not rust
- Unpluggable terminal strip for power supply input
- Easy to mount, open-frame design
- Gasket material supplied to allow better fit into your application's enclosure
- Memory, CompactFlash, 802.11 miniPCI card, and cable sets available
- Optional 2.5" hard drive for larger storage requirements
- Free technical and configuration support
- Long-term product availability

For more information, contact: info@winsystems.com

RSC# 33631 @ www.embedded-computing.com/rsc

WDL Systems

220 Chatham Business Drive • Pittsboro, NC 27312
800-548-2319
www.wdlsystems.com

eBox Embedded PC

WDL Systems, The Embedded Products Source, distributes the eBox from ICOP Technology. eBox is a complete Embedded PC in a rugged aluminum chassis. The eBox-4300 series is a tiny and fanless Embedded PC designed for limited physical space and temperature concerns. Its 500 MHz ULV VIA Eden CPU provides fast processing speeds with low power requirements. eBox-4300 attaches to any VESA 100 mounting fixture, such as a VESA-equipped LCD screen, or other surface. The eBox-4300 is available with 2.5" HDD support, Mini PCI, and RS-232. The entire line of eBox Embedded PCs from ICOP Technology offers an economical low power solution for any embedded project or industrial application. Obtain specifications and ordering information by visiting www.ebox-pc.com or www.wdlsystems.com.

FEATURES

- 500 MHz ULV VIA Eden with 512 MB DDR2
- Fanless with low power consumption (less than 15 W)
- Available with Dual RS-232 Serial, Mini PCI, or 2.5" IDE drive support
- Optional Wireless LAN support
- Type I/II CompactFlash socket
- VESA 100 mounting compatibility

For more information, contact: sales@wdlsystems.com

RSC# 31246 @ www.embedded-computing.com/rsc

AdaCore

104 Fifth Avenue, 15th Floor • New York, NY 10011
212-620-7300
www.adacore.com

GNAT Pro

AdaCore's GNAT Pro is the leading Ada development environment on the market today and is available for more platforms than any other Ada environment.

Along with general development environments, AdaCore offers specialized environments to meet stringent safety and security application development. The GNAT Pro High-Integrity Edition for DO-178B is a complete development environment with full DO-178B Level A certification materials. It has passed formal certification as a part of multiple avionics flight-critical systems. It is the ideal solution for any safety-critical development effort for avionics, high-speed rail, nuclear shutdown, medical, and other industries where top levels of safety must be assured.

FEATURES

- GNAT Pro High-Integrity Edition for DO-178B
- When lives depend on safe and secure software
- Certified to DO-178B Level A multiple times
- Independent safety certification
- Configurable runtime library
- Supports Ada83, Ada95, and now Ada2005

For more information, contact: sales@adacore.com

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CodeSourcery, Inc.

9978 Granite Point Court • Granite Bay, CA 95746
650-331-3385
www.codesourcery.com

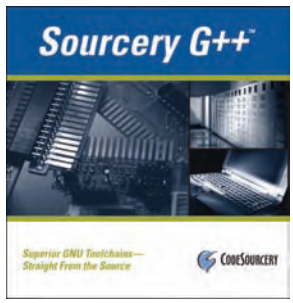
Sourcery G++

Sourcery G++™ is CodeSourcery's complete C and C++ development environment based on the GNU Toolchain. Sourcery G++ includes the GNU C and C++ compilers, the Eclipse™ IDE, and much more.

Sourcery G++ is available for the ARM®, ColdFire®, fido®, MIPS®, Power Architecture™, Stellaris®, and x86 processor architectures. Sourcery G++ runs on GNU/Linux® and Windows® host systems and targets bare metal, uClinux, GNU/Linux, and Windows systems.

Sourcery G++ Professional Edition features unlimited support from CodeSourcery's expert engineers, and Personal Edition is affordably priced for individuals and small development teams.

Download a free 30-day evaluation!



FEATURES

- Easy-to-use graphical installer and Eclipse-based integrated development environment
- Optimizing ISO-compliant GNU C/C++ compilers (GCC 4.2 plus enhancements) with C and C++ runtime libraries
- Flexible GNU macroassembler, powerful GNU linker, and source- and assembly-level GNU debugger
- Debug Sprites for hardware debugging using a JTAG/BDM device
- Instruction set simulator and GNU/Linux application simulator based on QEMU™
- CS3 for a uniform approach to board initialization and interrupt handling on bare metal platforms

For more information, contact: sales@codesourcery.com

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Innovative Integration

2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

FrameWork Logic

The FrameWork Logic tools provide comprehensive support for FPGA signal processing development in MATLAB and RTL for Innovative Integration products. The logic development cycle is shortened by building application logic within the FrameWork Logic hardware layer using pre-written and verified IP cores. The MATLAB tools provide a powerful graphical block diagram environment for hardware-in-the-loop and support for real-time data generation and analysis. The RTL tools complement the MATLAB environment and provide the flexibility of a high-level language. The tested high-level signal processing can be seamlessly integrated with VHDL in the same project, allowing you to work with the tools best suited for the job.

Data Sheets and Pricing Online!

FEATURES

- MATLAB and VHDL Board Support Packages
- Comprehensive hardware support and tools for signal processing
- Hardware interface layer design structure allows rapid integration of application-specific code
- Designed to support real-time signal processing and data acquisition
- Reference designs illustrating hardware use
- Applications: High speed signal processing development for FPGAs

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

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Embedded Computing Design Resource Guide 2008

pls Development Tools

1250 Oakmead Parkway • Sunnyvale, CA 94085
408-451-8408
www.pls-mc.com

Universal Debug Engine

Universal Debug Engine (UDE) is a powerful development platform to develop, test, and maintain microcontroller software applications.

UDE supports together with the Universal Access Device family various MCU cores and built-in Multi-core Debugging. State-of-the-art standard debug features (for example, Profiling) are included. UDE provides deep-in support for all available on-chip debug resources and peripherals. UDE offers "ARM9 Linux Support" as a comfortable user interface for simultaneous ARM Linux kernel and application debugging.

Being an integrated part of UDE, the open interface for User Definable Enhancements, enables you to easily create completely new types of applications.

Universal Debug Engine integrates High-Speed FLASH/OTP Programming Support – UDE MemTool.

FEATURES

- Debugging support for C166, XC166, XC2000, TriCore, PowerPC, eTPU, ARM, Cortex-M3, XScale via JTAG, DAP, ASC, CAN
- Automation interface allows the control of the debug engine, automatic FLASH programming in production
- Available C/C++ Compilers supported (ARM, GNU, Tasking, Keil, Wind River, ImageCraft ELF/DWARF 3.0)
- UDE provides the awareness of RTOS like CMX, uC/OS-II, OSEK-ORTI, OSE, Nucleus, eLinux, CASE Tools
- OCDS L2, MCDS, ETM, ETB, CoreSight, Nexus trace support up to 180 MHz, JTAG support up to 3.5 MB at 50 MHz
- FLASH/OTP programming support for internal, external EEPROMs (AMD, Intel, JEDEC), Gang Programmer available

For more information, contact: info@pls-mc.com

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AMCC
215 Moffett Park Drive • Sunnyvale, CA 94089
408-542-8600
www.amcc.com

AMC Reference Design Kit

AMCC Dual PowerPC 460GT AMC Card Reference Design Kit

The AMCC Arches Reference Design Kit provides users with a solution that allows for quicker time-to-market and thus a quicker time to revenue. The Arches Design Kit Advanced Mezzanine Card (AMC), incorporating the industry-standard Linux operating system and U-Boot firmware, is a comprehensive reference design kit specifically for AdvancedTCA and MicroTCA systems.

The AMC card schematics and layout files for the reference design kit are available so that customers can customize their designs from a proven baseline. In addition, cards are available as a commercial off-the-shelf product from Silicon Turnkey Express. Likewise, the Linux code and U-Boot firmware source are available to accelerate customers' software development.

Sample Applications and Utilities

The Resource CD provides a wide range of sample applications as a starting point for software development and utilities to assist in system configuration:

- Web server onboard
- Telnet server onboard
- FTP server onboard
- Processor/board configuration report
- Ethernet utility to configure IP address, MAC address, and modify EMAC registers
- Example flash file system for persistent storage
- Script-based Linux root file system build environment

LINX Inter-Process Communication from ENEA
RapidFET™ from Fabric Embedded Tools Corporation
Benchmarks
System Design Resources
AMCC Partners Ecosystem

Ordering Information

The Arches evaluation kit may be ordered from AMCC or any authorized AMCC distributor using part number RD-460GT-AMC-01. For more information, please visit www.amcc.com/sales. For more information, contact Gilles Garcia: ggarcia@amcc.com – 408-542-8600 OR please visit www.amcc.com/Embedded/Downloads/Arches.

FEATURES

- Comprehensive reference design kit for AdvancedTCA and MicroTCA systems, including industry-standard hardware and software
- Dual 460GT processor based design; AdvancedMC compliant – Serial RapidIO (AMC.4) – GbE (AMC.2) – PCI Express (AMC.1)
- Single-width midsize form factor; Commercially available solution
- Includes LINX, an open-source solution for distributed system Inter-Process Communication that is platform/interconnect independent
- Supports RapidFET™, a network management and diagnostic tool with a powerful Graphical User Interface (GUI) for RapidIO-based systems
- Architected to deliver improved reliability, flexibility, reduced equipment footprint, manageability, and serviceability
- Incorporates the latest trends in high-speed interconnect technologies with higher I/O capacity and computing performance
- Resource CD with system-level benchmarks and sample applications and industry-standard U-Boot firmware, Linux operating system, and software development tools
- Onboard JTAG connector enables connection of any compatible external JTAG probe for run-control debugging
- Board schematics, layout files, U-Boot source, and Linux source available from AMCC website
- Software development tools CDs from multiple industry-leading suppliers

For more information, contact: ggarcia@amcc.com

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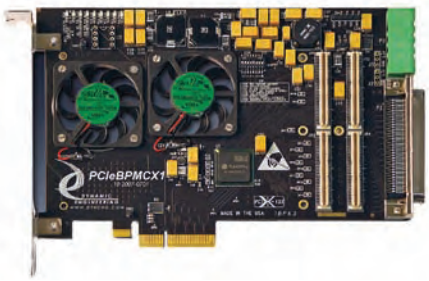
Dynamic Engineering

150 DuBois Street, Suite C • Santa Cruz, CA 95060
831-457-8891
www.dyneng.com

PCIeBPMCX1 Boards

Use your PMC with a newer style PC. The new PCs have PCI Express connectors, many times eliminating PCI slots. The PCIeBPMCX1 (PCI Express Bridge PMC 1-slot) adapter/carrier converter card provides the ability to install one PMC card into a standard PCI Express four lane slot. Suitable for PCI or PCI-X operation with the PMC; 32-bit or 64-bit data, and 33, 66, 100, or 133 MHz clock. Auto selected or switch programmable speeds. The bridge can operate with one, two, three, or four lanes active and can be installed into slots with more than four lanes if desired. Ask for the PCIeBPMC for 1 lane slot option.

"Dynamic Data Sheet": www.dyneng.com/pciebpmcx1.html.



FEATURES

- PCI/PCI-X speed operation with the PMC; 32- or 64-bit operation at 33, 66, 25, 50, 100, or 133 MHz, PCI or PCI-X
- PCI Express and PMC compliant design; auto selected or switch programmable speeds
- Bridge operational with one, two, three, or four lanes active; installable into slots with more than four lanes if desired
- 4 lane – PCI/PCI-X speed works with lane slots of 4 and up; Also available in 1 lane format
- Matched length, differentially routed impedance. Local power supplies using +12 V from PCI Express connector
- Zero Slot fan options front side clearance is fully compliant with carrier height requirement on slot 2

For more information, contact: dedra@dyneng.com

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Embedded Computing Design Resource Guide 2008

Innovative Integration

2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

X3-10M

The X3-10M is an XMC I/O module featuring eight simultaneously sampling 16-bit, 25 MSps A/D channels designed for high speed instrumentation and analysis for neuro-physical, high speed motion analysis and high speed data acquisition applications.

Flexible trigger methods include counted frames, software triggering, and external triggering. The sample rate clock is either an external clock or onboard programmable PLL clock source.

Data acquisition control, signal processing, buffering, and system interface functions are implemented in a Xilinx Spartan-3A DSP FPGA, 1.8M gate device. Two 512K x 32 memory devices are used for data buffering and FPGA computing memory. The logic can be fully customized using VHDL and MATLAB. Data Sheets and Pricing Online!

FEATURES

- 8 simultaneously sampling 16-bit, 25 MSps A/Ds. Programmable input: ±2 V, ±1 V, ±0.4 V, ±0.1 V
- High impedance, differential inputs. Xilinx Spartan-3A DSP, 1.8M gate FPGA
- 4 MB SRAM. Programmable low-jitter PLL timebase. Framed, software, or external triggering
- Log acquisition timing and events. 44 bits digital I/O on P16
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Applications: Multichannel sensor interface, neuro-physical instrumentation, or high speed motion recording

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

RSC# 35173 @ www.embedded-computing.com/rsc

Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

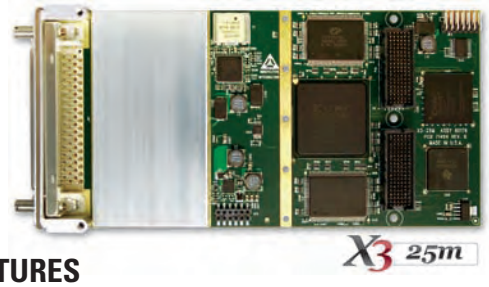
X3-25M

The X3-25M is an XMC I/O module featuring two 16-bit, 105 MSps A/D channels and two 16-bit, 50 MSps DAC channels designed for high speed stimulus-response, ultrasound, and servo control applications.

Flexible trigger methods include counted frames, software triggering, and external triggering. The sample rate clock is either an external clock or onboard programmable PLL clock source.

Data acquisition control, signal processing, buffering, and system interface functions are implemented in a Xilinx Spartan-3A DSP, 1.8M gate FPGA device. Two 1Mx16 memory devices are used for data buffering and FPGA computing memory.

The logic can be fully customized using VHDL and MATLAB using the FrameWork Logic toolset. Data Sheets and Pricing Online!



FEATURES

- Two 105 MSps, 16-bit A/D channels. Two 50 MSps, 16-bit DAC channels. ±2 V, ±1 V, ±0.2 V input ranges. ±2 V output range
- 16 bits front-panel DIO (8 differential pairs). Xilinx Spartan-3A, DSP 1.8M gate FPGA
- 4 MB SRAM. Programmable PLL timebase. Framed, software, or external triggering
- Log acquisition timing and events. 44 bits digital I/O on J16
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Applications: Wireless receiver and transmitter, stimulus-response measurements, high speed servo controls, and arbitrary waveform generation

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

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2390 Ward Avenue • Simi Valley, CA 93065
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X3-DIO

The X3-DIO is an XMC I/O module for high speed digital I/O data interfaces featuring 64 bits of front-panel digital I/O. The DIO is either single-ended LVCMOS or LVDS differential pairs. The DIO is directly connected to the FPGA, supporting high speed pattern generation, digital recording, custom I/O interfaces, and control applications.

Flexible trigger methods include counted frames, software triggering, and external triggering. The sample rate clock is either an external clock or onboard programmable PLL clock source.

Data acquisition control, signal processing, buffering, and system interface functions are implemented in a Xilinx Spartan-3A FPGA,1.8M gate device.

Data Sheets and Pricing Online!

FEATURES

- 64 single-ended/32 differential digital I/O. 100 MHz signal rates to FPGA using LVDS. 50 MHz LVCMOS signal rates
- 400 MBps LVDS capture/playback to SRAM. Optional on-card termination. Xilinx Spartan-3A DSP, 1.8M gate FPGA
- 4 MB SRAM. External clocking and triggering. Programmable timebase
- Framed, software, or external triggering. Log acquisition timing and events. 48 bits digital I/O on J16
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Applications: Pattern generation, custom digital interfaces for remote I/O, and digital controls

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

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Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

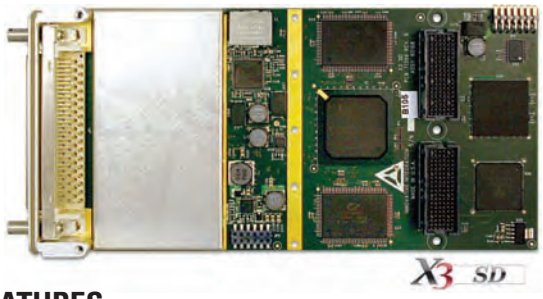
X3-SD

The X3-SD is an XMC I/O module featuring 16 simultaneously sampling, sigma delta A/D channels designed for vibration, acoustic, and high dynamic range measurements.

A precision, low-jitter timebase or external clock is used for sample rate generation. Sample rates up to 216 KHz with <10 Hz programmable resolution are supported as well as standard audio rates. Flexible trigger methods include counted frames, software triggering, and external triggering.

Data acquisition control, signal processing, buffering, and system interface functions are implemented in a Xilinx Spartan-3 FPGA, 1M gate device. Two 1Mx16 memory devices are used for data buffering and FPGA computing memory.

The logic can be fully customized using VHDL and MATLAB. Data Sheets and Pricing Online!



FEATURES

- 16 input channels. >110 dB SFDR. >105 dB S/N. Fully differential, ±10 V inputs
- Sample rates up to 216 KSps. Programmable oversampling modes. Xilinx Spartan-3, 1M gate FPGA
- 4 MB SRAM. Programmable PLL timebase. Framed, software, or external triggering
- Log acquisition timing and events. 48 bits digital I/O on J16
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Applications: Vibration measurement, audio and acoustic testing, and data acquisition

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

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Embedded Computing Design Resource Guide 2008

Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

X3-SDF

The X3-SDF is an XMC I/O module featuring four simultaneously sampling, sigma delta A/D channels designed for vibration, acoustic, and high dynamic range measurements. The A/D device has programmable output rates up to 24 bits at 2.5 MSps and 16 bits at 20 MSps using the programmable filter in the A/D.

A precision, low-jitter timebase or external clock is used for sample rate generation. Sample rates up to 20 MSps, with <10 KHz programmable resolution, are supported as well as external clocking. Trigger methods include counted frames, software, and external triggering.

Data acquisition control, signal processing, buffering, and system interface functions are implemented in a Xilinx Spartan-3 1M gate FPGA. Two 1Mx16 memory devices are used for data buffering and FPGA computing memory.

The logic can be fully customized using VHDL and MATLAB using the FrameWork Logic toolset.

FEATURES

- Four simultaneous A/D channels. >110 dB SFDR at 625 KSps. >105 dB S/N at 2.5 MSps. Fully differential, ±10 V inputs
- Programmable output resolution and sample rates up to 20 MSps. Programmable filters. Xilinx Spartan-3, 1M gate FPGA
- 4 MB SRAM. Programmable PLL timebase. Framed, software, or external triggering
- Log acquisition timing and events. 48 bits digital I/O on J16
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Applications: Vibration measurement, audio and acoustic testing, and data acquisition

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

RSC# 35262 @ www.embedded-computing.com/rsc

Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

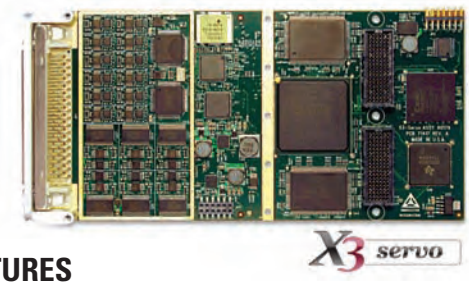
X3-Servo

The X3-Servo module features 12 simultaneously sampling A/D and DACs with an FPGA computing core. Low latency SAR A/D and fast-settling DACs support real-time servo control applications. The programmable input range and high input interface directly to many sensors, while the output is capable of driving many transducers. Front-panel digital I/O can be also be used as PWM or process controls.

Clock and trigger controls include support for consistent servo loop timing, counted frames, software triggering, and external triggering. The sample rate clock is either an external clock or onboard programmable PLL clock source.

Data acquisition control, signal processing, buffering, and system interface functions are implemented in a Spartan-3A.

Data Sheets and Pricing Online!



FEATURES

- Twelve 250 KSps, 16-bit A/D channels. Twelve 2 MSps, 16-bit DAC channels
- ±10 V, ±5 V, ±2 V, ±1 V input ranges. ±10 V output range. Low latency I/O. Xilinx Spartan-3A DSP, 1.8M gate FPGA
- 4 MB SRAM. Programmable PLL timebase. Framed, software, or external triggering.
- Log acquisition timing and events. 48 bits digital I/O on J16
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Applications: Servo controls, stimulus-response measurements, and data acquisition

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

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Embedded Computing Design Resource Guide 2008

Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

X5-210M

The X5-210M is an XMC I/O module featuring four 14-bit 250 MSps A/Ds with a Virtex-5 FPGA computing core, DRAM and SRAM memory, and 8-lane PCI Express host interface.

A Xilinx Virtex-5 SX95T with 512 MB DDR2 DRAM and 4 MB QDR-II memory provides a very high performance DSP core for demanding applications such as emerging wireless standards. The close integration of the analog I/O, memory, and host interface with the FPGA enables real-time signal processing at extremely high rates exceeding 300 GMACs per second.

The X5 XMC modules couple Innovative's powerful Velocia architecture with a high performance, 8-lane PCI Express interface that provides over 1 GBps sustained transfer rates to the host. Data Sheets and Pricing Online!

FEATURES

- Four 250 MSps 14-bit A/D channels. ±1 V, 50 ohm, SMA inputs and outputs. Xilinx Virtex-5, SX95T FPGA
- 512 MB DDR2 DRAM. 4 MB QDR-II SRAM. 8 RocketIO private links, 2.5 Gbps each. >1 GBps, 8-lane PCI Express host interface
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Fully customized using VHDL and MATLAB using the FrameWork Logic toolset
- Applications: Wireless receiver and transmitter; WLAN, WCDMA, and WiMAX front end; RADAR; electronic warfare; high speed data recording and playback; high speed servo controls; and IP development

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

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CORE SYSTEMS

Industrial Rackmount Displays

Core Systems manufactures a complete line of Industrial Rackmount Displays for static 4 post rack installations or rigorous transport case deployments. Core Systems' LCD Displays are built to operate in extreme environments and hostile situations. Our entire LCD product line is reliable, feature rich and easily deployable. Since all of our leading edge LCD display designs are customer driven and field tested you can rest assured that your program will flow smoothly with a Core Solution.

www.coresystemsusa.com

Rugged Panel Mount LCD

CORESYSTEMS
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Rugged MIL-Spec Displays

The Core Systems Commercial-off-the-shelf (COTS) Military Series offers a full range of Flat Panel displays specifically designed for the COTS military market-place. To meet the unique demands of field deployment, we have manufactured each LCD out of durable, lightweight materials and power efficient components. Our rugged displays will meet MIL-STD-901D (Grade A shock), MIL-STD-167 (vibration) and MIL-STD-461 (electromagnetic compatibility) ratings. Here at Core Systems, you are sure to find a field ready solution that you can rely on.

Who do you trust at your Core?

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X5-400M

The X5-400M is an XMC I/O module featuring two 14-bit, 400 MSps A/D and two 16-bit, 500 MSps DAC channels with a Virtex-5 FPGA computing core and PCI Express host interface on a standard XMC module.

A Xilinx Virtex-5 SX95T with 512 MB DDR2 DRAM and 4 MB QDR-II memory provides a very high performance DSP core for demanding applications such as emerging wireless standards. The close integration of the analog I/O, memory, and host interface with the FPGA enables real-time signal processing at extremely high rates exceeding 300 GMACs per second.

The X5 XMC modules couple Innovative's powerful Velocia architecture with a high performance, 8-lane PCI Express interface that provides over 1 GBps sustained transfer rates to the host. Data Sheets and Pricing Online!

FEATURES

- Two 400 MSps, 14-bit A/D channels. Two 500 MSps, 16-bit DAC channels. ±1 V, 50 ohm, SMA inputs and outputs. Xilinx Virtex-5, SX95T FPGA
- 512 MB DDR2 DRAM. 4 MB QDR-II SRAM. 8 RocketIO private links, 2.5 Gbps each. >1 GBps, 8-lane PCI Express host interface
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Fully customized using VHDL and MATLAB using the FrameWork Logic toolset
- Applications: Wireless receiver and transmitter; WLAN, WCDMA, and WiMAX front end; RADAR; electronic warfare; high speed data recording and playback; high speed servo controls; and more

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

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X5-GSPS

The X5-GSPS is an XMC I/O module featuring two 8-bit, National Semiconductor 1.5 GSps ADC08D1500 A/Ds with a Virtex-5 FPGA computing core, DRAM and SRAM memory, and 8-lane PCI Express host interface.

A Xilinx Virtex-5 SX95T with 512 MB DDR2 DRAM and 4 MB QDR-II memory provides a very high performance DSP core for demanding applications such as emerging wireless standards. The close integration of the analog I/O, memory, and host interface with the FPGA enables real-time signal processing at extremely high rates exceeding 300 GMACs per second.

The X5 XMC modules couple Innovative's powerful Velocia architecture with a high performance, 8-lane PCI Express interface that provides over 1 GBps sustained transfer rates to the host. Data Sheets and Pricing Online!

FEATURES

- Two 1.5 GSps, 8-bit A/D channels (National ADC08D1500). ±1 V, 50 ohm, SMA inputs. Xilinx Virtex-5, SX95T FPGA
- 512 MB DDR2 DRAM. 4 MB QDR-II SRAM. 8 RocketIO private links, 2.5 Gbps each. >1 GBps, 8-lane PCI Express host interface
- Power management features. XMC Module (75 mm x 150 mm). PCI Express (VITA 42.3)
- Fully customized using VHDL and MATLAB using the FrameWork Logic toolset
- Applications: Wireless receiver; WLAN, WCDMA, and WiMAX front end; RADAR; electronic warfare; high speed data recording and playback; high speed servo controls; and IP development

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

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iSPAN® 36CA

The iSPAN® 36CA AdvancedMC™ 4 port Gigabit Ethernet Packet Processing delivers a high-capacity line rate engine for use in AdvancedTCA, MicroTCA, and other proprietary form factors to address the needs of IPSEC acceleration, policy management and routing, and deep packet inspection in the emerging 3G/4G, IMS, and Voice Over IP infrastructure application elements.

The iSPAN® 36CA is an AdvancedMC implementation of the Cavium Networks next generation 58xx multi-core Octeon Plus Processor family. With AMC.1 and AMC.2 connectivity and optional RLDRAM for pattern matching, this AdvancedMC can be used on SBCs and carriers in AdvancedTCA, MicroTCA, and proprietary platforms.

FEATURES

- Cavium Networks Octeon 58xx onboard processor up to 600 MHz, with support for 4 to 12 cores
- 4x Gigabit Ethernet interfaces on front panel
- 4x Gigabit Ethernet (AMC.2) plus 4x PCI Express (AMC.1) interfaces to the AMC connector with management support across either
- Up to 1 GB of DDR2 SDRAM and optional RLDRAM for pattern matching and fast lookup
- Available software solutions for applications such as IPSEC acceleration, TCP/IP, and SRTP offload
- Available 6WINDGate™ software toolkit, a full-featured, ready to use, and customizable networking solution

For more information, contact: fastnet@iphase.com

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iSPAN® 3639

The iSPAN® 3639 AdvancedMC™ 4 or 8 port T1/E1/J1 communications controller from Interphase delivers a comprehensive high-capacity connectivity solution for use with AdvancedTCA and MicroTCA platform solutions to deliver a wide range of Voice Over IP, Wireless, and IP Multimedia Subsystem (IMS) infrastructure application elements.

The iSPAN 3639® integrates the Freescale™ PowerQUICC III™ communications controller to deliver high-performance and high-capacity processing of signaling traffic. With the addition of an optional FPGA with support for TDM switching and I-TDM protocol conversion, together with ISDN or CAS signaling protocol support, the 3639 can be used for full capacity media termination and media switching applications.

FEATURES

- Four or eight individually software selectable T1/E1/J1 interfaces, with front or rear access connectivity options
- Onboard support for SS7 MTP-2 (LSL/HSL), ATM, SAAL, ISDN, CAS, Frame Relay, HDLC, I-TDM, and more
- Complete Linux® Software Development Suite (iWARE) with firmware, host driver, API, tools, and samples
- Single-width, mid-size, or full-size, PICMG AMC.0 R2.0 compliant
- PCI Express (AMC.1) and Gigabit Ethernet (AMC.2) connectivity. Telecom clocks TCLKA/B/C/D support
- Freescale™ PowerQUICC III™ onboard processor at 833 MHz

For more information, contact: fastnet@iphase.com

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iSPAN® 3650

The iSPAN® 3650 AdvancedMC Quad OC 3/STM 1 interworking card is part of a new paradigm in communications processing subsystems. Based on the easy to program Wintegra™ WinPath2™ packet processor, which is purpose built for I/O processing tasks in network access environments, the iSPAN® 3650 offers an extensive set of protocols and multi-protocol interworking that reduce application development cycles and improve time to market.

The iSPAN® 3650 delivers unprecedented performance in IP traffic interworking between ATM AAL5 and Ethernet with its gateway on a card capability. Specialized functions include packet routing/classification, Layer 2 and Layer 3 traffic switching, VPN tag switching, and more.

FEATURES

- Four OC 3/STM 1 or one OC 12/STM 4 SFP interface
- High-Performance: 36,000 PVCs, 1 M/s AAL2 CPS packets, 50,000 Active CIDs, Full wire speed
- Multi-Protocol: AAL1, AAL2 and AAL5, ATM and PPP over SONET/SDH
- Carrier Grade Availability with APS support terminated on physically separate 3,650 cards
- Embedded MIPS 24K 450 MHz processor for onboard control processing
- Telecom clocks can be input and output on AdvancedMC CLK1 and CLK2

For more information, contact: fastnet@iphase.com

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PDSi Pinnacle Data Systems, Inc.

6600 Port Road, Suite 100 • Groveport, OH 43125
Tel: 614-748-1150 • Fax: 614-409-1269
www.pinnacle.com/products2/advancedmc/am2

PDSi Pinnacle Data Systems, Inc.

AMC-A2 PrAMC Board

PDSi's newest AMD Socket AM2 AMC Processor Module (AMC-A2) is a high-performance computing module for use in AdvancedTCA and MicroTCA systems. Designed around AMD Athlon™ processors, the AMC-A2 provides exceptional computing power in the convenient and versatile AdvancedMC (AMC) form factor.

OEMs in telecom, datacom, military, aerospace, and medical industries will appreciate this robust, modular, cost-effective computing platform alternative. With AMD 64 technology and rigorous, innovative design, the AMC-A2 processor AMC represents a new plateau in performance-per-watt. Long-term availability and high reliability are assured for embedded xTCA solutions. Contact PDSi for customization requirements.

For a customized application to your systems, please contact rob.ellis@pinnacle.com.

FEATURES

- High-performance hot swappable AdvancedMC processor module conforms to PICMG AMC.0 R2.0
- Supports AMD Athlon™ single- and dual-core processors with true multi-tasking for increased performance
- SOCDIMM socket supports DDR2 667 MHz ECC memory up to 2 GB
- Up to 8 GB optional onboard microDOC flash for local boot drive
- Front panel interfaces – 2x USB 2.0, 1x Serial. Pigeon Point module management
- Extended availability assured

For more information, contact: rob.ellis@pinnacle.com

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Technobox, Inc.
140 Mount Holly Bypass, Unit 1 • Lumberton, NJ 08048-1114
609-267-8988
www.technobox.com

4733

The Technobox 4733 is a PMC-to-PCI Express adapter that permits use of a PMC card in a 4X, 8X, or 16X PCI Express slot. Built around the 8114 bridge chip, the primary side of the bridge is fixed at 2.5 GHz per lane in each direction. The secondary (PCI/PCI-X) side operates at 33, 66, 100, or 133 MHz (either 64 or 32 bits). XCAP and M66EN signals are supported by DIP switch settings to force operation at non-X or lower PCI clock frequencies. Activity LEDs located at the edge of the board give an indication of key PCI and PCI Express signals and voltages. The DIN connector provides access to the 64-pin user I/O on the mezzanine card. JTAG signals are brought out to headers allowing users the option of connecting the JTAG ports.

FEATURES

- Adapts a PMC or PMC-X to a PCIe site
- PLX 8114 Bridge
- 4 lanes PCIe
- 2.5 Gbps per lane (each direction)
- Industrial temperature
- RoHS compliant

For more information, contact: info@technobox.com

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140 Mount Holly Bypass, Unit 1 • Lumberton, NJ 08048-1114
609-267-8988
www.technobox.com

5243

The Technobox 5243 allows use of a 32-bit PMC in a 1X, 4X, 8X, or 16X PCI Express slot. A single PCIe lane is supported and is composed of a 2.5 GHz transmit and a 2.5 GHz receive channel. Built around a PEX8111 transparent bridge, the primary side is fixed at 2.5 Gbps. The secondary side operates at 33 or 66 MHz and can be configured for 3 V or 5 V. The A and C rows of a 96-pin DIN connector connect with the 64-pin user I/O connector on the mezzanine card. A single status LED located at the edge of the board indicates working status for the PCIe lane. JTAG signals are brought out to headers.

FEATURES

- Adapts a PMC to a PCI Express site
- 1 lane PCI Express
- PLX 8111 Bridge
- Operational Status Indicator
- RoHS compliant

For more information, contact: info@technobox.com

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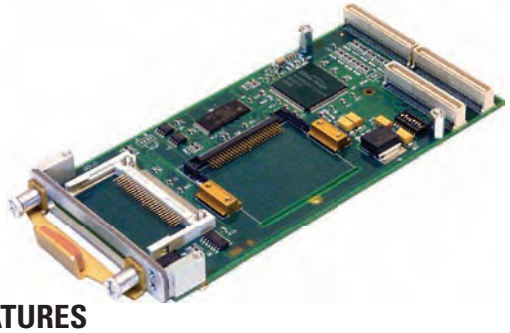
5264

Built around a Silicon Image PCI-680, the 5264 Front Panel CF Adapter provides an interface for two Type I or Type II CF devices. One device, connected to the primary IDE channel, is available out the front panel. A second device, connected to the secondary IDE channel, is mounted on the body of the adapter. Additionally, the secondary IDE channel of the adapter can interface other IDE/ATA devices via its rear I/O connector. The CF sites operate in true IDE mode and can be set to operate as either a master or a slave device via DIP switches. Two LEDs on the front panel provide activity status for the primary and secondary IDE channels.



FEATURES

- Supports 2 CF devices (Type I or II)
- Silicon Image PCI-680 controller
- Ultra133 on primary and secondary channels
- Front panel CF device on primary channel; onboard CF site on secondary; both with positive retention
- Supports DMA transfer to CF devices
- RoHS compliant

For more information, contact: info@technobox.com

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HLR/HSS

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Session Border Controller

31K G2
Quad AMC Carrier
ATCA Blade

36CA
Octeon Plus
Packet Accelerator

3639
Multiprotocol T1/E1/J1
Communications Controller

3650
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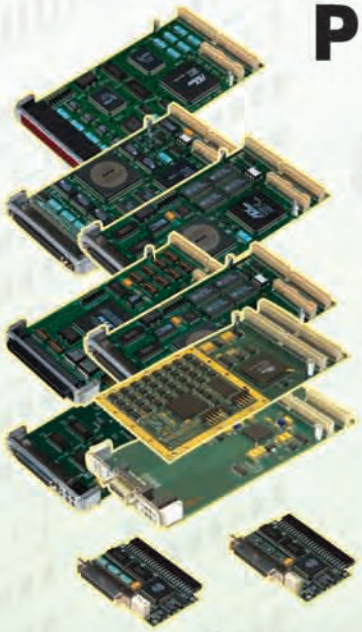
PCI-to-PMC

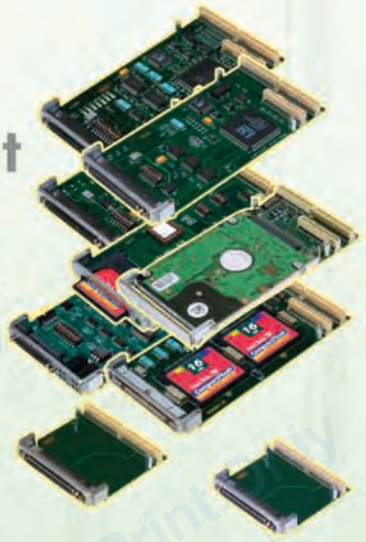


Serial

Ultra320

FPGA

Quad Ethernet



Adapters

SCSI

Async

SATA

Reconfigurable

RoHS

CardBus

IDE

Digital I/O

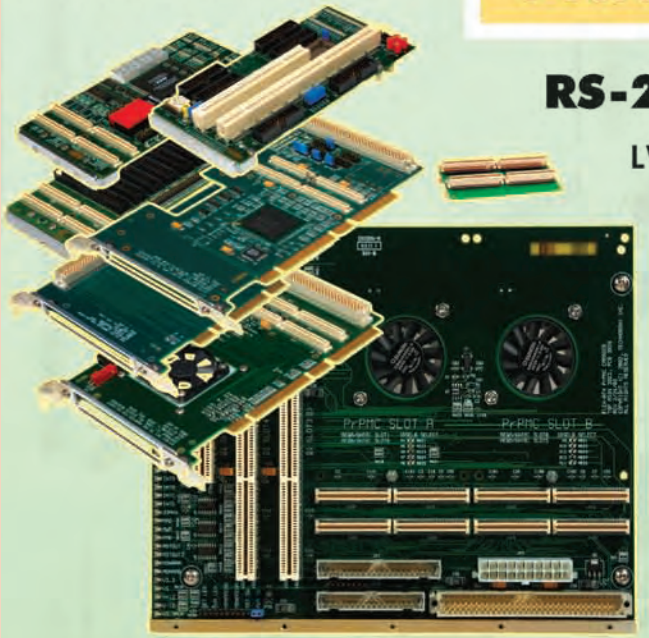
CompactFlash

Fast/Wide

PrPMC

SAS

PMC-to-PCI



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PIM

PMC-X

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Technobox produces **custom** and **off-the-shelf PMCs**. Our extensive range of solutions includes versatile FPGA-based digital I/O, async I/O, SATA, Ethernet, and IDE controllers. Plus a variety of **adapters, extenders, and tools** for PMC development or integration.

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AMCC PowerPC 405EX

The PowerPC 405EX combines the proven performance of the market leading PowerPC 405 processor with a high-performance suite of peripheral and memory interfaces, including PCI Express, USB 2.0 On-The-Go, DDR 2/1, and Gigabit Ethernet. The PowerPC 405EX also incorporates an advanced security engine, featuring header/trailer processing capability and support for the broadest range of security protocols, including IPSec, SSL, and DTLS. The PowerPC 405EX is ideally suited for next generation WLAN applications that require exceptional performance, small footprint, and low power.

The PowerPC 405 core has been optimized for system-on-chip designs requiring solid performance, low power, and a competitive price. Featuring separate instruction and data caches on chip, as well as a 5-stage pipeline architecture, the 405 boosts performance by performing most single cycle execution of most instructions, including loads and stores.

The AMCC PowerPC 405EX Features

- Security
- Ethernet Interface MACs
- DDR Memory Support
- USB 2.0 On-The-Go
- External Bus Controller (EBC)
- Development Tools Support
- PCI Express
- Dual Bus Architecture
- PowerPC Partners Ecosystem

For full details of the products and services available through the PowerPC Partners program, or to browse support available for a specific processor, visit AMCC at www.amcc.com/Embedded/Partners. AMCC also provides an evaluation kit for this PowerPC processor, including an optimized evaluation board, sample applications, and other software.

For more information, contact Gilles Garcia: ggarcia@amcc.com – 408-542-8600 OR please visit www.amcc.com/embedded.

FEATURES

- Superior Price/Performance for Cost Sensitive Wireless Access Applications
- Delivers 333 MHz to 667 MHz performance (506 to 1,014 DMIPs)
- Dual 1-lane PCI Express ports
- Supports up to 2 GB of DDR 2/1 DRAM
- High-performance Security Engine supports IPSec, SSL, DTLS, and SRTP (optional)
- USB 2.0 On-The-Go port
- 8/16/32-bit External Peripheral Bus Controller
- Two UARTs (UART0 with full hardware modem flow control)
- 32 General Purpose I/Os
- Low power dissipation, small form factor for high-density, power-conscious applications
- DMA Controller with four independent channels
- Two 10/100/1000 Ethernet MACs with MAL DMA support
- 8/16/32-bit External Peripheral Bus
- NAND flash controller
- Universal interrupt controller: 10 external interrupts
- JTAG and real-time trace support in processor core
- RoHS compliant (lead-free) version available

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AMCC PowerPC 460EX

With speeds of up to 1.2 GHz, support for floating-point operations, USB 2.0, PCI Express, SATA, Gigabit Ethernet, security, NAND flash interfaces, and low power dissipation, the PowerPC 460EX embedded processor is ideally suited to a wide range of high-performance applications, including imaging, industrial control, and networking.

The PowerPC 440 Core

To enhance overall throughput, the PowerPC 440 superscalar core incorporates a 7-stage pipeline and executes up to two instructions per cycle. Its large 32 KB data cache and 32 KB instruction cache are 64-way set-associative. Versatile configurations enhance performance tuning while optional parity protection preserves data integrity.

- High-Performance FPU
- Turbo Security (optional)
- High-Bandwidth Bus Architecture
- Extensive Memory Support
- On-Chip Memory
- PCI Express and PCI Interfaces
- Two Independent PCI Express Interfaces
- SATA
- Dual Ethernet With QoS and TCP/IP Acceleration Hardware
- USB Interface
- External Bus Interface
- Standard Peripherals
- PowerPC Partners Ecosystem

AMCC also provides an evaluation kit for this PowerPC processor, including an optimized evaluation board, sample applications, and other software.

For full details of the products and services available through the PowerPC Partners program, or to browse support available for a specific processor, visit AMCC at www.amcc.com/Embedded/Partners. For more information, contact Gilles Garcia: ggarcia@amcc.com – 408-542-8600 OR please visit www.amcc.com/embedded.

FEATURES

- Delivers 600 MHz to 1.2 GHz performance (CPU); Performance: 2.0 DMIPs/MHz (2,400 DMIPs at 1.2 GHz peak)
- 256 KB L2 cache with parity protection – also used as on-chip SRAM; 64 KB on-chip memory
- Two PCI Express interfaces; SATA controller; 10/100/1000 Mbps Ethernet support; Security (optional); NAND flash support
- Extensive connectivity by means of on-chip Ethernet, USB, UARTs, IIC, SPI, and PCI; Single/double-precision floating-point math applications
- One port SATA controller operating at up to 3.0 Gbps. Compliant with SATA II specifications; on-chip IPSec/SSL acceleration (optional)
- 5-stage FPU with 2.0 MFLOPS/MHz (SP/DP); hardware support for IEEE 754; single-precision and double-precision operation with thirty-two 64-bit floating-point registers
- (2) Ethernet 10/100/1000 Mbps, full duplex MACs with TCP/IP Acceleration Hardware, QoS, and Jumbo Frame, supporting GMII/MMTBI, RTBI, RGMII, SGMII, SMII interfaces. Memory Access Layer (MAL) provides DMA capability
- Up to 100 MHz, 27-bit address bus, 32-bit data bus External Bus Control (EBC) interface – Support for up to 6 ROM, RAM, or slave peripheral I/O devices
- One SPI serial interface

For more information, contact: ggarcia@amcc.com

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AMCC PowerPC 460GTx

With speeds of up to 1.4 GHz, the PowerPC 460GTx embedded processor offers a powerful mix of high-bandwidth, design flexibility, and robust features. With two PCI Express interfaces, an on-chip DDR2 SDRAM controller, network encryption engine, and a rich peripheral mix, the PowerPC 460GTx embedded processor is ideally suited for network and wireless infrastructure, and general purpose control plane applications.

The PowerPC 464 Core

The 464 core is an enhanced version of the 440 core. To enhance overall throughput, the PowerPC 464 superscalar core incorporates a 7-stage pipeline and executes up to two instructions per cycle. Its large 32 KB data cache and 32 KB instruction cache are 64-way set-associative. For additional system performance, the PowerPC 464 core includes dynamic branch prediction and 24 Digital Signal Processing (DSP) instructions, as well as non-blocking caches that can be managed in either write-through or write-back mode.

The AMCC PowerPC 460GTx Features

- High-Bandwidth Bus Architecture
- High-Performance Memory Support
- On-Chip Memory
- Gen 2 PCI Express Interfaces
- Ethernet Ports, TCP/IP Acceleration, and QoS
- Network Turbo Security (optional)
- External Bus Interface
- Standard Peripherals
- PowerPC Partners Ecosystem

For full details of the products and services available through the PowerPC Partners program, or to browse support available for a specific processor, visit AMCC at www.amcc.com/Embedded/Partners. AMCC also provides an evaluation kit for this PowerPC processor, including an optimized evaluation board, sample applications, and other software.

For more information, contact Gilles Garcia: ggarcia@amcc.com – 408-542-8600 OR please visit www.amcc.com/embedded.

FEATURES

- Delivers 800 MHz to 1.4 GHz performance for embedded I/O processor designs (2.0 DMIPs/MHz) (2,800 DMIPs at 1.4 GHz peak)
  - 32 K-I/32K-D L1 caches
  - 512 KB L2 cache, may also be used as on-chip SRAM
  - 32 KB on-chip SRAM
- High-speed Processor Local Bus (PLB) 2-way crossbar, supports 12.8 GBps peak bandwidth
  - 2nd High-Bandwidth (HB) bus 6.4G bandwidth
- Two Gen 2 PCI Express interfaces with four lanes configurable as two x4 or x1, or they can be combined as an 8-lane PCI Express; Compliant with PCI Express base specification 2.0; 5.0 Gbps full duplex per lane
- Network Turbo Security Engine with IPSec/SSL hardware acceleration – DES, 3DES, AES, ARC-4 encryption, MD-5, SHA-1, and SHA-2 (SHA-256, SHA-384, SHA-512) hashing
- Four 10/100/1000 full duplex Ethernet MACs
- On-chip network encryption engine
- High-bandwidth DMA engine; on-chip peripherals including UARTs, IIC, and NAND flash controller
- Offers low power dissipation and small form factor for high-density and power-conscious applications
- TCP/IP and iSCSI Acceleration Hardware support
  - True random number generator and a public key accelerator
- External Bus Control (EBC) interface (up to 100 MHz) with 29-bit address bus, 32-bit data bus supporting up to four ROM, RAM, EPROM, flash memory, or peripheral devices

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AMCC PowerPC 460GT Embedded Processor

With speeds of up to 1.2 GHz, support for Serial RapidIO, PCI Express, Gigabit Ethernet MACs, security, NAND flash interfaces, and low power dissipation, the PowerPC 460GT embedded processor is ideally suited to a wide range of high-performance applications, including networking and storage.

The PowerPC 440 Core

To enhance overall throughput, the PowerPC 440 superscalar core incorporates a 7-stage pipeline and executes up to two instructions per cycle. Its large 32 KB data cache and 32 KB instruction cache are 64-way set-associative. Versatile configurations enhance performance tuning while optional parity protection preserves data integrity. For additional system performance, the PowerPC 440 core includes dynamic branch prediction and 24 Multiply Accumulate instructions (MACs) that can be used for signal processing or other numerical tasks, as well as non-blocking caches that can be managed in either write-through or write-back mode.

- High-Performance Serial RapidIO (SRIO)
- Turbo Security (optional)
- High-Bandwidth Bus Architecture
- Extensive Memory Support
- On-Chip Memory
- PCI Express and PCI Interfaces
- Four Ethernet Ports, Including Two With QoS and TCP/IP Acceleration Hardware
- External Bus Interface
- Standard Peripherals
- PowerPC Partners Ecosystem

AMCC also provides an evaluation kit for this PowerPC processor, including an optimized evaluation board, sample applications, and other software.

For full details of the products and services available through the PowerPC Partners program, or to browse support available for a specific processor, visit AMCC at www.amcc.com/Embedded/Partners. For more information, contact Gilles Garcia: ggarcia@amcc.com – 408-542-8600 OR please visit www.amcc.com/embedded.

FEATURES

- Delivers 600 MHz to 1.2 GHz performance (CPU); Performance: 2.0 DMIPs/MHz (2,400 DMIPs at 51.2 GHz peak)
- 256 KB 12 cache with parity protection, may also be used as on-chip SRAM; DDR 1/2 memory support
  - Two PCI Express interfaces
- Single/double-precision floating-point unit for math-intensive applications
  - Serial RapidIO interface; Security (optional)
- Four GE MACs. Three with SGMII
  - NAND flash support
  - Extensive connectivity by means of on-chip Ethernet, UARTs, IC, SPI, and PCI
- Offers low power dissipation and small form factor for high-density and power-conscious applications
- Applications
  - Wireless
  - Wireless infrastructure
  - Enterprise network equipment
  - Control plane applications
- Turbo Security Engine: Optional on-chip IPSec/SSL-stage FPU – 2.0 MFLOPS/MHz (SP/DP); hardware for IEEE 754; single and double-precision operation – thirty-two 64-bit floating-point registers
- (4) Ethernet 10/100/1000 Mbps, full duplex MACs support for: IPv4 – IPv6 Internet protocols – Quality of Service (QoS) throughput
- Jumbo Frames GMII/MII, RGMII, SGMII, RMII, and Mu interfaces – CRC32 error detection and checking – TCP/IP and iSCSI Acceleration Hardware
- Support for JTAG board testing debuggers, and 4xx instruction trace interface; RoHS compliant (lead-free) version available
- NAND flash controller. Supports 1 to 4 banks of NAND flash memory devices; direct interfacing to discrete NAND flash devices and SmartMedia Card socket (22-pins); 4 Mb-256 Mb devices

For more information, contact: ggarcia@amcc.com

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AMCC PowerPC 460SX Embedded Processor

With speeds of up to 1.4 GHz, the PowerPC 460SX embedded processor offers a powerful mix of high-bandwidth design flexibility and robust features. With three PCI Express interfaces, an on-chip DDR2 SDRAM controller, I²0 messaging unit, RAID 5 and RAID 6 acceleration hardware, storage and network encryption engines, and a rich peripheral mix, the PowerPC 460SX embedded processor is ideally suited for RAID controllers, Storage Area Networking (SAN) equipment, iSCSI, NAS, and other embedded storage and networking applications.

The PowerPC 464 Core

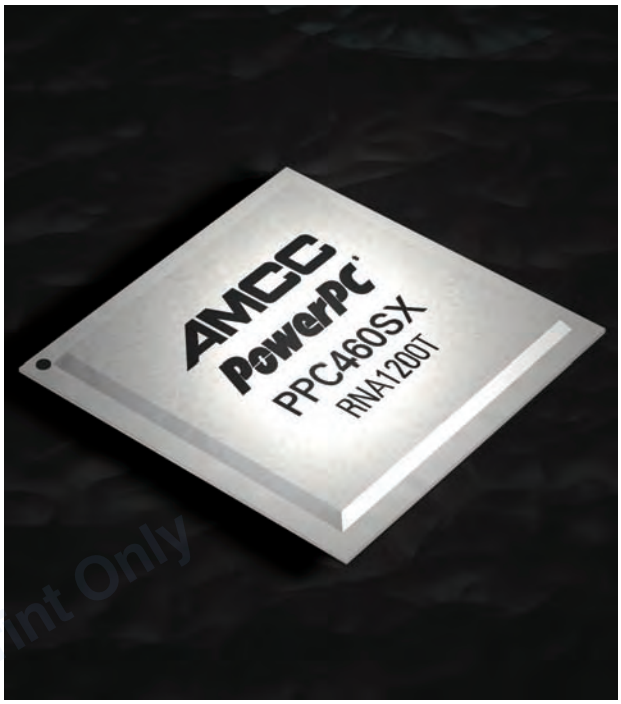
The 464 core is an enhanced version of the 440 core. To enhance overall throughput, the PowerPC 464 superscalar core incorporates a 7-stage pipeline and executes up to two instructions per cycle. Its large 32 KB data cache and 32 KB instruction cache are 64-way set-associative. For additional system performance, the core includes dynamic branch prediction and 24 Digital Signal Processing (DSP) instructions, as well as non-blocking caches that can be managed in either write-through or write-back mode.

- High-Bandwidth Bus Architecture
- High-Performance Memory Support
- On-Chip Memory
- Gen 2 PCI Express Interfaces
- RAID Hardware (optional) and I²0 Accelerate Storage Applications
- Ethernet Ports, TCP/IP Acceleration, and QoS
- Storage Security Engine (optional)
- Network Turbo Security (optional)
- External Bus Interface
- Standard Peripherals
- PowerPC Partners Ecosystem

For full details of the products and services available through the PowerPC Partners program, or to browse support available for a specific processor, visit www.amcc.com/Embedded/Partners.

AMCC also provides an evaluation kit for this PowerPC processor, including an optimized evaluation board as well as sample applications and other software.

For more information, please visit www.amcc.com/sales.
For more information, contact Gilles Garcia:
ggarcia@amcc.com – 408-542-8600 OR please visit
www.amcc.com/embedded.



FEATURES

- Delivers 800 MHz to 1.4 GHz performance for embedded I²0 processor designs; Performance: 2.0 DMIPs/MHz (2,800 DMIPs at 1.4 GHz peak)
- 32K-I/32K-D L1 caches and 512 KB L2 cache, may also be used as on-chip SRAM – 32 KB on-chip SRAM
- High-speed Processor Local Bus (PLB) with 2-way crossbar, supports 12.8 GBps peak bandwidth – 2nd high-bandwidth bus with 6.4 GBps bandwidth, accelerates RAID transactions
- RAID 5 and RAID 6 acceleration hardware for P and Q parity generation and check functions – TCP/IP and iSCSI Acceleration Hardware support
- On-chip storage and network encryption engines (optional)
- Three-channel DMA engine – Integrated I²O messaging
- On-chip peripherals including four 10/100/1000 Ethernet MACs, UARTs, IIC
- Three Gen 2 PCI Express interfaces, one with eight lanes configurable as x8, x4, x1, and two with four lanes configurable as two x4 or x1, or they can be combined as a second 8-lane PCI Express – Compliant with PCI Express base specification 2.0; 5.0 Gbps full duplex per lane; all ports
- (4) Ethernet 10/100/1000 Mbps full duplex MACs, with Quality of Service (QoS) support – IPv4 and IPv6 Internet protocols – Jumbo Frame
- Storage Security Engine (optional) Galois counter mode and XTS-AES, LRW-AES. SHA-1 and SHA-2 (SHA-224, SHA-256, SHA-384, SHA-512) hashing – Hash Message Authentication (HMAC)
- Network Turbo Security Engine with IPSec/SSL hardware acceleration (optional)

For more information, contact: ggarcia@amcc.com

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Intel Corporation
www.intel.com/go/embedded

Intel® Atom™ Processor Z5xx Series

The Intel® Atom™ processor Z5xx series delivers the benefits of Intel® architecture for small form factor, thermally constrained, and fanless embedded applications. Implemented in 45nm technology, these power-optimized processors provide robust performance-per-watt in an ultra-small 13 mm x 14 mm package. Intel's Hafnium-based 45nm Hi-k silicon process technology reduces power consumption, increases switching speed, and significantly increases transistor density over previous 65nm technology.

These single-core processors are validated with the low-power Intel® System Controller Hub US15W, which integrates a graphics memory controller hub and I/O controller hub into one small 22 mm x 22 mm package. The chipset includes the Intel® Graphics Media Accelerator 500 with advanced 3D graphics and extensive I/O capabilities such as USB 2.0, SDIO, and PCI Express®. It supports a 400/533 MHz CMOS FSB, dual independent display, and 1 GB maximum memory down in a single channel with one or two ranks.

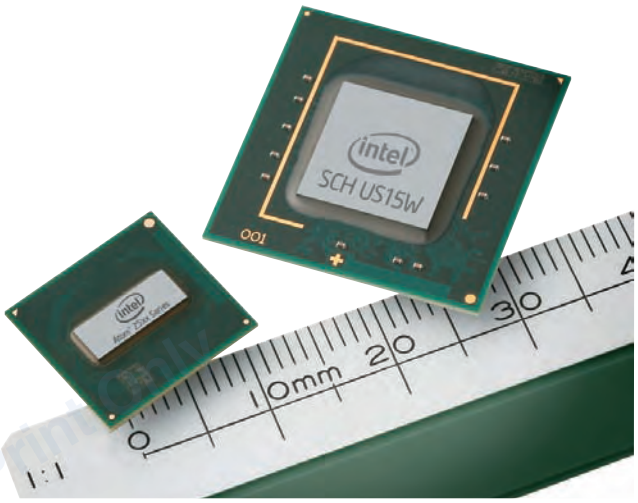
This new, two-chip platform has a combined TDP under 5 W and features embedded lifecycle support, making it ideal for many embedded market segments such as in-vehicle infotainment, medical, interactive client (kiosks, point-of-sale terminals), gaming, and industrial control. This platform provides more than 80 percent reduction in total footprint over the previous-generation three-chip solution (comparison platform: Intel® Celeron® M processor Ultra Low Voltage 423$^{\Delta}$ with Mobile Intel® 945GME Express chipset).

The processor is available in two options:

- Intel® Atom™ processor Z530$^{\Delta}$ at 1.6 GHz core speed, 2.2 W TDP and support for Hyper-Threading Technology^{+} (HT Technology)
- Intel® Atom™ processor Z510$^{\Delta}$ at 1.1 GHz core speed and 2.0 W TDP

$^{\Delta}$Intel® processor numbers are not a measure of performance. See www.intel.com/products/processor_number for details.

$^{+}$Please visit intel.com/go/embedded for details.



FEATURES

- Multiple micro-ops/instruction are combined into single micro-op and executed in single cycle for improved performance and power savings
- In-order execution core consumes less power than out-of-order execution
- HT Technology provides high performance/watt efficiency in an in-order pipeline for increased system responsiveness for multitasking
- One execution core is seen as two logical processors, and parallel threads are executed on a single core with shared resources
- New C6 state removes power from processor core and caches, resulting in less leakage than C4 state
- Split VTT rail removes power from ~90 percent of I/O, reducing C6 state leakage and achieving a significantly lower idle power
- Dynamic L2 cache sizing reduces leakage due to transistor sleep mode
- SSE3 instruction set enables software to accelerate data processing in specific areas, such as complex arithmetic and video decoding
- Enhanced Intel SpeedStep® Technology reduces average system power consumption
- Execute Disable Bit^{+} prevents certain classes of malicious "buffer overflow" attacks
- Intel® and a strong ecosystem of HW and SW vendors (intel.com/go/eca) support cost-effective development and help speed time-to-market
- Embedded lifecycle support protects system investment by enabling extended product availability for embedded customers

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Rethink cool.

Intel embedded processor/chipset with TDP of less than 5 watts*. Way cool.
For your fanless applications, design in Intel. Our new Intel® Atom™ processor, built from the ground up, delivers robust performance while keeping its cool. How? 45nm Hi-k next generation Intel® Core™ microarchitecture and Deep Power Down Technology. How cool is that? Go to **intel.com/go/rethink**

*The TDP specification should be used to design the processor thermal solution. TDP is not the maximum theoretical power the processor can generate.

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iSPAN® 55CA

The Interphase iSPAN® 55CA PCI-X™ 4 port Gigabit Ethernet Packet Processing solution is designed for use with PCI-X™ enabled rack-mount server platform solutions. The iSPAN® 55CA addresses the growing need for wire-speed IPSEC acceleration, policy management and routing, and deep packet inspection in the emerging 3G/4G, IMS, and Voice Over IP infrastructure application elements.

The iSPAN® 55CA is a PCI-X™ implementation of the Cavium Networks next generation 58xx multi-core Octeon Plus Processor family with optional RLDRAM for pattern matching.

FEATURES

- PCI-X™ card for rack-mount server form factor
- Cavium Networks high-performance Octeon Plus 58xx family of Processors with 4 to 16 cores at 750 MHz
- 4x Gigabit Ethernet interfaces on front panel
- Up to 4 GB of DDR memory
- High-bandwidth PCI-X™ host connectivity
- Available 6WINDGate™ software toolkit, a full-featured, ready to use, and customizable networking solution

For more information, contact: fastnet@iphase.com

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iSPAN® 5639

The iSPAN® 5639 PCI Express T1/E1/J1 communications controller from Interphase delivers a comprehensive high-capacity connectivity solution for use with PCI Express enabled rack-mount server solutions to deliver a wide range of Voice Over IP, Wireless, and IP Multimedia Subsystem (IMS) infrastructure application elements.

With four or eight T1/E1/J1 interfaces and a powerful onboard processor, the iSPAN® 5639 provides a high-capacity solution for signaling applications. With its high-performance PCI Express interface to the host, the iSPAN® 5639 also enables rapid exchange of payload information and is hence ideal for HMP media server applications.

FEATURES

- Four or eight individually software selectable T1/E1/J1 interfaces
- Onboard support for SS7 MTP-2 (LSL/HSL), ATM, SAAL, Frame Relay, HDLC, Host Media Interface, and more
- Complete Linux® Software Development Suite (iWARE) with firmware, host driver, API, tools, and samples
- High-bandwidth PCI Express host connectivity
- PCI Express Standard-height, Half-length form factor
- Freescale™ PowerQUICC III™ onboard processor at 833 MHz

For more information, contact: fastnet@iphase.com

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Zilog, Inc.
6800 Santa Teresa Blvd. • San Jose, CA 95119
408-513-1500
www.zilog.com

Classic Z8® MCUs

Targeted for high-volume applications, Zilog's flagship discrete Classic microcontroller family combines advanced 8-bit MCU capabilities, programming ease, and a competitive pricing structure. The Classic family is comprised of the following subfamilies – Z8 ROM/OTP, Z8 Low Voltage, Z8 ROMless, and Z8 GP Microcontrollers. Each subfamily features Zilog's easy-to-use register-to-register-based architecture, and comes in a wide range of memory sizes, voltage options, and extended temperature ranges to fit any embedded design requirement.

The Z8 ROM and OTP devices feature up to 32 GPIO, up to 64 KB of ROM, up to six vectored interrupts, two 8-bit timers, analog comparators, and various communication interfaces (UARTs, for example). The Z8 One-Time-Programmable (OTP) devices substitute OTP memory for ROM program memory, simplifying development for cost-conscious applications, and can be seamlessly transitioned to equivalent lower-cost ROM parts for mass production.

The Z8 Low Voltage devices can operate as low as 2 V, and feature up to 32 GPIO, up to 4 KB of ROM, up to two 8-bit timers, and available analog comparators.

The Z8 ROMless products feature up to 32 GPIO, up to six vectored interrupts, two 8-bit timers, analog comparators, and various communication interfaces (UARTs, for example).

The Classic family also features our Z8 GP (General-Purpose) series of devices, which offers up to 237 bytes of general-purpose RAM and up to 32 KB of OTP memory. The low-voltage Z8 GP series supports voltage ranges from 2.0 V to 3.6 V, making it perfect for low-power applications. The high-voltage series supports voltage ranges from 2.0 V to 5.5 V.

FEATURES

- Register-to-register architecture avoids accumulator bottlenecks and is more code efficient than RISC processors
- Low-EMI Operation-mode is programmable via software or as a mask option
- Relocatable stack, only limited in size by total RAM space
- Larger RAM spaces improve ease of code generation, cutting development time
- Full tool support with a range of cross assemblers, C-compilers, ICEBOX emulators, single and gang OTP/EPROM programmers, and software
- 8 MHz to 33 MHz optimized Z8® CPU core
- Flexible I/O – I/O byte, nibble, and/or bit programmable as inputs or outputs
- Analog inputs – three input pins are software programmable as digital or analog inputs
- Up to six vectored interrupt sources with software programmability
- Multiple timers on most devices, with flexible clocking and interrupt modes for simpler software solutions

For more information, contact: Zservice@zilog.com

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www.zilog.com

zilog®

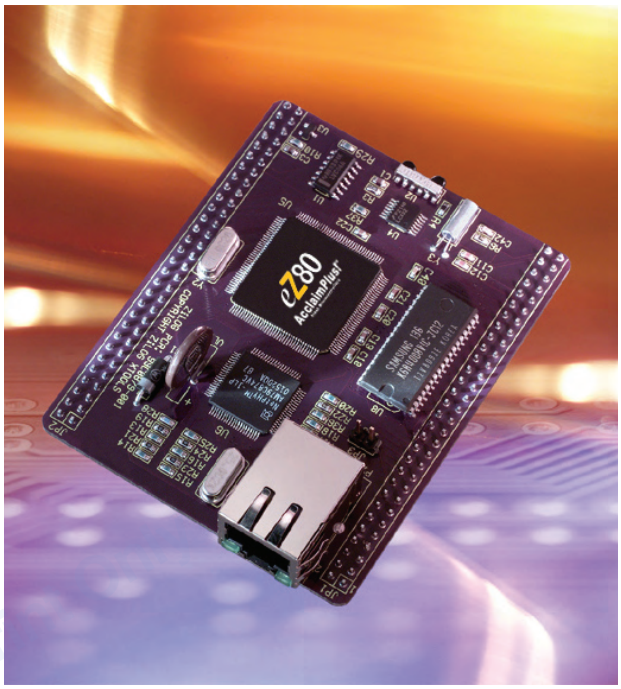
eZ80AcclaimPlus!®

The eZ80AcclaimPlus!® Ethernet Connectivity MCU is the latest in the award-winning eZ80Acclaim!® product family, which integrates a high-performance 50 MHz Flash MCU core with a fast 10/100BASE-T Ethernet MAC. Adding to the existing eZ80Acclaim!® feature set, the eZ80AcclaimPlus!® touts an updated embedded Internet software suite (ZTP) and an additional 10 percent system performance boost that equates to faster program execution and smaller memory space requirements over the current eZ80Acclaim!® family.

The eZ80AcclaimPlus!® Flash MCU can operate in full 24-bit mode addressing 16 MB linearly without a Memory Management Unit (MMU). Additionally, support for the Z80®-compatible mode allows Z80®/Z180 customers to execute legacy code within multiple 64 KB memory blocks with little modification. With an external bus supporting eZ80®, Z80®, Intel, and Motorola bus modes, designers have several options when interfacing to external devices.

These high-performance 8-bit Flash microcontrollers also offer a rich set of serial communication peripherals supporting legacy interfaces, and are equipped with an IrDA EnDec that facilitates wireless data transfer. The award-winning eZ80F91 represents the world's first 8-bit MCU with Flash and Ethernet integration.

The family also features a line of semi-customizable, Single Board Computers (SBCs) named Zdots®, offering an onboard PHY and rich peripherals that form a unique drop-in solution to any design. Combined with one of the strongest tool offerings in the market, supporting a FREE full-version ANSI C-Compiler, RTOS, and TCP/IP stack with every kit, the eZ80Acclaim!® Series is hard to beat when it comes to overall value and design flexibility.



FEATURES

- 10/100 Mbps Ethernet with MII interface to PHY devices
- Zdots® Single Board Computers (SBCs)
- Faster program execution and smaller memory space requirements over the current eZ80Acclaim!® family
- Complete Embedded Internet Software Suite with RTOS, flexible/configurable TCP/IP stack, and optional SSL
- Z80®/Z180 legacy upgrade path
- 50 MHz high-performance eZ80® CPU core
- 64-256 KB Flash memory/4-16 KB high-speed SRAM
- 24-bit addressing without an MMU
- 24-32 GPIOs, 2 UARTs, SPI, I²C, IrDA, WDT, RTC, and capture/compare/PWM
- JTAG, low-power PLL, and 32 KHz on-chip oscillator

For more information, contact: Zservice@zilog.com

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Zilog, Inc.
6800 Santa Teresa Blvd. • San Jose, CA 95119
408-513-1500
www.zilog.com

Z8 Encore!® MCUs

The Z8 Encore!® family of Flash microcontrollers is comprised of two main device series – the F0830 and F083A. Developed around the highly acclaimed eZ8® core, the devices feature key peripherals that are tied together to offer a complete solution with greater scalability, lower overall system cost, and reduced energy consumption.

Both the F0830 and F083A Series of devices share similar features, and offer a full line of products that are selectable by memory size, EEPROM, and ADC speed. The F083A, by contrast, extends the solution from the existing F0830 Series, and adds substantial cost-to-performance improvements for fan and motor control applications.

Common features available to both the F0830 and F083A devices include direct memory-to-memory arithmetic operation, a flexible Internal Precision Oscillator (IPO), and a best-in-class fast ADC. If your solution requires even more precision, the F083A takes all the performance and key peripheral features of the F0830, and adds to it a more optimized peripheral set specifically catered to applications that require faster response times. The F083A enhanced peripheral set enables critical motor control loop operations, for example, that accommodate for features such as current and temperature monitoring.

The entire family of Z8 Encore!® parts is supported by one of the most comprehensive tool offerings in the market. Each development kit provides all the necessary hardware and software tools, including a FREE full-version ANSI C-Compiler and software sample libraries.

FEATURES

- High-performance 20 MHz eZ8® CPU core
- Up to 12 KB of Flash/ROM
- Up to 256 KB of SRAM
- Up to 100 KB of EEPROM capability
- Single-pin, on-chip debugger
- Up to 8 channels, 10-bit SAR A/D converter
- Up to 256 B of register RAM
- Fast internal precision oscillator
- On-chip analog comparator
- Two 16-bit timers with PWM capability

For more information, contact: ZService@zilog.com

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zilog®

Z8 Encore! XP® MCUs

Hailed by design engineers as one of the most flexible architectures in the market today, Zilog has continued its tradition by eXPanding its current Z8 Encore!® 8-bit Microcontroller line with its Z8 Encore! XP® family of Flash Microcontrollers.

The Z8 Encore! XP® family provides a rich offering of Flash memory and a broad set of on-chip peripherals. Combined with Zilog's modified Harvard memory-to-memory-based architecture, and one of the strongest tool offerings in the market with a free full-version ANSI C-Compiler, product designers are now putting this unprecedented horsepower to use in all their embedded applications.

With up to 64 KB of Flash, and up to 4 KB of SRAM, the Z8 Encore! XP® MCUs provide some unique features not available in the first generation of Z8 Encore!® parts, including an on-chip analog temperature sensor, an analog comparator, and an analog transimpedance amplifier. Contributing to this highly integrated design is also an 8-channel, 10-bit A/D converter, a single-pin on-chip debugger, up to 18 interrupts, and up to 25 general-purpose I/O pins.

Recently added to the Z8 Encore! XP® family is Zilog's new Z8F1680 – an optimized 1.8 V, low-power Flash MCU. The F1680 Series ties together key peripherals to offer a perfect solution for those looking for a device that can accommodate such features as capacitive and resistive sensing, touch screen functionality, backlit control, panel control, and temperature compensation. Additionally, the F1680 Series incorporates a best-in-class feature set that is optimized for stepper motor/micro stepping control.

FEATURES

- 20 MHz eZ8® CPU core
- On-chip temperature sensor
- 1-64 KB of Flash memory with in-circuit programming
- High-resolution 10-bit Analog-to-Digital Converter (ADC)
- Single-pin, on-chip debugger
- Internal precision oscillator (5.53 MHz)
- Analog comparator
- UARTs, SPI, and I²C
- Transimpedance (current sense) amplifier
- Up to 128 B EEPROM capability

For more information, contact: Zservice@zilog.com

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gridconnect

PROFINET-IO

Convert a serial Modbus RTU/ASCII (RS-485 or RS-232) client into a PROFINET-IO device with the XPORT-PN-MB component.

Not much larger than a standard RJ-45 connector, this simple component can be added to existing boards and can convert an existing Modbus RTU/ASCII serial TTL port to a PROFINET-IO Ethernet port. Using Ethernet technology, every node has the ability to read/write data to each other using PROFINET-IO, thus eliminating the limitations of a serial network.

The XPORT-PN-MB is also available as a finished product as the NET232-PN-MB or NET485-PN-MB.

FEATURES

- Integrated into intelligent RJ-45 connector
- 10BASE-T/100BASE-TX compliant and RoHS compliant
- Auto-Sensing and Ethernet Activity and Status LEDs
- Wide temperature range: -40 °C to +85 °C
- +3.3 V Operation
- Customization and OEM versions available

For more information, contact: sales@gridconnect.com

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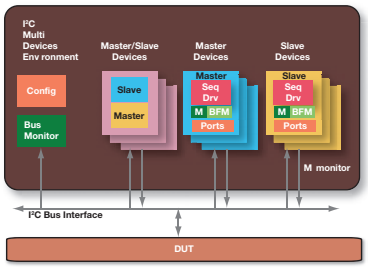
HDL Design House

Makenzijeva 79/III • Belgrade, 11000 Serbia and Montenegro
+381 (0)11 344 2359
www.hdl-dh.com

SoCVerify Kit

SoCVerify Kit is a library of HDL Design House Verification IP (VIP) with unified organization, implementation, and supported verification methodologies. SoCVerify Kit is a single verification IP solution for SoC projects that allows verification managers to select necessary VIP from one vendor, assuring that unified and advanced verification methodologies are used in all segments of SoC projects. HDL DH SoCVerify Kit provides verification engineers and managers with a broad portfolio of VIP, allowing easy verification of today's SoC. With large investments in development, verification, maintenance, and support for this library, HDL DH provides its customers with complete verification IP solutions and design and verification services for SoC projects.

hdl Design House
SoC Design and Verification Company



FEATURES

- I²C VIP – used to verify I²C designs based on I²C spec. version 2.1 – supports master, slave, master/slave
- RapidIO VIP – verifies RapidIO designs based on spec. version 1.3 – supports initiator, target, initiator/target
- HyperTransport VIP – verifies HT designs based on spec 1.1 – supports tunnel, cave, bridge, switch, host bridge
- PCI/PCI-X VIP – verifies PCI/PCI-X designs based on spec 2.0a/2.2 – supports initiator, slave, arbiter
- ATA/ATAPI-8 VIP – verifies ATA/ATAPI-8 design – supports host, device, PIO, multiword/ultra DMA, packet cmd
- SATA VIP – verifies SATA designs based on 1.0a/1.1 – supports host, device, port multiplier, port selector

For more information, contact: info@hdl-dh.com

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Imagination Technologies

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IP Cores for SoCs

Imagination Technologies' multimedia and communications semiconductor Intellectual Property (IP) cores are at the heart of today's most innovative and exciting consumer electronics products. Licensed by leading semiconductor manufacturers for use in highly complex System-on-Chip (SoC) devices, Imagination's IP features many advanced, patented design features.

Imagination's three key technology families – POWERVR, META, and ENSIGMA – are extremely flexible, customizable, multi-standard, and low power, enabling them to address many markets, such as digital radio and audio, mobile phone, Personal Media Player (PMP), car navigation and Personal Navigation Device (PND), Mobile Internet Device (MID), Ultra-Mobile PC (UMPC), digital TV and Set-Top Box (STB), and mobile TV.

Imagination
TECHNOLOGIES

FEATURES

- POWERVR SGX – Advanced, scalable, programmable shader based graphics; POWERVR MBX – the *de facto* for mobile 3D
- POWERVR Video – Massively multi-standard solutions for graphics up to HD resolution with multi-stream support
- POWERVR Display – Image enhancement technologies including I2P with gradient compensation and PDP range
- META MTX, ATP, and HTP versions offer multi-threaded RISC and DSP processing with high latency tolerance for SoCs
- ENSIGMA UCCP – Low-power, multi-standard demodulation platforms for digital TV, mobile TV, and digital radio
- IMGworks System-on-Chip (SoC) design services and support and CODESCAPE development tools plus IDE to support IP

For more information, contact: info@imgtec.com

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PCI Express

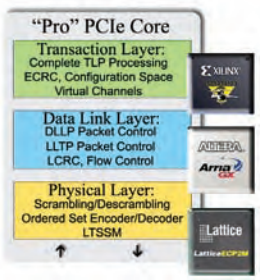
Need PCI Express Solutions?
Get Touit!

Touit's Standard PCI Express (PCIe) core handles all details of PCI Express layer implementation with user access to the entire Transaction Layer Packet (TLP), and it uses fewer than half the LUTs and registers needed for other cores.

For general applications, add on Touit's Pro Core processing layer with its parallel bus interface to manage TLP details and configure DMA channels.

For more demanding applications, Touit can custom-design the interface to fit your needs, or provide tech/engineer support for those designing their own interfaces.

Whichever route you choose, the best way to get the project done is to Get Touit.



FEATURES

- Low resource utilization
- Low packet receive and transmit latency
- Easy parallel interface
- Multiple DMA channels
- Supports all PCI Express features

For more information, contact: info@touit.com

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Advanced IP

As the semiconductor industry's trusted IP partner, Virage Logic provides a broad portfolio of silicon proven IP targeted at the world's leading foundry processes from 250 nm to 40 nm. Virage Logic's Silicon Aware IP™ (embedded memories, logic libraries, I/O) includes silicon behavior knowledge for increased predictability and manufacturability. The company also offers high performance and high efficiency DDR memory controller interface solutions. Virage Logic's highly differentiated product portfolio provides higher performance, lower power, higher density, and optimal yield to foundries, IDMs, and fabless customers developing products for consumer, communications and networking, handheld and portable, computer and graphics, automotive, and defense markets.

VIRAGE LOGIC

Accelerating Silicon Success

FEATURES

- Embedded SRAM
- Embedded NVM
- DDR memory controllers
- Logic libraries
- I/O
- Silicon Aware IP™ and System Aware IP™

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www.lynuxworks.com

LynxOS RTOS Family

Embedded operating systems for the most demanding real-time and embedded applications.

LynxOS – POSIX and Linux compatible hard real-time operating system.

LynxOS-178 – Safety certified DO-178 operating system. Unique FAA Reusable Software Component (RSC) certification.

LynxSecure – MILS separation kernel uses Intel VT technology to run multiple guest OSs in separate virtual partitions. Supports Linux and LynxOS APIs. Certifiable to EAL Level 7.

FEATURES

- Optimal security and safety – the only operating system family to support CC EAL 7 and DO-178B Level A
- Virtualization technology – supports multiple heterogeneous OS environments on the same hardware
- Complete Eclipse-based Luminosity product suite gives a consistent IDE across all LynxOS products
- Hard real-time performance for all POSIX and Linux applications
- Support for open standards – supports 100% binary compatibility for Linux or POSIX-based software application

For more information, contact: inside@lnxw.com

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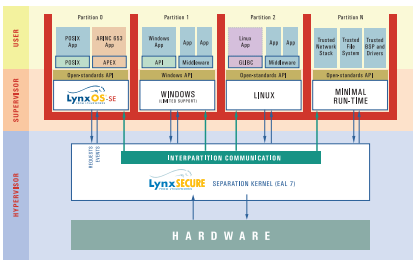
LynxSecure

The LynxSecure separation kernel meets the needs for the highest level of embedded software security. LynxSecure uses the space and time partitioning features of the LynxOS-178 safety-critical RTOS to provide the foundation for building highly secure systems utilizing the Multiple Independent Levels of Security (MILS) architecture and is designed for certification to Common Criteria EAL 7 as well as DO-178B Level A. LynxSecure supports software reuse by enabling BlueCat Linux and LynxOS-178 to run in user mode within LynxSecure partitions. LynxSecure provides a scalable solution from embedded systems to workstations and servers for applications in embedded avionics products, weapons systems, and C4ISR data systems, as well as critical infrastructure control systems.



FEATURES

- Optimal security and safety – the only operating system to support CC EAL 7 and DO-178B Level A
- Real-time – time-space partitioned RTOS for superior determinism and performance
- Virtualization technology – multiple heterogeneous OS environments on the same physical HW, including Intel® VT
- Highly scalable – supports Symmetric MultiProcessing (SMP) and 64-bit addressing for high-end scalability
- Open standards – Linux and POSIX application compatibility for migration to highly robust, secure environments
- Faster time to market – enables developers to begin early development for secure applications

For more information, contact: inside@lnxw.com

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- Integrated Timing and Triggering via GPS-disciplined Clock

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- PCI Express I/O Sites Deliver >800 MB/s to System Memory
- On-board USB 2.0 (x6), Gigabit Ethernet, SATA (x4), VGA, AC '97 Audio
- Supports X5/X3 XMC I/O Module Features (Private Data Channels, Triggering, Timing)

Compatible XMC Modules from Innovative Integration

X5-400M - 400 MSPS 14-bit A/D (x2) • 500 MSPS 16-bit D/A (x2) • 1GB DDR2 DRAM
X5-210M - 210 MSPS 14-bit A/D (x4) • 512MB DDR2 DRAM
X5-GSPS - 1.5 GSPS 8-bit A/Ds (x2) • 512 MB Memory
X3-10M - 25 MSPS 16-bit A/D (simultaneously sampling x8)
X3-25M - 130 MSPS 16-bit A/D (x2) • 50 MSPS 16-bit D/A (x2)
X3-A4D4 - 4 MSPS 16-bit A/D (x4) • 50 MSPS 16-bit D/A (x4)
X3-DIO - 64-bit 66MHz LVDS
X3-SD - 216 KHz, 24-bit Analog Input (x16)
X3-SDF - 24-bit, Fast Sigma-Delta A/D >110 dB (x4)
X3-Servo - 250 KSPS A/Ds (x12) • 2MSPS DACs (x12)

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5359 FabricPac SM

The FabricPac SM is a CompactPCI 2.16 compliant Switch Fabric Platform that contains redundant IPMI System Management Cards, along with dual AC or DC input 600 W or 400 W PICMG 2.11 power supplies. This platform provides the system integrator with the flexibility of designing a system, using both legacy bus based and next generation fabric base boards.

At the heart of the system are two PICMG 2.9 IPMI compliant System Managers in an over/under slot configuration. The IPMI System Managers are integrated into the chassis' electronics, providing an environment that is fully system managed and includes the cooling unit, system temperature, power supplies, fabric switches, and boards.

FabricPac SM contains a PICMG 2.16 Switch Fabric Backplane that delivers a maximum data throughput of over 40 Gbps. To ensure forward and backward compatibility the backplane contains 10 2.16 fabric node slots (eight slots contain the 64-bit/33 MHz PCI bus) and two switch slots.

The FabricPac SM chassis has been designed to meet the requirements of NEBS Level 3, FCC-B, CE and UL, as well as being completely RoHS compliant. The chassis comes standard with front and rear panel mounted ESD jacks along with a pair of recessed rack adapters that set the entire rack back 2" to create a cable management area for the cables that are connected to the front of the CompactPCI cards.

FabricPac SM cooling system features an evacuation cooling design that is supported by a front removable fan tray, which contains three high-powered fans that are speed-controlled and monitored by the IPMI System Manager. Airflow is front intake with rear exhaust with an average of 400 LFM per slot to all node, switch, and power supply slots.

Versatile. Reliable. Carlo Gavazzi's 5359 FabricPac SM Series CompactPCI Enclosures are designed to meet the needs of embedded, telecommunications, development, testing, military, and measurement.

FEATURES

- Redundant IPMI System Manager
- CompactPCI 2.16 fabric backplane with two fabric switch slots and legacy 64-bit/33 MHz bus
- RoHS and NEBS Level 3 compliant
- Hot swap 400 W or 600 W power supply
- Front replaceable speed-controlled and monitored fan tray
- 19" or 23" rackmountable
- 15.75" (9U) high x 12" deep enclosure

For more information, contact: pr@cg-cs.com

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IOxOS Technologies SA
4 Chemin de Fontenailles, Gland 1196, Switzerland
+41-22-364-7690
www.ioxos.ch

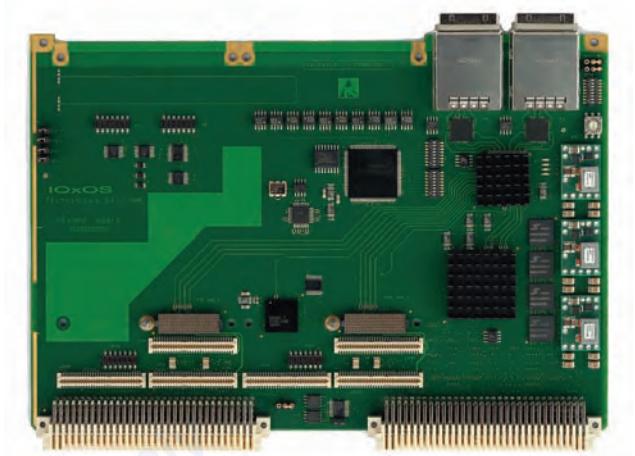
PEV1100

The first PCI Express to VME64x Transparent Interface

The PEV1100 has been designed with the aim of upgrading existing data acquisition and control systems without throwing away your valuable I/O boards. Remove the computing power from the VME crate and benefit from cheap and high performance hardware developed for telecommunication and server markets. With the PEV1100, I/O resources are physically separated from the computing element but still belong to its addressing domain, just by using a PCI Express external cabling connection. The PEV1100 not only offers transparent access to the VME bus, but additionally features 2 PMC/XMC slots, a shared memory, and a 4 channel DMA controller capable of moving data between the computing unit and its local resources (VME, PCI, PCI Express, shared memory).

The PEV1100 is targeted as a key element of VME64x data acquisition and control systems where high performance and computing power are major challenges: High energy physics equipment and particle accelerator control, aerospace integration test benches and flight simulators, as well as medical imaging systems.

Basically the PEV1100 allows a local host to access in a transparent way I/O resources hosted in a VME crate by extending its PCI Express Bus infrastructure over medium distances (up to 7 meters). The connection between hosts and PEV1100 interfaces is built on the latest PCI-SIG "PCI Express External Cabling Specification 1.0," defined to support PCI Express from x1 up to x16 lanes. The connectors and the cables are fully specified and widely available on the market. Optical adapters are available to provide connection distances up to 100 m. A second connection port allows chaining of multiple crates. In order to perform nonintrusive monitoring this port can be configured in nontransparent mode to connect another host acting as "system supervisor." To fully achieve the goal of replacing existing Single Board Computers embedded in VME crates, the PEV1100 hosts two PMC/XMC slots, a large shared memory, and a DMA controller; a high performance FPGA has been used to direct interface these resources, and a User Area is available to implement specific applications.



FEATURES

- General – 6U single-slot; PCI Express External Cabling Rev 1.0; Connection bandwidth at 10 Gbps; VME64x Master/Slave with slot 1
- Multi-chassis capability 2 PMC/XMC slots; Shared Memory; Power dissipation < 12 W
- PCI Express switch – 6 ports x4 lanes; nontransparent bridging; Hot Plug; Nonblocking; Support for DualCast 4x with 2eSST; Resource mapping through scatter/gather; Slave access to Shared Memory
- VME – Three or five rows (support for legacy crates); VME64x with 2eSST; Resource mapping through scatter/gather; Slave access to Shared Memory
- Shared Memory – Up to 1 GB High bandwidth; Low latency; Doorbells and semaphores
- PMC/XMC
  - Two IEEE 1386.1 slots; PCI 3.0 32-bit at 33/66 MHz; Connection to VME P2
- DMA controller
  - Four channels with chaining; Any source/destination
  - VME/PCI Express Shared Memory
- Software – Support for Linux and Windows; IOxOS Device Driver for: VME transparent accesses, Interrupt handling, DMA control
- Environmental and Regulatory Compliance; Commercial operating temperature (0 °C to +55 °C) with forced-air cooling
- Extended operating temperature (-40 °C to +85 °C)
- Relative Humidity 5% to 90% noncondensing
- Immunity EN50082-2/EN55024
- PEV1100 VME64x 6U Board
- PEV1101 PCI Express host adapter card
- PC1110L PCI Express x4 External Cable
- PO1102 Optical SFP PCI Express x1 adapter (optional)

For more information, contact: info@ioxos.ch

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USB/104 Series

Choose from a broad range of USB-based analog, digital, and serial I/O modules. What makes our USB/104 form factor unique is that its PCB size and mounting holes match the PC/104 form factor (without the bus connections). This allows our rugged line of boards to be added to any PC/104-based stack simply by connecting it to a USB port usually included on-board the variety of available embedded CPUs. Our USB/104 boards can also be added into many pre-existing non PC/104-based embedded systems and enclosures by using the board's pre-drilled mounting holes that allow for installation using standoffs. Also available are desktop versions that include a rugged steel enclosure and screw terminal board, a DIN-rail mounting provision, and extended temperature options.

FEATURES

- USB/104 Data Acquisition Series – the ideal choice for a variety of embedded OEM designers
- Choose from a broad range of USB-based analog, digital, relay, and serial I/O modules
- Available in OEM (board only) or enclosed in a small, rugged steel enclosure
- PC/104 module size and mounting compatibility, extended temperature options available
- DIN-rail mounting for industrial environments
- Integrates easily via any available USB port

For more information, contact: contactus@accesio.com

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Trusted ePlatform Services

3.5" SBC

The PCM-9388, a 3.5" SBC based on the Intel® Celeron® M processor, is a fanless general purpose platform for embedded applications where performance and long product lifetime support are more important than leading edge technology. Legacy support is provided by the 16-bit ISA PC/104 interface for add-on functionality or upgrades to existing factory automation and industrial equipment. Dual independent displays make the PCM-9388 ideal for Point-Of-Sale, digital signage, and medical applications, or as an ideal upgrade path that extends legacy investment for existing applications.

FEATURES

- Supports Intel® Celeron® M processor
- High performance with legacy PC/104 support platform
- Fanless support with low profile heat sink
- Supports DDR memory
- Full LCD support for 18-bit TTL/2-channel LVDS support up to 48-bit (optional)
- Dual independent display by CRT plus LVDS/CRT plus TTL

For more information, contact: ECGInfo@advantech.com

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Trusted ePlatform Services

ADVANTECH

COM Express

The COM Express SOM-5775 is designed with the Intel® Atom™ processor Z500 series. All the benefits of the Atom platform in the "Micro" form factor can perform the same functions as traditional COM Express modules but with a smaller board size of only 95 mm x 95 mm. The SOM-5775 module and development board will enable embedded developers to create mobile and portable applications. While the Intel Atom Z500 series processor is only a fraction of the size, the thermal design and 45 nm manufacturing process use 10x less power (under 10 W total) yet still provide great performance. The SOM-5775 supports DDR2 memory up to 1 GB, 10/100 Mbps Ethernet, 8 USB 2.0 ports, and a PCI Express interface, and the integrated graphic engine supports CRT and 24-bit LCD display modes. The target OS platform will be Windows XP Embedded and Vista.

FEATURES

- Embedded Intel® Atom™ processor Z510/Z530; Intel® SCH US15W chipset
- Intel 82551QM 10/100 Mbps Ethernet chip
- Supports DDR2 DRAM, PCI Express, 8x host USB 2.0 ports, 1x channel LVDS
- 10x less power (under 10 W total); longer battery life
- 1/7 chip size; smaller applications and devices
- Compatible with existing COM Express boards

For more information, contact: ECGInfo@advantech.com

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ADVANTECH

Mini-ITX

The Mini-ITX AIMB-240 is a highly integrated solution featuring high computing power at up to 2.8 GHz and extensive connectivity with up to six COM ports. The AIMB-240 also provides dual display and multi-panel support. Compliant with RoHS regulations, the AIMB-240 is the ultimate integrated platform when space, I/O connectivity, and superior networking performance are major concerns.

FEATURES

- Supports 90 nm Intel® µFC-PGA 478 Pentium® 4/Celeron® CPU
- Intel 82852GME chipset
- One DIMM socket supports up to 1 GB DDR 266/333 SDRAM
- 2-channel LVDS, DVI; 5.1-channel audio, TV-out
- Dual Realtek™ RTL8100C 10/100 Mbps LAN
- One PCI, one miniPCI, Type I/II CF; six COM, six USB 2.0, 8-bit GPIO

For more information, contact: ECGInfo@advantech.com

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ADVANTECH

PC/104-*Plus*

The PCM-4153 is a fanless, best-cost, performance PC/104-*Plus* Single Board Computer geared to satisfy the needs of a variety of industrial computing equipment. The PCM-4153 is ideal for communication, gaming, and medical applications that require flat panel support using digital displays with TTL interfaces and two Ethernet ports. For those who want superior performance for various low-power embedded applications, the PCM-4153 uses an AMD LX800 processor clocked at 500 MHz, in conjunction with onboard DDR333 system memory. PCM-4153 offers convenient connector layout, easy assembly, and multiple I/O, and includes two 10/100 Mbps Ethernet, four USB 2.0, and four serial ports for easy system expandability.

FEATURES

- Phoebus design, -40 °C ~ +85 °C
- AMD low-power LX800 500 MHz processor
- Supports DDR memory and a 24-bit TFT LCD interface
- Supports dual 100BASE-T Fast Ethernet
- Supports four USB 2.0 and four COM ports
- PC/104 and PC/104-*Plus* expansion interface

For more information, contact: ECGInfo@advantech.com

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510-403-3399
www.portwell.com

Portwell

PEB-2736

The PEB-2736, an embedded system board utilizing the Intel ECX form factor, is based on the Intel Atom processor Z500 series and the Intel System Controller Hub US15W. The new micro-architecture of the Intel platform benefits a range of low-power systems and handheld mobile devices in applications such as Portable POS, Medical Healthcare, Mobile Kiosk, Digital Signage, and In-Vehicle Infotainment. The PEB-2736 is specifically designed to operate at a very low power consumption of less than 10 watts at full loading. It supports dual display by LVDS and SDVO connector. The modular SDVO and SDIO board architecture can be easily customized to meet the customer's time to market and proprietary requirements.

intel inside

FEATURES

- Intel Atom processor Z500 series and the Intel System Controller Hub US15W
- One 200-pin SODIMM supports DDR2 SDRAM up to 1 GB
- One Type II CompactFlash and one IDE connector
- Dual independent display: SDVO and 24-bit LVDS; Multi-stream audio and CH5.1 supported
- Trusted Platform Module (TPM) and USB-Disk Module (UDM) could be added onboard
- Wireless application can be accomplished via mini-card socket on optional daughter card

For more information, contact: info@portwell.com

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Annapolis Micro Systems
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410-841-2514
www.annapmicro.com

2.0 GSps 10bit 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.

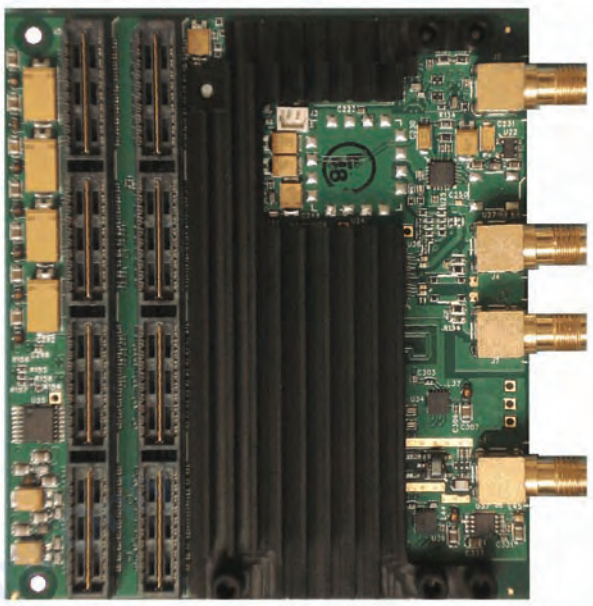
In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine board supplies user-configurable real-time continuous sustained processing of the full data stream. Up to two A/D and up to two Serial I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS or IBM Blade main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

For more information, contact: wfinfo@annapmicro.com

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Clock Synchronization Board

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

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

The four control trigger outputs can originate from a high-precision external source via front panel SMA, from a manual 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, 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 support.

FEATURES

- Four synchronized differential front panel clock outputs up to 3 GHz with typical skew of 5 ps
- Ultra-low clock jitter and phase noise – 275 fs with 1,280 MHz PLL and external 10 MHz reference
- Onboard PLL's manufacturing options provide fixed frequencies of 700 MHz-3 GHz, locked to internal or external reference
- Onboard low frequency oscillator provides fixed frequencies up to approximately 800 MHz
- Four synchronized trigger outputs, always synchronized with the output clock, with typical skew of 5 ps
- Jumper selectable trigger output levels of 3.3 V PECL, 2.5 V PECL, or 1.65 V PECL
- Source trigger from front panel SMA, 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

For more information, contact: wfinfo@annapmicro.com

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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 three Nyquist zones, ultra-low skew and jitter saw based clock distributions, and main board PCLK sourcing capability.

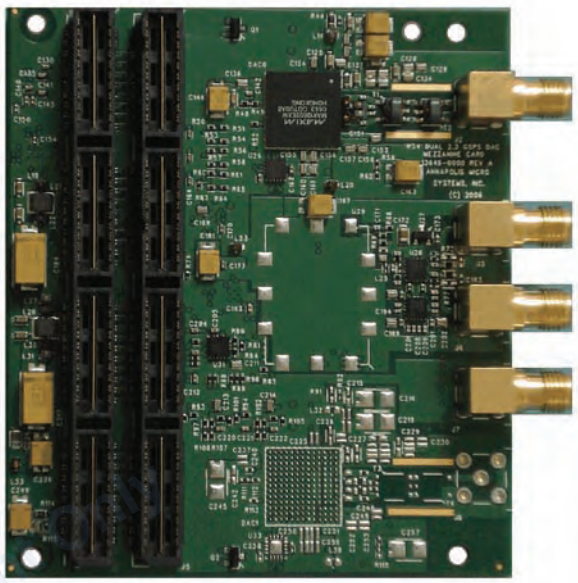
In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine board supplies user-configurable real-time A to D conversion and digital output. Up to two A/D or D/A and up to two Serial I/O cards can reside on each WILDSTAR 4 or WILDSTAR 5 VME/VXS or IBM Blade main board, or 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, Max 19692 for 2.3, 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

For more information, contact: wfinfo@annapmicro.com

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Quad 250/400/500 A/D

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

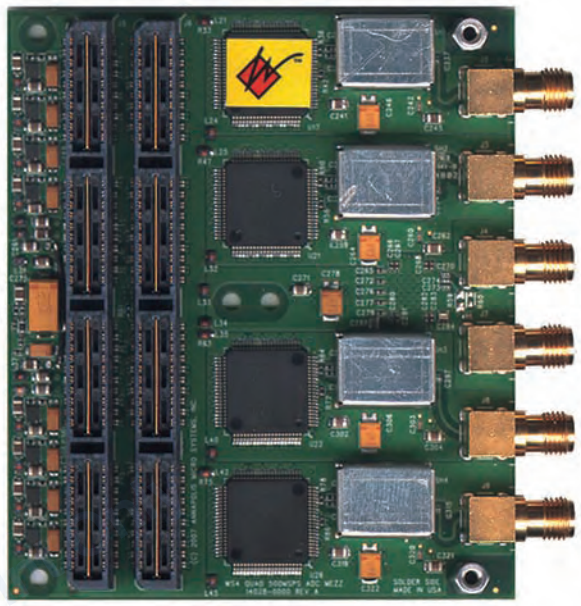
There is an onboard ultra-low jitter and skew clock distribution circuit to allow all four channels on a single A/D I/O board to be synchronized together. There is also an external clock input and a trigger input allowing multiple A/D I/O cards to be synchronized together. Synchronization of A/D I/O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

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

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.

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.



FEATURES

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

For more information, contact: wfinfo@annapmicro.com

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190 Admiral Cochrane Drive #130 • Annapolis, MD 21401
410-841-2514
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SFPDP UNI6 I/O

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

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

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

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

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

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

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

Annapolis Micro Systems, Inc. is a world leader in high-performance COTS FPGA-based 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

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

For more information, contact: wfinfo@annapmicro.com

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Tri XFP I/O Card

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.

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

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

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

The Tri XFP is the first of many I/O cards Annapolis will be releasing for its new WILDSTAR 4/5 Architecture Family, which uses Xilinx Virtex-4 and Virtex-5 FPGAs for processing elements. WILDSTAR 4 is the 10th generation of Xilinx FPGA processing-based COTS boards from Annapolis.

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

FEATURES

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

For more information, contact: wfinfo@annapmicro.com

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WILDSTAR 4 VXS

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 tenth-generation WILDSTAR 4 for VME64x/VXS uses Xilinx's newest Virtex-4 FPGAs for state-of-the-art performance. It accepts one or two I/O mezzanine cards in one VME64x or VXS slot, including 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 3 Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OS 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on Windows, Linux, Solaris, IRIX, ALTIX, VxWorks, and others. 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. With a graphical user interface for design entry, hardware-in-the-loop debugging, and proven, reusable, high-performance IP modules, WILDSTAR 4 for VME64x/VXS, with its 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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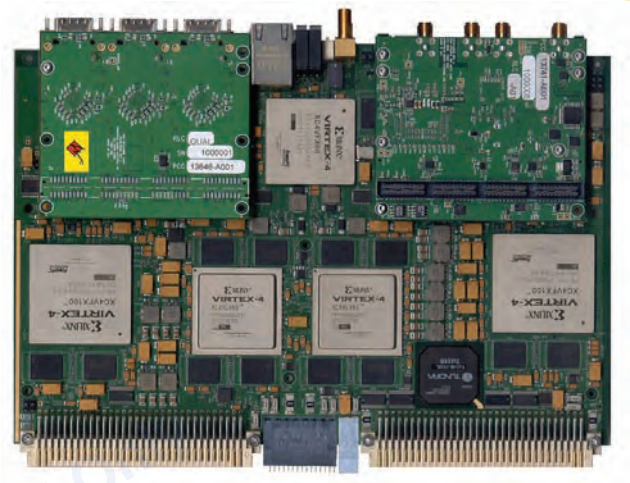

FEATURES

- Four Virtex-4 FPGA processing elements – two XC4VFX100 or XC4VFX140, and two XC4VSX55 or XC4VLX40, LX80, LX100 or LX160
- Up to 6 GB DDR2 DRAM in 12 banks or up to 2 GB DDR2 DRAM and up to 64 MB DDRII or QDRII SRAM
- Available for either VME64x or VXS backplanes
- High-speed DMA multichannel PCI 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/Integrated heatsink for cooling and stiffness
- Proactive thermal management system – board level current measurement and FPGA temperature monitor, accessible through Host API
- Save time and effort. Reduce risk with COTS boards and software
- Achieve world-class performance; WILD solutions outperform the competition
- Includes one-year hardware warranty, software updates, and customer support; training available

For more information, contact: wfinfo@annapmicro.com

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190 Admiral Cochrane Drive #130 • Annapolis, MD 21401
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WILDSTAR 5 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.

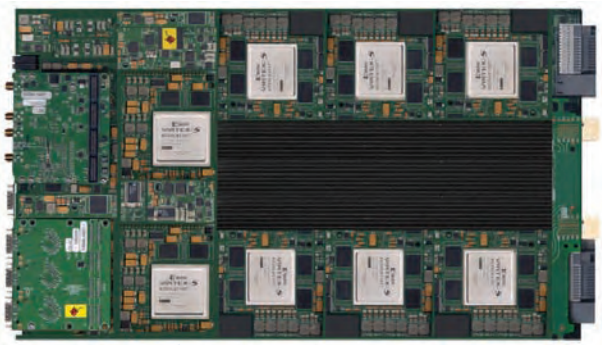
Fully Integrated into the IBM Blade Management System – Abundant power and cooling to ensure maximum performance.

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; WILD solutions outperform the competition.



FEATURES

- From two to eight Virtex-5 FPGA processing elements – LX110T, LX220T, LX330T, or FXT. 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

For more information, contact: wfinfo@annapmicro.com

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WILDSTAR 5 PCI E

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.

Twelfth generation WILDSTAR 5 for PCI Express uses Xilinx Virtex-5 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 3 Gbit 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 provides proven, reusable, high-performance IP modules. WILDSTAR 5 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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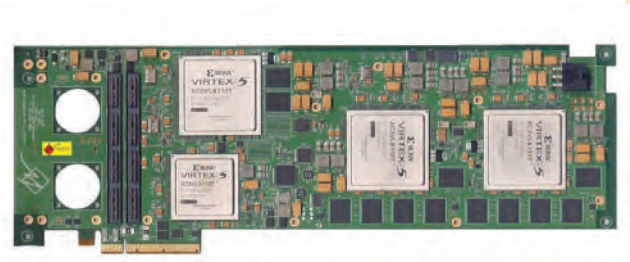

FEATURES

- Up to three Xilinx Virtex-5 FPGA I/O processing elements – LX110T, LX220T, LX330T, or FXT
- Up to 7 GB DDR2 DRAM in 12 memory banks per WILDSTAR 5 for PCI Express board or up to 2 GB DDR2 DRAM in two memory banks and up to 40 MB DDRII, QDRII SRAM, or up to 1.4 GB RLDRAM
- Programmable Flash for each FPGA to store FPGA image
- 8x PCI Express bus. High-speed DMA multichannel PCI controller
- Supports PCI Express Standard External Power Connector. Available in commercial or industrial temperature ranges
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for hardware interfaces and ChipScope access
- We offer training and exceptional special application development support, as well as more conventional support
- Includes one-year hardware warranty, software updates, and customer support
- Proactive thermal management system – board level current measurement and FPGA temperature monitor, accessible through Host API
- Save time and effort. Reduce risk with COTS boards and software
- Achieve world-class performance; WILD solutions outperform the competition

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64-3-377-9127, U.S. Toll Free 1-800-261-2934
www.bluewatersys.com

Rig 200

Rig 200 is a fully customizable ARM microprocessor development platform developed by Bluewater Systems, a leading embedded electronics design center. The platform readily assists with the development of software applications in parallel to custom hardware development in addition to prototyping a vast array of products, significantly reducing time and overall cost. Some base features include USB, Ethernet, CompactFlash, IDE, I2C, and SPI. In conjunction with Bluewater's Snapper Single Board Computer modules, the Rig 200 can be easily converted to a unique commercial design, assisting in expedited time to market. Together, Bluewater's Rig 200 and Snapper modules are fully proven designs offering capabilities including Bluetooth, 802.11, GPS, custom I/O, solid state storage, power management, and LCD options.

Snapper System Modules

Bluewater Systems' Snapper boards are a range of compact, high-density, ARM-based SOMs. Snapper modules can easily be embedded into custom designs, providing various product integration possibilities while reducing risk, time, and cost. Snapper modules' fully proven core design is supported by Bluewater's Rig 200 application platform, empowering their intended use in final product designs to be quickly converted to commercial products. The range of Snapper modules currently includes the SN 255, SN 270, and SN CL15, with SN 9260 planned. Standard features include components such as high-speed memory, Ethernet, and USB, with options available to customize. Snappers provide an extensive range of standard Linux application software that is compatible with existing PC Linux systems. Bluewater also delivers high quality engineering and consulting services to support the Rig 200 platforms and full range of Snapper products.

Bluewater's modular electronic design process and 11 years of experience enables it to quickly develop new products through use of its in-house library of technology reference designs. Bluewater has completed a range of development projects for the defense and aerospace industry, including working with organizations such as the Australian Department of Defence, Royal New Zealand Navy, Gulfstream, and NEC. Applications developed by Bluewater Systems include public transport display systems, security, GPS-based tracking, and automation.

FEATURES

Rig 200

- Rig 200 provides a powerful out-of-the-box solution for developing advanced ARM-based hardware and software
- Designed, used, and supported by a leading developer of ARM microprocessor-based products
- Supports embedded Linux and WinCE operating systems
- Uses Bluewater's Snapper modules to provide core CPU functionality, allowing the user to select a range of CPU and add-on options
- Ideal for product development and testing. Highly suited for rapid prototyping and low to medium run production
- Other peripheral options include GPS location, GPRS data connectivity, IDE hard disk, flash memory storage, LCD, and touch screens

Snapper System Modules

- Accelerates time to market, reduces risk
- Proven core design allows application focus
- Variants for ARM9 and XScale – lower cost than ATX modules
- Compatible s/w across all SOMs: U-Boot, Linux, WinCE
- Single voltage operation, low power consumption, ideal for mobile applications
- Other features include up to 4 GB flash memory, SPI, PCMCIA, and LCD I/F

For more information, contact: sales@bluewatersys.com

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Boston Engineering

411 Waverley Oaks Road, Suite 114 • Waltham, MA 02452
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FlexStack™

FlexStack™ helps companies streamline prototyping or jump-start deployment of any small, portable battery-powered device – particularly medical devices, electronics, robotics, or sensors – by offering a quickly configurable, stackable bus architecture in an embedded hardware solution. Based on the Analog Devices Blackfin® Processor, FlexStack combines a tiny but powerful embedded processor with an easy embedded programming environment for flexible, off-the-shelf solutions.

Prototypes built using FlexStack are actually deployable – allowing companies to ship products sooner and get true market feedback. Small and fast enough to run on battery power, FlexStack is inherently expandable and reconfigurable to match nearly any application need.

FEATURES

- Small, ultra portable (2.5" x 2.5"), rugged embedded computing platform with stackable capabilities
- Multiple configurations; CPU, COM, DAQ, Bluetooth, Power, and Breakout boards
- Analog Devices Blackfin BF537 600 MHz Processor with 64 MB SDRAM and support for 16, 32, 128 MB configuration
- 8 analog I/O channels, 2 analog output channels, and 16 digital I/O channels
- Standard communication with RS-232 interface or USB client, RS-485 interface, and Ethernet capabilities
- Onboard memory, SD card storage, RFID reader, Serial/JTAG programming and debug

For more information, contact: dplatz@boston-engineering.com

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Cogent Computer

17 Industrial Drive • Smithfield, RI 02917
401-349-3999
www.cogcomp.com

CSB733

The CSB733 is based on the Freescale i.MX31 using the compact SODIMM form factor developed by Cogent for embedded use. GPIO and CPU peripherals are available via the 200-pin SODIMM Edge Connector. The high performance 400 MHz ARM1136JF-S Core, VFPU, multiple serial interfaces, generous memory, 10/100 Ethernet, and onboard 3 V Regulator all combine to make the CSB733 an excellent choice for any size restricted, low power embedded system. In addition, the on-chip graphics and video acceleration engines and CMOS Sensor Input with YUV to RGB conversion allow the CSB733 to target sophisticated multimedia and video streaming applications.

Contact Cogent today for more information about the complete line of modules, development kits, and custom design services.

FEATURES

- 400 MHz ARM1136JF-S core with FPU and 128 K L2 Cache
- 3D Graphics Engine and MPEG-4/H.265 D1 at 30 FPS
- 128 MB Mobile DDR, 64 MB NOR, and 512 MB NAND flash
- 10/100 Ethernet, 480 MBps USB, SDIO, and Multiple Serial Ports
- Compact 200-pin SODIMM form factor (68 mm x 21 mm)
- Low Cost (<$700) Development Kit with 480 x 272 4.3" Touch LCD

For more information, contact: sales@cogcomp.com

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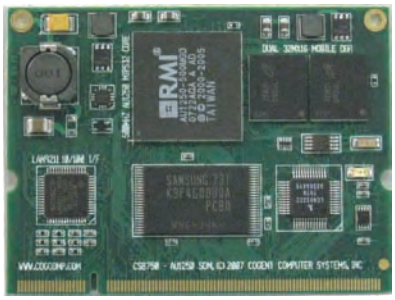
Cogent Computer

17 Industrial Drive • Smithfield, RI 02917
401-349-3999
www.cogcomp.com

CSB750

CSB750 is based on the Raza Microelectronics Au1250 using the compact SODIMM form factor developed by Cogent for embedded use. GPIO and CPU peripherals are available via the 200-pin SODIMM Edge Connector. The high performance 600 MHz Au1x00 Core, HW MAC, multiple serial interfaces, generous memory, 10/100 Ethernet, and onboard 3 V Regulator all combine to make the CSB750 an excellent choice for any size restricted, low power embedded system. In addition, the on-chip graphics and the Multimedia Acceleration Engine (MAE) and CMOS Sensor Input with YUV to RGB conversion allow the CSB750 to target sophisticated multimedia and video streaming applications.

Contact Cogent today for more information about the complete line of modules, development kits, and custom design services.



FEATURES

- 600 MHz Au1250 with Hardware Multiply-Accumulate Unit
- Multimedia Acceleration Engine (MAE): D1 at 30 FPS
- 128 MB Mobile DDR, 64 MB NOR, and 512 MB NAND flash
- 10/100 Ethernet, 480 MBps USB, SDIO, and Multiple Serial Ports
- Compact 200-pin SODIMM form factor (68 mm x 21 mm)
- Low Cost (<$700) Development Kit with 480 x 272 4.3" Touch LCD

For more information, contact: sales@cogcomp.com

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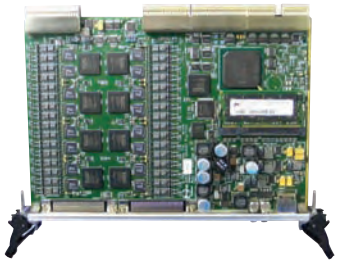
D-TACQ Solutions Ltd.

Scottish Enterprise Technology Park • East Kilbride, G75 0QD
United Kingdom
44-135-527-2511
www.d-tacq.com

ACQ132CPCI

The new ACQ132CPCI digitizer features 32 simultaneous analog input channels, with a front-end sample rate up to 65 MSps, and an integrated digital subsystem with 32-bit microprocessor, gigabyte DDRAM, and Gigabit Ethernet. The card features multiple FPGA devices, offering considerable onboard signal processing capability, for example increasing processing gain using oversampling digital filters or digital downconverter. The card can operate as a self-contained networked data acquisition device, and it can also operate conventionally with other standard CompactPCI cards.

The digitizer includes a flexible clocking system, with capability to multiply, divide, and share clocks with other cards either in local or remote chassis.



FEATURES

- 32 simultaneous differential analog inputs, 14-bit resolution, up to 65 MHz per channel sampling rate
- 2 MSps per channel sustained data rate to local memory (1 GB). 40 MB sustained output on Gigabit Ethernet
- Huge FPGA compute resource enables oversampling digital filters: 32 MSps, 14-bit input, 2 MSps, 16-bit output
- Burst mode operates to 65 MSps per channel. Integrated digital system enables high burst rate
- Self contained, networked data acquisition appliance. Control via published, standard TCP/IP interfaces
- CompactPCI form factor, 6U size, compatible with existing CompactPCI and PXI systems

For more information, contact: info@d-tacq.co.uk

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EMAC, Inc.

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www.emacinc.com

iPac-9302

The iPac-9302 is a low power, inexpensive Single Board Computer based on the Cirrus EP9302 Processor. This feature-packed board contains a wide variety of I/O including A/D, PWM, Digital I/O, Serial, Ethernet, and USB all on a board that is the same footprint as a PC/104 module at 3.77" x 3.54." This industrial strength SBC is perfectly suited for just about any embedded data acquisition and control application, and is ideal for engineers and students looking to develop low-cost embedded applications in Linux, Windows CE, or utilizing the .Net Micro Framework.

Single unit pricing for the iPac-9302 begins at $150.00 USD. For more information, please visit: www.emacinc.com/sbc_microcontrollers/ipac_9302.htm.

FEATURES

- Cirrus Logic EP9302 ARM 9 200 MHz Processor with Math Coprocessor
- 1 RS-232 Serial Port and 1 RS-232/422/485 Configurable Serial Port
- 1 10/100 BASE-T Ethernet Port and 2 USB 2.0 Ports
- 5 Channels of 12-bit A/D and 48 Digital I/O Lines
- 9 Synchronous Serial I/O Lines (SPI/AC97/I2S)
- SD/MMC Flash Card Socket

For more information, contact: info@emacinc.com

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Embedded Computing Design Resource Guide 2008

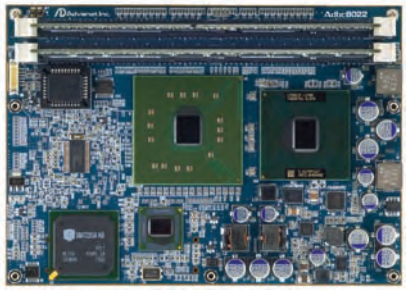
Eurotech Inc.

10260 Old Columbia Road • Columbia, MD 21046
301-490-4007
www.eurotech-inc.com

Adbc8022

The Adbc8022 is a COM module complying with the COM Express Standard, powered by an Intel® Core Duo processor L2400 or Core™2 Duo processor L7400/T7400 (optional).

This RoHS COM module is equipped with all the components required to construct a complete CPU board. Creating a carrier board satisfying customers' needs will enable flexible construction of various embedded systems. The module size is an extended form factor and includes: 4x link 5 port for PCI Express Interface 1.0a, 1 port Low Pin Count Interface 1.0, 1 port for System Management Bus 2.0, and 1 port for the I2C Bus 2.1.



FEATURES

- COM module complying with the COM Express standard (440 pin, Type 2)
- Intel® Core™ Duo processor L2400; Core™2 Duo processor L7400/T7400
- DDR2 DIMM socket 2 (dual channel) 4 GB maximum, compatible with PC2-3200 Registered DIMM, 1 MB Flash memory
- 1 port VGA: 1280 x 1024 at 24-bit, 2 port SATA 1.0a, 150 MBps, 4 port USB 2.0, 1 port 10/100/1000BASE-T
- IDE: 1 channel complying with Ultra ATA/100, 100 MBps, PCI: 32 bits/33 MHz, 5 V/3.3 V: PCI Local Bus 2.2

For more information, contact: sales@eurotech-inc.com

RSC# 35865 @ www.embedded-computing.com/rsc

Embedded Systems Design, Inc.
6810 Deerpath Road, Suite 300 • Elkridge, MD 21075
410-712-7290
www.embedded-sys.com

StreamBlade Family

The Embedded Systems Design, Inc. (ESD) StreamBlade™ Family of products provides developers with the software infrastructure and hardware building blocks necessary to implement distributed FPGA-based processing systems. ESD products are designed to transport and process real-time streaming data and are ideally suited to streaming applications such as telecommunications protocol processing, software-defined radio applications, and real-time streaming data, including video and voice processing, generation, recording, and playback. All ESD products were derived from actual client requirements. The SB-SOE-4 was designed to replace data formatting functions performed by two 1U rack-mounted Linux servers and 4-bit capture cards used in a Gigabit Ethernet-based streaming data distribution system. The SB-MiniFX was designed to implement one quarter of the SB-SOE-4 board's functions and interface with a client's dual ADC board. The SB-5600 was designed as a stand-alone real-time streaming I/O processing system utilizing a combination of FPGA, embedded, and general purpose processing nodes. The SB-5600 platform was designed to be a self-contained system to generate Pseudo Random Bit Sequence (PRBS) patterns and verify PRBS patterns with bit-error injection capability. The SB-5600 is ideally suited to real-time applications including: streaming data (voice, video, and image), telecom/datacom, symbol-to-bit conversion, algorithm acceleration, data formatting, pattern generation/recognition, and test instrumentation.

FPGAs provide an extraordinary opportunity to reduce Size, Weight, and Power (SWaP) consumption while accelerating processing capabilities in numerous applications. ESD plans to add additional products to the StreamBlade™ Family based on the constant input the company receives from its embedded engineering services business.

FEATURES

- FPGA-based platforms support development of combined software and reconfigurable hardware processing applications
- Developers have full access to configured FPGAs and general purpose processors
- Gigabit Ethernet ports, utilizing hard core MACs allow for the implementation of distributed FPGA processing nodes
- Ethernet connectivity provides network-based command, control, and status
- Innovative CPLD-controlled flash memory provides rapid configuration of FPGAs and embedded processors
- StreamBlade™ architecture leverages well-understood technologies, such as: Ethernet, TCP/IP, Linux, and FPGA
- ESD provides an Application Development Kit (ADK) including FPGA cores, sample applications, and source code
- Linux and GNU development tools may be used in combination with the FPGA design flow
- Signal conditioning is provided by plug-in modules
- Available I/O modules support serial differential clock and data streams (LVDS, RS-422, and ECL)
- Available I/O modules support parallel differential clock and data streams (LVDS, RS-422, and ECL)
- Available I/O modules support T1/E1 data streams, T3/E3 data streams

For more information, contact: info@embedded-sys.com

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Emerson Network Power
2900 South Diablo Way, Suite 190 • Tempe, AZ 85282
800-759-1107 or 602-438-5720
www.EmersonNetworkPower.com/EmbeddedComputing

CPCI7200 Board

The Emerson Network Power CPCI7200 Single Board Computer (SBC) uses the Intel® Core™2 Duo processor and E7520 plus 6300ESB chipset. The single-slot configuration is ideal for thermally constrained environments and includes dual GbE interfaces and dual channel 3.2 GBps high speed, Double Data Rate DDR2, for a combined maximum bandwidth of 6.4 GBps.

The CPCI7200 is a low-power, high-performance SBC that offers full hot swap compliance per PICMG® 2.1 and supports the PICMG 2.9 System Management and PICMG 2.16 CompactPCI® Packet Switching Backplane open specifications. In addition to the PICMG 2.16 variants, the CPCI7200 offers other value-added features including the PLX6466 PCI-to-PCI Bridge (PPB) for universal CompactPCI system or peripheral-slot functionality.

In addition, the CPCI7200 board supports the Intelligent Platform Management Interface (IPMI) specification for full board remote system and platform management as well as Baseboard Management Controller (BMC) and peripheral mode. Overall, with the value-added PLX6466 and GbE/PICMG 2.16 features, the CPCI7200 board is a superior choice for telecom applications like softswitches, control plane media-transport nodes, wireless gateways, and control plane CompactPCI and PICMG 2.16 systems as well as industrial automation, aerospace, medical imaging, railway control, and on-board flight information systems.

Emerson Network Power's commitment to open, standards-based computing and our understanding of our customers' needs helps to provide the foundation for our continued leadership delivering embedded computing solutions.

FEATURES

- 1.06 or 1.5 GHz Intel® Core 2 Duo processor
- 533 MHz or 667 MHz front side bus
- Intel® E7520 plus 6300ESB dual channel 3.2 GBps memory controller
- 2 GB ECC-protected DDR2-400
- Dual on-board Gigabit Ethernet interfaces
- Support for PICMG 2.16 and PICMG 2.0 CompactPCI Packet Switching Backplane specification
- Full PICMG 2.1, R2.0 Hot Swap specification compliance
- One or two PCI Mezzanine Card (PMC) sites
- Hard disk drive accessory kits optional
- Optional Rear Transition Module (RTM) in PICMG 2.16 and rear I/O variants
- PLX6466 PCI-to-PCI Bridge technology
- RoHS compliant (6 of 6)

For more information, contact: EmbeddedComputingSales@emerson.com **RSC# 36476 @ www.embedded-computing.com/rsc**

Emerson Network Power
2900 South Diablo Way, Suite 190 • Tempe, AZ 85282
800-759-1107 or 602-438-5720
www.EmersonNetworkPower.com/EmbeddedComputing

MVME7100 VME Board

The MVME7100, Emerson Network Power's highest performance VMEbus Single Board Computer (SBC), features a dual core PowerPC® processor and 2eSST high-speed VMEbus interface. The MVME7100 is designed to enable industrial, medical, and defense/aerospace Original Equipment Manufacturers (OEMs) to add performance and features for competitive advantage while providing backwards compatibility to protect their investment in VMEbus technologies. Customers can keep their VMEbus infrastructure (chassis, backplanes, and other VMEbus and PMC boards) while improving performance and extending the lifecycle.

Incorporating the most beneficial and proven features of Emerson's embedded controllers and SBCs, the MVME7100 gives OEMs the flexibility to support varying I/O requirements with the same base platform, simplifying part number maintenance, technical expertise requirements, and sparing. It also provides optimal speed, which is achieved due to the independence of the PCI buses for each PMC site. In addition, the board's non-volatile memory feature prevents system memory loss in the event of a power loss.

The MVME7100 SBC is based on the System-on-Chip Freescale MPC8641D with dual PowerPC e600 processor cores, high capacity DDR2 memory, up to 8 GB of NAND Flash, PCI-X, USB, and 2eSST. The MVME7100 series features dual integrated memory controllers, DMA engine, PCI Express interface, Gigabit Ethernet, and local I/O. Cost-effective peripherals can be integrated easily using USB interfaces.

The System-on-Chip implementation offers power/thermal reliability and lifecycle advantages not typically found in alternative architectures. In addition, the extended lifecycle of Emerson embedded computing products helps reduce churn in product development. Adding to the flexibility of the board, the MVME7100 supports packages for VxWorks and Linux.

FEATURES

- System-on-Chip Freescale MPC8641D with dual PowerPC® e600 processor cores, dual integrated memory controllers, DMA engine, PCI Express
- Four Gigabit Ethernet ports
- Up to 2 GB of DDR2 ECC memory, 128 MB NOR Flash, and 4 or 8 GB NAND Flash
- USB 2.0 controller for integrating cost-effective peripherals
- 2eSST VMEbus protocol offering interoperability with products such as the MVME6100 and MVME3100 at higher bandwidths
- Dual 33/66/100 MHz PMC-X sites for expansion via industry standard modules with support for processor PMCs
- 8x PCI Express expansion connector for PMC-X and XMC expansion using Emerson XMCspan
- Board support packages for VxWorks, LynxOS, and Linux
- MVME721A direct-connect Rear Transition Module (RTM) for I/O routing through rear of compact VMEbus chassis

For more information, contact: EmbeddedComputingSales@emerson.com **RSC# 36477 @ www.embedded-computing.com/rsc**

Eurotech Inc.
10260 Old Columbia Road • Columbia, MD 21046
301-490-4007
www.eurotech-inc.com

Catalyst Module

The Catalyst Module from Eurotech is a high performance, ultra low power embedded solution based on the Intel® Atom™ processor and System Controller Hub (SCH) US15W. With extensive wireless and graphical capabilities, the Catalyst Module is the ideal platform for applications where size, graphics, mobility, and low power consumption drive requirements such as in digital signage, in-vehicle infotainment, and point-of-service. I/O and communications are offloaded onto an adapter board, which can be a standard version or custom design (by Eurotech or a third party) to ensure quick time to market. In choosing the Catalyst Module, OEMs benefit from Eurotech's flexible business model and expertise in providing application-ready solutions with full life cycle management.

FEATURES

- Intel® Atom™ processor (CPU speed up to 1.5 GHz) and Intel® System Controller Hub (SCH) US15W
- Multimedia includes HD video, H.264, and MPEG-4/2/1 codec, Windows Media 9, dual display, and Intel HD audio
- Operating system support for Microsoft Windows CE, XP, XPe, Linux, and other RTOS
- Communications and I/O include GbE, Mini-PCI Express, USB 2.0, CANbus, serial ports, and PCI Express
- Advanced power management including ACPI power management and system health/environmental monitor
- Memory up to three SD/MMC cards and two PATA disk drives with up to 1 GB of DDR2 support

For more information, contact: sales@eurotech-inc.com

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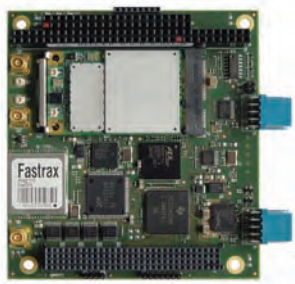
Eurotech Inc.
10260 Old Columbia Road • Columbia, MD 21046
301-490-4007
www.eurotech-inc.com

COM-1480

The Eurotech COM-1480 is a highly integrated low power PC/104-*Plus* board with advanced wireless communication technologies and is the ideal choice for a wide spectrum of mobile applications. It supports a multimode Tri-band HSDPA/UMTS engine with data rates of up to 3.6 Mbps, in conjunction with a Quad-band EDGE/GSM/GPRS connectivity technology with data rates of up to 216 Kbps. It also integrates a low power 12-channel high-accuracy GPS receiver. Optionally, the COM-1480 can integrate a Dual-band (800/1,900 MHz) CDMA 1xEV-DO Rev A engine that offers a complete 3G-enabled worldwide wireless solution.

A standard SIM-card can be installed onboard using a locking card holder or can be connected via an optional external SIM card interface.



FEATURES

- Tri-band HSDPA/UMTS (up to 3.6 Mbps downlink) and Quad-band EDGE/GSM/GPRS (up to 216 Kbps downlink)
- Optional Dual-band CDMA 1xEV-DO Rev A/1xEV-DO Rel 0/1xRTT (up to 3.1 Kbps downlink)
- 12-channel low power GPS receiver, L1 frequency, C/A code (SPS), Tracking sensitivity: -156 dBm
- GPS Accuracy, Position: 1.2 m (CEP95), Velocity: 0.1 m/s, Time: 20 ns RMS (static mode), GPS Protocol: NMEA-0183
- Operating temperature: -20 °C to +60 °C, Humidity: up to 95 percent, NC Power: +5 V ±5 percent
- Supported OS: Win CE, Win XPE, Linux

For more information, contact: sales@eurotech-inc.com

RSC# 35716 @ www.embedded-computing.com/rsc

Eurotech Inc.
10260 Old Columbia Road • Columbia, MD 21046
301-490-4007
www.eurotech-inc.com

CPU-1484

The CPU-1484 is an embedded board based on two modules: a mezzanine CPU module and a PC/104-*Plus* form factor carrier. The mezzanine CPU module mounts the Intel® Pentium® M 1.4 GHz (2 MB L2 cache, 400 MHz FSB) processor (according to version) and the Intel i855GME chipset. The module has been designed to allow high performance Pentium® M class processors to work in harsh environmental conditions while maintaining a compact PC/104 form factor: special care has been taken to improve thermal dissipation and make thermal coupling with different enclosures easier for safe fanless operation. The system memory (512 MB DDR) is soldered onboard so as to increase system reliability and MTBF under strong vibrations and/or mechanical shocks.

FEATURES

- Pentium® M 1.4 GHz (2 MB L2 cache) with i855GME chipset
- 512 MB DDR PC2100 soldered onboard, IDE ATA 100 Flash support, onboard VGA and LVDS Graphic controller
- Two Serial ports (RS-232/422/485), four USB 2.0, GbE, Fast Ethernet
- AC97 audio interface, keyboard, and mouse, programmable WD and RTC
- Operating temperature: 0 to +60 °C standard, -40 °C to +85 °C extended; Humidity: up to 95 percent, NC Power: +5 V (±5 percent)
- Supported OS: Win CE, Win XPE, Linux

For more information, contact: sales@eurotech-inc.com

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Eurotech Inc.
10260 Old Columbia Road • Columbia, MD 21046
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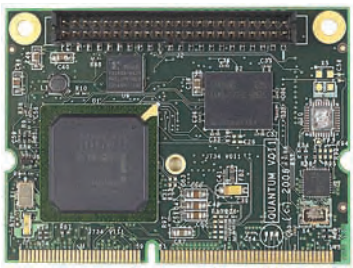
QUANTUM

The QUANTUM PXA270 based SODIMM format SBC module gives OEMs a very low power, high performance and cost effective computer component for easy integration into their application specific motherboards. Its ready to run potential eliminates the work and risk involved with designing the complex processor core and operating system element. Designers can focus on the I/O and interface features unique to their market applications.

The PXA270 processor incorporates Intel® XScale micro architecture, multimedia acceleration, rich peripheral integration, and sophisticated power management. It supports wireless clients with the latest Intel mobile technology. It's ideal for mobile and handheld devices, power sensitive embedded communications, asset monitoring, and compact MMI solutions.



FEATURES

- 520/312 MHz Marvell PXA270 XScale processor
- 64 MB soldered SDRAM, 256 KB SRAM, SD/SDIO/MMC card interface. Up to 64 MB soldered Spansion MirrorBit™ Flash
- TFT/STN flat panel interface up to 640 x 480 x 16-bit color depth
- 4-wire touch screen interface and AC97 Audio Controller
- 10/100BASE-TX Ethernet Controller and CompactFlash interface bus
- Embedded Linux 2.6 or Windows CE 5.0 offered pre-installed

For more information, contact: sales@eurotech-inc.com

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Innovative Integration
2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

Innovative Integration
... real time solutions!

SBC-ComEx

The SBC-ComEx is a user-customizable, turnkey embedded instrument that includes a full Windows/Linux PC and supports a wide assortment of ultimate-performance XMC modules. With its modular I/O, scalable performance, and easy to use PC architecture, the SBC-ComEx reduces time-to-market while providing the performance you need.

Distributed Data Acquisition – Put the SBC-ComEx at the data source and reduce system errors and complexity. Optional GPS-synchronized timing, triggering, and sample control is available for remote I/O. Limitless expansion via multiple nodes.

Uniquely Customizable – Dual XMC sites for I/O, user-programmable FPGA for I/O interfaces, triggering and timing control, and USB ports.

Remote or Local Operation – Continuous data streaming up to 220 MBps (10 m, cabled PCI Express LAN) or 1 Gbps Ethernet. Optional, stand-alone, autonomous operation with GPS timed sampling.

Rugged – Runs diskless from FLASH drive in a compact, rugged 250 mm x 170 mm footprint that is ready for embedded operation.

12 VDC-Only Operation – Perfect for portable or automotive data loggers or waveform generators.

See the X3 and X5 XMC Cards under the MEZZANINE CARDS tab within this guide.

Data Sheets and Pricing Online!

FEATURES

- Combines industry-standard COM Express CPU module and dual XMC modules in a compact, stand-alone design
- Scalable CPU performance from Celeron to dual-core Pentium using COM Express with up to 4 GB memory
- Small form factor: 250 mm x 170 mm. Rugged, stand-alone operation. Able to operate diskless and headless. Runs Windows or Linux applications
- Configurable I/O uses standard XMC I/O modules. Add anything from RF receivers to industrial control modules
- PCI Express I/O sites (VITA 42.3) deliver >600 MBps to CPU memory
- Integrated timing and triggering support for I/O includes optional GPS-disciplined clock
- Supports Innovative X3 and X5 I/O module features for private data channels, triggering, and timing features
- USB 2.0 x6, Gigabit Ethernet, SATA x4, VGA, AC'97 audio
- System expansion supported with cabled PCI Express – use other eInstruments
- Boots from SATA, HDD, or USB FLASH. Optional GPS module support. AC or 12 VDC operation
- Excellent choice for embedded control or remote data acquisition!
- Excellent choice for industrial test and measurement or OEM instrumentation!

For more information, contact: sales@innovative-dsp.com **RSC# 36881 @ www.embedded-computing.com/rsc**

Interphase
2901 North Dallas Parkway, Suite 200 • Plano, TX 75093
214-654-5000
www.iphase.com

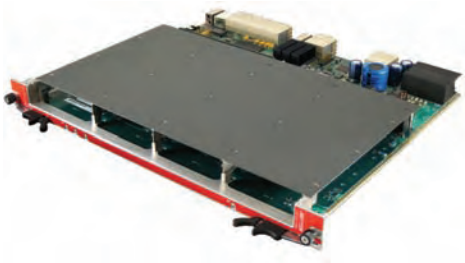
INTERPHASE®
Designed To Perform. Designed To Last.™

iNAV® 31K

The iNAV® 31K AdvancedTCA 1/10 Gbps fabric interface Carrier Card is a flexible, high-performance addition to next generation systems. It meets the needs of a wide variety of applications in AdvancedTCA 3.1 systems, including I/O, processing, and storage.

The iNAV® 31K features include a high-performance Ethernet switch with 24 Gb ports and up to two 10 Gb ports, an optional PCI Express switch, advanced Telecom Clock management, and a Linux®-based Board Management Processor that can support full local and remote management.

Advanced fully managed Ethernet Switching technology supports features such as complex VLANs, Rapid Spanning Tree, Link Aggregation, and Multicast.



FEATURES

- Supports four single-width, mid-size AdvancedMCs or up to two double-width, mid-size AMCs
- Supports 1/10 Gb (AdvancedTCA 3.1 Option 1 and 9) links to the AdvancedTCA Fabric, as well as Base Interface links
- Optional x4 PCI Express links to each AMC bay, with support for a Processor AMC and SAS/SATA disk AMCs
- Advanced Telecom Clock management accepts clock from and to any AMC bay and can drive a clock to any bay
- Powerful Linux®-based Board Management Computer with PCI Express and Gigabit Ethernet access to all AMC bays
- The iNAV® 31K together with the Interphase portfolio of AdvancedMCs provides an ideal environment for delivery

For more information, contact: fastnet@iphase.com

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Interphase
2901 North Dallas Parkway, Suite 200 • Plano, TX 75093
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www.iphase.com

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iNAV® 74PF

The iNAV® 74PF is a processor AdvancedTCA blade with four Freescale 8641D dual-core processors. The 74PF is targeted at high-volume transaction and user-plane traffic processing required for next generation Wireless infrastructure and IMS control planes. The iNAV® 74PF supports complex processing of Layer 4-7 protocols and unified control-plane and host media processing using PowerPC vector processing extensions.

Integrating the iNAV® 74PF with I/O AdvancedMCs™ such as the iSPAN® 36x series hosted on the iNAV® 31K Carrier Card results in a very powerful solution architecture that can be used to implement the next generation of network platforms.

FEATURES

- Four Freescale 8641D dual-core processors based on the Power e600 Core
- Superior cost, density, memory capacity, and thermals compared to Processor AMCs plugged into a carrier card
- 10 Gigabit Ethernet links to AdvancedTCA fabric for high throughput and data transfer
- Up to 4 GB of memory per processor complex
- Independent PowerPC PowerQUICC III™ based Board Management Computer to enable full use of processors
- Linux® Board Support Package for hosting control applications on Board Management Computer

For more information, contact: fastnet@iphase.com

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Kontron
14118 Stowe Drive • Poway, CA 92064
858-677-0877
www.kontron.com

3.5-inch SBCs

Kontron offers two families of 3.5-inch SBCs – JRex and EPIC.

The newest addition to the JRex family is the JRexplus-LX that is equipped with the fanless AMD Geode™ LX800 CPU for excellent performance. In addition to PC/104-*Plus* expansion, the JRexplus-LX supports two Serial ATA interfaces for fast hard drives and Gigabit Ethernet. All of the other JRex family features are standard on this new addition to the family.

The Kontron EPIC/PM boasts an Intel® Pentium® M 745 processor with 1.8 GHz and 2 MB L2 cache. For cost sensitive applications or fanless operation, the Kontron EPIC/PM is also available in ULV Celeron® M 373 with 1 GHz or Intel® Celeron® 800 MHz versions.

FEATURES

- PC/104 and PCI-104 compatible embedded Single Board Computers
- Scalable performance ranging from low end all the way up to Intel® Pentium® M processors
- Support for onboard and add-on memory
- Drop in replacements within the Kontron JRex and EPIC product families
- Request a sample today and start evaluating immediately
- For more information on Kontron 3.5-inch SBCs, visit www.kontron.com/3.5-inch

For more information, contact: sales@us.kontron.com

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Embedded Computing Design Resource Guide 2008

Kontron
14118 Stowe Drive • Poway, CA 92064
858-677-0877
www.kontron.com

Kontron ETX COMs

The Kontron ETX®-CD is the highest performance Computer-On-Module based on the ETX 3.0 standard. This module is built around the Intel® Core™2 Duo processor and Intel® Celeron® M processor as well as the Intel 945GM and ICH7M chipset. Kontron ETX®-CD modules provide the following interfaces that are always located in the same physical position on each board: PCI 2.3, USB 2.0, Serial ATA, Parallel ATA, and LVDS, as well as an ACPI (Advanced Configuration and Power Interface) for optimized power management. This consistency of design ensures scalability between ETX product family modules. Other modules offering AMD and VIA processors also are available.

To learn more about Kontron ETX modules and the ETX 3.0 standard, please visit www.kontron.com/ETX.

FEATURES

- Highest performance for Computer-On-Modules
- Processing performance up to Intel® Core™2 Duo processors
- Support for up to 2 GB of system memory
- Serial ATA, USB 2.0, Integrated Graphics, Audio, and more
- ETX 3.0 – Long Term Support
- Request a sample today and start evaluating immediately

For more information, contact: sales@us.kontron.com

RSC# 35719 @ www.embedded-computing.com/rsc

Kontron
14118 Stowe Drive • Poway, CA 92064
858-677-0877
www.kontron.com

ETXexpress-MC

Kontron ETXexpress Computer-On-Modules are 100 percent COM Express™ solutions. As truly scalable embedded solutions, Kontron ETXexpress modules are built around advanced processors and chipsets from various suppliers including up to the 2 GHz Intel® Core™2 Duo T7500 processor – ETXexpress-MC.

For more information on Kontron ETXexpress COM Express™ solutions, visit www.kontron.com/ETXexpress.

FEATURES

- 100 percent COM Express™ compliant
- Processing performance up to 2 GHz Intel® Core™2 Duo processors
- Dual channel memory support for up to 4 MB system memory
- Integrated GEN4 graphics with 24-bit LVDS support
- 5x PCI Express Lanes, 8x USB 2.0, and 3x Serial ATA
- Gigabit Ethernet for high connectivity

For more information, contact: sales@us.kontron.com

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Kontron
14118 Stowe Drive • Poway, CA 92064
858-677-0877
www.kontron.com

Flatpanel SBCs

When a very low profile computer is needed to be directly mounted behind a flat panel, the Kontron ePanel family of mobile flatpanel SBCs is the solution. The Kontron ePanel-PM is a complete SBC with a very low height based on low power Intel® Celeron® M and Pentium® M processors. A wide range of software is available for this proven x86 platform. Along with very low power consumption, many onboard interfaces are available allowing systems to be designed within a very short period and brought to market with minimal engineering effort. Kontron also offers a complete line of flatpanel controllers (aFLAT series), which enable easy plug-and-display integration of flatpanels in embedded applications. For more information on these solutions, visit www.kontron.com.

FEATURES

- Low profile form factor with Intel® Celeron® M and Pentium® M processors
- Low power consumption
- Wireless LAN/Internet, Bluetooth connections, and more through PC-CARD-Slot or Mini-PCI
- Multi-panel support offering solutions up to WUXGA including HDTV
- Customizable OSD hardware and software solutions
- Request a sample today and start evaluating immediately

For more information, contact: sales@us.kontron.com

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Kontron
14118 Stowe Drive • Poway, CA 92064
858-677-0877
www.kontron.com

microETXexpress-SP

The microETXexpress-SP is the newest addition to Kontron's family micro-size (95 mm x 95 mm) COM Express™ modules based on the Intel® Atom™ Z500 series processor and System Controller Hub platform. Intel's new two-chip solution makes it easy for microETXexpress to support embedded applications in areas not previously possible due to power requirements.

Kontron microETXexpress Computer-On-Modules are compatible to the COM Express™ standard from PICMG and follow the COM.0 Type 2 pin-out definition. The locations of the identically mapped pin-outs are also 100 percent COM.0 compatible. The microETXexpress family of modules now offers performance scalability from Intel® Celeron® processors up to the Intel® Atom™ 45nm High-K processor.

FEATURES

- Highly efficient Intel® Atom™ processor Z500 series
- Integrated memory controller, graphics engine, and I/O controller in the Intel® System Controller Hub US15W
- Unprecedented power consumption/performance ratio for x86 based ultra mobile solutions
- PCI, PCI Express, Gigabit Ethernet, USB 2.0, Serial ATA, LVDS, HD Audio, etc.
- 100 percent COM Express™ pin-out Type 2 compatible
- For more information, visit www.kontron.com/uETXe-SP

For more information, contact: sales@us.kontron.com

RSC# 36939 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Kontron
14118 Stowe Drive • Poway, CA 92064
858-677-0877
www.kontron.com

MOPS PC/104 SBCs

Kontron offers a diverse range of PC/104 and PC/104-*Plus* embedded Single Board Computers (SBCs). The Kontron MOPS-PM for PC/104-compliant expansion modules is equipped with Intel® Pentium® M class processors and 855/852 GME/ICH4 chipset. The Kontron MOPS-PM emphasizes the company's long term commitment to PC/104-*Plus,* which utilizes PCI and ISA buses. Also available is the Kontron MOPSlcdLX featuring the AMD Geode™ LX800 processor at 500 MHz. This MOPS PC/104 SBC offers high reliability and performance at low power consumption – only passive cooling if at all – no moving parts.

For more information on all of the Kontron ETXexpress MOPS PC/104 SBCs, visit www.kontron.com/MOPS.

FEATURES

- PC/104 and PC/104-*Plus* compatible embedded Single Board Computers
- Scalable performance ranging from low end all the way up to Intel® Pentium® M processors
- Low power, passively cooled options available
- Support for onboard and add-on memory
- Drop in replacements within the Kontron MOPS PC/104 SBC family
- Request a sample today and start evaluating immediately

For more information, contact: sales@us.kontron.com

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Kontron
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858-677-0877
www.kontron.com

nanoETXexpress-SP

The Kontron nanoETXexpress-SP is the first credit card-sized COM Express™ module based on the Intel® 45nm technology platform – the Intel® Atom™ processor Z500 series and the Intel® System Controller Hub US15W.

Ultra mobile embedded applications have traditionally had very few options available to them among the standards-based platforms that could adequately meet their unique requirements. The trouble was that available solutions just were not small enough, did not have the right mix of integrated features, and had limited options for future generation product revisions that would allow for taking advantage of technology advancements.

The nanoETXexpress as a COM Express™ compatible Computer-On-Module changes this situation. As introduced by Kontron at the end of 2007, new nanoETXexpress modules will offer the desired small footprint, and the mix of integrated features desired by ultra mobile application designers has been fully researched – smart battery support, multiple PCI Express lanes and USB 2.0 ports, Serial ATA support, advanced graphics capabilities such as dual 24-bit LVDS channels, Gigabit Ethernet, onboard DRAM and Flash instead of SODIMM sockets, extreme low power Ethernet controller, a wide range power supply input of 4.75 VDC to 14 VDC, and more. All in a footprint of a mere 55 mm x 84 mm! Kontron's nanoETXexpress products are truly designed with the requirements of embedded handheld devices, such as those for medical or multimedia applications and small mobile data systems in mind.

The nanoETXexpress specification is downloadable, and Kontron Certified Design partners also are ready to support customized needs. Learn more and request an evaluation kit today at www.kontron.com/nano.

FEATURES

- Highly efficient Intel® Atom™ processor Z500 series
- Intel® System Controller Hub US15W with integrated memory controller, graphics engine, and I/O controller
- Up to 1 GB DDR2 onboard system memory
- Up to 4 GB onboard Flash SSD
- Wide range input voltage range (4.75 V-14 V)
- Unprecedented power consumption/performance ratio for x86 based ultra mobile solutions
- PCI Express, Gigabit Ethernet, USB 2.0, Serial ATA, LVDS, HD Audio, and more
- 100 percent COM Express™ pin-out Type 1 compatible
- OS support for: Windows® XP, XPe, CE, Linux, VxWorks
- Commercial temperature range for typical operation and storage. Ask about wider temperature ranges
- ACPI 2.0 + APM S3 hot and cold support
- For more information on the nanoETXexpress-SP, visit www.kontron.com/nano

LiPPERT Embedded Computers

5555 Glenridge Connector, Suite 200 • Atlanta, GA 30342
404-459-2870
www.lippertembedded.com

THE EMBEDDED PC COMPANY

Cool LiteRunner 2

The Cool LiteRunner 2 is an affordable PC/104 single board computer, powered by an AMD Geode™ GX 466@0.9W Pentium-compatible processor running at 333 MHz. It features 256 MB soldered RAM, AC97 sound, and 4 USB 2.0 host ports. Together with a CS5536 I/O companion and a Super I/O, the Cool LiteRunner 2 forms a complete PC. A built-in miniPCI slot facilitates expansion with standard cards. Two Ethernet controllers are integrated, too. A graphics controller using UMA handles the graphics for the built-in VGA and LVDS connectors. A floppy disk adapter, PS/2 connectors, parallel printer, and three serial ports with selectable RS-232 and RS-485 standards are built-in, too. Eight freely usable I/O pins for application defined signals are available on a flat cable connector.

FEATURES

- AMD Geode™ GX 466@0.9W with 256 MB soldered RAM
- miniPCI slot and CompactFlash socket
- 2 x 10/100BASE-T Ethernet
- 4 x USB 2.0 host ports, 3 x serial RS-232/422/485
- Very low power consumption
- Models for the extended temperature range -40 °C to +85 °C

VDC 2006 PLATINUM VENDOR

For more information, contact: ussales@lippertembedded.com

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www.lippertembedded.com

THE EMBEDDED PC COMPANY

Cool RoadRunner-LX800

The Cool RoadRunner-LX800 is a PC/104-*Plus* board, based on the very energy-efficient Geode LX800 processor, handling 1 GB RAM. It comes with a graphics controller with VGA, LVDS, and parallel TFT adapters. Backlighting is provided for LCD modules. The board communicates through an Ethernet port, RS-232/422/485 serial ports, or four USB 2.0 host ports. Legacy ports like PS/2 and a parallel printer port are available. AC97 sound, an IDE adapter, and CompactFlash socket are integrated, too. I2C bus, PWM outputs, and programmable general purpose digital signals are provided. A 5 V-only power supply is sufficient. The Cool RoadRunner-LX800 runs Windows, Linux, and VxWorks operating systems. Models for the extended temperature range of -40 °C to +85 °C are available.

FEATURES

- AMD Geode™ LX800 processor @ 500 MHz
- 1 GB DDR333 RAM max
- Graphics up to 1920 x 1440 pixels. CRT, TFT, LVDS adapters
- 10/100BASE-T Ethernet, USB 2.0
- Only 6.5 W power consumption
- Optionally extended temperature range -40 °C to +85 °C

VDC 2006 PLATINUM VENDOR

For more information, contact: ussales@lippertembedded.com

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www.lippertembedded.com

THE EMBEDDED PC COMPANY

Cool Roadrunner-PM

The Cool RoadRunner-PM is a complete PC/104-*Plus* single board computer with PCI and ISA bus. Several processor variants are available: Pentium M with 1.4 GHz or 1.8 GHz, or Celeron M with 1.0 GHz. The i82855GME chipset features a fast graphics engine with 2D and 3D capabilities and delivers outstanding graphics performance. Up to 1 GB RAM is supported. There is a Gigabit Ethernet controller integrated onboard as well as two serial ports. USB, ATA-100, and AC97 sound come as standard. SVGA monitors and TFT flat panels can be connected through the dual channel LVDS interface. LEDs for power, watchdog, Ethernet, and life signalization support troubleshooting. Models for the extended temperature range of -40 °C to +85 °C are available.

FEATURES

- Intel® Pentium® M or Celeron® M processors
- 1 GB DDR-SODIMM RAM maximum
- SXGA: 2048 x 1536 pixels
- Dual channel LVDS for displays
- 10/100BASE-T Ethernet, 6 x USB 2.0, 2 x RS-232 or RS-485
- Low power consumption, 16-32 W depending on processor
- Passive cooling possible. Extended temperature range available for 1.0 GHz version

For more information, contact: ussales@lippertembedded.com

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THE EMBEDDED PC COMPANY

Cool SpaceRunner-LX800

The Cool SpaceRunner-LX800 is a fully self-contained, rugged single board computer. Its x86-compatible AMD Geode LX800 processor comes with graphics, 256 MB RAM, and 2 GB solid state disk without any moving parts. Both VGA or LVDS displays are directly supported. All standard peripherals are already integrated onboard. There is a LAN interface, four USB host ports, and two serial interfaces, which are user configurable to handle either RS-232 or RS-485 levels. An IDE adapter for external hard disks and a flexible parallel printer port complete the interface range.

With its soldered RAM, solid state disk, and very low power consumption, the Cool SpaceRunner-LX800 is the best choice for devices that need to operate in adverse environments.

FEATURES

- AMD Geode™ LX800 processor at 500 MHz with 256 MB soldered DDR333 RAM
- CRT, LVDS, with backlight and resolutions up to 1920 x 1440 pixels
- IDE Ultra ATA-100, 2 GB solid state disk
- 10/100BASE-T Ethernet, 4 x USB 2.0 ports, 2 serial ports that support RS-232/422/485
- Low power consumption
- Extended temperature range -40 °C to +85 °C

For more information, contact: ussales@lippertembedded.com

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LiPPERT Embedded Computers

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404-459-2870
www.lippertembedded.com

LIPPERT
THE EMBEDDED PC COMPANY

CoreExpress™-ECO

The CoreExpress™-ECO is a Computer-On-Module (COM) implementation in a 58 mm x 65 mm format. It is based on the CoreExpress™ specification, a no-compromise new development that leaves the traditional PC interfaces behind.

CoreExpress™ modules are legacy-free, meaning they come with digital interfaces only; when an application requires analog signals, these can easily be implemented on the carrier board. The tiny module size stems from today's advanced chip technology that not only reduces the required space but also allows for very low power processors.

The low power requirements lead to minimum cooling efforts, decreasing the total dimensions further when compared to existing solutions.

FEATURES

- Intel® Atom™ processor with either 512 MB or 1 GB soldered DDR2 RAM
- 2 PCI Express lanes, SDIO/MMC, SMBus, GMBus/DDC, LPC bus
- 2 graphics ports (LVDS and SDVO), HD audio, 8 USB 2.0 ports, IDE, UEFI BIOS
- Only 58 mm x 65 mm and 28 grams
- 5 V only supply, 5 W
- Optional extended temperature range -40 °C to +85 °C

For more information, contact: ussales@lippertembedded.com

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Embedded Computing Design Resource Guide 2008

Micro/sys

3730 Park Place • Montrose, CA 91020
818-244-4600
www.embeddedsys.com

MICRO/SYS

Micro/sys RCB1626

The RCB1626 provides a fast Intel XScale RISC processor with lots of memory on a 104 form factor. The ARM architecture means the RCB1626 draws little power at its full 533 MHz clock speed, reducing the power and cooling requirements. Onboard I/O includes 24 TTL digital I/O lines, dual 10/100BASE-T Ethernet, CompactFlash, and 4 serial ports. This powerful RCB has the latest I/O expansion channel: StackableUSB. More than 5 StackableUSB I/O boards can be plugged in, top and/or bottom side, to allow maximum flexibility. With up to 64 MB of onboard linear flash and 128 MB of SDRAM, high-level operating systems (Linux and WinCE) can be installed. The onboard CompactFlash connector provides expansion to standard CompactFlash cards for additional storage.

FEATURES

- Industry's first StackableUSB™ low-power ARM processor
- 7 USB ports and 4 serial ports
- 266 to 533 MHz clock speed; dual 10/100BASE-T Ethernet; 128 MB SDRAM, 64 MB flash
- CompactFlash connector
- 24 bits of digital I/O
- Extended temperature available

StackableUSB

For more information, contact: info@embeddedsys.com

RSC# 36863 @ www.embedded-computing.com/rsc

Micro/sys

3730 Park Place • Montrose, CA 91020
818-244-4600
www.embeddedsys.com

Micro/sys USB1700

The USB1700 GPS Receiver is a global positioning module that stacks directly onto any StackableUSB CPU to provide 12-channel WAAS-capable GPS functionality. This quarter-sized 104 I/O board delivers improved field performance plus easy hardware and software integration since it uses a standard USB format. The USB connection can be established by stacking 2 boards via a StackableUSB bus forming a rugged brick or by interfacing to a PC via a USB cable. With extremely fast startup times for determining location and tracking movement, it performs well in challenging foliage-canopy, multipath, and urban-canyon environments, making it ideal for rugged environments. It also serves well on desktops with limited space and the traditional USB cabling.

FEATURES

- First StackableUSB™ global positioning module
- Small, quarter-size 104 stacking board (1.85" x 1.78")
- 12-channel WAAS-capable GPS module
- Powered by the Trimble Copernicus GPS core module
- RF antenna option for connection to a passive antenna for the GPS module
- Extended temperature available

StackableUSB

For more information, contact: info@embeddedsys.com

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PDSi Pinnacle Data Systems, Inc.

6600 Port Road, Suite 100 • Groveport, OH 43125
Tel: 614-748-1150 • Fax: 614-409-1269
www.pinnacle.com/products2/comexpress/module

COMX-S1 COM Express Board

PDSi's new AMD Socket S1 COM Express Module (COMX-S1) is a low cost, compact, embeddable computing core with the capability to drive a broad range of OEM applications especially where video output is required. Several performance levels are available, from the ultra low-watt AMD Sempron™ processors (ideal for fanless applications) to the dual-core muscle of AMD Turion™ X2 Mobile Technology. The AMD M690 Series Chipset delivers exceptional built-in graphics. COMX-S1 significantly reduces initial platform design time while enabling convenient serviceability and future upgradeability – just unplug and update the COM Module and leave your application-specific I/O carrier in place. Bring increased flexibility and modularity to your applications.

For a customized application to your systems, please contact rob.ellis@pinnacle.com.

FEATURES

- Supports AMD Socket S1 family including AMD Sempron and AMD Turion X2 Dual-Core Mobile Technology
- Perfect for embedded OEM applications requiring future upgradeability. Extended availability assured
- AMD M690 Series Chipset for flexible multi-output video including dual LVDS, analog VGA, optional TV Out
- PICMG Type 2 compatible: 4 PCIe, 8 USB, 4 SATA II, 1 Ethernet port
- MicroATX Carrier Board and packaged Development Systems available for rapid startup
- Up to 4 GB DDR2 667 SDRAM (1 – 200 pin SODIMM socket)

For more information, contact: rob.ellis@pinnacle.com

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Radicom Research, Inc.
2148 Bering Drive • San Jose, CA 95131
408-383-9006
www.radi.com

Radicom
Affordable Modem Technology

TinyModem

Measuring just 0.66" x 1.25" x 0.75", the TinyModem is the world's smallest modem module with an RJ-11 connector built in.

The TinyModem is fully self-contained. Standard features include caller ID, line-in-use, extension pickup, call-waiting, remote hang-up detection, data rates from 300 to 56 Kbps, 14.4 Kbps fax rate, and voice playback and recording capability.

The TinyModem gives embedded applications designers more flexibility to add functionality to communications-enabled systems. Its ultra low power consumption does not tax resources, and the TinyModem's tight configuration frees up valuable real estate for additional features in more compact designs.

The TinyModem has been FCC68, CS-03, and CTR21 certified with CE Marking, and is c/UL, EN60950-1, IEC60950-1 approved. The TinyModem is RoHS compliant, and conforms to all standards required for immediate shipping to Europe and around the globe.

The TinyModem is also IEC60601-1, Medical Electronics certified with tolerating isolation voltage up to 3,750 V. The TinyModem features -40 °C to +85 °C operating temperature. It is ideal for applications including Medical Devices, Remote Monitoring and Data Collection Systems, POS, Home Security Networks, Handheld Computers, and any small footprint device that needs to communicate reliably.

Radicom works with OEM customers closely to ensure their embedded data communications systems are successfully integrated at the lowest cost with the highest capability. Radicom modifies its award-winning modems to meet specific application requirements, and designs custom modems to fit special needs, maintaining the fastest turn-around time in the industry.

FEATURES

- -40 °C to +85 °C operating temperature; Enhanced EMC/EMI shielding
- Serial TTL interface, data, fax, voice playback, and recording
- Standard AT commands support; Generates and detects DTMF tones in voice mode
- Single 3.3 V supply, 5 V tolerant I/O; 3,750 V high voltage isolation
- Low power consumption, sleep mode support
- Up to 56 Kbps data speeds downstream
- Up to 48 Kbps data speeds upstream
- V.42bis and MNP 5 data compression
- V.42 LAPM and MNP 2-4 error correction
- Transferable FCC68, CS-03, and CTR21 certifications with CE Marking
- IEC60601-1 (Medical Electronics) certified
- c/UL 60950-1 recognized components; EN60950-1, IEC60950-1 safety approved

For more information, contact: atsau@radi.com

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Small Form Factor SIG

2784 Homestead Road, Suite 269 • Santa Clara, CA 95051
408-480-7900
www.sff-sig.org

Consortium for SFF

The Small Form Factor Special Interest Group (SFF-SIG) is a worldwide trade group based in Silicon Valley that develops, promotes, and supports specifications for small form factor circuit boards and related technologies. The SFF-SIG is the only industry group with an entire family of form factor specifications with bus expansion optimized for the new sub-10 W 2-chip x86 platforms including Intel's Atom™ and VIA's Nano™ CPUs. The expansion connector, SUMIT™, connects easily to high and low speed I/O, and board designs are already underway.

Additionally, SFF-SIG seeks to enable practical, mainstream, real-world applications. SFF appreciates the extensive investments in off-the-shelf products made by system OEMs and seeks to preserve those investments while smoothly embracing new technologies. Consolidating suppliers around standards, facilitating cross-platform interoperability, and architecting common expansion schemes are all goals of SFF. As history indicates, standards with rich "ecosystems" endure the test of time. SFF is concerned about all components of the system-level solution. It doesn't help much to shrink the board if the cabling, storage, and thermal issues are problematic.

Working groups are formed to address specific topics and formats in detail. Incubator Groups are spawned rapidly when new or existing voting members have a draft specification or even a rough idea. Other members apply to join the Incubator Group. Groups are listed to the right.

If your company wants to participate in or stay abreast of the development of important new standards shaping the evolution of electronics systems, you should consider membership. System OEMs and suppliers are welcome.

Visit www.sff-sig.org for the latest, most up-to-date information.

FEATURES

- SUMIT™ and Express104™ Specifications are already released. E-mail info@sff-sig.org to request
- [PSG] Pico-ITX with SUMIT Incubator Group, specification in review
- [Q7G] Qseven Incubator Group, specification in review
- [FSG] Flash Storage Incubator Group, specification in development
- [SCG] SFF-COM Incubator Group, specification in development
- [PCG] Pico-COM Incubator Group, group formation underway
- [LPEG] Low-Power External Graphics Incubator Group, group formation underway
- [RMG] RISC Module Incubator Group, group formation underway
- [LFG] Legacy Firmware Incubator Group, group formation underway
- [RRG] Rugged RAM Incubator Group, group formation underway

For more information, contact: info@sff-sig.org

RSC# 37843 @ www.embedded-computing.com/rsc

Technologic Systems
16610 East Laser Drive, Suite 10 • Fountain Hills, AZ 85268
480-837-5200
www.embeddedARM.com

200 MHz ARM9 SBCs

Low Power, High Reliability, and Performance at Great Prices

Technologic Systems' 200 MHz ARM9 series SBCs are rugged, low power computers that run without fans or heat sinks between -40 °C to +85 °C. In a programmable power-save state, the TS-7260 ultra low power model can draw less than 1/2 W of power, allowing it to be powered by small solar panels or inexpensive batteries. Our SBCs are available in thousands of Commercial-Off-The-Shelf configurations and are available to ship today. Eight rugged computers are included in this series: TS-7200, TS-7250, TS-7260, TS-7300, TS-7350, TS-7370, TS-7390, and TS-7400.

PC/104 Expansion Bus

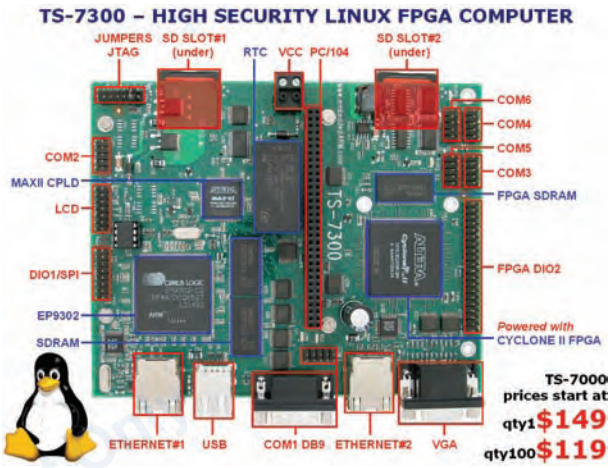
The industry standard 8/16-bit PC/104 bus on our SBCs allows you to easily add features to your project by stacking feature-specific peripheral boards from any third party vendor. Technologic Systems has a broad line of peripherals including video, CAN Bus, DIO, Ethernet ports, cellular/line modems, and battery backup. We also offer custom peripheral and SBC designs at competitive prices.

Operating Systems and Software for ARM

These computers use eCos/RedBoot to load the TS-Linux, a compact distribution based on the 2.4 Kernel and Busybox. Optional support for RTAI real-time extension and 2.6 Kernel is provided. TS-Linux includes the Apache web server, SSH, FTP, and telnet servers. The full-featured Debian distribution is also available using larger Flash media. It is identical to the desktop version and enables fast application development in a C/C++ embedded environment. In addition, Linux-boots-Linux and fast-bootup Linux solutions are available, enabling boot times as low as 1.10 seconds.

New TS-7350, TS-7370 LCD-Ready FPGA Computers

The TS-7350 and TS-7370 are ARM9 CPU embedded computers designed to provide flexibility through the integration of a programmable 5K LUT Lattice XP2 FPGA. These products are LCD-ready computers as the FPGA is connected to a dedicated RAM frame buffer, meaning that a custom video core can be included on the FPGA to provide an interface to most color TFT-LCD panels. The 64-pin PC/104 signals are connected straight to the FPGA, which brings the video signals out through the PC/104 connector, allowing customers to design their own physical video interfaces to their LCD displays of choice.



FEATURES

- 200 MHz ARM9 processor with MMU, up to 128 MB of RAM and up to 256 MB of onboard Flash, user-programmable onboard FPGA
- Two USB, up to two 10/100 Ethernet, up to 10 COM ports, 800 x 600 VGA video, SD card or CompactFlash slot(s), SPI bus
- LCD and keypad ports, A/D converters, up to 55 GP-DIO lines, TS-XDIO for PWM and quadrature counter, watchdog timer
- PC/104 bus with many available peripherals – VGA video, CAN Bus, GSM/line modems, serial ports, DIO lines, battery backup
- Out-of-the-box productivity – Quick boot to full-featured Linux Kernel 2.4.26 or 2.6.21 through RedBoot or Linux bootloader
- Runs TS-Linux compact file system and the Debian Linux embedded distribution; supports RTAI/C/C++/Java
- Under 2 seconds fast bootup to Linux solutions available along with Linux-based bootloader
- Cool-running – no fan or heat sink from -40 °C to +85 °C
- Ultra low power – 4.5-20 VDC input voltage (default 5 VDC) with power as low as 1/4 W; under 2 W at full speed default
- Options include larger Flash memory drives, RTC, USB 802.11g Wi-Fi, 12-bit 8-channel ADC, temperature sensor, etc.
- Full-featured TS-ARM Development Kit enables rapid application development
- Extended product lifetime – Technologic Systems has never discontinued a product in more than 20 years of business

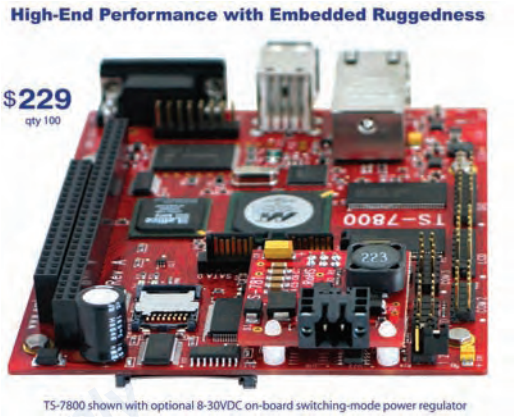
For more information, contact: info@embeddedARM.com

RSC# 30234 @ www.embedded-computing.com/rsc

Technologic Systems
16610 East Laser Drive, Suite 10 • Fountain Hills, AZ 85268
480-837-5200
www.embeddedARM.com

TS-7800 500 MHz ARM9 SBC

The TS-7800 is a RoHS compliant SBC based on a 500 MHz ARM9 CPU with PCI bus that provides a standard set of onboard peripherals such as GbE, dual SATA, and dual high-speed host/slave USB 2.0. The TS-7800 also features an FPGA that is programmable via Linux and provides extra peripherals such as 110 GPIO lines, additional serial ports, and dual SD card sockets. On the software side, the TS-7800 uses a Linux 2.6 Kernel that allows bootup in 0.69 seconds and provides driver support for all onboard hardware. The 512 MB onboard Flash enables installation of full Debian with development environment. The TS-7800 is backward compatible with our TS-72xx computers, providing three times more performance and higher-end features with an identical footprint.



TS-7800 shown with optional 8-30VDC on-board switching-mode power regulator

0.69 Seconds Bootup Firmware

The TS-7800 bootstrap combines FPGA hardware logic, specific bootup firmware, and Kernel tweaks to ensure fast boot time, security, and more:

- Linux-based bootloader boots Linux 2.6 Kernel to shell-prompt in 0.69 seconds from onboard Flash. Also boots from SD card
- Full Debian can be installed into onboard Flash from a USB Flash dongle, eliminating the need to use miniaturized niche embedded Linux distributions or blast/boot boards
- Unbrickable design ensures 100 percent recoverability from SD card in case of onboard Flash erasure

12,000 LUT FPGA

- Implements extra onboard peripherals
- Connects to CPU via 50 MHz local PCI bus
- Default load uses PC/104 connector either as GPIO or PC/104 bus

Linux 2.6, Debian, and Eclipse IDE support

The TS-7800 is shipped with Linux 2.6 Kernel and the Debian distribution on onboard Flash. This default configuration creates an embedded system that can run a wide range of server services, desktop-like applications, and development tools. Technologic Systems also provides the Eclipse IDE for Windows, configured for cross-architecture development and pre-installed on a 2 GB SD card.

FEATURES

- 500 MHz ARM9 CPU
- Internal PCI bus, PC/104 connector
- 128 MB DDR-RAM
- 512 MB NAND Flash (17 MBps)
- 12,000 LUT onboard FPGA
- 2 SD card slots (1 MicroSD, 1 full-SD)
- 2 SATA ports
- 2 USB 2.0 480 Mbps host/slave
- GbE, 10/100/1000 speeds
- 5 10-bit ADC channels
- 10 serial ports, 2 optional RS-485
- 110 GPIO (86 as a PC/104 bus)
- Matrix keypad and text LCD support
- Optional temperature sensor, RTC, and Wi-Fi
- Low-power (4 W at 5 V)
- Sleep mode (uses 200 microamps)
- Fanless operation from -20 °C to +70 °C
- Linux boot time in 0.69 seconds
- Kernel 2.6 and Debian Linux
- **Visit our new website powered by a TS-7800**

For more information, contact: info@embeddedARM.com

RSC# 33645 @ www.embedded-computing.com/rsc

Themis Computer

47200 Bayside Parkway • Fremont, CA 94538
510-252-0870
www.themis.com/prod/t2bc.htm

T2BC Blade Server

Themis' new T2BC is for use in the entire family of IBM® BladeCenter® chassis. The T2BC is a cost-efficient uniprocessor blade that offers the same reliability and availability that IT organizations expect from servers that run the Sun® Solaris™ 10 OS.

The T2BC Blade Server enables Solaris applications to run natively on an UltraSPARC® T2® Chip Multi-Threading (CMT) processor. The T2BC functions as an independent Sun T2 server running the Solaris 10 operating system. The T2BC can be managed by Sun's Integrated Lights Out Management (ILOM) tools. The T2BC can share the same chassis with server blades that utilize other processor architectures and operating systems. The T2BC processor's eight cores each support eight threads, a total of 64 "hot" threads per socket.

FEATURES

- Qualified for use in IBM® BladeCenter® BCT, H, and BCH chassis with other IBM blade servers
- Processors: One (1) UltraSPARC® T2® processor per server (eight cores per T2 processor) running at 1.2 GHz
- Memory: Up to 32 GB (fully buffered DDR II memory), up to 500 GB SAS or SATA HDD storage
- Fibre Channel and InfiniBand support to be available via optional daughtercards
- Integrated dual Gigabit and 10-Gigabit Ethernet controllers
- Runs current Solaris 10 applications unmodified and Solaris 8/9 applications with Sun's Migration Assistant

For more information, contact: info@themis.com

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Themis Computer

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www.themis.com/prod/hardware/tc2d64.htm

TC2D64 VMEbus SBC

Themis' TC2D64™ is a new 6U VMEbus computer based on the Intel® Core™2 Duo processor. The TC2D64 can be configured with 2.16 GHz or 1.5 GHz Intel Core 2 Duo processors, depending on available backplane slots and cooling airflow. An onboard 64-bit PMC slot allows expansion using a wide variety of PMC cards, and PMC carrier cards allow expansion into four PMC slots, including two XMC slots. Operating system support includes Solaris™ 10 as well as Windows® and Linux®.

Themis' TC2D64 is designed for a wide range of demanding applications. Like all of Themis' VME products, TC2D64 memory modules are designed to withstand high shock and vibration. The TC2D64 is fully RoHS-compliant.

FEATURES

- Intel® Core™2 Duo processor with clock rates of 1.5 GHz to 2.16 GHz and Intel 7520 chipset used in servers
- Memory – up to 4 GB DDR II SDRAM and 1 MB flash memory (512 KB for BIOS, 512 KB user)
- Error Detection/Correction – 8-bit ECC to main memory for single error correction and double error detection
- Onboard PMC slot and an optional carrier card add up to three (3) PMC slots
- The TC2D64 is designed for a range of applications in challenging environments – up to 30G shock at 20 ms
- Operating system support – 64-bit Solaris™ 10, Linux®, and Microsoft® Windows®

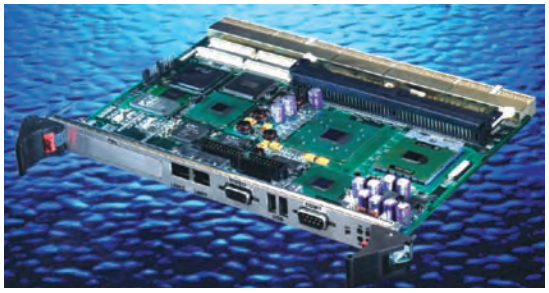
For more information, contact: info@themis.com

RSC# 36187 @ www.embedded-computing.com/rsc

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

CP16

Trenton's CP16 uses the Intel® Pentium® M processor to provide maximum processing capability and thermal performance. Key features designed into the CP16 include a front access PMC slot, local storage options, dual Gigabit Ethernet ports, and support for up to 2 GB of DDR220/266 memory. A rear transition module, RTM25, is available with or without dual Ultra320 SCSI interfaces and provides rear access to the SBC's I/O ports and status LEDs. PICMG® 2.16 (Packet Switching Backplane), 2.1/2.12 (Hot Swap), 2.9 (IPMI) compliance, and features like a local storage option and the ability to turn off the CompactPCI® bus enable the CP16 to excel in a wide variety of either CompactPCI system board or server blade computing applications.



FEATURES

- PICMG® 2.16 Packet Switching Backplane and PICMG® 2.1 (Hot Swap) support
- Intel® Pentium® M processor with the Intel® E7501 chipset
- Supports up to 2 GB of DDR200/266 plug-in memory modules
- Dual Gigabit Ethernet and Enhanced ATI® video
- Ability to turn off the CompactPCI® bus for server blade applications
- Optional rear transition module available with or without dual Ultra320 SCSI

For more information, contact: info@TrentonTechnology.com

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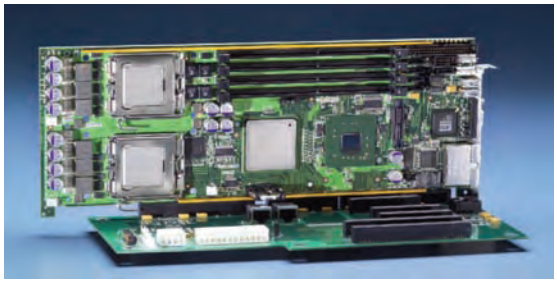
Trenton Technology
2350 Centennial Drive • Gainesville, GA 30504
770-287-3100
www.TrentonTechnology.com

MCX/MCG Series

Trenton's MCX/MCG series of PICMG® 1.3 or SHB Express™ System Host Boards (SHBs) offers a wide variety of board configurations designed to excel in your most demanding and diverse server-class and graphics-class computing applications. Dual-core processor options provide two and quad-core processors provide four execution cores per CPU. For dual-processor board configurations, each CPU has its own independent system bus to reduce data bottlenecks while maximizing processing throughput. The four-channel memory interface features DDR2-667 FB-DIMMS with a maximum of 16 GB. An extended memory SHB configuration is available that supports up to 32 GB of system memory.



FEATURES

- One circuit board plus two quad-core processors deliver eight execution cores of outstanding performance
- Single circuit board SHB design featuring dual- or quad-core Intel® Xeon® processors with independent FSBs
- Quad-channel DDR2-667 memory interface supports up to 32 GB of system memory
- Supports 32-bit/64-bit applications and x16, x8, x4, and x1 PCI Express links to a PICMG® 1.3 backplane
- Six Serial ATA/300 interfaces with RAID 0, 1, 5, and 10 support and seven USB 2.0 interfaces
- Supports three Gigabit Ethernet interfaces: two to the board's I/O bracket and one down to the backplane

For more information, contact: info@TrentonTechnology.com

RSC# 32706 @ www.embedded-computing.com/rsc

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

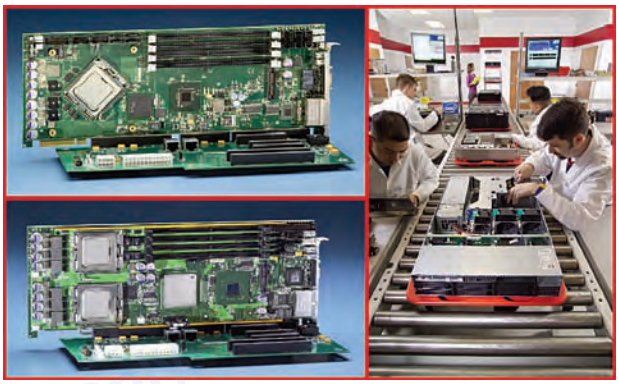
TQ9, MCX & Systems

From air to sea to land-based military systems you will find Trenton hardware. Trenton Technology has built a reputation among our customers as one of the nation's leading providers of high quality Single Board Computers, system host boards, and backplanes. We are a US based electronics engineering and manufacturing company that has developed what is arguably the most reliable array of products in the field.

Trenton's latest Single Board Computer is the TQ9 and it supports a wide variety of single-, dual-, and quad-core Intel® Core™2 processors. New I/O interface capabilities include an audio codec interface, two eSATA connections to the backplane, and a dozen USB interfaces. A system designed with the TQ9 supports option cards from x16 PCI Express® to legacy 32-bit/33 MHz PCI cards. The single-processor TQ9 complements Trenton's latest dual-processor MCX- and MCG-series of SBCs. The MCX- and MCG-series of Single Board Computers feature the latest dual- and quad-core Intel® Xeon® processors.

Trenton's extensive line of PICMG 1.3 backplanes supports a wide variety of PCI Express®, PCI-X, PCI, and even legacy or purpose-built ISA option card combinations. All of Trenton's PICMG 1.3 products are designed to provide many years of trouble-free service in robust embedded computing applications and come with a standard five-year factory warranty.

Trenton Systems, Inc. (www.TrentonSystems.com) is a new company made up of experienced board-level and industrial computer system engineers that specialize in providing robust computing systems for aerospace and military applications. Reliability and system longevity are key components of industrial computers purchased from Trenton Systems. We engineer in reliability and peace of mind by using long-life embedded sub-components and system revision control to ensure that the system configurations purchased today will remain available throughout the project's life.



FEATURES

- TQ9 – Long-life/embedded dual-core Intel® Core™2 processor E8400 (pending) and the Intel® Core™2 Duo processor E6400 or E4300
- TQ9 – Intel® Q35 Express chipset and the ICH9DO with built-in SATA RAID support, quad-core processor options supported
- TQ9 – Four DDR2 DIMM sockets, dual channel DDR2-800 memory interface (8 GB maximum), Audio Codec interface, and analog audio port
- TQ9 – Dual Gigabit Ethernet, eight USB, and four SATA II 300 ports; one 10/100BASE-T Ethernet, two eSATA II, and four USB backplane interfaces
- TQ9 – Video support for this PCI Express® graphics-class SHB includes x16 video and graphics cards, ADD2 cards, or onboard video port
- MCX/MCG Boards – A single-board design with two processors that provide up to eight processor execution cores per board
- MCX – Server-class SHB, dual- or quad-core Intel® Xeon® processors, Intel® 5000P chipset, independent 1,066/1,333 MHz system bus for each CPU
- MCG – Graphics-class SHB, dual-, quad-core Intel® Xeon® processors, Intel® 5000X chipset, independent 1,066/1,333 MHz system bus for each CPU
- MCX/MCG Boards – Four-channel system memory interface with 16 GB and 32 GB support options, six SATA II 300 ports with RAID support
- MCX/MCG Boards – Three Gigabit Ethernet interfaces, eight USB 2.0 ports, supports PCI Express®, PCI-X, and PCI option cards
- Backplanes – PICMG 1.3 Server/Graphics-class, models available to support x16, x8, x4, x1 PCI Express®, PCI-X, PCI, and ISA cards
- Systems – Standard and custom products, 19" rackmount, 2U, 4U, 6U form factors, motherboard and PICMG 1.x SBCs, CompactPCI, and MicroTCA

For more information, contact: info@TrentonTechnology.com

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Tri-M Engineering
100-1407 Kebet Way • Port Coquitlam, BC V3C6L3 Canada
604-945-9565
www.Tri-M.com

VSX104

The VSX104 is a 300 MHz fanless CPU module featuring a complement of robust features such as extended temperature operation and soldered DDR2 RAM integrated in a small, low power package. The VSX104 is RoHS compliant and conforms to the PC/104 form factor, which allows users to easily add a wide range of low-cost I/O options.

The VSX104's 300 MHz DM&P Vortex86SX System-on-Chip (SoC) is a high performance and fully static 32-bit x86 processor designed to work with embedded operating systems including Windows® CE, Linux, DOS, and most popular 32-bit RTOSs. Standard features of the VSX104 include 128 MB soldered on DDR2 RAM, four COM ports, two USB 2.0 ports, and one 10/100 Ethernet port. In addition to 2 MB onboard SPI flash (floppy emulation), it also includes both a Type I CompactFlash™ socket as well as a microSD socket. An onboard redundancy port allows for two VSX104 modules to be stacked together, and system expansion is supported by the PC/104 interface.

The VSX104 is a compact design measuring 3.55" x 3.775" x 0.9" and has an operating temperature of -40 °C to +85 °C. Single +5 VDC power is supplied through the PC/104 bus or 2-position screw terminal and total power consumption is a mere 1.85 Watts. The VSX104 is in full production with units available from stock.

FEATURES

- 300 MHz Vortex86SX SoC
- 128 MB soldered DDR2 RAM
- Integrated 10/100 LAN, 4x RS-232, 2x USB 2.0, 1x LPT, keyboard, mouse
- 2 MB onboard SPI flash
- Fanless operation for high reliability
- 1.85 Watt power consumption
- Type 1 CompactFlash™ and microSD sockets
- Extended temperature operation: -40 °C to +85 °C
- Onboard redundancy port
- RoHS compliant
- Small footprint: 3.55" x 3.775" x 0.9"
- Designed to work with embedded operating systems including Windows® CE, Linux, DOS

For more information, contact: info@tri-m.com

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Trucomp, Inc.

1560 Sawgrass Corporate Parkway • Sunrise, FL 33323
954-331-4661
www.trucompusa.com

PX5 COM Express™

Trucomp offers a complete line of COM Express™ Modules for Entry Level, Mid Range, and High End applications. The P65, using the Mobile Intel® 965GME Express chipset, is powered by the latest technology including the Intel® Core™2 Duo Processor up to 2.2 GHz. The P45 is based on the Mobile Intel® 945GME Express chipset. The P15 uses the Mobile Intel® 915GME Express chipset and is the best candidate for low cost applications. The ComBB, PICMG® COM Express™ Rev 1.0 compliant Micro-ATX Baseboard is the ideal testing platform for the entire COM Express™ series. E.E.P.D. GmbH, a Trucomp company, specializes in the design and manufacture of advanced and innovative Embedded Computer Solutions for the OEM market.

FEATURES

- Up to 6 PCI Express lanes
- Audio, SATA, and 8x USB 2.0 interfaces
- 1 GbE option available
- Analog VGA and Serial DVO interfaces
- LPC interface for legacy devices support
- Customized and OEM versions available upon request

For more information, contact: sales@trucompusa.com

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Embedded Computing Design Resource Guide 2008

VersaLogic Corporation

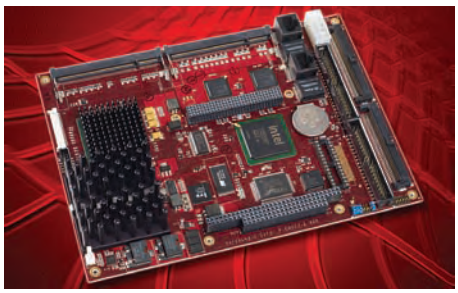
3888 Stewart Road • Eugene, OR 97402
541-485-8575
www.VersaLogic.com

Cobra ULV (EBX-12)

The latest release in VersaLogic's Cobra EBX Single Board Computer (SBC) family features an Intel ULV Celeron M 1.0 GHz processor and fanless operation. The advanced design makes it suitable for a wide range of higher-end applications including telecommunications devices and advanced security systems.

Standard onboard features include Extreme Graphics 2 video, dual 10/100 Ethernet, USB 2.0 support, and RS-232/422/485 COM ports. Integrated Digital I/O and optional Analog I/O reduce the need for external expansion.

The RoHS-compliant Cobra features an OEM-enhanced embedded BIOS and is compatible with a variety of embedded operating systems, including Windows, Linux, VxWorks, and QNX. VersaLogic will customize the Cobra in OEM quantities as low as 100 pieces.



FEATURES

- Intel ULV Celeron M 1.0 GHz processor
- Fanless operation
- Extreme Graphics 2 video
- High speed DDR RAM
- Integrated I/O and Ethernet
- CompactFlash socket

For more information, contact: Info@VersaLogic.com

RSC# 36927 @ www.embedded-computing.com/rsc

VersaLogic Corporation

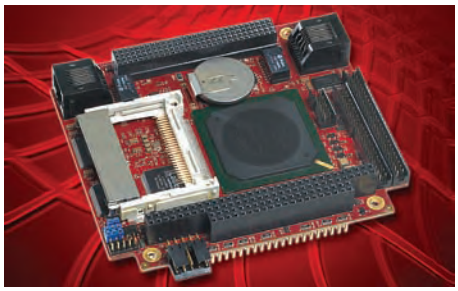
3888 Stewart Road • Eugene, OR 97402
541-485-8575
www.VersaLogic.com

Cougar (EPM-14)

VersaLogic's new Cougar is a PC/104-*Plus* Single Board Computer (SBC) targeted at military, homeland security, avionics, and medical applications. The Cougar features an AMD LX 800 processor, fanless extended temperature operation, and high resistance to mechanical and thermal shock while drawing less than five watts of power.

Standard onboard features include high-performance video, dual 10/100 Ethernet, USB 2.0 support, and RS-232/422/485 COM ports. The high-resolution video output can be configured for standard desktop-type displays or LVDS flat panels.

The RoHS-compliant Cougar is compatible with a variety of embedded operating systems, including Windows, Linux, VxWorks, and QNX. VersaLogic will customize the Cougar in OEM quantities as low as 100 pieces.



FEATURES

- AMD LX 800 processor
- 256 MB soldered-on DDR memory
- Fanless extended temperature operation
- High-performance video
- Integrated I/O and Ethernet
- CompactFlash socket

For more information, contact: Info@VersaLogic.com

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Embedded Computing Design Resource Guide 2008

WinSystems, Inc.

715 Stadium Drive • Arlington, TX 76011
817-274-7553
www.winsystems.com

M2M Enabled SBC

Designed to provide seamless machine-to-machine connectivity, the LBC-GX500 supports a wide variety of wired and wireless standards with an operational temperature of -40 °C to +85 °C. The LBC-GX500's connectivity options include 802.11 wireless Ethernet, GSM/GPRS/CDMA cellular modem, ZigBee wireless module, 10/100 wired Ethernet, 56 kbps POTS modem, six USB ports, and ten COM channels.

In addition to its networking capability, the WinSystems' LBC-GX500 is a full-featured SBC with a variety of onboard peripherals. Features include 48 parallel digital I/O lines, video/flat panel controller, keyboard controller, LPT port, and AC97 audio with an optional 12-bit A/D converter. Windows® and Linux Quick Start Kits are available to help with program development.

FEATURES

- AMD Geode GX500@1W processor
- High-resolution video controller supports CRT or LCD panels
- 10/100 Mbps Ethernet controller and wireless 802.11
- Supports POTS modem, GPRS/CDMA cellular modem, ZigBee, and optional GPS receiver module
- Six USB ports, ten COM ports, 48 digital I/O lines, IDE, FDC, keyboard, and PS/2 mouse interface
- -40 °C to +85 °C fanless operational temperature range

For more information, contact: info@winsystems.com

RSC# 35973 @ www.embedded-computing.com/rsc

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

Fanless 1 GHz SBC

The EBC-855-G-1G-0 is a highly integrated, low-cost ($595) Single Board Computer designed for rugged, performance-driven applications. It operates over a temperature range of -40 °C to +70 °C without a fan and is designed for applications including industrial automation, security, medical/diagnostic equipment, MIL/COTS, test and measurement, and transportation. WinSystems uses chipsets from Intel's long life embedded road map to ensure longevity of the core technology.

The EBC-855-G includes support for both wired and wireless Ethernet (with remote boot capability), simultaneous support of both SVGA and LVDS flat panel video, four USB 2.0 ports, four serial COM ports, AC97 audio, PS/2 keyboard, LPT, and 48 lines of digital I/O. It supports up to 1 GB of industry-standard PC2700 SDRAM, up to 16 GB of CompactFlash, plus support for hard and floppy disk drives. PC/104 and PC/104-*Plus* expansion is supported for additional special I/O requirements.

It also supports advanced features such as custom splash screen, APM 1.2 and ACPI 1.0b power management modes, PXE boot, and multi-language support. The BIOS supports legacy operation of a USB keyboard and mouse, as well as booting from a USB floppy disk, USB keys, and other USB-connected mass storage devices.

The board supports Windows® XP embedded, Linux, and other x86-compatible RTOSes. The EBC-855-G requires only +5 V and typically draws 2.1 A with 1 GB of DDR SDRAM installed. A 1.8 GHz Pentium® M version is available. These features are also available in our EPX-855, an EPIC-compliant Single Board Computer.

FEATURES

- Intel® 1 GHz CPU (fanless), or higher-performance 1.8 GHz Pentium® M is available
- Intel® Extreme Graphics 2 technology supports CRT and LVDS flat panels simultaneously
- 10/100 Mbps Intel Ethernet controller
- 802.11a/b/g wireless supported
- Four serial COM ports, four USB 2.0 ports, and 48 bi-directional TTL digital I/O lines
- Bi-directional LPT port, AT keyboard, and FDC controller
- PC/104 and PC/104-*Plus* I/O expansion
- Offered in two form factors: EBX 5.75" x 8.0" and EPIC 4.5" x 6.5"
- Responsive and knowledgeable technical support
- Compatible with most x86 operating systems
- Long-term product availability
- Quick Start Kits for software development

For more information, contact: info@winsystems.com

RSC# 31925 @ www.embedded-computing.com/rsc

WinSystems, Inc.

715 Stadium Drive • Arlington, TX 76011
817-274-7553
www.winsystems.com

Video/Ethernet SBC

WinSystems' PPM-GX is a highly integrated, PC/104-*Plus* SBC designed for deeply embedded, space-limited, low power applications. It is a full-featured SBC that includes an AMD GX500 CPU, CRT and flat panel video, 10/100 Ethernet, USB, and four RS-232 COM channels.

It also includes the standard PC controllers for floppy disk, IDE hard disk, CompactFlash, mouse, keyboard, AC97 audio, and LPT. Its x86 PC software compatibility assures a wide range of tools to aid in your applications program development and checkout. The PPM-GX's extremely low power dissipation permits fanless operation.

The board operates from -40 °C to +85 °C for rugged applications requiring an embedded PC design. All these features are on a board measuring 3.6"x 3.8" (90 mm x 96 mm).

FEATURES

- AMD GX500@1W processor
- Video with CRT or flat panel support
- Ethernet, two USB ports, and four COM ports
- -40 °C to +85 °C operating temperature
- Small, rugged board
- Windows and Linux supported

For more information, contact: info@winsystems.com

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DMP Electronics, Inc.
8F, No. 12, Wu-Quan 7th Road, Wu-Gu Industrial Park
Wu Gu Xiang, Taipei, 248 Taiwan
886-2-2298-0770
www.vortex86sx.com

300 MHz Vortex86SX

The Vortex86SX System-on-Chip (SoC) was originally designed with Long-Product-Life-Cycle support to provide a product migration path to the existing user of the DMP M6117D chip, a 40 MHz 386SX System-on-Chip (SoC) introduced to the market in the early 1990s, reaching end-of-life in 2007.

The Vortex86SX chip is a 32-bit 300 MHz x86 System-on-Chip (SoC), built with a 0.13 micron process and ultra low power consumption design (less than 1 W). The Vortex86SX SoC integrated many of the common computing I/O and peripherals into a single chip design, a 27 mm x 27 mm 581-pin BGA package.

The Vortex86SX SoC supports Windows Embedded CE, Linux, DOS, and other Operating Systems. The SoC design integrates 32 KB write through direct map L1 cache, native 16-bit ISA bus, PCI Rev. 2.1 32-bit bus interface at 33 MHz, SDRAM, DDR2, ROM controller, Internal Peripheral Controllers (IPC) with DMA and interrupt timer/counter included, Serial Peripheral Interface (SPI), Fast Ethernet MAC, FIFO UART, USB 2.0 Host, IDE controller, and more into a single chip, System-on-Chip (SoC) design.

With its core design based on the matured x86 CPU architecture and rich set of integrated I/O peripherals and features and designed to function in harsh temperature ranges of -45 °C to +85 °C, the Vortex86SX provides the ideal hardware platform to design new generations of Industrial Single Board Computers and embedded controllers to build Automation Control, Medical, Automotive, Utility Metering, Firewall Router, Security Access, Thin Client, Intelligent RFID reader, RS-232 to TCP protocol converter, Home and Building Automation, and other devices.

FEATURES

- All-in-one x86 architecture in a single chip package
- Built-in 256 KB BIOS flash eliminates the need for external flash for the BIOS
- 10/100 Mbps Fast Ethernet MAC/PHY, ISA Bus, PCI Bus, LPC Bus, SPI, and JTAG
- SDRAM and DDR2 Memory Control Interface, 4 USB v2.0 host interface and 40 bits GPIO
- Five FIFO UARTs enable support for 5 serial ports without additional UART chip
- MTBF Counter and Hardware Redundancy to support mission critical applications
- Support DOS, Linux, Windows CE 5.0, Windows Embedded CE 6.0, and other RTOS
- Production quality reference design with Schematic, Layout, and Gerber files available
- 581-pin BGA with 1 mm ball pitch packaging, able to design using lower cost 4 layers PCB
- -40 °C to +85 °C Operating Temperature, meets RoHS compliance requirements
- 10 Year Life-Cycle-Support, 2007 to 2016
- ISOinChip for production tracking

For more information, contact: soc@dmp.com.tw

RSC# 36886 @ www.embedded-computing.com/rsc

Texas Instruments
12500 TI Boulevard • Dallas, TX 75243
972-644-5580
www.ti.com/omap35x

OMAP35x Processors

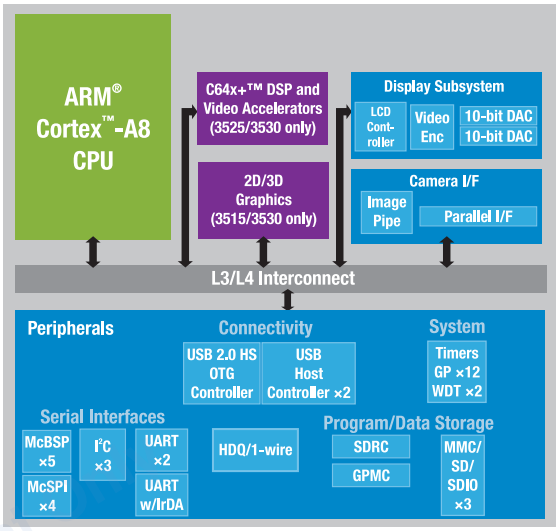
TI's OMAP™ platform delivers a wide variety of high-performance applications processors with fast, portable power and a robust support network with a software portfolio that includes open source. The complete platform allows for differentiation and rapid development of applications from multimedia-enhanced devices to general purpose computer applications that require Linux or Windows CE class operating systems.

OMAP35x Applications Processors

The multicore OMAP35x processors are based on the market's first broad offering of the ARM® Cortex™-A8 core to provide an unprecedented combination of laptop-like performance at handheld power levels in a single chip. With more than four times the processing power of today's 300 MHz ARM9 devices, the superscalar 600 MHz ARM Cortex-A8 core is integrated into four new OMAP35x applications processors.

These processors offer a variety of combinations of the Cortex-A8 core, multimedia-rich peripherals, OpenGL® ES 2.0 compatible graphics engine, video accelerators, and TMS320C64x+™ DSP core. The modular and extensible OMAP35x Evaluation Module (EVM) provides all the components needed to start developing today on the OMAP3503 processor including an OMAP3503 Linux board support package based on the 2.6.22 kernel.

Development with the OMAP35x devices is supported by the TI Developer Network, which encompasses an ecosystem of more than 400 companies with expertise reaching from operating system implementation to application user interfaces. The applications processors also support 12MP still image capture and are pin-for-pin compatible to make it easy for OEMs to efficiently create a complete product portfolio based on the single platform. Software developed on previous generations of ARM devices and the C64x+ DSP are also compatible with the cores on the OMAP35x devices.



FEATURES

- **OMAP3503 applications processor:** The OMAP3503 processor has a 600 MHz Cortex-A8 core with integrated peripherals. The Cortex-A8 achieves a 4x performance lift over the 300 MHz ARM9 by doubling the clock speed and doubling the MIPS per MHz efficiency. www.ti.com/omap3503
- **OMAP3515 applications processor:** For integrated photorealistic graphics, the OMAP3515 processor consists of the same peripheral set and ARM core as the OMAP3503, plus the first broadly available, integrated OpenGL ES 2.0 compatible hardware graphics engine. www.ti.com/omap3515
- **OMAP3525 applications processor:** The OMAP3525 processor addresses the need for high-definition video, imaging, audio, and multimedia acceleration capabilities with an integrated TMS320C64x+™ DSP combined with hardwired video and imaging processing accelerators, as well as dedicated video centric peripherals. www.ti.com/omap3525
- **OMAP3530 applications processor:** This superset device brings together the integrated ARM, DSP, graphics engine, and peripheral set into a single chip to enable performance-hungry, power-efficient productivity and entertainment applications. www.ti.com/omap3530
- **OMAP35x Evaluation Module (EVM):** The modular and extensible EVM enables developers to prototype complete systems and upgrade to future OMAP35x devices. Build low power/high-performance applications today with this complete development tool. www.ti.com/omap35x

For more information, contact: support@ti.com

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A ruggedized multi-computer workstation for applications that demand the best.

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- Can be factory configured to be powered from DC or AC sources
- All hard drives are removable
- Temperature range of -10C to 60C
- Each of the 4 computers can be independently configured with Core 2 Dual or Core 2 Quad Intel processors
- Supports multiple operating system configurations
- Can be factory configured as 4 independent computer systems or one cluster computer
- Each individual computer has 2 PCI slots, 1 PCIx-16 slot, up to 8G RAM, 4 SATA ports, 2 Gigabit Ethernet ports, and up to 12 USB 2.0 ports
- Jacyl Technology is the OEM of the Mission Workstation, contact us for custom configurations

Jacyl Technology specializes in the design and production of custom and COTS electronic systems for severe environment applications.

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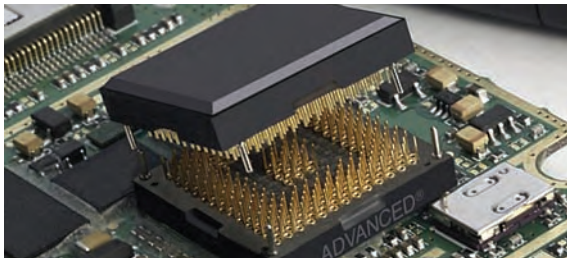
www.advanced.com

0.5mm BGA Socket

The newest BGA Socket Adapter System from Advanced is a breakthrough in fine pitch socket technology. Available in either 0.50mm or 0.65mm pitch, the patented design utilizes male and female pins in an interstitial pattern – offering the reliability of screw-machined terminals with multi-finger contacts in a compact SMT socket.

At only 2.00mm larger than the device package, this new design is perfect for development and validation of BGA and LGA devices, production level socketing, and can also be used for SMT board-to-board connector applications that mandate compact size and high reliability.



FEATURES

- Superior electrical performance – low signal attenuation up to 2.5 GHz
- Small overall size and same footprint as device – only 2.00mm larger than device
- Standard eutectic tin/lead solder balls or lead-free tin/silver/copper solder ball terminals for RoHS applications
- Field-proven screw machined terminals with multi-finger contacts are gold plated for gold/gold interconnect
- Unique alignment pins protect pin field and aid in hand placement with available optional stand-offs
- Sockets and adapters are provided with protective covers, which facilitate automated pick and place

For more information, contact: info@advanced.com

RSC# 30097 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Dawn VME Products

47915 Westinghouse Drive • Fremont, CA 94539
510-657-4444
www.dawnvme.com

ATR-3500 Series

The ATR-3500 Series Enclosure offers a rugged solution typically found in expensive conduction-cooled platforms, with the benefit of using standard, inexpensive VPX, CompactPCI®, or MicroTCA™ boards. This is made possible by Dawn's revolutionary Thermal Exchanged Flow™ (TEF) Cooling System. The TEF uses a two-stage cooling system consisting of a completely sealed inner-housing and a forced-air outer-housing. The inner-housing incorporates the computer board and I/O boards. The heat is conducted from the inner-housing via dip-brazed aluminum fins. The hot air is then exhausted from the outer-housing using two 165 CFM fans.

FEATURES

- Conduction-cooled solution, utilizing standard VPX, CompactPCI®, or MicroTCA™ boards
- Completely sealed electronics compartment
- Designed and engineered with extremely tight tolerances along with precision machined card guides
- Available in MicroTCA™, CompactPCI®, or VPX backplanes
- Able to accommodate standard front panels or Dawn's special rugged panels
- Complete with RuSH™ System Health Monitor. Ensures correct system operation by monitoring temperatures

For more information, contact: mail@dawnvme.com

RSC# 37680 @ www.embedded-computing.com/rsc

AP Labs
10864 Thornmint Road • San Diego, CA 92127
858-674-2850
www.aplabs.com

AP Labs

FS-7277 and Drive

The AP Labs FS-7277 Thermo Electric Chassis is a rugged ATR (long) enclosure designed for five slots of 6U VME or CompactPCI boards. Using Thermo Electric Technology (TET), this chassis enables the use of convection-cooled boards in a completely sealed (and waterproof) environment.

This unit will not only withstand temperature extremes, shock, vibration, humidity, and dust, but is also designed to withstand exposure to high-pressure sprays such as those experienced by military vehicles passing through a tank wash.

The cooling unit consists of a cold plate, a Thermo Electric module, multiple heat sinks, and fans to assist heat rejection. The cold surface faces the inside of the chassis and the hot side is exposed to the external environment. The Thermo Electric module transfers heat from the cold plate to the heat sink. The internal fans circulate cold air over the circuit cards and through the card cage.

The external fan forces air over the external air to air heat sink in order to dissipate the liberated heat. This particular cooling technique eases the challenges presented by high-performance embedded computers and the limited capabilities of conventional heat exchangers.

Pictured with the FS-7277, the AP Labs Disk Drive Enclosure is a low-power disk drive carrier, which can hold up to four SATA drives within LRUs. This high-performance disk drive unit is a sealed assembly and ideal for moisture resistant applications. The removable hard disk cartridge technology combines the features of a flexible-cartridge system and removable disk drive system, providing the convenience of data portability from your rugged unit to your lab setup. When used in conjunction with the FS-7277, this Thermo Electric ATR chassis is a rugged, reliable data recording system, with removable hard disk cartridge drives capable of acquiring real-time high-resolution RGB and/or NTSC/PAL video and audio, as well as high-speed serial data.

FEATURES

- Designed to meet the needs of the military's next generation vehicles
- Sealed unit to operate in harsh exterior environment
- Front I/O panel customized to user specification
- Allows use of COTS air-cooled boards in environments typically requiring conduction-cooled
- Thermostatic control of internal temperature
- Watertight to MIL-STD-108E – Immersion to 3 feet for one hour
- Chem-filmed per MIL-C-5541, Class 3
- All fastener hardware is stainless steel
- Access conforms to MIL-HDBK-45, guideline 36
- DC input: 28 VDC per MIL-STD-704A
- DC draw: 12 Amp maximum
- Custom options – I/O panel, internal I/O cabling, connectorization of I/O panel, backplane, elapsed time indicator

For more information, contact: info@aplabs.com

RSC# 34976 @ www.embedded-computing.com/rsc

Carlo Gavazzi Computing Solutions
10 Mupac Drive • Brockton, MA 02301
508-588-6110
www.gavazzi-computing.com

709 Rugged Chassis

Carlo Gavazzi Computing Solutions 709 Series Rugged Rackmount Enclosures are engineered for dependability in some of the most severe and extreme environments involving airborne, shipboard, and ground mobile applications. Designed as a rugged solution to meet a broad spectrum of Military Standards, the 709 has a longstanding reputation as a Commercial-Off-The-Shelf (COTS) product that can be easily configured to meet the most challenging deployed requirements.

Enclosures are configured as a 19" rackmount system capable of supporting a wide variety of industry bus standards such as VME, VME64x, VXS, VPX, VXI, CompactPCI, and custom bussed backplane technologies. Available in heights ranging from 8U to 14U, these systems are configurable for either rigid mount or shock isolated card cages. The 709 Series utilizes an aluminum, welded design incorporating EMI "honeycomb" filters and environmental gaskets on all access panels to meet stringent emissions requirements. Power supply options provide a wide range of inputs from AC single and three-phase to DC and provide output power up to 2,400 W. The internal rack infrastructure has been designed to meet IEEE 1101.10/.11. All systems can be designed to accommodate application specific I/O requirements. Rugged, reliable, and ready for deployment, Carlo Gavazzi Computing Solutions 709 Series of Enclosures.

FEATURES

- VME, VME64x, VXS (VITA 41.0), VPX, VXI, CompactPCI compatible
- 8U to 14U height offerings
- 125" aluminum welded construction
- 187" aluminum front panel
- 350-1,600 W power supply options
- AC input: 85-264 VAC, 47-440 Hz
- DC input: 18-36 VDC options
- Shock isolated card cage
- Removable shock isolated drive bays

HARTING

1370 Bowes Road • Elgin, IL 60123
847-741-1500
www.HARTING-usa.com

Micro Card Edge Connector

For applications requiring board to board mezzanine or small pluggable daughtercard connections, the new HARTING Micro Card Edge (MCE) data connectors provide a reliable and flexible solution. A small circuit board links the connectors, which allows for maximum flexibility in the mechanical design of the system. Parallel boards can be as close as 20 mm to each other, with no theoretical maximum distance.

Ideal for telecommunication, medical, and industrial applications, data transmission rates up to 14 Gbps can be achieved with excellent signal integrity characteristics. An extremely smooth contact surface provides low insertion forces and ensures high contact reliability with a guaranteed minimum of 200 mating cycles.

FEATURES

- 40- and 100-contact, 0.8 mm pitch SMT connectors, transmission speeds up to 14 Gbps
- Designed for 1.6 mm PCB bridge (20 mm minimum spacing, no maximum)
- 8.8 mm wide by 20.6 mm (40-contact) or 47.8 mm (100-contact)
- Ultra-smooth contact coating ensures low insertion force, high contact reliability, and minimum of 200 mating cycles
- Tape and reel packaging and vacuum pad for full pick and place compatibility
- Reflow compatible molding rated to +230 °C for 60 seconds and +60 °C for 20 seconds

For more information, contact: more.info@HARTING.com

RSC# 37872 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Hybricon Corporation

12 Willow Road • Ayer, MA 01432
978-772-5422
www.hybricon.com

Conduction Cooled ATR

Avionics/UAV: FORCED AIR CONDUCTION COOLED ATR

MARKET: United States Military

APPLICATION: UAV PROGRAM OVERVIEW: As part of the UAV's guidance and radar tracking system, this electronic enclosure required ruggedizations while staying lightweight. This forced air, conduction cooled enclosure is responsible for COTS protection and electronic payload in a sealed card cage, and is capable of operating in extended temperature and shock/vibration environments.

FEATURES

- Forced air conduction cooled ATR. Top load 6U dip brazed card cage
- 8-slot customer specific VME64x backplane. Sealed internal area offering protection against foreign matter
- Front to rear airflow over folded fin stock. 400 W MIL-STD-704E conduction cooled power supply
- 28 V input. System monitoring
- Top access panel with captive hardware. Front I/O panel
- Provisions to mount rugged slides

For more information, contact: cburden@hybricon.com

RSC# 37214 @ www.embedded-computing.com/rsc

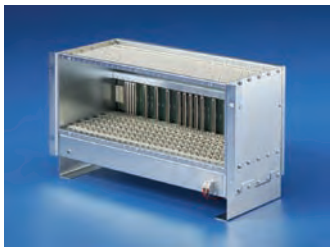
Kaparel Corporation, A Rittal Company

97 Randall Drive • Waterloo, ON N2V 1C5 Canada
817-447-9420
www.kaparel.com

MicroTCA Systems: 2U-9909.809, 3U-9910.557, 5U-9911033

Kaparel MicroTCA Systems were designed as a compact solution for flexible and cost-critical applications. AdvancedMC modules are plugged directly into a High-Speed backplane without a carrier card. MicroTCA stands out due to its very small design, but also due to its high scalability and clearly reduced system costs. The compact design supports a variable installation in 200 mm deep, 482.6 mm (19") enclosures or instrument cases and wall-mounted enclosures.

The advantages of MicroTCA extend beyond the telecommunications market to medical technology, safety engineering, or industrial automations. Kaparel, a Rittal Company, offers rack-mounted systems as well as development systems in 2U, 3U, 4U, and 5U, including backplanes for the accommodation of AdvancedMC modules in half and full height.



FEATURES

- Complies with AMC.0 and MicroTCA 1.0
- System availability of at least 99.999 percent
- Hot swap compatible
- Heat dissipation of 20-80 W per module
- MCH and AMC modules plugged directly into the backplane
- Compact design for variable installation
- RoHS compliant
- Technical specifications
  - 482.6 mm (19") shelf, 2U, 3U, 4U, and 5U, 200 mm deep
  - Up to 14 slots
  - Cooling of up to 60 W per slot

For more information, contact: kdubois@kaparel.com

RSC# 37868 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Protocase, Inc.

210 South 8th Street • Lewiston, NY 14092
866-849-3911
www.protocase.com

Custom Enclosures

Protocase, Inc. builds fully finished custom metal electronic enclosures with a 2-3 day turnaround, and no minimums. Our unmatched speed and simplicity make us the leading choice for over 1,600 engineers and designers. We can work from your CAD design, or our design services group can can do the work for you, starting from rough sketches to actual boards and components. Or try our free advanced design tools. Protocase Designer® 3D enclosure CAD software is the fastest and easiest way to design a custom enclosure, and gives you real-time pricing. So try us for your next project and experience the simplicity.

FEATURES

- Fully finished, custom metal enclosures with mounting hardware, powder coat, and silk screen
- 2-3 day lead time from completed order to shipping
- No minimums – we welcome orders as low as quantity one
- Expert enclosure CAD design services at affordable prices
- Fast quotations – instant online pricing or 24 hour turnaround on submitted drawings
- Ultra-simple advanced design tools including free Protocase Designer® enclosure design CAD

For more information, contact: info@protocase.com

RSC# 37836 @ www.embedded-computing.com/rsc

Radian Heatsinks

2160 Walsh Avenue • Santa Clara, CA 95050
1-800-689-2802
www.radianheatsinks.com

FI and FJ Series

The F-Series of aluminum cross cut fin BGA heatsinks with fans are high efficiency cooling products designed for BGA chipsets.

These devices mount with EZ Snap™ Mounting Clips to provide optimum cooling for various package sizes. These off-the-shelf, high efficiency solutions are easy to install and require no special board modifications or complex assemblies.

radian
ISO 9001:2000 Certified

FEATURES

- High efficiency aluminum plate fin design provides low pressure-drop characteristics
- Constructed of Extruded Aluminimum AL6063 for optimum heat transfer
- DC Fan for improved heat dissipation
- Designed specifically for BGAs and other surface mount packages
- EZ Snap™ Mounting Clip is constructed of UL94-V0 Rated Nylon and comes pre-assembled with the thermal pad
- Use Clip Tool HS8063 to attach (or remove) heatsink directly to BGA chips

For more information, contact: customerservice@radianheatsinks.com

RSC# 37883 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

RAF Electronic Hardware

95 Silvermine Road • Seymour, CT 06483
Tel: 203-888-2133 • Fax: 203-888-9860
www.rafhdwe.com

Male-Female Stacking

Male-female stacking spacers from RAF Electronic Hardware help overcome space limitations that may occur when PC/104 or PC/104-*Plus* bus drives are installed. With this approach, stand-alone module stacks are used like ultra-compact bus boards, but without needing back-planes or bird cages. Module boards are spaced exactly 0.6" apart using RAF precision-made nylon or aluminum male-female spacers, to build structurally secure stand-alone module stacks. RAF stacking spacers allow PC/104 and PC/104-*Plus* embedded system designers to employ application-specific module stacks for their products that are easily and securely assembled. The RAF hardware can be used with more than 100 different PC/104 ultra-compact bus board modules produced by manufacturers today.

RAF
RAF ELECTRONIC HARDWARE
a Division of MW Industries, Inc.

FEATURES

- Precision manufactured for perfect fit
- Nylon or aluminum stacking spacers
- Length: 0.600"; Diameter 3/16"; round and hexagon profiles
- 3/16" long 4-40 male thread on one end
- 1/4" deep 4-40 internal thread depth
- Mating screw and hex nut available for either material

For more information, contact: info@rafhdwe.com

RSC# 30218 @ www.embedded-computing.com/rsc

Schroff
14100 Danielson Street • Poway, CA 92064
858-679-4550
www.schroff.us

Schroff®

CompactPCI Systems

The Schroff® CompactPCI product family consists of 1U through 12U rackmount enclosures based on industry standard IEEE 1101.10 and .11 specifications. With a wide variety of off-the-shelf solutions, design engineers can easily select an available product that meets their requirements and accelerates time-to-market.

Schroff offers a full line of CompactPCI backplanes in a variety of slot counts and routing configurations. Also, Schroff engineers specialize in modifying a system design for your unique requirements as your volumes increase. Our in-house design, manufacturing, assembly, and testing expertise has established Schroff to be the recognized market leader in industry standard enclosure packaging solutions.

FEATURES

- CompactPCI backplane designs that support various options for PICMG 2.16, H.110 CT, and 32/64-bit
- Intelligent Monitoring for temperature, fan control, and power supply status
- 1U through 12U rackmount systems with redundant hot-swappable cooling solutions
- Solutions with pluggable or fixed AC or DC power supplies
- Optimized backplane design for lower layer count and high performance
- Engineered thermal solutions using FloTherm simulations and empirical testing

For more information, contact: info@pentair-ep.com

RSC# 37839 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Schroff
14100 Danielson Street • Poway, CA 92064
858-679-4550
www.schroff.us

Schroff®

MicroTCA Systems

Schroff® has developed a wide range of small MicroTCA™ systems that will accelerate your time-to-market and balance the performance-to-cost ratio that allows system integrators to deliver an overall solution with a distinct competitive advantage.

The unique mechanical design of Schroff's card guides, subracks, and struts allows for maximum flexibility and consistent performance in every application. From this, many products have been developed to meet the enterprise, telecom, military, industrial, and medical markets. Cost effective backplane routing designs and innovative cooling and power management solutions are helping system integrators in all of these markets achieve their cost and performance objectives for next generation equipment.

FEATURES

- Proven MicroTCA™ hardware, card guides, EMC gasket, subrack assembly
- Table-Top and Side-Mount Cube Systems
- Solutions with fixed AC Power Entry and other power configuration options
- Optimized backplane design for lower layer count and high performance
- Engineered thermal solutions using FloTherm simulations and empirical testing

For more information, contact: info@pentair-ep.com

RSC# 35878 @ www.embedded-computing.com/rsc

Tri-M Engineering
100-1407 Kebet Way • Port Coquitlam, BC V3C6L3 Canada
604-945-9565
www.Tri-M.com

HESC104

The HESC104 is a 60 W DC-DC converter that includes a flash based microcontroller and 4 Amp charger for advanced power management and smart battery charging. Combined with a Tri-M standard battery pack or super cap module, the HESC104 can be used as an Uninterruptible Power Source (UPS) for an industrial system. The HESC104 is designed for low noise embedded computer systems, has a wide input range of 6-40 V (>6:1), and is ideal for battery or unregulated input applications. The HESC104 is specifically designed for vehicular applications and has heavy-duty transient suppressors (5,000 W) that clamp the input voltage to safe levels, while maintaining normal power supply operation. The ±5 VDC and ±12 VDC outputs are controlled by a constant off-time current-mode architecture regulator that provides excellent line and load transient response.

The HESC104 provides up to four stages of battery charging and can charge SLA, NiCd, and NiMh batteries and level two and three SMBus compatible batteries. Charge currents are up to 4 Amp, and battery charging voltages are from 9.5 V to 19.5 V. The HESC104 has advanced power management functions that allow timed on/off control of the HESC104, notification of changes to main power, and changes in the battery status. For example, the HESC104 can be programmed to power-off the main outputs in 60 seconds and then turn them on again 12 hours later. In addition to smart charging and power management, the HESC104 can monitor up to 16 different temperatures using digital temp sensors. The HESC104 is available as RoHS and PC/104 compliant, and -40 °C to +85 °C is standard.

FEATURES

- 60 W DC-DC converter
- 6 V to 40 VDC input range
- +5 V, +12 V, -5 V, and -12 VDC output
- 4 Amp charger at 9.5 V to 19.5 V
- Multistage charging SLA, NiCd, NiMh
- SMBus level three compatible charger
- Extended temperature: -40 °C to +85 °C
- High efficiency up to 95 percent
- High transient suppression
- Low output ripple
- Reverse polarity input protection
- Monitor up to 16 different temperatures

For more information, contact: info@tri-m.com

RSC# 21059 @ www.embedded-computing.com/rsc

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

Vector Chassis

VME and VME64x, CompactPCI or PXI chassis available in many configurations from 1U to 12U, 2 to 21 slots. Many power options up to 1,200 W. Dual hot-swap 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 80 mm rear I/O backplane slot configuration is available. Available in 1U, 2 slots up to 7U, 12 slots for VME, CompactPCI, or PXI. All chassis are 1101.10/11 compliant. Hot-swap, plug-in, AC, or DC power options are available.

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 W.

Series 790 is MIL-STD-461D and E compliant and certified, economical, and lighter weight than most 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 timeframe. Many factory paint colors are available and can be specified with Federal Standard or RAL numbers.

For more detailed product information go to www.vectorelect.com or call 1-800-423-5659 and discuss your application with a Vector representative.

FEATURES

- COTS or ruggedized EMI/RFI models
- Vertical or horizontal card insertion
- Card sizes up to 9U x 400 mm
- System monitoring option (CMM)
- AC or DC power input
- Power options up to 1,200 W

For more information, contact: inquire@vectorelect.com

RSC# 37683 @ www.embedded-computing.com/rsc

WinSystems, Inc.

715 Stadium Drive • Arlington, TX 76011
817-274-7553
www.winsystems.com

Low-Cost Enclosures

WinSystems' enclosures are sized to fit three popular SBC form factors: EBX, EPIC, and PC/104. Named the ENC-EBC-1000, ENC-EPX-1000, and ENC-104 respectively, these low-cost enclosures can package a variety of system configurations quickly and easily.

They are designed for embedded applications requiring mounting inside NEMA boxes, OEM machinery, wiring closets, equipment rooms, and other areas where it is necessary to protect an SBC system with additional PC/104 I/O modules.

All RoHS-compatible enclosures are made from lightweight, rustproof aluminum to provide strength, durability, and functionality. These units are easy to mount and can attach vertically on a wall, on a table, under a counter, or inside a larger piece of equipment.

FEATURES

- Three different sized enclosures package EBX, EPIC, and PC/104 SBCs
- Rugged, lightweight aluminum construction
- Quick and simple assembly
- Slotted keyholes for easy mounting
- Ample room for cable runs
- Custom configurations available

For more information, contact: info@winsystems.com

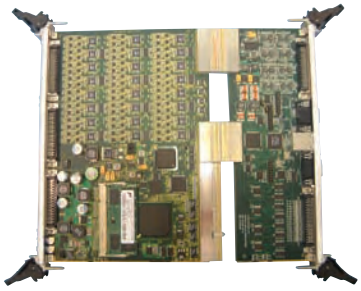
RSC# 37681 @ www.embedded-computing.com/rsc

D-TACQ Solutions Ltd.

Scottish Enterprise Technology Park • East Kilbride, G75 0QD
United Kingdom
44-135-527-2511
www.d-tacq.com

ACQ196CPCI

The ACQ196CPCI is an Ethernet networked data acquisition device, with high level standards compliant interfaces such as the Web Service interface, which makes it trivial to interface to any networked computer. The board meets the requirement for high channel density simultaneous data acquisition in cost-sensitve applications. The board samples 96 input channels simultaneously with 16-bit resolution at sample rates up to 500 KSps (Kilo Samples per second) per channel, while still offering a robust buffered differential front end input stage with good AC and DC performance. Onboard, real-time signal enhancement is available. Applications: transient recorder, data streaming over Ethernet and backplane interface used for low latency control loops, and automated test.



FEATURES

- 16-bit ADC per channel for true simultaneous analog input
- High throughput, available in two speed grades: 250 KSps per channel and 500 KSps per channel
- Maximum channel density – 96 channels in one slot, replaces a rack full of 16 channel data acquisition boards
- Uses latest silicon for highest performance at lowest cost/channel: Deployed in applications down to 1 kHz
- True differential input to each channel. Input features high common mode range and input overvoltage withstand
- Plant cable interface to front panel – 3 x SCSI 68 connectors on front panel

For more information, contact: info@d-tacq.co.uk

RSC# 33909 @ www.embedded-computing.com/rsc

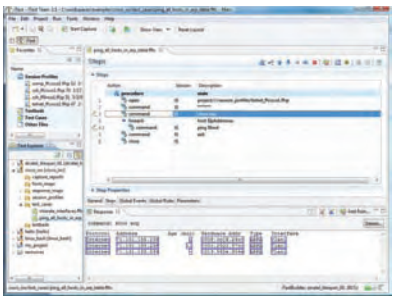
Fanfare

1091 North Shoreline Blvd. • Mountain View, CA 94043
866-326-3637
www.fanfaresoftware.com

iTest

Fanfare delivers innovative testing solutions to network equipment manufacturers and service providers. iTest™, Fanfare's test automation software, is the only test-authoring solution that empowers test automation teams, including testers with minimal scripting skills, to instantly build automated test cases.

Using iTest, developers and testers create and share automated tests that control and analyze results from multiple devices, traffic generators, and applications, while automatically documenting each test with pass-fail criteria. The result is an enhanced quality of products and services, reduced time-to-market, and improved productivity across the entire product development and service deployment life cycle.



FEATURES

- Orchestrate multi-device, multi-protocol, multi-vendor device and system tests
- Allow all testers, regardless of scripting ability, to contribute to automation initiatives
- Test through Command Line Interfaces (CLI), SNMP, embedded Web interfaces, Tcl, and other protocols
- Use abstraction and mapping to build maintainable, portable, automated test cases
- Include logic functions for looping and comparisons, and perform analysis and parsing for pass-fail criteria
- Manage and leverage test equipment, including traffic generators, for sophisticated testing requirements

For more information, contact: info@fanfaresoftware.com

RSC# 35221 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Highland Technology, Inc.

18 Otis Street • San Francisco, CA 94103
415-551-1700
www.highlandtechnology.com

T344

The T344 is a compact 4-channel, 32 MHz waveform generator. It incorporates four DDS waveform synthesizers that may be used independently or synchronously to produce polyphase signals. Waveforms include sine, triangle, sawtooth, noise, and precision square/PWM outputs. User-loaded arbitrary waveforms may be generated.

Test relays allow any output to be diverted to a test connector for in-system calibration verification. Built-In-Self-Test is provided.

The T34x family of generators includes the T340 and T346.

FEATURES

- Four independently programmable outputs: sine, triangle, sawtooth, square/PWM, Gaussian noise, and ARB
- Channels may be synchronized for coordinated polyphase or time-synced signals at same or ratio frequencies
- Multiple T344s may be synchronized together via the SYS connector
- 0-32 MHz outputs with milli-Hertz resolution
- Up to 10.24 V p-p output, programmable 5:1 attenuation and DC offset
- Test output and BIST are included

For more information, contact: info@HighlandTechnology.com

RSC# 37789 @ www.embedded-computing.com/rsc

Highland Technology, Inc.

18 Otis Street • San Francisco, CA 94103
415-551-1700
www.highlandtechnology.com

T560

The T560 builds on Highland Technology's family of small digital delay generators, intended for use in embedded OEM applications. The T560-1 is the standard, packaged version, usable in many OEM applications and as the evaluation unit for custom versions. It uses the technology developed for the Highland models V851 VME module, V951 VXI module and P400 (benchtop) digital delay generators, with basic TTL/CMOS input and output levels and simplified logic.

The T560 accepts an internal or external trigger and generates four precise output pulses, each user programmable in time delay and width. It is ideal for laser sequencing, radar/lidar simulation, or sequential event triggering.

FEATURES

- Four TTL-level delay outputs, individually programmable for delay and pulse width to 10 ps resolution
- 10-second range, 20 ns insertion delay, 16 MHz maximum trigger rate, 35 ps typical RMS jitter
- Crystal-clock DSP phase-lock system maintains high delay accuracy with zero trigger indeterminancy
- Optional Internal OCXO time base with external lock capability; DDS synthesizer for internal trigger rates
- COMM: RS-232 serial interface standard, Ethernet optional; PWR: External universal power supply or 12 VDC
- Easily mounted enclosure allows short cable runs and reliable unattended operation

For more information, contact: info@HighlandTechnology.com

RSC# 37040 @ www.embedded-computing.com/rsc

Embedded Computing Design Resource Guide 2008

Innovative Integration

2390 Ward Avenue • Simi Valley, CA 93065
805-578-4260
www.innovative-dsp.com

Andale Data Logger

Andale (pronounced on' duh lay) is a powerful data logging system that directly controls an NTFS disk subsystem to support gap-free storage or playback of analog or digital signals acquired using the Innovative X-series XMC modules. The included logging software moves data in real-time between the analog or digital I/O peripherals on any Innovative XMC module to/from dedicated SATA drives with minimal intervention from application software or Windows.

A dedicated PCI Express SATA RAID controller interfaces to conventional hard disk drives supporting data flow rates up to 700 MBps, sustained. File sizes are limited only by the amount of disk storage available. Two TB of storage are available in the standard configuration. See the X3 and X5 XMC Cards under the MEZZANINE CARDS tab within this guide. Data Sheets and Pricing Online!

FEATURES

- Turnkey, High Speed Data Acquisition plus Storage. Internal 2 or 8 TB Hard Disk Array
- 700 MBps sustained performance from analog or digital I/O module to standard NTFS disk files
- Supports all Innovative X3 and X5 I/O module features including triggering and timing features
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SystemTrace

Applications:

- Software Test and Evaluation
- System Integration
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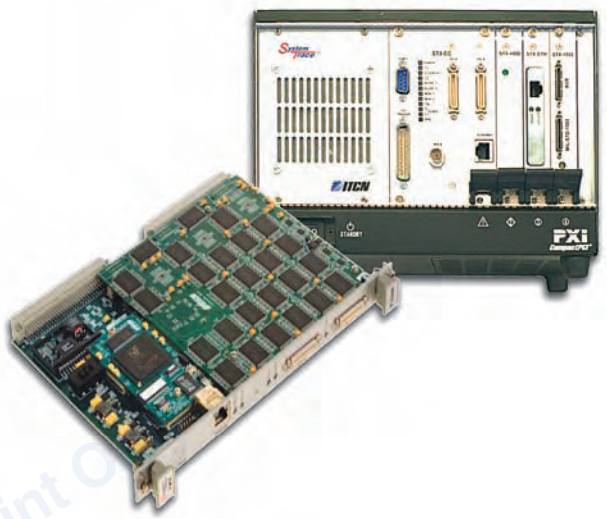
- Operational Test (Land, Sea, Air)
- Diagnostics/Prognostics

SystemTrace provides a scalable, reconfigurable platform for instrumentation of system data buses. This instrumentation combines unified controls, timing, and trigger features to provide seamless integration of multiple instrumentation modules.

SystemTrace provides data monitoring using Real-Time Non-Intrusive (RTNI) techniques. The act of monitoring does not affect the system's operation. Data collected from key data flow points are Time-Correlated, so that dependencies on actions among system elements can be observed.

SystemTrace architecture consists of a PC workstation, a communications network, and one or more instrumentation modules. The SystemTrace workstation is a Windows PC with the SystemTrace Graphical User Interface (GUI) for configuration, control, and data analysis. The communications network provides an Ethernet interface between the instrument modules and the workstation.

Instrumentation modules are the central component of SystemTrace. Multiple modules can be distributed throughout the system under test. When multiple buses are being simultaneously monitored, the modules' Trigger Sync Logic allows precise Time-Correlation of collected data and triggering across multiple units.



FEATURES

- A system-wide view of operations correlated in time aids analysis
- RTNI monitoring does not affect system operation during measurements, thereby giving accurate results
- Supports the entire life-cycle of the instrumented embedded system, reducing instrumentation cost
- Common GUI for dissimilar targets saves time and training investment
- Collection of only "data of interest" increases length of observation time and decreases analysis time
- Scalable architecture supports changing requirements
- Remote monitoring of targets saves time and money
- Programmable data collection scenarios for user controlled parameters
- Simultaneous monitoring of multiple buses gives a system-wide view of data
- Complex state machine, filters, and triggers for in-depth testing and analysis

For more information, contact: sales@itcninc.com

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Measurement Computing

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USB-QUAD08

The new USB-QUAD08 data acquisition device provides simultaneous input and decoding for up to eight incremental quadrature encoders at a resolution of up to 64-bits. Its eight quadrature counters with indicator LEDs support both differential and single-ended inputs, and it features multiple programmable counting modes. Acquisition speed is software selectable up to 10 MHz with a jitter of less than 20 nsec. The USB-QUAD08 can also serve as a high-speed pulse counter for general counting applications. The eight digital I/O bits support up to 42 V with clamping diodes for CEMF suppression. The USB-QUAD08 has detachable screw terminals and a 37-pin D-sub connector, pin-compatible with Measurement Computing's PCI-QUAD04, for upgrade/migration from PCI.

FEATURES

- Eight counter inputs (quadrature/non-quadrature)
- Differential or single-ended inputs, configurable
- 10 MHz counters, ±12 V input, 42 V maximum digital I/O
- 16-, 32-, 48-, 64-bit resolution
- Multiple counting modes
- Pacing (external/internal) and triggers

For more information, contact: info@mccdaq.com

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Embedded Computing Design Resource Guide 2008

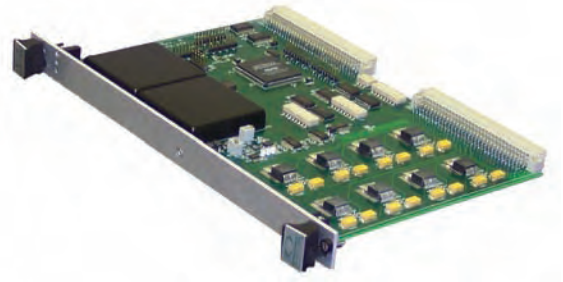
Precision Analog Systems

7540 N.W. 5th Street, Suite 2 • Plantation, FL 33317
954-587-0668
www.precisionanalog.com

PAS 9912/AO: 8-Channel VME Analog Output Card

The PAS 9912/AO provides eight, 12-bit, high-power analog voltage output channels on a 6U VMEbus card. Two quad, high speed voltage output DACs, with 10 uSec settling times provide a total of eight analog output channels. Eight high-power operational amplifiers buffer the DAC output signals and provide a gain of 1.5 or 2.5 as an ordering option. Voltage output signals are available on the a and c rows of the P2 connector.

Four analog output ranges are available under program control, allowing the card's output voltage to be tailored to your application. Both 15 Volt and 25 Volt versions of the card are available. All outputs provide a minimum of 40 mAmps of output current. The PAS 9912/AO is designed for long-term availability, and can be customized for your application. Precision Analog specializes in VME and PCI Express designs, whether off-the-shelf, tailored to your specific application, or fully custom.



FEATURES

- VME Interface: A32, A24, A16; D32, D16 slave, no interrupts
- Data Read-Back: DACs have digital read-back registers
- Long-Word Write: Two DACs can be updated with a single VME long-word
- Simultaneous Update: Software or external sync updates DACs simultaneously
- Calibration: All DACs are calibrated with a precision onboard voltage reference
- Onboard DC to DC converters: ± 30 Volt power for Op Amps, ±15 Volt power for DACs

For more information, contact: lna@precisionanalog.com

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Avnet Electronics Marketing

2211 South 47th Street • Phoenix, AZ 85248
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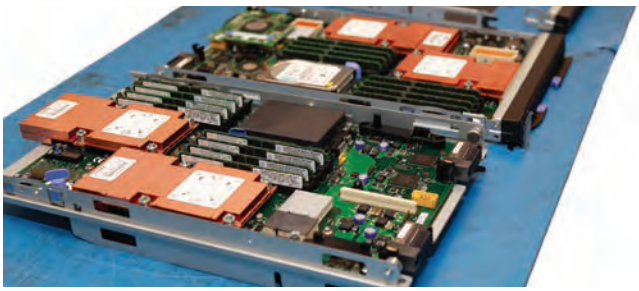
Integration Center

Avnet simplifies and streamlines the solution development and delivery process by providing Integration Services that enable OEMs, system builders, and system integrators to maximize their existing resources, operate more efficiently, and reduce costs associated with new product development.

Avnet's Integration Services can be employed at select stages or throughout the development of the complete solution. Our capabilities include hardware configuration, software configuration, packaging, and logistics and maintenance.

With bi-coastal integration facilities in Phoenix, AZ and Boston, MA, Avnet ensures all integration requirements are met. The Avnet engineering team can sort through the technologies on the market and identify the best options for your design.



FEATURES

- **Hardware Configuration:** Avnet has the certifications and expertise to provide complete hardware configuration
- **Software Configuration:** Avnet Integration Services provide application loading, configuration, and setup
- **Packaging and Logistics:** Utilize Avnet's packaging services to develop a turnkey solution
- **Maintenance:** Avnet's maintenance program offers many flexible options for managing your maintenance needs
- **LCD Displays:** Avnet offers an array of flat panel LCDs and a full range of complementary value-added services
- **Custom Cable Assembly:** Avnet has the ability to meet detailed specifications across a variety of assemblies

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FEATURES

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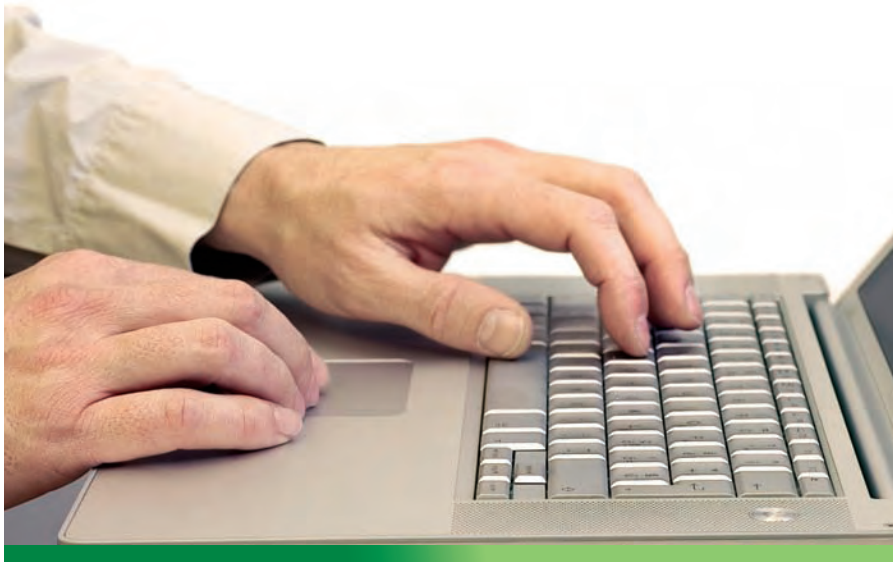

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About Moxa

For over twenty years, industrial systems integrators have relied on Moxa products in major device networking installations around the world. Moxa offers industrial-grade solutions backed by an excellent warranty and highly-specialized technical support for a diverse range of applications, including connecting PLCs to a wireless control network, transmitting temperature signals over long distances, and automating device control and monitoring at remote locations.

What the People Behind Networking and Communication Need:

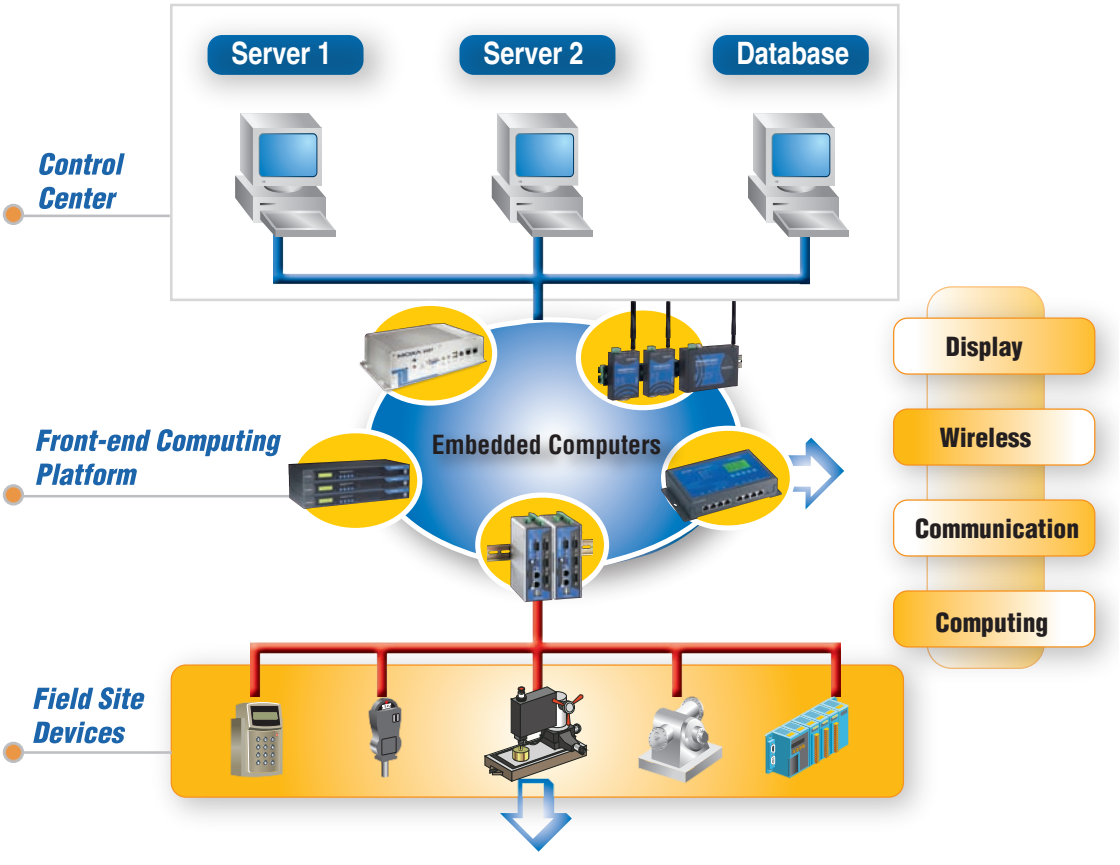
- Install customer's AP
- Wide choice of peripherals
- Customized solutions
- Products for outdoors and harsh industrial environments
- Faster time-to-market and lower costs
- More reliable embedded computer
  (fanless, no moving parts, low power consumption, generate less heat)

What is an Embedded Computer?

An embedded computer is a compact, programmable platform designed to perform specific computing and processing tasks that do not require a full-fledged PC. Moxa offers a wide range of embedded computers for a variety of industrial applications, and gives users a choice of processors, operating systems, storage capacities, form factors, and device interfaces.

Benefits for Industrial Applications:

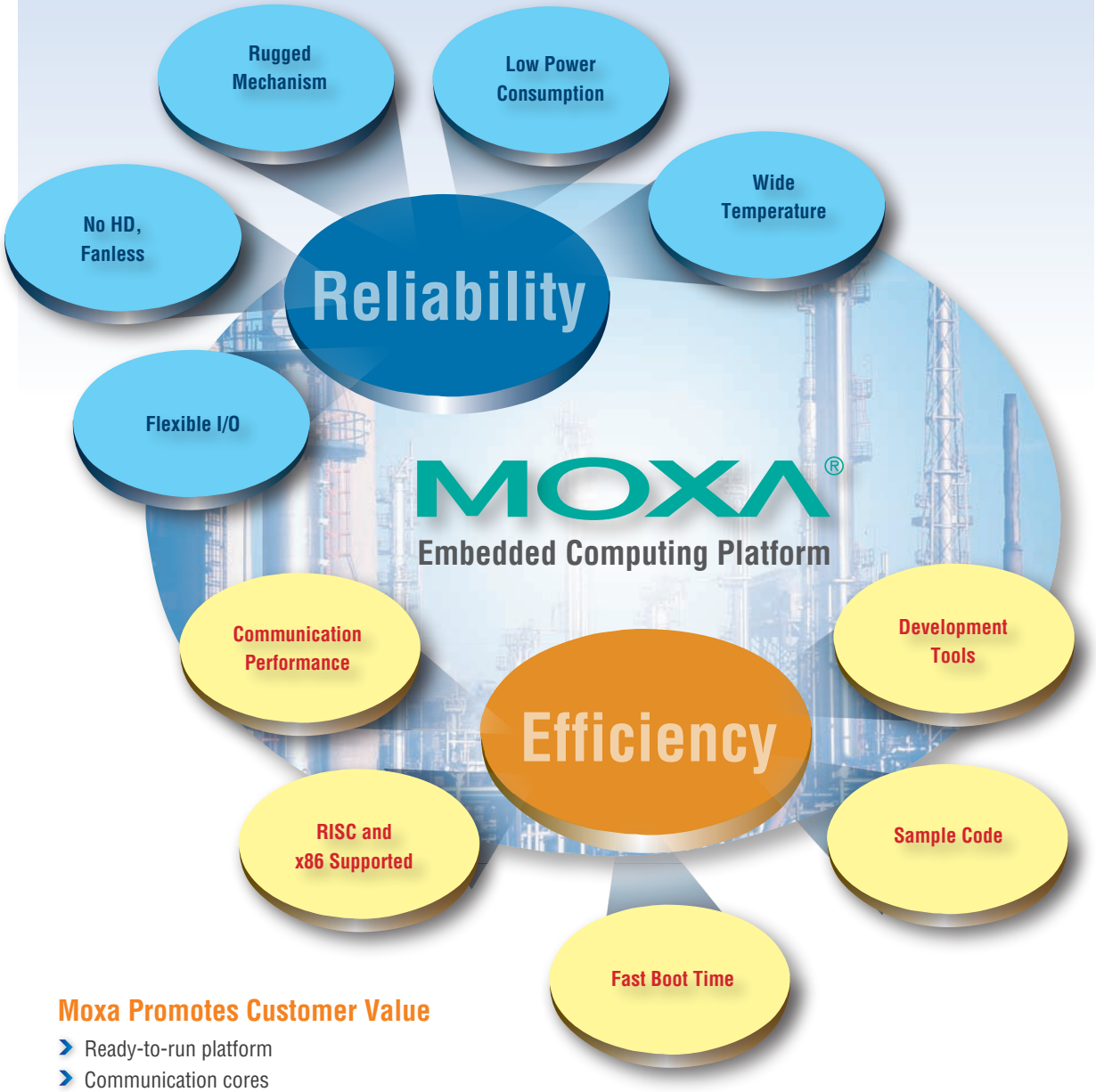
- Fit for distributed architectures
- Compact size
- Multiple I/O interfaces
- Good networking function
- Support for wireless
- Rugged design
- Easy to develop and maintain



Serial, DIO, CANbus, Ethernet, Fieldbus, Modbus, and more

Why Choose an Embedded Computer from Moxa?

Moxa's embedded computers provide the reliability and efficiency needed for industrial embedded applications, and support features that provide users with a reliable platform for building the most optimal embedded solutions at the lowest cost. The robust hardware design and easy-to-use software tools make Moxa's embedded computers ideal for establishing embedded systems quickly and with the least amount of effort.



Moxa Promotes Customer Value

- Ready-to-run platform
- Communication cores
- Fit for harsh environments
- Robust design
- Add-on software tools
- Quality and service

Rcore : Ready-to-Run Concept

Moxa's Rcore concept provides users with an integrated ready-to-run embedded platform that speeds up and reduces the effort required for system development.

OS Ready

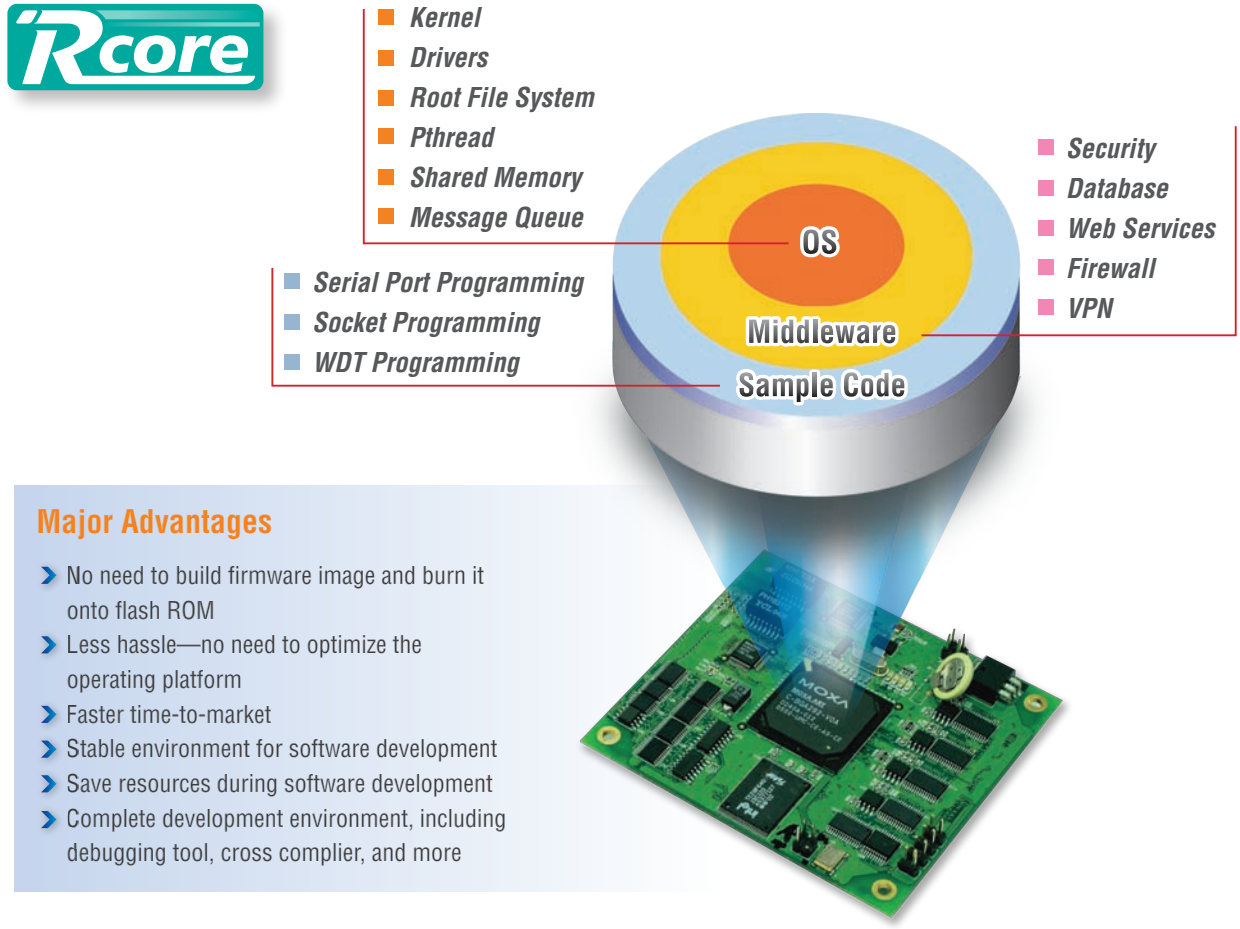
Moxa's embedded computers use either the Linux or Windows Embedded operating system, providing programmers with a user-friendly environment for application development, and reducing the effort required for system integration. Moxa's RISC-based embedded computers with an open Linux OS offer a powerful computing environment and stable system operation to ensure the most cost-effective solution for a variety of industrial applications.

Middleware Ready

Moxa's embedded computers offer a variety of middleware to help you easily access and manage application software. This is essential for reducing the effort required for application development. The middleware includes a database, web service, firewall, and VPN, and can be customized by request.

Sample Code Ready

Moxa provides sample code for a wide range of embedded applications. These sample codes help programmers quickly grasp the full functionality of their applications, and in this way gain the confidence needed to complete their project, essentially speeding up product development and ensuring that code is efficient and bug-free.

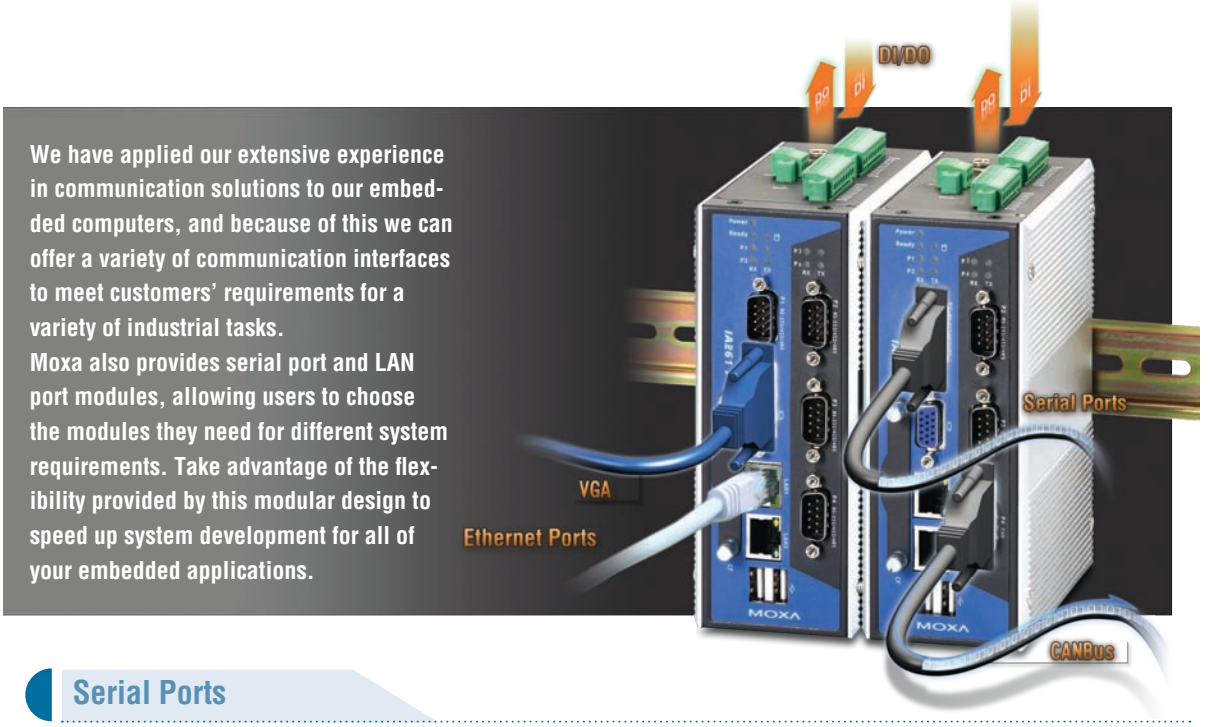


Major Advantages

- No need to build firmware image and burn it onto flash ROM
- Less hassle—no need to optimize the operating platform
- Faster time-to-market
- Stable environment for software development
- Save resources during software development
- Complete development environment, including debugging tool, cross complier, and more

Communication Cores

We have applied our extensive experience in communication solutions to our embedded computers, and because of this we can offer a variety of communication interfaces to meet customers' requirements for a variety of industrial tasks.
Moxa also provides serial port and LAN port modules, allowing users to choose the modules they need for different system requirements. Take advantage of the flexibility provided by this modular design to speed up system development for all of your embedded applications.



Serial Ports

Serial communication is one of Moxa's core technologies, and has helped millions of serial devices connect to the network for industrial applications. Our RS-232/422/485 serial ports provide powerful communication performance for all industrial device connectivity.

Ethernet Ports (switch ports & LAN ports)

Both switch ports and LAN ports are provided to offer a diverse range of network communication options, helping users easily create an integrated industrial application that requires Ethernet protocols.

DI/DO Channels

Moxa's DI/DO channels are designed with 3 KV of optical isolation protection to ensure that your system operates safely and reliably. These DI/DO channels are quite useful for activating remote motion triggers.

CAN Ports

Moxa's embedded computers also provide CAN ports for connecting remote devices, making them more suitable for industrial automation applications that require CANOpen protocol.

Fit for Harsh Environments

All of Moxa's embedded computers are designed for industrial-grade operation, guaranteeing reliable and stable operation in any harsh environment.

Wide Temperature

Moxa's embedded computers are designed to withstand extremely hot and cold environments, and can be used in temperatures ranging from -40 to 75°C.

Low Power Consumption

The components of Moxa's embedded computers are chosen to meet industrial-grade demands. To achieve this task, Moxa uses a fanless, cable-less, no hard disk design that guarantees stable system operation, but without generating too much heat.

Anti-vibration and Anti-shock Design

Moxa's embedded computers have an industrial-grade, rugged design that can endure continuous 5G vibration, and also provide a 50G anti-shock guarantee, making them the best embedded computer solution for industrial environments that experience strong vibrations. These computers can also be used as the core computer for applications that require installing the embedded computer on moving objects.

Isolation

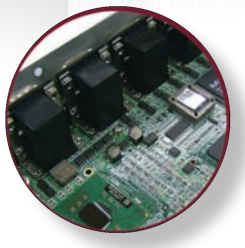
Isolation protection is a key part of creating a secure communication platform. All of Moxa's communication interfaces are well-protected with different isolation standards. All serial ports come with 15 KV ESD protection for all signals, Ethernet ports come with 1.5 KV magnetic protection, and DI/DO channels have 3 KV optical isolation protection. These features make Moxa's embedded computers the ideal solution for providing stable and reliable industrial communication.

EMI

Electromagnetic interference presents a big challenge for engineers who design and develop embedded systems. Moxa's embedded computers use industrial-grade components that meet all international EMI standards and directives to reduce radiation effects and provide a reliable embedded platform for any industrial application.

Robust Design

Any product is only as good as its components, and Moxa has chosen nothing but the best. These industrial-grade products are tough enough to provide continuous, reliable, long-term operation in even the harshest industrial settings. Moxa's embedded computers are based on the following design requirements, and have a longer MTBF to meet the stringent demands of industrial applications.



Cable-less

The cable-less concept offers a strong hardware design and promises a reliable combination of embedded components. This design helps ensure a stable system operation and robust hardware design, since all components are firmly attached. This is especially beneficial for applications that require installing the computer on moving objects.

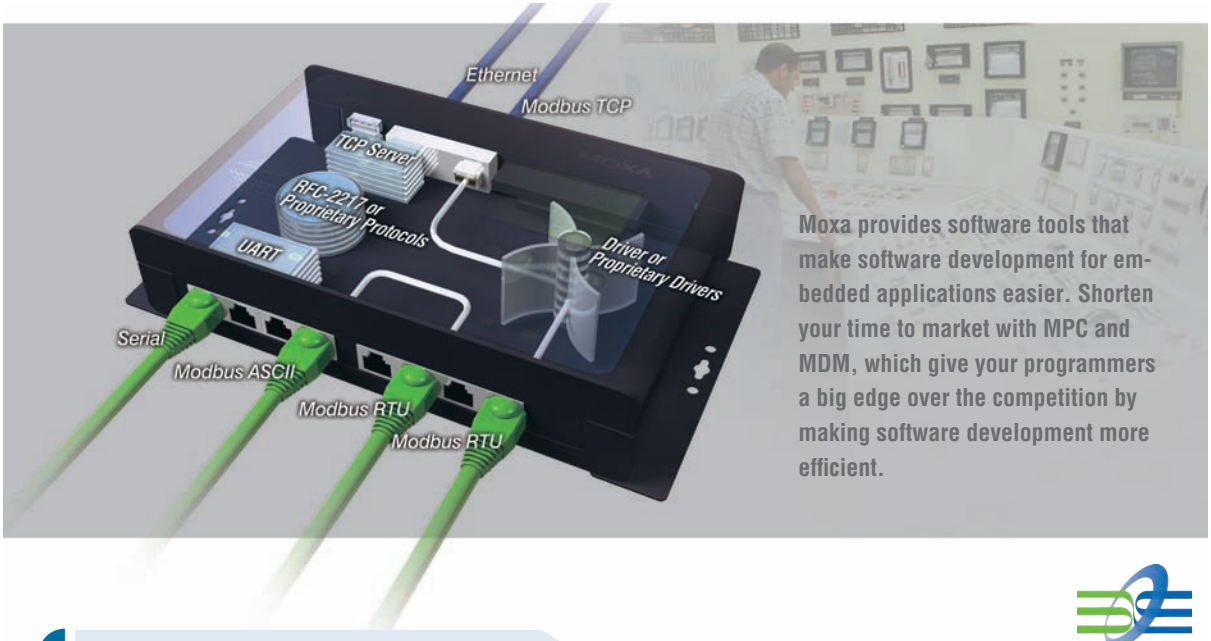
Fanless

A fanless design is a major requirement for industrial solutions. Moxa focuses on choosing the finest components that generate less heat but can still maintain high system performance. The fanless design makes Moxa's embedded computers ideal solutions for applications that experience extremely hot or cold environments.

Compact Design

Moxa's industrial embedded computers have a compact form factor, making them ideal for both indoor and outdoor industrial environments, especially at field sites that do not have a lot of extra space. Moxa has made its mark in the embedded market by providing computers that are compact yet powerful, and can be used in any industrial environment.

Software Tools for Added Value



Moxa provides software tools that make software development for embedded applications easier. Shorten your time to market with MPC and MDM, which give your programmers a big edge over the competition by making software development more efficient.

Moxa Protocol Converter (MPC)

MPC is a software engine that establishes bi-directional data stream channels between any two ports on an embedded computer, and loads custom-written programs or drivers (written in C) that audit the data as it flows from one port to the other. Moxa's MPC software engine gives solution providers a great tool for coordinating the flow of data between a wide range of devices and protocols. With MPC, developers can easily establish a communication channel that connects any combination of two channel ports, but without needing to write additional programs.

Features:

- Port-to-port communication for both serial ports and network ports
- Driver programmable
- Easy configuration with Moxa Device Manager (MDM)

Moxa Device Manger (MDM)

Moxa Device Manager (MDM) is an efficient online device management tool that can easily handle management tasks such as configuring the network or serial ports, managing and/or transmitting text and binary files, and monitoring and controlling processes by using a Windows-based user interface. In a nutshell, MDM gives system integrators the benefit of managing and monitoring all remote devices from one computer.

Features:

- Remote control and management
- Configuration and maintenance without using the command line
- Easy installation and setup
- Secure and reliable data transmission
- Scalable architecture for application extension
- Unified Windows-based interface for heterogeneous systems

Quality & Service

Quality Assurance

Moxa has been accepted into the ISO 9001:2000 family of certified organizations, with annual re-certification by some of the most demanding auditors. In addition, Moxa has also achieved ISO 14001 certification for adopting an environmental management system. Moxa's embedded computers are designed to meet a variety of industrial certifications, including FCC, CE, DNV, LVD, and CCC.

Longer MTBF

The industrial-grade design of Moxa's embedded computers ensures a longer MTBF, making these computers an optimal choice for building embedded applications.

5-year Warranty

All of Moxa's embedded computers are backed by a solid 5-year warranty, reflecting Moxa's reputation for providing quality products that work reliably, even when used for demanding industrial applications.

Technical Support

Moxa's technical support group works closely with our R&D team to help customers solve problems quickly and with satisfactory results. Our technical support engineers use their know-how to maintain an up to date FAQ and glossary of relevant technical terms, both of which can be found on Moxa's website, giving customers the resources they need to perform basic troubleshooting tasks.

RMA Service

You can easily get RMA (Returned Merchandise Authorization) service and trace the status of your returned products online with the Moxa e-RMA system. Our customer service staff is happy to provide you with friendly and immediate service.

Customer Satisfaction Management

We periodically send out a customer satisfaction questionnaire to all Moxa end-users so that we can better understand what our customers think of Moxa's services and products. With your help, we work continually to improve our support strategy to provide you with better services and products.

Moxa Technical Support Certification (MTSC)

The Moxa Technical Support Certification (MTSC) system was established to guarantee that customers around the world receive the most up to date, on-time assistance with their Moxa products. All MTSC engineers are required to attend regular training sessions, led by Moxa's own technical support experts, and must pass a rigorous battery of tests before being awarded the MTSC seal of approval.

x86-based Computing Solutions

A wide variety of industrial applications, including data acquisition, numerical computing, and even protocol conversion, can benefit from Moxa's x86-based computers, which provide an easy-to-use programming environment for quick system development. Moxa also provides x86-based models that come with a VGA output, allowing you to make your industrial applications more user-friendly by adding a terminal and a monitor.

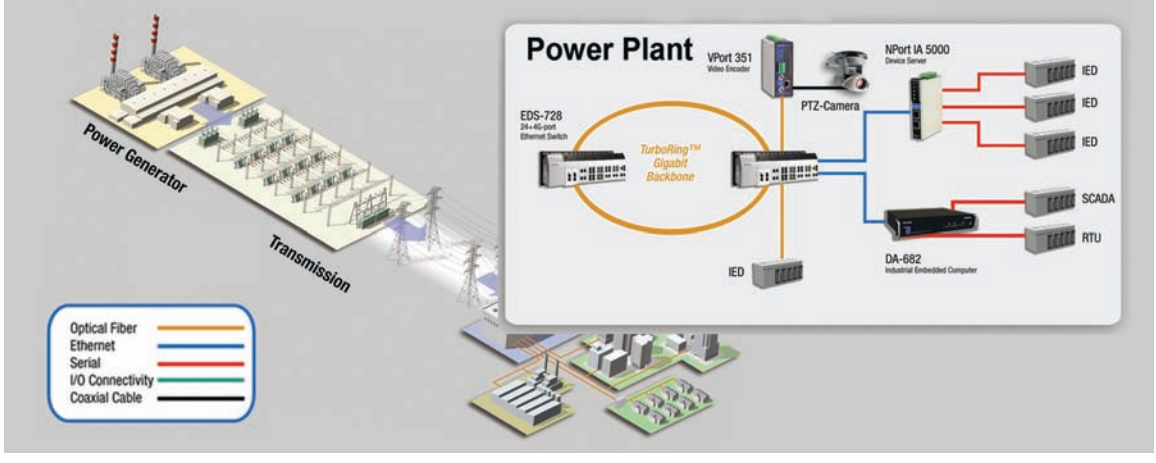
Moxa's x86-based Solutions Come in one of two Form Factors:

Wallmount Computers

The "V Series" of wallmount computers come with serial ports, LAN ports, a PCMCIA slot, switch ports, USB hosts, a CompactFlash socket, and DI/DO channels. These multiple interface options make them the ideal solution for industrial automation, including factory automation, production line facilities, and even the mining industry.

Rackmount Computers

Moxa's rackmount computers come with multiple serial ports and LAN ports, all with a modular design. This is particularly convenient when users would like to create a flexible solution for data and network communication. The friendly design gives users the advantage of being able to swap out modules quickly and easily.



RISC-based Computing Solutions

Moxa's RISC-based computers offer a powerful computing engine that has the potential to speed up industrial tasks, such as data acquisition, data computing, and protocol conversion. By embedding pre-configured commands in the computer, all industrial tasks can be performed well, and system integrators can create embedded applications with less effort and at a lower cost.

Moxa's RISC-based solutions offer several product types:

Rackmount Computers

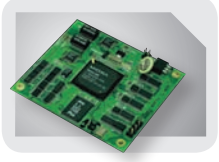
The DA Series with rackmount design is well-suited for data collection in power automation, and also as ideal front-end controllers for dealing with complicated protocol conversion applications.

DIN-Rail Computers

The IA Series with rugged design is ideal for industrial applications such as factory automation, mining, and production line management. The wide temperature feature of these computers also makes them the perfect solution for applications deployed in harsh environments.

Wallmount Computers

The UC Series provides multiple connection options for data communication, such as serial ports, PCMCIA, SD, DI/DO, and USB hosts, and work well as front-end controllers for demanding applications such as data acquisition, data computing, and protocol conversion.



Embedded Modules

The EM Series is designed for system integration and software development in industrial applications. These mini-size core modules can be easily integrated into systems for implementation in related industrial applications, such as data acquisition and control systems. A full-function development kit minimizes the effort required for system integration, and reduces your time to market.

Wireless Computing Solutions

Moxa's W300 series of embedded computers offer a perfect combination of wireless solutions and computing platform, allowing you to expand the range of your industrial applications. Both short-range and long-range wireless solutions are available, making the W300 computers ideal solutions for adding a wireless architecture to your industrial embedded computing applications, such as environmental monitoring and SCADA.

WLAN Solution for Short-range Communication

The W311/321/341 computers offer powerful serial connectivity for connecting a variety of industrial remote devices, and provide a reliable and convenient data transmission solution for field sites where wired communication is costly or unavailable.

Cellular Solution for Long-range Communication

The W315/325/345 computers are particularly well suited for connecting to remote devices that are not easily reached with a land-based line, or in locations that require stable wireless service.

Product Selection Guide

	Wallmount				DIN-Rail	
	RISC-based		x86-based		RISC-based	
Model Name	UC-7100 Series	UC-7400 Series	V481	V460 Series	IA240 Series	IA260 Series
CPU	MOXA ART ARM9 32-bit or Cirrus EP9302 ARM9 CPU	Intel XScale IXP-422 or Intel XScale IXP-425	Intel ULV Celeron M 1 GHz processor	AMD Geode LX 800@0.9W processor, 128K L2 Cache,	MOXA ART ARM9 32-bit RISC CPU	Cirrus EP9315 ARM9 CPU
CPU Frequency	192 MHz processor or 200 MHz	266 MHz or 533 MHz	1 GHz	500 MHz	192 MHz	200 MHz
RAM	16 MB (32 MB for ODM) or 32 MB onboard (64 MB for ODM)	128 MB onboard (256 MB for ODM)	256 MB DDR2 SDRAM (WinCE model) or 1 GB DDR2 SDRAM (WinXPe model)	256 MB DDR2 SDRAM (WinCE model) or 512 MB DDR2 SDRAM (WinXPe model)	64 MB onboard (128 MB for IA241 ODM)	128 MB onboard (256 MB for ODM)
Flash	8 MB onboard (16 MB for ODM) or 16 M Bonboard (32 MB for ODM)	32 MB onboard	256 MB (CE model) or 1 GB (XPE model) industrial CompactFlash card onboard to store OS	256 MB (CE model) or 1 GB (XPe model) industrial DOM onboard to store OS	16 MB onboard (32 MB for IA241 ODM)	32 MB onboard
OS	Windows CE 5.0 or µClinux or Linux	Embedded Linux or Windows CE 5.0	Windows CE 5.0 or Windows XP Embedded	Windows CE 6.0 or Windows XP Embedded	Embedded Linux	Windows CE 6.0
Ethernet	2 x 10/100 Mbps (1 for UC-7101)	2 x 10/100 Mbps	1 x 10/100 Mbps, 1 x 10/100/1000 Mbps	2 x 10/100 Mbps or 4 x 10/100 Mbps	2 x 10/100 Mbps	2 x 10/100 Mbps
Buzzer, RTC, WDT	Yes	Yes	Yes	Yes	Yes	Yes
Power Input	12 to 48 VDC	12 to 48 VDC	9 to 36 VDC	9 to 36 VDC	12 to 48 VDC	Redundant power input design PWR1: 12 to 48 VDC (3-pin terminal block) PWR2: 12 to 48 VDC (power jack with thread)
Power Consumption	Less than 4 Watts	Less than 4 Watts	25W; 650 mA @ 36 VDC; 2750 mA @ 9 VDC	25W; 730 mA @ 36 VDC; 2820 mA @ 9 VDC	7 watts	783 mA @ 12 VDC (with no load on USB ports) 1.2 A @ 12 VDC (with load on 2 USB ports)
Storage Expansion	SD	CF	2nd CF available for storage expansion and IDE HDD support (option)	CF	SD	CF
Serial Ports	1 or 2 or 4 x RS-232/422/485	8 x RS-232/422/485	8 x RS-232/422/485	2 x RS-232 2 x RS-232/422/485	4 x RS-232/422/485	4 x RS-232/422/485 (2 for IA261)
USB	Yes or n/a	Yes	Yes	Yes	Yes	Yes
PCMCIA	Yes	Yes or n/a	n/a	Yes (V462 only)	Yes (IA241 only)	n/a
VGA	n/a	n/a	Yes	Yes	n/a	Yes
DI/DO	n/a	8 (UC-7408 only)	n/a	8 (V468 only)	4	8
CANbus	n/a	n/a	n/a	n/a	n/a	2 (IA262 only)
Anti-Vibration	2G or 3G	3.5G	5G	5G	5G	5G
Anti-Shock	n/a	5G	50G	50G	50G	50G
Operatiing Temperature	Standard: -10 to 60°C (14 to 140°F) Wide temp.: -40 to 75°C (-40 to 167°F)	Standard: -10 to 60°C (14 to 140°F) Wide temp.: -40 to 75°C (-40 to 167°F)	Standard: -10 to 60°C (14 to 140°F) Wide Temp: -35 to 75°C (-31 to 167°F)	Standard: -10 to 60°C (14 to 140°F) Wide Temp: -40 to 75°C (-40 to 167°F)	Standard: -10 to 60°C (14 to 140°F) Wide Temp.: -40 to 75°C (-40 to 167°F)	Standard: -10 to 60°C (14 to 140°F) Wide Temp.: -40 to 75°C (-40 to 167°F)
Safety	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), TÜV (EN60950-1)	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), TÜV (EN60950-1)	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), LVD, CCC (GB4943)	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), LVD, CCC (GB4943CCC)	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), TÜV (EN60950-1)	UL/cUL

Product Selection Guide

	Rackmount		Wireless		Embedded Modules	
	RISC-based	x86-based	RISC-based		RISC-based	
Model Name	DA-660 Series	DA-682	W3x1 Series (WiFi)	W3x5 Series (GSM/GPRS)	EM1200 Series	EM2260
CPU	Intel XScale IXP-422 or Intel XScale IXP-425	Intel Celeron M 1GHz processor	MOXA ART ARM9 32-bit RISC CPU	MOXA ART ARM9 32-bit RISC CPU	MOXA ART ARM9 32-bit	Cirrus Logik EP9315 ARM9 CPU
CPU Frequency	266 MHz or 533 MHz	1 GHz	192 MHz	192 MHz	192 MHz	200 MHz
RAM	128 MB onboard (256 MB for ODM)	256 MB DDR2 SDRAM (WinCE model) or 512 MB DDR2 SDRAM (Linux or WinXPe model)	32MB or 64MB	32MB or 64MB	16 MB onboard (32 MB for ODM)	128 MB onboard (optional 256 MB)
Flash	32 MB onboard	256 MB (CE model) or 1 GB (XPE model) industrial Flash Disk Module to store OS	16 MB	16 MB	8 MB onboard (16 MB for ODM)	32 MB
OS	Embedded Linux or Windows CE 5.0	Linux or Windows CE 6.0 or Windows XP Embedded	Embedded Linux with MMU support	Embedded Linux with MMU support	Embedded µClinux (kernel 2.6.9)	Windows CE 6.0
Ethernet	2 or 4 x 10/100 Mbps or 2 Optical Fiber	4 x 10/100/1000 Mbps and 4 or 8 10/100 Mbps LAN ports expandable	1 x 10/100 Mbps (RJ45)	1 x 10/100 Mbps (RJ45)	2 x 10/100 Mbps	2 x 10/100 Mbps
Buzzer, RTC, WDT	Yes	Yes	Yes	Yes	Yes	Yes
Power Input	100 to 240 VAC/VDC auto ranging (47 to 63 Hz for AC input)	100 to 240 VAC/VDC auto-ranging (47 to 63 Hz for AC input)	12 to 48 VDC	12 to 48 VDC	12 to 48 VDC	12 to 48 VDC
Power Consumption	12 watts	50W	400 mA @ 12 VDC, 4.8 watts or 600 mA @ 12 VDC (no USB load), 1200 mA @ 12 VDC (with load on 2 USB ports)	400 mA @ 12 VDC, 4.8 watts or 600 mA @ 12 VDC (no USB load), 1200 mA @ 12 VDC (with load on 2 USB ports)	5 VDC @ 625 mA	5.4 watts
Storage Expansion	CF	CF	SD	SD	SD	CF
Serial Ports	8 ro 16 x RS-232/422/485	8 or 16 x RS-232/422/485	1 or 2 or 4 x RS-232/422/485	1 or 2 or 4 x RS-232/422/485	2 or 4 x RS-232/422/485	4 x RS-232/422/485
USB	Yes or n/a	Yes	Yes or n/a	Yes or n/a	n/a	Yes
PCMCIA	Yes or n/a	n/a	n/a	n/a	n/a	n/a
VGA	n/a	Yes	n/a	n/a	n/a	Yes
DI/DO	n/a	n/a	1 Relay (W341 only)	1 Relay (W345 only)	n/a	8
CANbus	n/a	n/a	n/a	n/a	n/a	n/a
Anti-Vibration	3G	n/a	5G	5G	n/a	n/a
Anti-Shock	n/a	n/a	50G	50G	n/a	n/a
Operatiing Temperature	-10 to 60°C (14 to 140°F)	-10 to 60°C (14 to 140°F)	-10 to 60°C (14 to 140°F)	-10 to 60°C (14 to 140°F)	Standard: -10 to 60°C (14 to 140°F) Wide Temp.: -40 to 75°C (-40 to 167°F)	Standard: -10 to 60°C (14 to 140°F) Wide Temp.: -40 to 75°C (-40 to 167°F)
Safety	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), TÜV (EN60950-1)	UL/cUL (UL60950-1, CSA C22.2 No. 60950-1-03), LVD, CCC (GB4943)	UL/cUL (UL60950-1), TÜV (EN60950-1)	UL/cUL, TÜV	n/a	n/a

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