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AUGUST 2010
VOLUME 8 • NUMBER 5

Networking EBX Compilers Medical Blades SSDs ITX Displays GPUs Chassis EDA PC Mezzanines

Tech Channel:

Wind River on virtualization

2010 Resource Guide

More Tech Channels:

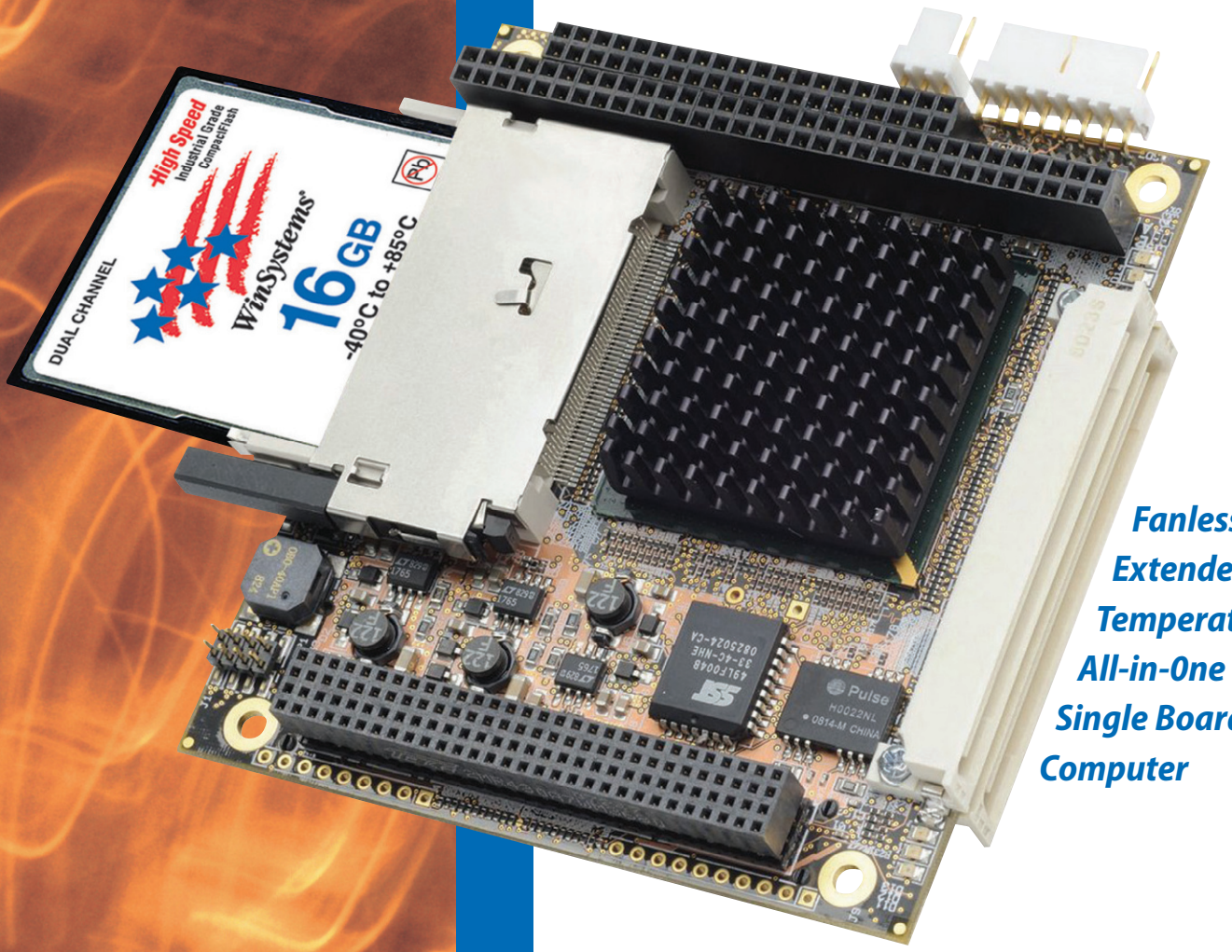
Microchip on touch interfaces

AMD on digital signage

Panel Discussion:

Smart grid, and what you need to know now

PC/104-*Plus* SBC Supports Industrial Control, HMI, Networking and I/O



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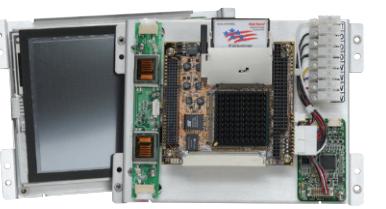

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On the cover

On the cover: Our annual Resource Guide issue, with product profiles in 34 different categories, features several Tech Channels this year.

- Wind River discusses how virtualization and multicore processing are changing embedded designs.
- Microchip Technology shows how touch interfaces work in tough environments.
- AMD looks at diversity in digital signage and how graphics hardware has to be flexible, yet stable.

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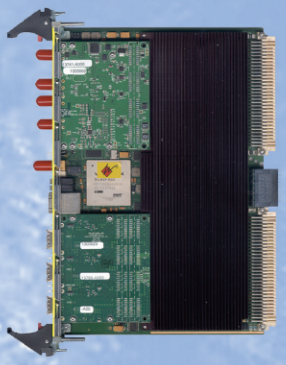

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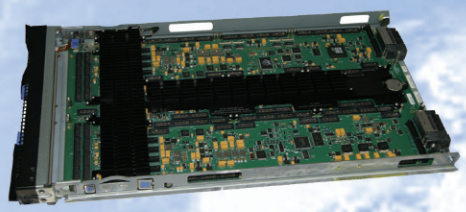

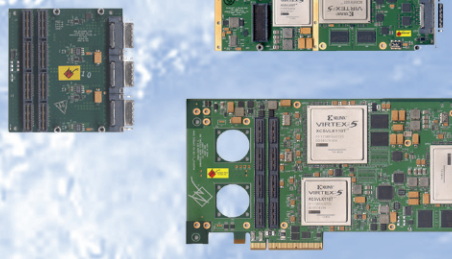

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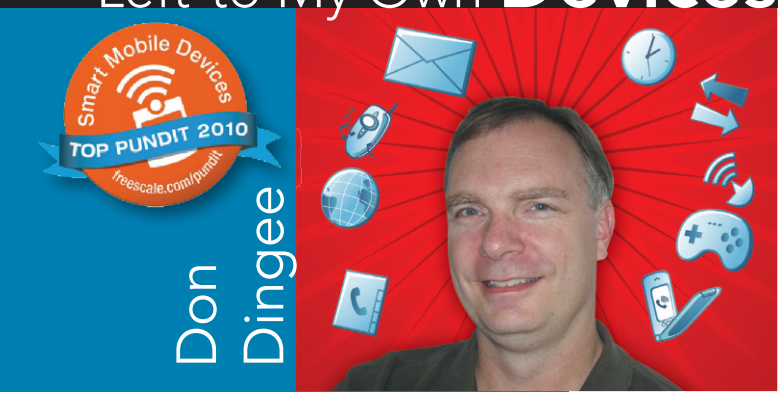

Get off my bike, Alphonse

By Don Dingee

When we look at a situation only thinking about what's gone on in the past, we don't see the entire picture.

I was watching the final individual time trial stage of this year's Tour de France as I prepared to write this, and happened to sit down when Lance Armstrong was mid-course. Coverage was fixed on Lance's time to the first checkpoint, and he was falling way off the pace and even wobbling with his pedal strokes, something I don't ever remember seeing before.

At that point, race commentator Paul Sherwen remarked "Perhaps [Lance] no longer has the desire to win this race." Funny he should mention that, because during the next commercial break the Lance Nike "Engine" ad played, and then I realized just how badly that comment missed what's going on now.

2D: Nike Lance "Engine," http://bit.ly/aMUU7c

We're falling into this same trap in our view of the embedded computing industry. If we look out the rearview mirror and not the windshield, we miss seeing a much bigger race.

Take Lance for instance. He's put a huge amount of energy into starting a cycling team and is still encouraging younger riders. He's definitely inspired millions of people with his courage and unbelievable perseverance. Now, he's creating his future. It's fun to celebrate accomplishments and dream of greatness, like Alphonse enjoys doing when Lance is away on business, but it's time to move on and create new stories.

When I hear something like "smartphones and tablets will never take over for PCs," I'm hearing folks who need to look out the windshield. PCs will continue as prosumer workstations for graphics arts, code development, EDA, gaming, and similar heavy lifting. But walk into your nearest Apple Store and watch people use the iPads for an hour. Consumers like mom posting pics and teens creating social content and kids doing lots of other things are headed for or already on smartphones and tablets. It's just starting. We haven't imagined all the tools that will show up, and it's already affecting embedded computing.

We have examples of more changes in embedded computing in our content this month. Motorola is shedding its base station infrastructure team to Nokia Siemens Networks for $1.2 billion. Why do that in a rapidly growing market? The answer comes from DesignArt Networks: The base station market has changed, and new Systems-on-Chip (SoCs) are enabling the new game of compact base stations, where new leaders will emerge. (And Motorola gets to focus on Droids, their best move right now.)

Another example is our interview with the GM of Dell's OEM Solutions unit, a much bigger name in embedded computing than you might realize. You'll also see ideas from Microchip, Altia, Wind River, AMD, and many companies in our Resource Guide pointing at changes under way in our industry. Our virtual panel discussion on the smart grid is also different and enlightening, with representation from APS, EPRI, GridWise Alliance, Lockheed Martin, and others.

Don't be like Alphonse and just pretend. By all means, have fun on the bike. Then get off, figure out the changes, and go make something happen. Let me know what you're seeing.

2D: Radio Shack Alphonse on bike, http://bit.ly/dxe1fK

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4G data explosion: Compact base stations to the rescue

By Joachim Hallwachs

The explosion in data rates is driving a need for more base stations, which are typically big, expensive pieces of equipment. Integrating 4G functions into Systems-on-Chip designed to reduce the size and expense of a Compact Base Transceiver Station enables wider deployment to meet the growing data traffic demand.

Operators are experiencing the early effects of the mobile data traffic explosion. While most of the initial data volume was driven by mobile data cards in laptops and Web tablets, the growing percentage of smartphone subscribers is beginning to add significant demand.

From 2008 to 2010 mobile data traffic volume in the United States is expected to grow from 138 petabytes to the staggering amount of 1 exabyte (10^{18} bytes), nearly an increase of 750 percent. As subscriber usage models go, mobile data consumption tends to follow wire-line broadband usage models within a few years of delay, giving wireless radio access technology a chance to catch up.

Experts predict this trend to continue, with even moderate forecasts leading to an annual U.S. mobile data traffic volume of about 40 exabytes by 2014 and 90 exabytes by 2015 (see Figure 1). This amounts to a growth of roughly 9,000 percent within just five years. So how will this explosion in data traffic affect the mobile radio infrastructure equipment market?

Data capacity from 4G technology

With LTE (R8) and LTE Advanced (R10), radio access technology will be evolving from Single Input Single Output (SISO) to Multiple Input Multiple Output (MIMO), applying 2x2 transmit and receive diversity, and soon to Multi-User MIMO (MU-MIMO), applying 4x4 RF diversity. This can yield a capacity increase of about 200-300 percent across an entire cell area. With new spectrum assets released by auctions globally, operators in 2015 can expect to utilize roughly 40 MHz of paired spectrum, a capacity increase of another 400 percent.

Using today's 3G deployments as a baseline, the total yield of new spectrum auctions and gains related to 4G technology combined represents 800-1,200 percent of capacity increase. Compared to the outlined demand (the 9,000 percent stated earlier), this indicates a massive 4G capacity gap. To support the expected mobile data traffic volume in 2015, operators will install an order of magnitude more cells during 2013 and 2014 and try out related equipment in 2012 and 2013, which will be developed by mobile equipment vendors in 2011 and 2012.

A shift in the mobile radio access network architecture to the deployment of more and smaller 4G cells is imminent. This will allow the frequent reuse of expensive operator spectrum assets based on newly deployed cell sites and help address the exploding demand for mobile data capacity.

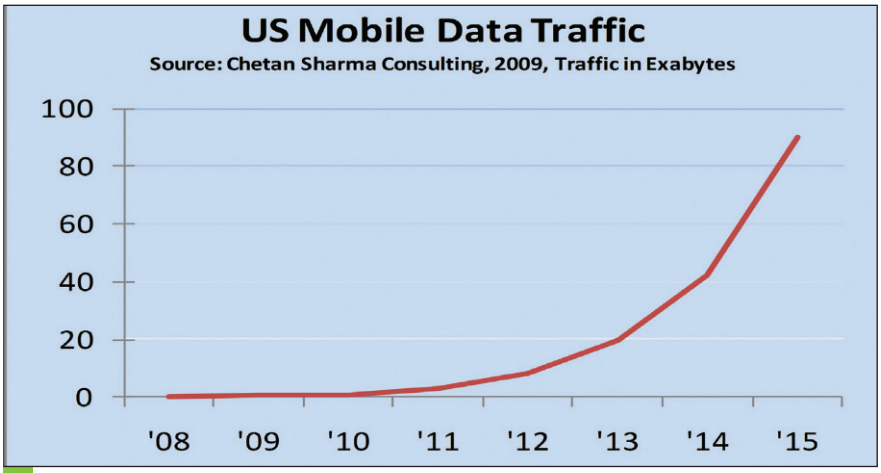

Figure 1 | Mobile data traffic volume in the United States is projected to reach 90 exabytes by 2015.

What are compact base stations?

A new base station paradigm designed to enable operators to deploy the necessary cell density in the coming years must be a priority design target for equipment vendors. Compact Base Transceiver Stations (Compact BTS) are a mandatory part of near- to medium-term 4G radio access network deployments, with first-generation equipment being deployed in WiMAX today.

Fundamentally System-on-Chip (SoC)-based, Compact BTS equipment combines all the processing layers of a complete base station in a passively cooled single-box form factor that can be mounted just about anywhere power can be found. Single-box outdoor or indoor Compact BTS equipment comes in a variety of enclosures, antenna form factors, and RF output classes (see Table 1). The key requirement of Compact BTS is to enable operators to use any type of real estate or right of way to deploy more cells strictly on a least-cost base. To achieve this, Compact BTS equipment will eliminate requirements for operators to construct, lease, and maintain air-conditioned shelters or cabinets.

While operators will have to accept the requirement to add new cell sites to traditional radio access network locations, there will always be the need to minimize the resulting cost impact. The CAPEX and OPEX involved in acquiring, building out, installing, and operating additional cell sites will cause operators to minimize and gradually increase the total number of added sites.

To maximize the spectral efficiency and capacity yield of each new cell, Compact BTS equipment employs all the bells and whistles of evolving 4G technology:

- Support of wide spectrum channels for 4G mobile broadband usage
  - Up to 40 MHz Frequency Division Duplex (FDD) LTE and 80 MHz Time Division Duplex (TDD) LTE of total channel capacity
  - Flexible support of FDD and TDD spectrum usage
- Maximum reuse of available spectrum from any given cell site
  - Cost-effective multisector deployment options for all Compact BTS
  - Multicarrier spectrum aggregation to create virtual 4G service channels
- Extensive support of 4G Adaptive Antenna System (AAS) technology
  - Minimum of 4 Tx and 4 Rx streams, with processing support for MU-MIMO
  - Optional support of 8 Tx and 8 Rx antennas, with AAS signal processing support, such as

Compact BTS Equipment				
Application	**Macro cells**	**Micro cells**	**Pico cells**	**Indoor APs**
General	Single-enclosure BTS, size and cost reduced by extensive use of SoC technology. Contains all BTS components - Control Layer, Backhaul, MAC, PHY, digital radio front-end (DFE), and analog RF/PA sub-system.			
Spec	Size, Weight and Power Consumption largely determined by heat-dissipation of integrated RF/PA sub-system. [Compact BTS are entirely passively cooled and *never* require climate controlled shelters or cabinets]			
Power Consumption	Up to ~170W	50W to 120W	25W to 60W	10W to 25W
Antenna Options	Discrete Antennas multi-sector Options	Discrete Antennas multi-sector Options	Integrated Antennas multi-sector Options	Integrated Antennas single sector
Physical Form Factor	Identical to RRH	similar to small RRH or outdoor Access Point	outdoor Access Point	Indoor Access Point
RF Array Support	4x4 - 8x8	2x2 - 4x4	4x4	4x4
Mounting Locations	Dependent on actual Compact BTS Equipment Form Factor (size, weight, power consumption)			
	Tower, roof tops	Tower, roof tops, side walls	Side walls, lamp posts, traffic lights, poles, ... MSO cable strands, ...	Floors, SMB, MTU, ...
Operational	Controlled and monitored remotely, very high MTBF			
Multi-protocol	Software-defined architecture for simultaneous multi-protocol operation , e.g. GSM, HSPA, LTE, WiMAX			
Self-backhaul, Relay	Hub Functionality	Hub Functionality	Self-Backhaul for Metrozone Deployments	TBD
Subscribers	Flexible - driven by site location, cell size, and local market demography			
Subs per Sector	> 200	< 200	< 100	< 50

Source: In-Stat, 5/2010

Table 1 | Compact BTS equipment comes in various formats with a number of options suitable for different applications. Image courtesy of In-Stat.

beam forming, interference cancellation, and so on
- Support of Self-Organized Network (SON) software technology
  - Initial autodiscovery, self-configuration, and network operations center autoconnect capability
  - Automated self-configuration, ongoing maintenance, and RF operation

At the same time, Compact BTS equipment needs to support infrastructure-grade operations requirements and meet requirements related to equipment practice that allow the deployment of carrier-grade, high-density radio access networks:

- Extremely compact, passively cooled, single-box equipment options
  - Minimum power consumption, with software-optimized Power Amplifier (PA) efficiency
  - Minimum size and weight, enabling single-craft installation
- Long-term deployment viability
  - In-field software upgradability: Fully software-defined BTS architecture
  - In-field software evolution: Support of future mobile standards evolution
  - In-field software backward compatibility: Concurrent support of multiple mobile standards
  - In-field RF evolution: Continued reuse of initially deployed spectrum
- Operational infrastructure requirements
  - Very high MTBF, at least comparable to acceptable Remote Radio Head (RRH) metrics
  - Extensive support of real-time diagnostics, statistics, alarming, and logging
  - 100 percent operability from the central network operations center, especially under system error conditions

Compact BTS equipment must be cost-effective, not only in its deployment impact, but also in terms of equipment and ongoing support costs. The bottom line is simple: Once an order of magnitude of additional 4G cell sites is installed, revisiting these cell sites should not be required for a long time.

First-generation single-carrier WiMAX deployments

The aforementioned requirements can only be supported based on a new generation of silicon solutions: multilayer, multicore SoCs. These SoCs offer multiple targeted processing layers for various BTS architecture subsystems – CPU cores for system and service management, RISC cores with hardware acceleration for network layer and data path processing, DSP cores with hardware acceleration for PHY layer and AAS processing, and additional DSP cores with hardware acceleration for the software-defined implementation of the Digital RF Front-End (DFE) layer.

With the integration of all base station processing layers, modern SoC-based Compact BTS design eliminates almost all discrete components found in traditional base stations while maintaining high performance. This is the only way to satisfy the extremely stringent requirements for maintaining low size, weight, and power consumption while still supporting medium- and high-power PA options.

Reducing the entire base station design to a single SoC integrated with a suitable RF subsystem, Compact BTS equipment consumes a mere fraction of traditional BTS's system power and delivers a higher MTBF than even stand-alone RRH equipment, combining flexible RF/PA solutions with complete BTS functionality in one compact, passively cooled box.

The first generation of this Compact BTS equipment is now available based on DesignArt Networks' DAN2400 SoC, utilizing the ultra-compact system architecture depicted in the reference design captured in Figure 2. Compact Pico and MicroBTS products span 2x2 to 6x6 Tx/Rx AAS configurations, with total system output power ranging from 0.5-12 W.

Operators can reduce the 5-year CAPEX and OPEX associated with traditional BTS applications by about 38-47 percent, asserts Monica Paolini, founder and president of Senza Fili Consulting. They can also gain the additional benefit of flexible site selection to expand their networks, such as the ability to deploy in any location that provides for a standard power source and carries suitable antennas.

Second-generation multicarrier 3G and 4G solutions

The latest edition of multilayer, multicore SoCs takes the Compact BTS design architecture several steps further, first extending the range of Compact BTS applications from 0.25 W indoor access points up to 80 W macrocells, then adding connection options to build

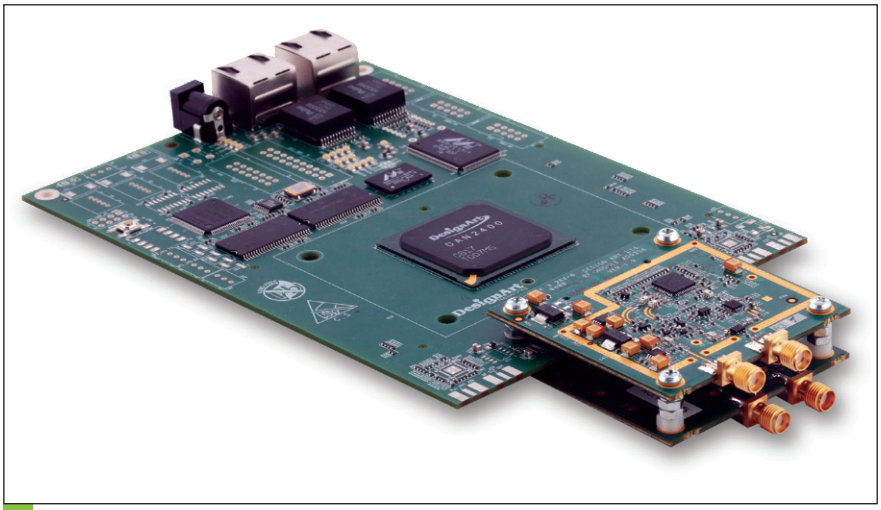

Figure 2 | The DAN2400-based 4x4 Tx/Rx Compact BTS delivers high reliability in a passively cooled form factor.

ultra-scalable, distributed, multisector Compact BTS and RRH applications. All of these applications are entirely based on passively cooled single-box equipment, thus covering mobile operators' site specifications without the need for any shelter.

The critical benefit for operators and vendors is that all of these design options use the same baseband, control plane, and backhaul hardware and software subsystems. Thus vendors can use a single R&D framework for an entire product line (back to Table 1), in turn furnishing operators with coherent end-to-end operational, network, and service behavior of densely deployed Compact BTS infrastructure.

Combining a scalable, embedded, multilayer, multicore BTS architecture with a fully software-defined multicarrier, multimode digital radio front end embedded in a single SoC brings additional benefits, including the ability to operate multiple mobile radio access technologies simultaneously from the same Compact BTS (see Figure 3).

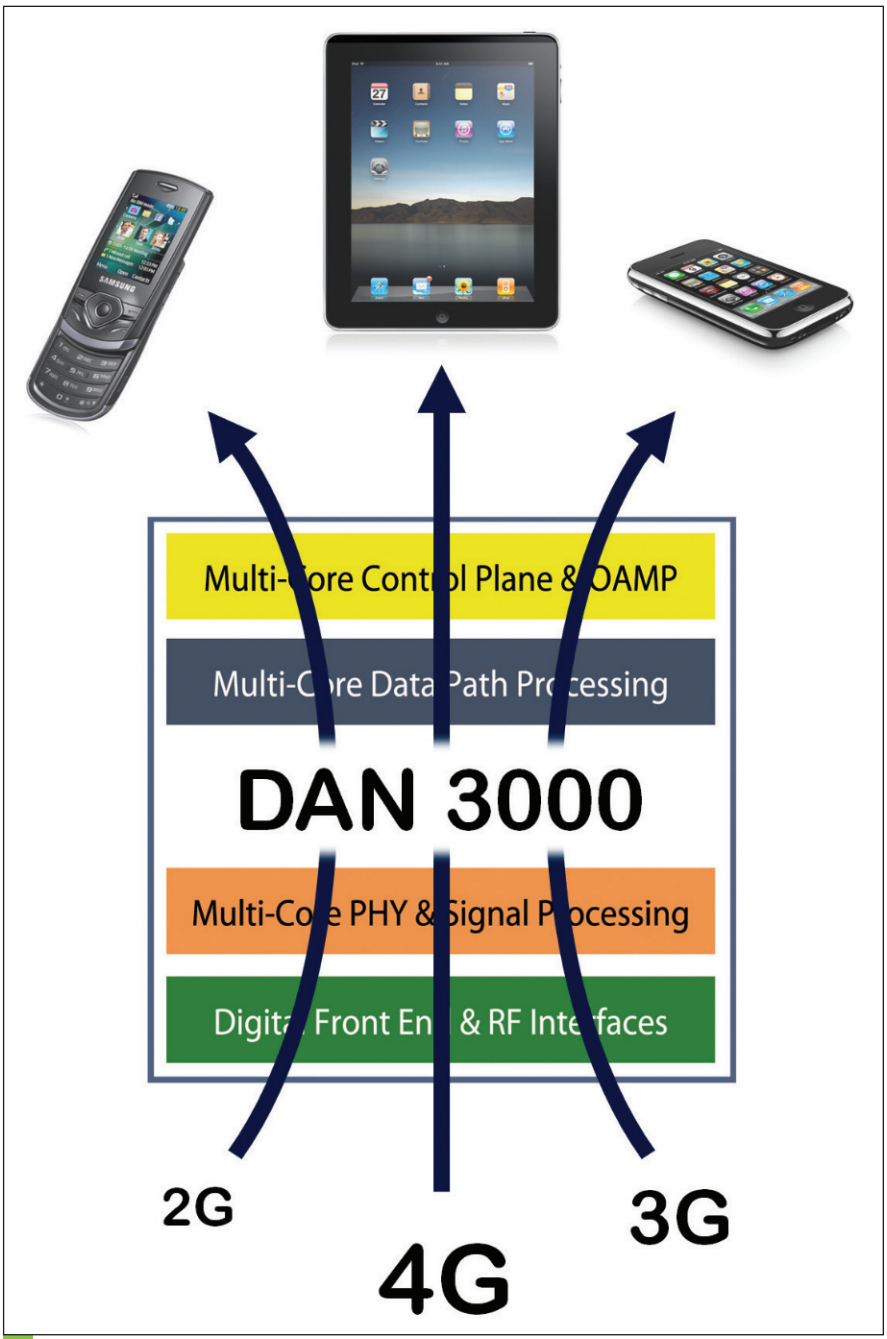

Figure 3 | A multilayer, multicore BTS architecture enables concurrent multiprotocol SoC operation.

Second-generation Compact BTS equipment based on DesignArt Networks' DAN3000 SoC family supports in-field software upgradability to future 4G mobile access technologies while maintaining backward compatibility with existing 2G or 3G subscribers. As mobile service access technology evolves and subscribers migrate to newer devices, multicarrier Compact BTS equipment can reuse and aggregate initially deployed spectrum assets, combining multiple carriers to form virtual 4G service channels.

Once the carrier-grade, multigigabit radio access network solution based on dense deployment of cost-effective Compact BTS equipment is installed, operators will not need to revisit deployment sites for in-field software upgrades. Utilizing this advanced SoC design approach, vendors can drastically improve margins in highly competitive traditional base station segments while using the same development investment to capture market share in the exploding Compact BTS market. ECD

Joachim Hallwachs *is VP of marketing for DesignArt Networks. Prior to joining DesignArt, he served in executive assignments at Accelerated Networks, Avaya, sentitO, SSC, and Siemens. Joachim has an MS in Physics from Eberhard-Karls University in Tübingen, Germany.*

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Discover new possibilities with mTouch™ Metal Over Cap technology

By Keith Curtis

Capacitive touch has become a ubiquitous form of user interface, encompassing touch screens, touch buttons, and even linear/circular sliders. Touch elements appear in everything from cell phones to appliances to information and Point-Of-Sale (POS) kiosks. However, even with their phenomenal success, capacitive touch solutions are still locked out of some applications due to physical limitations of their design.

This exclusion can be caused by capacitive touch's sensitivity to water or the very field effect nature of the interface. For example, any application that involves Braille is excluded because users must be able to brush their fingers over the sensors to read the button legend. Interfaces that must operate near water or wet areas similarly exclude capacitive touch without complex filtering and decoding logic. Capacitive touch interfaces also have trouble with actuators other than fingers such as fingernails or gloved hands.

So far, these exclusions have typically relegated user interfaces to traditional mechanical buttons; however, with the introduction of Microchip's new Metal Over Cap touch systems, these limitations are no longer valid. Metal Over Cap touch (Figure 1) uses a flexible metal plate suspended above the capacitive touch sensors to shield the capacitive touch sensor from the effects of water and noise and to translate the user's press into a capacitive shift that can be detected and decoded with Microchip's mTouch™ capacitive touch system.

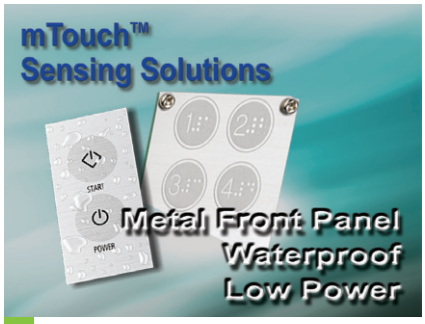

Figure 1 | Metal Over Cap technology enables capacitive touch sensing through metal and gloves and on surfaces that come in contact with liquids.

This powerful combination allows operations in both wet and submerged applications. The translation of the user's press into a physical motion removes the user from the electrical field of the sensor. This eliminates a common pathway for noise and opens the door for sensing a press by finger noise, styluses, and even gloved hands and booted feet.

The electrical and software interface to the Metal Over Cap touch system is the same high-resolution capacitive touch interface used by Microchip's existing mTouch system. In fact, an existing mTouch™ design can be converted into a Metal Over Cap touch system with the addition of a metal cover. The secret is in the design of the flexible metal target. This target can take the form of a solid metal fascia layer with the user interface printed on its top side or a thin metal layer bonded to the back of a plastic fascia. The mechanical design of the metal target determines the required actuation force as well as the shape and placement of the buttons on the interface.

To help customers design Metal Over Cap touch systems, Microchip provides design information and access to design partners skilled in the mechanical design aspects of metal over capacitive sensing. In addition, demonstration boards and development systems are available to help evaluate technology, design new systems, and convert existing capacitive touch systems. Combined with Microchip's wide variety of microcontrollers and no license fee open architecture, these design tools will help users create a product that will wow their customers.

We make it easy to please everyone from supervisors to end customers with an elegant and intuitive user interface, and a simple and cost-conscious design. For more information on Microchip's Metal Over Cap technology, see the Touch interfaces Tech Channel product page (right). Microchip application teams are ready to help you design Metal Over Cap technology into your solution.

***Keith Curtis** is technical staff engineer with the Security, Microcontroller, and Technology Development Division at Microchip Technology Inc., where he develops training and reference materials for incorporating microcontrollers into a variety of designs. His experience includes engineering design and management roles at Summit Engineering, Tele-Tech, and Bally Gaming. Keith has a BS in Electrical Engineering from Montana State University.*

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mTouch™ Metal Over Cap Sensing Solutions

Capacitive Touch Sensing Technology has become the preferred alternative to traditional push button switch user interfaces. Some of the benefits of touch sensing include:

- Lower manufacturing costs achieved by lowering costs of molds, tooling and assembly
- Elegant and stylish designs
- Increased reliability via lesser moving components

However, being a field effect technology, it does suffer from a few limitations:

1. Standard capacitive touch systems normally do not work through metal coverings.
2. It requires special software to operate in environments with radiated and/or conducted noise.
3. Reading buttons in the presence of water or other contaminants can be difficult.
4. It is problematic for visually impaired users that rely on Braille.
5. It has trouble detecting a touch through gloves.

Microchip's mTouch Metal Over Cap sensing technology overcomes these limitations through the use of a flexible conductive target layer suspended over traditional capacitive touch sensors. When the user applies a small actuation force on the target, a micron level deflection in the target is created that can be sensed using mTouch capacitive touch technology.

The user of a conductive target layer transforms the capacitive touch system from a field effect technology to a force sensing system that is immune to both water and EMI/RFI. Also, because it relies on an actuation force, and not the presence of the user's finger, it works equally well with a user's finger, gloves or even a stylus.

The target layer can be either the metal face plate of the product, with the user interface screened on the outside, or a thin metal flashing on a non-metallic faceplate. The only requirement is that the face plate be sufficiently flexible to create a 5-10 µM deflection in response to the user's actuation force.

FEATURES & BENEFITS

PIC® MCUs featuring mTouch technology offer several benefits:

- Lowest power MCUs in the industry for longer battery life
- Integrated peripherals such as USB, segmented and graphical LCD modules for true human interface system-on-a-chip
- Free software library simplifies implementation and free source code puts you in control of your own design
- Free Metal Over Cap deflection design tool

TECHNICAL SPECS

mTouch™ solutions offer:

- 1-32 Capacitive Touch Channels
- 6-pin to 100-pin devices
- Up to 512 KB Flash memory
- Sleep current down to 20 nA
- Active current down to 50 µA/MHz

AVAILABILITY

- Over 150 PIC MCUs featuring mTouch technology are in production today
- Order the enhanced mTouch Capacitive Evaluation Kit (DM183026-2) now
- Metal Over Cap sensor board to be announced soon

Visit *www.microchip.com/mTouch* to learn more and to download applications notes and software.

APPLICATION AREAS

- Battery Applications, Line-powered Applications, Thermostats, Remote Controls, Medical Devices, Cell Phones, Home Appliances, Security, Automotive, Smart Energy, Printers

For more information, contact: www.microchip.com/mTouch

www.embedded-computing.com/p45444

Contrasting sprites and GPUs and the HMI modeling approach

By Peter Abowd and Jim Mikola

Graphics subsystems are critical to embedded applications such as automotive displays. Choosing the right graphics engine for the job is the first issue, and deciding how to program for it is the second. This overview compares the approaches to designing graphics engines based on sprites and GPUs and discusses how to develop code for both with modeling.

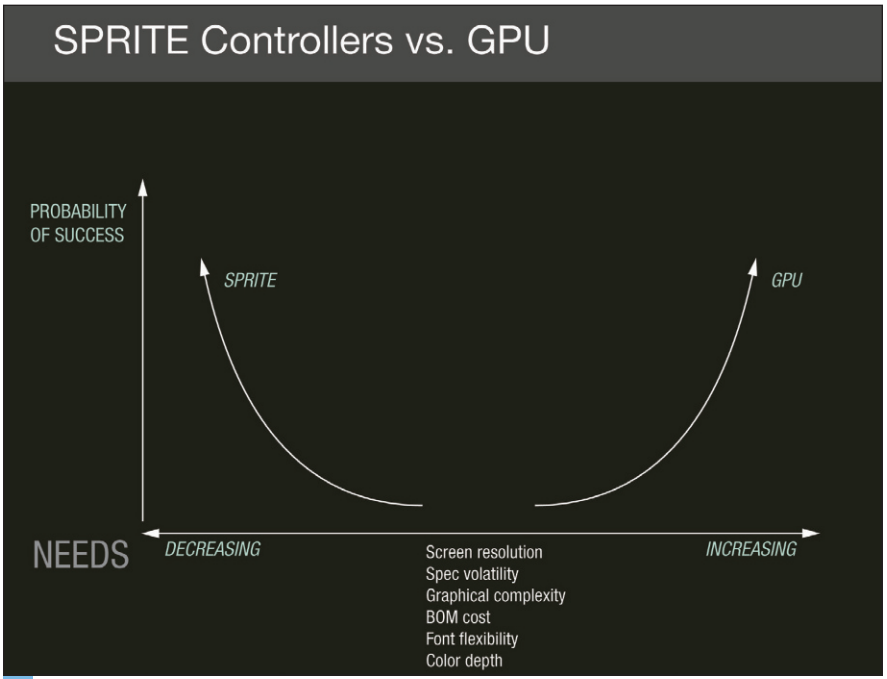

Figure 1 | When making decisions about hardware for small embedded displays, designers must consider the characteristics of the entire system – screen resolution, graphical complexity, font flexibility, and color depth – as well as project limitations like BOM cost and stability of the specification.

Embedded developers creating new, small embedded displays have another option to consider beyond the Graphical Processing Unit (GPU). Sprite-based chips have found their place in automotive applications. These display controllers offer renderless manipulation of graphical images in a manner similar to a slide show. To assist engineers looking to solve this design dilemma, Altia offers a set of guidelines that can help them make an informed decision between these two options.

It is important to clarify that Altia has no obligation or agenda to support either mechanism. The company is not tied to any semiconductor companies or technologies, and its tools are not constrained to one operating system. These tools are proven with each solution, as companies are taking their Altia-generated graphics code to production on sprite-based chips and GPUs. Therefore, the goal of this discussion is to help designers get the best Human Machine Interface (HMI) running in their products on the best possible mechanism for their applications.

Let's start with a diagram – a graphical contrast of sprites vs. GPUs in Figure 1 – and explore the details further.

Sprites: Simpler, but need planning

The sprite option is suitable for lower-end display products and is fast becoming an alternative to the GPU. So when does a sprite-based display controller successfully fit an HMI?

Sprites are a good solution when an HMI is composed of well-specified static images. The specification should be defined in advance so that designers know what is being implemented graphically in the HMI before development begins. There should not be a great deal of complexity with Z-ordering of visual and textual information. Sprite chips perform best on lower-resolution displays. These display controllers do not handle text as conveniently, often imposing restrictions like one character per sprite or a single color text per sprite. If a design is operating with a constrained Bill Of Materials (BOM), then sprite chips are a good option. They do not always require additional support chips like external RAM or flash and can operate with minimal use of internal resources.

This new hardware option does not come without challenges. At this point, sprite chips cannot easily support high-resolution displays or high color depth on lower-resolution displays. Memory bandwidth becomes a limiting factor with sprite chips as the sprite capability is integrated into the Display Controller Unit (DCU). The DCU constantly accesses graphical memory for all visible sprites every time a frame is clocked out to the display. Care must be taken to ensure the HMI does not violate bandwidth constraints by overlapping too many graphical objects, otherwise display failure will occur.

Layers of complexity

At present, if the HMI design is not known well enough at the beginning of the project, then sprite chips are a risky option. This is due to the high cost associated with changing the HMI graphical design once it is implemented on the chip. Sprite-based chips use the concept of a layer to represent an

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individual image (or sprite). Building any screen in the HMI requires placing all the images and text into these layers and positioning the layers as the designer wants them to appear on the display. The Z-order of graphics is determined by the Z-order of the layers. This is device-specific and typically cannot be changed after the layers are assigned. Therefore, Layer 1 will always appear on top of Layer 2, and so on. This is important only if the two layers intersect. The intersection is determined by the (x, y) position assigned to the layer and the pixel size of the sprite that the layer contains.

Getting the layout and organization of the layer content to appear as desired requires forethought. On parts with a limited number of layers, one can imagine the complexity that would go into defining the layer content and ordering so the images appear a certain way. Late change to layer arrangement could have a serious impact on the contents of all layers, even layers on unrelated screens. Therefore, success with sprite chips requires upfront design. Images and text must be carefully planned and arranged. If flexibility is needed with an HMI design, then rework time and cost become expensive.

It should be noted that although sprite chips are renderless, some rendering might be required to work within the constraints imposed by the chip. An example would be the number of sprites (layers) allowed by a sprite chip. A chip with a low total sprite count would be constrained when showing text where each text character occupies a single sprite. Such a chip would require that individual text characters be combined or rendered into a single memory block, which could be shown as a single sprite. The render operations can be accomplished using hardware resources like a DMA engine if allowed by the device.

GPUs: Flexible and robust, but more complex

The alternative to the sprite chip is the GPU, a proven solution with a wide range of samples running in production. This mature and well-supported technology offers tremendous flexibility during development.

The GPU presents important benefits that make it an obvious selection for specific applications. Unlike with sprite chips, memory bandwidth limitations will not result in display failure since the GPU is separate from the DCU. This allows higher-display resolutions and color depths than with sprite chips. There are very few restrictions regarding layer composition and blending. Designers can be much more flexible with text and can render more sophisticated animations on a GPU. This is a great solution to consider when the HMI specification is volatile. A GPU has fewer layers, thus reducing complexity when structuring an HMI.

More resources around the engine

The GPU requires some flexibility with a BOM, as this solution is perceivably more expensive than a sprite, especially when considering the additional external RAM and flash that it may require. GPUs are generally coupled on a System-on-Chip (SoC) with a far more powerful host processor than typically found with a sprite-based display solution. When opting for a separate GPU and host processor, increased complexity is introduced in the board layout.

The GPU presents a unique set of challenges. First, total cost is a definite consideration, especially when counting multiple chips, board real estate, and PCB layout complexity. As GPUs can support deeper color depths with greater text and font control image, memory consumption has a tendency to explode. Once the amount of image memory gets too big, image compression starts to become a constraint. Designers need to deal with image compression, decompression, and the associated costs and performance issues, which means more complexity and trade-offs. Finally, variability in GPU programming remains an issue.

Despite discussion about "the open" – OpenGL and OpenVG – the standards are not implemented the same way throughout the industry. Drivers vary greatly, and different semiconductor companies optimize differently. So getting optimized performance for a specific platform still requires some amount of customization.

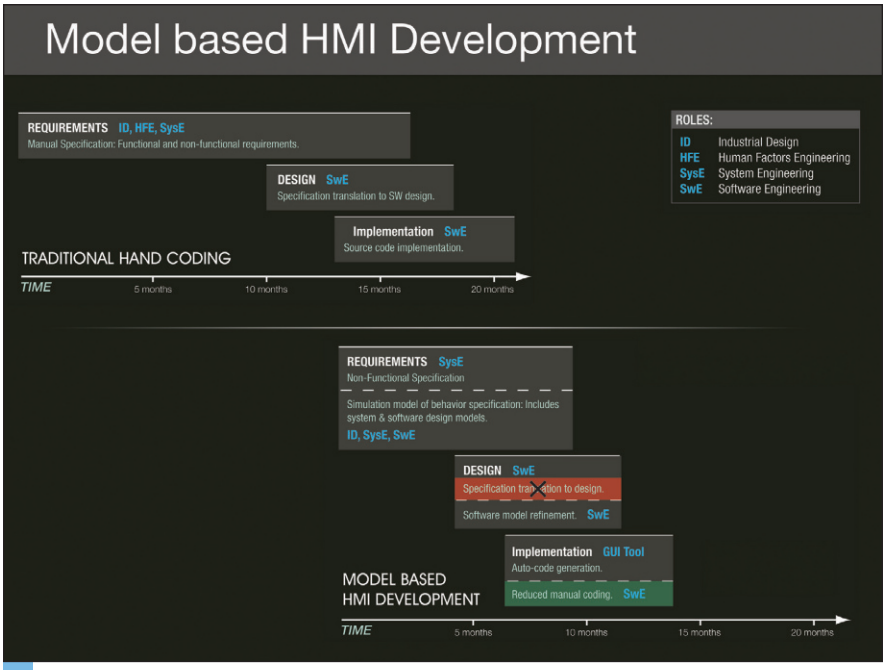

Figure 2 | With a model-based development process, teams can collaborate more efficiently around a detailed representation of the desired system with all of its intended behaviors intact.

Modeling and generating code pays off

Considering the trade-offs in the underlying graphics engine and the task of programming at hand, the question remains: How do designers get a winning HMI design? Model-based development is the path to the most efficient and effective HMI.

Where does model-based development factor into the everyday engineering effort? A traditional development process consists of time spent defining natural language requirements, followed by painful and expensive manual translation steps to create a software design and implementation from this natural language requirement. When a model-based engineering environment is introduced, the requirements process is more efficient because executable models of the intricate HMI behavior are created. An overview of a model-based environment is shown in Figure 2.

A model that can represent HMI behaviors can not only be done more quickly than writing a natural language document, but it can also depict graphical behavior that is nearly impossible to effectively define in a text-based document. These executable specifications can be baselined as a requirement model and then act as the initial software design, which is then refined for embedded target performance and limitations. Then, with products like Altia DeepScreen, an embedded implementation can be autogenerated from this refined executable model. Designers refine the model built as a requirement and then autogenerate the embeddable code for it, considerably reducing the development effort.

Model-based development, especially when paired with a graphics code generator, offers the flexibility to create the graphical model once and then generate code for multiple graphical platforms. This allows designers to try it on a variety of platforms until the right fit for the application is found. When the time comes to select hardware, be it a sprite or GPU, model-based development provides a sure-fire method for achieving a winning combination of hardware and HMI. ECD

Peter Abowd *is president of worldwide automotive for Altia, Inc. He has an extensive technical and management background in automotive embedded applications, with 20 years at Ford Motor Company and Visteon Corporation, where he served as director of embedded software development. Peter holds a BS in Electrical Engineering with a concentration in Computer Engineering from the University of Notre Dame and an MS in Software Engineering with a real-time specialization from Carnegie Mellon University.*

Jim Mikola *is senior engineer at Altia, where his responsibilities include new feature development for Altia's HMI engineering tools suite and creation of hardware-specific ports for Altia's DeepScreen code generator. Jim acquired experience in automotive software development during his tenure at Visteon, Motorola, and General Motors. He holds a BS in Electrical Engineering from the University of Michigan, an MS in Electrical Engineering from Purdue University, and is a graduate of the Naval Nuclear Power Engineer Program at Westinghouse.*

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What is the next embedded evolution?

By Mark Hermeling

Looking at today's embedded devices makes us realize what a tremendous change we have gone through during the past 5-10 years. These devices have become more powerful, with beautiful screens, amazing battery life, and of course, connectivity.

Evolution will continue. We will get better batteries, better screens, and more connectivity. But what will fuel the growth in numbers of devices and applications in the next five years? The answer is obvious: multicore.

Multicore processors deliver more performance per watt with a smaller die size, enabling them to power the devices of tomorrow. Multicore processors already reign in many of today's embedded devices, especially those that power our telecommunications connections. Multicore will migrate from these devices into all the rest, including cell phones, printers, and automotive entertainment and industrial control devices. Multicore delivers more instructions per second. This increase in processing power offers two main benefits for next-generation embedded systems:

1. **Better performance:** Counted in instructions per second, transactions per second, calls handled per second, measurements per second, and overall throughput
2. **Consolidation:** The combination of multiple distinct pieces of functionality often serviced by multiple different operating system instances on a single chip

Multicore poses the challenge of harnessing this processing power. To understand this challenge, consider a telecom switch, which used to be built with multiple distinct processors. In this system, a crash on any processor was not detrimental; the processor would simply be rebooted. A next-generation telecom system, on the other hand, has 12 cores or more. A crash that brings down that processor could seriously damage the switch. Therefore, separation and fault isolation are necessary.

As another example, consider a medical system, which used to be built with a PC for human-machine interaction and integration with an office back end. This system used Microsoft Windows and productivity suites running on it as well as an embedded system providing control and data acquisition. In contrast, a next-generation medical system uses a single multicore device running both Microsoft Windows and the control and measuring functionality – different operating systems on the same multicore chip, which requires separation, fault containment, and collaboration between operating system instances to pass data.

The best way to properly manage these multicore devices is with virtualization. Virtualization allows a designer to partition a multicore chip. Each partition is separated from the next in space (memory, devices) and time (processor core usage) and provides fault containment, meaning that one partition cannot negatively affect another. Virtualization allows multiple partitions called virtual machines to share a single core and span several cores. For example, a virtual machine could split an eight-core multicore chip into three two-core partitions running Wind River Linux Symmetric Multi-Processing (SMP) and two single-core partitions running VxWorks. Figure 1 shows Wind River Hypervisor, part of Wind River's Multicore Software Solution.

Virtualization technology has been around for many years. It initially started on IBM's mainframes, then made its way into the IT sector, and now is being rapidly adopted in the embedded industry. Each of these sectors has slightly different requirements. In the embedded industry, footprint is important, as are real-time characteristics such as determinism and interrupt latency. Virtualization for embedded is available on new, powerful multicore chips such as Intel's processors with VT-x virtualization technology and Freescale's e500mc, which is used in some of the Systems-on-Chip (SoCs) in its QorIQ line. Virtualization is also available on Freescale's e500 cores, which are used in embedded designs as well as on several ARM variants.

Multicore and virtualization are changing the way people design embedded systems. This combination of new technologies has the potential to turn the embedded evolution into a revolution.

Mark Hermeling *is a senior product manager with Wind River focusing on multicore and virtualization solutions.*

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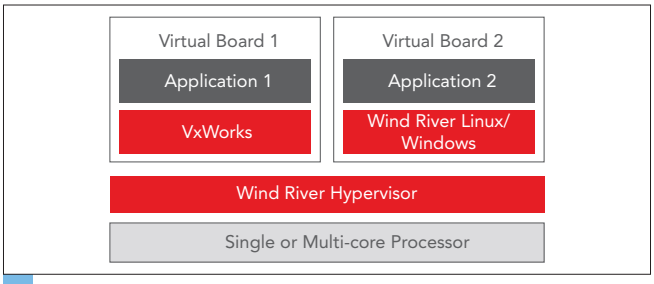

Figure 1 | Wind River Hypervisor allows cores to be partitioned into virtual boards.

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WIND RIVER

Wind River Hypervisor

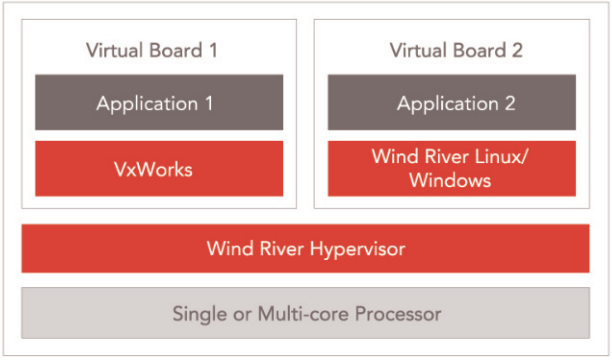
Wind River Hypervisor is one of the building blocks of Wind River's comprehensive multi-core software solution. Wind River Hypervisor is optimally integrated (for performance) with Wind River Linux, VxWorks, and Windows and has the ability to support other operating systems and executives. Wind River Hypervisor enables the new software configurations required to architect the embedded systems of tomorrow – systems that can be developed, diagnosed, and analyzed using Wind River Workbench.

Wind River Hypervisor provides virtualization capabilities that enable the configuration of single and multi-core processors with multiple operating systems.

Wind River Hypervisor is a Type 1 embedded hypervisor with a very small footprint, minimal latency for device access, plus deterministic response times and optimizations for maximum performance. Wind River Hypervisor supports a variety of different processor architectures, taking advantage of hardware virtualization support when available.

Wind River Hypervisor provides the ability to configure and partition hardware devices, memory, and cores into "virtual boards" that an operating system uses as its execution environment. It also allows you to run multiple different virtual boards on a single processor core (core virtualization) or one virtual board over multiple processor cores. In both cases, the hypervisor can provide virtualization and protection of memory and device access.

Wind River Hypervisor is configurable. It can be configured to use all of its features, including core virtualization, or it can be scaled down to a minimal "supervisor" to provide improved protection, reliability, and scalability in a supervised Asymmetrical Multi-Processing (sAMP) configuration.



FEATURES

- **Processor support:** Supports single and multi-core processors
- **Operating system support:** Integrates with VxWorks, Wind River Linux, and Microsoft Windows, delivering optimal performance; supports other operating systems and executives
- **Virtual board interface:** Provides a hardware-like interface for easy porting of operating systems or for developing minimal applications that do not require an operating system
- **Protection:** Enables assigning devices to virtual boards; provides device and memory protection between the virtual boards; prevents failures in the applications or operating system on one virtual board from affecting another operating system and its applications
- **Build:** Provides system projects for configuring and building entire multi-operating systems from Wind River Workbench
- **Debugging:** Features agent-based debugging of multiple collaborating cores running VxWorks and Linux applications over Ethernet connections and supports JTAG-based debugging
- **Core scheduling:** Provides a priority-based and partitioned scheduler; supports other schedulers
- **Communication:** Provides a message-passing protocol designed for communication between cores and/or virtual boards; uses a socket-like API and shared memory as a fast, zero-copy communication medium between operating systems
- **Device access:** Provides direct access to devices from virtual boards, thereby minimizing overhead, and provides the ability to share devices (e.g., serial, Ethernet) so a single device can be used by more than one virtual board
- **Virtual board management:** Enables start, stop, and reload/restart of guest operating systems

For more information, contact: info@windriver.com

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Q&A

Embedded by another name: Dell

Q&A with Rick Froehlich, VP & GM, Dell OEM Solutions

ECD: Why is Dell going after the embedded business?

FROEHLICH: For more than 12 years, Dell OEM Solutions has supported OEMs that build a wide array of hardware-based customizable products. While 50 percent of the market still chooses to build rather than buy, we're seeing the pendulum swing as companies navigating the complex supply chain realize that the total cost of ownership is much higher than just component costs.

Companies build because they perceive it as more cost-effective and because they're uncomfortable with losing control over their IP. While the component cost seems lower in the short term, they're almost always surprised by soft costs in the long term. Also, IP is migrating more and more toward software and away from hardware, enabling companies to move to COTS hardware. By choosing to outsource their ecosystem to us in whole or in part, our customers free up their time and resources to focus on what they do best: innovate.

ECD: Explain your embedded model. You offer standardized OEM system configurations with extended life cycles?

FROEHLICH: Dell is the only Tier 1 manufacturer that offers a single source for comprehensive, end-to-end integration, producing "copy-exact" products across the globe. Customers have access to our full standards-based product portfolio and can customize it to their particular specifications. Our holistic approach provides complete supply chain management expertise including design, manufacturing, test and development, fulfillment, and service and support. This consultative approach is unique because of our build-to-order heritage and established global infrastructure. The key here is to leverage standard components so OEM customers can leverage our services model and get the economies of scale we enjoy. Some of our standard products have extended life cycles up to three and a half years with seven years of support. For example, Siemens Healthcare recently chose the Dell Precision T5500 Long-Life Workstation to power its ultrasound solutions (see Figure 1).

ECD: You do some customization, but not board customization, right? What can be customized in a solution?

FROEHLICH: We have listened to OEMs in different industries and aligned our standards-based technologies to their needs. Dell OEM Solutions provides customers with dedicated account and engineering teams to lead them through the entire design, development, manufacturing, logistics, and support processes. We have a full range of fully customizable, OEM-ready (non-Dell brand) hardware. This can include custom bezels or build-your-own bezel kits (to which customers can apply their own logos), custom chassis, packaging and documentation, installation of third-party cards and proprietary software, custom BIOS, fulfillment, regulatory assistance, and third-party thermal testing. We will even run custom software scripts in our factories to the specifications the customer requires so products are tested properly.

ECD: What embedded application segments are embracing this Dell embedded model, and how is that changing the way they solve problems?

Dell is a global OEM supplier to more than 1,500 customers in 40 industries. We work with dozens of industry verticals, including medical and life sciences equipment, industrial automation and process controls machinery, point of sale, kiosk, digital signage, digital cinema, casino gaming, security and surveillance, transportation solutions, and others that build their own hardware-based solutions powered by the Dell systems embedded in them.

Figure 1 | The Dell Precision T5500 Long-Life Workstation powers ultrasound equipment from Siemens Healthcare.

We've recently seen increased interest from the health care industry, which is highly regulated with complex recertification processes requiring technologies designed for harsh environments. Dell OEM Solutions addresses these needs with our longer manufacturing life cycles and enhanced material stability (see Figure 2).

In another example, we helped a different health care company scale back from two servers, a workstation, and Just a Bunch of Disks (JBOD) to two Dell Precision Long-Life Workstations in its MRI units, a change that will result in 21.5 percent cost savings once the units are deployed.

ECD: What's been the biggest surprise you've seen as your embedded business has grown?

FROEHLICH: The first surprise is how narrowly the market defines embedded. When working with OEMs we define embedded as the hardware inside powering a solution, such as the workstations that power the Siemens ultrasound units. This is not how the embedded market views itself. Embedded is still a very chip-oriented and motherboard-focused discussion. Also, the fact that hardware manufacturers are increasingly becoming software companies to facilitate innovation is interesting to me. Hardware isn't the point of innovation; it merely facilitates it.

ECD: You work closely with Intel and Microsoft. Which of their new technologies is included in your vision for embedded customers?

FROEHLICH: We have incorporated many of the products on Intel's Embedded long-life roadmap into Dell standard products so we can easily extend the life of our platforms. The seven-year life cycles Intel has on these chipsets are key for our customers. Intel Embedded is also working on other products for specific use in key industry verticals that we are analyzing for incorporation into our product set. These products address the software appliance, medical, and digital signage markets. ECD

__Rick Froehlich__ is vice president and general manager of Dell's OEM Solutions Division. During Rick's nine-year career at Dell, he has run Dell's PowerConnect Network switching business and started the Dell/EMC partnership. Prior to Dell, Rick spent six years in management consulting at A.T. Kearney running large strategy and operations improvement engagements. Rick began his career in the Finance Development Program at Procter & Gamble. Rick has a BA from Principia College in Illinois and an MBA from Washington University in Missouri.

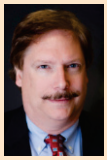
Dell OEM Solutions Division
www.dell.com/oem

Figure 2 | Dell OEM Solutions addresses the needs of the medical and life sciences industries and more than 30 other vertical markets.

Smart grid: What's here, what's needed, and what you should know now

By Monique DeVoe

Panelists:



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Ken Van Meter
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Editor's note: We thought it would be a nice change of pace to hear from a panel composed of experts farther down the supply chain working in and around utilities and alliances developing smart grid technology. Our virtual panelists comment on issues they see in making the smart grid a reality, providing insights into the problems associated with gathering, communicating, analyzing, and securing this real-time consumption data.

ECD: What's the biggest technology gap in making the smart grid a reality?

MCGRANAGHAN: Let's define the smart grid as the infrastructure and technologies that enable integration of the consumer and distributed resources (generation, renewables, storage, demand response, load control) with the operation of the entire grid and electricity markets, while also improving the reliability and security of the overall electric service. The biggest gap is the lack of inexpensive, standardized, and ubiquitous communications that deliver bandwidth, extreme reliability, and security for both control and management applications as well as basic information management and sharing applications. This broadband

The biggest gap is the lack of inexpensive, standardized, and ubiquitous communications that deliver bandwidth, extreme reliability, and security ...

communications infrastructure does not need to be one technology, but it needs to extend all the way from central control systems to end-user devices.

SIMON: The gap is not so much related to a gap in technology but more with the need for ubiquitous, extensible, and robust real-time two-way communications. The task is selecting the right communications infrastructure to meet the needs now and in the future, and that entails appropriate standards and equipment interoperability.

HAMILTON: Interoperability standards. The GridWise Alliance, a coalition of many of the companies competing to develop technologies and solutions for a smarter grid, is adamantly technology neutral. All of the manufacturers and the utilities that will install those products desperately need agreed-upon interoperability standards to govern how all of these systems interact, so technology investments are not wasted. Because the GridWise Alliance looks holistically at the intersection of policy and market forces, our view is less about gaps and more about helping the right technology developments thrive.

VAN METER: The biggest technology gap is efficient, low-cost storage at both the grid level and the endpoints – homes, businesses, and micro-grids. If we had cheap, high-performance storage today, the timeframe for electric cars would move forward by years and the ability to deal with the non-coincidence of energy generation and energy demand would let us harvest large amounts of energy that are currently being wasted. Solar power would become a cheap and viable alternative if the energy created during the best periods of the day could be stored, and the same is true for wind. Far fewer power plants would be needed, and it could buy us the time we need to explore and develop emerging energy production and transmission solutions.

MACARI: Load shedding and Open Automated Demand Response will help efficiency in electricity generation, reducing the need for standby power plants not contributing power to the grid at that moment but burning fossil fuels 96 percent of the time. To further help with fossil fuel usage, integration of distributed generation of renewables is also a technological challenge to the smart grid.

LOCKWOOD: The buzz around the smart grid has definitely raised awareness of the potential for providing energy usage and cost information for consumers and utilities to act upon. We are now seeing legislation proposed at the federal level pushing our industry toward near real-time consumption information and the associated impacts on electric bills. There are challenges with bridging the gap between the *status quo* of post-month energy information

ECD in 2D:

Today's electric grid needs a complete makeover in order to be smarter, more efficient, and utilize more renewable energy sources. Use your smartphone, scan this code, watch a video: http://bit.ly/bw6nqu

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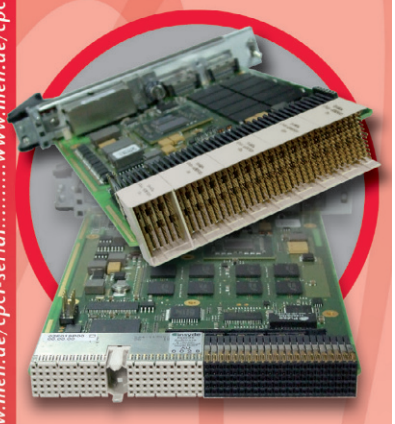

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communications and an endgame where consumers can dictate their level of energy granularity. Cost-effective solutions for making this information readily available both in the customer's home via an in-home display as well as on the utility's normal customer portal are critical.

GUNTHER: The smart grid encompasses hundreds of diverse technologies and infrastructure elements. Answering this requires narrowing it down to one of seven National Institute of Standards and Technology (NIST) Smart Grid Conceptual Model Domains. In the consumer domain (Figure 1), we need standardized information models supporting both real-time and historical energy consumption data. We also need technology, like what is detailed in proposed standards IEEE 1701, 1702, and 1703, that innovatively leverages information to empower consumers and their smart devices in making intelligent energy consumption choices, either automatically or with minimal human interaction. With NIST-driven work being done by IEEE and the Smart Grid Interoperability Panel (SGIP) to accelerate standards development, we are well on the way to achieving these goals.

ECD: How are you trying to solve these gaps?

LOCKWOOD: APS has proposed a two-year Home Energy Information pilot project to test how customers modify their behavior based on the timeliness of consumption data. We already provide day-behind hourly data visible online for customers and will be testing for a discernable impact on consumer behavior if we provide energy information as energy is being consumed. Lessons learned will drive how our business provides billing information in the future.

GUNTHER: As NIST SGIP Administrator, with support from the IEEE and others, EnerNex brings together key constituencies to identify common requirements and goals and implement standards

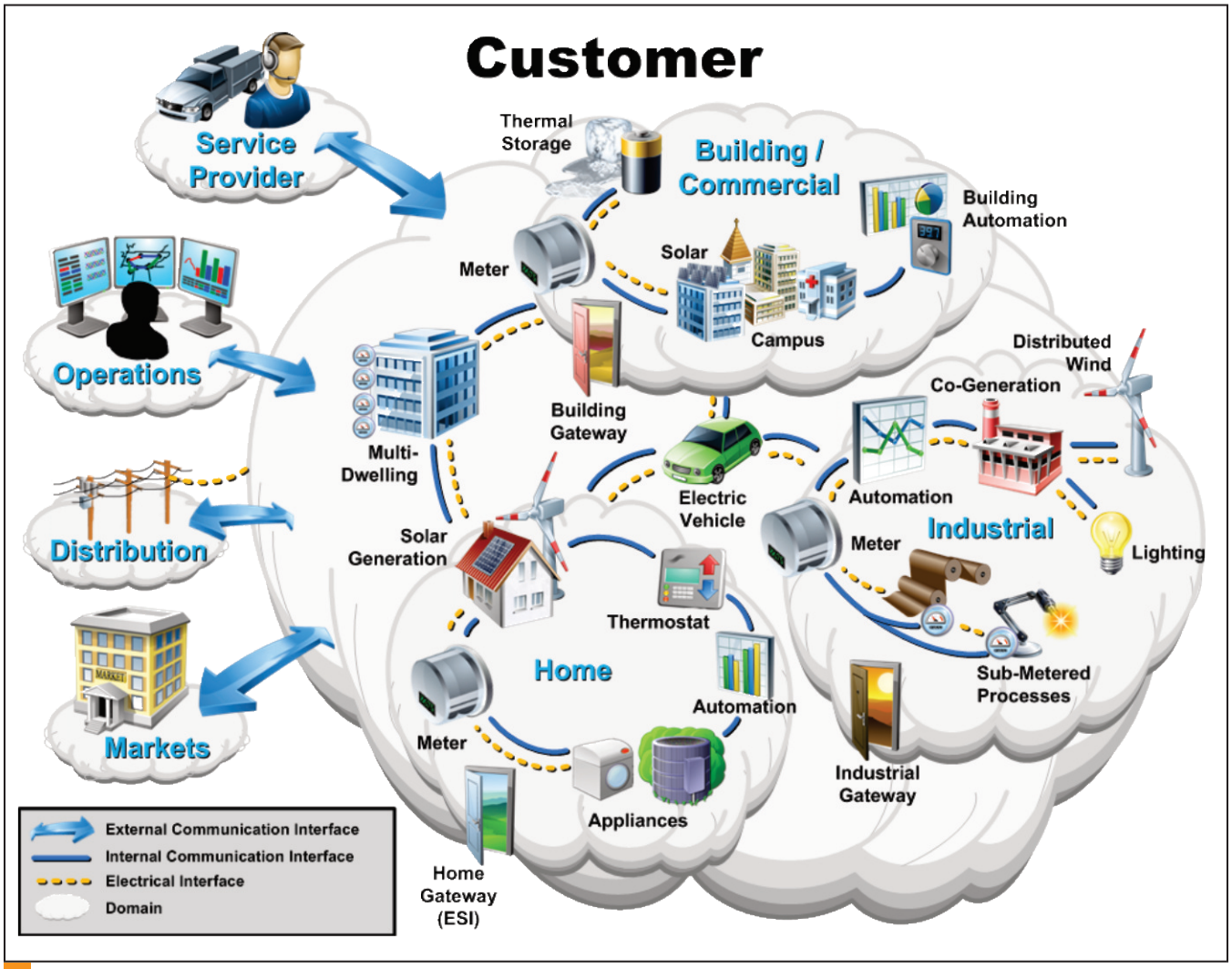

Figure 1 | The consumer domain within NIST's Smart Grid Conceptual Model Domains needs standardized information models supporting real-time and historical energy consumption data.

as quickly as possible. With insight gained through collaborations with NIST, IEEE, and other stakeholders, we're advising vendor clients about implementing embedded systems, protocol stacks, and other vital technologies needed to deploy these standards and ultimately meet consumer requirements and expectations. We're also aiding our utility clients in building back-office systems with extensible architectures capable of adapting to and supporting rapid technology advancements and evolving regulations.

HAMILTON: The GridWise Alliance and its members work closely with NIST to ensure that the standards process is moving both expeditiously and comprehensively. However, most utilities are not waiting for completion of this process to begin deploying smart grid technologies. Our message is until the NIST process is complete, we should not choose just one platform, but allow open standards and protocols to foster a variety of technological advancements.

SIMON: We look to understand utilities' specific needs today and their future strategic objectives, identify what they already have in place that can be used, and then build a network on top of that with expansion in mind. Related to standards and interoperability, we select products that are not necessarily bleeding edge but also not proprietary and have capability for more functions as the network grows.

MACARI: Sophisticated sensors, controls, and algorithms will increasingly help make the electric grid a smarter and more modern system. The California Smart Grid Center at California State University, Sacramento, is working with the California Energy Commission and various research centers to address these challenges. We are involved in demonstration and pilot projects with our local utility company, Sacramento Municipal Utility District (SMUD), as well as with PG&E, Southern California Edison, Cisco, and various solar power providers in California.

VAN METER: We are advancing storage solutions, including nanotech technology, more efficient fuel cells, and other alternatives, and we are collaborating with other leading companies and research entities in the field such as MIT. We are actively applying nanotechnology to advanced energy applications such as clean energy generation and energy storage. For example, at the molecular scale carbon nanotubes have a huge surface area ready to absorb energy or store electrons to create highly efficient renewable energy devices and powerful batteries. We understand and have built energy production and storage devices that "can't fail" but must operate in constrained environments with little or no maintenance for years.

MCGRANAGHAN: Numerous efforts are under way:

- The Electric Power Research Institute (EPRI) Intelligrid Program focuses on researching infrastructure for the smart grid – information integration, communications, and security requirements and

technologies. NIST, DOE, and EPRI are working on security requirements for this communications and information infrastructure.

- The NIST SGIP develops standards assuring interoperability in the infrastructure. The interface between the home area network and the smart grid must be defined and standardized to facilitate the development of appliances, thermostats, electric vehicle chargers, storage systems, photovoltaic interfaces, and more devices. The work of the OpenSG group in developing the requirements that are leading to the ZigBee Alliance Smart Energy Profile 2.0 standard is an excellent example of progress in this area.
- The EPRI Smart Grid Demonstration Initiative (www.smartgrid.epri.com) is evaluating new technologies in actual deployments through demonstrations worldwide. These demonstrations are helping to verify the interoperability of standards and identify gaps that still need to be fixed (see Figure 2). In particular, we want to demonstrate that electric infrastructure communication standards will work transparently on multiple types of communications technologies and systems.

ECD: What breakthrough in computing, networking, or sensing technology is needed to fully enable your vision for the smart grid?

VAN METER: We are focusing on breakthroughs in securing the smart grid, particularly in the cyber security arena. While programs such as North American Electric Reliability Corporation Critical Infrastructure Protection are important, they are only one step in addressing true secure grids. We are developing and implementing static and dynamic solutions that we think bring this key grid element to the next level. The ability to deal with cyber threats on a comprehensive, real-time basis is an essential component to success.

LOCKWOOD: Shifting the utility industry into the 21st century will require a quantum leap forward in the amount of data being gathered regarding the health

The interface between the home area network and the smart grid must be defined and standardized to facilitate the development of appliances, thermostats, electric vehicle chargers, storage systems, photovoltaic interfaces, and more devices.

	Primary Integrated Technologies & Applications	Smart Grid Demonstration Members																
		Host Site Colloborators											Collaborators					
		AEP	Con Ed	Duke	EDF	ESB	Exelon	FE	KCP&L	PNM	SCE	Southern	Ameren	CHG&E	Entergy	SPP	SRP	TVA	WPS
Distributed Energy Resources	Demand Response Technologies	■	■															
	Electric Vehicles	■		■		■			■		■	■						
	Thermal Energy Storage	■			■	■	■	■	■	■								
	Electric Storage <= 100 kWh (Utility Local Storage, Customer Storage,...)	■	■	■	■		■	■		■	■	■						
	Electric Storage > 100 kWh (Typically at substations or near renewables .)	■						■	■	■	■	■						
	Solar Photovoltaic	■		■	■				■	■	■	■						
	Wind Generation	■				■	■											
	Conservation Voltage Reduction (volt/var management and related)	■		■		■			■		■	■						
	Distributed Generation (Microturbin, Fuel Cell, Diesel Generator, Biogas,...)	■	■		■		■		■	■								
Communications and Standards	Customer Domain (SEP, BACnet, HomePlug, WiFi, etc.)	■	■	■		■	■		■	■	■	■						
	Transmission & Distribution (IEC 61850, 60870, DNP3, IEEE 1547)	■	■	■		■	■	■	■	■	■	■						
	Operations Domain (IEC 61968/61970, MultiSpeak, OpenADR,...)	■			■	■	■		■	■		■						
	Cyber Security (Authentication, Certificates, Encryption, Intrusion Detection,...)		■	■	■	■	■			■	■	■						
	AMI or AMR	■		■		■	■		■	■		■						
	RF Mesh or Tower	■				■	■	■	■		■	■						
	Public or Private Internet		■	■	■	■	■		■	■	■	■						
	Cellular Based (1xRTT, GPRS, EVDO, CDMA, 3G, LTE, 4G,...)	■		■		■			■	■	■	■						
	WiMAX (IEEE 802.16) Communications			■							■							
Programs	Price Based (RTP, DA, CPP, PTR, TOU, Block,...)	■		■		■	■	■	■	■	■	■						
	Incentive Based (DR, DLC, Ancillary Services, Interruptible, Bidding,...)	■	■		■	■	■	■	■	■	■	■						
Ops & Planning	Integration with System Operations (RT Visibility of DER, DMS Integration)	■	■	■		■	■	■	■	■	■	■						
	Integration with System Planning (Visibility of DER in planning,..)	■	■	■	■	■		■		■	■	■						
	Modeling and/or Simulation Tools	■	■	■	■	■		■		■	■	■						

Cross Collaboration Opportunities
- Areas of Interest
- Similar Project Learnings

Figure 2 | The EPRI Smart Grid Demonstration Initiative is evaluating new technologies to verify interoperability and indentify gaps that need to be filled.

and status of our distribution system. Problems arise in what to do with this data and how to make it presentable and understandable in real time. Software systems that can store, aggregate, and slice and dice data into usable formats will be instrumental in our ability to leverage future smart grid investments.

SIMON: Smart grids can be built today to achieve many of the benefits we've all talked about, as much of the equipment needed exists in some form now. We want to see continued innovation and improvements in automation, renewable energy, and storage. It's more a function of cost and size of equipment. Lower costs, smaller footprints, and faster speeds will come with improvements over time, and the result will be more equipment installed in a better smart grid.

GUNTHER: NIST's Smart Grid Conceptual Model (Figure 3) requires greater access to reasonably priced and reliable bandwidth across communications networks of all types, including IEEE 802 packet networks, to achieve optimal management of the core electric power infrastructure. There is also a need for durable sensing and computing technologies capable of operating in rugged electromagnetic environments and climates – something often underestimated. For example, IEEE 1613 defines standard environmental and testing requirements for communications networking devices in electric power substations.

MACARI: Transmission and distribution sensors need to be installed in key locations throughout the electric grid, and control algorithms and cryptographic technology are needed to help manage the traffic of free-flowing electrons throughout the entire system. These technologies are being deployed throughout the Sacramento region by SMUD with support from American Recovery and Reinvestment Act DOE funding. In addition, the campus of California State University,

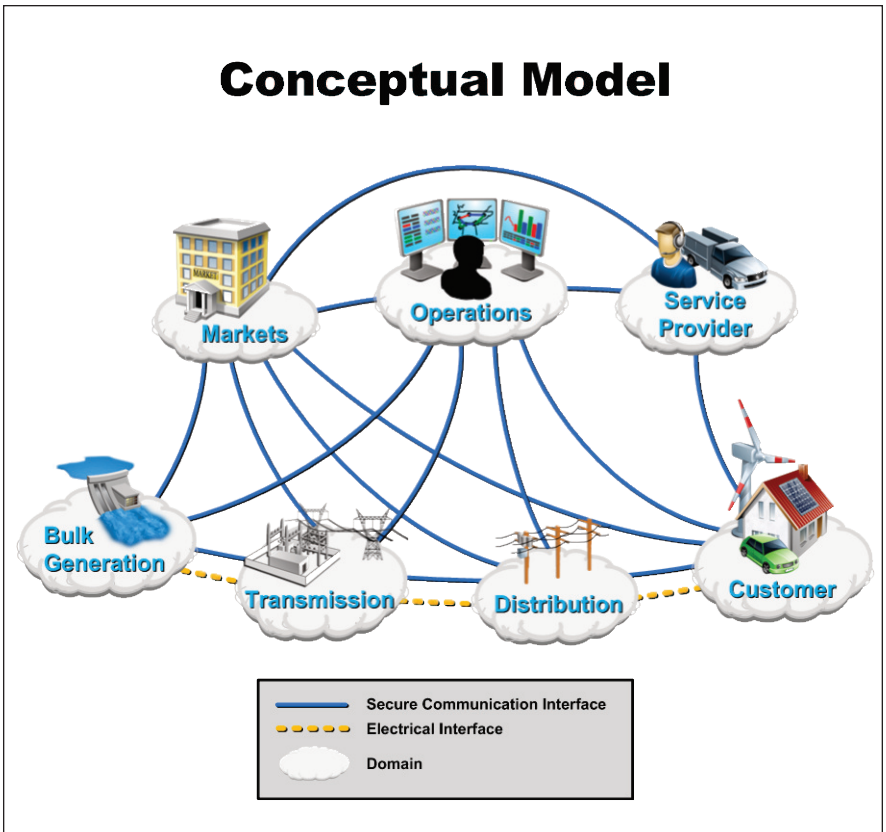

Figure 3 | For optimal management of the electric power infrastructure, NIST's Smart Grid Conceptual Model requires greater access to reasonably priced and reliable bandwidth across networks.

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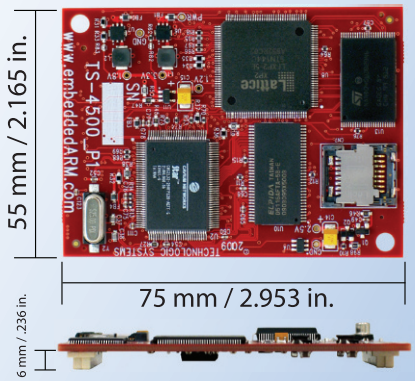

TS-SOCKET Macrocontrollers are CPU core modules that securely connect to a baseboard using the TS-SOCKET dual connector standard with common pin-out interface. COTS baseboards are available or design your own baseboard for a custom solution with drastically reduced design time and complexity. Start your embedded system around a TS-SOCKET Macrocontroller to reduce your overall project risk and accelerate time to market.

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Sacramento, will undergo an $8.6 million upgrade to begin a self-contained micro-grid.

MCGRANAGHAN: Computing and networking technologies are quite advanced, as they are driven by the telecom and entertainment industries. The smart grid has a few requirements that stretch these technologies – security requirements, reliability requirements, performance across multiple types of physical media and systems – but the basic networking and computing technologies that are applied for the Internet, financial systems, entertainment systems, process control systems, and other applications are very usable in the smart grid. Sensing technologies are capable of supporting smart grid requirements, but the challenge is integrating all these sensors and intelligent controllers across the communications infrastructure and optimizing system performance.

HAMILTON: The trick will be the integration of breakthrough technologies into a system that allows large-scale, distributed generation of renewables along with new types of devices consuming electricity and new ways to view and manage demand. The traditional electric grid needs to integrate things like electric vehicles, distributed generation, and micro-grids – all interacting in real time with consumers – without jeopardizing reliability and safety. Energy storage technologies, dynamic forecasting, and instantaneous digital dispatch will be critical to smoothly integrate all of these moving parts.

ECD: What do you wish hardware/software engineers working on smart grid projects were more aware of?

MCGRANAGHAN: It is important that developers of hardware and software for the smart grid are aware of the standards development work under way because it's the foundation for interoperability. Standards like IEC 61850 in substations, BACNET in commercial facilities, ZigBee Alliance Smart Energy Profile 2.0 in the premise (home/building) network, and the Common Information Model for systems integration are important. Products should focus on compatibility with these and other standards, and participation in the NIST SGIP can help.

MACARI: Hardware and software engineers need to gain knowledge in basic power systems and a deeper understanding of how the electric grid works, and then add knowledge of cyber security matters to any smart grid development.

VAN METER: As we design hardware, software, and firmware, we must ensure that they are fully compatible with current and emerging standards and with the interoperability guidelines being developed by NIST and SGIP. Also, full life-cycle, end-to-end cyber security is critical. Every day, leading companies work with cyber firms at every stage of the life cycle, from planning to development to integration to operation, thus ensuring a secure system. A secure component is useful, but unless the system is interoperable and secure, it will ultimately cause problems, potentially serious ones.

Open standards will go a long way in enabling future potential, but it will be the utility-specific customizability of those open standards that drives the success or failure of smart grid projects.

LOCKWOOD: Each utility is different, from how their distribution system is currently architected to how they design rates for their customer base. Open standards will go a long way in enabling future potential, but it will be the utility-specific customizability of those open standards that drives the success or failure of smart grid projects.

GUNTHER: Like critical medical systems, smart grid technologies carry significant human safety and economic implications. Smart grid engineers must follow through with a few key activities:

- **Design rugged, durable equipment:** Electric power equipment operates in extreme climactic and electromagnetic environments, and communications and control systems must function properly despite close proximity to the flow of thousands of amps of current during system faults.
- **Accommodate device life cycles and remote accessibility requirements:** As power systems devices have lifetimes of 20 years or more with minimal hands-on intervention, they need ample processing power, memory, and code space for new technology and features delivered via firmware updates.
- **Develop automated smart devices:** Once the "new toy" lure of in-home smart energy consumption devices wears off, consumers won't want to play energy manager, so smart devices need to act wisely with real-time data on consumers' behalf without direct interaction.

HAMILTON: We need to get young people interested in smart grid jobs that require the skills our utility workforce has now – operating a dangerous and complex electromechanical grid – completely linked with software, telecommunications, and analysis skills that will overlay that grid. Many utilities and manufacturers have been undertaking truly landmark research, but efforts to link those developments to the consumers are still lagging. Utilities intimately understand the grid and its operation and are responsive to their consumers, but this new world of consumers directly and actively engaged in the system is challenging.

SIMON: We are gravely concerned that the infrastructure being deployed for Advanced Metering Infrastructure (AMI) is great for metering but will not be robust enough to achieve many of the other more innovative grid automations that bring significant benefits. Planning, designing, and building for the future and not just focusing on what is needed today is important. ECD

ECD in 2D:

The existing hardware in the grid also poses challenges that EPRI is addressing in its Electric Labs. Use your smartphone, scan this code, watch a video: http://bit.ly/9kJVgf

How can you meet the diverse requirements of digital signage applications?

By Cameron Swen

While attending the recent InfoComm 2010 show, I had the opportunity to discuss the requirements of digital signage solutions with vendors serving the market. It's no surprise to hear that the requirements are as diverse as the number of vendors. So how do silicon providers formulate a strategy to meet the requirements of a market that doesn't agree on what the requirements are?

Digital signage hardware, software, and solution providers have very diverse business models that often lend themselves to vastly varying features and requirements for their applications. Drilling down to the hardware requirements, one digital signage application might require a single display, while another system might integrate two or more HD displays with a Point-Of-Sale (POS) terminal. Some systems only require basic 2D graphics, while others leverage HD video and 3D. Systems might be integrated into or mounted on the back of a display that requires them to be compact and low power, while others might have the luxury of a ventilated cabinet.

Meeting the requirements for all of these different implementations might seem easy to accomplish by putting together the right combinations of off-the-shelf commercial hardware. But as simple as it may seem, experienced vendors assert that this strategy will quickly drive people out of business through recurring management and service costs.

To begin with, off-the-shelf hardware used in PC applications is only available for sale for about 12 months on average. Hardware picked from the bargain bin might already be near the end of its life with limited availability. That means that a large digital signage installation might use more than one hardware configuration, resulting in the need to manage and maintain multiple software images with updates and bug fixes in the operating system, drivers, and middleware.

Imagine doing this at multiple installations, each with a unique set of requirements, for just five years. By that time one might be supporting more than 10 different hardware configurations and maintaining even more software images. Which systems in the field have which hardware configuration, and which of those were updated to the latest software level during a repair or service call? Managing this becomes a major fixed cost even for companies that do it well.

What about maintenance and repair? If a system fails, should the entire system be replaced, or just the failing motherboard? Are you going to keep an inventory of matching motherboards on hand for each installation so you don't have to create yet another software image for that particular installation? How many? Since typical PC hardware is not designed for 24/7 operation in these environments, how high of an annual failure rate is acceptable – 20 percent?

While signage player hardware from embedded vendors supporting extended availability and designed for 24/7 operation is more expensive than commercial components, experienced vendors will testify that it quickly pays for itself through reduced repair, management, and inventory costs. Managing a single hardware solution that is available for several years with limited variations to meet specific price, power, and performance requirements can enable the long-term support of a single software image. Compared to the overall installation cost and ongoing operating expenses, the player hardware is a small portion of the investment.

AMD offers a full range of embedded graphics solutions to meet the diverse price, power, and performance requirements of digital signage applications and is working closely with embedded vendors to provide reliable, low-power and high-performance ATI Radeon™ graphics-based solutions (see Figure 1). Moreover, it is AMD's goal to maintain the availability of these Radeon-based solutions for 5-plus years*. So why settle for anything less than ATI Radeon™ Embedded graphics for your digital signage application?

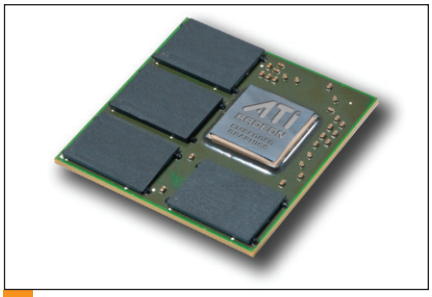

Figure 1 | The ATI Radeon E4690 GPU offers 512 MB GDDR3 and 5-plus years of availability.

*Part availability is planned for 5 years from date of announcement, subject to change without notice.

Cameron Swen *is a senior manager of product marketing in AMD's Embedded Solutions Division. His experience includes technical marketing positions at National Semiconductor and AMD. Cameron holds a degree in Engineering from Colorado State University.*

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Editor's Choice

USB audio in more channels

One of the more interesting applications for multicore processors is audio, and XMOS has been breaking new ground using the XS1-L2 event-driven processor for this application. The company has recognized the shift away from IEEE 1394 toward USB Audio Class 2.0 and continues to launch reference designs to help the transition.

Implemented entirely in software in the XS1-L2, this latest reference design supports high-speed USB Audio 2.0 (480 Mbps) and up to 18 input and 18 output audio channels at 24-bit resolution and 192 kHz sample rate. The reference design also includes attention to things like a highly accurate local low-jitter clock and less than 3 milliseconds roundtrip latency, providing sound quality needed for professional, prosumer, and consumer live music recording applications.

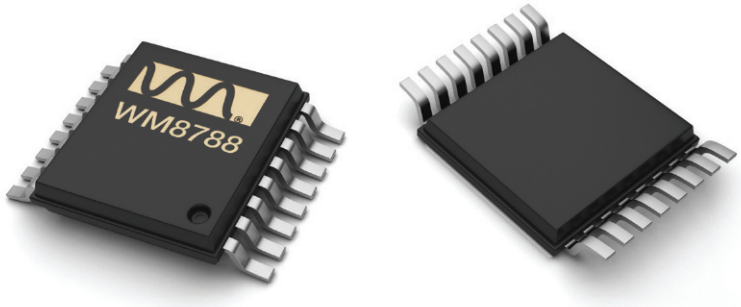
XMOS | www.xmos.com

www.embedded-computing.com/p45628

ADCs for better sound

Also needed for better audio are better Analog-to-Digital Converters (ADCs). Wolfson Microelectronics continues to improve its product offering tailored for the best sound possible in consumer electronics while keeping the package small at 16 pins and the power simple at a single 3.3 V input.

Both the WM8788 and WM8789 high-performance ADCs feature a pair of stereo analog audio inputs for capturing line-level inputs in the 1 Vrms range with SNR performance of 106 dB SNR and 93 dB of THD+N. Additionally, the WM8789 features an extra pair of stereo analog inputs. They both output 16-, 20-, or 24-bit stereo data, with audio sample rates from 8 kHz to 192 kHz.



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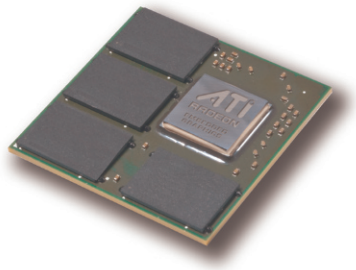
* Performance claim based on 3DMark06 HDR/SM3.0 benchmarks compared to the ATI Radeon E2400. ** Part availability is planned for 5 years from date of announcement, subject to change without notice.



FEATURES

Desktop-level performance
- 20 shader processors
- 128-bit memory interface
- 512 MB GDDR3

Exceptional video decode
- H.264, VC-1, MPEG-2
- Picture-in-Picture

Extended availability
- 5 year supply availability**
- Dedicated technical support

For more information, contact: Cameron.swen@amd.com

www.embedded-computing.com/p45452

Processing and logic: Heat sinks

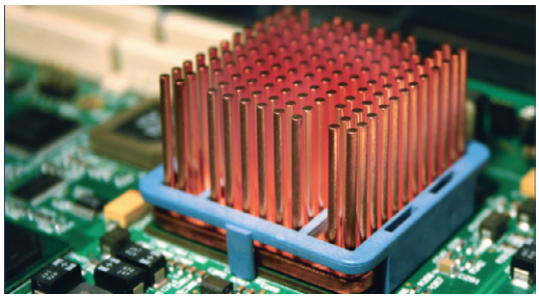
Radian Heatsinks

2160 Walsh Avenue • Santa Clara, CA 95050
408-988-6200
www.radianheatsinks.com

INM-PCU Series

The INM-PCU Series of copper round pin BGA heatsinks includes high efficiency cooling products that are ideal for omni-directional airflow.

These devices mount with EZ Snap™ Mounting Clips and/or Thermal Tape to provide optimum cooling for various package sizes and airflow. These off-the-shelf, high efficiency solutions are easy to install and require no special board modifications or complex assemblies.



FEATURES

- High efficiency copper round pin design provides low pressure-drop characteristics
- Constructed of Forged CU1100 Oxygen-Free Copper for optimum heat transfer
- Ideal for omni-directional airflow
- Designed specifically for BGAs and other surface mount packages
- Optional EZ Snap Mounting Clip is made of UL94-V0 Rated Nylon
- Use Clip Tool HS8063 to attach or remove heatsink assembly directly to BGA Chip
- Finished with clear anti-oxidation finish
- Selected Clip and Thermal Pad Options are pre-assembled at the factory

For more information, contact: sales@radianheatsinks.com

www.embedded-computing.com/p41324

App enablers: Databases

Objectivity, Inc.

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Objectivity/DB Release 10

This technology enables some of the most advanced embedded devices and deployments, supporting the requirements and innovations of today and tomorrow.

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objectivity/db10

FEATURES

- **Reliability:** Designed for embedded stand-alone systems that simply must work all the time.
- **Flexibility:** Design and deploy the systems you want, with complete interoperability among heterogeneous operating systems and language bindings, including C#, C++, Java, Python and Smalltalk on Linux, Windows and most hardware.
- **Performance:** Near real-time performance on vast volumes of complex interrelated data. Objectivity/DB improves performance by orders of magnitude.

For more information, contact: info@objectivity.com **www.embedded-computing.com/p45584**

App enablers: Java virtual machines

Skelmir, LLC

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617-625-1551
www.skelmir.com

SKELMIR
virtual machine technology

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CEE-J is Skelmir's fast, compact, proven, clean room virtual machine suite for hosting Java applications on embedded devices. Market-proven since 1998, CEE-J runs on more than 10 million devices worldwide and counting.

CEE-J

CEE-J is available and optimized for a vast array of operating systems, processors, and virtual machine specifications. It is the ideal platform for resource-constrained embedded devices including: digital set top boxes, onboard navigation and infotainment systems, Point-Of-Sale and handheld wireless devices, routers and gateways, industrial automation, multifunction printers, and more.

CEE-J VMs feature its advanced graphics engine with support for hardware acceleration and OpenGL. Built directly into the CEE-J VM, the CEE-J graphics engine offers TrueType font engine support, anti-aliased text and graphics, full alpha channel support, and more. Add CEE-J Animator to quickly and easily bring animations to user interfaces. Also available without graphics for headless devices.

FEATURES

- Full VM footprint with advanced graphics: 1.5 to 5MB
- + 500KB footprint addition to include animation support
- Host apps written to Personal Java through J2SE specifications
- Highly optimized interpreters for each supported architecture
- Ahead of time, dynamic, and JIT compilation options available
- Supported OSs: Linux, VxWorks, eCos, Nucleus Plus, STOS20/21, other proprietary RTOSs, Windows, Mac OS X
- Supported CPUs: MIPS32, MIPS64, ARM9/11, StrongARM, XScale, x86, PowerPC, SuperH, STMicro, DSPs
- Flexible licensing plus porting, integration, and ongoing support by Skelmir's team of embedded experts

For more information, contact: all_sales@skelmir.com **www.embedded-computing.com/p45586**

Development aids: Compilers

CodeSourcery

9978 Granite Point Court • Granite Bay, CA 95746
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http://www.codesourcery.com/sgpp

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Sourcery G++ is CodeSourcery's comprehensive tool suite for professional embedded C and C++ developers.

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Sourcery G++ targets ARM, ColdFire, IA32, MIPS, Power, and SuperH processors. Sourcery G++ runs on Linux and Windows host systems and supports bare metal/RTOS, uClinux, and Linux development.

Sourcery G++ is available in Professional, Standard, and Personal Editions.

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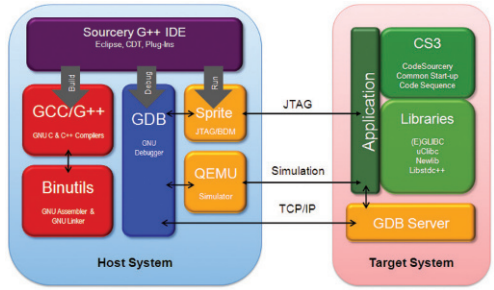

FEATURES

- Eclipse-based integrated development environment
- Optimizing GNU C/C++ compilers (GCC 4.4 plus enhancements)
- C/C++ runtime libraries
- Source- and assembly-level GNU debugger
- Hardware debugging with Abatron, ARM RealView ICE, AxBDM-CF, Freescale CCS devices, Macraigor, MIPS System Navigator, SEGGER J-Link, P&E, or ULINK2
- Instruction set simulator and Linux application simulator
- Board Builder and CS3 for bare metal platforms
- Sysroot Utilities and Remote System Explorer for Linux platforms
- Comprehensive documentation and knowledge base

For more information, contact: sales@codesourcery.com **www.embedded-computing.com/p37420**

Development aids: Networking stacks

Stonestreet One

9960 Corporate Campus Drive, Suite 3300 • Louisville, KY 40223
502-708-3500
www.stonestreetone.com

Bluetopia® – Bluetooth Protocol Stack

Bluetopia eases Bluetooth application development by providing a robust and flexible software development tool that implements the Bluetooth protocols and profiles above the Host Controller Interface (HCI). Bluetopia's Application Programming Interface (API) provides access to the upper-layer protocols and profiles described below plus others and can interface directly to the most popular Bluetooth chips from Broadcom, CSR, TI, and others. Bluetopia has shipped in millions of consumer and enterprise devices.

Bluetopia+LE

Bluetopia+LE is composed of two distinct offerings to support Dual Mode and Single Mode Bluetooth 4.0 devices. Bluetopia+LE Dual combines the standard BR/EDR offering with additional support for Bluetooth Low Energy (Bluetooth 4.0). Bluetopia+LE Single is derived from the legacy Bluetopia, but has been highly optimized to work with the tighter memory requirements of Single Mode devices.

FEATURES

- Bluetooth Profiles: GAP, SDP, SPP, DUN, FAX, GOEP, OPP, FTP, HSP, HFP, HCRP, HID, SYNC, SAP, GAVDP, A2DP, BIP, PAN, AVRCP, MAP, BPP, HDP
- Processors: ARM7/ARM9/ARM11, CORTEX M3, TI OMAP, TI MSP 430, TI Stellaris, Intel x86, Freescale ColdFire, Freescale i.MX, Freescale Kinetis, ST Micro STM32
- Operating Systems: Windows Mobile, Windows CE, Linux, Android, Nucleus, QNX, ThreadX, VxWorks, uITron, uCOS, Green Hills Integrity, NetBSD, MQX, Safe RTOS, Free RTOS. Proprietary Scheduler/OS

For more information, contact: sales@stonestreetone.com **www.embedded-computing.com/p45459**

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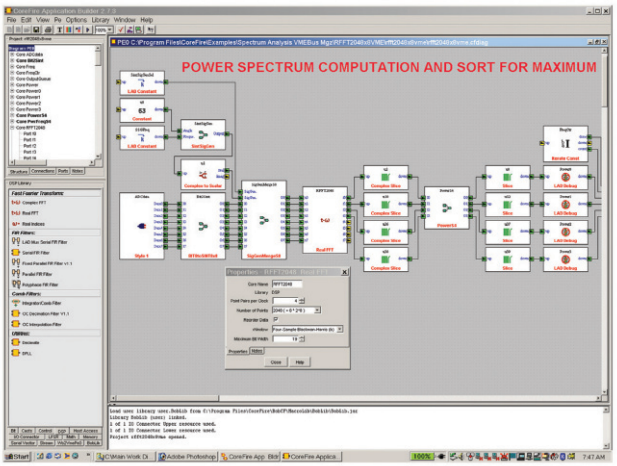
Develop your application very quickly and easily with our CoreFire™ FPGA Application Builder, which transforms the FPGA development process, making it possible for theoreticians to easily and quickly build and test their algorithms on the real hardware that will be used in the field.

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

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

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



FEATURES

- Dataflow-based – automatically generates intermodule control fabric
- Drag-and-drop graphical interface
- Work at high conceptual level – concentrate on solving algorithmic problems
- Hardware-in-the-loop debugging
- More than 1,000 modules incorporate years of application experience
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For more information, contact: wfinfo@annapmicro.com **www.embedded-computing.com/p33544**

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408-559-7778
www.xilinx.com

Xilinx ISE Design Suite 12

ISE® Design Suite 12 software unlocks greater design productivity with breakthrough technologies for power optimization and cost. The Design Suite enables the fastest time to design completion with Xilinx Targeted Design Platforms – available in four configurations aligned to user-preferred methodology logic, embedded, DSP, or system design.

Xilinx Targeted Design Platforms provide embedded, DSP, and hardware designers with access to an array of devices supported by open standards, common design flows, IP, and runtime platforms. The ISE Design Suite offers domain-specific design environments and enables designers to meet power and performance goals with Xilinx CPLDs and FPGAs, including the new Virtex®-6 and Spartan®-6 families.

ISE Design Suite provides a tight connection between embedded and DSP flows to enable integration of designs with embedded, DSP, IP, and user blocks in one system. For users familiar with differing design environments, ISE Design Suite 12 provides accommodations ranging from the push button user to the advanced designer.

FEATURES

- Design preservation flow to improve timing predictably
- Partial reconfiguration supporting Virtex-6 FPGAs
- Intelligent clock gating supporting Virtex-6 FPGAs
- Plug-and-play FPGA design through AMBA® 4 AXI™-4 interconnect protocol IP

For more information, contact: more_info@xilinx.com **www.embedded-computing.com/p45587**

Operating systems: Linux and tools

SYSGO

Am Pfaffenstein 14 • 55270 Klein-Winternheim, Germany
www.sysgo.com

ELinOS Industrial Grade Linux

ELinOS is a comprehensive development environment for embedded Linux software development. Unlike traditional Linux implementations, SYSGO's ELinOS is purpose-built for use in demanding industrial applications. SYSGO brings 15+ years of field expertise to make an embedded Linux offering well-suited for real-world complex applications and to back it up with world-class support. Many BSPs corresponding to the most successful boards on the market are included, as well as BSPs for virtualization engines such as QEMU and VMware or for the other SYSGO flagship product, PikeOS. Besides the widely used x86 version, ELinOS also supports PowerPC, ARM, MIPS, and SH platforms. ELinOS includes CODEO, the Eclipse-based development environment that provides guided configuration, remote debugging (often down to the hardware instruction level), target monitoring, remote application deployment, and timing analyses in addition to standard application development features such as compilers and assemblers.

FEATURES

- Industrial grade
- Integrated Eclipse-based development environment
- Real-time extensions support
- Target configuration editor
- Runs out of the box
- One-year support included
- Validated and tested for PPC (60x, 4xx, E500), x86, ARM, SH-4, MIPS
- BSPs for major embedded boards and chip vendors included

For more information, contact: Jacques.Brygier@sysgo.com **www.embedded-computing.com/p45461**

SYSGO

Am Pfaffenstein 14 • 55270 Klein-Winternheim, Germany
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SYSGO
EMBEDDING INNOVATIONS

PikeOS Safe and Secure Virtualization

PikeOS is an innovative OS providing an embedded systems platform where multiple virtual machines can run simultaneously in a secure environment. The Safe and Secure Virtualization (SSV) technology allows multiple operating systems APIs to run concurrently on one machine. PikeOS provides the widest range of "personalities" on the market. Its microkernel architecture allows it to be used in cost-sensitive, resource-constrained devices as well as large, complex systems. The simplicity, modularity, and compactness of the PikeOS design results in real-time performance that competes head-to-head with conventional proprietary RTOS solutions while offering innovations in platform independence. PikeOS includes CODEO, an Eclipse-based integrated development environment that provides guided configuration, remote debugging (often down to the hardware instruction level), target monitoring, remote application deployment, and timing analyses in addition to standard application development features such as compilers and assemblers.

FEATURES

- Based on separation microkernel
- Strict time and resource partitioning
- Combines paravirtualization and hard real-time
- MILS compliant
- Eclipse-based development environment
- Certification to safety-critical standards (DO-178B, IEC 61508, and EN 50128)
- Personalities examples: Linux, legacy RTOS, ARINC 653, POSIX, RTEMS, PikeOS Native, OSEK, C/C++, Java, Ada
- Available for PowerPC, x86, ARM, MIPS, SPARC V8/LEON, and others
- Single and multicore processor support

For more information, contact: Jacques.Brygier@sysgo.com

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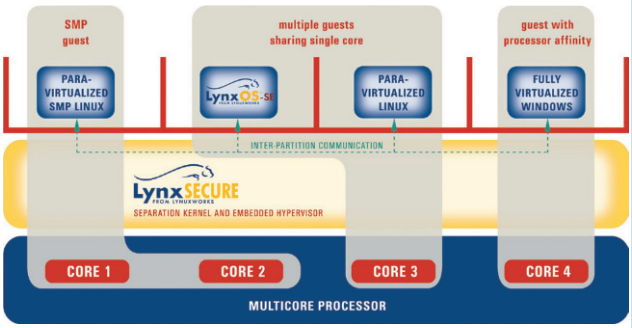
LynxSecure Embedded Hypervisor and Separation Kernel

With the introduction of the new LynxSecure separation kernel and embedded hypervisor, LynuxWorks once again raises the bar when it comes to superior embedded software security and safety. LynxSecure has been built from the ground up as a real-time separation kernel able to run different operating systems and applications in their own secure partitions.

The LynxSecure separation kernel is a virtual machine monitor that is certifiable to (a) Common Criteria EAL 7 (Evaluated Assurance Level 7) security certification, a level of certification unattained by any known operating system to date; and (b) DO-178B Level A, the highest level of FAA certification for safety-critical avionics applications.

LynxSecure conforms to the Multiple Independent Levels of Security/Safety (MILS) architecture. The embedded hypervisor component of LynxSecure allows multiple "guest" operating systems to run in their own secure partitions. These can be run in either paravirtualized or fully virtualized modes, helping preserve legacy applications and operating systems in systems that now have a security requirement. Guest operating systems include the LynxOS family, Linux and Windows.



FEATURES

- Optimal security and safety – the only operating system designed to support CC EAL 7 and DO-178B Level A
- Real time – time-space partitioned RTOS for superior determinism and performance
- Virtualization technology – supports multiple heterogeneous operating system environments on the same physical hardware using Intel VT hardware
- Highly scalable – supports Symmetric MultiProcessing (SMP) and 64-bit addressing for high-end scalability
- Support for open standards – supports 100% binary compatibility for Linux or POSIX-based software applications to migrate to a highly robust, secure environment
- Support for latest Intel Quad Core i7 Nehalem processors

For more information, contact: inside@lnxw.com

www.embedded-computing.com/p30051

Interconnects and power: System power supplies

Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008
1 888 412 7832 or +1 760 930 4600
Emerson.com/DinRail

ADN-C DIN Rail Mount Industrial Power Supplies

The ADN-C Series features a new slim form factor (50 to 87 mm wide), high operating efficiency (> 90%) and active Power Factor Correction (PFC > 0.92). To ensure high reliability, the ADN-C Series is comprehensively protected against continuous short-circuit and overload conditions, has a high Demonstrated Mean Time Between Failures (DMTBF) of over 450 kHr and offers a wide operating temperature range of -10 °C to +60 °C without derating.

Other attributes include: PowerBoost™ overload capability to withstand high inrush loads, such as motors, relays, solenoids and DC-DC converters, which can cause ordinary power supplies to fold back or shut down; a patented DIN rail mounting clip that enables tool-free snap-on mounting specially designed for industrial environments; three LEDs on the front of the case for status monitoring; large accessible screw terminal connections; and a single/parallel operation toggling switch for enhanced scalability.

FEATURES

- Slim form factor (from 50 mm)
- Highly efficient > 90% switching technology
- Meets UL 508, UL 60950-1, IEC 60950, Class I, Div 2 Hazardous Locations, EN 61000-3-2 and SEMI F47 Sag Immunity
- Adjustable voltage and power factor correction
- Parallel redundant operation
- High MTBF and reliability with five-year warranty

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.embedded-computing.com/p41669**

Interconnects and power: System power supplies

Emerson Network Power

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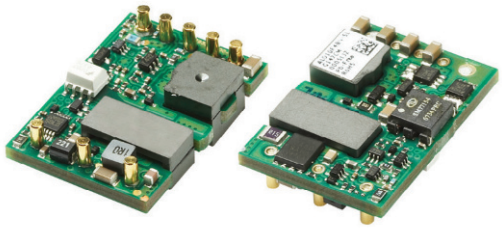
1 888 412 7832 or +1 760 930 4600
Emerson.com/ALD15

ALD15 Sixteenth-brick DC-DC Converter

The low profile ALD15 sixteenth-brick DC-DC converter series from Emerson Network Power is ideal for use with telecom-standard 48V power supplies. They are capable of achieving up to 92% efficiency at full load and are extremely cost-effective when used in applications requiring up to 35W of output power. With an installed height of just 0.35", they are ideal for systems that require tight inter-board spacing or where sufficient separation between the converter and adjacent boards is needed.

Offered in seven output voltages (12V @ 2.75A, 5V @ 7A, 3.3V @ 10A, 2.5V @ 11A, 1.8V @ 13A, 1.5V @ 15A and 1.2V @ 15A), they accept a wide input voltage range of 36-75Vdc and feature outputs that can be adjusted from 90-110% of nominal voltage via external trim resistors. Standard features deliver best-in-class performance: differential remote sense, remote on/off facilities, undervoltage lockout and non-latching overvoltage protection and are protected against overcurrent and overtemperature conditions. All models feature a compact 1.3" x 0.9" sixteenth-brick footprint.



FEATURES

- High efficiency
- High density
- High capacitive load limit on start-up
- Regulation to zero load
- Fixed frequency switching
- Through-hole or surface-mount termination
- Basic insulation
- EU Directive 2002/95/EC compliant for RoHS

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.embedded-computing.com/p45455**

Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008
1 888 412 7832 or +1 760 930 4600
Emerson.com/LCM600

LCM600Q Bulk Front End AC-DC Power Supply

The LCM600Q from Emerson Network Power is one of the industry's lowest cost 600W AC-DC power supplies and maintains Emerson's high standards of quality and reliability, demonstrated by an MTBF of greater than 500,000 hours under normal operating conditions. A wide array of safety approvals makes the LCM600Q ideal for use in a variety of applications in industrial, medical, process and digital signage/display markets.

Rated for 600W of adjustable output power at 25A with an output power density of 7.41W per cubic inch, the LCM600Q delivers operating efficiency of approx. 88% typical at full load and comes equipped with variable speed "smart" fans supported by integrated controls to enhance reliability and achieve even higher levels of energy efficiency. It features active AC inrush controls – limiting inrush current at power-on to 25A – and is protected against overvoltage conditions up to 145%. The power supply can be equipped with an optional 5V auxiliary output for powering standby circuitry when minimizing unplanned downtime and enhancing serviceability are critical.

FEATURES

- Wide input voltage range of 85-264Vac with no minimum load requirement
- Convenient size 2.4" x 4.5" x 7.5"
- Best-in-class industrial/medical safety approvals
- -40°C to +70°C with derating
- Efficiency 89% typical
- Variable "Smart Speed" fan
- DSP-controlled PFC rated at 0.99 typical to minimize input harmonic current distortion
- ±20% adjustment range
- Margin programming
- Oring FET option

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.embedded-computing.com/p45454**

Interconnects and power: System power supplies

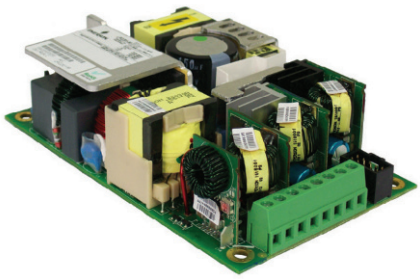
Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008
1 888 412 7832 or +1 760 930 4600
Emerson.com/LPQ200

LPQ200-M Compact 200W Open Frame AC-DC Power Supplies

The LPQ200-M series of compact 200W open frame AC-DC power supplies features four adjustable outputs. With a 3" x 5" footprint and a height of 1.32" (less than 1U), they offer a power density of more than 10W per cubic inch and are capable of achieving efficiencies of up to 84% at full load. Certified with ITE and non-patient contact and non-patient critical medical safety approvals, they are ideal for use in a variety of IT, communications, medical, dental and laboratory applications. The LPQ200-M series is currently available in two standard models: LPQ201-M offers DC outputs of +3.3V, +5V, +12V and -12V; LPQ202-M offers DC output of +5V, +12V, +24V and -12V.

Outputs are adjustable from -20% to +10% and offer a full-load hold-up time of 16ms. The power supplies can operate with input voltages of 90-264Vac (120-300Vdc) and feature a maximum safety ground leakage current of just 275µA with a 264Vac input. LPQ200-M series power supplies are rated for operation from 0° to +50°C without derating, up to +70°C with derating, and can cold-start from temperatures as low as -20°C.



FEATURES

- Medical and ITE safeties
- Active power factor correction
- 3 x 5 x 1U form factor
- Quad output
- Overload protection
- Built-in Class B EMI filter
- Remote sense and power fail
- EN61000-3-2 compliant
- Adjustable outputs
- Thermal overload protection
- Overvoltage protection

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.embedded-computing.com/p45453**

Interconnects and power: System power supplies

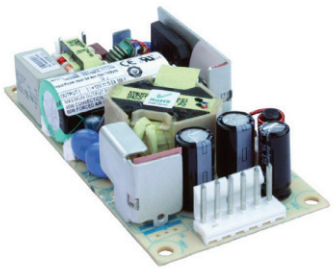
Emerson Network Power

5810 Van Allen Way • Carlsbad, CA 92008
1 888 412 7832 or +1 760 930 4600
Emerson.com/PowerSupplies

NPS40-M Series AC-DC Power Supply

The all-new NPS40-M Series from Emerson Network Power features both Information Technology Equipment (ITE) and non-patient contact and non-patient critical medical safety approvals. The NPS40-M power supply is a compact open frame design, measuring just 2" x 4" with a height of only 1". It has a typical full load efficiency of 87%. The supply is primarily intended for use in ITE and light industrial systems, as well as for equipment intended for non-patient contact and non-patient critical use in low-power medical, dental and laboratory applications.

The NPS40-M Series supports up to 45W with convection cooling and up to 60W with forced air cooling. Under normal operating conditions, they require less than 74W of input power and consume less than 300mW of power under no-load conditions. They meet rigorous efficiency standards, including Energy Star 2.0, California Energy Commission (CeC) and International Efficiency Level V.



FEATURES

- Universal input
- Remote sense
- Overload and short-circuit protection
- Adjustable output voltage
- High efficiency, high MTBF
- Built-in EMI filter (CISPR 22 Class B)
- Less than 300mW no-load power consumption
- 0°C to +80°C operation
- Input power < 74W
- Complies with EN 61000-3-2; UL Class I approved

For more information, contact: TechSupport.EmbeddedPower@Emerson.com **www.embedded-computing.com/p44588**

Interconnects and power: System power supplies

Tri-M Engineering

100-1407 Kebet Way • Port Coquitlam, BC V3C 6L3 Canada
604-945-9565
www.tri-m.com

HE104+DX

The HE104+DX is a high efficiency 108W DC-DC converter that can supply +3.3V, +5V, +12V, and -12V DC outputs. The HE104+DX is designed for low noise embedded computer systems, has a wide input range of 6V to 40V DC, and is ideal for battery or unregulated input applications. The HE104+DX is specifically designed for vehicular applications and has heavy-duty transient suppressors (9,000W on both main and secondary inputs) that clamp the input voltage to safe levels, while maintaining normal power supply operation.

The HE104+DX is a MOSFET-based design that provides outstanding line and load regulation with efficiencies up to 90 percent. Organic Semiconductor Capacitors provide filtering that reduces ripple noises below 20mV. The low noise design makes the HE104+DX ideal for use aboard aircraft or military applications or wherever EMI or RFI must be minimized.

FEATURES

- 108W DC-DC converter
- +3.3V, +5V, +12V, and -12V DC output
- 6V to 40V DC input range
- Extended temperature: -40°C to +85°C
- PC/104-*Plus* compliant
- High efficiency up to 90 percent
- High transient suppression
- Low output ripple
- Remote on/off standard
- Removable connector blocks

For more information, contact: info@tri-m.com **www.embedded-computing.com/p16985**

Advanced Media Inc. Ritek USA
1440 Bridgegate Dr., Suite 395 • Diamond Bar, CA 91765
909-861-2269
www.ritekusa.com

Ridata Industrial CompactFlash Cards

Ridata Flash Media offers a wide variety of Flash Media to fit all your recording needs and offers many features over other mobile storage media. It is cool and silent with no moving parts, has low power consumption, and is small enough for all your mobile devices.

Ridata CompactFlash (CF) cards are a series of memory cards that adapt Flash memory technology. Conforming to the CompactFlash Specification released by the CompactFlash Association (CFA), Ridata CF cards can run in three basic modes: 1) PC Card I/O Mode, 2) PC Card Memory Mode (CF Mode), and 3) True IDE Mode (Fixed Mode). Therefore, Ridata CF cards can be applied to all kinds of portable devices with a CF card slot, such as digital cameras, pocket PCs, notebook PCs, industrial controllers, embedded systems, PMP, and other multimedia devices. Ritek's R&D continually introduces new solutions, speed, and capability for Ridata CF cards to excel in every project and exceed every client's expectations.

FEATURES

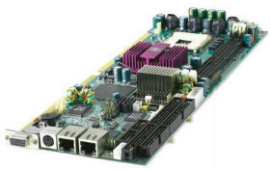
- Host ATA disk I/O BIOS, DOS/Windows file system, utilities, and application software compatible.
- Linux compatible.
- Controller supports Ultra DMA Mode up to Mode 6.
- Conforms to the CompactFlash Association standard.
- High speed access for reading and writing.
- Supports 8- or 16-bit host transfers with any host speed using IORDY.
- 3.3V/5V single power supply.
- Error Correction Code (ECC) embedded.
- Low power consumption with automatic power management.
- Physical Write Protection switch feature is available.

For more information, contact: flashmemorysales@ritekusa.com

www.embedded-computing.com/p45466

Your Trusted Provider for Embedded Applications

Single Board Computers



- Latest Intel® technology: Xeon®, Core™ 2 Duo, Pentium®, Celeron®
- Complete PICMG portfolio: PICMG 1.0, PICMG 1.2, PICMG 1.3
- Performance plus backward compatibility
- Long life cycle support

Extended Temp

ECX Boards

- Intel® Atom™ processor (Z510P, Z510PT, Z520PT or Z530P) with industrial temperature
- Dual display (LVDS and SDVO)
- Multiple USB ports
- Gigabit Ethernet
- Low power fanless and small footprint
- Long life cycle support

Portwell's extensive product portfolio includes single-board computers, embedded computers, specialty computer platforms, rackmount computers, communication appliances, and human-machine interfaces.

We provide both off-the-shelf and versatile custom solutions for applications in the medical equipment, factory automation, retail automation, semiconductor equipment, financial automation, mission critical and network security markets.

American Portwell is both an ISO 9001:2000 and ISO 13485:2003 certified company.

intel Embedded Alliance

Portwell

www.portwell.com
1-877-278-8899

InnoDisk USA Corporation
43154 Christy Street • Fremont, CA 94538
Tel: 510-770-9421 • Fax: 510-770-9424
www.innodisk.com

INNODISK®
Beyond your imagination

PCIe SSD – Matador Series

InnoDisk Matador Specifications:

****

Capacities: SLC: 128GB ~ 512GB, MLC: 128GB ~ 1TB
BUS Interface: PCIe x8 Gen 1.1
Performance Read/Write:
SLC: 900MB/s/550MB/s, MLC: 700MB/s/500MB/s
IOPS: >22300
ECC: 4 bit/512bytes
O/S Support: Windows family, RHEL5, SLES10
Raid Support: 0, 1, 0+1
Dimension: 171 x 89 x 23.15mm

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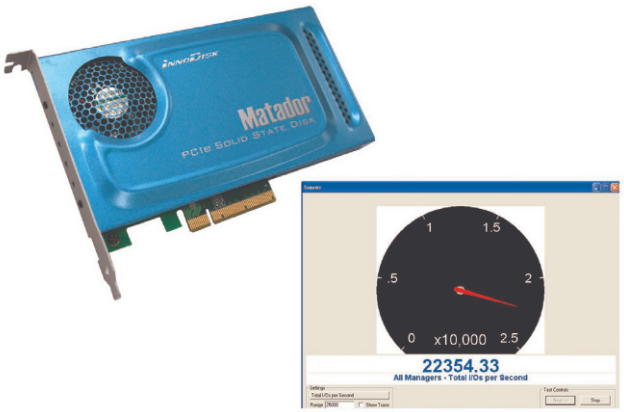


Flash memory has quickly become the product of choice for applications requiring high reliability and high acceptance to shock, vibration, humidity, altitude, and temperature. From a simple HDD replacement to the most refined storage assortment, the InnoDisk Matador series offers new, revolutionary products that are well-matched for the task.

InnoDisk integrates SSD, RAID, and mechanical design into our Matador series. Matador is revolutionizing the storage world by delivering to users the ultimate level of reliability and performance in a fully integrated device. The great advantage of Matador is that it only needs a minimum amount of space but offers a maximum amount of performance. The low power consumption and compact size are also the best solution for protecting our environment. With performance of over 900MB/s, the system only needs to install one Matador instead of an HDD array container. The InnoDisk Matador series is the answer for performance, integration, and a friendly environment.

Industry Leadership:
As the inventor of Matador® PCIe SSD, SATADOM®, InnoDisk remains the most experienced and innovative supplier on the market today. The company has over 30 engineers devoted to Flash storage products and is able to consult on any specific deployment need. The elite team holds many product patents and is experienced in designing industrial grade storage devices for embedded systems. The ISO-9001 company provides comprehensive solutions and specialized applications. Innodisk is among the most reliable and highest performing manufactures globally.

Call 510-770-9421 or visit www.innodisk.com to learn about the latest news and updates on InnoDisk products.

FEATURES

- Firmware customization for special needs
- Fast access on small file size (DRAM cache buffer)
- Wide range of capacity support
- Small form factor to fit into small chassis
- Onboard RAID/SSD controller for better compatibility
- Simple integrated RAID system
- Power guard to ensure data integrity
- Price competitive compared to Solid State Disk
- Mean Time Between Failure (MTBF) > 4,000,000 hours
- Static wear leveling algorithm to ensure consecutive writes of a specific sector are not written physically to the same page/block in the Flash
- Hard and Secure Erase algorithms for complete media declassification: Data will be completely erased within seconds with no trace back
- Fast Erase specially designed for military applications
- Outstanding performance and excellent reliability
- Mission-critical functions for software and hardware

Matador Markets:
- Cloud computing
- Enterprise server
- Communication and network

Mission-Critical Application:
- Military
- Scientific

Performance Application:
- Gaming server
- Video/Audio

For more information, contact: www.innodisk.com

www.embedded-computing.com/p45443

Planar Systems, Inc.

1195 N.W. Compton Drive • Beaverton, OR 97006
503-748-1100
www.planarembedded.com

PD420TI

The PD420TI is a proven solution for retail digital signage. Touch-screen integration makes it easy for your customers to interact with your digital content. A standardized command protocol greatly simplifies the process of managing a digital signage network. The PD420TI is a 42" display but can be changed to be any size from 37-65".

FEATURES

- Proven deployments at large retailers
- Available in 37-65" models
- Touch-screen integration for easy navigation by a consumer
- Standardized command protocol for easy management of your display network
- Internal power supply
- Works in portrait and landscape mode

For more information, contact: matt.adamson@planar.com **www.embedded-computing.com/p45585**

Artila Electronics Co., Ltd.

4F., No. 6, Lane 130, Minquan Road • Xindian City, Taipei County, 231 Taiwan R.O.C.
886-2-8667-2340
www.artila.com

Matrix-604 WinCE Industrial Computer

Matrix-604 is equipped with an ATMEL AT91SAM9G20 400MHz SoC, 64MB SDRAM, 128MB NAND Flash memory and I/O peripherals that include Ethernet, RS-232/422/485, programmable digital I/O and USB ports. WinCE 6.0 is preinstalled in the NAND Flash memory, and the SDK for Microsoft Visual Studio 2005 is available for user application development. In addition, the Remote Display Control of WinCE is supported to allow the user to develop a graphic user interface for a headless device like Matrix-604. For critical applications that need 7/24/365 operation, Matrix-604 provides a fail-over mechanism using the onboard DataFlash to recover the file system when the NAND Flash crashes and fails to boot.

FEATURES

- ARM9 ATMEL AT91SAM9G20 400MHz
- 64MB SDRAM and 128MB NAND Flash
- 2MB DataFlash for system fail-over and recovery
- One 10/100Mbps Ethernet port
- Four 921.6Kbps RS-232/422/485 ports
- Two USB 2.0 host ports and one USB 2.0 client port
- 5 CMOS level digital I/O
- WinCE 6.0 and .NET Compact Frameworks 2.0
- Compact 78x108x24mm design
- Ultra low power consumption, less than 3W

For more information, contact: sales@artila.com **www.embedded-computing.com/p45263**

Systems: Industrial systems

AXIOMTEK

18138 Rowland St. • City of Industry, CA 91748
626-581-3232
www.axiomtek.com

eBOX310-830-FL – *CAR PC!*

The eBOX310-830-FL is a **compact in-vehicle box computer** certified with E-Mark Certification **(E-13)** and ISO-7637 power standard, which certifies it as compatible with other vehicle components and meets Tier 1 car makers' requirements. Its power module design incorporates an MCU microprocessor for power control. The unit is powered by an Intel® Core™2 Duo processor with the Intel® 945GME and ICH7M chipsets. It supports various embedded operating systems, including Windows® CE, Windows® XP Embedded, and Linux. The box computer comes with one 200-pin DIMM socket that supports up to 2GB DDR2 400/533 DRAM for high memory expansion capabilities and two Mini PCI Express slots for custom system configurations, such as GPS, GSM/GPRS, Wi-Fi, WiMAX, Bluetooth, HSDPA, and more!

FEATURES

- Supports Socket M for Intel® Core™2 Duo/Core™ Duo/Core™ Solo/ Celeron® M up to 2.33 GHz
- Intel® 945GME+ICH7M chipset
- ISO-7637 Pulse 1/2a/3a/3b/4/5a vehicle standard
- Wide range vehicle power supply with ignition control
- Fanless operation design with full feature I/O
- One 2.5" SATA drive bay and CompanctFlash™ slot

For more information, contact: info@axiomtek.com **www.embedded-computing.com/p44651**

Systems: Industrial systems

Trenton Technology

2350 Centennial Drive • Gainesville, GA 30504
770-287-3100
www.TrentonTechnology.com

TCS4500 4U Rackmount Computer

Trenton's TCS4500 is a 4U rackmount computer with a shallow depth dimension that makes it an ideal choice for applications where computer mounting space is at a premium. The system is pre-configured with a high-performance, dual-processor Trenton JXT6966 single board computer and Trenton's BPC7041 backplane. The system's COTS SBC and backplane are both covered by Trenton's exclusive five-year factory warranty. The TCS4500 is a flexible system designed to support applications that require longevity, stability and the capability of supporting multiple PCI Express 2.0 or 1.1 option cards. This server chassis combines multiple hot swap/front access drive bays and optional card support with the JXT6966 dual-processor single board computer to deliver outstanding performance in rugged embedded computing applications.

A few typical applications for the TCS4500 are:

- Bridge navigation and telemetry
- Submarine control and airborne server
- Video wall displays and virtualization

FEATURES

- Shallow-depth chassis (17.8") is ideal for mounting in confined spaces
- 4U system with two quad-core Intel® Xeon® C5500 Series processors (Jasper Forest)
- Trenton's exclusive 5-year factory warranty on the system's JXT6966 SBC and BPC7041 backplane
- Supports up to 10 PCI Express 2.0/1.1 option cards for maximum system flexibility
- Four hot swap, front access 2.5" storage drive bays standard and multiple front and rear system interface ports
- Standard options include one optical media and one storage drive with up to three additional 2.5" HDDs

For more information, contact: jrenehan@trentontechnology.com **www.embedded-computing.com/p45433**

Moxa, Inc.
3001 Enterprise St., #210 • Brea, CA 92821
1-714-528-6777
www.moxa.com

MOXA®

V2101 Series

x86 Ready-to-Run Embedded Computer with Intel Atom Z510PT processor, VGA, LVDS, Audio, 2 LANs, 2 Serial Ports, 3DI, 3DO, 4 USB 2.0 Ports, SD

The V2101 embedded computers are based on the Intel Atom Z510PT x86 processor, and feature 2 serial ports, dual Gigabit LAN ports, 4 USB 2.0 hosts, and SD socket. The V2100 Series offers both VGA and LVDS outputs, making it particularly well-suited for industrial applications, such as SCADA and factory automation.

The V2101 computers' 2 serial ports make them ideal for connecting a wide range of serial devices, and the dual 10/100/1000 Mbps Ethernet ports offer a reliable solution for network redundancy, promising continuous operation for data communication and management. As an added convenience, the V2101 computers have 3 DI and 3 DO for connecting digital input/output devices. In addition, the SD and USB sockets provide the V2101 computers with the reliability needed for industrial applications that require data buffering and storage expansion.

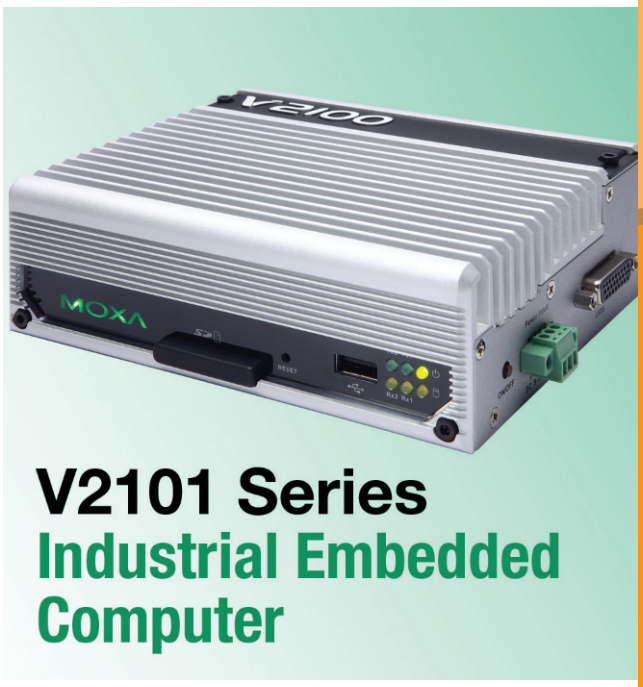
Pre-installed with Linux, Windows CE 6.0 or Windows XP Embedded, the V2101 Series provides programmers with a friendly environment for developing sophisticated, bug-free application software at a lower cost. In addition to the standard model, the V2101 also comes in a -40 to +85°C wide temperature model for harsh industrial environments.

Industrial Computing Solutions

Moxa's industrial embedded solutions are used to construct powerful front-end controllers that can execute on-site data collection and control at widely distributed remote sites through industrial Ethernet or wireless backbones. All of the computers feature rugged reliability and fanless operations with a wide operating temperature range of -40 to +85°C. Our products feature a user-friendly environment that makes application development easy. Moxa provides prompt and extensive customization services in addition to a wide selection of ready to-run products such as industrial computers, wireless computers, and wide temperature computers.

Moxa: Your Trusted Partner in Automation

Founded in 1987, Moxa is now one of the leading manufacturers of industrial networking, computing, and automation solutions. Moxa provides thousands of hardware and software products and draws upon 23 years of accumulated expertise. We deliver network-centric automation solutions that integrate automation and IT systems into a single network platform that simplifies management, reduces costs, and achieves greater reliability and efficiency.



FEATURES

- Intel Atom Z510PT 1.1GHz processor, 400MHz FSB
- DDR2 SODIMM socket, support DDR2 400 up to 2GB max
- Dual independent displays (VGA+LVDS)
- 2 Gigabit Ethernet ports
- 4 USB 2.0 ports for high speed peripheral
- 3 DI + 3 DO
- 2 RS-232/422/485 ports
- Built-in CompactFlash for storing OS
- SD socket for storage expansion
- LED indicators for power, storage
- Ready-to-run Embedded Linux, Windows CE 6.0, or Windows Embedded Standard 2009 platform
- -40 to +85°C wide operating temperature models available

For more information, contact: toni.cook@moxa.com

www.embedded-computing.com/p45469

Sealevel Systems, Inc.
2779 Greenville Highway • Liberty, SC 29657
864-843-4343
www.sealevel.com

SBC-R9 ARM9 RISC Single Board Computer

The SBC-R9 delivers RISC computing power with a wealth of I/O features and the latest embedded software environment.

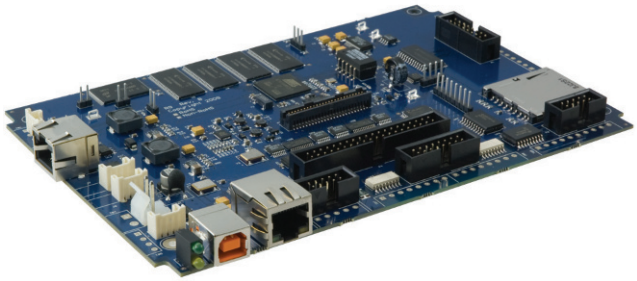
The SBC-R9, an application-ready platform for your next product design, is based on the 200MIPS Atmel AT91SAM9263 microcontroller boasting a 32-bit ARM instruction set for maximum performance. With up to 256MB RAM and 256MB Flash memory, the unmatched I/O features of the SBC-R9 extend the possible uses beyond traditional ARM applications. The SBC-R9 is the perfect platform for embedded applications requiring small size, wide operating temperature range, and flexible I/O connectivity.

Standard I/O includes Ethernet, serial, USB, CANbus, and digital and analog interfaces. System designers can directly drive TFT/STN LCDs from the onboard video controller, and the board also includes a resistive touchscreen controller, making it perfect for human-machine interface applications. Sealevel is unique in the market, offering a low NRE/MOQ product specialization service to create tailor-made SBC-R9 versions based around the customer's specific requirements by easily adding or removing features for the perfect fit.

To provide the fastest time to market, the Windows CE 6.0 BSP binary and low-level drivers for system I/O are included. Additionally, the SBC-R9 software package is equipped with Sealevel's Talos framework, which offers a high-level, object-oriented .NET Compact Framework (CF) device interface. This interface provides an I/O point abstraction layer with built-in support for the specific needs of analog and digital I/O such as gain control and debouncing. Sealevel also offers full Linux support for the R9.

Measuring just under 7.5" x 5.0" in size, the SBC-R9 is small enough to fit into most embedded applications and is rated for a full -40°C to +85°C operating temperature range. The SBC-R9 is powered from your 7-30VDC source, or you can select from a variety of Sealevel power supply options.

A QuickStart development kit is available, which includes the most common accessories and allows customers to be up and running very quickly.



FEATURES

- Atmel AT91SAM9263 ARM thumb processor
- Supports up to 256MB SDRAM and 256MB Flash memory
- Dual SD/MMC expansion card slots
- Integrated LCD and backlight controller
- Resistive touchscreen controller
- (1) 10/100BASE-T Ethernet interface
- (1) USB 2.0 device port (Type B)
- (2) USB 2.0 host ports (Type A)
- (1) CAN 2.0b bus interface
- (4) Software configurable RS-232, RS-422, RS-485 serial ports via 40-pin header connector
- (1) Dedicated RS-485 serial port via RJ-45 and Molex connector
- (8) Optically isolated inputs (5-30V)
- (8) Open-collector digital outputs
- (8) 12-bit differential or single-ended analog inputs
- (2) 32-bit quadrature counters
- Supports 7-30VDC input power via 2-pin connector

For more information, contact: sales@sealevel.com

www.embedded-computing.com/p41745

VIA Technologies, Inc.
940 Mission Court • Fremont, CA 94539
510-683-3300
www.viaembedded.com

VIA Embedded Systems

AMOS-3001: Strong, Silent and Powerful

- Dimensions: 150 mm (W) x 45 mm (H) x 108 mm (D)
- Supports four USB 2.0 ports, onboard GPIO port, COM port and programmable watchdog timer
- Wide range of operating temperatures from -20°C up to +70°C
- Shock resistant to 70G and vibration resistant to 7G for maximum reliability
- Supports hardware acceleration of H.264 for full HD 1080P, MPEG-2 & WMV9 display
- Supports Gigabit Ethernet & optional Wi-Fi networking
- Multiple mounting solutions: Wall/Table/VESA

AMOS-3001

ART-3000: Fanless Compact Embedded System by Em-ITX

VIA Nano™ CPU, two GigaLAN, two LVDS, four COM, DC-in 7~36V

- Two 24-bit single channel LVDS ports and one VGA port for triple concurrent display with dual independent display
- Supports four USB 2.0 ports
- Wide range of operating temperatures from -20°C up to +60°C
- Shock resistant to 20G in CompactFlash storage configurations and vibration resistant to 5G for maximum reliability

ART-3000

VIPRO Panel PC Series

Fanless Panel PC with 6.5"/15" TFT LCD and 5-wire resistive touch screen

- Built-in VIA new generation 1.3GHz VIA Nano™ processor with L2 cache 1MB memory
- Built-in 2M CMOS camera, speakers and microphone on the front
- Supports two Gigabit Ethernet ports, four COM ports and four USB 2.0 ports
- IP65 front panel compliant against water and dust

VIPRO Panel PC Series

M'SERV S2100: Storage-oriented 2-Bay Mini Server

Nano™ CPU, dual PCIe GigaLAN, two SATA, one CompactFlash, two 3.5" SATA HDD and three USB 2.0 ports

M'SERV S2100

For more information, contact: embedded@viatech.com

www.embedded-computing.com/p45577

Systems: Medical systems

Advantech
38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/medical

PIT-1501W

Advantech's PIT-1501W is a UL60601-1/EN60601-1 certified patient infotainment terminal featuring IP65/NEMA4 sealing. Its 16:9 display provides HDTV standard 1366 x 768 pixel resolution for HDTV viewing via an optional digital TV tuner. Powered by an efficient, low-voltage Intel Atom Z530 1.6 GHz processor, the PIT-1501W runs silently and consumes very little power. Less than 10 pounds and a mere 2.5" thick, the terminal is highly versatile and can be mounted virtually anywhere.

Based on Windows XP Embedded or Linux, the PIT-1501W's all-in-one design includes CPU, memory, HDD, OS, camera, RFID and Wi-Fi – eliminating the hassle of integrating peripherals. LED indicator lights, nurse call buttons and Smart Card readers are standard features.

FEATURES

- Intel Atom Z530 1.6 GHz processor
- 15.6" TFT-LCD with touchscreen
- Built-in 1.3 megapixel CMOS camera
- Built-in mic, speaker and headset support
- RFID, Wi-Fi and Smart Card reader
- Built-in emergency key and 2x indicators
- Multiple input supports: RJ-45, USB x2
- EN60601-1 certification approved
- IP65 (front) and IPX1
- Silent, fanless operation
- Optional TV tuner, handset and wired remote controller

For more information, contact: ECGInfo@advantech.com **www.embedded-computing.com/p45446**

Systems: Panel computers

Advantech
38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com

UTC-W101

Advantech's UTC-W101 is an award-winning, interactive self-service touch computer ideal for use in restaurants, health care facilities and retail shopping environments. Powered by an Intel Atom processor, it is a silent, low power solution with a 16:9, 10.1" LCD touch panel that's UL60601-1, IEC/EN60601-1 and IP65/NEMA 4 certified.

Additional features include programmable function keys and a service call LED lamp. Two Gigabit Ethernet ports can be configured to support LAN teaming, wake-on LAN or boot from LAN. The UTC-W101 has a variety of I/O ports including 2 COM, 4 USB 2.0, Mic-in, Line-out and 2 stereo speakers.

Rugged enough to stand up to frequent use and 24-hour operation, the UTC-W101 is capable of standing upright on a desk or being mounted on a wall.

FEATURES

- Fanless Intel Atom Z510P 1.1 GHz or Z530P 1.6 GHz + US15WP architecture
- Low power consumption attributed to Intel Atom eMenlow architecture
- UL60601-1, IEC/EN60601-1 certified
- Natural viewing experience with 16:9 10.1" WSXGA display
- Instant function access through front programmable hot keys
- Front panel complies with IP65/NEMA 4 protection standard
- VESA 75 mm mounting holes for desktop stand and wall mount

For more information, contact: ECGInfo@advantech.com **www.embedded-computing.com/p45447**

Avalue Technology Inc.

7F, No. 228, Lian-Cheng Rd. • Chung-Ho City, Taipei 235, Taiwan
+886.2.8226.2345
www.avalue.com.tw

Avalue Panel Computers

Avalue's Panel PCs adopt the Intel® Atom™ series and latest Core™ i7 series processors, featuring low power, fanless design and quick heat dissipation conditions. Touch panels leverage low refractive touch technology and a unique Super Anti-Abrasion (SAA) design, which allows the touch panel to reach hardness of 6.2 to 6.5, preventing scratches and increasing its durability. The computer uses an LED backlight display to reduce heat, power consumption and cost. The aluminum chassis protects the computer when it is used in more humid environments, such as factories or testing labs, ensuring that it operates reliably. The front panel is IP65 safety certified, and computer waterproof certification is optional. Embedded COM/ETX/XTX CPU modules equipped with scalable baseboards bring diversified tiers of system performance. The modularized concept extends product lifetime and makes the computer price-competitive. Avalue Panel PCs are widely applied in automation, human machine interface, point-of-service, and digital signage applications.

FEATURES

- 8 to 37-inch 4:3/16:9/17:10 multifunctional touch Panel PC
- Onboard Intel® Atom™ N270/D510, Core™ i7, AMD LX800 CPU
- Supports up to 3GB (1GB per bank) SDRAM
- Dual Gigabit Ethernet and rich I/O ports
- Optional wireless module
- Fanless thermal design
- IP65 compliant
- Up-to-date technology panel
- Streamlined industrial design

For more information, contact: sales@avalue.com.tw **www.embedded-computing.com/p45579**

Systems: Panel computers

AXIOMTEK

18138 Rowland St. • City of Industry, CA 91748
626-581-3232
www.axiomtek.com

GOT-812 – *FULL IP65* (all sides)

The GOT-812 is a robust 12.1" fanless touch panel computer integrated in a fully IP65-rated water/dust-proof stainless housing, protecting the entire system from any rugged environment. Its sunlight-readable technology, high brightness 800 nits color display, and low reflective touch screen allows the screen to be readable even in strong sunlight. Other features include shock and vibration endurance up to 3G for CompactFlash™ and 2G for 2.5" HDD storage devices. The GOT-812 can withstand an extreme temperature range of -20°C to +55°C suited for operation under severe outdoor as well as indoor environments, such as wet/moist/dusty spaces, food assembly lines or kitchens, ships exposed to the ocean's salt water, and more!

FEATURES

- 12.1" SVGA TFT fanless touch panel computer with Intel® Atom™ processor N270
- IP65-rated whole system water/dust-proof design
- Fanless system with wide operating temperature range from -20°C to +55°C
- Optional 802.11a/b/g/n wireless kit for network connection
- Optional IP62 keyboard kit
- Suspension and VESA mounting

For more information, contact: info@axiomtek.com **www.embedded-computing.com/p44652**

Systems: Panel computers

WinSystems, Inc.

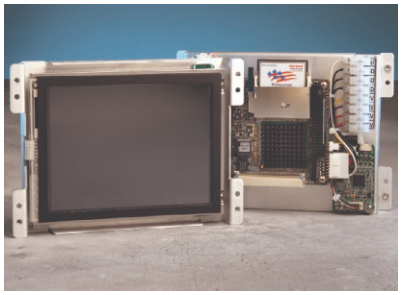
715 Stadium Drive • Arlington, TX 76011
817-274-7553
www.WinSystems.com

Open-Frame Panel PC

WinSystems' Panel PC (PPC) is a compact display subsystem that includes a 6.5", 12", or 15" TFT flat panel, x86-compatible Single Board Computer (SBC), and touchscreen integrated into an open-frame enclosure less than 3" thick. I/O is provided via Ethernet, USB, and serial I/O ports. Plus expansion is available for wireless communications and other I/O functions using PC/104 modules.

The combination of embedded PC functionality, industrial-grade construction, and -20°C to +70°C temperature operation makes these units ideal for industrial automation and control applications with tight system integration and minimal space requirements. PPCs support operating systems such as Linux and Windows® XPe, plus x86-compatible RTOSs.

WinSystems offers a 30-day evaluation program plus award-winning technical support.



FEATURES

- Compact 6.5", 12.1", or 15" TFT panels, with industrial-grade resistive touchscreens
- Includes PC-compatible single board computer with PC/104 I/O expansion capability
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Kontron CG2100 Carrier Grade Server

Designed for Ruggedness, Reliability, Long Life and Performance

The CG2100 Carrier Grade Server combines performance, ruggedness, reliability and long life in a NEBS-3 and ETSI compliant 2U chassis. It includes dual socket support for the Intel® Xeon® processor 5600 series, providing improved performance per watt.

This high-performing, rugged server is an excellent choice for the demanding environment and limited space of the Telco central office, as well as for network data centers. In addition, the CG2100 is ideal for other types of rugged applications, such as in the military and medical segments, where meeting tough environmental requirements is critical.

The CG2100 introduces several new valuable capabilities such as support of PCIe Gen2, Power Management Bus, DDR3 memory, hot-swap/redundant fans and increased memory and storage capacity.

FEATURES

- NEBS-3/ETSI compliant
- Long life support (3-5 years)
- 20-inch depth, ruggedized 2U chassis
- Dual redundant AC or DC power option
- Telco alarm management
- Hardware RAID option
- Industry-leading performance/watt
- High availability and serviceability with hot-swappable components

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ADVANTECH

TREK-550

Powered by an Intel Atom Z510 1.1 GHz or Z520 1.3 GHz processor, Advantech's TREK-550 is a dedicated box computer ideal for use in industrial vehicle fleets, transport trucks, buses and taxis. Connections to monitoring systems such as onboard diagnostics (ODB-II), Car Area Networks (CAN) and tire pressure monitors are all possible. Built-in wireless communications such as WWAN, WLAN and Bluetooth allow it to send data back to a central site and enable it to receive over-the-air updates (AOTA) when communicating with central dispatch.

The TREK-550 can operate in extreme temperatures and transient power conditions. Its rugged housing carries a military grade certification against shocks and vibrations.

Dead reckoning technology allows TREK-550 to provide GPS positioning in problematic areas where satellite communication is typically blocked – tunnels, mountains and dense urban centers.

FEATURES

- Certifications: CE/FCC/e-mark, MIL-STD810F, ISO 7637-2, SAE J1455
- Rich I/O including CAN, LAN, RS-232, RS-485, J1708, isolation 4DI/4DO, Line-out, Mic-in and USB
- GPS with AGPS and dead reckoning technology (gyro and speed line)
- Built-in communication modules: GSM/GPRS/HSDPA/CDMA/WLAN and Bluetooth
- Dual display/audio output for both driver and passenger
- Ignition on/off delay, SW detectable/controllable for car power management
- Automotive grade working temperature range of -30 °C to +70 °C
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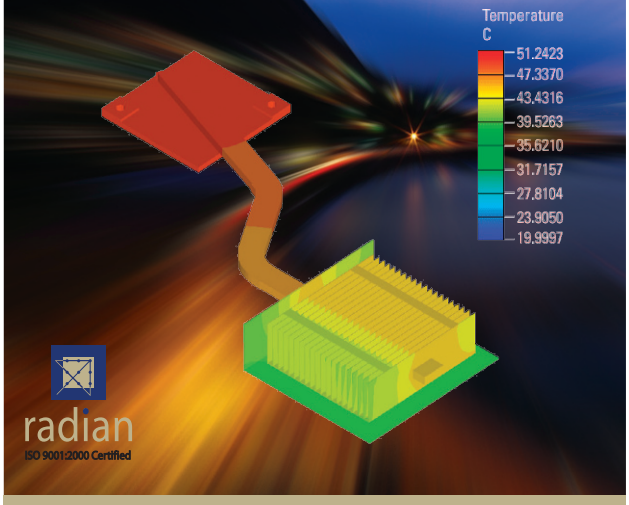

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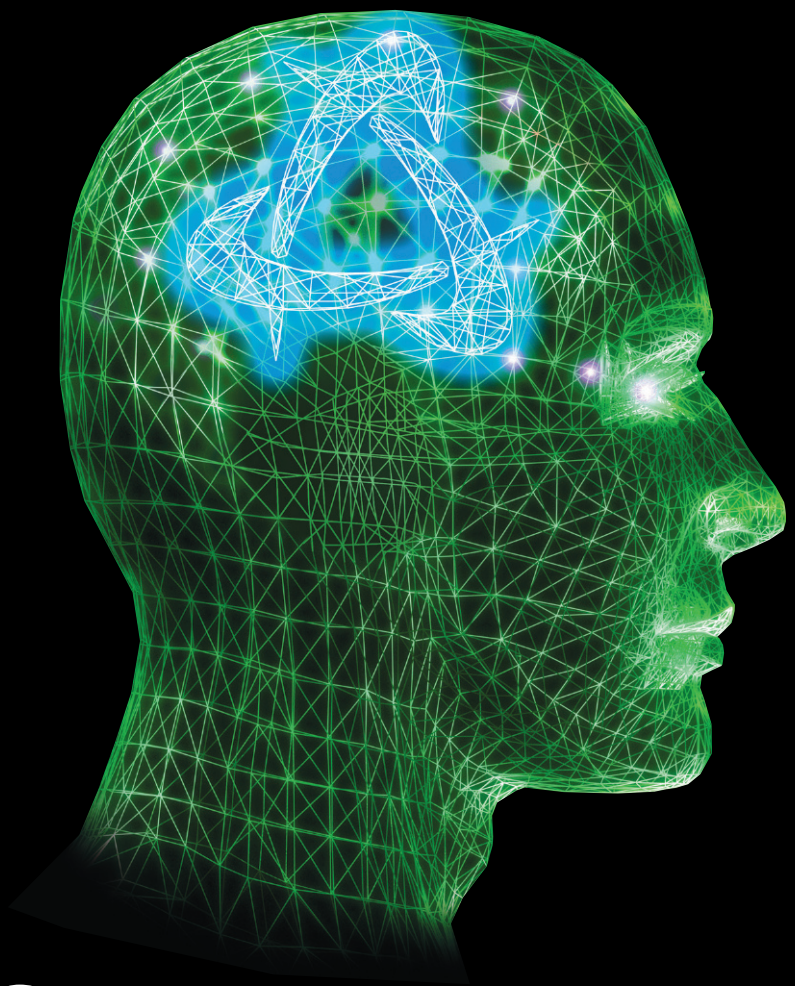

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2010 Resource Guide

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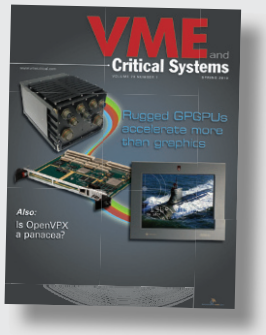

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WILDSTAR 5 for IBM Blade

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

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

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

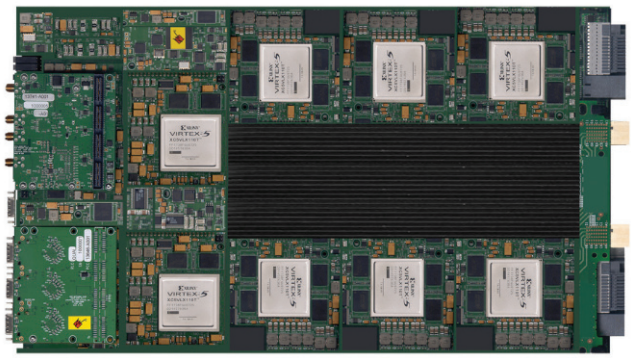
Fully Integrated into the IBM Blade Management System – Abundant power and cooling for maximum performance.

Annapolis Micro Systems, Inc. is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

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

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

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



FEATURES

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

For more information, contact: wfinfo@annapmicro.com **www.embedded-computing.com/p35882**

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2.0 GSps 10-bit A/D

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

In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine 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 PCIe main board.

Our boards run on many different operating systems. We support our boards 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 boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

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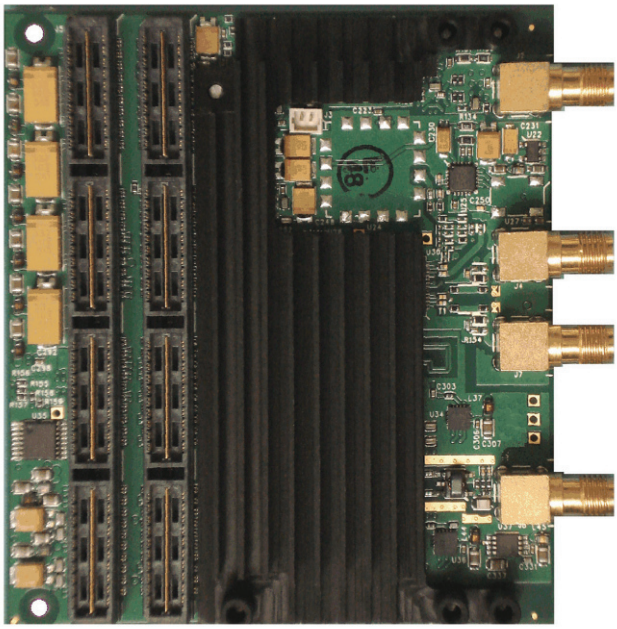

FEATURES

- 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/PCIe/ 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 **www.embedded-computing.com/p36021**

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

In concert with the WILDSTAR 4 or WILDSTAR 5 FPGA processing main boards, this mezzanine 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 PCIe main board.

Our boards run on many different operating systems. We support our boards 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 boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

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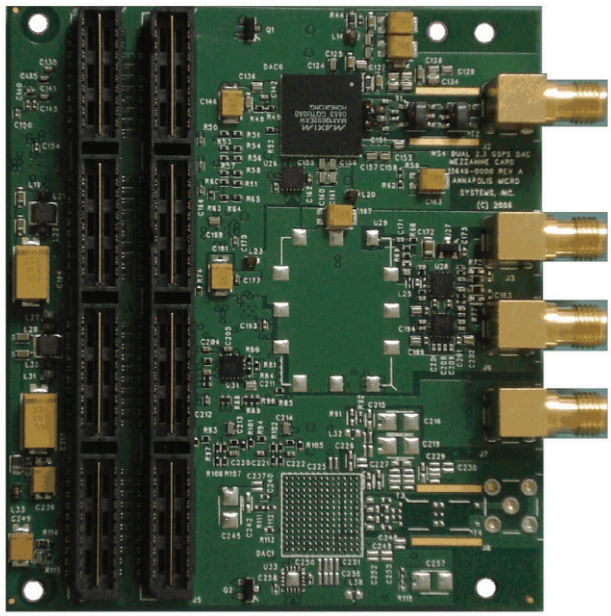

FEATURES

- One or two 12-bit Analog to Digital Converters: Max 19693 for 4.0 GSps, Max 19692 for 2.3 GSps, or Max 5859 for 1.5 GSps
- Five SMA front panel connectors: two single-ended DAC outputs, one high-precision trigger input with Fs precision
- One universal single- or double-ended 50-ohm clock input
- High-precision trigger input manufacturing options – 1.65 V LVPECL, 2.5 V LVPECL, 3.3 V LVPECL
- I/O card plugs onto WILDSTAR 4 or 5 VME/VXS/PCI-X/PCIe/ 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 **www.embedded-computing.com/p36023**

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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 10 G full duplex InfiniBand per I/O card, or 10 G 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 boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

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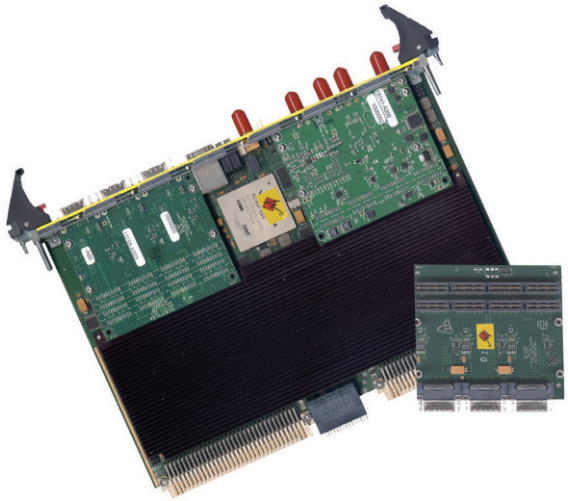

FEATURES

- 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 boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

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/PCI Express 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 tenth generation of Xilinx FPGA processing-based COTS boards from Annapolis.

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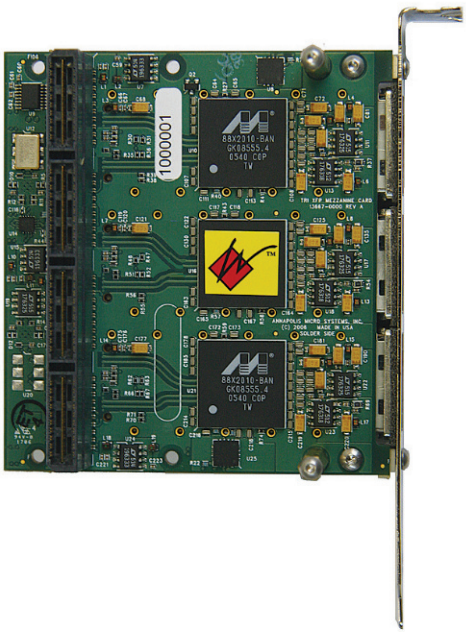

FEATURES

- 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 6 – Pluggable Virtex-6 Module for IBM Blade

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

Our 14th-generation Pluggable Virtex-6 Module for WILDSTAR 5 for IBM BladeCenter uses Xilinx's newest Virtex-6 FPGAs for state-of-the-art performance. This module plugs into the WILDSTAR 5 for IBM BladeCenter. Other potential modules available today include Virtex-5 and Tilera. 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. The Virtex-6 Pluggable Module provides extremely high overall throughput and processing performance. The combination of our COTS hardware and CoreFire allows our customers to make massive improvements in processing speed, while achieving significant savings in size, weight, power, person-hours, dollars, and calendar time to deployment.

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

FEATURES

- One Virtex-6 FPGA processing element – XC6LX240T, XC6LX365T, XC6LX550T, XC6SX315, or XC6SX475
- Up to 3.5 GB DDR2 DRAM in 7 banks or up to 224 MB DDRII or QDRII SRAM
- Plugs into any of 6 pluggable processing module slots on WILDSTAR 5 for IBM BladeCenter
- Up to 16 RocketIO lanes to crossbar
- 4 lanes connect to PCIe switch on WILDSTAR 5 Blade Board
- LVDS systolic ring connecting all I/O FPGAs and computing FPGAs
- RocketIO systolic ring connecting pluggable positions 0-2 and 3-5
- Programmable Flash to store FPGA images on WILDSTAR 5 Blade Board, which acts as host
- Full CoreFire Board Support Package for fast, easy application development
- VHDL model, including source code for hardware interfaces and ChipScope access
- Host software: Windows, Linux, VxWorks, etc.
- Available in both commercial and industrial temperature grades
- Proactive thermal management system – board-level current measurement and FPGA temperature monitor, accessible through Host API
- Save time and effort and reduce risk with COTS boards and software
- Achieve world-class performance – WILD solutions outperform the competition
- Includes one-year hardware warranty, software updates, and customer support; training available

For more information, contact: wfinfo@annapmicro.com

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410-841-2514
www.annapmicro.com

WS4 Quad 250/400/500 MSps A/D

The Annapolis Quad Channel 250/400/500 MSps A/D I/O Card provides 4 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.

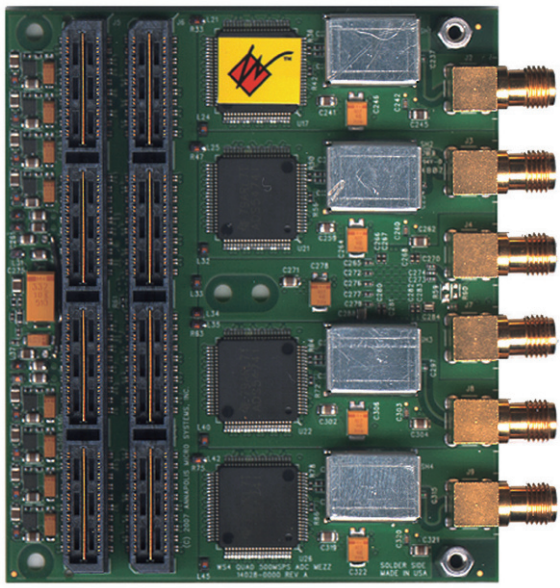
There is an onboard ultra-low jitter and skew clock distribution circuit to allow all four channels on a single A/D I/O board to be synchronized together. There is also an external clock input and a trigger input allowing multiple A/D I/O cards to be synchronized together. Synchronization of A/D I/O 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 PCIe main board.

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

Our boards run on many different operating systems. We support our boards 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/PCIe/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 the customers' applications succeed

For more information, contact: wfinfo@annapmicro.com **www.embedded-computing.com/p35976**

PICMG: AdvancedMC

Kontron

14118 Stowe Drive • Poway, CA 92064
888-294-4558
www.kontron.com

AM4020 – Intel® Core™ i7 processor AMC

The Kontron AdvancedMC processor module AM4020 is a powerful single-width AMC designed around the new Intel® Core™ i7 processor. With up to dual 2.53 GHz, the Kontron AM4020 offers the ultimate in computing power and integrated graphics when utilized in MicroTCA and AdvancedTCA integrated platforms.

The single-width AdvancedMC processor board AM4020 integrates the memory controller, PCI Express and the graphics processor within the multicore processor. Equipped with the highly integrated Intel® QM57 Platform Controller Hub, it offers high power density and performance on an extremely compact footprint.

With its outstanding overall performance, the module is ideal for MicroTCA and AdvancedTCA telecommunications applications such as IPTV, media servers and media gateways. The Kontron AM4020 is also an ideal fit for the medical, automation, aerospace, military and security markets, which require fast data processing.

FEATURES

- AMC processor module, single module, full-size or mid-size
- Intel® Core™ i7 up to 2.53 GHz
- Up to 8 GB SDRAM memory (soldered) with ECC running at 1,066 MHz
- Graphics interface
- Up to 32 GB SATA NAND Flash memory module
- Comprehensive I/O capabilities
- Superb monitoring features
- PICMG AMC.0/.1/.2/.3 compliance
- Extended temperature according MicroTCA.1

For more information, contact: info@us.kontron.com **www.embedded-computing.com/p44089**

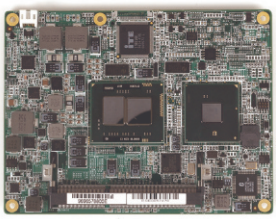
PICMG: COM Express

Advantech

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com

SOM-5788

Advantech's SOM-5788 offers a low-power, high-performance chipset solution in a COM Express Type II form factor. It features 8 GB of DDR3 memory in addition to VGA, LVDS, HDMI and HD audio support. The SOM-5788's Intel Core i7 architecture allows graphical performance 1.5 times greater than that of a GM45-based platform. Additional features include support for five hard drives (1 PATA and 4 SATA). The SOM-5788's versatility makes it ideal for multiple applications across many industries, including gaming, medical and transportation.



FEATURES

- Embedded Intel Core i7 processor + QM57
- Intel GMA integrated in Intel Core i7 or Intel Core i5
- Supports 6 PCIe x1, 4 PCI masters
- Supports 4 SATA II ports, 8 USB 2.0 ports
- Supports embedded software API and utilities
- DDR3 800/1,066 MHz memory up to 8 GB

For more information, contact: ECGInfo@advantech.com **www.embedded-computing.com/p45451**

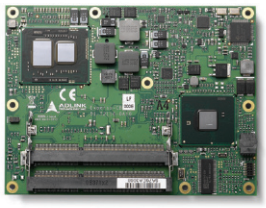
PICMG: COM Express

Ampro ADLINK Technology, Inc.

5215 Hellyer Avenue, #110 • San Jose, CA 95138
1-800-966-5200
www.adlinktech.com

Express-CB

The Express-CB is a COM Express™ Type 2 module supporting the 64-bit Intel® Core™ i7/i5 processor with CPU, memory controller, and graphics processor on the same chip. Based on the latest Mobile Intel® QM57 Express chipset, the Express-CB is specifically designed for customers who need high-level processing and graphics performance in a long product life solution. Integrated graphics support includes features such as OpenGL 2.1, DirectX 10, and Intel® Dynamic Video Memory Technology. Graphics outputs include CRT, LVDS, and Embedded DisplayPort. The Intel® Mobile QM57 Express chipset integrates CRT and single/dual-channel 18/24-bit LVDS display outputs. In addition to the onboard integrated graphics, a multiplexed PCI Express® graphics x16 bus is available for discrete graphics expansion, Embedded DisplayPort, or general purpose x8, x4, or x1 PCI Express® connectivity. The Express-CB features a single onboard Gigabit Ethernet port, up to eight USB 2.0 ports, and four SATA 3 Gb/s ports with optional support for RAID 0/1/5/10. Legacy support is also provided for 32-bit PCI, LPC, SMBus, and I2C.



FEATURES

- Intel® Core™ i7/i5 processor
- Intel® QM57 chipset
- Up to 8 GB dual-channel DDR3 SDRAM at 1,066 MHz
- Six PCI Express x1, one PCI Express x16 for graphics (or general purpose x8/x4/x1)
- 18/24-bit LVDS and Embedded DisplayPort
- SATA-300, IDE (PATA), Gigabit LAN, USB 2.0
- COM Express™ Type 2 module

For more information, contact: kelly.gillilan@adlinktech.com **www.embedded-computing.com/p44187**

PICMG: COM Express

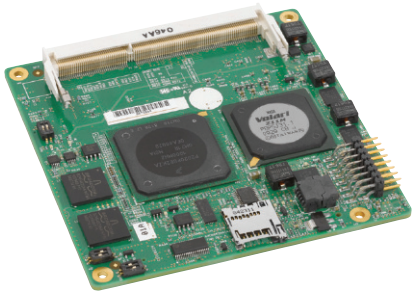
Emerson Network Power

2900 S. Diablo Way, Suite 190 • Tempe, AZ 85282
1 800 759 1107 or +1 602 438 5720
Emerson.com/COMX

COMX-P2020 Module

The COMX-P2020 module provides the performance and features of the Freescale QorIQ™ P2020 dual-core processor on a convenient plug-in mezzanine module. By incorporating and leveraging the mechanical features and dimension of the COM Express® specification, the COMX-P2020 exhibits all the best open standard attributes, allowing easy technology upgrades with future devices, competitive pricing with choice of modules and speedy time to market.

The QorIQ P2020 processor is effectively a System-on-Chip device with a range of features including USB, PCI Express, Gigabit Ethernet, memory controller, general purpose I/O and a removable flash controller. Emerson has added a graphics controller on the module to enable LCD connection through either a local LVDS or a VGA port for those applications that need graphics output. The overall dimensions are 95 mm x 95 mm (following the definition of a compact COM Express module), which enables it to fit within a very wide range of enclosures when mounted on a customer carrier.



FEATURES

- Based on COM Express form factor
- Freescale QorIQ P2020 processor
- Two e500 Power Architecture cores running at 1.2 GHz
- Onboard XGI Z11M Graphics Processor Unit (GPU)
- Supports up to 2GB DDR3 SO-DIMM
- 95 mm x 95 mm compact footprint
- MicroSD card slot for onboard storage
- Suitable for a range of applications including programmable automation controllers, security gateways, civil aeronautics, renewable energy controllers, test and measurement and other embedded devices

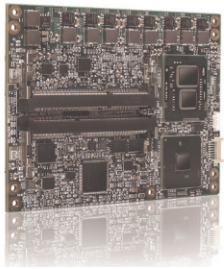
For more information, contact: EmbeddedComputingSales@Emerson.com **www.embedded-computing.com/p45457**

PICMG: COM Express

Kontron
14118 Stowe Drive • Poway, CA 92064
888-294-4558
www.kontron.com

Kontron COM Express™ Modules

Kontron offers the most expansive portfolio of COM Express™ compliant and compatible modules. Modules range in performance and power consumption from the ultra-small, extremely power-efficient nanoETXexpress-SP with the Intel® Atom™ Z5xx processor series all the way up to the top-performing ETXexpress®-AI featuring Intel® Core™ i7 processors.



FEATURES

- COM Express™ Type 1 and Type 2 solutions
- Processing performance up to 2.53 GHz Intel® Core™ i7 processors
- Other low-power CPU-based modules also available
- Up to 8 MB system memory on COMs with dual channel and ECC memory support
- ETXexpress, microETXexpress, nanoETXexpress – Size options all following the COM Express™ standard pin-outs
- Request a sample today and start evaluating immediately

For more information, contact: info@us.kontron.com **www.embedded-computing.com/p42374**

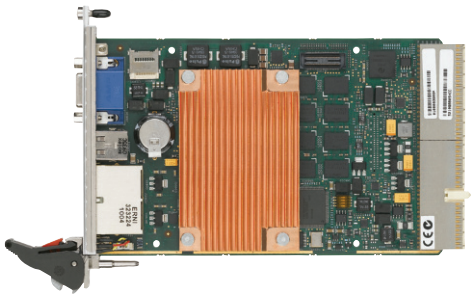
PICMG: CompactPCI

Emerson Network Power
2900 S. Diablo Way, Suite 190 • Tempe, AZ 85282
1 800 759 1107 or +1 602 438 5720
Emerson.com/CompactPCI

CPCI7203 PICMG 2.30 3U Processor Board

The Emerson Network Power CPCI7203 3U form factor SBC features the Intel® Core™ i7 integrated dual-core processor for use in high-performance, space-constrained applications. Onboard memory includes up to 4GB DDR3 and 256KB non-volatile Ferroelectric Random Access Memory (F-RAM). F-RAM does not require batteries or periodic refreshes and offers many more read/write cycles and faster performance than flash memory, which benefits critical non-volatile data storage, data logs and dynamic program updates. The Trusted Platform Module (TPM) enhances data security and encryption capabilities. The CPCI7203 supports a range of operating system and software options.

The CPCI7203 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 specification and PICMG 2.30 CompactPCI PlusIO specification, which supports the new serial buses on the J2 connector for data transfer rates of up to 5Gbit per second.



FEATURES

- Intel Core i7 integrated dual-core processor (up to 2 GHz)
- Up to 4GB ECC-protected DDR3-800/1066 (soldered)
- 256KB non-volatile F-RAM
- Mobile Intel® 5 Series chipset: Ibex Peak-M PCH
- One VGA and two onboard Gigabit Ethernet interfaces
- One UART and four USB 2.0 ports
- Four PCI Express and two SATA interfaces
- Ideal for a wide range of industrial, medical and military/aerospace applications, such as railway control, semiconductor processing, robotics, image processing, vehicle communications and onboard flight information systems

For more information, contact: EmbeddedComputingSales@Emerson.com **www.embedded-computing.com/p45456**

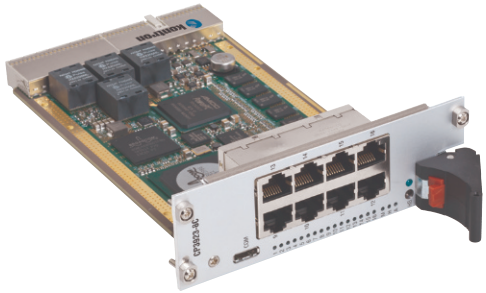
PICMG: CompactPCI

Kontron
14118 Stowe Drive • Poway, CA 92064
888-294-4558
www.kontron.com

CP3923 – Gigabit Ethernet Switch

The Kontron Ethernet switch CP3923 is a fully managed Layer 2/3 Gigabit switch offering IPv4/IPv6 routing and full management capabilities. It supports a powerful set of CLI, Telnet, Web and SNMP management interfaces to configure the entire set of protocols and parameters including Layer 2 and Layer 3 (IPv4/IPv6*) protocols, multicasting, QoS and security. The Kontron CP3923 also maximizes the reliability of rugged COTS applications by supporting Intelligent Platform Management (IPMI) and hot-swap capabilities.

Eight GbE ports to the rear and up to eight GbE to the front ensure the highest connectivity capabilities. The CP3923 is available with three different front I/O versions: with eight GbE ports via RJ-45 (CP3923-8C), for mobile- and transportation-oriented applications with four (CP3923-4M) or eight (CP3923-8M) Fast Ethernet ports via M12-D connectors.



FEATURES

- Fully managed Layer 2 and 3 switching and routing
- Leading-edge technology based on BCM56226
- Versatile design with RJ-45 or M12-D front options
- EN50155 compliant (with M12 versions)

For more information, contact: info@us.kontron.com **www.embedded-computing.com/p45353**

PICMG: CompactPCI

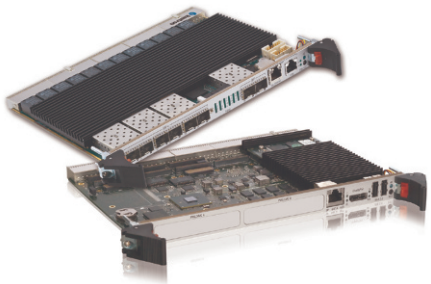
Kontron
14118 Stowe Drive • Poway, CA 92064
888-294-4558
www.kontron.com

CP6002 and CP6930 – a perfect pair for 6U CompactPCI

Core i7 Processor Board – 10 Gigabit Ethernet Switch

The Kontron CompactPCI 6U processor board CP6002 comes with various rugged levels, making it yet another addition to Kontron's rugged PICMG 2.16 portfolio. Based on the Intel® Core™ i7 processor and mobile chipset, the Kontron CP6002 features high computing and graphic performance with a low thermal power design and a complete set of data, communication and multimedia interfaces.

The Kontron CompactPCI and VITA 31 switch CP6930 is a 6U hot-swappable switch with 26 GbE ports and six high-performance uplinks (10 GbE). The CP6930 is designed for future-oriented applications requiring outstanding bandwidth and communication safety. Six SFP+ front ports running at 10 Gb/s full line speed and two SFP ports at the front providing 1 Gb support give the Kontron CP6930 ultimate flexibility.



FEATURES

- ***CP6002***
- High computing and graphic performance
  Intel® Core™ i7 processors combined with QM57 chipset
- Highly shock and vibration resistant, extended temperature range
- 4x GbE, 6x SATA with RAID, DVI and HDMI, HDD, CF
- ***CP6930***
- 6U 4HP CompactPCI and VME 10 GbE switch, PICMG 2.16 and VITA 31.1 compliant
- 6x 10 GbE via SFP+, 2x 1 GbE via SFP, 24x GbE
- Non-blocking Layer 2 and 3 switching and routing

For more information, contact: info@us.kontron.com **www.embedded-computing.com/p45580**

Vector Electronics & Technology, Inc.
11115 Vanowen Street • North Hollywood, CA 91605
800-423-5659
www.vectorelect.com

cPCI, PXI, VME, VXI Custom Packaging Solutions

ITAR REGISTERED

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

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

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

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

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

For more detailed product information, visit 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 400mm
- System monitoring option (CMM)
- AC or DC power input
- Power options up to 1,200 watts

For more information, contact: inquire@vectorelect.com

www.embedded-computing.com/p42254

Small form factors: Chassis

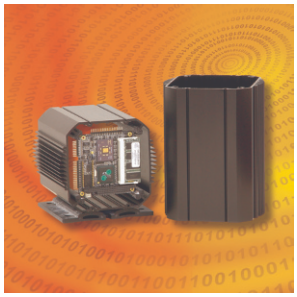
Tri-M Engineering

100-1407 Kebet Way • Port Coquitlam, BC V3C 6L3 Canada
604-945-9565
www.tri-m.com

CanTainer – Rugged PC/104 Enclosure

The CT104 CanTainer is a rugged PC/104 enclosure system constructed of .125" aluminum and designed for hostile and mobile environments. It features a dual system of shock and vibration isolation: The PC/104 modules are mounted axially in the enclosure with four internal rubber corner rails to absorb high-frequency vibrations, while the entire enclosure is mounted on the host platform with a thick rubber pad that absorbs low-frequency G-forces. The rubber pad may be removed for optional mounting solutions such as hard mounting, flange endcap, or fluidic mount assembly.

The CanTainer cross section measures 6.00" wide by 5.45" high (not including mounting pad) and is designed to mount PC/104 boards axially along the entire length of the enclosure body. The enclosure is available in standard lengths from 2" and 12" with custom lengths up to 48".



FEATURES

- Dual shock and vibration protection system
- PC/104 mounting
- Available as a complete kit
- Passively cooled
- Easily customized: length, coating, etching, milling, mounting
- 6063-T5 extruded aluminum
- .125" thick
- High-grade extruded rubber
- Black anodized coating
- Standard lengths from 2" to 12"

For more information, contact: info@tri-m.com **www.embedded-computing.com/p44299**

Small form factors: COM/SOM

EMAC, Inc.

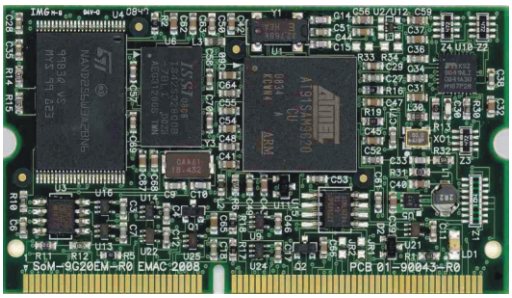
2390 EMAC Way • Carbondale, IL 62902
618-529-4525
www.emacinc.com

SoM-9G20

The SoM-9G20M is based on the Atmel ARM9 400 MHz AT91SAM9G20 processor. This ARM9 processor has an Ethernet MAC built in along with 7 serial ports. It utilizes external SDRAM and includes an MMU that allows it to run Linux or WinCE 6.0. A SoM (System on Module) is a small embedded module that contains the core of a microprocessor system.

Using the same small SODIMM form factor utilized by other EMAC SoM modules, the SoM-9G20 is the ideal processor engine for your next design. All of the ARM processor core is included on this tiny board, including: Flash, memory, serial ports, Ethernet, I2S audio, PWMs, timer/counters, A/D, digital I/O lines, clock/calendar, and more. Price is $155 Quantity 1.

www.emacinc.com/som/som9G20.htm



FEATURES

- Small, 144-pin SODIMM form factor (2.66" x 1.5")
- Atmel ARM9 Jazelle AT91SAM9G20 400 MHz processor
- 10/100BASE-T Ethernet with onboard PHY
- 6 serial ports, 4 with handshake (7 serial ports optionally available)
- 2 USB 2.0 host ports and 1 USB 2.0 (full speed) device port
- Up to 64 MB of SDRAM and up to 1 GB of NAND Flash
- SD/MMC Flash card interface
- 2 SPI ports and 1 I2S audio port
- Timer/counters and Pulse Width Modulation (PWM) ports
- 4 channel 10-bit Analog-to-Digital converter
- Typical power requirement less than 1 Watt

For more information, contact: info@emacinc.com **www.embedded-computing.com/p41262**

Technologic Systems
16525 East Laser Drive • 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 customizable 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 is installed with full Debian with development environment by default. The TS-7800 is backward compatible with our TS-72xx computers, providing three times more performance and higher-end features with an identical footprint.

0.69 Seconds Bootup Firmware

The TS-7800 bootstrap combines FPGA hardware logic, specific boot-up 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

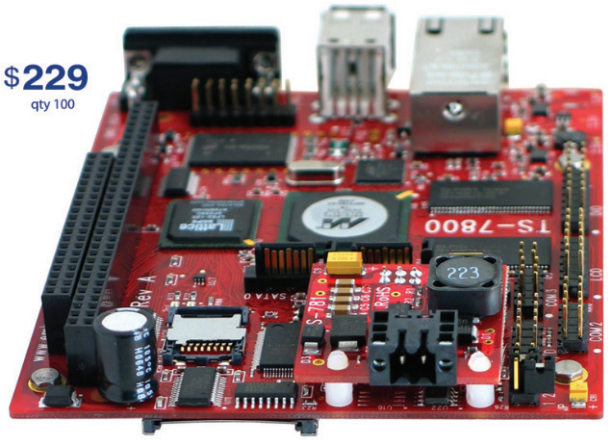
12,000 LUT FPGA

- 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 ships 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.

High-End Performance with Embedded Ruggedness



TS-7800 shown with optional 8-30VDC on-board switching-mode power regulator

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 website powered by a TS-7800**

For more information, contact: info@embeddedARM.com

www.embedded-computing.com/p33645

Technologic Systems
16525 East Laser Drive • Fountain Hills, AZ 85268
480-837-5200
www.embeddedARM.com

TS-SOCKET MACROCONTROLLERS

JUMP START YOUR EMBEDDED SYSTEM DESIGN

The TS-SOCKET Macrocontrollers are a series of embedded computers based on the TS-SOCKET connector standard. These CPU core modules securely connect to your custom baseboard, enabling drastically reduced design time and complexity. Start your embedded system design around one of our TS-SOCKET Macrocontrollers to reduce your overall project risk and accelerate time to market.

TS-SOCKET MACROCONTROLLER STANDARD

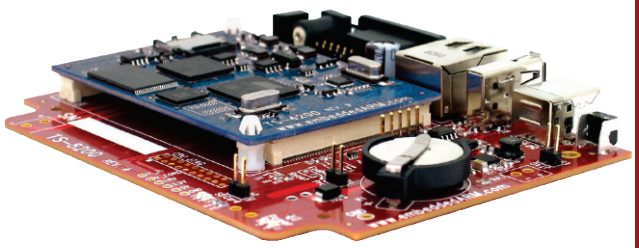
TS-SOCKET is an embedded computer standard designed and controlled by Technologic Systems, Inc. It defines both a form factor and a connection pin-out and is based on two 100-pin low-profile connectors, allowing secure connection between a Macrocontroller and a baseboard.

A TS-SOCKET Macrocontroller is an embedded CPU board that implements the TS-SOCKET specification. The form factor is 75mm x 55mm, about the size of a credit card. In addition to two 100-pin off-board male connectors, a TS-SOCKET Macrocontroller features CPU, RAM, NAND Flash, SD card socket, Ethernet MAC/PHY and requires a single 5V power source. Peripherals can include USB host and device, SATA, CAN, GPDIO, external bus, video, touchscreen, audio, SPI and UART. All parts are soldered on and no moving parts are not used, ensuring embedded ruggedness and reliability.

A TS-SOCKET baseboard can be any piece of hardware, supplied by the customer or Technologic Systems, that interfaces with a Macrocontroller through the dual TS-SOCKET standard connectors.

INEXPENSIVE CUSTOM DESIGNS, FAST TIME-TO-MARKET

All TS-SOCKET Macrocontrollers will be designed with a common pin-out, which means that they are interchangeable. This will give our customers more options and flexibility when selecting an embedded system, since a baseboard can be used with multiple macrocontrollers. As an application example, a baseboard designed to provide video and touchscreen functionality can have its CPU easily upgraded to improve video playback performance or later as a second generation upgrade. Lower design costs and faster time-to-market directly result from the TS-SOCKET board interchangeability feature because the standardization significantly reduces design complexity.



FEATURES

- 75mm x 55mm (credit card sized)
- Dual 100-pin connectors
- Secure connection with mounting holes
- Common pin-out interface
- Low profile with 6mm spacing

BENEFITS

- Simplifies custom embedded systems
- Rapid design process gets products to market faster
- Several COTS baseboards for evaluation and development
- Design your own baseboard or use our design services
- Macrocontrollers are interchangeable for future upgrades

TS-SOCKET MACROCONTROLLER PROJECTS

- TS-4200: Atmel ARM9 with super low power
- TS-4300: Cavium ARM11 with dual 600 MHz and FPU
- TS-4500: Cavium ARM9 at extremely low cost
- TS-4700: Marvell PXA168 with video and 1.0 GHz CPU
- TS-4800: Freescale iMX515 with video and 800 MHz CPU

PRICE AND AVAILABILITY

- The TS-4200 and TS-4500 are available now. The TS-4800 is planned to be released along with a Touch Panel Computer baseboard. Prices start at $92 at quantity 100.

For more information, contact: info@embeddedARM.com **www.embedded-computing.com/p44297**

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

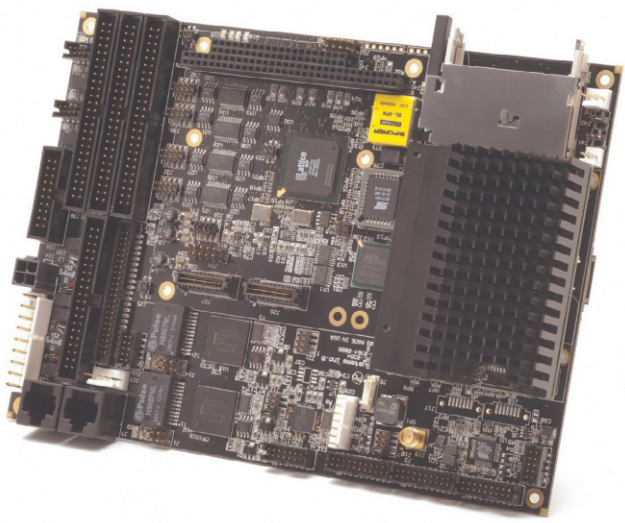
Fanless Intel® Atom™ SBC with SUMIT and PC/104 Expansion

WinSystems' EBC-Z510 is a full-featured EBX-compatible SBC with a rich array of onboard peripherals plus even more I/O expansion options. Based on Intel's 1.1GHz Atom™ or 1.6GHz Atom™ processor and the SCH-US15W System Controller Hub, the EBC-Z510-G is supplied with 512MB DDR2 system memory on a COMIT-compatible module. Its I/O interface features two Gigabit Ethernet ports, CRT and LVDS flat panel video, a Mini PCIe card interface for a wireless networking module, four USB 2.0 ports, four serial RS-232/422/485 COM ports, HD audio, PATA controller, CompactFlash socket, 48 lines of digital I/O, LPT, plus PS/2 keyboard and mouse controllers.

This SBC supports the new SUMIT-ISM (Stackable Unified Modular Interconnect Technology - Industry Standard Module™) I/O expansion standard plus COMIT (Computer-On-Module Interconnect Technology). The board has both SUMIT AB connector pair plus legacy PC/104 connectors. It will support SUMIT-ISM, PC/104, or Pico-I/O self-stacking modules.

Since the EBC-Z510-G's architecture is PC compatible, it supports Windows® XP Embedded and Linux software operating systems along with a vast software development tool set including device drivers and libraries. It also supports advanced features such as custom splash screen, power management modes, and PXE boot.

The board is designed for applications including industrial automation, security, medical/diagnostic equipment, MIL/COTS, transportation, and test and measurement. It operates over a temperature range of -40°C to +70°C without a fan or the necessity to slow down the CPU clock frequency. The Phoenix BIOS supports the Enhanced Intel® SpeedStep® technology that enables the processor to switch between multiple frequency and voltage points. This allows optimal performance and the lowest power. It also supports the circuitry for catastrophic thermal protection.



FEATURES

- Intel® Atom™ 1.1GHz (EBC-Z510-G) or 1.6GHz processor (EBC-Z530-G)
- Advanced power management features supported
- Intel® Graphics Media Accelerator supports CRT and LVDS flat panels simultaneously
- Custom splash screen on start-up
- Two Intel Gigabit Ethernet controllers
- 802.11a/b/g wireless supported with Mini PCIe
- Four serial COM ports, four USB 2.0 ports with two more on SUMIT, and 48 bidirectional TTL digital I/O lines
- Bidirectional LPT port plus AT keyboard and mouse
- Supports CompactFlash Type 1 and 2 cards
- SUMIT-ISM, PC/104, and Pico-I/O module expansion
- Long-term product availability
- Starter kits for quicker system development

For more information, contact: Info@WinSystems.com

www.embedded-computing.com/p43062

Small form factors: COM/SOM

EMAC, Inc.

2390 EMAC Way • Carbondale, IL 62902
618-529-4525
www.emacinc.com

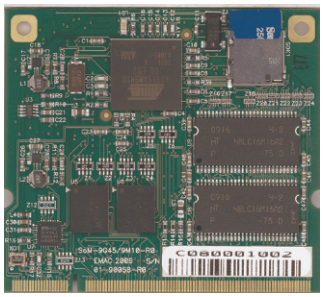
EMAC, inc.
EQUIPMENT MONITOR AND CONTROL

SoM-9G45/9M10

The SoM-9G45/9M10 is a System-on-Module (SoM) based on the Atmel ARM9 AT91SAM9G20 or AT91SAM9M10 processor. This fanless ARM9, 400 MHz SoM has an Ethernet PHY included with 4 serial ports. It utilizes up to 256 MB of external DDR2/SDRAM, 1 GB of NAND Flash, and includes an MMU that allows it to run Linux and Windows CE Operating Systems. A SoM is a small embedded module that contains the core of a microprocessor system.

Using the same small 200-pin SODIMM form factor utilized by other EMAC SoMs, the SoM-9G45/9M10 is the ideal processor engine for your next design. All of the ARM processor core is included on this tiny board featuring: Flash, memory, serial ports, Ethernet, I2S audio, PWMs, timer/counters, A/D, digital I/O lines, video, clock/calendar, and more. Price is $190 Quantity 1.

www.emacinc.com/som/som9g45.htm



FEATURES

- Small, 200-pin SODIMM form factor (2.66" x 2.375")
- Atmel ARM9 Jazelle AT91SAM9G45 or 9M10 400 MHz processor
- 10/100BASE-T Ethernet with onboard PHY
- 4 serial ports with handshake and 1 I2C and 2 SPI ports
- 1 USB 2.0 Host and 1 Host/Device (USB OTG) High-Speed ports
- Up to 1 GB of NAND Flash, 8 MB of Dataflash, and 256 MB of RAM
- On-module microSD card socket and 2nd external SD card interface
- 1 I2S audio port
- Graphic LCD interface with up to 1280 x 860 resolution
- Resistive touchscreen interface
- Hardware CODECs: H.264, MPEG-4, MPEG-2, VC-1, H.263
- Typical power requirement less than 1 Watt

For more information, contact: info@emacinc.com **www.embedded-computing.com/p44298**

Small form factors: -ITX

Advantech

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/embcore

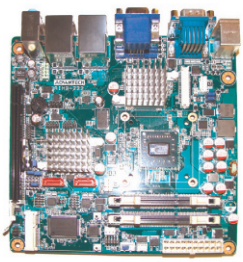
ADVANTECH

AIMB-222

Advantech's AIMB-222 is a new Mini-ITX industrial motherboard that offers powerful graphical and 3D rendering performance. Its ATI Radeon HD4200 graphical controller is built-in, and supports OpenGL 2.0 and DirectX10.

It supports VGA, LVDS and HDMI. DVI is optional. Multiple I/O include 4 USB, 2 serial ports and 2 SATA.

The AIMB-222 is ideal for demanding graphical-intensive applications such as gaming and digital signage.



AMD Embedded Solutions PARTNER

FEATURES

- AMD Athlon II NEO 2.2 GHz dual core
- Two 201-pin SODIMM up to 4 GB DDR3 1,066 MHz SDRAM
- 0 °C to +60 °C operating temperature
- Support VGA/LVDS/HDMI, DVI optional
- 2x Gigabit Ethernet
- 1 Mini PCIe slot, 1x PCIe 16 slot
- Dual LANs, 4 COM, Mini PCIe and CF
- Supports embedded software APIs and utilities

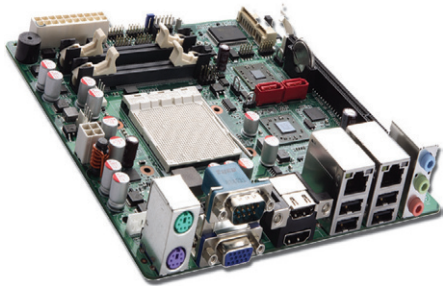
For more information, contact: ECGInfo@advantech.com **www.embedded-computing.com/p45450**

AXIOMTEK

18138 Rowland St. • City of Industry, CA 91748
626-581-3232
www.axiomtek.com

MANO110

Powered by the **AMD Athlon™ 64** processor with the **AMD RS780E+SB710 chipset**, the MANO110 is the best choice for embedded solutions that require high-resolution displays and full graphics features for gaming, POS, DSA, digital surveillance, and medical health care. Through the integrated ATI Radeon HD 3200 graphics, this space-saving industrial-grade Mini-ITX motherboard comes with an array of display interfaces such as VGA, DVI, and HDMI. Rich I/O connectivity and expansion interfaces include high-definition audio, two Gigabit LAN, eight USB 2.0, two SATA-300, four COM ports, and Mini PCI Express. Also included is a watchdog timer to keep system running smoothly.



FEATURES

- Built-in AM2&AM2+ socket AMD Athlon™ 64 processors
- **DVI-I and HDMI display output**
- **High graphics performance via AMD RS780E**
- 8 USB 2.0 ports and 2 Gigabit Ethernet ports
- 4 COM ports for transaction terminal applications
- One PCIe x16 expansion slot and Mini PCI Express slot

For more information, contact: info@axiomtek.com **www.embedded-computing.com/p44440**

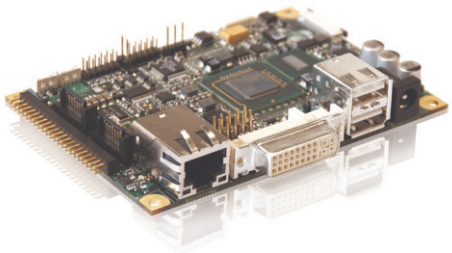
Small form factors: -ITX

Kontron

14118 Stowe Drive • Poway, CA 92064
888-294-4558
www.kontron.com

Kontron Embedded SBCs

The newest additions to Kontron's family of embedded SBCs are the pITX-SP and the JREXplus-DC. Both new designs bring Intel® Atom™ technology into the small form factor SBC space. The pITX-SP delivers the ultimate in power efficiency with the pairing of the Atom™ Z5xx processor series and the US15W System Controller Hub. The JREXplus-DC, based on the Intel® Atom™ N270 processor and the 945GSE chipset, delivers the best performance per dollar ratio and integrated support for a rich classic I/O set.



FEATURES

- Scalable solutions offering power efficiency and performance including the latest Intel® Atom™ processor technology
- Support for onboard and expandable system memory
- Drop-in replacements within the Kontron SBC product families
- Request a sample today and start evaluating immediately

For more information, contact: info@us.kontron.com **www.embedded-computing.com/p42375**

VIA Technologies, Inc.
940 Mission Court • Fremont, CA 94539
510-683-3300
www.viaembedded.com

Small Form Factor Embedded Boards

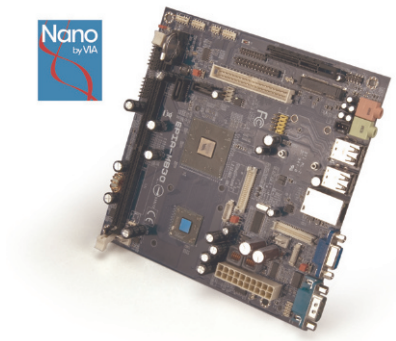
EPIA-M830
17 cm x 17 cm
MPEG-2/DiVX & WMV9/VC1, IDE, SATA, GigaLAN, COM, Mini-PCIe & PCIe
CPU: 1.3GHz VIA Nano™-E (with fan), 1.0GHz VIA Nano™-E (fanless)
Chipset: VX800

EPIA-M840
17 cm x 17 cm
MPEG-2/DiVX & WMV9/VC1, IDE, SATA, CF, dual GigaLAN, COM, dual LVDS & PCIe
CPU: 1.3GHz VIA Nano™-E (with fan), 1.2GHz VIA Nano™-E (fanless)
Chipset: VX800

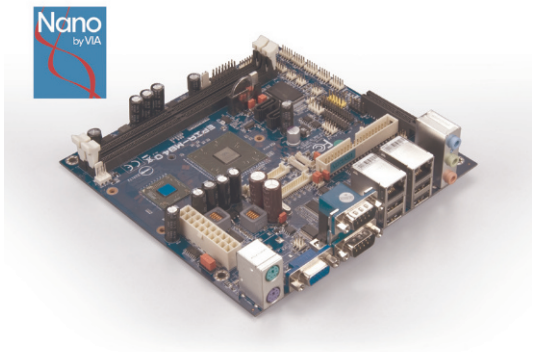
EPIA-M850
17 cm x 17 cm
Blu-ray, full HD video support, SATA, dual GigaLAN, COM, LVDS & PCIe
CPU: 1.3GHz VIA Nano™-E (with fan), 1.2GHz VIA Nano™-E (fanless)
Chipset: VX900

EITX-3001
17 cm x 12 cm
VGA, LVDS, HDMI, GigaLAN, four COM, six USB & resistive touch, built-in DC power
CPU: 1.3GHz VIA Nano™-E
Chipset: VX855

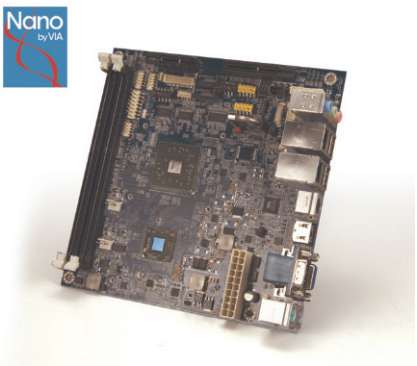
EPIA-P820
10 cm x 7.2 cm
MPEG-2 & 4, WMV9, H.264, LVDS, HDMI, USB, SATA & GigaLAN support
CPU: 1.2GHz VIA Nano™
Chipset: VX855



EPIA-M830



EPIA-M840



EPIA-M850

EPIA-P820

EITX-3001

For more information, contact: embedded@viatech.com

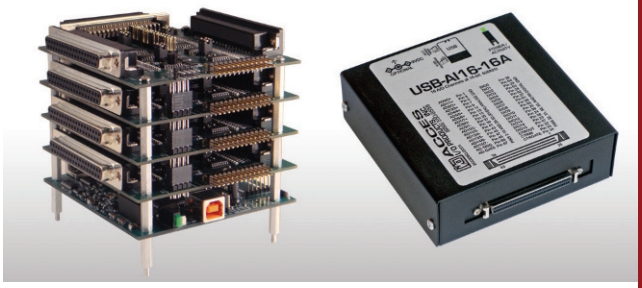
www.embedded-computing.com/p45576

ACCES I/O Products, Inc.

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

USB-AI Series, up to 128 Differential Analog Inputs

The USB-AI Series is a new line of low-cost USB/104 analog input modules. This innovative line of 12- and 16-bit USB modules offers up to 128 differential inputs and is ideal for precision measurement, analysis, monitoring, and control in countless embedded applications. Standard features in the USB-AI Series include additional digital I/O lines and a 16-bit counter/timer – all packaged in a small, rugged, industrial enclosure. With an excellent price/performance value, this family of boards also includes models with slower A/D speeds and a group of 12-bit modules for less demanding applications. The OEM USB/104 version provides just the board without the enclosure and is ideal for a variety of embedded OEM applications – simply connect to any available USB port. The USB-AI Series offers a wide range of signal conditioning types per channel such as: RC filters on each input, voltage divider on each input, 4-20mA current inputs, thermocouples (temp sensor for cold junction), RTD measurement, and bridge completion.



FEATURES

- High-speed USB 2.0 device with up to 500kHz sampling rate
- Up to 128 signal conditioned analog inputs, 12- or 16-bit
- Eight input ranges, unipolar or bipolar
- Real-time hardware auto-calibration and oversampling for accurate data
- Wide range of signal conditioning types per channel:
- RC filters and voltage divider on each input
- 4-20mA current inputs
- Thermocouples (temp sensor for cold junction)
- RTD measurement and bridge completion
- A/D starts via software, timer, or external trigger
- 16-bit programmable counter/timer

For more information, contact: contactus@accesio.com **www.embedded-computing.com/p36141**

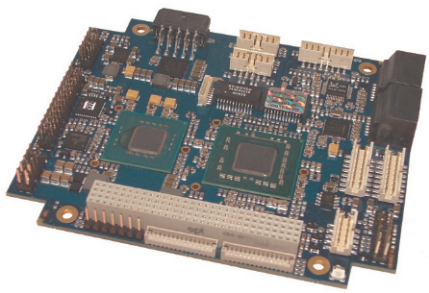
Advanced Digital Logic, Inc.

4411 Morena Blvd., Suite 101 • San Diego, CA 92117
858-490-0597
www.adl-usa.com

Intel Core 2 Duo/Celeron M 1.20GHz-2.26GHz PCI/104-Express

The ADLGS45PC is based on the Intel® Core 2 Duo/Celeron® M Small Form Factor (SFF) processors and the Intel® GS45 Express (Cantiga) chipset. Built on the 45nm process, the ADLGS45PC sets a superior performance standard in an embedded PCI/104-Express form factor. The Intel® Core 2 Duo and Celeron® M SFF processors guarantee the benefits of genuine Intel® architecture to SFF and thermally constrained markets in PCI/104-Express and 3.5" form factors.

The Intel® graphics controller drives a CRT to 2048x1536 and/or 18/24/36/48-bit LVDS LCD to 1600x1200 resolution. Memory is added via a SODIMM204 socket that accepts up to 4GB of DDR3-1066 DRAM. Besides ACPI/APM functions, the ADLGS45PC has several features: 8x USB 2.0, 2x RS-232/422/485 COM ports, PS/2 keyboard and mouse, LPT, AC'97 sound, and 2x 10/100/1000Mb LAN. The ADLGS45PC also offers 4x SATA II ports with RAID 0/1/5/10 support.



FEATURES

- Intel® Celeron® M/Core 2 Duo (SFF)
- Intel® GS45/ICH9M-E chipset/DDR3-1066MHz DRAM – up to 4GB
- LAN controllers 2x 1Gb LAN/CRT/LVDS INTF, 8 ch. HDA
- 4x SATA 3GB/s with RAID support
- 8x USB 2.0 ports, 2x COM, LPT, SMBus TPM
- RTC, watchdog timer, HW monitoring, ITPM
- For high performance, extended temp/rugged applications
- PCI/104-Express v1.0
- Serving the PC/104 industry for over 15 years!

For more information, contact: sales@adl-usa.com **www.embedded-computing.com/p43638**

Small form factors: PC/104

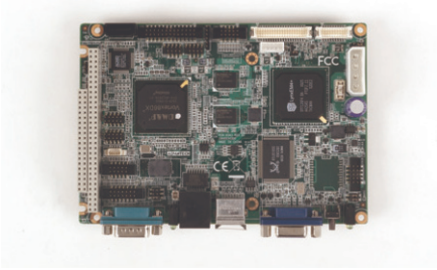
Advantech

38 Tesla, Suite 100 • Irvine, CA 92618
800-866-6008
www.advantech.com/embcore

PCM-9343

Advantech's PCM-9343 is an exceptional 3.5" low-power, low-cost SBC supported by multiple embedded operating systems – from Windows CE to Linux. Available with or without conformal coating, it is ideal for remote monitoring applications (utility meters) and extreme temperature applications (traffic signal control, street/stadium lighting).

The PCM-9343 is legacy compatible, fully supporting ISA through its PC/104 bus.



FEATURES

- DM&P Vortex86DX, onboard DDR2 memory up to 512 MB
- Display type: CRT, 24-bit LVDS, 24-bit TTL
- Supports floating point unit, total power consumption 4 ~ 6 Watts
- Dual LAN: 10/100 LAN1 and 10/100 LAN2, supports PC/104 (8-bit/16-bit ISA) expansion
- Supports embedded software APIs and utilities, OS: DOS, WinCE, WinXPE and Linux

For more information, contact: ECGInfo@advantech.com **www.embedded-computing.com/p45449**

Small form factors: PC/104

Micro Technic A/S

Smedevænget 5 • Aarup, 5560 Denmark
+45 66153000
http://www.pc104shop.com

Micronix SBC-2800

Micronix SBC-2800 is a **Single Board CPU** module based on Atmel's AT91SAM9260 microcontroller. A combination of a power supply/charger for an external Li-Ion battery, a GSM/GPRS modem, a GPS receiver, and analogue and digital I/O makes this module very useful in many stand-alone applications.

Micronix SBC-2800 uses Telit's GE863-GPS with a quad band (900/950/1800/1900MHz) cellular engine and a SiRFstarIII™ single chip GPS receiver. The modem is controlled by AT commands, supported by an onboard UART, and is fully compatible with the AT command set. The power supply can be backed up by an external Li-Ion battery. A built-in charger will ensure that the battery is fully charged.

Micronix SBC-2800 is ideal for data logging and alarm systems. It can be ordered as a box solution online – MS-2800.

Find it at the online shop www.PC104SHOP.com from $150 and up.

FEATURES

- **Embedded CPU ARM9 400MHz**
- **GPS data via AUX port**
- **Linux-based firmware**
- **8MB flash**
- **32MB SDRAM**
- **MicroSD Flash adapter**
- **2x USB host**
- **1x USB device**
- **2x RS-232**
- **8 digital inputs, isolated**
- **8 digital outputs, isolated**

For more information, contact: sales@micro-technic.com **www.embedded-computing.com/p35875**

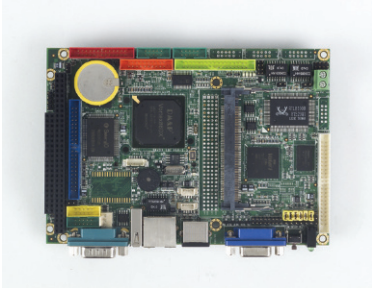
ICOP Technology Inc.

12328 Valley Blvd. #B • El Monte, CA 91732
626-444-6666
http://www.icoptech.com

800MHz VDX-6326 SBC

This SBC is built with the Vortex86DX System-on-Chip (SoC), an x86-based processor designed for embedded and industrial applications. At 800MHz, this low-power SBC draws 880mA at 5VDC. The SBC's soldered-on DDR2 RAM and fanless design, along with integrated video/LCD, three 10/100Mbps Ethernet, audio, USB 2.0, 4 serial ports, parallel port, IDE storage, GPIO, keyboard/mouse, RTC and more, provide the ideal hardware platform to develop a broad range of embedded applications. In addition to supporting popular modern embedded OSs and RTOSs such as Linux, Windows XP, Windows XP Embedded, WES 2009, Windows Embedded CE 6.0 and WEC 7, legacy support for applications that require older versions of Linux, Windows and DOS is available.

The VDX-6326 SBC is designed to operate in -40°C to +85°C industrial operating temperature, with 10 years of product life to support projects with long product life-cycle requirements.



FEATURES

- 800MHz x86 CPU with L1 and L2 cache
- Three 10/100Mbps Ethernet
- Integrated VGA with LCD support, IDE, 4 serial ports, parallel port, USB 2.0, keyboard/mouse, audio and 16 GPIO
- Soldered-on system memory (available in 256MB and 512MB)
- Two sets of watchdog timers
- Single 5VDC @ 740mA power requirement makes it easy to adapt this board to existing designs
- -40°C to +85°C industrial operating temperature range
- Support available for Windows XP, Windows XP Embedded, WES 2009, Windows Embedded CE 5.0/6.0, WEC 7, Linux and popular RTOSs

For more information, contact: info@icoptech.com **www.embedded-computing.com/p45458**

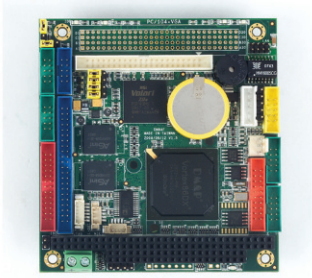
Small form factors: PC/104

ICOP Technology Inc.
12328 Valley Blvd. #B • El Monte, CA 91732
626-444-6666
http://www.icoptech.com

800MHz VDX-6354 SBC

This SBC in the PC/104 format is based on the Vortex86DX System-on-Chip (SoC), an x86-based processor designed for embedded and industrial applications. At 800MHz, this low-power SBC draws 740mA at 5VDC. The SBC's soldered-on DDR2 RAM and fanless design, which uses a low-profile heat sink to meet the PC/104 stacking specification, along with integrated video/LCD, Ethernet, audio, USB 2.0, 4 serial ports, parallel port, IDE storage, GPIO, keyboard/mouse, RTC and more, provide the ideal hardware platform to develop a broad range of embedded applications. In addition to supporting popular modern embedded OSs and RTOSs such as Linux, Windows XP, Windows XP Embedded, WES 2009, Windows Embedded CE and WEC 7, legacy support for applications that require older versions of Linux, Windows and DOS is available.

The VDX-6354 SBC is designed to operate in the -40°C to +85°C industrial temperature range, with 10 years of product life.



FEATURES

- 800MHz x86 CPU with L1 and L2 cache
- Integrated VGA with LCD support, IDE, 4 serial ports, parallel port, USB 2.0, Ethernet, keyboard/mouse, audio and 16 GPIO
- Soldered-on system memory (available in 256MB and 512MB)
- Two sets of watchdog timers
- Single 5VDC @ 740mA power requirement makes it easy to adapt this board to existing designs
- -40°C to +85°C industrial operating temperature range
- Support available for Windows XP, Windows XP Embedded, WES 2009, Windows Embedded CE 5.0/6.0, WEC 7, Linux and popular RTOSs

For more information, contact: info@icoptech.com **www.embedded-computing.com/p41101**

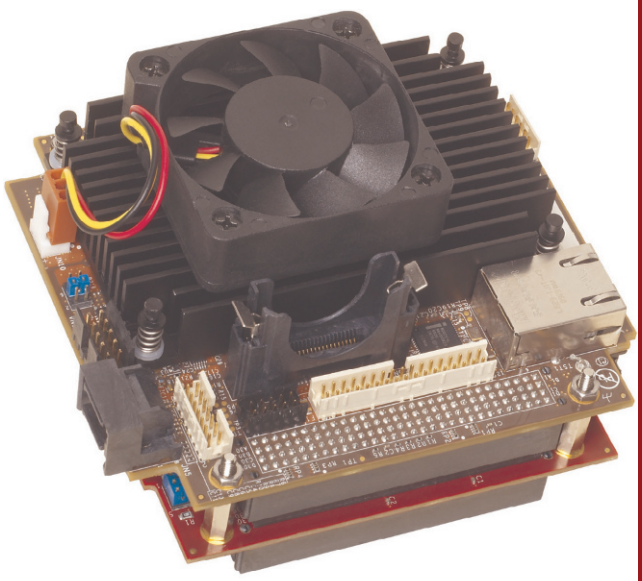
VersaLogic Corp.
4211 W. 11th Ave. • Eugene, OR 97402
800-824-3163
www.VersaLogic.com/products

Leopard (VL-EPM-35)

The Leopard is an embedded computer featuring an Intel Core 2 Duo processor. Based on the PC/104-*Plus* industry standard form factor, the Leopard supports PCI and ISA stackable expansion buses on a 4.21" x 3.78" footprint. With its combination of ultra-high performance (up to 2.26 GHz), mid-range power consumption (21.3 W typ.), ruggedness, and compact size, the Leopard is an ideal embedded computer solution for medical, security, defense, transportation, and industrial markets. Potential applications include flight navigation, guidance systems, and evolving applications that rely on fast onboard processing of large amounts of data.

Like all VersaLogic products, the Leopard is designed to support OEM applications where high reliability and long-term availability are required. From application design-in support, to its 5+ year production life guarantee, the Leopard supports serious embedded applications. The Leopard is manufactured and tested to the highest quality standards and is fully RoHS compliant. Customization is available, even in low OEM quantities.

The Intel Core 2 Duo processor features enhanced Intel SpeedStep® technology, which provides dynamic processor frequency scaling to meet instantaneous performance needs while minimizing power draw and heat dissipation. This allows users to fine-tune the balance of power conservation and performance to suit their application needs.



FEATURES

› PC/104-*Plus* form factor
Industry-standard expandable, compact, highly rugged format.

› Intel® Core™2 Duo processor
Up to 2.26 GHz performance.

› High-performance video
3D video acceleration (Gen 5.0). Analog and LVDS flat panel outputs.

› Network support
Dual Gigabit Ethernet with remote boot support.

› System RAM
Up to 4 GB DDR3 RAM for system flexibility.

› USB I/O
Six USB 2.0 ports support keyboard, mouse, and other devices.

› Device I/O
Five serial ports, dual SATA interface, and HD audio.

› Flash memory
MiniBlade™ socket and eUSB interface for high-reliability flash storage.

› Extended temperature version
-40 °C to +85 °C operation for harsh environments.

› MIL-STD-202G
Qualified for high shock/vibration environments.

› SPX™ expansion
Supports expansion with versatile SPX add-on I/O modules.

› OS compatibility
Windows XP, Windows Embedded XPe/CE, Linux, VxWorks, QNX, DOS

For more information, contact: sales@versalogic.com

www.embedded-computing.com/p45445

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

PPM-LX800 Extended Temperature PC/104-*Plus* SBC

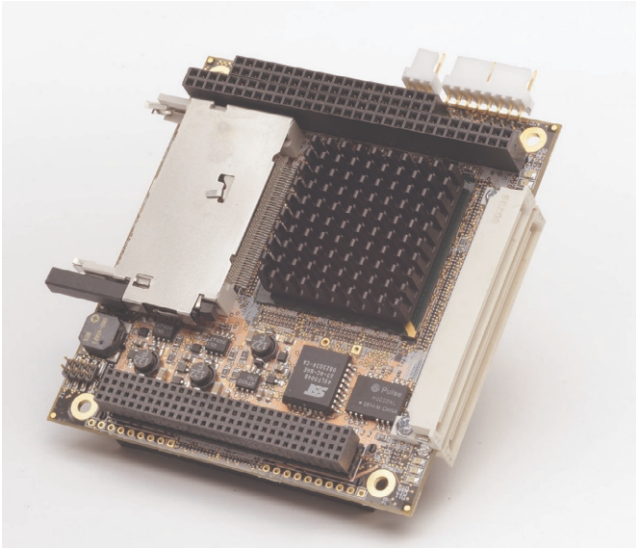
The PPM-LX800-G is a highly integrated PC/104-*Plus* Single Board Computer (SBC) designed for space-limited and low-power applications. It is a full-featured SBC that includes the AMD LX800 x86-compatible CPU.

Onboard I/O functions include analog CRT and digital flat panel video controller, 10/100 Ethernet controller, two USB 2.0 ports with overcurrent protection on each channel, and four COM channels. The PPM-LX800-G includes standard PC controllers for IDE hard disks, CompactFlash devices, PS/2 mouse and keyboard controller, AC'97 audio, LPT, PC/104, and PC/104-*Plus* expansion connectors all on a single 90mm x 96mm industry-standard module.

There are 16 bits of TTL-compatible digital I/O with each line individually programmable for input, output, or output with read-back operation. The major feature of the onboard digital I/O controller is its ability to monitor the 16 lines for either rising or falling digital edge transitions, latch them, and then interrupt the host processor notifying it that a change-of-input status has occurred.

The PPM-LX800-G has x86 PC software compatibility, which assures a wide range of tools to aid in your application's program development and checkout. It supports both Windows® XP Embedded and Linux operating systems and other real-time operating systems. WinSystems provides free technical phone support to assist customers with system integration of our SBCs and I/O modules in their designs.

Its low power dissipation permits fanless operation over a temperature range from -40°C to +85°C. This board is well suited for rugged applications requiring excellent processor performance in an embedded PC design. It is RoHS compliant.



FEATURES

- AMD LX800 CPU; x86-compatible
- Small size: 90mm x 96mm
- Video with CRT resolutions to 1920 x 1440 and panel resolutions to 1600 x 1200
- Custom splash screen on start-up
- 10/100 Mbps Ethernet controller
- Two USB 2.0 ports with overcurrent protection
- Four COM channels with FIFOs
- 16 digital I/O lines with event sense supported
- AC'97 audio, LPT, mouse, and keyboard controllers
- -40°C to +85°C operating temperature
- Long-term PC/104-*Plus* product availability

For more information, contact: Info@WinSystems.com

www.embedded-computing.com/p41296

Small form factors: PC/104

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

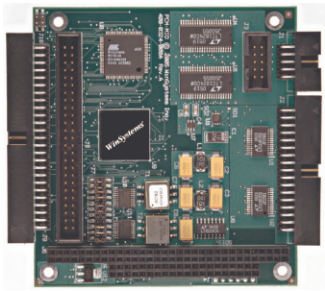
Multifunction PC/104 A/D, D/A, & DIO Module

The PCM-MIO is a versatile, PC/104-based analog input, analog output, and digital I/O board. The board's precision converters and voltage references require no calibration.

It will support up to 16 single-ended input channels or 8 differential input channels. The software programmable input ranges are ±5V, ±10V, 0-5V, and 0-10V. There are eight 12-bit Digital-to-Analog (D/A) converters with individual software programmable voltage ranges of ±5V, ±10V, 0-5V, and 0-10V. A total of 48 bidirectional TTL-compatible digital I/O lines can be software configured as input, output, or output with readback.

The PCM-MIO operates over the industrial temperature range of -40°C to +85°C. Free software drivers are available for C, Windows®, and Linux.

WinSystems offers a 30-day product evaluation program plus award-winning application support.



FEATURES

- Two 16-bit 100K samples/sec Analog-to-Digital (A/D) converters
- Two quad 12-bit Digital-to-Analog (D/A) converters
- 48 bidirectional TTL-compatible digital I/O lines
- Free software drivers in C, Windows®, and Linux
- -40°C to +85°C temperature operation
- Lower cost A/D- or D/A-only configurations available

For more information, contact: Info@WinSystems.com **www.embedded-computing.com/p41298**

VITA: Chassis

SIE Computing Solutions, Inc.
10 Mupac Drive • Brockton, MA 02301
508-588-6110
www.sie-cs.com

716 Series Conduction Cooled ATR Enclosures

716 Series offers a wide range of COTS solutions from a rugged precision machined design. Engineered for strength, light weight, and maximum cooling in a conduction cooled environment, the 716 Series incorporates a unique frame and configurable conducting walls that allow the ATR to be tailored to meet a wide range of thermal requirements.

FEATURES

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

For more information, contact: info@sie-cs.com **www.embedded-computing.com/p34423**

SIE Computing Solutions, Inc.

10 Mupac Drive • Brockton, MA 02301
508-588-6110
www.sie-cs.com

720 Series Liquid Cooled ATR Enclosures

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

FEATURES

- Expansive range of ARINC sizes
- Easily configurable for custom sizes
- Modular power supply
- AC or DC filtered inputs
- High altitude fan offering
- System performance monitoring
- Cold start heaters
- Avionics isolation tray
- Configurable I/O panel

For more information, contact: info@sie-cs.com **www.embedded-computing.com/p44110**

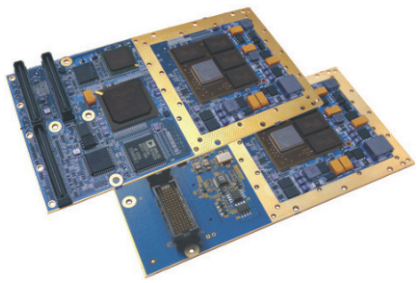
WOLF Industrial Systems Inc.

5 Foxfire Chase, Uxbridge, Ontario, Canada L9P 1R4
Toll free: 1-800-931-4114 Fax: 905-852-1735
www.wolf.ca/products

PMC and XMC E4690-based plug-in graphics upgrades

Wolf announces new PMC and XMC embedded graphics boards for VME, PMC, XMC, VPX, CompactPCI, PCIe and VME64 architectures. Military, aerospace, industrial and medical OEMs may now specify Wolf plug-in replacement graphics boards that offer greatly increased performance. Based on an embedded version of AMD's new E4690 graphics chip, they offer more than 10 times the 3D rendering speed of earlier solutions, with low CPU utilization and brilliant picture quality. Select modules offer up to 50 standard combinations of dual independent display output and up to 19 combinations of dual channel input. All Wolf video graphic products conform to MIL-810 environmental shock, vibration and extended temperature operation and offer 10-plus years of availability.

For more information on high performance video graphic boards, visit www.wolf.ca/products.



FEATURES

- Plug-in high performance video upgrade for OEMs
- 10x faster 2D and 3D rendering than previous generation
- Three versions available: (1) Frame Grabber, (2) Multiple Video I/O and (3) Video Output only
- 50 combinations of dual independent video output
- 19 combinations of dual independent video input
- Low CPU utilization and brilliant picture quality
- Extended temp -40°C to +85°C operating environment
- Embedded memory version of AMD E4690 (512MB) graphics chip
- Reduced power modes and improved conductive cooling
- OpenGL drivers, DO-178B and real-time operating systems support supplied from ALT Software

For more information, contact: sales@wolf.ca **www.embedded-computing.com/p45465**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401
410-841-2514
www.annapmicro.com

Four Channel Clock Synchronization Board

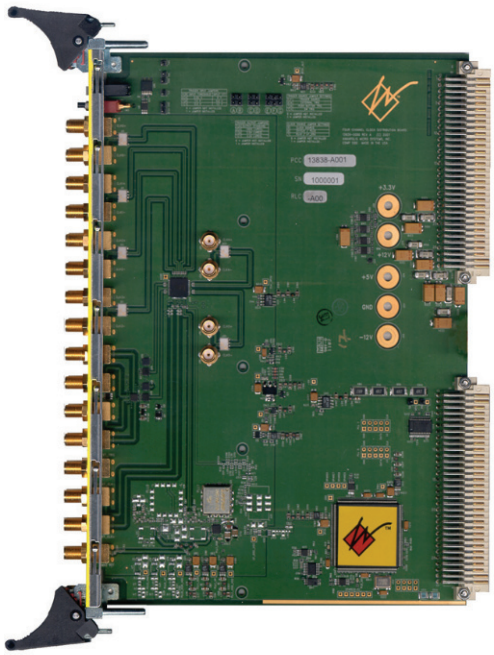
The Four Channel Clock Distribution Board distributes a common clock and synchronized control signal triggers to multiple cards in the system. This 6U VME64x/VXS board provides four high-speed, ultra-low jitter, ultra-low skew differential bulkhead mounted clock outputs, two ultra-low skew differential vertical SMA 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 to 3 GHz with an onboard reference oscillator, or a PLL ranging from 700 MHz to 3 GHz with a 10 MHz external reference. Manufacturing options for Clock Source 1 are a PLL ranging from 700 MHz to 3 GHz with an onboard reference oscillator, a PLL ranging from 700 MHz to 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 push button on the front panel, or from software via an optional Backplane P2 Connector Serial Port. These trigger outputs are synchronized to the distributed clock to provide precise output timing relationships.

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

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



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 to 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, push button, 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

www.embedded-computing.com/p33661

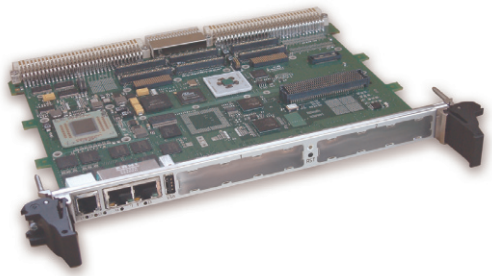
Kontron

14118 Stowe Drive • Poway, CA 92064
888-294-4558
www.kontron.com

Kontron VME processor board VM6250

6U VME PowerPC SBC with AltiVec™

The Kontron VM6250 single- or dual-core processor board offers scalable performance, high data throughput, low power dissipation and easy extensibility via XMCs, PMCs and FMCs (FPGA mezzanine cards), according to VITA 57. The Kontron VM6250 upgrades VME-based air- or conduction-cooled applications with extraordinary processing performance and innovative features. When VME applications require Intel® processors, the Kontron VM6250 is 100% I/O compatible with PENTXM2 Xeon-based SBC (same backplane and front panel connectors), a unique value proposition to the VME market.



FEATURES

- Up to 1.33 GHz Freescale Dual-Core MPC8641 with AltiVec
- Extreme flexibility via XMC, PMC and FMC sites and optional PMC carrier
- Linux Fedora 9 and VxWorks 6.6 support
- Air- and conduction-cooled versions
- Multi-year supply through Kontron Long-Term Support offering
- Improved time to market with ready-to-go system solutions

For more information, contact: info@us.kontron.com **www.embedded-computing.com/p45581**

VITA: VME

Themis Computer

47200 Bayside Parkway • Fremont, CA 94538
510-252-0870
www.themis.com

T2VPX™

Themis Computer's T2VPX™ is the first member of the company's new family of VITA-46 compliant board-level computers. Utilizing the Sun® UltraSPARC® T2 processor, the new SBC brings high-speed serial fabrics to the most demanding environments.

T2VPX continues Themis' legacy of bringing the high-performance Solaris™ operating system to demanding applications. Featuring a new system architecture with up to eight processor cores and 64 threads, 10 Gigabit Ethernet, onboard HDD support, and nine front-panel I/O ports, the T2VPX is designed to provide the industry's best data bandwidth and server class I/O.

The T2VPX targets compute-intensive, multi-threaded military and aerospace applications requiring rugged computing solutions and high-bandwidth I/O fabrics.

FEATURES

- Sun UltraSPARC® six or eight core T2 processor
- Up to 32GB ECC DDR2 FBDIMM memory
- Three 10 Gigabit Ethernet ports, two on VPX J1
- CPU independent board management controller
- Onboard 1.8" SATA HDD support
- Front-panel I/O:
  - One (1) 10 Gigabit Ethernet port
  - Four (4) Gigabit Ethernet ports
  - Two (2) USB 2.0 ports
  - One (1) 4x SAS port
  - One (1) serial console port
- Shock: 35G peak, 20ms

For more information, contact: info@themis.com **www.embedded-computing.com/p43254**

VITA: VME

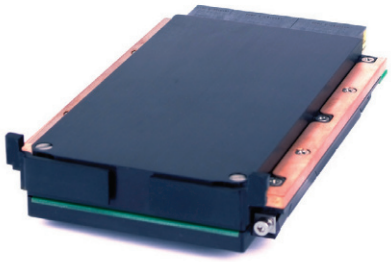
Themis Computer

47200 Bayside Parkway • Fremont, CA 94538
510-252-0870
www.themis.com

TSBCi7-300X™

The TSBCi7-300X 3U VPX Single Board Computer is designed for high-performance rugged applications. High performance combined with I/O flexibility are assured through the use of Intel® Core™ i7 processors and the highly integrated IBEX Peak QM57 Platform Controller Hub (PCH) chipset. The TSBCi7-300X has a full complement of PCIe buses, configurable as x1, x2, x4, x8, and x16 interfaces. All common serial interfaces are supported, including USB, RS-232, RS-422, and RS-485.

The TSBCi7-300X processor is ideally suited for mission computer, display processor, payload controller, sensor management, EW, and SIGINT applications, as well as high-speed data storage units. A high-resolution video graphics interface is standard, allowing use of VGA, HDMI, and DVI displays. An onboard MIL-STD-1553 interface is optionally available. The SBC is provided in several ruggedization grades from commercial air cooled to full MIL conduction cooled.



FEATURES

- Intel Core i7 series processor and Intel IBEX Peak QM57 PCH chipset
- 3U VPX per VITA 46
- VITA 48 VPX-REDI
- VITA 65 OpenVPX
- 0.8" air cooled, 0.85", 1" conduction cooled pitch available
- x16 PCIe lanes
- Two (2) IEEE 1588 Gigabit Ethernet ports
- Two (2) RS-232/422/485 and one (1) RS-232/422/485 with handshake
- Four (4) USB 2.0 ports
- One (1) SATA port
- One (1) high-resolution VGA, HDMI, DVI and two (2) audio in/out

For more information, contact: info@themis.com **www.embedded-computing.com/p45463**

VITA: VME

Themis Computer

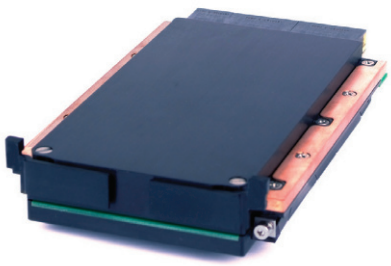
47200 Bayside Parkway • Fremont, CA 94538
510-252-0870
www.themis.com

TSC-300X™

TSC-300X is a 3U VPX RAID Controller Module utilizing the LSI-SAS1068E PCIe RAID Controller and is capable of supporting up to eight SAS/SATA mass storage drives. Configuration parameters and BIOS are stored onboard and are accessible via an I2C interface. The module includes an XMC/PMC site, accessible via PCIe.

Supportable Operating Systems:

- Microsoft® Windows® XP
- Red Hat® Linux®
- SuSE® Linux® Enterprise Editions
- Microsoft Windows 2000
- Microsoft Windows Server 2003/2008
- Solaris™ 9/10
- Consult factory for current list of validated Operating Systems



FEATURES

- 3U VPX conduction cooled per VITA 46, VITA 48, and VITA 65 OpenVPX
- PCIe 1.0a: x1, x2, x4, and x8 per VITA 46.4
- Up to 8x SAS/SATA FLASH or rotating drives supported
- SAS/SATA transfer rates up to 3 Gb/s per drive
- RAID 0, 1, 1E
- XMC/PMC site with rear I/O per VITA 46.9, VITA 42.3, and IEEE 1386.1
- Supports the LSI 1068E MegaRAID Software Utility
- Drive activity LEDs for each attached drive
- I2C bus for chassis management functions
- ZEROIZE and PURGE command via discrete interface
- Supports PURGE command via PCIe

For more information, contact: info@themis.com **www.embedded-computing.com/p45462**

VITA: VME

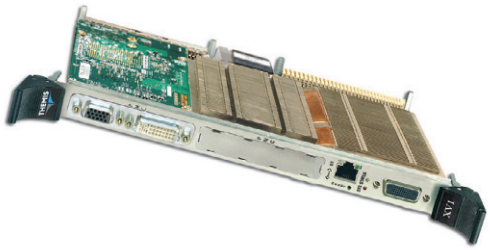
Themis Computer

47200 Bayside Parkway • Fremont, CA 94538
510-252-0870
www.themis.com

XV1™

Themis Computer's XV1™ is a 6U VMEbus computer that utilizes the Intel® Quad-Core L5408 Xeon® processor, clocked at up to 2.13 GHz, and Intel's 5100 chipset used in high-performance Xeon servers. The XV1 provides high performance and is designed to meet the needs of customers who require quad-core performance for their demanding applications. Themis' XV1 boards target compute-intensive embedded, storage, and communications applications as well as a wide range of commercial and military applications.

The XV1 base configuration includes: 2GB of DDR II memory, three Gigabit Ethernet ports, two SATA II ports, four USB 2.0 ports, and two XMC/PMC slots. Storage can be provided through the use of an onboard CompactFlash card or with an optional onboard 2.5" SATA drive. The board includes VITA 41 dual-Gigabit Ethernet to support highly networked environments.



FEATURES

- Up to 8GB DDRII SDRAM memory
- Flash memory: 1MB
- Error detection/correction – 8-bit ECC
- CompactFlash™ slot
- XMC/PMC single expansion slot
- Up to three (3) Gigabit Ethernet ports
- Four (4) USB ports and three (3) SATA II ports
- VITA 41 compliant
- Cooling: -5°C to +55°C (ambient temperature)
- OS support: Linux®, Microsoft®, and Solaris™ 10
- Shock: 30G peak, 20ms

For more information, contact: info@themis.com **www.embedded-computing.com/p39525**

VITA: VPX

SIE Computing Solutions, Inc.

10 Mupac Drive • Brockton, MA 02301
508-588-6110
www.sie-cs.com

VPX Series VITA 46/48 Backplanes

VPX backplanes are designed to the latest VITA 46 and 48 standards. The 5-slot I/O PLUS™ 3U VPX full mesh backplane is designed for a wide array of VPX applications. The highly configurable VPX REDI backplane offers high bandwidth in a compact size and provides greater I/O flexibility through I/O PLUS™, an innovative use of configurable I/O daughtercards that accommodates an array of VPX applications.

FEATURES

- 5-slot full mesh VPX backplane
- 2 slots dedicated I/O daughtercards
- VITA 46 and 48 compliant
- Over 200 Watts per slot
- 28 layer board
- RoHS compliant product features

For more information, contact: info@sie-cs.com **www.embedded-computing.com/p45468**

Annapolis Micro Systems, Inc.
190 Admiral Cochrane Drive, Suite 130 • Annapolis, MD 21401
410-841-2514
www.annapmicro.com

WILDSTAR 6 for OpenVPX

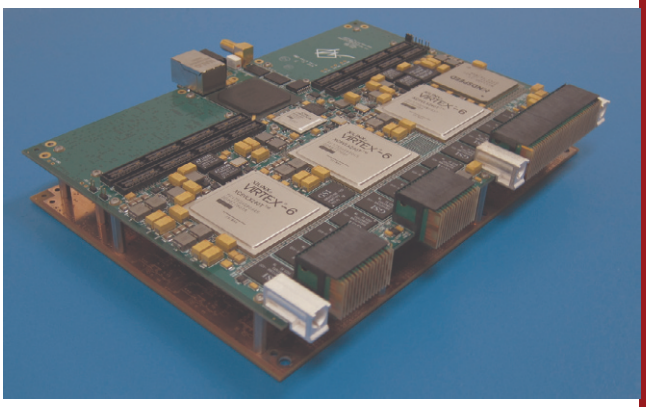
Annapolis Micro Systems is a world leader in high-performance, COTS FPGA-based boards and processing for RADAR, SONAR, SIGINT, ELINT, DSP, FFTs, communications, Software-Defined Radio, encryption, image processing, prototyping, text processing, and other processing-intensive applications.

Our 14th-generation WILDSTAR 6 for OpenVPX uses Xilinx's newest Virtex-6 FPGAs for state-of-the-art performance. It accepts one or two I/O mezzanine cards in one VPX slot or up to 4 in a double wide VPX slot, including Single 1.5 GHz 8-bit ADC, Quad 250 MHz 12-bit ADC, Single 2.5 GHz 8-bit ADC, Quad 130 MHz 16-bit ADC, Dual 2.3/1.5 GSps 12-bit DAC, Quad 600 MSps 16-bit DAC, Universal 3Gbit Serial I/O (RocketIO, 10 Gb Ethernet, InfiniBand), and Tri XFP (OS 192, 10G Fibre Channel, 10 Gb Ethernet). Our boards work on a number of operating systems, including Windows, Linux, Solaris, IRIX, ALTIX, and VxWorks. We support our board products with a standardized set of drivers, APIs, and VHDL simulation models.

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

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

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



FEATURES

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

For more information, contact: wfinfo@annapmicro.com

www.embedded-computing.com/p45439

Editor's Choice

A new "home energy gateway"

In June's Deep Green column I called for a home energy gateway combining Wi-Fi and ZigBee into an easier-to-use system so appliances, smart meters, and other devices could be integrated: "It won't be long before we'll be sitting on a couch with something that looks like a tablet reviewing energy usage profiles and reconfiguring appliances accordingly."

Right on cue, GE announced Nucleus: a 5 W plug computer that gathers energy usage data from the in-home smart network (one ZigBee radio for a smart meter, one ZigBee radio for appliances, and a Wi-Fi connection) and enables real-time energy consumption to be viewed via a PC or a smartphone app. It's coming in 2011 to homes near you.

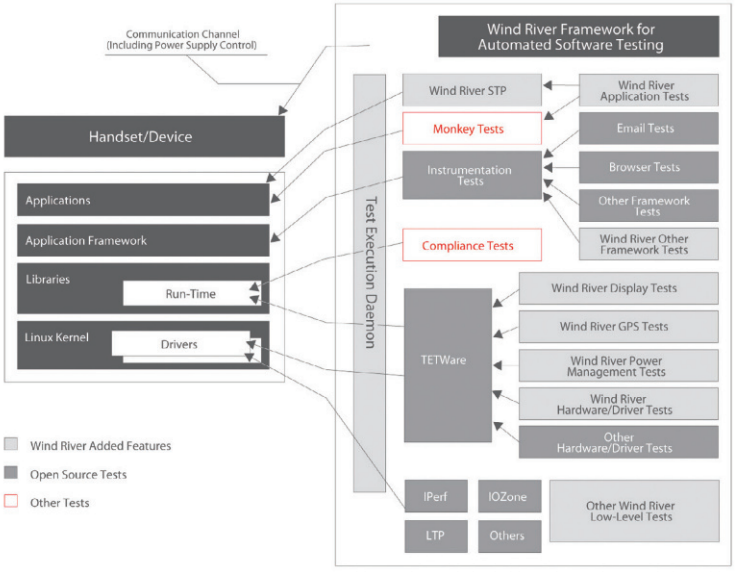
GE Appliances | www.geappliances.com/home-energy-manager

www.embedded-computing.com/p45626

Testing beyond Android compliance

Lots of people are excited about Android, and with good reason. It's finding homes in smartphones and all kinds of other devices, from set-top boxes to industrial control to defense applications. One critical item that folks should pay attention to is testing – not only being sure everything works, but also being sure nothing breaks.

Wind River recently introduced Framework for Automated Software Testing for Android. It handles three types of testing: compatibility in the form of Google's Android Compatibility Test Suite; functional, with "thousands" of tests for popular Systems-on-Chips (SoCs) and chipsets; and stress, helping find things like memory leaks. This should be an immense help to Android developers.



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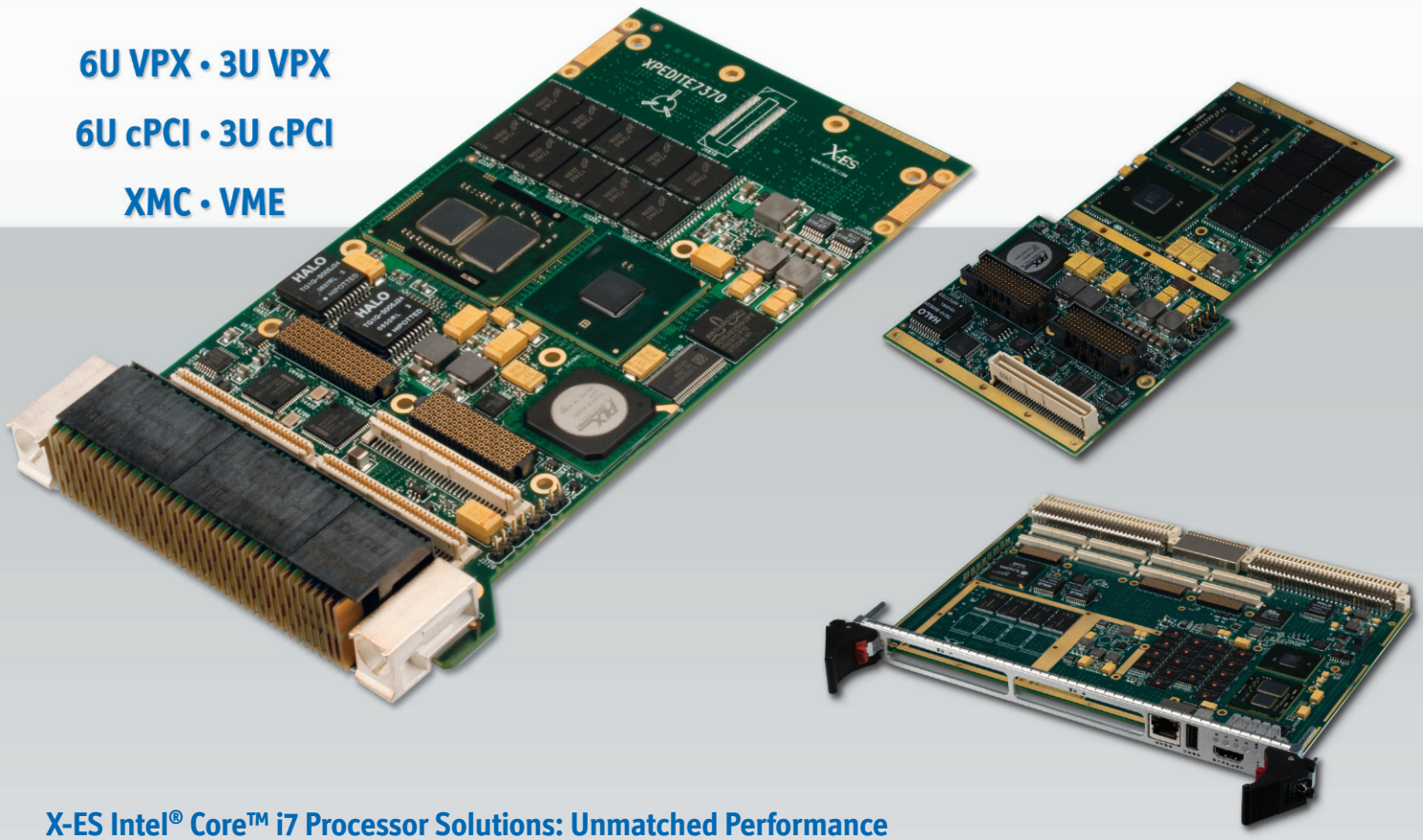

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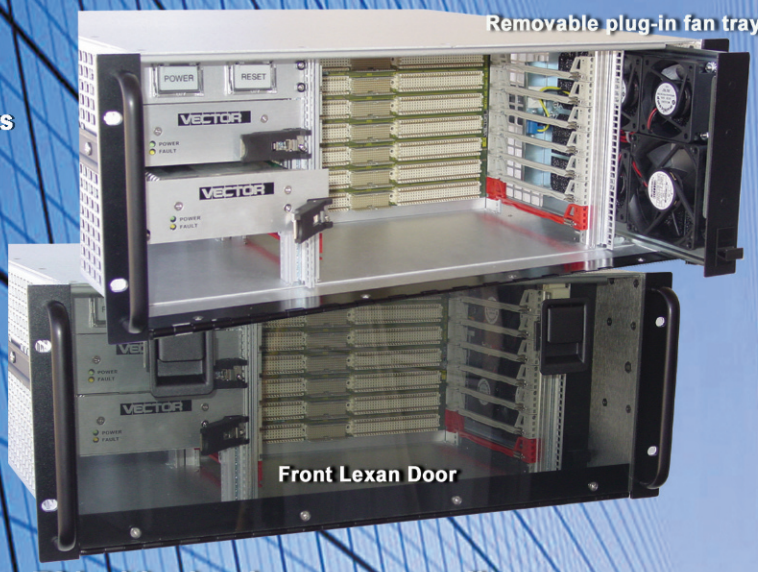

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