

EXCLUSIVE: Panel Discussion – The present and future of portable medical devices

PC/104^{and} small form factors

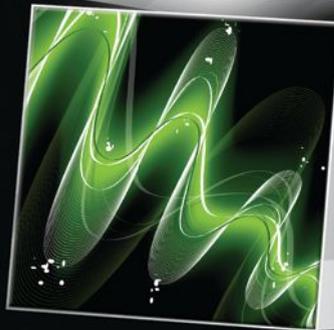
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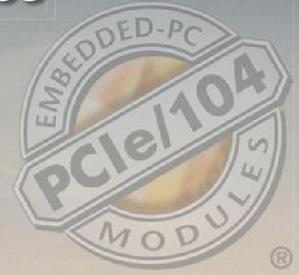
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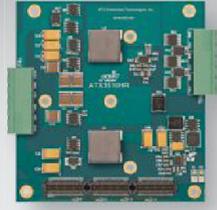
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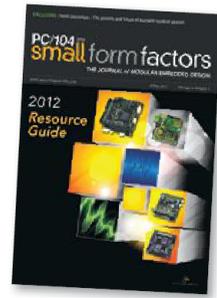
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PC/104 and small form factors

THE JOURNAL of MODULAR EMBEDDED DESIGN

Volume 16 • Number 1



ON THE COVER:

2012 is bringing a host of embedded development challenges in the areas of portable mobile medical, commercial, and industrial devices and smart energy embedded tech, including graphics-intensive displays and UIs, secure connectivity, and much more. Also check out the 2012 Resource Guide for industry-leading embedded computing products.

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ISSN: Print 1096-9764, ISSN Online 1550-0373


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www.linkedin.com/groups?gid=1854269



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PC/104 and Small Form Factors Editorial/Production Staff

Monique DeVoe, Assistant Managing Editor
mdevoe@opensystemsmedia.com
Len Crane, PC/104 Consortium President
info@pc104.org

Brandon Lewis, Associate Editor
blewis@opensystemsmedia.com
Paul Rosenfeld, SFF-SIG President
info@sff-sig.org

Sales Group

Dennis Doyle
Senior Account Manager
ddoyle@opensystemsmedia.com
Tom Varcie
Senior Account Manager
tvarcie@opensystemsmedia.com
Rebecca Barker
Strategic Account Manager
rbarker@opensystemsmedia.com
Eric Henry
Strategic Account Manager
ehenry@opensystemsmedia.com
Ann Jesse
Strategic Account Manager
ajesse@opensystemsmedia.com
Christine Long
Director of Online Development
clong@opensystemsmedia.com

International Sales
Elvi Lee, Account Manager – Asia
elvi@aceforum.com.tw
Regional Sales Managers
Barbara Quinlan, Midwest/Southwest
bquinlan@opensystemsmedia.com
Denis Seger, Southern California
dseger@opensystemsmedia.com
Sydele Starr, Northern California
sstarr@opensystemsmedia.com
Ron Taylor, East Coast/Mid Atlantic
rtaylor@opensystemsmedia.com

Reprints and PDFs

republish@opensystemsmedia.com

OpenSystems Media Editorial/Production Staff



Mike Demler, Editorial Director
DSP-FPGA.com
mdemler@opensystemsmedia.com
Joe Pavlat, Editorial Director
CompactPCI, AdvancedTCA,
& MicroTCA Systems
jpavlat@opensystemsmedia.com
Jerry Gipper, Editorial Director
VITA Technologies
jgipper@opensystemsmedia.com
Warren Webb, Editorial Director
Embedded Computing Design
Industrial Embedded Systems
wwebb@opensystemsmedia.com
John McHale, Editorial Director
Military Embedded Systems
jmchale@opensystemsmedia.com
Jennifer Hesse, Managing Editor
Embedded Computing Design
Industrial Embedded Systems
jhesse@opensystemsmedia.com

Sharon Hess, Managing Editor
VITA Technologies
Military Embedded Systems
sharon_hess@opensystemsmedia.com
Monique DeVoe
Assistant Managing Editor
PC/104 and Small Form Factors
DSP-FPGA.com
mdevoe@opensystemsmedia.com
Brandon Lewis, Associate Editor
CompactPCI, AdvancedTCA,
& MicroTCA Systems
blewis@opensystemsmedia.com
Curt Schwaderer
Technology Editor
Steph Sweet, Creative Director
David Diomede, Art Director
Joann Toth, Senior Designer
Konrad Witte, Senior Web Developer
Matt Jones, Web Developer

Editorial/Business Office

Patrick Hopper, Publisher
Tel: 586-415-6500
phopper@opensystemsmedia.com

Subscriptions
Karen Layman, Business Manager
www.opensystemsmedia.com/subscriptions
Tel: 586-415-6500 ■ Fax: 586-415-4882
30233 Jefferson, St. Clair Shores, MI 48082

Rosemary Kristoff, President
rkristoff@opensystemsmedia.com
Wayne Kristoff, CTO
16626 E. Avenue of the Fountains, Ste. 201
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By Paul Rosenfeld, SFF-SIG President

More standards, please

Industry trade groups that address standardization issues facing the small form factor and stackables marketplace tend to come in two flavors. Some groups, like the CompactFlash Association, are focused on a single technology and drive that technology across multiple markets through an evolutionary process over time. Other groups, including the SFF-SIG, slice horizontally across a single market (small form factor boards and systems), addressing multiple technologies that might be necessary to drive a complete solution for that market.

Expanding our focus

The SFF-SIG started with a single board-to-board interface standard – SUMIT, or Stackable Unified Module Interface Technology – and quickly realized that, short of endless tweaking and twiddling, we were done with our standardization efforts. We asked ourselves what other technologies constrained the growth of the small form factor market, and whether we had anything to contribute to standardization efforts for these technologies that might solve problems in the SFF space.

As happens with the vast bulk of standardization efforts today, it is rare for a group to start working on a standard with a blank sheet of paper. Every participant brings something to the table and some bring quite a bit – in some cases a fully developed product with documentation ready to be “blessed” by the industry and turned into a standard.

Reviews, risks, and rewards

We’ve been fortunate during the first few years of the SFF-SIG to have some members willing to bring products to the table and subject their efforts to industry peer review as part of the process of standardization. SiliconSystems brought us their SiliconBlade replaceable mass storage technology for standardization (which we call MiniBlade); VIA Embedded brought us the Pico-ITX form factor standard (which we enhanced to Pico-ITXe with the “e” signifying SUMIT expansion along with the definition of Pico-I/O expansion modules); and LiPPERT Embedded Computers brought us the CoreExpress COM standard and contributed significantly to the XR-DIMM Rugged Memory specification with Swissbit and Virtium Technology. Each of these standards went through three-to-six months of review from SFF-SIG members.

Of course, a strategic shift or company acquisition can orphan a standard, leaving it without a sponsor. In spite of the risks, we’d like to have more standards submitted to SFF-SIG.

We don’t believe that continuing standards development in other technologies dilutes our efforts, nor will offering multiple standards to solve the same technology problem compromise our integrity (hence we offer both the COMIT and CoreExpress COM standards). This wider focus can actually have a positive effect. Standards subject to peer review and published by an independent trade group offer a better and more robust long-term solution than standards tied to a single company, even if there are multiple sources for that company’s products.

“ We’ve been fortunate during the first few years of the SFF-SIG to have some members willing to bring products to the table and subject their efforts to industry peer review as part of the process of standardization. ”

Moving forward we’d like to offer the SFF-SIG as a home for Kontron’s recently introduced ARM-based COM standard and Advantech’s MIOe interface for SFF mezzanine cards. Publication by an independent industry trade group such as the SFF-SIG goes a long way in building system OEM confidence in the longevity, vendor-neutral control, and breadth of support for these standards. Yes, there are risks when your idea gets in front of a group – somebody’s going to have thoughts about how to make it better. And if you’ve already built one or more products that’s a very uncomfortable discussion, but we can deal with that.

Open forum for open standards

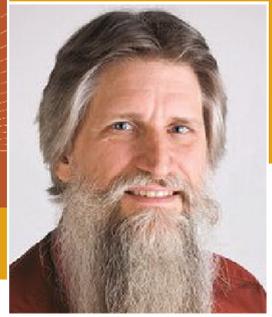
And while we’re at it, we’re open to all kinds of ideas on how to make small systems smaller – thermal solutions, display interfaces, and so on. Bring us your product and let’s create a new standard available to the industry free of charge. Of course, if you are already selling these things, you might have a pretty good head start.

Drop me an email at info@sff-sig.org if you’re interested.

Small Form Factor Special Interest Group
650-961-2473 • info@sff-sig.org



PC/104 Consortium



By Len Crane, PC/104 Consortium President

Happy 20th!

The PC/104 Consortium celebrates its 20th anniversary

Wow! Where does the time go? Believe it or not the first PC/104 specification was officially released in 1992, 20 years ago! Twenty years is quite a testament to almost any endeavor. In the fast-moving world of electronics it's even more surprising to see this kind of staying power. And how has the PC/104 format been so popular while other formats have come and gone? Why has the PC/104 Consortium been so successful at maintaining and leveraging this format? With a little hindsight these questions are easy to answer.

The products

Any conversation about the popularity of PC/104 products has to start with its most compelling feature: the stacking interface. The ability of PC/104 boards to interconnect by just stacking them on top of each other has been called everything from "really convenient" to "economical" to "revolutionary." For more details on the benefits of PC/104 stacking architecture see the Winter 2011 edition of *PC/104 and Small Form Factors* magazine – <http://opsy.st/zg8KBn>.

Additionally, the PC/104 format benefited from its compact size. The 90 mm x 96 mm (3.6" by 3.8") footprint was easy to fit into a number of applications where larger boards or card cages just could not go.

Its small size also provided an inherent ruggedness. The short distance between mounting points limits board flex, which makes it easy to design boards to operate in high shock or vibrate environments. Since adding boards to the system actually reinforces the other boards in the stack, a PC/104 system is hard to beat for ruggedness.

The standards

The success of the PC/104 format is also tied to the way it is supported. The PC/104 Consortium gets its energy from a wide range of dedicated manufacturers who cooperate to support the PC/104 specifications, and they don't take their responsibility lightly. By writing a specification that was clear and unambiguous, the PC/104 format was easily adopted by a wide range of manufacturers. The care that went into the specification assured compatibility between cards from one manufacturer to another. Having hundreds of compatible products available in the marketplace does not happen by accident!

Over the last 20 years the Consortium has not just supported the original specification, but has evolved new PC/104 specifications including stacking PCI and PCI Express designs, most of which are backward compatible in some way with previous PC/104 specifications. The resulting family of PC/104 products brings a wide range of performance and I/O options into the hands of design engineers.

The manufacturers

The third piece of the puzzle is the wide availability and variety of functions available in the PC/104 format. This is actually a result of the two factors above, but sometimes even the best ideas don't catch on. In the case of PC/104, there were lots of manufacturers that knew a good thing when they saw it. Within a short time there were numerous PC/104 products available and the critical mass of PC/104 was unquestionable.

Combine the strengths of the original PC/104 design, the care and attention of the Consortium to manage and evolve the specifications, and lots of

manufacturers jumping on the bandwagon and you have a winning formula (with a lot of compatible products). The advantages to the user are clear: a huge selection of products based on a reliable specification. It's no wonder that the PC/104 format has been going strong for 20 years.

Looking forward

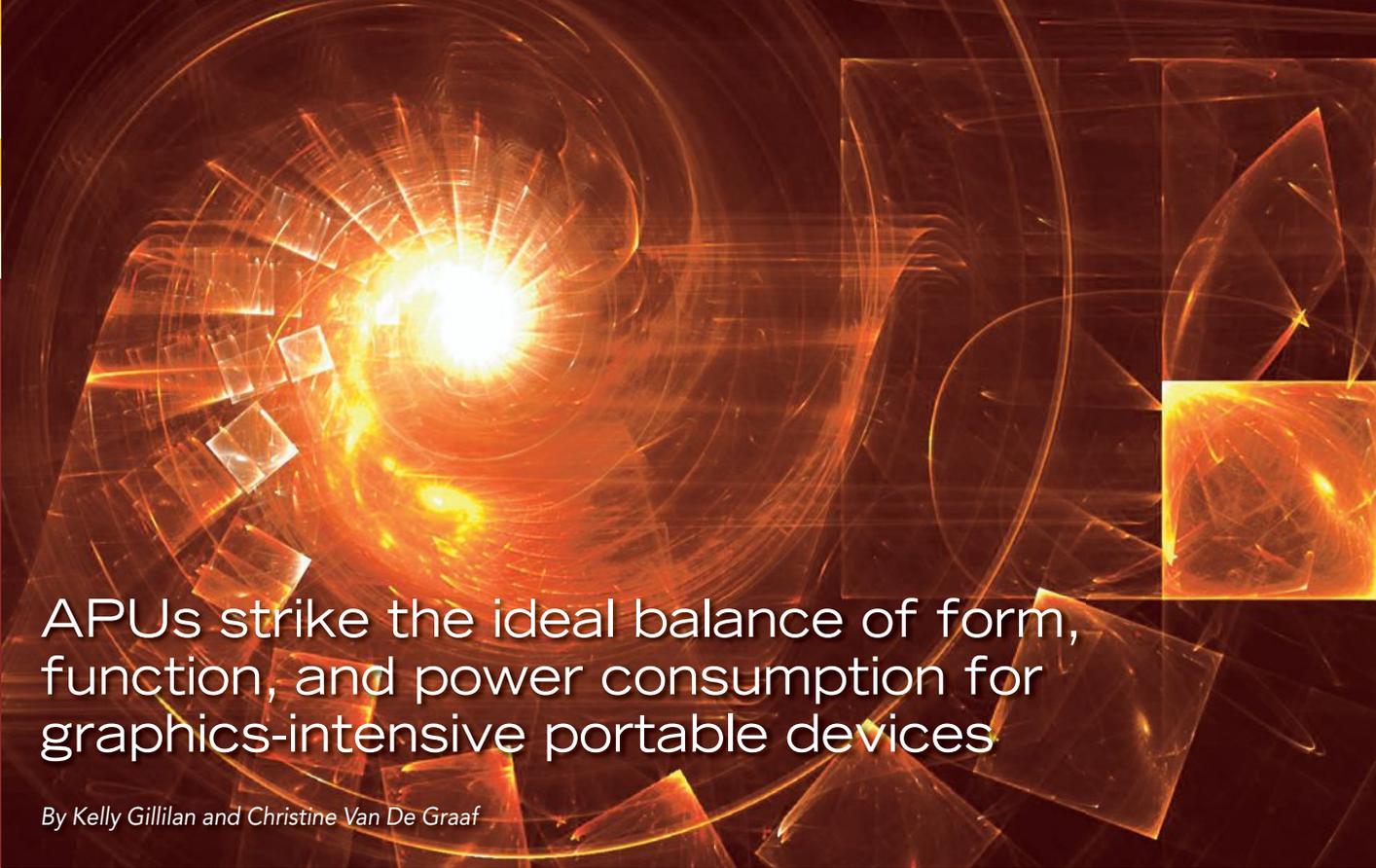
The PC/104 Consortium was originally established by 12 companies with a common vision of adapting desktop computer technology for embedded applications. It has been a tremendous success. Today the Consortium has more than 60 member companies in every corner of the globe. It has had a very positive impact on the embedded computer marketplace, and deserves to be celebrated.

So what will the next 20 years bring? Knowing the dedication and ingenuity of Consortium members, there will continue to be evolving specifications around which manufacturers can build the most reliable, compatible, widely supported products in the industry. The result is a win/win situation for both PC/104 manufacturers and PC/104 users.

PC/104 and Small Form Factors magazine is celebrating PC/104 and the PC/104 Consortium's 20th anniversary in this year's Summer issue with a timeline and other features on the PC/104 family and the companies involved in its past, present, and future.

For more information on PC/104 specifications or to search for specific PC/104 products, visit www.PC104.org or search www.smallformfactors.com/products.

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APUs strike the ideal balance of form, function, and power consumption for graphics-intensive portable devices

By Kelly Gillilan and Christine Van De Graaf

Achieving high levels of graphics and video performance for portable, small form factor systems is difficult when utilizing conventional CPU and discrete GPU processor architectures. With the recent advent of Accelerated Processing Units (APUs), designers are equipped to break this graphics barrier without giving an inch – literally – in board space.

Ongoing innovation in the x86 semiconductor industry is the foundation for the near-ubiquitous use of x86 embedded computing technology in the ever-growing range of SFF applications. Even with continued improvements in CPU performance and power efficiency, however, designers of SFF portable systems remain challenged to achieve their most ambitious design goals for graphics performance and visual immersion. Growing demand for higher performance graphics capabilities has led OEMs to explore new x86 processor architectures that promise to meet exacting multimedia performance requirements for applications spanning commercial, medical, and industrial domains, with a growing focus on portable and/or battery-powered devices.

Embedded boards and modules equipped with new-generation Accelerated Processing Units (APUs) can facilitate advanced graphics capabilities within an extremely small footprint, without compromising power and cooling efficiency or cost. The merging of advanced x86 computing capabilities with the parallel processing power of General-Purpose Graphics Processing Units (GPGPUs) in a single device allows OEMs to design low-power, graphics-intensive SFF systems that until now have been exclusive to power-hungry multi-core CPUs and add-on graphics cards.

The evolution to increasingly intense graphics

Graphics-driven applications are accelerating the pace of innovation for portable, energy-efficient SFF systems. Applications spanning digital signage,

information terminals, point-of-care medical imaging and diagnosis, and industrial applications are evolving to offer advanced graphics performance, but in many cases are constrained by conventional CPU and discrete GPU processor architectures. Here we'll look at each of these applications individually and address some of their unique design constraints, and also assess the ways in which APUs can minimize these constraints.

Mobile digital signage and information terminals

The travel services industry in particular has embraced digital signage as a means to provide timely, location-aware information. GPS-assisted in-vehicle digital signage and other mobile digital signage better equip travelers for personal use and empower travel services

and transportation vendors with “high proximity” advertising space for local businesses. Multi-screen display capabilities are emerging as an important feature for these applications, and mobile digital signage is especially sensitive to power consumption requirements. Low power draw is crucial if a mobile digital sign is to be powered by, for example, a shuttle bus battery.

Point-of-care medical imaging and diagnosis

Portable medical devices with sophisticated medical imaging capabilities for use at the point of care outside of the hospital can enable medical professionals to examine patients in the field, as well as access and process imaging-intensive patient data such as Picture Archiving and Communications Systems (PACS) datasets stored within hospital information systems. These devices ensure high-resolution imaging and ultra-precise diagnostic information that first responders and care providers count on to expedite treatment decisions.

Apart from the inherent design constraints associated with high-performance graphics processing, device portability, and battery-life preservation, medical device designers grapple with stringent device certification processes that often consume valuable time and intense time-to-market pressures that few other industries face as acutely.

Portable industrial applications

Imaging and data-intensive industrial applications such as image detection and recognition, automated inspection, and distributed data collection systems that require high-speed vector processing are increasingly being deployed in remote settings for monitoring purposes, and are therefore sensitive to portability requirements. In addition to requiring increased parallel processing capabilities to facilitate high-precision real-time data collection, these systems often need to be ruggedized for harsh environments. Highly compact, fluid- and particle-sealed system enclosures present obvious challenges to airflow and venting – challenges that are often insurmountable with traditional CPUs due to their thermal profiles.

APUs yield higher performance graphics with fewer components

New-generation boards and modules designed with advanced x86 APUs are ideally suited to minimize and/or eliminate the aforementioned design challenges while maximizing overall graphics performance. The combination of a low-power CPU and a discrete-level GPU into a single embedded APU provides OEMs with optimal picture resolution (frame rates and resolutions of up to 2560 x 1600 pixels, for example) for their graphics-driven, mobile SFF systems. Combining a GPU core on the same die as the CPU enables host systems to offload computation-intensive pixel data processing from the CPU to the GPU. Freed from this task, the CPU can serve I/O requests with much lower latency, thereby dramatically improving real-time graphics processing performance.

Size and integration

APUs also reduce the footprint of a traditional three-chip platform to just two chips – the APU and the companion controller hub. The combination of general purpose CPU and GPU onto a single die with a high-speed bus architecture and shared, low-latency memory model simplifies design complexity through a reduction in board layers and power supply needs, enabling SFF system designers to achieve aggressive form factor goals while driving down overall system costs.

By providing native, high-performance graphics processing at the silicon level, APUs preclude the need for bulky add-on graphics cards that usually require a right-edge connector. In space-constrained designs, an edge connector takes up more space (card-edge boards are typically 3" to 5" taller) and exposes it to additional shock and vibration that can lead to signal integrity issues. Designing APU-caliber graphics capabilities directly onto a carrier board is a more rugged, long-term option.

Power and cooling

The Performance-Per-Watt (PPW) gains enabled by APUs assure greater power efficiency and lower heat dissipation, which in turn can preclude the need for fan cooling within SFF systems,

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thus helping to preserve board space, improve overall system reliability, limit system noise, and lower BOM costs. Supporting Thermal Design Power (TDP) profiles from 5.5 W to 18 W, with typical power consumption below 6 W[1], AMD G-Series APUs equip designers with the ability to keep board-level total power dissipation to within approximately 35 W, well within the 45 W threshold at which mobile systems begin to become hot and physically uncomfortable to the touch. These factors enable designers to optimize their SFF systems for extremely compact enclosures and/or applications with power constraints, and can help designers stay within the 25 W threshold at which passive cooling is an acceptable (and typically favorable) option.

Multi-display video immersion

The ability to support multiple independent display outputs simultaneously is an emerging requirement for realizing ultra-immersive video displays for digital signage, and also SFF portable medical devices. New-generation APUs enable designers to cost-effectively develop multiple video displays without sacrificing board space for add-on graphics cards and controllers or compromising overall picture resolution. They also offer the ability to decode up to three HD video streams in parallel and support up to four independent digital displays via a wide range of standard interfaces, including DisplayPort, DVI, HDMI, LVDS, and VGA.

Vector processing for SFF industrial systems

Applications requiring increased parallel computing capabilities, such as the portable medical and industrial devices mentioned above, are well suited for boards and modules equipped with APUs. These applications include 3D medical X-ray image reconstruction and smart camera applications such as high-precision image/pattern detection and identification. However, traditional CPU architectures and application programming tools are optimized for scalar data structures and serial algorithms, and as such, are not the best match for data-intensive vector processing applications.

The integration of general-purpose, programmable scalar and vector processor cores for high-speed parallel processing establishes a new level of processing performance for SFF systems at an unprecedented PPW. In the case of AMD G-Series APUs, the general-purpose vector processor cores within the embedded GPU – 80 shader cores running at 500 MHz (AMD Fusion T56N) – drive the ultra-high-speed processing required to handle intensive numerical computations.

Time to market

The inherent architectural advantages introduced with APUs go a long way toward minimizing design complexity and accelerating time to market. These advantages are owed primarily to reductions in board layers, discrete add-on processors/cards, and power supply and cooling needs, which naturally minimize the number of components on the board and therefore enable designers to shorten, and in some cases eliminate, design cycles.

The underlying x86 APU architecture also enables portable SFF system designers to tap into the vast selection of existing x86-optimized software, applications, and development environments available on the market, introducing additional opportunities to enhance development efficiency and speed time to market. The open development ecosystem for the AMD G-Series platform, for example, includes support for Linux, Microsoft Windows, and Real-Time Operating Systems (RTOSs), multiple BIOS options, OpenGL 4.0 and OpenCL support, and source-level debug tools.

By implementing AMD G-Series APUs on the most common form factors for graphics-intensive applications, such as Computers-On-Module (COMs) and SFF SBCs and motherboards, Kontron is making the benefits of this new x86 processing architecture readily available for application development. OEMs and system integrators can take advantage of highly scalable, validated APU-based platforms that streamline design cycles and minimize design risks to ensure fast time to market for graphics-intensive and parallel-data SFF applications.

Making graphics performance goals achievable

New APU processor architectures are making a fast and transformative impact on SFF design initiatives, unlocking high-performance graphics capabilities in small form factors that simply can't be achieved with conventional CPUs and GPUs. Continued innovation in the APU domain promises to push graphics performance boundaries even further, and will ultimately yield a new generation of portable SFF systems that defy space, power, and cooling limitations in ways previously unimagined. **SFF**



Kelly Gillilan is the Product Marketing Manager for the AMD Embedded Solution division, overseeing worldwide marketing strategy and activities. He has worked extensively in embedded applications for most of the past decade. Kelly holds a degree in Computer Engineering and is fluent in Mandarin Chinese.

Christine

Van De Graaf is the Product Manager for Kontron America's Embedded Modules and Small Form Factor SBCs product families. Christine has more than a decade of experience working in the embedded computing technology industry, and holds an MBA in marketing management from California State University, East Bay.



AMD
kelly.gillilan@amd.com
www.amd.com

Kontron
christine.vandegraaf@us.kontron.com
www.kontron.com

References

- [1] For complete test and configuration information please refer to the AMD "Brazos" Platform Performance and Power Optimization Guide Publication #48109 Rev 2.01 available on the AMD Embedded Developers Support Web site.

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Effective UI development with GUI tools for embedded devices

By Jim Trudeau and Roger Edgar

A good Graphical User Interface (GUI) can thrill customers, and a good reusable GUI development platform can save developers time and money; however, design subtleties and pitfalls keep developers on their toes.

A good User Interface (UI) is priceless. Think of the clean iTunes interface. The meaning of "UI" is quickly becoming something other than "User Interface"; it can now stand for "Unbelievably Important" and an "Untapped Investment" in embedded systems.

As microcontrollers move up the ladder in capability and out into the world of the consumer, and processors have moved from low-capacity 8-bit to high-capacity 32-bit systems, human interaction with software becomes more important. Along the way, programmers wondered, "What do I do with this horsepower?" Now they're in a position to use this power to respond to customer requirements that say, "I want this to look like an Android or iPad app."

However, the amount of effort involved in creating an effective UI is non-trivial.

Graphical User Interface (GUI) development takes at least three basic steps: designing a visual interface (windows and widgets), writing the code that implements that interface, and getting that code to work on the specified hardware. Additionally, as processor power has grown, so have customer expectations. Color, touchscreens, gesture recognition, and speech recognition continue to up the ante in development efforts and create even greater challenges. Tools like GUI software packages are available to help automate the basics, but programmers still have a lot of work to do to create a polished interactive interface where each step of development has its own challenges and remedies.

Designing and building the interface

The old-fashioned, and still valuable, way to build a visual interface is pencil and graph paper. In essence this

step involves creating "storyboards" and mapping out the interface.

The updated version of those storyboards is a good GUI package that includes an interface builder: a way for the developer to define a window's complete layout with adornments, scroll bars, text areas, buttons, widgets, colors, text, and so on. This allows items to be positioned accurately with correctly configured behavior and styles.

There should be transparent objects that can act as containers to group certain objects together, such as a collection of radio buttons that respond to a single message. The library will have a message-delivery system that can deliver the message to the objects in the group. All of the required properties and connections among the controls in the window can be set up using a container hierarchy.

There is a critical subtlety here to be aware of. Typically the layout utility is a desktop tool that ultimately generates code for an embedded platform. It is important for the interface to look and behave precisely the same on both the host development platform and the platform being developed. The window builder should enable a What-You-See-Is-What-You-Get (WYSIWYG) design. The same runtime library rendering the image on the desktop should render the image on the destination device. The OS shouldn't, for example, render a font one way on the desktop OS and appear differently on the end product. Pixel-for-pixel spacing on a small output device can matter a great deal.

Creating the code

Once settled on a design, some libraries make developers write code from scratch. That's not the ideal solution. A good GUI package will generate all the code and configuration files required to create the interface. The generated code should be compiler-neutral, typically standard ANSI C or C++.

A good bit of the UI's basic behavior code can be generated as well. For example, a collection of radio buttons has the standard behavior of all turning off except the one selected. That update behavior can be coded automatically. This is not rocket science; programmers spending time writing basic functionality wastes their true value.

The functionality behind that interface is up to the developer. Here the library can be a great help. This code should be well documented, showing developers where to add (and not add) code to the program. The automatically generated code should have function stubs with statements equivalent to `// put your code here`. The designers of the library know what kind of code belongs where and should provide a great deal of guidance. Look for that kind of help in good GUI tools.

Finally, in addition to the actual programming code, consider UI text. Fonts in foreign languages and non-Roman scripts like Mandarin, Kanji, or Arabic are an important consideration. Look

carefully for font support in a tool. How does text get into the UI, and how easy is it to update and modify that text? What happens when a client says, "We're going after the market in India; we need to have the software localized into Hindi"? Developers need to be able to change the language independently of the code for smooth system transitions.

Running on hardware

Once the interface is fully designed and coded, it has to work. It should be compatible with multiple processors, multiple

display screens with different display technologies, physical dimensions, and color depths. It needs to be independent of hardware assumptions and dependencies so migration to new platforms and the addition/removal of components will not require substantial recoding or redesign. Input mechanisms should also be independent – mouse, stylus, capacitive touch, resistive touch, and so forth. The library should be software independent as well, and should work with a choice of operating systems, drivers, and other software packages.

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To work on a hardware platform, no library can stand alone. It must have a runtime library that sits on the hardware and does work like render images and fonts. There are also hardware drivers for input and output devices. As an example, take a look at the block diagram for the PEG library from Freescale (Figure 1).

Moving a GUI to a new platform is still work, but a compartmentalized design reduces the work to a minimum. If input is changed from mouse to gesture-based resistive touch, the design is going to need a new input driver. However, a well-factored GUI should require very few if any changes to the design and code. In a well-factored design, the GUI calls a routine to get an XY coordinate instead of calling a mouse driver. The mouse will feed that coordinate into the input layer, isolating the GUI from the hardware. Then if the mouse changes to a stylus or a touch screen, the GUI code doesn't change at all; each new driver feeds its data to the right place.

But wait, there's more. Recall the importance of WYSIWYG between the desktop designer and the embedded platform: This isn't just for quality control and testing – there is another significant benefit from that. It's possible to build a functional prototype on the desktop without having the actual physical device complete and in hand; the application can be distributed to key stakeholders in the beginning of the development cycle and get buy-in without developing hardware. Then after the device really exists and when the specs come in for the next-generation device that needs to hit the market in three weeks, developers will be as prepared as they can be.

Focus on implementation, not code

Using GUI tools can help lock down the basics and give developers more time to focus on making sure an interface's logic is sound and the interaction is intuitive. Because it is relatively easy to create a working mockup of a UI, developers can test usability before or in parallel with application functionality. End users will thank UI designers when they don't have to figure out what to choose for messages like the one in Figure 2.

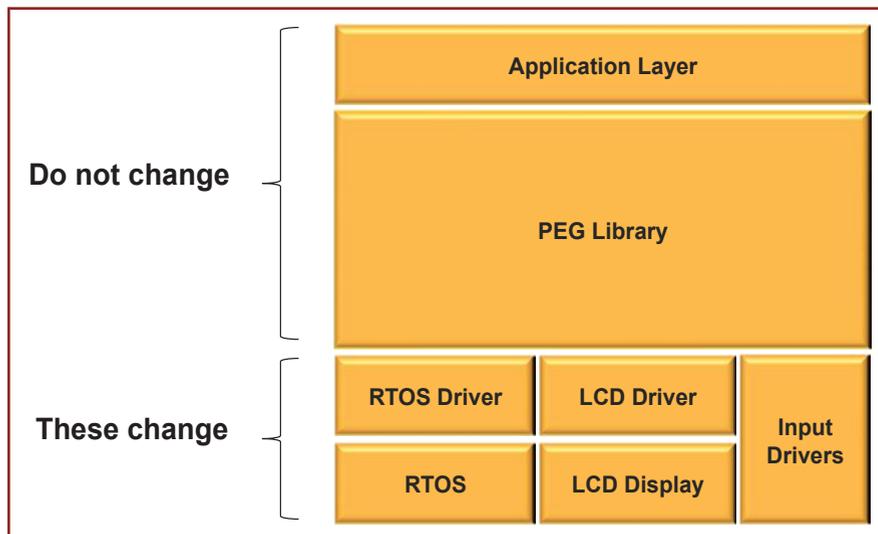


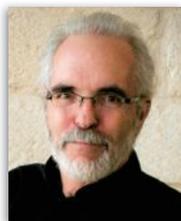
Figure 1 | A well-factored GUI library can replace input and output drivers relatively easily, as seen in the PEG library from Freescale.



Figure 2 | Which button cancels the operation? UI developers should spend time programming logic and interactive elements rather than basic code to avoid these types of embarrassments.

Jump off the shoulders of giants

Creating a UI for the first time is revolutionary. Modifying and leveraging it in future products is evolutionary. Creating a new UI for every new piece of software, or even writing code to create windows and widgets isn't a smart use of time. Very bright people solved these problems a good while back, and the intelligent thing to do here is to reuse known good practices – a simple UI consistent across and independent of different platforms – with the help of a good GUI engine. The proper choice of GUI tools allows UI code to be future-proofed (as much as possible) during development, reducing time and support burdens during its lifetime. **SFF**



Jim Trudeau is Senior Technical Marketer focusing on software solutions with the Industrial and Multi-Market Group of Freescale, in Austin, TX. He is the author of Programming Starter Kit for Macintosh (1995) and Mastering CodeWarrior (1997), as well as numerous articles and training courses on software development. He is inordinately fond of a good UI.

Roger Edgar is responsible for product management and business development for Freescale's Industrial and Multi-market Enablement team, including the PEG software line. Prior to Freescale, Roger was as a founding partner for JumpStart Marketing and served as Vice President at Impart Technologies.



Freescale Semiconductor
 Jim.Trudeau@freescale.com
 Roger.Edgar@freescale.com
 www.freescale.com

Designing portable medical devices that emulate today's consumer devices – with added security

By Monique DeVoe,
Asst. Managing Editor

PANEL



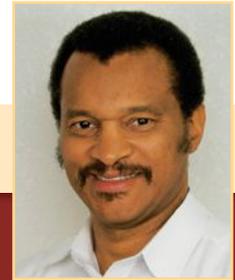
Jeff Munch
CTO, ADLINK Technology



Joseph Chung
Medical Product Manager,
Advantech



Colin McCracken
Director of Solution Architecture,
American Portwell
Technology, Inc.



Michael Taborn
Lead Platform Architect for
the Healthcare Sector in the
Intelligent Systems Group, Intel

Editor's note: Portable devices are a top focus in the small form factor embedded scene. Medical devices lead the portable design revolution, taking patient care out of traditional clinical settings and into the home and remote settings. When we asked a group of panelists about the present and future of mobile devices, medical was at the forefront of their minds. They discussed the challenges of combining the “iPhone factor” of user-friendly design with stringent security requirements and regulations, choosing platforms, and others that stand in the way of the next generation of devices they're trying to develop. Edited excerpts follow.

SFF: *Portable medical devices have come a long way in the last few years. What impresses you about the current state of technology in these types of devices?*

TABORN: The cell phone market, among others, is driving cost, size, power, and ease of use improvements and possibilities into all application areas, which in medical modalities are quickly being implemented to improve patient outcomes. The handheld ultrasound and its battery life is a great example. The most impressive impact on medical devices is the better focus on user experience. This will directly improve patient care by decreasing the error rate of the applications and evaluation of the data.

McCRACKEN: Out of nowhere, Android has emerged with the potential to become a dominant platform for portable embedded computing devices in the not-so-distant future. Chip-scale integration and improvements in battery technologies accompany the demand

for standardized software application platforms. Finally, the performance of ARM SoCs has increased (up to Gigahertz dual core), while Intel has lowered its entry-level ultra-mobile processors to fit within size and power envelopes in order to compete for these coveted high-volume applications.

CHUNG: The projective capacitive multi-touch screen has become one of the hottest topics within this segment, but requires application software development to showcase its values. Also, energy efficiency has always been a key focal point for portable devices, and the rise of RISC-based solutions has helped to further energy savings.

Additionally, the different types of connectivity including Wi-Fi, Bluetooth, and 3.5G/4G wireless that are now readily built into portable medical devices permit easy access of electronic medical record databases or the future medical cloud in any location equipped with wireless signal reception.

MUNCH: The acceptance of x86 and Windows into a market that has traditionally relied on custom hardware and software solutions is impressive. We see Windows as the primary user interface tied to FPGAs performing data crunching in many medical applications. There is also an increasing desire to use standard building-block products like COM Express CPU modules to allow the product design to be focused on its core competency, which is increasingly software.

SFF: *What design challenges are engineers currently facing in medical device development?*

McCRACKEN: One key task facing engineers is platform selection. Everything from design environment and development tools to production royalties to product updating in the field hangs in the balance. Android is optimized for ARM at the moment, while other Linux platforms and Windows Embedded Compact run well on ARM and x86/Intel

architectures alike. Additionally, time-to-market pressures are becoming as critical for FDA and other regulatory-based markets as they are for commercial and consumer markets where the winners take all. To that end, the richness and completeness of a product offering's "out-of-the-box" functionality translates directly to competitive advantage. SBCs and COMs need to be ready as close as possible to the silicon launch (mass production).

MUNCH: There has been a significant increase in the speed of signals in

today's designs, resulting in the need to use expensive and complicated simulation tools to verify signal integrity. Waiting until a design is fabricated to check and catch signal integrity issues can impact launch schedules and development costs. Even when using module building blocks the design still needs to deal with high-speed interfaces such as PCI Express, SATA, and now USB 3.0 SuperSpeed.

TABORN: Of the many challenges engineers face, designers must first consider security since virtually all medical

devices in the future will be connected to some type of network. Second, there are new demands for "ease of use" that are fostered by what many in the industry call the "iPhone factor."

CHUNG: Medical customers see features like low cost, long battery life, light weight, slim design, and new technologies that are currently seen in consumer products, and expect to see these elements implemented in portable medical products, but medical devices do not yet have these features.

SFF: *Where do you expect medical devices to go in the future?*

CHUNG: Eventually portable medical devices will be used in the same sense that we use smartphones and tablets in our daily lives, but within a more secure network and with mechanisms to permit/deny access to sensitive patient data. Not only the patients but the physicians and healthcare administrators will benefit significantly from this development.

From a hardware perspective, lighter and thinner is always the trend. On a system level, portable medical devices have different market segments, such as general hospital/clinical administration usage that may require building a whole infrastructure, or portable diagnostic devices for ultrasound, ECG, and blood pressure monitoring that require joint system design with customers.

McCRACKEN: Someday, the portable subset of embedded devices will be nearly as ubiquitous as their consumer counterparts, relatively speaking. Whether in the form of sensors or medical patient monitors, these products will proliferate based upon consolidated, standardized ultra-mobile platforms much the way the original DOS + x86 embedded computers did. In some cases with dual- or multicore systems, the second processor core will be devoted to the deterministic and real-time aspects of the device, such as taking measurements.

TABORN: These devices will be far more flexible and extensible in the future. One of the best things to happen to medical is the advent of the iPhone. This

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demonstrated to the world that a small device could be intuitive and very efficient. This will cause device manufacturers to address the areas of ease of use and human workflow, reducing human error and encouraging operation and use cases in non-traditional settings – improving patient care throughout the world.

SFF: *What does the industry need to get to the next generation of medical portable mobile devices?*

MUNCH: Continuing to drive down total power consumption would be a good start, and achieving this will just take time. This results in two benefits: an increase in battery life (or a smaller battery to reduce weight) and reduction in power that needs to be dissipated.

CHUNG: The prospect of wireless battery charging would be one technology that would help these applications realize their true potential for power-efficiency and application usage.

Additionally, comprehensive infrastructure, regulations, and mobile healthcare

protocols will be key to these devices' future. This will allow medical computing manufacturers the ability to develop portable/mobile medical-specific devices and applications that can be implemented within the same network, making the future medical cloud ecosystem possible.

TABORN: The ability to implement future security policies must be considered in today's devices. This suggests having the "headroom" in the design shipped today to be able to implement more complex policies in the future. Unlike most devices, medical devices in clinical and hospital settings are unique in that they can be in service for 10-to-15 years. For consumer-g geared medical mobile devices, we will have to ensure that the applications data acquired can be just as safe and reliable as data acquired in the clinical setting (given the various different circumstances). Multicore solutions are becoming readily available in both Intel and ARM architecture families. This topology choice will allow developers to address these unique application

requirements for today with the necessary performance headroom to support the ever-changing security landscape.

McCRACKEN: Better hardware standards are needed in order to "cross the chasm." Some existing standards like Qseven have been reasonably architecture-independent. However, there are now so many single-vendor-driven x86 and (especially) ARM module and interface standards that have been prevented from reaching critical mass in this industry. A casual stroll down the halls of Embedded World in Germany reveals that a massive shake-out will be needed; otherwise system manufacturers will be left squandering time-to-market and development budgets in taking the full custom path. Standards organizations have been portrayed as slow-moving and political, leading some suppliers to go it alone. Any standards groups that can set aside self-interests and become more responsive to customers and end users will have a major leg up in leading the consolidation that is needed to facilitate the next wave of medical portable devices. **SFF**

EDITOR'S CHOICE



WIND RIVER

Securing the development process

Connected embedded devices from medical to automotive to consumer systems are going online at an unprecedented pace, and are the next target for malicious attacks through software vulnerability exploits. The bad news is security hasn't been a top priority for embedded developers in the past, but now that the industry has woken up to security's importance, the good news is there are more tools available to efficiently analyze software for defects. Coverity and Wind River recently teamed up on a pre-configured Coverity Static Analysis

tool for Wind River's Workbench development environment (in Linux and VxWorks flavors) to make security testing an efficient part of the process.

Instead of analyzing for security vulnerabilities at the end of the development process, this combination allows testing to be performed as code is being written, which saves time and development costs – especially helpful for the quick time-to-market pressures associated with these systems. While desktop analysis is no stranger to this type of tool, such as in Visual Studio or Eclipse, it's new territory for embedded software, and something we should see spread to other dev platforms in the near future.

Coverity | www.coverity.com | www.smallformfactors.com/p366575

Wind River | www.windriver.com | www.smallformfactors.com/p366576

Making well-rounded, secure smart energy devices

Smart grid initiatives are taking off around the world, and security issues associated with metering and other factors are among the top concerns for utility customers and device makers alike. Green Hills Software's Next Generation Platform for Smart Energy allows developers to focus on security in addition to providing a comprehensive platform for smart device development from the initial design stages to maintenance and updates after release. It includes optimized software development tools, middleware, hardware trace probes, and the company's RTOS in addition to robust security options with a full suite of ISS Security Toolkits.

The security suite includes: SSL Security stack – a great fit for smart energy applications – for standards-based secure M2M communications (wired and wireless), IPsec/IKEv2 technology for secure communication and power management, SSH Secure Server with a portable ANSI C SSH SDK for interactive shell and tunneled TCP/IP security, and Secure Loader for ensuring proper installation and updates. An added layer of security comes from the Floodgate Packet Filter embedded firewall tech from Icon Labs, which allows networked devices to have control over the packets they process, protecting against malicious attacks. The platform also includes ISS Device Lifecycle Management (DLM) that ensures a device's software, firmware, and data are authentic and allows for secure management in the field.

Green Hills Software | www.ghs.com | www.smallformfactors.com/p366578



Intelligent ZigBee-enabled tablet design for use in smart grids

By Khalid Kidari

Until recently, ZigBee readers were mostly independent devices dedicated to their singular ZigBee function. With the Smart Energy ZigBee standard, however, commercially available enterprise tablets can integrate this technology along with other utility-specific functionality to become more useful in the smart grid. This discussion explores the key design considerations for tablet computers used to install and maintain smart grids.

With worldwide power consumption on the rise, utilities are faced with the challenge of providing more power while reducing environmental impact. Smart grids have emerged as a solution for managing output by providing electricity exactly where and when it is needed, thereby improving energy availability and reliability while improving regulatory compliance. ZigBee technology is at the core of smart grid functionality, as its low-cost sensors can be used to manage demand response and load control, automate meter reading, and provide real-time data, along with the additional capability of individually or simultaneously targeting specific groups of devices, including HVACs, water heaters, lighting, electric vehicles, and generation systems.

Until recently, ZigBee-style communicators have been dedicated devices

with the sole function of reading sensors. With the standardization of the ZigBee Smart Energy profile by the ZigBee Alliance, however, there is an opportunity for tablet computers to incorporate ZigBee and become more

relevant tools in the installation and maintenance of smart grids (Figure 1).

The challenge in designing a tablet computer for use within the smart grid is finding a way to bridge emerging



Figure 1 | A tablet computer equipped with ZigBee can be used to identify and repair an outage, as well as communicate with the cloud and a company's servers.

technologies with the traditional functions of the utilities market, all while packaging it in a rugged device that can stand up to the elements and inevitable drops and spills in the field. There are several key design considerations for tablet computers used for smart grid applications, including the ability for the device to manage multiple functions, modularity, connection with the cloud, and ruggedness.

ZigBee explained

ZigBee specifies a suite of high-level communications protocols with small, low-power digital radios based on the IEEE 802.15.4-2003 standard for Low-Rate Wireless Personal Area Networks (LR-WPANS). It takes the IEEE 802.15.4 standard a few steps further with additional network and security layers, as well as an application framework. From this framework, the ZigBee Alliance also developed standards – technically referred to as public application profiles – that can be used to create multi-vendor interoperable solutions, which allow for customization and favor total integration. ZigBee advantages include:

- ZigBee uses the 2.4 GHz radio frequency to deliver a variety of reliable and easy-to-use standards anywhere in the world
- ZigBee sensors can run on harvested power or batteries. Users can expect an extended battery life that could exceed 10 years for very low-duty applications, such as automatic meter reading, when using common alkaline batteries in a typical ZigBee product. For higher duty applications, battery life can range from 100 days to three years
- Transmission distances are remarkable for a low-power solution, ranging from 1 to 1,000 meters (about 3 to 3,280 feet), depending on power output and environmental conditions such as other buildings, interior wall types, and geographic topology
- Multiple ZigBee sensors can be configured into self-healing mesh networks that extend the range of multiple sensors by miles

A more secure network

ZigBee offers Machine-to-Machine (M2M) communication, offering an advantage

over Wi-Fi and WiMAX solutions that are costly and potentially less secure. Recently, some utilities have explored automatic meter-reading systems that rely on home Wi-Fi networks to push usage data and provide customers with Web-based control of thermostats. Customers, however, have balked over the companies' perceived access to other personal information flowing through Wi-Fi access points.

In contrast, ZigBee is a more secure proposition, offering end users the same remote control of their thermostats by smartphone or computer, but ensuring the utility company is receiving only the information they are intended to get. Since data for entire neighborhoods is conveyed through a mesh network and individual addresses are assigned numerical codes no identifying customer information that could breach privacy – like addresses – is transmitted over the network.

Colonizing the smart energy space

ZigBee wireless networks have been in use for more than a decade, establishing it as a proven technology for a range of applications, including home and building automation, remote controls, healthcare, and retail services. Until the recent adoption of a standard ZigBee Energy profile, however, solutions in the smart grid/energy space had been mostly custom developments, relying on proprietary radios and communicators dedicated solely to the function of communicating with the ZigBee radios, which, for example, read meters.

In the last decade, the ZigBee Alliance began an incremental release of the ZigBee Smart Energy standard in order to create a global ecosystem of interoperable products – including meters, thermostats, outlets, load-control devices, and transformers – that monitor, control, inform, and automate the delivery and use of energy and water. The Smart Energy profile calls for the certification of products in order to provide assurance they will perform and can communicate with one another, regardless of manufacturer.

One tablet, many functions

ZigBee-enabled smart grids have added a layer of sophistication to utility

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operations, allowing for management of demand response and load control, automated meter reading, and identification and repair of outages. The ability to natively communicate with the devices that manage these functions is imperative, but to focus purely on incorporating ZigBee into a tablet is shortsighted. It is important to also consider how technicians use their equipment in the field, and then build on strategies for managing those technicians, maintaining fleets and inventory, and serving customers.

During smart grid installation, for example, some technicians carry a ZigBee communicator, laptop computer, GPS, measurement instruments, and a camera. Incorporating all of these on a tablet computer simplifies their jobs and cuts costs. As each data point is gathered, the tablet can be used to test and validate the new meter or transformer, document and pinpoint its exact location using location-based services and GPS, acquire the work order and communicate with the central office, scan equipment barcodes, access mapping data and manuals, and more in a single lightweight portable computer. Ultimately, combining these tools into a single device lowers purchase and maintenance costs for the end user by as much as 50 percent. Alternatively, a technician might carry a rugged laptop worth \$3,000 (sometimes also with a data plan for \$50/month), GPS worth \$300, a handheld worth \$1,000 (with a data plan for \$50/month), measurement devices (such as an ohmmeter) worth \$500 to \$1,000, and a ZigBee programming device worth \$500. The cost of a similarly equipped mobile tablet could be about half.

After installation, the same tablet can be used for reading meters, assessing outages, maintaining the network, and restoring power – all while providing the company a powerful tool for routing assignments to the closest technician, maintaining inventory, and geofencing.

There isn't an app for that: The importance of modularity

Industry-specific tools such as measurement equipment often inhibit using a computer as the primary tool for field

Figure 2 | The DAP Technologies M9010 tablet is ruggedized for portable use and includes a variety of advanced communications options like ZigBee and wireless broadband to keep technicians connected.



service. In many cases an installer or field technician will carry a computer as well as separate equipment to fulfill their job function; smart grid installers need an ohmmeter to test voltage, transformer technicians need equipment to test for vibration, and solar installers need a compass.

Modular design that affords the integration of key equipment into a tablet is the antidote to static designs that disallow change and custom designs that require expensive R&D. DAP Technologies' M9010 tablet, for example, features a backpack design that allows end users to add their own circuitry to accommodate a range of tools and data inputs for custom solutions, or specify packaged solutions such as RFID (Figure 2).

The future is in the cloud(s)

With ZigBee radios along the smart grid continually pinging data, cloud computing will play an ever greater role in managing the billions of bytes of data that are produced daily, providing real-time usage information to customers and technicians analyzing data in the field.

When designing a tablet for the smart grid, wireless broadband communication is imperative for accessing the vast quantities of data and providing field analysis. Field technicians might be sent to investigate repeat outages in a particular network. Using tablets to access the cloud, they could look for trends in peak consumption and use that data in conjunction with information from the ZigBee modules to correct the issue.

It is also important for the tablet to be compatible with the utilities' existing systems. For most utilities, that means a Windows-based operating system.

Built to last

Any computer that is to be used in field applications must be built to withstand

the elements and abuses that come with heavy outdoor use. In addition to remaining operational in weather conditions that range from driving rain, snow, and ice to humidity, blazing hot temperatures, and dust storms, tablets for utility applications should be safe for use around chemicals including acetone, crude oil, ISO-propane, diesel, oil, acetaldehyde, benzene, chloride, and more. Minimum requirements for rugged tablets in these applications should be IP67 – completely sealed against dust and water – and the ability to survive multiple 6-foot (1.8-meter) drops to concrete.

A multi-use, connected tool

Rugged tablets offer a lightweight, mobile, durable, and user-friendly platform for incorporating ZigBee into a solution that performs most of the required tasks for smart grid installation and maintenance. As ZigBee continues to gain prominence in smart grid applications and beyond, it is important to remember that incorporating this essential technology into a complete package will reap the most benefits for the user, both in terms of cost savings and field efficiency. **SFF**



Khalid Kidari is Director of Product Management and Marketing at DAP Technologies.

He oversees the company's entire line of rugged tablet, handheld, and fixed-mount computers. DAP serves customers in industries that include field service, utilities, warehouse, supply chain, transportation, and logistics.

DAP Technologies
K.Kidari@daptech.com
www.daptech.com



Giving smart energy its own “easy button”

By Monique DeVoe, Assistant Managing Editor

One key idea of the smart grid/energy movement is to give consumers the knowledge and information to proactively monitor their energy use. A plethora of data has been produced out of smart energy programs, and having a standardized format with apps to make sense of it all would be a tremendous help. This is what U.S. Chief Technology Officer Aneesh Chopra had in mind during GridWeek in September 2011 where he challenged utilities to create standards and a framework for consumer data – the Green Button initiative.

The initiative’s medical history

The idea for the Green Button initiative came from one step over on the color spectrum: the Blue Button. This digital button was created in fall 2010 to assist returning Iraq and Afghanistan veterans to access health records in digital format, when and how they wanted it. The goal for Blue Button was to create a better use of electronic health records and other information technology in healthcare. A logical next step was to extend the concept to consumer energy data, which already has a strong presence in electronic records.

The standard foundation

Standards for interoperable usage data have been in the works for years, starting with the Energy Usage Information (EUI) “seed

standard” in 2010. Building on the EUI, 2011 saw development begin on a standard to deliver historical and ongoing usage data: the Energy Service Provider Interface (ESPI). ESPI additionally defined the transmission and authorization of usage data for access by third parties (which could be anything from apps to appliances). Security features (such as OAuth) and privacy considerations were other driving features for ESPI[1].

Based on ESPI, Green Button supplies historical energy usage information directly to the end-user by providing data through XML files made consumer-friendly with an XLST file, rendering usage data that is both human and machine readable.

Within the 90-day challenge period set forth by the administration, this standard was ratified and its usage agreed upon by California utilities.

The future is green

Green Button’s availability was formally announced on Jan. 18 at a Santa Clara event called “Transforming the Energy Landscape with the Green Button” with California’s three largest utilities – San Diego Gas & Electric (SDG&E), Southern California Edison (SCE), and Pacific Gas and Electric (PG&E) – and more than 100 executives from leading smart energy companies present in support.

Approximately 6 million customers from PG&E and SDG&E already have access to Green Button, with SCE planning to provide Green Button data to its 4 million customers later in 2012. Several other utilities across the country have also joined in.

Chopra expressed hope for nationwide adoption by utility companies, and various companies and individuals are hard at work creating apps to make better use of Green Button data. For example, Tendril opened its platform APIs and has provided software development tools that have attracted more than 200 app developers. Beyond simply displaying data, future applications could provide analysis to determine if windows need to be changed based on temperatures and usage data, estimate the energy costs prospective tenants can expect to pay, or verify if energy-efficiency remodeling has had an effect.

Though Chopra recently stepped down as White House CTO, the momentum gathered so far for the Green Button initiative should drive future expansion and growth. **SFF**

References:

- [1] See the National Institute of Standards (NIST) Green Button page for more details on the formation of the standard: <http://opsy.st/yYZAM6>

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TS-7500 Ultra-Compact 250 MHz ARM9 Computer Module

The TS-7500 is an ultra-compact embedded computer module based on a 250 MHz ARM9 CPU from Cavium Networks. With 64 MB RAM, 4 MB bootable onboard flash, a microSD card slot, and a 5K LUT programmable FPGA, the TS-7500 is a powerful and flexible embedded solution. The TS-7500 boots Linux 2.6 from onboard flash or SD card in under 3 seconds. 10/100 Ethernet, USB slave, and dual USB host ports are brought out directly. The 44-pin downward facing header brings out I2C and 31 FPGA-controlled lines, making it easy to interface with a base board of your own design.

User-Programmable FPGA

The TS-7500 features a 5K LUT Lattice XP2 FPGA. Although loaded by default with a standard bitstream that implements SD card access, GPIO, SPI, and 8 XUART high-performance UARTs, the FPGA can easily be reloaded automatically at startup with a user-programmed bitstream. If your application requires custom real-time logic such as non-standard bus interfaces, PWM outputs, quadrature decoding, pulse timing, or digital counters, Technologic Systems can integrate that functionality into a custom TS-7500 FPGA configuration for an elegant and affordable solution. For our customers who prefer to do their own FPGA development, Technologic Systems has made available a TS-7500 open-core Verilog project. An alternative FPGA bitstream that implements CAN and SPI is also available.

The TS-7500 Development Kit

The development kit includes the TS-ENC750 enclosure with the TS-752 base board. The base board demonstrates the power of the TS-7500, implementing relays, RS-232, RS-485, CAN, Power-over-Ethernet, and GPIO signal protection.

Similar Boards Also Available:

TS-7550 features a 256 MB ultra-reliable XNAND* drive for a guaranteed successful bootup. Please visit our website for more information on XNAND technology.

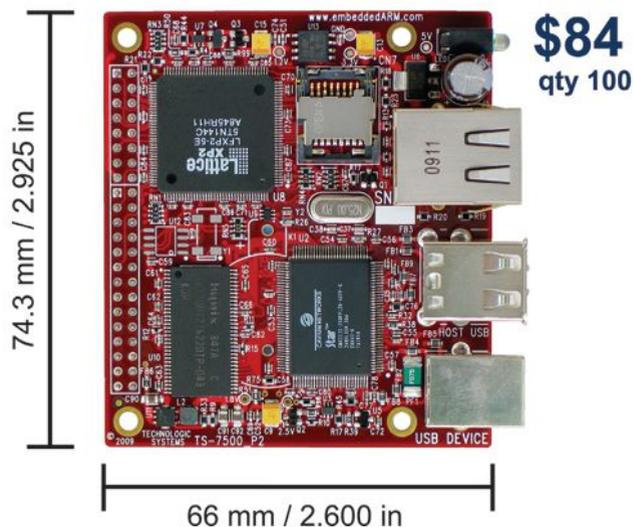
TS-7552 features a 256 MB ultra-reliable XNAND* drive, additional USB ports, and Wi-Fi option.

TS-7553 features a 256 MB ultra-reliable XNAND* drive, Wi-Fi option, and an inexpensive DIN mountable plastic enclosure option.

TS-7558-BOX-DIN features 16 I/O on screw-down terminals with DIN mount enclosure for industrial control applications.

* **Technologic Systems XNAND Technology** is available on many boards in the 75xx series. XNAND is an ultra reliable and industrial grade user-space device driver that uses Reed-Solomon codes, extra checksums, and a RAID based technique to allow any Linux filesystem to be used with confidence on SLC NAND flash. The result is a rugged non-volatile storage device with industrial grade flash reliability. Our TS-BOOTROM can also boot from XNAND for an ultra-reliable bootup. *Please visit our website for more information on XNAND.*

Faster. Smaller. Cheaper.



FEATURES

- > 250 MHz ARM9 CPU
- > 64 MB DDR-RAM
- > 4 MB NOR Flash
- > 5K LUT user-programmable FPGA
- > 1 microSDHC card slot
- > USB 2.0 480 Mbps host (2)
- > USB 2.0 480 Mbps slave (1)
- > 1 10/100 Ethernet
- > 8 TTL UARTs or 3 UARTs & CAN
- > 33 GPIO, SPI, and I2C interfaces
- > Watchdog timer
- > Optional battery backed RTC
- > Power-over-Ethernet ready
- > Small size (67 mm x 75 mm)
- > Low power (400 mA @ 5 V)
- > Fanless operation from -20 °C to +70 °C
- > Unbrickable, boots from SD or Flash
- > Boots Linux 2.6 in less than 3 seconds
- > AppKit includes baseboard and enclosure



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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 base board, 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 base board.

A TS-SOCKET Macrocontroller is an embedded CPU board that implements the TS-SOCKET specification. The form-factor is 75 mm x 55 mm, 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 5 V power source. Peripherals can include USB host and device, I2C, CAN, GPIO, external bus, video, touchscreen, audio, SPI, and UART. All parts are soldered-on and no moving parts are used, ensuring embedded ruggedness and reliability.

A TS-SOCKET base board 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 are 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 base board can be used with multiple Macrocontrollers. As an application example, a base board 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.

series starts at \$92 qty 100



FEATURES

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

BENEFITS

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

TS-SOCKET MACROCONTROLLER PROJECTS

- › TS-4200: Atmel ARM9 with super low power
- › TS-4500: Cavium ARM9 at extremely low cost
- › TS-4700: Marvell PXA166 with video and 800 MHz CPU
- › TS-4800: Freescale iMX515 with video and 800 MHz CPU

PRICE AND AVAILABILITY

- › TS-4200, TS-4500, TS-4700, and TS-4800 are available now. Several COTS development baseboards are available and TS-TPC-8390 is available as a complete touch panel computer product using either TS-4700 or TS-4800 Macrocontroller CPUs.
- › Prices start at \$92 at quantity 100.

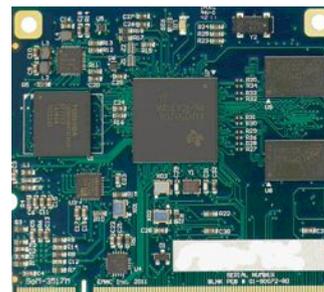


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SoM-3517

The SoM-3517 uses the same small SODIMM form-factor utilized by other EMAC SoM modules, and 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, SPI, I2C, I2S Audio, CAN 2.0B, PWMs, Timer/Counters, A/D, Digital I/O lines, Video, Clock/Calendar, and more. The SoM-3517M additionally provides a math coprocessor, and 2D/3D accelerated video with image scaling/rotation. Like other modules in EMAC's SoM product line, the SoM-3517 is designed to plug into a custom or off-the-shelf carrier board containing all the connectors and any additional I/O components that may be required. The SoM approach provides the flexibility of a fully customized product at a greatly reduced cost.

Contact EMAC for pricing & further information.

FEATURES

- > TI ARM Cortex-A8 600 MHz Fanless Processor
- > Up to 512 MB of DDR2 SDRAM
- > Up to 1 GB of NAND Flash
- > 2 High Speed USB 1.1/2.0 Host ports
- > 1 High Speed USB OTG port
- > 4 Serial ports, 2 I2C and 2 SPI ports
- > Processor Bus Expansion
- > 10/100 BaseT Fast Ethernet
- > CAN 2.0 B Controller
- > Neon Vector Floating Point Unit
- > 16-bit DSTN/TFT LCD Interface
- > 2D/3D Accelerated Video w/Resistive Touch
- > Small, 200 pin SODIMM form factor (2.66 x 2.375")

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Contact: info@emacinc.com

Phone: 618-529-4525

Website: www.emacinc.com/som/som3517.htm

I/O boards: Analog

General Standards Corporation

www.generalstandards.com/analogio5.php

PC104P-24DSI6LN 6-Channel Low-Noise 24-Bit Delta-Sigma PC104-Plus

This module is ideal for a wide variety of applications, including sonar arrays, audio waveform analysis, analog inputs, voltage acquisition, phase comparison, and acoustic research. The 6-channel analog input board provides high-density 24-bit analog input resources on a standard PC104-Plus module. It is available on adapters for alternate form factors, including PMC, PCI, cPCI and PC104-Plus, and PCI-Express. We offer free loaner boards and free software drivers.

Each of six analog input channels contains a lowpass image filter and a delta-sigma A/D converter that provides digital antialias filtering. A linear-phase digital antialiasing filter rejects out-of-band signals, and a lowpass analog filter reject those interference signals that fall within the harmonic images of the digital filter. Input response can be selected as DC coupled for response down to DC, or as AC-coupled for maximum dynamic range.

An internal sample-rate generator is adjustable over a 2:1 frequency range, and is divided down within the local controller to provide individual channel sample rates from 2KSPS to 200KSPS. Conversion data from all active channels is transferred to the PCI bus through a 256K-sample data buffer that is supported by two DMA channels. Multiple channels can be synchronized to perform sampling in "lockstep", either by a software command, or by external hardware sync and clock input signals.



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FEATURES

- > Low Phase Skew Typically less than 55ns with Fsig < 0.35*Fsamp
- > 110dB Dynamic Range to 100KSPS; 98 dB SINAD
- > 6 Differential 24-Bit Analog Input Channels
- > Delta-Sigma Converter per Channel, with Linear Phase Digital Antialias Filtering
- > Synchronous/Independent ADC Clocking; sample rates from 2-200 KSPS per Channel
- > Software-Compatible, and I/O Connector-Compatible with PC104P-24DSI12
- > 256 K-sample FIFO Buffer with DMA, Block-Mode and Demand-Mode Transfers
- > Internal Sample Rate Generators
- > Hardware Sync and Clock I/O for Multiboard Synchronization
- > Supports GPS Synchronization to a 1PPS Input

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Multifunction A/D, D/A, and Digital I/O

The PCM-MIO is a versatile, PC/104-based analog input, analog output, and digital I/O board designed to meet customer demands for high-accuracy and high-channel-count analog and digital I/O. The board is based upon Linear Technologies' precision converters and voltage references, which require no external calibration.

The board will support up to 16 single-ended input channels, 8 differential input channels, or various combinations of both. The software-programmable input ranges are $\pm 5V$, $\pm 10V$, 0-5V, and 0-10V. The input channels are voltage protected to $\pm 25V$ and can work directly with industry-standard signal conditioning modules.

There are eight, 12-bit Digital-to-Analog (D/A) converters with individual software-programmable voltage ranges of $\pm 5V$, $\pm 10V$, 0-5V, and 0-10V. The output channels can be updated and cleared individually or simultaneously. They also work with industry-standard signal conditioning modules.

A total of 48 bidirectional TTL-compatible digital I/O lines are onboard that can be software configured as input, output, or output with readback. Twenty-four can generate interrupts if it senses a change of state on any of these lines. Each output can sink 12mA and will interface directly with opto-isolated modules.

The PCM-MIO operates over the industrial temperature range of $-40^{\circ}C$ to $+85^{\circ}C$. Free software drivers are available for C, Windows[®] XPembedded, WES7, and Linux.

WinSystems offers the board configured with the A/D converters depopulated, and another version with the D/A converters depopulated. This lowers the cost of the unit if these functions are not required for your application. Additional configurations are available as well. Please contact an applications engineer with your requirements.



FEATURES

- > Analog and digital I/O on one board
- > 16-bit Analog-to-Digital (A/D) converter
- > Conversion speed: 100k samples per second
- > Two quad 12-bit Digital-to-Analog (D/A) converters
- > Each individual channel independently software programmable
- > Low-noise onboard DC/DC converter
- > No adjustment potentiometers or calibration needed
- > 48 bidirectional TTL-compatible digital I/O lines with 24 capable of event sense interrupt generation
- > Free software drivers in C, Windows[®], and Linux
- > +5V only operation
- > $-40^{\circ}C$ to $+85^{\circ}C$ temperature operation
- > Configurations available with A/D or D/A only

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Multifunction DAQ-PACK Series (Up to 128 Channels)

The DAQ-PACK Series is a highly integrated multifunction data acquisition and control system. The system offers an ideal solution for adding portable, easy-to-install high-speed analog and digital I/O capabilities to any PC or embedded system with a USB port. It performs signal conditioning such as RC filtering, current inputs, RTD measurement, bridge completion, thermocouple break detection, voltage dividers, small signal inputs, and sensor excitation voltage supply.

The small, compact, multifunction I/O DAQ-PACK Series units provide the user with everything needed to start acquiring, measuring, analyzing, and monitoring in a variety of applications. These data acquisition and control devices can be used in many current real-world applications such as precision measurement, analysis, monitoring, and control in countless embedded applications.



FEATURES

- > 32, 64, 96, or 128-channel single-ended or differential analog inputs
- > High-speed USB 2.0 multifunction DAQ
- > Sustained sampling speeds up to 500kHz
- > 12 or 16-bit resolution A/D converter
- > Flexible, software configured functionality
- > 18 input ranges, 9 unipolar and 9 bipolar, per 8-channel programmable
- > Wide range of flexible signal conditioning types
- > Autocalibration and oversampling for real-time accurate data
- > A/D starts via software, timer, or external trigger
- > Two 16-bit analog outputs and 16 high-current digital I/O lines
- > 16-bit programmable counter/timer

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Xtreme I/O ADC-DAC Analog I/O Solution

Xtreme I/O ADC-DAC is an analog and digital peripheral board for the PCI-104 small form factor embedded marketplace.

Connect Tech offers two models of the Xtreme I/O ADC-DAC. The PCI-104 ADC-DAC Analog Input & Output Model offers 32 single ended/16 differential channels of 16 bit analog input, 4 channels 16 bit analog output, and 16 bit GPIO. The PCI-104 ADC Analog Input Model offers 32 single ended/16 differential channels of 16/12 bit analog input and 16 bit GPIO.

The Xtreme I/O ADC-DAC is ideal for data acquisition, measurement and control applications.



FEATURES

- > Analog Inputs: 32 Single Ended/16 Differential Channels, 16/14/12 bit, 100kps, Software-Programmable Input Ranges
- > Analog Outputs: 4 Channels, 16/16/12 bit resolution, 6 programmable output ranges
- > Digital I/O: 16-bit bidirectional I/O
- > -40°C to 85°C (-40°F to 185°F)
- > Windows, Linux, QNX
- > Fully PCI-104 compliant
- > Custom solutions
- > Lifetime warranty
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USB-DIO-96 High-Density Digital I/O

Designed for compact control and monitoring applications, this product features 96 or 48 industrial strength TTL digital I/Os. This USB device is an ideal solution for adding portable, easy-to-install digital I/O to any PC or embedded system with a USB port. The USB-DIO-96 is useful for monitoring dry contacts or generating outputs for controlling external devices such as LEDs and other indicators or system equipment. Applications include home, portable, laptop, education, laboratory, industrial automation, and embedded OEM.

These boards use 2 or 4 industry standard 50 pin IDC-type shrouded headers with 24 lines per connector. Utility 5VDC is available on pin 49 of each connector with grounds on all even numbered pins to reduce crosstalk and maintain industry compatibility. A mini USB header connector is provided in parallel with the high retention type B connector for stacking and embedded applications. Available accessories include a wide variety of cables and screw terminal boards for quick and easy connectivity.



FEATURES

- > 96 or 48 lines of digital I/O
- > High-speed USB 2.0 device, USB 1.1 backward-compatible
- > Twelve or six 8-bit ports independently selectable for inputs or outputs
- > All I/O lines buffered with 32mA source, 64mA sink current capabilities
- > I/O Buffers can be enabled or tri-stated under program control
- > Jumper selectable I/O pulled up to 5V for contact monitoring, down to ground, or floating
- > Resettable fused +5VDC outputs per 50-pin connector
- > OEM version (board only) features PC/104 module size and mounting compatibility

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Contact: contactus@accessio.com

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I/O boards: FPGA and DSP

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SMT101: Low-cost I/O-customizable and stackable platform

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The SMT101 is the industry's lowest cost and highest performance PCI/104-Express™ Xilinx Virtex-5 FXT with a local expansion bus.

Designed for a variety of applications including real-time data acquisition, control and vision, it features programmable logic with embedded PowerPC 440 processor cores, high density DRAM memory buffers, USB2.0 and PCI Express for high bandwidth data transfers.

The SMT101 is a recommended platform solution to design rugged, low-weight and small form factor embedded systems for instrumentation, avionics and military applications.



FEATURES

- > Programmable and reconfigurable logic
- > Embedded PowerPC 440 processor
- > 256MB DDR2 SDRAM memory banks
- > 1PPS synchronization and clock I/O signals
- > Two SATA connectors
- > RS-232 and USB 2.0 ports
- > PCI Express x1, x4

Compatible with our I/O mezzanine cards:

- > Multi-channel analogue and digital data converters (A/D and D/A)
- > Multichannel video I/Os (PAL/NTSC, Camera Link, DVI, HDMI, GigE)
- > Communication interfaces (Optical Fibre, RS422, Ethernet)

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I/O boards: FPGA and DSP

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SMT105: Embedded I/O-programmable module with PowerPC

SUNDANCE is a worldwide supplier and manufacturer of **industrial-class PCI/104-Express** digital signal processing (DSP), and reconfigurable small form factors and COTS **embedded systems**.

The SMT105 is the elementary brick to build a complete range of PCIe/104 small form factor, stackable I/O-configurable and programmable solutions compatible with our wide range of mezzanine cards including:

- **Multi-channel A/D and D/A** for telecommunications, high-speed data recorder, arbitrary waveform generator, cognitive multi-radio mesh networks, SATCOM, Radar.
- **Embedded vision and display** equipments for Camera-Link, GigE or RS-422 cameras, industrial inspection, automation, medical imaging, traffic monitoring, UAV equipment.
- **Communications and data recording:** Gigabit Ethernet, Fiber optics transmission, SATA recorder.

**FEATURES**

- › High-density programmable and reconfigurable logic
- › Embedded PowerPC 440 processor
- › Right mix of SRAM and DRAM memory banks
- › I/O mezzanine card expansion header
- › Two 4Gbps Fiber optic modules
- › Two SATA connectors
- › RS-232 and USB 2.0 ports
- › PCI Express x1, x4
- › Ruggedization level: Commercial or Industrial

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Contact: pci104@sundance.com

I/O boards: Multifunction

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P104-WDG-CSMA PC/104-Plus Watchdog Timer Board

This feature-rich Watchdog board will vigilantly stand guard over your system and will help avoid costly system failures. The board can be used to monitor the operation of your application program as well as operating system and will initiate a system reset in case of lockup. In addition, the P104-WDG-CSMA can monitor and control a variety of system hardware parameters such as temperature, voltage, fan speed, humidity, and more. The board was designed to allow for complete peace of mind when planning your next PC/104-based embedded system. Applications include kiosks, industrial automation, military/mission-critical, asset management and tracking, retail, medical, embedded OEM, temperature measurement, and many others which require self-reliant embedded systems.

Want more?! One general purpose optically isolated input, two isolated digital outputs to control/switch external events, two non-isolated digital outputs, two general purpose A/D inputs, and even a security light sensor that can be used to detect if the darkened interior of an enclosure is opened.

**FEATURES**

- › PC/104-Plus watchdog timer card with software selectable timeout from 4μsec
- › Watchdog open collector reset outputs
- › Temperature measurement, monitor, and alarm
- › Fan status and speed control
- › PCI/104 power monitor/limit alarm interrupt
- › Opto-isolated input to trigger reset
- › General purpose opto-isolated input, two outputs
- › Two general purpose 8-bit A/D inputs
- › External fused 5V and 12V power
- › Light sensor for enclosure security
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USB-AO Series Multifunction USB Analog Output

Small form factor USB-based data acquisition and control. The USB-AO Series is an innovative line of 12 and 16-bit USB analog output modules. Up to 16 channels of 16-bit resolution analog outputs along with two 16-bit analog inputs and 16 digital I/O lines. The USB-AO Series can be used in an assortment of USB-based embedded applications that require stable and accurate output signals. Ideal applications include light control, motion control, and process control.

The boards features both unipolar and bipolar output ranges. Additional specific ranges can be achieved as factory options. All analog output channels can be updated either individually or simultaneously. System calibration specific to user requirements can be performed via a provided, easy-to-use software utility.

A micro-fit USB header connector is provided in parallel with the high retention type B connector and can be used for stacking and embedded applications.



FEATURES

- › Up to 16 analog outputs with 12 or 16-bit resolution
- › Unipolar and bipolar output ranges
- › Real-time hardware calibration per channel
- › Update outputs individually or simultaneously
- › Two 16-bit analog inputs and 16 lines of digital I/O
- › OEM version (board only) features PC/104 module size and mounting compatibility
- › Alternate micro-fit embedded USB header connector
- › Type B USB connector features industrial strength and high-retention design
- › Extended operating temperature and DIN rail mounting provisions

ACCES I/O Products, Inc. | 858-550-9559

Contact: contactus@accessio.com

Follow us on Twitter @accessio

Mezzanines: ExpressCard

www.smallformfactors.com/p366643



www.AlphiTech.com

PCIe-Mini-AD8200

The PCIe-Mini-AD8200 with 1X Lane PCI Express Mini card and a simultaneously sampled A/D, offers a mix of up to 8 single-ended or 4 differential analog input channels. All channels feature programmable gain 1 or 2 and can be programmed to handle analog input with a single-ended or differential configuration.

The 16-bit A/D converters can provide a global acquisition and conversion time of $\leq 5\mu\text{sec}$ per sample per channel. The board offers a programmable digital filter with $\pm 5\text{ V}$ range and the -3 dB frequency is typically 15 kHz. In the $\pm 10\text{ V}$ range the -3 dB frequency is typically 23 kHz.

Alphi Technology offers a variety of PCI Express Mini cards: PCIe-Mini-DA16, PCIe-Mini-1553, PCIe-Mini-ARINC429, PCIe-Mini-CAN, PCIe-Mini-DIO and more.



FEATURES

- › 8 channels 16-bit A/D converter simultaneously sampled
- › Fast throughput rate: 200 KSps for all 8 channels
- › 8 channels SE or 4 pseudo differentials
- › Single-ended or 4 differential channels
- › True bipolar analog input ranges: $\pm 10\text{ V}$, $\pm 5\text{ V}$ – selection applies to all channels
- › Analog input clamp protection
- › $1\text{M}\Omega$ analog input impedance
- › Programmable 2nd order anti-alias analog filter
- › Over-sampling capability with digital filter
- › PCI Express compliant

Alphi Technology Corporation | 480-838-2428

Contact: sales@AlphiTech.com



www.embeddedARM.com

Technologic Systems Industrial Controllers

Technologic Systems offers two powerful computers targeting industrial process control, the TS-8820-BOX and the TS-7558-BOX. Our Linux-powered process controllers can be connected directly to industrial equipment using rugged screw terminal connectors and isolated I/O. With Technologic Systems controllers, an intelligent automation system can be implemented at low cost with a minimal number of components.

The TS-7558-BOX

The TS-7558-BOX is a complete solution for extremely low cost industrial control applications. Designed around the mature Cavium 250MHz ARM9 architecture, the TS-7558-BOX is priced at \$199 (qty 100) including the plastic enclosure. The screw terminals bring out 16 I/O-isolated inputs, isolated outputs, and ADC. TS-7520-BOX with 50 DIO and 8 ADC is also available.

The TS-8820-BOX

The TS-8820-BOX is a powerful solution for a wide variety of industrial applications. This controller features an 800MHz CPU housed in a rugged extruded aluminum enclosure that exposes the I/O on screw terminals while protecting the sensitive electronics. 120 screw terminals on the TS-8820-BOX bring out 16 I/O-ADC, DAC, H-bridges, relays, isolated CAN, isolated RS-232, and isolated RS-485. TS-8820-BOX is priced at \$588 (qty 100), including the enclosure.

FPGA Flexibility

Both products feature FPGAs, making them an ideal solution for industrial applications that require non-standard interfaces. The standard DIO, PWM, and pulse counter functionalities work for many applications, but many others would benefit from custom logic, which can be expensive. For a one-time engineering charge, Technologic Systems engineers can create custom FPGA programming to solve a wide variety of problems. The opencore FPGAs also enable customers with Verilog programming expertise to do their own development.

Software

The TS-7558-BOX and TS-8820-BOX both boot Linux in under 3 seconds, allowing your application to start working immediately. The Linux kernel can be loaded from an SD card or from the industrial SLC XNAND drive. XNAND is recommended for a guaranteed bootup.

Full Debian Linux is also supported, allowing sophisticated software solutions such as database servers, web servers, and custom applications in Ladder Logic, Structured Text, Java, PHP, python, perl, or any language supported by Debian.

For both the TS-7558-BOX and the TS-8820-BOX, Technologic Systems provides a C library for accessing all hardware features, as well as a wrapper utility for scripted access. A complete industrial control application with a web-based user interface served by the controller can be written in the scripting language of your choice.

Industrial Controllers

start at
\$199
qty 100



Picture of TS-8820-BOX

FEATURES

- > Program in C or ladder logic
- > 800MHz CPU (8820)
- > 250MHz CPU (7588)
- > Fanless operation from -20°C to +70°C
- > Rugged industrial screw-down connectors
- > Opto-isolated digital I/O
- > 16 channels of 16 bit ADC (8820)
- > 8 channels of 12 bit ADC (7588)
- > 16 bit digital counters
- > PoE capable 10/100 Ethernet
- > USB Host ports
- > RS-232, RS-485, CAN (isolated on 8820)
- > Industrial SLC XNAND drive
- > User-programmable opencore FPGA
- > DIN mount option



Technologic Systems | 480-837-5200

Contact: info@embeddedARM.com
www.embeddedarm.com/Ind-Ctrl



www.ept.de/index.php?colibri-connectors

Colibri

ept Inc. has launched **Colibri**, a new surface mount board-to-board connector designed to meet the specifications for PICMG COM Express®. The Colibri connector system is designed to be both rugged and flexible. Colibri is a double-row connector system consisting of a socket and plug. The two components each have a pitch dimension of 0.5 millimetres and are produced using SMT technology. Colibri connectors feature 220 pins, but the number can be individually configured as required. ept gives its customers additional flexibility by offering Colibri products that are compatible with all common connectors available on the market. Colibri connectors from ept meet all requirements of the PICMG COM Express®, SFF-SIG Core Express® and nanoETXexpress standards. The Colibri model with an overall height of eight millimetres is the first in the range with further versions in various heights and pin numbers to follow in due course.



FEATURES

- › Surface mount board-to-board connector system
- › Meets the specifications for PICMG COM Express®
- › Contacts designed for .5mm pitch
- › 8mm stack height
- › 220 pin count
- › Intermatability with available connectors on the market
- › Robust connector design
- › Plug connector with ground shield
- › Receptacle connector with ground pins

EPT, Inc. USA | 215-547-4056

For more information contact: Steve Lawler | slawler@eptusa.com

Packaging: Power supplies

www.smallformfactors.com/p366618



www.WinSystems.com

Wide Input DC/DC Power Supplies with -40° to +85°C Operation

The PCM-DC-AT512 is one of three different PC/104 wide input range, DC/DC power supplies. The input voltage range for the units is from 10 to 50V DC which allows them to work with 12, 24, or 48V battery operated or distributed DC power systems. All versions will operate from -40° to +85°C with no fans or heat sinks, and are well suited for applications including pipelines, transportation, communications, solar power, and military.

The standard output voltage for the PCM-DC-AT500 is +5V @ 20A. The triple output PCM-DC-AT512's voltages are +5V @ 20A, +12V @ 3A, and -12V @ 0.5A. Also a PC/104-Plus unit called the PPM-DC-ATX, provides +5V, +3.3V, +12V, -12V and +5V standby output plus signals for suspend and sleep modes.



FEATURES

- › PC/104 compliant fanless, DC/DC power supply
- › 10 to 50V input range
- › Multiple output voltages supported
- › Overvoltage and overcurrent protection
- › No minimum load needed for regulation
- › No fan or heatsink require
- › -40° to +85°C temperature operation
- › PC/104-Plus version with ATX support available
- › Custom OEM configurations

WinSystems, Inc. | 817-274-7553

Contact: Info@WinSystems.com

Twitter: WinSystemsInc • Facebook: WinSystems • LinkedIn: WinSystems Inc.

ADVANTECH

www.advantech.com/embcore/

COM-Express Compact – SOM-6765

SOM-6765 is powered by the super low power Intel® Atom™ N2600 and D2700 processors based on COM.0 R2.0 type 2 pin-out. Type 2 pin-out and legacy I/O support make for easy migration, and type 2 connectors are resistant to shock and vibration while offering high bandwidth, and high-speed data transmission. The new SOM-6765 offers ample performance with a focus on super low-power consumption and is suitable for a variety of handheld and portable devices, digital signage, vehicle devices, marine equipment, and mobile medical equipment.



FEATURES

- › Embedded Intel® Atom™ Processor N2600/D2700 + NM10
- › Intel Gfx support DX9 and OGL 3.0
- › Supports VGA, 18/24-bit LVDS
- › Support DDR3 memory up to 1066 4G
- › Support 2 PCIe x1, 4 PCI Master, LPC, SMBus, I2C Bus, 2 SATAII, EIDE, 8 USB2.0, GbE
- › Supports Advantech iManager and software APIs

Advantech Corp., USA

38 Tesla, Suite 100 • Irvine, CA 92618
Toll Free: 800-866-6008

Contact: ECGinfo@advantech.com

Twitter: www.twitter.com/advantech_usa

Facebook: www.facebook.com/advantechusa

ADVANTECH

www.advantech.com/embcore/

SOM-7565

SOM-7565 is Advantech's first COM-Express Mini module compliant with the COM R2.1 type 10 specification for customers targeting ultra low-power applications. The compact design (84 x 55 mm) is about the size of a business card, making it suitable for portable applications in point of sale, transportation, medical and factory devices. With Intel® Atom™ processor N2600 + chipset NM10 at TDP 5W, Advantech is able to provide a powerful solution consuming around 8W during heavy loading. While customers enjoy the benefit of low-power consumption, the dual-core processor delivers a 40% or more improvement in processing power compared to Intel® Atom™ processors N455 and E680. Designing a carrier board driven by SOM-7565 provides customers with ample performance yet super low power consumption.



FEATURES

- › Embedded Intel® Atom™ Processor N2600 + NM10
- › Intel Gfx support DX9 and OGL 3.0
- › Supports 18-bit LVDS, eDP/HDMI/DVI/DisplayPort
- › Onboard 2 GB DDR3 800 memory
- › Support 3 PCIe x1, LPC, SMBus, I2C Bus, 1 SATAII, 8 USB2.0, GbE
- › Supports Advantech iManager and software APIs

Advantech Corp., USA

38 Tesla, Suite 100 • Irvine, CA 92618
Toll Free: 800-866-6008

Contact: ECGinfo@advantech.com

Twitter: www.twitter.com/advantech_usa

Facebook: www.facebook.com/advantechusa



Connect Tech Inc.
Embedded Computing Experts

www.connecttech.com

COM Express® Carrier Boards

Connect Tech's COM Express® Carrier Board is a full featured compact carrier (175mm x 115mm), compatible with COM Express® Type 2 Basic or Compact modules. Optional expansion capabilities via PCI-104 or PCI/104-Express allow users to easily add I/O, FPGA or a myriad of other peripherals from the extensive PC/104 ecosystem to create a unique commercial-off-the-shelf solution.

The COM Express® Carrier Board features SATA, mSATA, Compact Flash, USB, Gigabit Ethernet, Serial, GPIO and LVDS/VGA/HDMI video, and can be used with any COM Express® module from major manufacturers for access to the most current processors.

COM Express®



FEATURES

- > COM Express® Type 2 Basic and Compact module compatible
- > COM Express® Carrier supports modules from major manufacturers
- > Board features include SATA, mSATA, Compact Flash, USB, Gigabit Ethernet, Serial, GPIO and LVDS/VGA/HDMI Video
- > PC/104-Plus and PC/104-Express expansion capabilities
- > Custom COM Express® Carrier Board Solutions
- > Lifetime warranty
- > Free technical support

Connect Tech Inc. | 519-836-1291 • 800-426-8979

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Pinnacle Data Systems, Inc.

www.pinnacle.com

AMD Socket S1 COM Express Module

PDSi's AMD Socket S1 COM Express Module (COMX-S1) is a low cost, compact, embeddable computing core with the capability to drive a broad range of OEM applications. Built around AMD's x86-based Socket S1 processors, it enables 64-bit computing at a progression of performance levels from the ultra low-power AMD Sempron™ 2100+ (perfect for fanless applications) to the dual-core muscle of the AMD Turion™ X2 TL62.

The Computer-on-Module design is fully compliant with PICMG COM Express Type 2 specifications, offering a large variety of interfaces to cover the needs of most embedded applications. The AMD M690/SB600 chipset provides I/O versatility, with interfaces for high speed data, audio, high-resolution graphics and more. PDSi's companion COM Express Carrier Board (COMX-CB) provides a plug-and-go platform with physical ports for virtually all of the I/O types supported by the COM Express Module.



FEATURES

- > Supports AMD Socket S1 processor family including: AMD Turion™ 64 X2 dual-core mobile/Mobile AMD Sempron™
- > Up to 4 GB DDR2 SDRAM
- > Video – Dual Ch LVDS, VGA, optional TV Out
- > AC '97 audio interface, optional HD Audio
- > 4 PCI Express interfaces (x8, x1, x1, x1)
- > 8 USB ports
- > 4 SATA II ports
- > 1 Ethernet port (10/100/1000)
- > PICMG COM Express Type 2 compatible pinout
- > MicroATX Carrier Board available for rapid startup
- > Extended availability assured, 3rd party integration welcomed

Pinnacle Data Systems, Inc. | 614-748-1150

Contact: info.sales@pinnacle.com

Artila

www.artila.com

M-506

The M-506 is a 3.5" form factor ARM9 Linux-ready single board computer with on-board TTL/LVDS LCD interface that can drive TFT LCD panels up to 1280 x 860 pixels. 4-wire resistive touchscreen is also supported. The M-506 is a reliable computing platform for mission-critical industrial applications, including intelligent transportation system, building automation, energy-saving system, and scenario control systems, where human machine interface is necessary.

The M-506 is powered by ATMEL 400MHz AT91SAM9G45 ARM9 CPU, with on-board 128MB SDRAM, 128MB NAND Flash. The M-506 is pre-installed with Linux kernel 2.6.38 and file system, plus rich commonly-used utilities and daemons and various hardware device drivers. The M-506 provides rich real-world IOs, including one 10/100Mbps Ethernet, four USB 2.0 high-speed (480Mbps) hosts, three RS-232 ports, one RS-422/485 port and four GPIOs.



FEATURES

- > ATMEL 400MHz AT91SAM9G45 ARM9 CPU
- > 128MB SDRAM, 128MB NAND Flash
- > Linux kernel 2.6.38 with file system
- > On-board TTL/LVDS LCD interface, supports 5V/12V LCD panels, up to 1280 x 860 pixels
- > Free GNU toolchain included with Gtk+ and Qt-embedded GUI libraries
- > One 10/100Mbps Ethernet
- > Three RS-232, one RS-422/485 serial ports
- > Four USB 2.0 hosts, supports high speed mode (480Mbps)
- > One micro-SD socket, supports upto 16GB capacity
- > Four GPIOs
- > Standard 3.5" form factor
- > 12-40VDC wide range power input

Artila Electronics Co., Ltd. | 8862-8667-2340

Contact: sales@artila.com

ADVANTECH

www.advantech.com/embcore/

AIMB-214

AIMB-214 is powered by the newest ultra low power Intel® Atom™ processors which are built on 32nm process technology. The thermal design power rating of the Intel N2600 dual core architecture is only 3.5W, while with the dual core 1.8GHz processor is only 8W, enabling future power reductions, smaller systems and performance improvements. All these features are packed into a space-saving, power-efficient, and cost-effective Mini-ITX form factor. AIMB-214 utilizes the Intel NM10 chipset, provides both DC12V & ATX12V support, offering a lower total cost of ownership. AIMB-214 can support system memory up to either 2 GB or 4 GB of DDR3 1066 SDRAM, depending on the processor.



FEATURES

- > Supports Intel® Atom™ processor N2600, N2800 and D2700 dual core
- > One 204-pin SODIMM up to 4 GB DDR3 1066 MHz SDRAM
- > Supports 1 PCI and 1 Mini-PCIe expansion, 6 serial ports, 8 USB, and Cfast
- > Lower total cost of ownership with DC12V support and support 18/24-bit LVDS
- > Onboard TPM 1.2 support (optional)
- > Supports embedded software APIs and Utilities

Advantech Corp., USA

38 Tesla, Suite 100 • Irvine, CA 92618

Toll Free: 800-866-6008

Contact: ECGinfo@advantech.com

Twitter: www.twitter.com/advantech_usa

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www.WinSystems.com

Single or Dual core Intel® ATOM™ 1.66GHz EPIC SBC

The EPX-C380 is a highly integrated, single or dual core, single board computer designed for rugged, performance-driven applications. It operates over a temperature range of -40°C to +85°C without a fan and is designed for applications including industrial automation, security, medical/diagnostic equipment, MIL/COTS, test and measurement, and transportation. WinSystems uses chipsets from Intel's long life embedded road map to ensure longevity of the core technology.

The EPX-C380 features two Gigabit Ethernet ports, simultaneous display of both X VGA and LVDS flat panel video, eight USB 2.0 ports, four serial COM ports, HD (7.1) audio, and 48-lines of digital I/O. It supports up to 2GB of SDRAM, Type I and II CompactFlash, plus two SATA channels for disk drives.

PC/104-Plus and miniPCIe expansion is supported for additional special I/O requirements and wireless networking. It also supports advanced features such as custom splash screen, power management modes, PXE boot, and multi-language support. The board supports Windows® XP Embedded, Linux, and other x86-compatible RTOSs.

WinSystems also makes an EBX and SUMIT-ISM single board computers which are powered by the Intel Atom processor. Both SBCs are packed with I/O functions and have graphic controllers for processor-intensive applications.

The SUMIT-ISM SBC measures 3.6 x 3.8 inches (90 x 96mm), and supports PC/104 module expansion. The EBX SBC measures 5.75 x 8.00 inches (146 x 203mm), and also supports PC/104 module expansion.

WinSystems offers a 30-day product evaluation program.

www.WinSystems.com/EPX-C380P



FEATURES

- > 1.66GHz Intel® Atom™ processor N450 single core or D510 dual core available
- > Embedded Gen 3.5+ GFX video core supports CRT and LVDS flat panels simultaneously
- > Custom splash screen on start up
- > Optional 1MB of battery-backed SRAM
- > Two Gigabit Ethernet ports
- > Two SATA channels
- > Eight USB 2.0 ports
- > Four serial RS-232/422/485 channels
- > 48 bi-directional digital I/O lines
- > CompactFlash (CF) card supported
- > Mini PCIe and PC/104-Plus expansion connectors
- > High definition audio supported (7.1)
- > +5V only operation
- > EPIC sized: 4.5" x 6.5" and RoHS compliant
- > EBX sized SBC also available, EBC-C384
- > Extended temperature operation
- > Responsive and knowledgeable technical support
- > Long-term product availability
- > Quick Start Kits for software development

ADVANTECH

www.advantech.com/embcore/

MI/O Extension SBC – MIO-5250

MIO-5250 (Multiple I/O) Extension Single Board Computer is designed with the MI/O Extension form factor (146 x 102 mm) and powered by Intel® Atom™ Dual Core processor. MIO-5250 not only features an ultra low power processor and rich I/O capability, but is also equipped with flexible multiple I/O expansion which delivers faster time-to-market using fewer development resources.

Advantech's MI/O Extension form factor with integrated multiple I/O helps system integrators to optimize solutions in a more cost-effective way. Customers receive the best current I/O choices to meet their vertical application development needs, as well as helping them retain their specialist domain know-how. MIO-5250 takes advantage of MI/O Extension by saving up to 20% of system space as well as providing flexibility for future I/O expansion and upgrades.



FEATURES

- › Embedded Intel Atom Dual Core processor N2600/ N2800/D2700 + Intel NM10, 1 x DDR3 memory support up to 4 GB
- › DirectX® 10.1, multiple display: 24-bit LVDS1, 48-bit LVDS2, HDMI, VGA
- › Flexible design by using integrated multiple I/O: MIOe to approach vertical applications & keep domain know-how
- › 2 GbE support, HD Audio, Rich I/O interface with 4 COM, 1 SATA, SMBUS, 8-bit GPIO, PCIe Mini Card & CFast
- › Supports iManager, embedded software APIs and Utilities

Advantech Corp., USA

38 Tesla, Suite 100 • Irvine, CA 92618
Toll Free: 800-866-6008

Contact: ECGinfo@advantech.com

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Embedded Solutions™

www.adl-usa.com

ADLQM67PC – First Ever Sandy Bridge in PC/104 Form Factor

The ADLQM67PC features the 2nd generation Intel Core™ i7 processor that incorporate Intel's latest embedded two-chip platform. This 2nd generation i7 processor integrates Intel's HD Graphics 3000 engine with AVX (Advanced Vector Extensions) as well as the memory controller functions of a traditional GMCH. The QM67 Platform Controller Hub (PCH) provides PCI-Express I/O bandwidth at twice the speed (5Gbps) of previous i7 or Core 2 Duo platforms.

The ADLQM67PC is ideal for rugged applications where high processor performance is critical. It brings unparalleled performance to applications such as radar and sonar processing, image signal processing, tactical command and control, surveillance and reconnaissance, transportation and railway.



FEATURES

- › Intel Core i7-2655LE, 2.2 GHz PCIe/104 SBC and Celeron 827E SBC
- › Up to 4GB DDR3-1333 DRAM SoDIMM204
- › Type 1 Bottom-Stacking PCI/104 Express V2.0 with Gen2 protocol (2.5 to 5GT/s)
- › 2x SATA 600 Ports with RAID
- › 2x 10/100/1000Mbit Ethernet LAN Port
- › 2x High Speed RS232 COM Ports, 8x USB2.0 Ports
- › Separate Onboard VGA, LVDS, HDMI/DVI, DisplayPort
- › ADL-SST (System Sensor Technology)
- › Windows XP, XPe, Windows 7, Compact Embedded Support
- › Linux Compatible
- › Operating Range -25° to +70° C (-40° to +85° C available – call sales for details)

ADL Embedded Solutions | 858-490-0597

Contact: sales@adl-usa.com



www.WinSystems.com

-40°C to +85°C PC/104 SBC with Dual Ethernet

The PCM-VDX-2 is a highly integrated PC/104 single board computer (SBC) designed for space-limited and low-power applications. It is a full-featured SBC that includes a 1GHz Vortex86DX CPU with 512KB of DRAM.

I/O support includes two 10/100 Ethernet ports, four USB 2.0 ports with overcurrent protection on each channel, and four COM channels. The PCM-VDX-2 includes the standard PC controllers for IDE hard disks, CompactFlash devices, PS/2 mouse and keyboard controller, LPT, and PC/104 expansion connectors all on a single 90mm x 96mm module.

There are 16 bits of TTL-compatible digital I/O, with each line individually programmable for input, output, or output with readback 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.

There is also a depopulated version of this SBC called the PCM-VDX-1 that is designed to replace legacy 386, 486, and early generation PC/104-compatible Pentium SBCs.

The PCM-VDX has x86 PC software-compatibility, which assures a wide range of tools to aid in the designer's application program development and checkout. It supports both the Linux operating system and other real-time operating systems.

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.

WinSystems offers a 30-day product evaluation program.

www.WinSystems.com/PCM-VDXP



FEATURES

- › Fanless, low power 1GHz Vortex86DX processor
- › PC/104 bus compliant form factor (90mm x 96mm)
- › 512MB of soldered-down onboard DRAM
- › 1MB of battery-backed SRAM
- › CompactFlash socket
- › Optional 512MB onboard SSD flashdisk
- › Two 10/100 Mbps Ethernet ports
- › Four USB 2.0 ports
- › Four serial RS-232/422/485 ports
- › ESD protection on LAN, USB, and serial ports
- › 16 lines of general purpose I/O
- › PATA, LPT, PS/2 keyboard and mouse controller
- › Mini PCI and PC/104 expansion connectors
- › WDT, RTC, status LEDs, and beeper
- › Extended temperature -40°C to +85°C operation
- › Runs Linux, DOS, and other x86-compatible operating systems
- › Downloadable drivers available
- › Responsive and knowledgeable technical support
- › Long-term product availability



www.aim-online.com

AP104-1553-x

MIL-STD-1553 Test & Simulation Module for PC/104-Plus with 1, 2 or 4 Dual Redundant Streams plus up to 8 bi-directional Discrete I/O signals.

The AP104-1553-x is a member of AIM's new family of advanced PC/104-Plus bus modules targeted to embedded MIL-STD-1553A/B applications.

The AP104-1553-x Full Function version concurrently acts as the Bus Controller, Multi RT (31) & Chronological Monitor. Single Function & Simulator Versions are also available



FEATURES

- > Complex Triggering, Data Capture/Filtering, 100% Bus Recording
- > Full Error Injection/Detection (AS4112)
- > Physical Bus Replay
- > Extended temperature range variants available
- > Driver Software included: WindowsXP/Vista/7, Linux
- > Optional Databus Test & Analysis Software plus RT Production Test Plan SW

AIM-USA | Toll free 877-520-1553

Contact: salesusa@aim-online.com

For more information: www.aim-online.com/products/hardware/mil-std-1553/ap104-1553-x.aspx



www.diamondsystems.com/products/aurora

Aurora PC/104 SBC

Aurora is a rugged single board computer based on the 1.6GHZ Intel Atom Z530P CPU that conforms to the compact PC/104 form factor. Aurora supports up to 2GB of ruggedized DDR2 RSODIMM SDRAM, provides high-resolution LVDS and SDVO graphics interfaces, and offers SATA, USB, serial, digital I/O, and Gigabit Ethernet interfaces.



FEATURES

- > Intel Atom Z530P CPU running at 1.6GHz
- > Up to 2GB of ruggedized RSODIMM DDR2 SDRAM
- > 4 USB 2.0 ports
- > 2 RS-232; 2 RS-2332/422/485 ports
- > 1 Gigabit Ethernet port
- > Support for USB flashdisk up to 8GB
- > 1 SATA port
- > LVDS LCD and SDVO
- > PS/2 keyboard and mouse
- > 8 digital I/O lines
- > PC/104 (ISA) and SUMIT-A expansion buses
- > -40° C to +80° C operating temperature

Diamond Systems Corporation | 650-810-2500

Contact: sales@diamondsystems.com



www.kontron.com

Kontron Small Form Factor PC/104 SBCs

The demands placed on appliances used in the field range from extreme temperature exposure to constant vibration and much more. The solutions need to be designed to be reliable and survive under such conditions. Kontron offers PC/104 SBCs including Intel® Atom™ and Core™ Duo processor offerings within the MICROSPACE® family that do just that. Kontron uses industrial-grade components for by-design solutions that can withstand harsh conditions. Additionally, 100 percent extended temperature-tested solutions are available to ensure the solution meets the application-specific temperature requirements.



FEATURES

- › Scalable solutions offering power efficiency and performance including the latest Intel® dual core Atom™ processor and FPGA technology as well as the new AMD G-Series APU
- › Support for onboard and expandable system memory
- › Drop-in replacements within the Kontron SBC product family
- › PCIe/104™, PCI/104-Express, and PC/104-Plus
- › Request a sample today and start evaluating immediately

Kontron | 888-294-4558

Contact: info@us.kontron.com

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www.micro-technic.com/sbc2800

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 standalone applications. 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 on-board UART, and is fully compatible with the AT command set.

The power supply can be backed-up by an external Li-Ion battery. Built-in charger will insure that the battery is fully charged. 16 isolated analogue ($\pm 10V$ or 0-2.0V) inputs and 16 digital I/O channels. It is ideal for data logging and alarm systems & withstands extended temperatures, shock and vibration of mobile equipment.



FEATURES

- › **Multipurpose SBC module including:** ARM9 CPU, 180MHz, Linux bootloader, support for microSD Flash
- › **Communication:** GSM/GPRS modem (quad-band), GPS receiver, GPS data via AUX port
- › 8-50V power supply integrated, power supply, UPS circuitry, battery charger for Li-Ion
- › Data acquisition and control I/O, 16 isolated 24-bit A/D ch., 16 isolated digital I/O
- › **USB connectivity:** 2x USB host and USB device, wide temperature range: -20° to +70°C
- › **Applications:** vehicular data logging; track, control and monitor everything that moves
- › Also available as a box solution – Nanobird MS-2800

Micro Technic A/S | +45 6615 3000

Contact: sales@micro-technic.com

<http://www.linkedin.com/company/micro-technic-a-s>



PCAN-PC/104

CAN Interface for PC/104

The PCAN-PC/104 card enables the connection of one or two CAN networks to a PC/104 system. Multiple PCAN-PC/104 cards can easily be operated using interrupt sharing. The card is available as a single or dual-channel version. The opto-decoupled versions also guarantee galvanic isolation of up to 500 Volts between the PC and the CAN sides. The package is also supplied with the CAN monitor PCAN-View for Windows® and the programming interface PCAN-Basic.

FEATURES

- › PC/104 form factor
- › Multiple PC/104 cards can be operated in parallel (interrupt sharing)
- › 14 port and 8 interrupt addresses are available for configuration using jumpers
- › Bit rates up to 1 Mbit/s
- › Compliant with CAN specifications 2.0A and 2.0B
- › Connection to CAN bus through D-Sub slot bracket, 9-pin (in accordance with CiA® 102)
- › NXP SJA1000 CAN controller, 16 MHz clock frequency
- › NXP PCA82C251 CAN transceiver
- › 5-Volt supply to the CAN connection can be connected through a solder jumper, e.g. for external bus converter
- › Extended operating temperature range from -40 to 185 °F

PEAK-System Technik GmbH

Phone: +49 (0) 6151-8173-20 • Fax: +49 (0) 6151-8173-29

E-Mail: info@peak-system.com

Website: www.peak-system.com



www.adl-usa.com



ADLD25PC–Intel Atom D525 Dual Core, 1.80GHz PCI/104-Express

The ADLD25PC features the Intel® Atom D525 processor that is designed for a two-chip platform. The processor interfaces to the ICH9M-E which is also used on the ADLGS45PC and provides similar PCI/104-Express I/O connectivity to enable high performance rugged, portable and thermally constrained applications. The D525 has an Intel-rated thermal design power (TDP) maximum of 13 Watts.

The ADLD25PC is ideal for rugged and mobile applications where power consumption is critical. These jobs include deeply embedded enclosures for industrial applications, as well as rugged portable applications such as transceivers for tactical communication, GIS mapping, night vision applications, railway and other applications that often use battery-type power sources.

FEATURES

- › Up to 4GB DDR3-800 DRAM SoDIMM204
- › Type 2 Bottom-Stacking PCI/104 Express – 4 x1 Lanes
- › 2x SATA 300 Ports, 8x USB2.0 Ports
- › 1x 10/100/1000Mbit Ethernet LAN Port
- › 4x COM Ports - 2x RS232 Ports, 2x RS232/422/485 Ports
- › Optional PCIe Mini Socket for Wireless Applications & On-board Flash
- › Operating Range -25° to +70° C
(-40° to +85° C available – call sales for details)

Serving the PC/104 Industry for over 15 Years!

ADL Embedded Solutions Inc. | 858-490-0597

Contact: sales@adl-usa.com



PCAN-PCI/104-Express

CAN Interface for PCI/104-Express

The PCAN-PCI/104-Express card enables the connection of one or two CAN networks to a PCI/104-Express system. Up to three cards can be stacked together. The CAN bus is connected using a 9-pin D-Sub plug on the slot bracket supplied. The card is available as a single or dual-channel version. The opto-decoupled versions also guarantee galvanic isolation of up to 500 Volts between the PC and the CAN sides. The package is also supplied with the CAN monitor PCAN-View for Windows® and the programming interface PCAN-Basic.

FEATURES

- › PCI/104-Express card, 1 lane (x1)
- › PC/104 form factor
- › Up to 3 cards can be used in one system
- › Bit rates up to 1 Mbit/s
- › Compliant with CAN specifications 2.0A and 2.0B
- › Connection to CAN bus through D-Sub slot bracket, 9-pin (in accordance with CiA® 102)
- › NXP SJA1000 CAN controller, 16 MHz clock frequency
- › NXP PCA82C251 CAN transceiver
- › 5-Volt supply to the CAN connection can be connected through a solder jumper, e.g. for external bus converter
- › Extended operating temperature range from -40 to 185 °F

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Phone: +49 (0) 6151-8173-20 • Fax: +49 (0) 6151-8173-29

E-Mail: info@peak-system.com

Website: www.peak-system.com

Processor boards/SBCs: PC/104-Plus



Cool FrontRunner-AF

Intended for applications in areas like medical, digital signage, transport, and traffic control, the Cool FrontRunner-AF integrates the AMD Fusion APU and controller hub on a standard 3.8" by 3.6" PC/104-Plus board. Two APU choices are available: A single core processor at 1.0 GHz, and dual core processor at 1.65 GHz.

The Cool FrontRunner-AF is available in all temperature grades, commercial (0°... 60°C), industrial (-25°... 60°C), and extended (-40°... 85°C, only T40R). Its power consumption varies with the processor type from 10 to 18 watts.

The board runs Windows 7, Windows Compact 7, Windows XPe, Windows XP, and Linux operating systems. LEMT is implemented for condition management and other functions, including live power monitoring.

FEATURES

- › AMD Fusion G-Series Accelerated Processing Unit (APU), running at 1.0 GHz (T40R, single core) and 1.65 GHz (T56N, dual core)
- › 4 GB DDR3 SODIMM maximum
- › Graphics processor, handles DirectX 11 and vector processing
- › LVDS and VGA, with backlight and control
- › HD audio
- › 6x USB 2.0
- › 1x SATA, 1x CFAST
- › Gigabit LAN
- › 2x RS232/RS422/RS485
- › SPI and SMB buses
- › CFast slot
- › EFI-BIOS

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Contact: ussales@lippertembedd.com

Fax: 678-417-6273



PCAN-PC/104-Plus

CAN Interface for PC/104-Plus

The PCAN-PC/104-Plus card enables the connection of one or two CAN networks to a PC/104-Plus system. Up to four cards can be operated with each piggy-backing off the next. The CAN bus is connected using a 9-pin D-Sub plug on the slot bracket supplied. The card is available as a single or dual-channel version. The opto-decoupled versions also guarantee galvanic isolation of up to 500 Volts between the PC and the CAN sides. The package is also supplied with the CAN monitor PCAN-View for Windows® and the programming interface PCAN-Basic.

FEATURES

- › PC/104 form factor
- › Use of the 120-pin connection for the PCI bus
- › Up to four cards can be used in one system
- › Bit rates up to 1 Mbit/s
- › Compliant with CAN specifications 2.0A and 2.0B
- › Connection to CAN bus through D-Sub slot bracket, 9-pin (in accordance with CiA® 102)
- › NXP SJA1000 CAN controller, 16 MHz clock frequency
- › NXP PCA82C251 CAN transceiver
- › 5-Volt supply to the CAN connection can be connected through a solder jumper, e.g. for external bus converter
- › Extended operating temperature range from -40 to 185 °F

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Phone: +49 (0) 6151-8173-20 • Fax: +49 (0) 6151-8173-29

E-Mail: info@peak-system.com

Website: www.peak-system.com



PCAN-PC/104-Plus Quad

Four-Channel CAN Interface for PC/104-Plus

The PCAN-PC/104-Plus Quad card enables the connection of four CAN networks to a PC/104-Plus system. Up to four cards can be operated with each piggy-backing off the next. The CAN bus is connected using a 9-pin D-Sub plug on the slot brackets supplied. There is galvanic isolation of up to 500 Volts between the computer and CAN sides. The package is also supplied with the CAN monitor PCAN-View for Windows® and the programming interface PCAN-Basic.

FEATURES

- › PC/104 form factor
- › Use of the 120-pin connection for the PCI bus
- › Up to four cards can be used in one system
- › Bit rates up to 1 Mbit/s
- › Compliant with CAN specifications 2.0A and 2.0B
- › Connection to CAN bus through D-Sub slot brackets, 9-pin (in accordance with CiA® 102)
- › NXP SJA1000 compatible CAN controller (FPGA implementation)
- › NXP PCA82C251 CAN transceiver
- › Galvanic isolation on the CAN connection up to 500 V, separate for each CAN channel
- › 5-Volt supply to the CAN connection can be connected through a solder jumper, e.g. for external bus converter
- › Extended operating temperature range from -40 to 185 °F

PEAK-System Technik GmbH

Phone: +49 (0) 6151-8173-20 • Fax: +49 (0) 6151-8173-29

E-Mail: info@peak-system.com

Website: www.peak-system.com



Connect Tech Inc.
Embedded Computing Experts

www.connecttech.com

Qseven Carrier Boards & Single Board Computers

Connect Tech's Qseven Carrier Boards range from light and low cost options to full featured PCI-104 and PCIe/104 embedded computing solutions.

Qseven Carrier Boards offer embedded processor options including AMD, Intel®, Freescale, TI, NVIDIA and VIA which are easily upgradeable to accommodate future generations. These bus-independent carrier boards offer Mini-PCIe and SIM-card expansion capability.

For applications that require deep I/O functionality and a rugged form factor, Connect Tech's PCI-104 and PCIe/104 Single Board Computers are completely scalable and can be used with any industry standard I/O from the extensive PC/104 ecosystem. The on-board connectors provide access to 2x SATA, 1x Gigabit Ethernet, 4x USB 2.0, LVDS and VGA Video, 2x RS-232 and 2x RS-422/485 serial ports.



FEATURES

- > Pico-ITX, PCIe/104 and PCI-104
- > AMD, Intel®, Freescale, TI, NVIDIA and VIA
- > Mini-PCIe & SIM Card Expansion
- > Board features: 2x SATA, 1x Gigabit Ethernet, 4x USB 2.0, LVDS & VGA Video, 2x RS-232 and 2x RS-422/485 serial ports
- > -20°C to 70°C (-4°F to 158°F), optional -40°C to 85°C (-40°F to 185°F)
- > Scalable and compatible with industry standard I/O options
- > Multi-vendor support from both Qseven and PC/104
- > Custom solutions
- > Lifetime warranty
- > Free technical support

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SECOQseven pITX Cross Platform Starter KIT

SECOCQ7-pITX-Xboard

Carrier Board for Qseven® Quadmo747 modules on picolTX Form Factor. Cross Platform Starter kit is a complete package that contains all that is necessary to start developing with Qseven® CPU modules, both on x86 and on ARM architectures, and verify the possibilities offered by these two different worlds. In every moment it will be possible to swap from one architecture to the other, changing only the module. In this way time-to-market becomes zero.

Cross Platform Starter Kit is the ideal way for x86 developers to approach ARM world, and vice-versa, exploring new possibilities and choosing the best solution for the application they have to build. When testing will be finished, it will be possible to follow the indications of SECOQSeven Design Guide to create your own-designed Carrier Board.



FEATURES

- > **Supported Modules:** All Qseven® Embedded Computer Modules
- > **Expansion Slots:** 1 x miniPCI Express slot
- > **SIM Card slot** for miniPCI Express modems
- > **Mass Storage:** 1 x S-ATA connector μSD Card Slot
- > **I/O:** Up to 7x USB ports (1 x USB client) – 1 x Gigabit/FastEthernet connector – 1xFastEth (opt), CAN Interface, 8xGPIO, 2x serial port I2C Bus, SPI, 4Wire touch controller
- > **Audio:** AC'97 and HD Audio Codec, jumper selectable Line In, Mic In Earphone
- > **Video:** LVDS Interface, HDMI Connector
- > **Power:** 12V Power jack
- > **Temp range** available in extreme version, -40°C to +85°C
- > **Dimensions:** 100 x 72 mm (3.94" x 2.83")

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Extended Temperature CompactFlash

These CompactFlash cards are targeted for applications that need industrial-grade reliability, industry-standard compatibility, and IDE hard disk drive emulation for fast program and data storage. Our CompactFlash cards have greater than 2 million program/erase cycles and unlimited reads while maintaining fast transfer speeds of up to 66MB/s in burst mode.

Fully operational from -40°C to +85°C, these CompactFlash cards are available in storage densities from 128MB to 16GB, and fit any computer, SBC, or instrument with a CompactFlash socket. Since they are True IDE Mode and ATA-3 compliant, they are compatible with different operating systems such as Linux, Windows®, and other RTOSs without requiring special drivers.

We offer in-stock product availability plus free technical telephone support with a factory applications engineer.

www.IndustrialCompactFlash.com



FEATURES

- > 128MB to 16GB storage capacity
- > Up to 66MB/s burst with 37MB/s read and 16MB/s write sustained
- > Sophisticated error-checking and wear-leveling algorithms
- > Withstands 2,000Gs shock and 16.3Gs vibration
- > -40°C to +85°C operating temperature
- > In-stock availability and RoHS-compliant

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www.connecttech.com

Solid State Drive Solutions

SSD/104 SATA is a rugged stackable storage solution with a storage capacity range from 4GB to more than 256GB. SSD/104 SATA allows up to two mSATA SSD modules to be installed into any PC/104-Plus, PCI-104, PCI/104-Express and PCIe/104 stack or embedded system.

SSA/104 SATA is available as a complete storage solution with a preinstalled mSATA module, or as a separate mSATA carrier that supports any mSATA SSD module.

Designed with the latest generation of mSATA SSD modules, SSD/104 SATA can easily be upgraded to accommodate future generations of mSATA modules for even greater system capacity and faster performance.



FEATURES

- > Storage capacity range from 4GB to >256GB
- > Supports up to two mSATA SSD Modules
- > SATA signals from any PCIe/104 or PCI/104-Express Type 2 SBC enables cable free operation
- > Performance: Host Transfer Rate: 300MB/s, Sequential Read/Write: Read: Up to 270MB/s, Write: Up to 240MB/s, Random Read & Write IOPS: Read: Up to 35k, Write: Up to 30k
- > Build options include PCI/104-Express, PCIe/104, PCI-104 and no bus option
- > Industrial Temperature: -40°C to 85°C (-40°F to 185°F)
Commercial Temperature: 0°C to 70°C (32°F to 158°F)
- > Dimensions: 3.55" x 3.775"
- > Lifetime warranty and free technical support

Connect Tech Inc. | 519-836-1291 • 800-426-8979

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www.Datakey.com/RUGGEDrive

UFX RUGGEDrive™ Memory Token

The **UFX RUGGEDrive™ Memory Token** is not your typical USB flash drive. It's **more rugged** and **more secure** than consumer flash drives, making it an ideal choice for harsh-environment embedded applications.

While functionally the same as a USB flash drive, the RUGGEDrive™ memory token utilizes solid over-molded construction – making it impervious to liquids and viturally crush-proof. RUGGEDrive™ receptacles are rated for 50,000 insertion cycles (compared to only 1,500 for USB), and are available with IP67 and MIL-STD-810F ratings. Standard cables connect RUGGEDrive™ receptacles to header or USB connectors on PC/104 and other single-board-computers. The UFX PC Adapter allows RUGGEDrive™ tokens to plug into standard PC USB ports. For increased security, each UFX token has a unique serial number, which can be utilized for data encryption.



FEATURES

- › USB 2.0 Hi-Speed (electrical) Interface
- › Capacities: 4GB, 8GB, 16GB, 32GB
- › Solid Over-Molded Construction
- › PCB-Mount and Panel-Mount Receptacle Options
- › Receptacles Rated for 50,000 Insertions (compared to only 1,500 for USB Type A)
- › Reduced Emission, MIL-STD-810F, IP67-Rated Receptacles
- › Fixed USB Vendor ID & Product ID
- › Unique Serial Number on Each UFX Memory Token
- › Receptacles Connect to Header and Type A USB Connectors
- › Ideal for Use in Harsh Environments with PC/104 and Other Single-Board-Computers
- › Adapter Allows UFX Tokens to be Used in Standard PC USB ports

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ezLCD-301

EarthLCD has introduced the all new **ezLCD-301** to its lineup of intelligent touch LCD products. Described as “The Character Module Killer,” this low cost version of the popular “ezLCD” product family was developed to give design engineers a highly functional, very flexible, extremely cost-effective alternative to buttons, switches, character modules, STN, VFD or more complex graphic touch displays.

Rapid product development is possible in Windows 7, XP, Linux, and OS X Operating Systems. Connect to your PC via USB and access the 4MB Flash drive. “EZ” to use EarthSEMPLE programming language and embedded serial terminal program to help quickly create and execute custom fonts, widgets, bitmaps, and macros.

The ezLCD-301 features a 2.6 inch color TFT LCD that delivers 400 x 240 pixel resolution, 65K colors, 180 Nit brightness, a four-wire resistive touchscreen and an integrated LCD controller system that boasts four Mbytes of flash memory and USB 2.0 and RS232/TTL interfaces. Its mechanical outline of 2.69 x 1.61 inches makes it viable for 1U high applications. The ezLCD-301-QK includes the ezLCD-301 and a USB development cable and retails for \$100 ea.



FEATURES

- › THIRD GENERATION “SMART” ALL-IN-ONE MODULE TECHNOLOGY
- › COLOR TFT LCD DISPLAY, 2.6 INCH DIAGONAL
- › 400 X 240 RESOLUTION, 16 BIT, 65,535 COLORS
- › 180 NIT BRIGHTNESS, LED BACKLIGHT
- › INTEGRATED FOUR-WIRE RESISTIVE TOUCHSCREEN
- › 16 BIT MICROCONTROLLER-POWERED LCD CONTROLLER SYSTEM
- › 4 MBYTE FLASH FOR STORING BITMAPS, FONTS, AND MACROS
- › USB 2.0 AND RS232/TTL INTERFACES
- › MECHANICAL OUTLINE: 2.69 X 1.61 INCHES, PERFECT FOR 1U
- › 3.3V OPERATING VOLTAGE, LOW POWER, RoHS COMPLIANT
- › SIMPLE EMBEDDED MACRO PROGRAMMING LANGUAGE

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For more information, visit: www.store.earthlcd.com/ezLCD-301



www.embeddedARM.com

Industrial Touch Panel Computers

Technologic Systems offers two industrial TPCs powered by 800MHz CPUs with hardware video acceleration. They are ideal for applications requiring a touch screen human machine interface (HMI), such as industrial automation, home automation, self-service machines, and point-of-sale terminals. Both offer an excellent value with a full range of features and industry standard connectors and a fanless, low power, high performance modular design. Technologic Systems TPCs are rugged, industrial, splashproof, and affordable Linux based solutions for a human machine interface with video playback capability. These complete touch panel computer solutions are designed around the TS-SOCKET standard. They ship with TFT LCD, TS-SOCKET baseboard and choice of 800MHz Macrocontroller CPU modules – Marvell PXA166 ARM9 (TS-4700) or Freescale i.MX515 ARM Cortex-A8 (TS-4800).

The TS-SOCKET Standard

The TS-TPC-8390 and TS-TPC-8900 are modular designs following the TS-SOCKET standard. TS-SOCKET defines a standard interface between a CPU module (TS-4700 or TS-4800) and an application-specific baseboard (TS-8390 or TS-8900). Applications developed for TS-TPC products can easily be ported to different hardware configurations to increase performance, decrease cost, change panel size, or add hardware features. Products based on TS-SOCKET are modular, flexible, and future-proof.

7" TS-TPC-8390 Low Cost Touch Panel Computer

The 7", 800x480 TS-TPC-8390 features 2 Ethernet ports, 4 USB ports, 6 serial ports, DIO, CAN, SPI, I2C, and 6 channels of 16 bit A/D. Qty 100 starts at \$415.

10.4" TS-TPC-8900 Expandable via PC/104

The 10.4", 800x600 TS-TPC-8900 features 2 Ethernet ports, 2 USB ports, 6 serial ports, DIO, I2C, SPI and 2MB of non-volatile RAM. Up to two CAN ports are available if supported by the Macrocontroller chosen. Options include Power over Ethernet, XBee, and Wi-Fi over mini PCI express (USB interface). Additional functionality such as relays, high-speed ADC, or extra I/O can be added via the PC/104 connector. The 64 pin PC/104 connector supports any 8 bit PC/104 peripheral, including many Technologic Systems off-the-shelf peripherals. Qty 100 starts at \$599.

Upcoming Fully Enclosed TPCs

Fully enclosed TPCs will be announced in Q2 2012.

Touch Panel Computers

start at
\$415
qty 100



FEATURES

- > Resistive touchscreen
- > LED backlit display
- > Gasketed construction
- > Tough power coated finish
- > Fanless operation from -20 °C to +70 °C
- > 800MHz ARM CPU
- > 256MB RAM
- > 256MB SLC XNAND
- > MicroSD slot
- > 5K LUT programmable FPGA
- > Fastboot Linux
- > Debian Linux
- > Dual Ethernet
- > USB ports
- > CAN
- > 2 RS-232 ports
- > RS-485
- > Mono speaker on PCB
- > Stereo audio jack
- > SPI
- > I2C
- > DIO



Technologic Systems | 480-837-5200

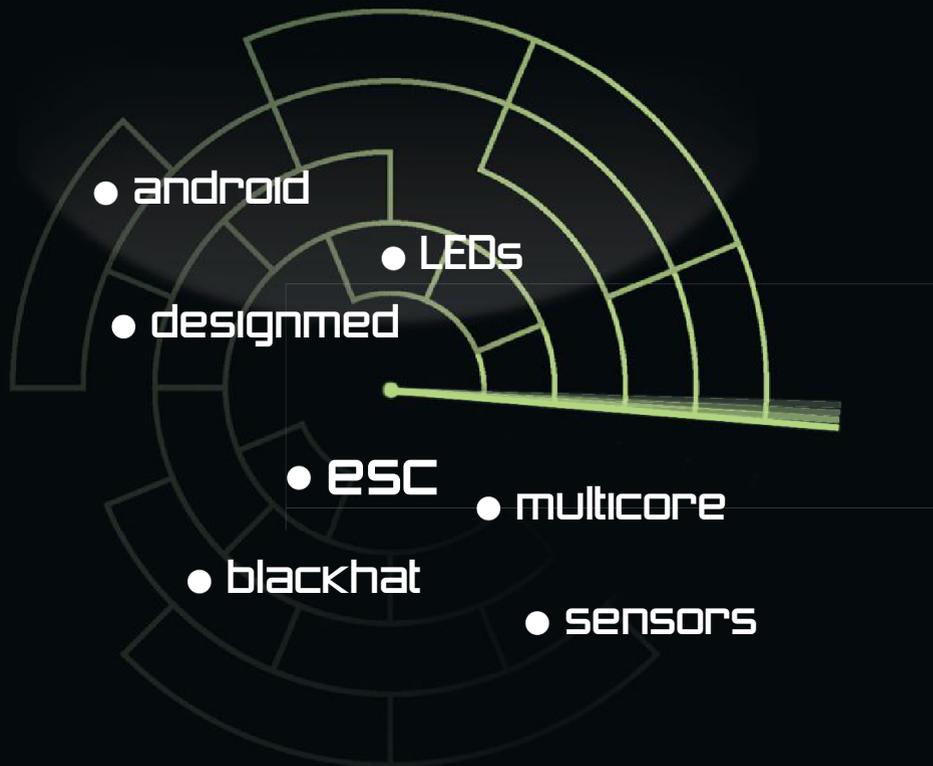
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1 GHz PC/104 SBC Supports Networking and Communications

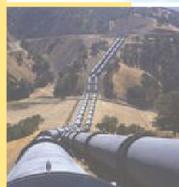
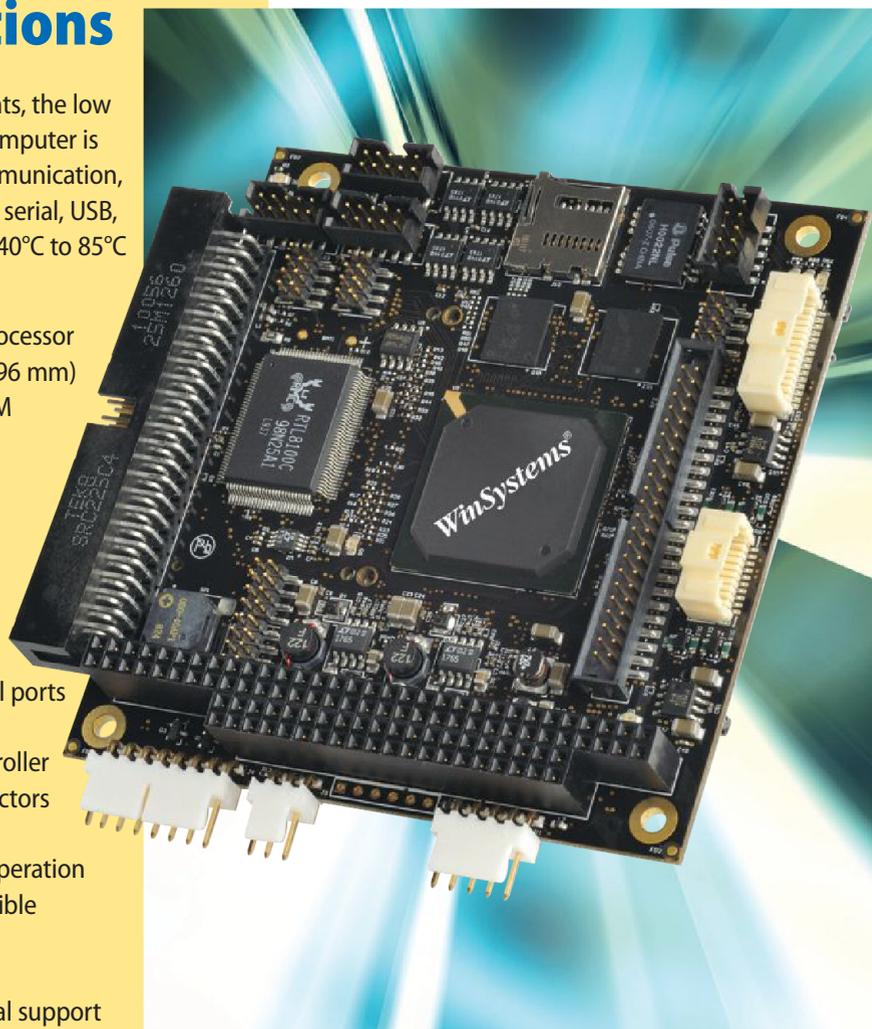
Hardened for harsh, industrial environments, the low power PCM-VDX-2 PC/104 single board computer is designed for medical, transportation, communication, and control applications. It is packed with serial, USB, and Ethernet ports, plus GPIO; and offers -40°C to 85°C extended temperature operation.

- Fanless, low power 1GHz Vortex86DX processor
- PC/104 Bus compliant form factor (90 x 96 mm)
- 512MB of soldered-down onboard DRAM
- 1MB of battery-backed SRAM
- CompactFlash socket
- Optional 512MB onboard SSD flashdisk
- Full-featured I/O includes:
 - Two 10/100 Mbps Ethernet ports
 - Four USB 2.0 ports
 - Four serial RS-232/422/485 ports
 - ESD protection on LAN, USB, and serial ports
 - 16 lines of general purpose I/O
 - PATA, LPT, PS/2 KYBD and Mouse controller
 - Mini PCI and PC/104 expansion connectors
 - WDT, RTC, status LEDs, and beeper
- Extended temperature -40°C to +85°C operation
- Runs Linux, DOS, and other x86-compatible operating systems
- Downloadable drivers available
- Responsive and knowledgeable technical support
- Long-term product availability

The PCM-VDX-2 can be customized by depopulating certain features or adding soldered-down flash memory, CompactFlash card retention clip, and/or a Mini PCI video card.

Understanding long-term product availability is a critical issue for our customers, the PCM-VDX-2 is offered beyond 2017. Contact us for additional product information and pricing. Our factory application engineers look forward to working with you.

Ask about our 30-day product evaluation.



Call 817-274-7553 or Visit
www.winsystems.com/PCM-VDXP



715 Stadium Drive • Arlington, Texas 76011
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