Dedicated Systems' News

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WIND RIVER — COTS RTCA DO-178C Certification Evidence for VxWorks Product Line

Inside this issue:

Wind River announced it has extended its safety critical systems product capabilities to support complete RTCA DO-178C certification evidence as a commercial off-the-shelf (COTS) solution. Adherence to DO-178C, Level A guidelines is now supported in Wind River's industry-leading VxWorks real-time operating system product line--specifically, VxWorks Cert Platform, for federated systems, and VxWorks 653 Platform, for ARINC 653 space and time partitioned, multi-vendor Integrated Modular Avionics (IMA) systems.

DO-178 is the guidance document recommended by the FAA to ensure software will perform safely and reliably in an airborne system. The latest revision of DO-178, revision C, includes updates to address new software methodologies and technologies not addressed by DO-178B. DO-178C was released with four supplements that address emerging software trends and technologies, specifically: software tool qualification considerations, model-based design, object-oriented design, and formal methods of certification. These documents were created by RTCA SC-205 (together with EUROCAE WG-71), a DO-178C working group which includes worldwide members from industry and government agencies. DO-178C supplements include: DO-330, DO-331, DO-332, and DO-333.

"Wind River leads the industry with its COTS DO-178C compliant certification evidence. The VxWorks 653 DVD contains over 70,000 hyperlinked files to support the insertion of this evidence into a FAA-certified system," said George Romanski, CEO of Verocel, Inc., which has been a member of SC-205 since its inception.

altec ComputerSystems — Hermetically sealed MIL Spec USB Metal Stick

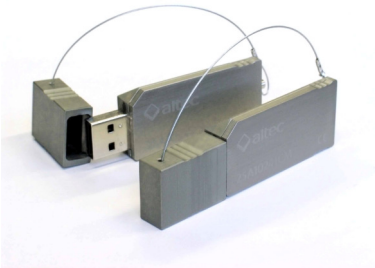
The *altec* "MIL Full Metal Stick" was developed to withstand the toughest environmental conditions as a compact and mobile data storage device. It is typically used in defence, avionics and in heavy industry applications.

The *altec* "MIL Full Metal Stick " is resistant to practically any environmental danger. The solid aluminum case encloses and protects the core, and a special compound hermetically seals the sensitive electronic components within. Accordingly, the *altec* "MIL Full Metal Stick " is completely resistant to moisture, pressure and temperature changes. The full encapsulation of the electronic circuits and the perfect mechanical bond to the enclosing case protects your data reliably against liquids, dust, dirt, shock and vibration.

Technical Specifications
– USB 2.0 downwards compatible to USB 1.1
– 4GB - 32GB SLC NAND Flash (64GB on request)
– Dimensions: 70 x 21 x 9 mm
– DC Input Voltage: 5 Volt ±10%
– Power Consumption: typical 150 mA (read/write)

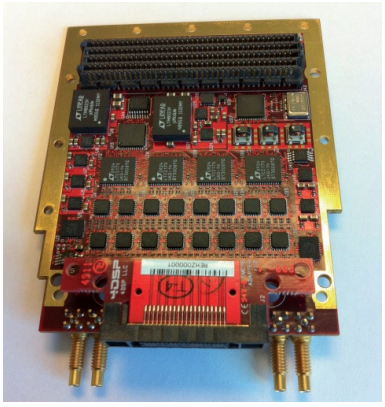
Environmental Specifications (operating):
– Temperature: -25° to +85° C
– Humidity: 8% to 95%, non-condensing
– Shock: min. 500 G
– Vibration : MIL-STD-810F, Part 15, Category 8

Transfer Rates:
– Read: approx. 33 MB/s
– Write: approx. 20 MB/s



FMC116: 16-channel 125MSPS 14-bit A/D

The FMC116 is a sixteen-channel ADC FMC Daughter Card which is fully compliant with the VITA 57.1-2008 standard. The FMC116 provides sixteen A/D 14-bit 125Msps channels which can be sampled by an internal clock source (optionally locked to an external reference) or an externally supplied sample clock. A trigger input for customized sampling control is also available. The FMC116 has the HPC (high-pin count) connector, front panel I/O, and is conduction cooled capable.



The design is based on Linear Technology's quad channel 14-bit 125Msps ADC with high speed serial DDR LVDS outputs (2-lanes per channel). The analog signal input is DC coupled with offset correction circuitry, connecting from a connector on the front panel.

The FMC116 is supported out of the box on the 4DSP FMC carriers (VP680, FC6301) and on the ML605. A reference design (FPGA firmware and host software) is available as part of the package.

DNA- Power Conversion Boards

When configuring an I/O Cube, users can choose from these layers to add the ability to generate voltages to power external devices locally. Three models with different voltage levels (±15V, +24V and ±45V) suit most industrial application requirements. These models offer an isolated DC/DC converter, overload protection, over-temperature shutdown, and a software controlled on/off switch.

DNA-PC-911
±15V power conversion board

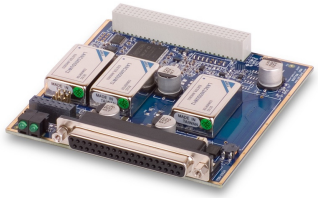
- Supplies ±15V to external devices
- Input voltage: 9-36V DC
- 36W capability
- Suited for powering DNA-AO-350
- Isolated DC/DC converter
- Overload protection
- Over temperature shutdown
- Software controlled on/off switch
- Read status of lines: voltage in limits, overload

DNA-PC-912
+24V power conversion board

- Supplies +24V to external devices
- Input voltage: 18-40V DC
- 40W capability
- Suited for powering DNA-DIO-401/402/405
- Isolated DC/DC converter
- Overload protection
- Over temperature shutdown
- Software controlled on/off switch
- Read status of lines: voltage in limits, overload

DNA-PC-913
±45V power conversion board

- Supplies ±45V to external devices
- Input voltage: 9-36V DC
- 15W capability
- Suited for powering DNA-AO-353
- Isolated DC/DC converter
- Overload protection
- Over temperature shutdown
- Software controlled on/off switch
- Read status of lines: voltage in limits, overload



AdaCore Releases GNAT Pro 7.0

model-based integration, qualified code generation for safety-critical systems

AdaCore announced the availability of GNAT Pro 7.0, a major new version of the company's flagship development environment product. This latest annual release completely implements the upcoming Ada 2012 language revision, offers a range of improvements (many based on user suggestions), supports several new platforms, includes an important new testing tool (GNATtest), and enhances several existing tools. As with all AdaCore products, GNAT Pro is Freely-Licensed Open Source Software (FLOSS).

"Although our main priority is always to maintain the highest level of support for our existing customers, we are still able to sustain a rapid pace of improvements and developments," said Robert Dewar, President and CEO of AdaCore (US). "Every major release of GNAT Pro contains substantial advances, and this release is certainly no exception. It contains many important improvements, featuring in particular a comprehensive implementation of the new Ada 2012 language standard, which is itself an exciting step forward."

The Ada programming language is reaching the final stages of a major revision, and the new standard, known as Ada 2012, will then be sent to ISO (International Organization for Standardization) for ratification. The new features establish the Ada programming language as the benchmark for developers requiring the highest levels of reliability, safety, and security. The most important enhancements relate to the concept of contract-based programming. The introduction of more powerful assertion mechanisms in the language, such as pre- and post-conditions for subprograms, global assertions, and type invariants, encourage programmers to better specify the meaning of their code, and allow run-time verification to guarantee that their intent is, in fact, obeyed. These features will also be useful for static analysis tools.

The new GNAT Pro 7.0 includes the following enhancements:

Compiler

- Complete Ada 2012 support
- New controlled type implementation (better memory usage)
- New warnings and improved error messages
- Optimizations for array processing and composite return values

Tools

- Complete Ada 2012 support
- Many new options and pretty-printing improvements in gnatpp
- New coupling metrics in gnatmetric

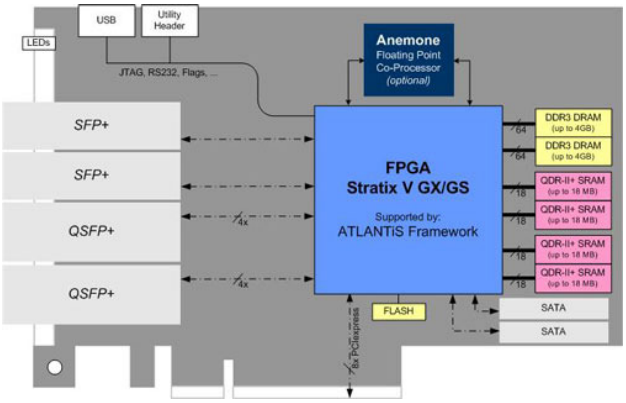
New Components

- GNATtest (Automatic Test Framework), to create and maintain a complete unit testing infrastructure for complex projects. Based on AUnit, GNATtest embodies a simple idea: each visible subprogram should have at least one corresponding unit test.

Altera Stratix® V half length PCIe Board

with Dual QSFP+ and Dual SFP+

BittWare's S5-PCIe-HQ (S5PHQ) is a half-length PCIe x8 card based on the high-bandwidth, power-efficient Altera Stratix V GX or GS FPGA. The S5PHQ is a versatile and efficient solution for high-performance network processing, signal processing, and data acquisition. Combining it with BittWare's Anemone co-processor and ATLANTiS FrameWork enhances productivity and portability and allows even greater processing efficiency. Over 8 GBytes of on-board memory includes DDR3 and QDRII/II+. Providing additional flexibility are two front-panel QSFP+ cages and two SFP+ cages for serial I/O, allowing two 40GigE and two 10GigE interfaces (or ten 10GigE), direct to the FPGA for reduced latency.



DEDICATED SYSTEMS

Upgrading COTS Legacy Systems

From the Dedicated Systems experience treasure chest

The design, maintenance and upgrade of COTS-based systems are complex tasks. New products and technologies constantly enter the marketplace. This leads to a vast array of COTS standards and products, extreme quality and capability differences between products, and potential product incompatibilities, even when they claim to adhere to the same standard families.

In this first article we assume our team of engineers is tasked to upgrade a legacy system with state-of-the-art COTS components. Let's further assume this is a system consisting of (a) VME boards (b) backplane (c) power supply (d) fans and (e) chassis. However most of below points apply equally to standards other than VME.

Remembering why COTS was adopted in the first place (cost reduction through vendor independence, support, OS compatibility, time-to-market/deployment, longevity) the team is faced with several challenges.
COTS products have built-in assumptions about how they will be used, which may or may not match your requirements. It is difficult to identify mismatches between old and new COTS components before you actually test them. One wants to avoid vendor lock-in at all times. You also want to select products that comply with the life time of your expected upgrade program – in many cases more than 5-10 years.

So, here are a few pointers from our experience treasure chest that should be considered:

Do you need to add a new capability to the legacy system?

- Are there enough empty slots in the backplane?
- Will the new boards just take power off the backplane or will they communicate with other boards?
- Does the power supply have all necessary power rails with more than enough current?
- Are the fans capable of cooling the new boards?

Do you upgrade old cards?

- What are the software implications? Will the new boards work with an older OS version or are you forced to upgrade? You may need to test and re-certify everything.

Can you also upgrade the backplane, power supply?

- Your application software and mechanical footprint are the main considerations when choosing to stay with the old or go to a new COTS standard (say from VME to VPX or VME to CPCI). VME and CPCI have slightly different depth dimensions; 3U and 6U cards can be mixed to a degree.
- You most likely have to change the cable harness from the power supply to the backplane – possibly the power supply as well.

Do you have the right tools to trouble shoot integrating new with old?

- Most backplane vendors offer extender boards for VME, CPCI, µTCA with test fields and removable bridges to measure voltages and currents.
- Analyser boards are more expensive options; they can plug into empty slots and monitor traffic on the backplane.
- Does your chosen vendor have proven support capabilities?

Do your chosen COTS components match the legacy system's environmental specification?

- Many vendors provide their products in several spec ranges and also conformal coating.

Do your chosen COTS components match the longevity requirements of the upgraded system?

- Some vendors offer packages like extended warranty, End-of-life notifications and related last time buy opportunities. You might be given 6 months time for a last time buy opportunity, followed by some years of guaranteed repair support.

How can you attempt to make future upgrades less painful then this one?

- Does your chosen vendor have roadmaps for future products? Are these products backwards compatible?
- Remember the company size of the vendor is not proportional to their commitment to the COTS market and its longevity needs. Many mid size companies working exclusively in the COTS field have proven to provide reliable and fast support – and very often have far superior lead times than their bigger competitors.

With over 30 years combined experience, we are intimately familiar with embedded software and COTS hardware. We can help you to reduce your design risk, navigate pitfalls and achieve better outcomes.