

## **Curtiss-Wright Controls Introduces Industry's First Air-Flow-Through (AFT)-cooled NVIDIA Fermi Architecture GPGPU VPX Engine**

*New ANSI/VITA 48.5-2010-compliant version of CWCDs's VPX6-490 Module delivers 864 GFLOPS in -40 to 55C Environments*

**ASHBURN, VA – June 28, 2012** – Curtiss-Wright Controls Defense Solutions (CWCDs), a business group of Curtiss-Wright Controls, has announced the industry's **first rugged Air Flow Through (AFT) cooled GPGPU embedded DSP module**. The announcement of the AFT version of CWCDs' **VPX6-490 GPU Application Accelerator**, a dual NVIDIA® GPU-based 6U VPX module based on NVIDIA's 240 CUDA® core Fermi architecture, follows the recent environmental qualification of the ANSI/VITA 48.5-2010 compliant version of the board. The VPX6-490, CWCDs's latest technology signal and image processing engine, delivers 864 GFLOP (peak) performance. With AFT cooling, at typical maximum operating air-borne and ground ambient air-temperatures of 55 degree C, the board can operate at 160W without de-rating performance for thermal management. The VPX-490's ruggedized version of NVIDIA's MXM™ module enables it to operate optimally over the full -40 to 55C inlet air military temperature range.

The VPX-490 has also passed full conduction cooled shock and vibration qualification. Enhanced with support for AFT cooling, CWCDs's highest performance DSP processor boards can now operate at higher levels of power dissipation compared to conventional conduction cooled systems that depend on heat exchangers in the system chassis. AFT cooling enables system designers to develop and deploy more powerful computing platforms than ever before.

"The combination of the VPX6-490's dual 240 core NVIDIA Fermi architecture graphics processors and AFT cooling significantly raises the DSP processing bar for demanding SWaP-constrained embedded C4ISR applications," said Lynn Bamford, vice president and general manager of Curtiss-Wright Controls Defense Solutions. "Combined with our OpenVPX™ single board computers, FPGA engines and FMC I/O modules, CWCDs offers the most comprehensive and highest performance GPGPU-based computational solutions for the most demanding HPEC applications."

"NVIDIA's 240-core GPU devices with our Fermi architecture, as used on Curtiss-Wright's VPX6-490 module, are ideal for the massively parallel processing required by today's most demanding defense and aerospace C4ISR applications," said Vineet Gupta, vice president, Global Automotive and Embedded Solutions at NVIDIA.

### **About AFT Cooling**

Curtiss-Wright was the first COTS board and system supplier to license Northrop Grumman Corporation's recently patented AFT cooling technology for use in CWCDs's rugged, deployed embedded systems. Compliant with the ANSI/VITA 48.5-2010 standard, CWCDs will offer Northrop Grumman's AFT cooling technology, which uses highly rugged, sealed processor modules, on several of its VPX (VITA 46/48/65) systems for use in dense, high performance systems such as those deployed in C4ISR applications, including SIGINT, ELINT, COMINT and radar processing.

Northrop Grumman's AFT technology (U.S. Patent Number 7,995,346) improves the air cooling of advanced electronic modules through the use of a compact core style heat exchanger design that significantly increases the cooling efficiency of removable electronic modules such as VPX (VITA 46/48) cards. CWCDs offers Northrop Grumman's AFT cooling technology on a wide range of rugged fully integrated VPX-based embedded systems. This new advanced thermal management approach provides a highly efficient open standards-based cooling method that ensures optimal performance from densely integrated host boards and mezzanine modules

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AFT modules are housed in rugged, sealed "shells" that enable cooling without directly exposing a module's electronics to contact with air. This eliminates the risk of exposure to contaminants in the air, which is an occasional peril in systems for both commercial and military applications. Northrop Grumman's AFT technology employs sliding air seals at the inlet and outlet of AFT cards. This enables the modules to be removed and replaced in the field, which can be a priority for military systems.

One of the most reliable active cooling solutions available, AFT cooling is ideal for systems that require high power densities. AFT provides a thermal path to the cooling air with the least possible resistance, making it possible for CWCDs's AFT-cooled chassis to handle thermal densities up to 200W per system slot. Each AFT card is provided with a heat frame through which the cooling air is passed. On both the inlet and the exhaust sides of the card a gasket mounted inside the chassis seals the card's internal air passage to the chassis side walls. These seals prevent air from being blown into the chassis and protect the internal electronics from the harsh external environment.

The AFT air frame both prevents the ambient system air from contacting the electronics directly and dramatically decreases the thermal path to the cooling air. This technology enables cooling air to be brought into very close proximity to a module's high power components. And because each individual module's thermal path is isolated, each card is provided its own cooling air inlet and exhaust channels, AFT eliminates the need for multiple cards to share cooling air or thermal interfaces. AFT cooling can be directed both to components on the base card, and to components on high performance mezzanine modules such as XMC cards.

#### **CWCDs's Thermal Management Expertise**

For over three decades, CWCDs has been a recognized leader in thermal management for rugged deployed systems. This unmatched expertise provides us with the ability to understand and perform trade studies for a wide range of solutions to handle the thermal load presented in program requirements. At the system level CWCDs has developed solutions that utilize forced air internal, forced air external, forced air via a rugged and compact air conditioning unit, conduction/baseplate cooled, natural convection, liquid cooled chassis and now Northrop Grumman's AFT thermal management technology.

#### **About the VPX6-490**

The VPX6-490 functions as a co-processor attached to a host Intel®-processor board and takes advantage of the new PCIe Expansion Plane definitions in the VITA 65 OpenVPX standard to provide off the shelf backplane support for high-speed interconnection between pairs of SBC/GPU. The combination of 2nd Generation Intel processors, Gen2 PCI Express interconnect and 480 NVIDIA CUDA cores raises the performance bar for embedded High Performance Embedded Computing (HPEC) systems for demanding military digital signal processing (DSP) applications such as C4ISR, EO/IR, and SatCom.

The VPX6-490 takes full advantage of GPUs based on the NVIDIA Fermi architecture. Designed for high performance computing, the newest generation of NVIDIA processors features larger internal shared memories, a completely new L2 cache, unified memory addressing and many other enhancements to improve CUDA-based applications performance and improve programmer productivity. The VPX6-490 supports its dual high performance GPU processors with a 2 Gbyte, 256-bit wide, 80 Gbyte/s GDDR5 memory subsystem designed to eliminate data bottlenecks and support large signal processing datasets into the onboard memory. Each GPU device supports a full 16-lane Gen2 PCIe interface to the backplane, supporting the maximum possible bandwidth between host and GPU. The VPX6-490 also supports 8-lane and 4-lane PCIe interfaces.

The VPX6-490 is designed to work with Intel® processor-based SBCs, such as the Curtiss-Wright VPX6-1956 2nd Generation Intel® Core™ i7 and the CHAMP-AV8 dual 2nd Generation Intel® Core™ i7 multi-processor card.

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**VPX6-490 Performance Features:**

- 6U OpenVPX™ GPGPU Application Accelerator
- 80 Gbyte/s memory bandwidth
- Enhanced GPGPU performance based on NVIDIA Fermi architecture:
  - 240 CUDA processor cores
  - 2 Gbytes GDDR5 memory
  - 256-bit memory interface
  - 16-lane Gen2 PCIe interface
  - Dual DVI graphics outputs
- CUDA library support
- Rugged air-cooled and conduction-cooled variants
- Temperature sensors
- IPMI
- 12V power

### **Curtiss-Wright Continuum HPEC Subsystem Components**

The VPX6-490 is a key element of Curtiss-Wright's new Continuum High Performance Embedded Computing (HPEC) initiative. Continuum HPEC systems consist of a large number of distributed processors, IO, and software stacks connected by a low latency system fabric. HPEC capabilities are developed in our Ashburn, VA HPEC Center of Excellence. With scalable architectures, dataflow modeling and configuration validation, Curtiss-Wright's Continuum HPEC customers can source embedded supercomputing platforms that integrate Intel®-based multi-processor boards with AVX, GPGPU co-processors, Xilinx® Virtex® 6 FPGAs, SRIO and Ethernet switching with Open Standard software solutions including VxWorks®, and Linux with OpenMPI and OFED software interfaces. Supported products include Curtiss-Wright's CHAMP-FX3 Virtex6 FPGA board, the CHAMP-AV8 dual 2nd Generation Core® i7-based multiprocessor board, the VPX6-1956 2nd Generation Core i7 SBC, the VPX6-6902 SRIO/Ethernet switch, and the VPX6-490 GPGPU module. OpenVPX™ enclosures are supported including a small 5-6 slot and 19" rack 16-slot air-cooled Chassis.

For availability and pricing information, please contact the factory.

Click here for more information on the [VPX6-490](#).

### **Sales & Editorial Contacts**

For editorial information regarding Curtiss-Wright Controls Defense Solutions products or services, contact John Wranovics, public relations director, Curtiss-Wright Controls, Tel: (925) 640-6402; email. [jwranovics@curtisswright.com](mailto:jwranovics@curtisswright.com).

Sales inquiries: Please forward all Sales and reader service inquiries to Jerri-Lynne Charbonneau, Curtiss-Wright Controls Defense Solutions, Tel: (613) 254-5112; Fax: (613) 599-7777; e-mail: [sales@cwcddefense.com](mailto:sales@cwcddefense.com). Curtiss-Wright Controls Defense Solutions, Tel: (978) 952-2017.

### **About Curtiss-Wright Controls Defense Solutions**

Curtiss-Wright Controls Defense Solutions (CWCDSD) is a long established technology leader in the development of rugged electronic modules and systems for defense applications. CWCDSD serves as a technology and integration partner to its customers, providing a full range of advanced, highly engineered solutions from modular open systems approaches to fully custom optimized solutions. Our unmatched capabilities and product breadth span from industry standard based COTS modules to complete electronic subsystems. The company's modules and systems are currently deployed in a wide range of demanding defense & aerospace applications including C4ISR systems, unmanned subsystems, mission computing, fire control, turret stabilization, and recording & storage solutions. Additionally, the company's broad engineering capabilities combine systems, software, electrical, and mechanical design expertise with comprehensive program management and a broad range of life-cycle support services. For more information visit [www.cwcddefense.com](http://www.cwcddefense.com).

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**About Curtiss-Wright Controls, Inc.**

Headquartered in Charlotte, NC, Curtiss-Wright Controls is the Motion Control segment of Curtiss-Wright Corporation. With manufacturing facilities around the world, Curtiss-Wright Controls is a leading technology-based organization providing niche motion control products, subsystems and services internationally for the aerospace and defense markets. For more information, visit [www.cwcontrols.com](http://www.cwcontrols.com).

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