VPX3U-AD5000E-VO-CV

NVIDIA Ada, Video Outputs: DisplayPort, 12G-SDI

Key Features

- NVIDIA RTX™ 5000 (AD103) GPU with 9728 CUDA Cores, 304 Tensor Cores, 76 RT Cores
- 16 GB GDDR6 256-bit memory with up to 576 GB/s
- Up to 3x DisplayPort/HDMI/DVI outputs
- Option for up to 2x 12G-SDI outputs
- Module power: 70W to 140W, configurable

GPU Features

- Ada GPGPU parallel processing:
  - CUDA Toolkit 12, CUDA Compute capability 8.9
  - CUDA-X AI and CUDA-X HPEC libraires
  - OpenCL™ 3.0, DirectX® 12 Ultimate, OpenGL 4.6, OpenGL ES 3.2, Vulkan™ 1.2
- 304 Tensor Cores (4th Gen)
- 76 Ray Tracing cores (3rd Gen)
- NVENC (8th Gen) and NVDEC (5th Gen) with up to 8K video encoding and hardware decoding support

Connectivity / System Management

- IPMI system management, up to Tier 3
- NVIDIA GPUDirect RDMA support
- Linux and Windows drivers
- AD103 GPU support requires one of the following host CPUs: Intel H/HX/P/PX/S Class, AMD H/HS Class

Mechanical / Open Systems Architecture

- High level of ruggedization:
  - Rugged conduction cooled
  - Operating temp: CC: -40° to +70°C optimal, up to +85°C operational
  - Vibration (sine wave): 10G peak, 5 - 2000Hz
  - Shock: 40G peak
- Dimensions: 160mm x 100mm x 25.4mm
- Weight: 1.33 kg
- ANSI/VITA 48, 65 (VPX-REDI, OpenVPX)
- OpenVPX slot profile 14.4.4

Overview

The VPX3U-AD5000E-VO-CV module includes an NVIDIA RTX™ RTX 5000 Ada embedded GPU and an optional WOLF FGX2 in a rugged 3U VPX module. The NVIDIA RTX 5000 embedded GPU provides the advanced processing capabilities for high performance embedded computing (HPEC) and artificial intelligence (AI) processing. The WOLF FGX2 provides video conversion for up to 4K formats which are not native to the GPU, such as SDI, ARINC 818, and other formats by request.

The NVIDIA Ada architecture includes CUDA cores for HPEC, 4th generation Tensor cores for AI and data science computations, and 3rd generation Ray Tracing (RT) cores for visually accurate rendering. The Ada GPU uses a new TSMC 4N NVIDIA Custom Manufacturing Process which to increased efficiency. The denser Ada GPUs have more CUDA and Tensor cores operating at higher clock frequencies at the same power, delivering significantly more performance per watt compared to WOLF's previous generation product.

Unlocking the best performance requires the best cooling capability. WOLF's advanced cooling technology is designed to move heat using a low weight, high efficiency path from the GPU die to the wedgelocks.

This information is subject to change

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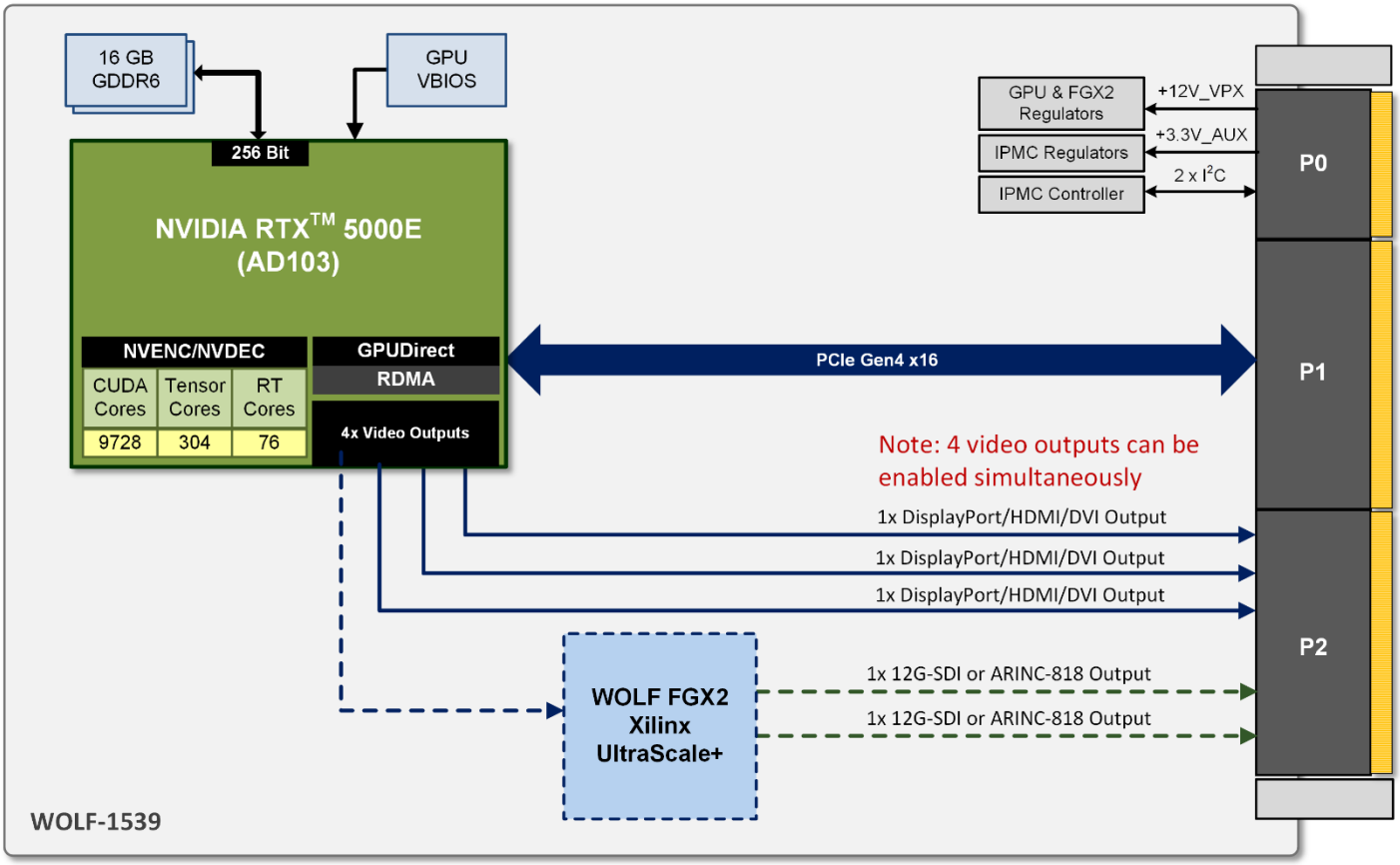
The VPX3U-AD5000E-VO-CV module uses a WOLF chip-down design to provide NVIDIA's advanced Ada architecture GPU technology on an extremely rugged board, making it an excellent choice for aerospace and defense applications. WOLF designs and manufactures these modules in North America with full component traceability.

The OpenVPX model supports PCIe x16 with up to Gen4 support, routed directly to the P1 connector.



The Ada RTX 5000 GPU supports up to 4 video outputs. Three of those outputs are routed directly to the P2 connector. One is routed to the P2 pinout assignment used for SOSA Aligned SBCs for ease of integration, and also to provide compatibility with the cables typically used in lab settings when a backplane may not be available (e.g. Meritec cables). Note that in order to accommodate the SBC video pin mapping this product is not pin compatible with WOLF-1538.

One GPU output can be routed to the WOLF FGX2 to be converted into SDI (up to 12G-SDI data rates) or ARINC 818 formats. The video output can be a DP MST carrying two 4K video streams. When two streams are carried to the FGX2 the additional two streams available from the GPU can be output directly to P2 in DP/HDMI/DVI format.

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Power and Performance

An NVIDIA GPU will operate at the GPU clock speed available at the set TGP (total GPU subsystem power). The highest clock speeds are available at the highest TGP power allowed by the GPU. When the TGP setting is decreased the clock speed will also decrease resulting in a decrease in processing speed. The GPU clock speed will also decrease if the GPU temperature exceeds 87°C to protect the GPU from heat damage. If the GPU temperature is below 86.5°C the GPU will operate at boost clock speeds when higher processing is required.

The Ada AD103 GPU in this 3U VPX module will default to a TGP power of 80W. At a TGP of 80W the base clock of 930 MHz provides up to 18.1 TFLOPS, and at higher GPU loads the boost clock can provide up to 1680 MHz which provides up to 32.7 TFLOPS. A higher TGP can be configured if the GPU can be cooled sufficiently, while a lower TGP can be configured when operating in hotter environments.

NVIDIA Ada GPU

NVIDIA Ada GPUs are manufactured using a new TSMC 4N NVIDIA Custom Manufacturing Process, an enhanced version of the N5 (5nm) node process. This allows a higher transistor density and lower voltage requirements, which provides increased efficiency. As a result, Ada GPUs have many more CUDA cores at the same die size as the previous generation, and higher clock speeds at the same power level, which leads to greatly increased processing/watt compared to the previous generation. The new Ada architecture also provides a big increase in the GPU's memory cache size, providing a boost to memory subsystem handling at the same bandwidth. With the increased performance and memory handling abilities, and improved next gen Tensor cores and RT Cores, the Ada GPUs are able provide significant performance increases compared to the previous generation.

Tensor Cores for Artificial Intelligence and HPEC

Tensor Cores are designed to speed up the tensor / matrix computations used for deep learning neural network training and inferencing operations. NVIDIA Ada architecture GPUs include the fourth-generation Tensor Core design which supports many data types for improved performance, efficiency, and programming flexibility, including a sparsity feature, a Tensor Float 32 (TF32) precision mode, and a new FP8 precision mode.

NVIDIA provides CUDA-X AI and CUDA-X HPEC libraires which have been designed to work with NVIDIA Tensor Core GPUs to provide the tools needed to accelerate development of applications for AI and HPEC.

Hardware Accelerated Video Encode / Decode

The Ada GPU includes the NVENC video encode and NVENC decode hardware acceleration engine. Using the GPU for video encoding provides an efficient, high quality method to achieve real time 8K and 4K encoding without burdening the system CPU. The Ada encoding engine includes support for several popular codecs and is the first GPU to include AV1 hardware encoding and decoding support. The NVIDIA Video Codec SDK provides a complete set of APIs, samples and documentation for hardware accelerated video encode and decode.

Slot Profile Support

This module supports OpenVPX slot profile 14.4.4, 12V power only.

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Ordering Codes

The following table defines series of common order codes for the VPX3U-AD5000E-VO-CV module. The asterisks denote characters of the part number that are defined based on common configuration options. Some configuration options for this module include:

- Display Interfaces
- FGX2 for converted video
- Default Power Threshold
- Conformal Coatings
- Variant Locked

Ordering Number	Description
3U VPX Ada AD5000 Single Slot Configurations	
153933-F***-***VPX3vA0	3U VPX, Conduction Cooled, 1", OpenVPX, NVIDIA Ada RTX 50000, 16GB GDDR6, PCIe x16 up to Gen4, Rear: 3x DisplayPort out
153933-F***-***VPX3vA0	3U VPX, Conduction Cooled, 1", OpenVPX, NVIDIA Ada RTX 50000, 16GB GDDR6, PCIe x16 up to Gen4, WOLF FGX2, Rear: 2x 12G-SDI out, 2x DisplayPort out

* Contact Sales for the latest Ordering Numbers and available options.

Manufacturing and Quality Assurance

WOLF designs modules to pass the following environmental standards:

- MIL-STD-810 (United States Military Standard for Environmental Engineering Considerations and Laboratory Tests)
- MIL-HDBK-217 (Reliability Prediction of Electronic Equipment)
- RTCA DO-160 (Environmental Conditions and Test Procedures for Airborne Equipment) on request

WOLF complies with the following management systems:

- AS9100D: Quality Management System - Requirements for Aviation, Space and Defense Organizations (certified)
- ISO 9001:2015: Quality management systems (certified)
- AS5553: Counterfeit Electronic Parts; Avoidance, Detection, Mitigation, and Disposition (compliant)
- NIST SP 800-171: Protecting Controlled Unclassified Information in Nonfederal Systems (compliant)

Boards are manufactured to meet the following standards:

- IPC-A-610 CLASS 3 (Acceptability of Electronic Assemblies)
- IPC 6012 CLASS 3 (Qualification and Performance Specification for Rigid Printed Boards, Class 3 for High Reliability Electronic Products)
- IPC J-STD-001 (Requirements for Soldered Electrical and Electronic Assemblies)

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ITAR Free

GOVERNMENT-INDUSTRY DATA EXCHANGE PROGRAM GIDEP

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