VPX3U-A2000E-FGX2-COAX

NVIDIA Ampere, Video I/O, SDI, CVBS, 75 Ohm Coax Connectors

Key Features

- NVIDIA RTX™ A2000, 2560 CUDA cores, 80 Tensor cores, 20 RT cores
- 12G-SDI and CVBS inputs, 12G-SDI outputs
- 75 Ohm coax connectors for video I/O
- Cooling options: conduction cooled (1" pitch) or air flow through (1.5" pitch)
- Module power: 90W (default), configurable

GPU & FGX Features

- Video inputs/outputs:
  - ☐ Two 12G-SDI inputs
  - ☐ Two CVBS inputs
  - ☐ Four 12G-SDI outputs
- Ampere GPGPU parallel processing:
  - ☐ CUDA Toolkit 12, CUDA Compute capability 8.6
  - ☐ OpenCL™ 3.0, DirectX® 12 Ultimate, OpenGL 4.6, OpenGL ES 3.2, Vulkan™ 1.2
- 80 Tensor Cores (3rd Gen), 34/66 TOPS (dense/sparse)
- 20 Ray Tracing cores (2nd Gen)
- 8 GB GDDR6 128-bit memory, up to 256 GB/s
- NVENC (7th Gen) and NVDEC (5th Gen) video encoding and hardware decoding support

Connectivity / System Management

- IPMI system management
- NVIDIA GPUDirect RDMA support
- Configurable PCIe Gen4 switch
- Linux and Windows drivers
- NVIDIA Ampere GPU support requires the following host CPUs: Intel E, S/H/H35 or AMD H/HS Class

Mechanical / Open Systems Architecture

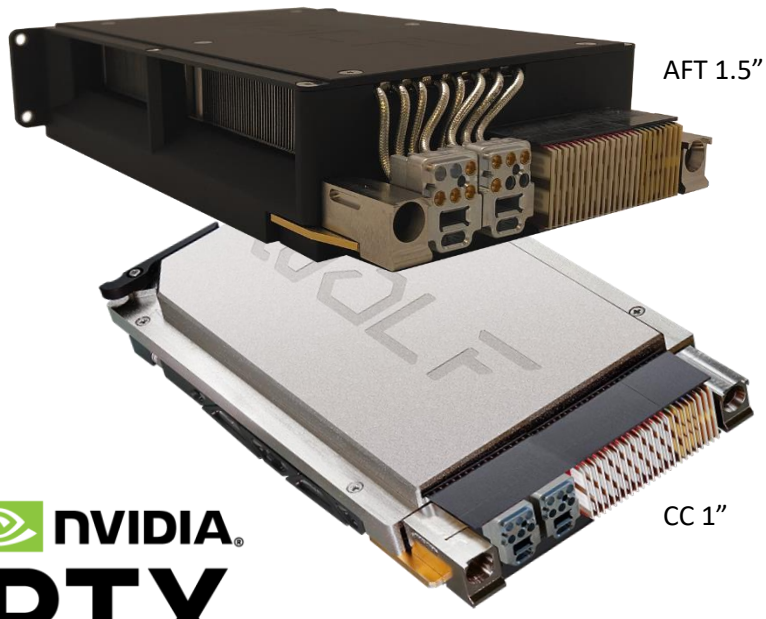
- High level of ruggedization:
  - ☐ Conduction cooled (CC) or Air flow through (AFT)
  - ☐ Operating temp: CC: -40°C to +70°C standard, operational to +85°C; AFT: -40°C to +71°C
  - ☐ Random Vibration: VITA 47.1 Class V3
  - ☐ Shock: VITA 47.1 OS2
- Two 75 Ohm coaxial connector type C, VITA 67.3
- Dimensions: 160 x 100 x 25.4/3.81 mm
- Weight: 1.3 kg
- ANSI/VITA 48, 65 (VPX-REDI, OpenVPX)
- SOSA™ Aligned support for slot profile 14.6.11-16

Overview

The VPX3U-A2000E-FGX2-COAX module includes an NVIDIA RTX™ A2000 embedded GPU and a WOLF FGX2 in a rugged 3U VPX module. The NVIDIA Ampere architecture includes CUDA cores for parallel processing, Tensor cores for dedicated AI-accelerated compute, and Ray Tracing cores for superior rendering speeds. The WOLF FGX2 provides video conversion for formats which are not native to the GPU, such as 12G-SDI and analog formats.

The NVIDIA Ampere architecture has introduced many significant improvements to the performance and efficiency of the GPU, with more flexible CUDA FP32/INT core use, more efficient third generation Tensor cores, and second generation RT cores. The Ampere GPU fabrication uses an 8nm manufacturing processing providing significant power improvements which, along with other Ampere architecture improvements, can provide up to 103 GFLOPS/W, providing almost twice the performance compared to the previous Turing generation's 60 GFLOPS/W or the Pascal generation's 46 GFLOPS/W.

Unlocking the best performance requires the best cooling capability. WOLF's advanced cooling technology moves heat away from the hot components using an efficient conduction cooled or air flow through design.



NVIDIA RTX

This information is subject to change

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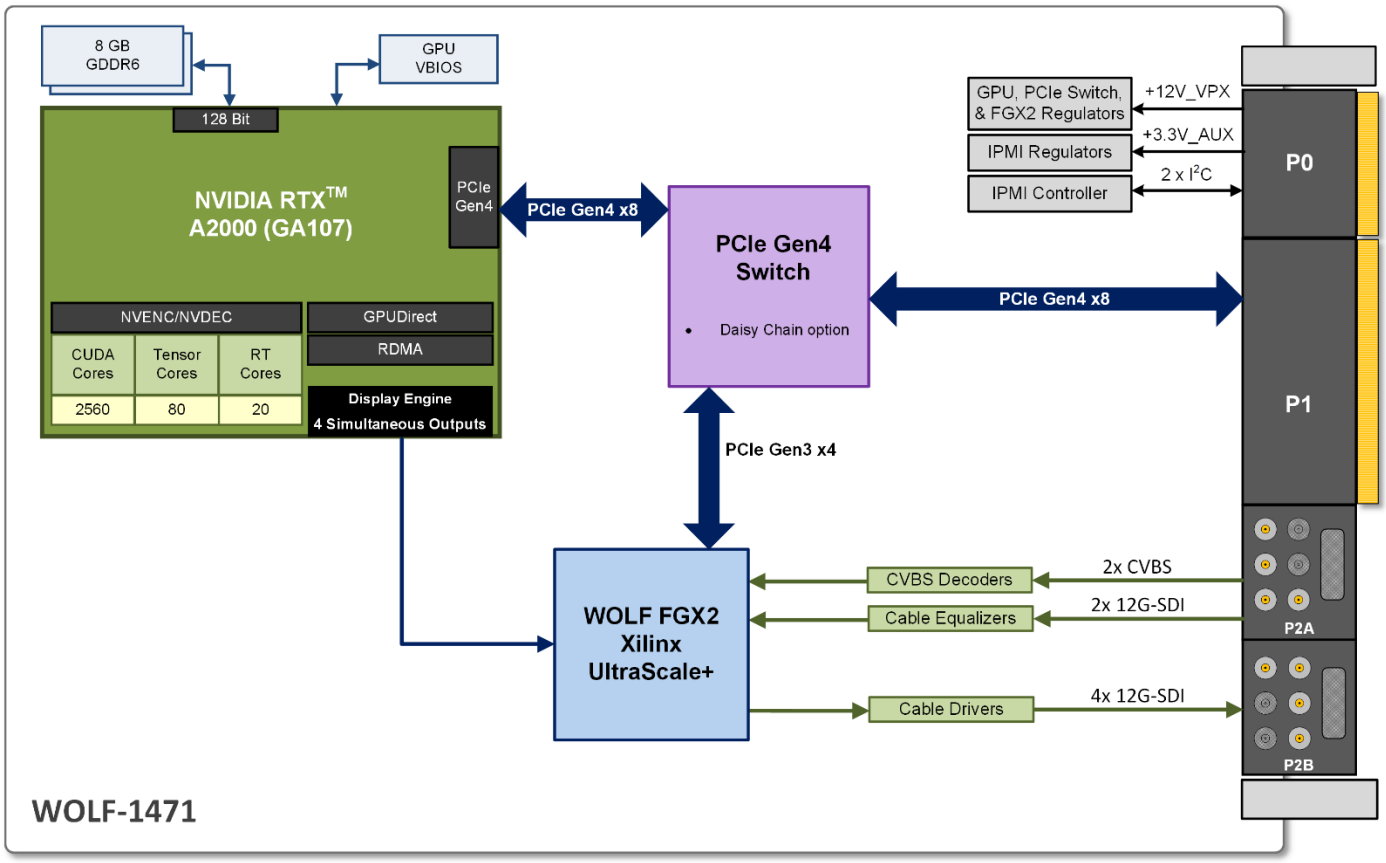

Chip-Down Design

This module uses a WOLF chip-down design to provide NVIDIA Ampere architecture GPU technology and the WOLF FGX2 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.

NanoRF 75 Ohm Contacts in P2

VITA standards have been revised to define a new hybrid NanoRF/optical connector with up to six 75 Ohm NanoRF contacts per connector and one optical connector. It was specifically defined for video capture and transmit, and it can support up to 18+ GHz.

VITA standards working groups made revisions to VITA 65.0, 65.1 66.5, and 67.3 to define the new connectors and new slot profiles for the modules that will use these connectors.

The Technical Standard for SOSA™ Reference Architecture, Edition 2.0, Version 2, also references this new connector and provides coaxial pin definitions for each contact.

This information is subject to change

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. If the GPU temperature is below 87°C the GPU can operate at boost clock speeds when higher processing is required. If the GPU temperature exceeds 89°C the GPU base clock speed will also decrease to protect the GPU from heat damage.

The Ampere GA107 GPU typically operates at TGP power levels from 35W to 80W. At 80W the base clock of 1387 MHz provides 7.1 TFLOPS FP32 performance while the boost clock of 1815 MHz provides 9.2 TFLOPS. At 35W the base clock of 607 MHz provides 3.1 TFLOPS while the boost clock of 1177 MHz provides 6.0 TFLOPS.

NVIDIA Ampere Streaming Multiprocessor (SM)

Each NVIDIA Ampere architecture streaming multiprocessor (SM) partition contains CUDA cores for FP and INT operations, Tensor cores for AI, Ray Tracing (RT) cores for rendering, Texture Units, a register file, and L1/Shared Memory. Each previous generation Turing SM partition had two primary datapaths, with one able to process FP32 operations while the other was limited to integer operations. An Ampere SM partition's two primary datapaths can both process FP32 operations, with one datapath dedicated to FP32 operations and the other capable of executing either FP32 or integer operations. For operations which require only FP32 operations this doubles the number of available CUDA cores per SM. This change to the available functionality of the primary datapaths along with many other improvements to the other components in the Streaming Multiprocessor allows Ampere GPUs to provide significant performance improvements.

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 Ampere architecture GPUs include the third-generation Tensor Core design which supports many new data types for improved performance, efficiency, and programming flexibility, including a new sparsity feature and a new Tensor Float 32 (TF32) 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 Ampere GPU includes the NVENC video encode (version 7.2) and NVENC decode (version 5) hardware acceleration engine. Using the Ampere GPU for video encoding provides an efficient, high-quality method to achieve real time 8K and 4K encoding without burdening the system CPU. The Ampere decoding engine includes support for several codecs, including AV1 hardware decoding support. The NVIDIA Video Codec SDK provides a complete set of APIs, samples and documentation for hardware accelerated video encode and decode.

Ordering Codes

The following table defines series of common order codes for the VPX3U-A2000E-FGX2-COAX 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
- Conformal Coatings
- Variant Locked
- Default Power Threshold
- PCIe Configuration Options

Ordering Number	Description
3U VPX Ampere A2000 Single Slot Configurations, Mil/Aero Operating Temperatures	
147133-F**-***VPX3vA0	3U VPX, Conduction Cooled, 1”, NVIDIA Ampere A2000, 8GB GDDR6, WOLF FGX2, PCIe Gen4 x8, Rear: 4x 12G-SDI out, 2x 12G-SDI in, 2x CVBS in
1471G4-F**-***VPX3vA0	3U VPX, Air Flow Through, 1.5”, NVIDIA Ampere A2000, 8GB GDDR6, WOLF FGX2, PCIe Gen4 x8, Rear: 4x 12G-SDI out, 2x 12G-SDI in, 2x CVBS in

* 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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