XMC-A2000E-VO

NVIDIA RTX A2000 with 4 Simultaneous Video Outputs

Key Features

- NVIDIA RTX™ A2000, 2560 CUDA cores, 80 Tensor cores, 20 RT cores
- Up to 4 simultaneous video outputs
- DisplayPort, HDMI and DVI supported
- 8 GB GDDR6 memory, 128 Bit, 192 GB/s max
- Configurable operating power, 26W to 50W, with lower power/performance options available

GPU Features

- Up to 4 simultaneous video outputs
  - ☐ DisplayPort 1.4, up to 4K at 60Hz
  - ☐ DVI and HDMI support
  - ☐ Option for CC models: one VGA output
- Ampere GPGPU parallel processing support:
  - ☐ CUDA® Toolkit 11, CUDA Compute capability 8.6
  - ☐ OpenCL™ 3.0, DirectX® 12 Ultimate, OpenGL 4.6, OpenGL ES 3.2, Vulkan™ 1.2
  - ☐ GPUDirect support
- 80 Tensor Cores (3rd Gen)
- NVENC (7th Gen) and NVDEC (5th Gen) with video encoding and hardware decoding support

Connectivity/System Management

- PCIe x8; GPU supports up to Gen4 when operating at 26W and up; PCIe Gen4 requires CPU and motherboard with Gen4 support
- Linux and Windows drivers available
- NVIDIA driver support requires the following host CPU: Intel E/S/H/H35 Class, AMD H/HS Class

Mechanical/Architecture

- Designed for Harsh Environments:
  - ☐ Rugged conduction cooled (CC) or air cooled (AC)
  - ☐ Operating temp: CC: -40°C to +70°C standard, operational to +85°C; AC: -40° to +60°C standard, operational to +71C
  - ☐ Vibration (sine wave): 10G peak, 5 - 2000Hz
  - ☐ Shock: 40G peak for CC, 30G peak for AC
- Dimensions (mm): CC: 74x143.75; AC: 74x149
- Weight: CC: 276g; AC: 253g
- VITA 46.9 VPX I/O mapping patterns supported: X12d, X8d, X16s

Overview

This XMC module includes an advanced NVIDIA RTX™ A2000 embedded GPU. Data can be routed to the high-performance NVIDIA Ampere architecture GPU for processing, encoding, or AI inference, and then be output via DisplayPort, HDMI, DVI or PCIe x8.

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 144 GFLOPS/W, providing almost three times the performance of the Pascal generation's 51 GFLOPS/W.

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 to move heat away from the GPU.

NVIDIA RTX

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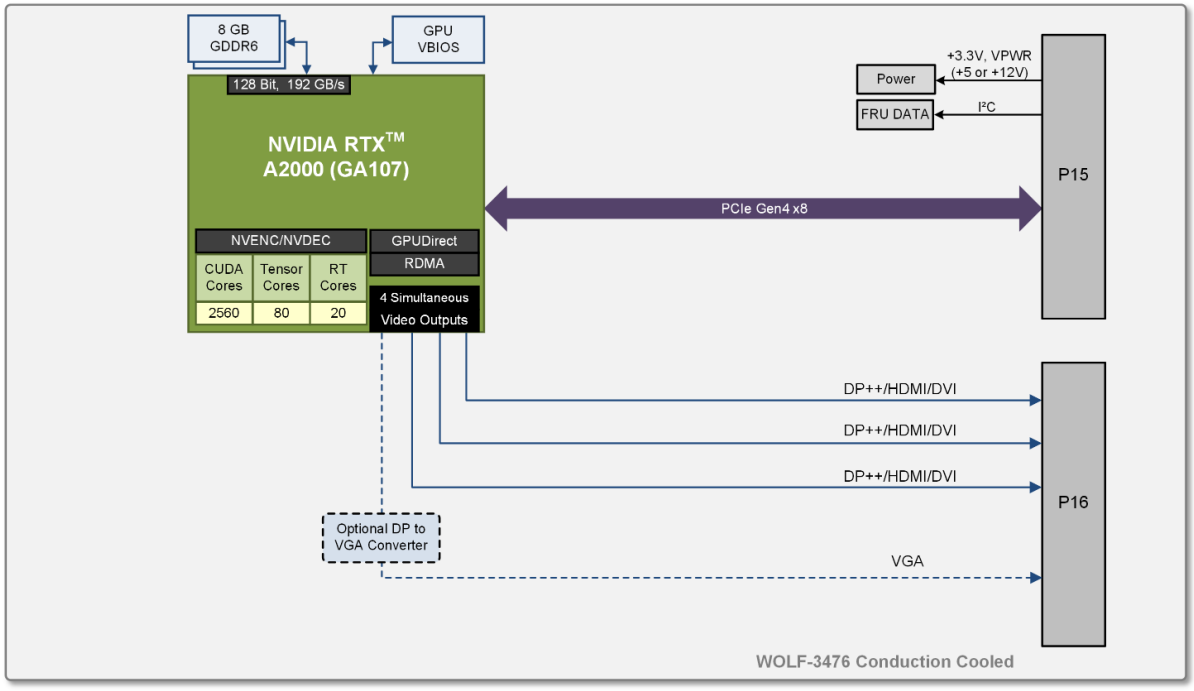

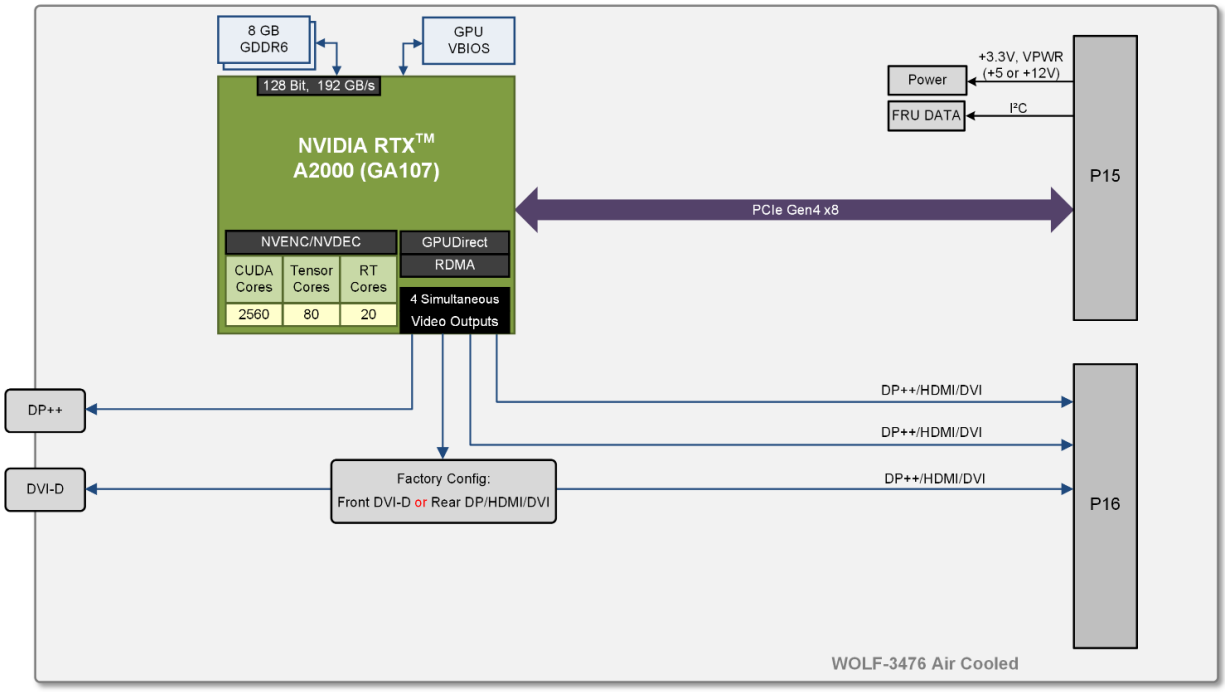

Power and Performance

Powering the XMC board with a 5V source will provide up to a TBP (total board power) of 40W. Powering the XMC board with a 12V source will provide up to a TBP of 50W.

The GPU will operate at the GPU base 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 89°C to protect it from heat damage.

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.

Fast GDDR6 Memory

Getting data into and out of a high performance GPU requires fast graphics memory to ensure that the memory does not become a system bottleneck. In moving from GDDR5 to GDDR6 the number of data transfers per clock cycle doubled from two to four, and memory chips can be read in dual-channel modes rather than just single channel modes. The newer GDDR6 memory does all of this while also slightly reducing the memory's average power consumption compared to using GDDR5 memory.

PCIe Gen4 Interface

Ampere is the first NVIDIA GPU generation to include support for PCIe Gen4, providing double the throughput of the previous generation's PCIe Gen3 speeds.

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.

This information is subject to change.

Ordering Codes

The following table defines series of common order codes for the XMC-A2000E-VO module. The asterisks denote characters of the part number that are defined based on common configuration options. Some common configuration options for this module include:

- Display Interfaces
- Conformal Coatings
- XMC 1.0, 2.0 or XMC+ (ANSI/VITA 88)
- Air or Conduction Cooled
- Maximum Power config

Part Number	Description
Example XMC-A2000E-VO Configurations	
347632-FZ011-000XMCvA0	XMC 2.0, Conduction Cooled, Ampere A2000; PCIe Gen4 x8; rear: 2x DVI-D, 1x DP++, Conformal Coating 1B73
347631-F002-000XMCvA0	XMC 1.0, Conduction Cooled, Ampere A2000; PCIe Gen4 x8; rear: 3x DP++
347622-F003-000XMCvA0	XMC 2.0, Air Cooled, Ampere A2000; PCIe Gen4 x8; front: 1x DP++, 1x DVI-D; rear: 2x DP++

* Contact WOLF to determine the appropriate configuration for your system.

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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