

VPX3U-BW5000E-SWITCH



System Switch and HPC: PCIe & Network Switch, Blackwell GPU

KEY FEATURES

- NVIDIA RTX™ 5000 (GB203) Blackwell GPU with 10496 CUDA Cores, 320 Tensor Cores
- 24 GB GDDR7 256-bit VRAM with ECC support
- Network switch and PCIe switch
- Module power: 100W to 180W, configurable

GPU FEATURES

- Blackwell GPGPU parallel processing:
 - CUDA Toolkit 12, Compute capability 10.0
 - OpenCL™ 3.0, DirectX® 12 Ultimate, OpenGL 4.6, OpenGL ES 3.2, Vulkan™ 1.2
- 5th Gen Tensor Cores with new data precisions (new: FP4 and FP6, FP8 Gen2)
- GDDR7 memory provides over 50% more bandwidth compared to the previous generation
- NVENC (9th Gen) and NVDEC (6th Gen) with up to 8K video encoding and hardware decoding support

CONNECTIVITY / SYSTEM MANAGEMENT

- Configurable PCIe Gen4 switch
- Configurable 200 GbE network switch: 8 ports up to 25GbE and one 1000BASE-T
- NVIDIA GPUDirect RDMA support
- IPMI system management
- Linux and Windows drivers
- GB203 GPU support requires one of the following host CPUs: Intel H/HX/P/PX/S or AMD H/HS Class

MECHANICAL / OPEN SYSTEMS

ARCHITECTURE

- High level of ruggedization:
 - Rugged conduction cooled
 - Operating temp: CC: -40°C to +70°C standard, operational to +85°C
 - Vibration Random: VITA 47.1 Class V3 (5 to 2000Hz)
 - Vibration Sine: 10g peak (5 to 2000 Hz)
 - Shock: 40G (MIL-STD-810H, Method 516.8)
- Dimensions: 160mm x 100mm x 25.4mm
- Weight (approximately): 1.6kg
- ANSI/VITA 48, 65 (VPX-REDI, OpenVPX)
- SOSA™ Aligned switch slot profile: 14.4.15

OVERVIEW

The VPX3U-BW5000E-SWITCH rugged 3U VPX module includes an NVIDIA RTX™ 5000 Blackwell embedded GPU, a PCIe Gen4 switch, and a 200 GbE Network switch. This module can operate both as a system switch and an HPC node, all in one slot-saving module.

The NVIDIA Blackwell GPU has an improved architecture which provides increased efficiency. The module also supports 24GB of GDDR7 memory which provides over 50% higher bandwidth compared to the previous generation. The GPU supports PCIe x16 providing a fast data transfer path to/from the module.

This module can also act as a switch, directing up to 8 ports of 25GbE network traffic per port. The PCIe switch has enough lanes to be used both to send data to the GPU and to direct PCIe data to other modules in the system.

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 hot chips to the wedgelocks.

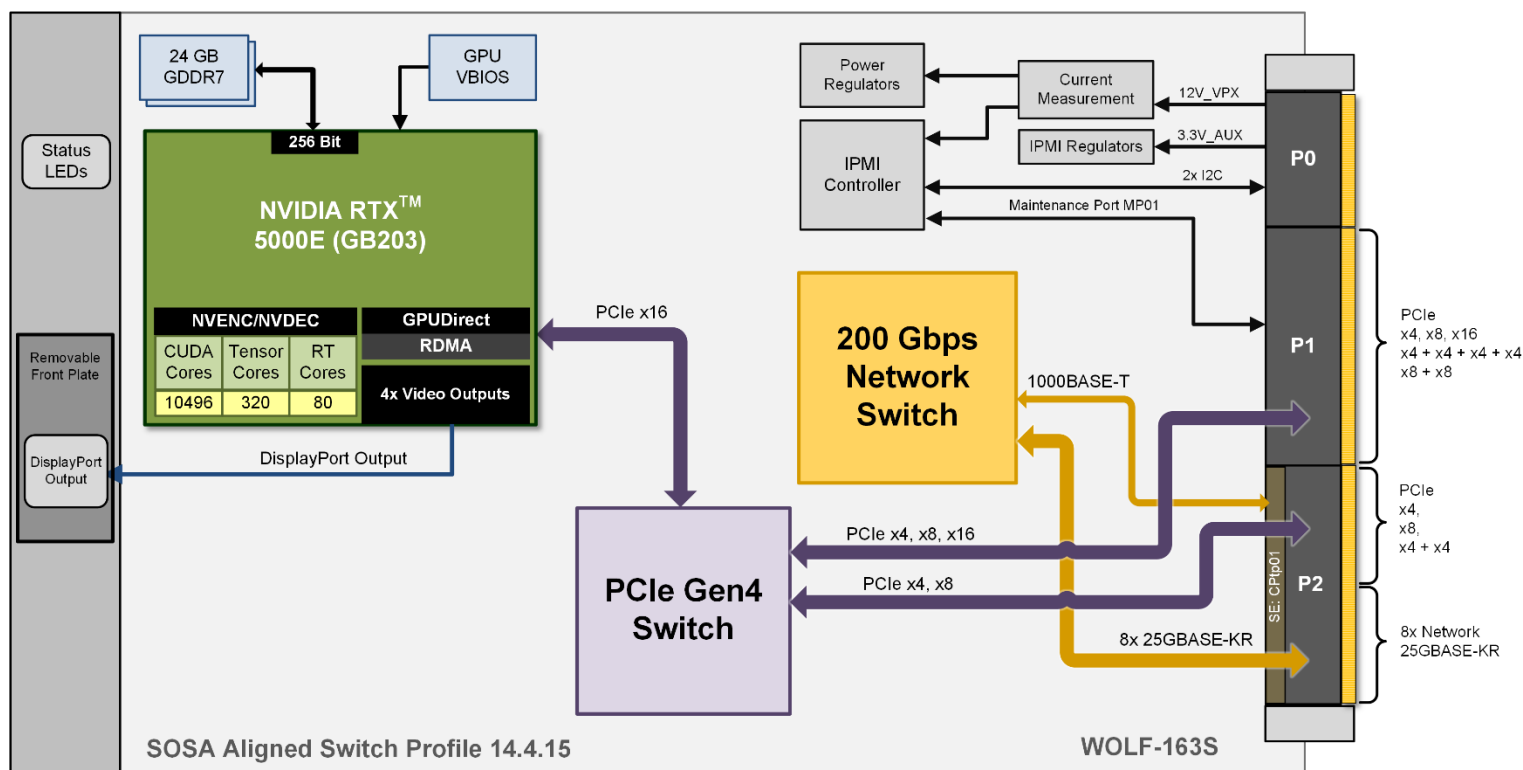


This information is subject to change

Chip-Down Design

The VPX3U-BW5000E-SWITCH module uses a WOLF chip-down design to provide switches and NVIDIA's advanced Blackwell 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.

This SOSA Aligned module supports slot profile 14.4.15 with PCIe Gen4 support and 200 GbE.



Switch and HPC in One Module

This module can operate as both a system switch and an HPC node, allowing the system designer to make efficient use of the available 3U VPX chassis space. The network switch can direct ethernet traffic between modules, with 8 ports, each up to 25 GbE. The PCIe switch can be used to route data to the GPU, while still provisioning the additional available lanes to meet other module's data switching needs.

POWER AND PERFORMANCE

An NVIDIA GPU clock speed is dependent on the TGP (total GPU subsystem power) and the GPU temperature. 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 exceeds 87°C the GPU clock speed will also decrease to protect the GPU from heat damage. If the GPU temperature is below 86.5°C the GPU can operate at maximum boost clock speeds at the currently available power when the GPU detects that higher processing is required.

The Blackwell GB203 GPU in this 3U VPX module will default to a TGP power of 100W. At a TGP of 100W the base clock of 1125 MHz provides up to 24.2 TFLOPS, and at higher GPU loads the boost clock can run up to 1792 MHz which provides up to 38.5 TFLOPS. A higher TGP of up to 150W can be configured if the GPU can be cooled sufficiently, with a maximum boost clock of 2370 MHz providing up to 50 TFLOPS.

NVIDIA BLACKWELL GPU

NVIDIA Blackwell GPUs have an improved architecture which provides increased efficiency. Blackwell GPUs have CUDA cores that can all handle either FL or INT operations, whereas previous generations restricted half of the CUDA cores for FL operations only. This is important for tasks that require lots of small, frequent lookups resulting in frequent address computations, which are commonly required by the matrix operations used by AI and HPC calculations. Optimizing these lookups ensures the data can reach the processing cores efficiently, permitting full use of the processing power. The new Blackwell architecture also supports GDDR7 memory, which provides 55% more memory bandwidth. With the increased performance and memory handling abilities, and improved next Gen Tensor cores, the Blackwell GPUs are able provide significant performance increases compared to the previous generation.

TENSOR CORES FOR ARTIFICIAL INTELLIGENCE AND HPC

Tensor Cores are designed to speed up the tensor / matrix computations used for deep learning neural network training and inferencing operations. NVIDIA Blackwell architecture GPUs include the fifth-generation Tensor Core design which supports many data types for improved performance, efficiency, and programming flexibility, including support for new INT4 and INT6 precision modes and microscaling formats. NVIDIA provides CUDA-X AI and CUDA-X HPEC libraires designed to work with NVIDIA GPUs to provide the tools needed to accelerate development of applications for AI and HPEC.

HARDWARE ACCELERATED VIDEO ENCODE / DECODE

The Blackwell 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 Blackwell encoding engine includes support for several popular codecs including AV1 hardware encoding and decoding support. The NVIDIA Video Codec SDK provides APIs, samples and documentation for hardware accelerated video encode and decode.

SOSA SLOT PROFILE SUPPORT

This module provides support for the SOSA aligned switch slot profile. The module is compatible with the previous generation WOLF-134S module, which allows the WOLF-163S to be a plug-in upgrade for the previous WOLF product.

The following SOSA aligned profile is supported: 14.4.15 Switch Slot Profile.

This information is subject to change

ORDERING CODES

The following table defines series of common order codes for the VPX3U-BW5000E-SWITCH module. The asterisks denote characters of the part number that are defined based on common configuration options. Some configuration options for this module include:

- Network config options
- Variant Locked
- Conformal Coatings
- PCIe config options
- Default Power Threshold

Ordering Number	Description
3U VPX Switch and Blackwell BW5000E Configurations	
163S33-F***-***VPX3vA0	3U VPX, Conduction Cooled, 1", 14.4.15 switch profile, NVIDIA Blackwell RTX 5000, 24GB GDDR7, PCIe P1 x16 and P2 x8, Network 8 ports each 25GbE
163S33-F***-***VPX3vA0	3U VPX, Conduction Cooled, 1", 14.4.15 switch profile, NVIDIA Blackwell RTX 5000, 24GB GDDR7, PCIe P1 x16 and P2 x4 + x4, Network 8 ports each 10GbE

* 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



Datasheet Rev.3

WOLF-163S

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