# VPX6U-BW5000E-DUAL-VO

## Dual NVIDIA Blackwell, 10496 CUDA Cores per GPU, 8 Video Outputs

### Key Features

- Two NVIDIA RTX™ 5000 (GB203) GPUs, each with 10496 CUDA Cores, 320 Tensor Cores
- 24 GB GDDR7 256-bit VRAM per GPU with ECC support
- Up to 8 DisplayPort outputs, options for HDMI
- Module power: 190W to 320W, configurable

### GPU Features

- Blackwell GPGPU parallel processing:
  - CUDA Toolkit 12, CUDA Compute capability 10.0
  - CUDA-X AI and CUDA-X HPEC libraries
  - OpenCL™ 3.0, DirectX® 12 Ultimate, OpenGL 4.6, OpenGL ES 3.2, Vulkan™ 1.2
- 320 Tensor Cores (5th Gen) per GPU
- 80 Ray Tracing cores (3rd Gen) per GPU
- NVENC (9th Gen) and NVDEC (6th Gen) with up to 8K 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 driver support requires the following host CPU: Intel H/HX/P/PX/S Class, AMD H/HS Class

### Mechanical / Open Systems Architecture

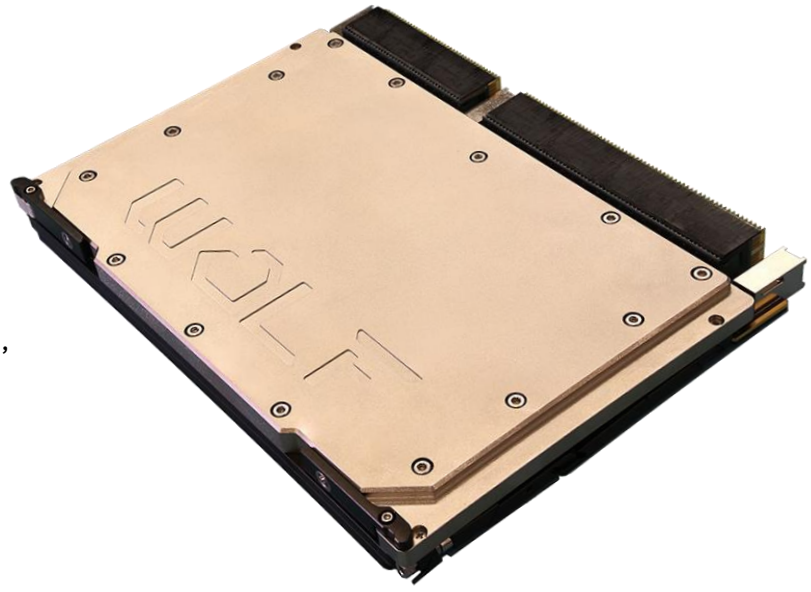
- High level of ruggedization:
  - Rugged conduction cooled (CC), air cooled (AC), or liquid flow through (LFT)
  - Operating temperature: CC: -40°C to +70°C standard, operational to +85°C, AC: -40°C to +60°C standard, operational to +71°C
  - Vibration (sine wave): 10G peak, 5 - 2000Hz
  - Shock: 40G peak for conduction cooled, 30G peak for air cooled
- Dimensions: 160mm x 233mm x 25.4mm
- Weight (approximately): TBD
- ANSI/VITA 48, 65 (VPX-REDI, OpenVPX)
- OpenVPX and SOSA Aligned profile support 10.6.4

### Overview

The VPX6U-BW5000E-DUAL-VO module includes two NVIDIA RTX™ 5000 Blackwell embedded GPUs and a PCIe Gen4 switch in a rugged 6U VPX module. The NVIDIA RTX 5000 embedded GPU provides advanced processing capabilities for high-performance embedded computing (HPEC) and artificial intelligence (AI) data processing.

The NVIDIA Blackwell architecture includes CUDA cores for HPC, and 5th generation Tensor cores for AI and data science computations. The Blackwell GPU has an improved architecture which provides increased efficiency. The module also supports 24GB of GDDR7 memory per GPU, which provides over 50% higher bandwidth compared to the previous generation. The GPU supports PCIe Gen4, providing a fast data transfer path to/from the module.

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.



NVIDIA RTX

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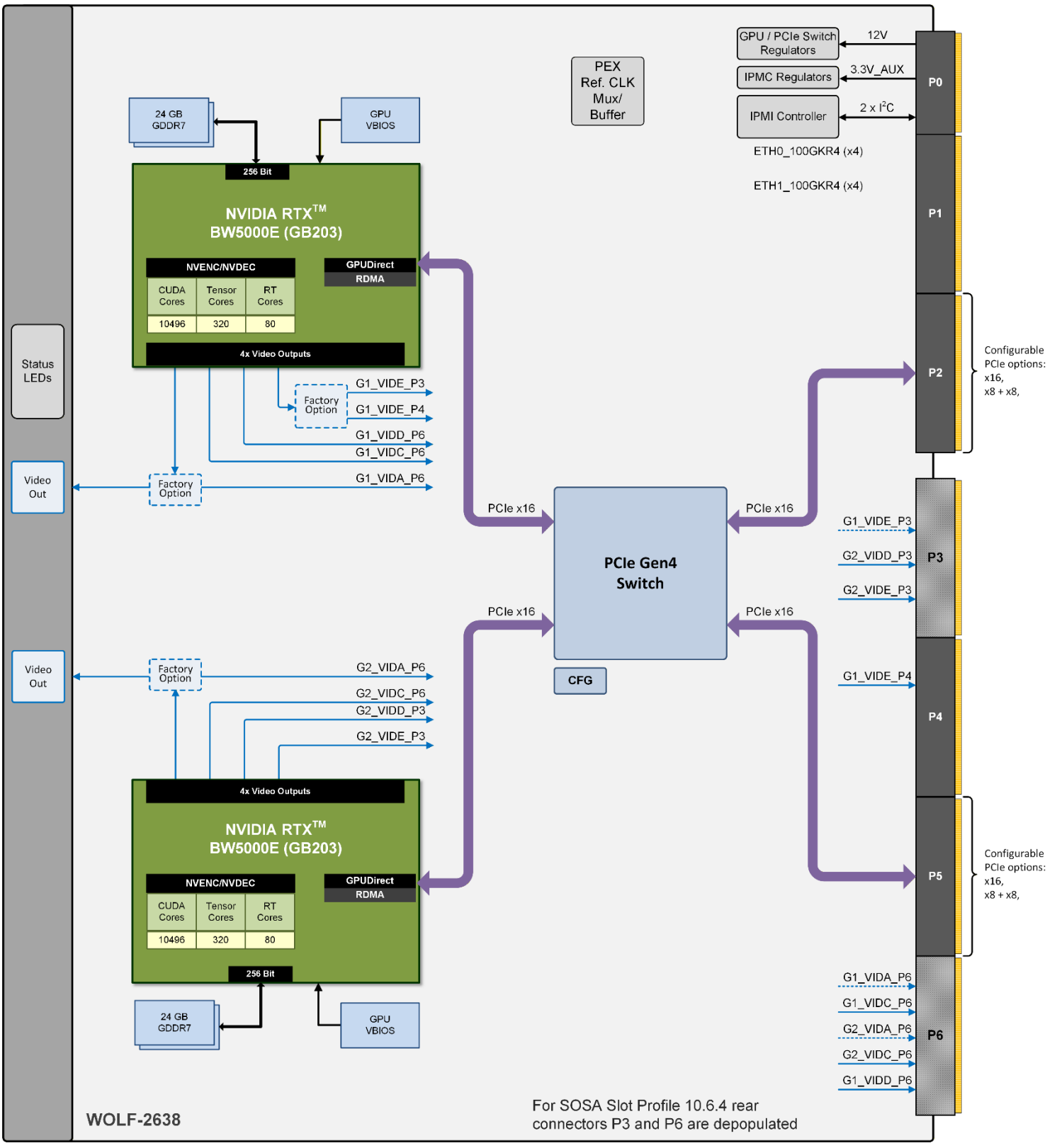


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## Power and Performance

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.

Each Blackwell GB203 GPU in this 6U VPX module defaults to a TGP of 100 W per GPU. At 100 W, the base clock of 1125 MHz provides up to 23.6 TFLOPS per GPU, while at higher GPU loads the boost clock can reach up to 1792 MHz, providing up to 37.6 TFLOPS per GPU. A higher TGP of up to 150 W per GPU can be configured when sufficient cooling is available, enabling a maximum boost clock of 2370 MHz and performance of up to 50 TFLOPS per GPU.

## NVIDIA Blackwell GPU

NVIDIA Blackwell GPUs have an improved architecture which provides increased efficiency. Blackwell GPUs have CUDA cores that can all handle either FP or INT operations, whereas previous generations restricted half of the CUDA cores for FP 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-generation Tensor cores, the Blackwell GPUs are able to 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 libraries 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 NVDEC 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 GPU also supports hardware-accelerated AV1 encoding and decoding. The NVIDIA Video Codec SDK provides a complete set of APIs, samples and documentation for hardware accelerated video encode and decode.

## SOSA and OpenVPX Slot Profile Support

This module's configurable switch provides support for SOSA aligned and OpenVPX slot profiles. The module can be configured with pin mappings that are compatible with previous generation WOLF-2538/2348 modules, which allows the WOLF-2638 to be a plug-in upgrade for previous WOLF products. The following SOSA aligned profile is supported:

- 10.6.4 Payload Slot Profile, P3 and P6 depopulated

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## Ordering Codes

The following table defines series of common order codes for the VPX6U-BW5000E-DUAL-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 are:

- Display Interfaces
- Conformal Coating Type
- COTS, MCOTS or Locked
- Open VPX or SOSA Aligned Configuration
- PCIe Switch Configuration
- Alternative cooling Configuration; AFT

| | Ordering Number | Description |
|---|---|---|
| | **6U VPX Blackwell RTX 5000 Single Slot Configurations** | |
| | 263833-F***-***VPX6vA0 | 6U VPX, Conduction Cooled, 1”, Dual NVIDIA RTX 5000 Blackwell, Rear: 8x video outputs |
| | 263833-F***-***VPX6vA0 | 6U VPX, Conduction Cooled, 1”, Single NVIDIA RTX 5000 Blackwell, Rear: 4x video outputs |
| | 2638L3-F***-***VPX6vA0 | 6U VPX, Liquid Cooled, 1”, Dual NVIDIA RTX 5000 Blackwell, Rear: 8x video outputs |

* 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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