

## NVIDIA Orin, ConnectX-6, up to 100GbE, PCIe Gen4, Video I/O

### KEY FEATURES

- Orin Industrial with embedded Ampere GPU: 2048 CUDA cores, 64 Tensor cores
- Embedded 12-core NVIDIA Cortex ARM64 CPU, 2.2GHz
- ConnectX-6, provides up to 100GbE, PCIe Gen4
- Video I/O with SDI in/out, DisplayPort/HDMI out
- Module power: configurable from 70W - 110W

### ADDITIONAL AGX ORIN FEATURES

- MST DisplayPort or HDMI output
- HD or 3G-SDI input/output, CVBS input/output
- 2x Deep Learning Accelerator (DLA) v2 engines
- Vision Accelerator engine v2
- Dedicated programmable audio processor
- Hardware accelerated video encode and decode with up to 4K-UHD resolution
- 64 GB LPDDR5, 256-bit, up to 205 GB/s
- CUDA® 12, OpenGL® 4.6, OpenGL ES 3.2, Vulkan™ 1.3

### CONNECTIVITY / SYSTEM MANAGEMENT

- Storage: NVMe 1TB on board, SATA Gen2 (3 Gbps) interface on P2
- ConnectX-6 PCIe Gen4 Switch, configurable, x8 or bifurcate down to x4, or down to x2
- Backplane Ethernet for 40/100GBASE-KR4 and 10GBASE-KR control plane support; supports RoCE
- 1000BASE-T Ethernet
- USB 3.2 and USB 2.0, uUSB for system setup
- Advanced Jetson security features
- Switching is offloaded from the CPU and run on the ConnectX hardware with NVIDIA ASAP<sup>2</sup> technology
- On-board IPMI controller for system management
- Removable front panel for setup/test/debug
- WOLF BSP with Jetson Linux and JetPack SDK

### MECHANICAL / OPEN SYSTEMS ARCHITECTURE

- High level of ruggedization:
  - Operating temperature: -40°C to +85°C
  - Vibration (sine wave): 10G peak, 5 - 2000Hz
  - Shock: 40G peak
- Dimensions: 160mm x 100mm x 25.4mm
- Weight (approximate): 1.5kg
- ANSI/VITA 48, 65 (VPX REDI, OpenVPX)
- SOSA Aligned SBC slot profile 14.2.16

### OVERVIEW

The VPX3U-ORIN-CX6-FGX-SBC module meets the needs of demanding C5ISR applications, providing a secure compute node which provides advanced AI and HPC processing capabilities, high data transfer rates, and the cyber security features required to ensure data is being protected. This autonomous SOSA aligned module includes an NVIDIA Jetson AGX Orin Industrial, NVIDIA ConnectX-6 SmartNIC, and WOLF FGX for video formats not native to the Orin.

The NVIDIA Orin's embedded Ampere GPU provides the CUDA cores and Tensor cores for data processing, deep learning inference, machine vision, audio processing and video encoding/decoding. The 2048 CUDA cores provides data processing, while the 64 Gen3 Tensor cores provides the underlying architecture required for an efficient inference engine for deep learning inference computing.

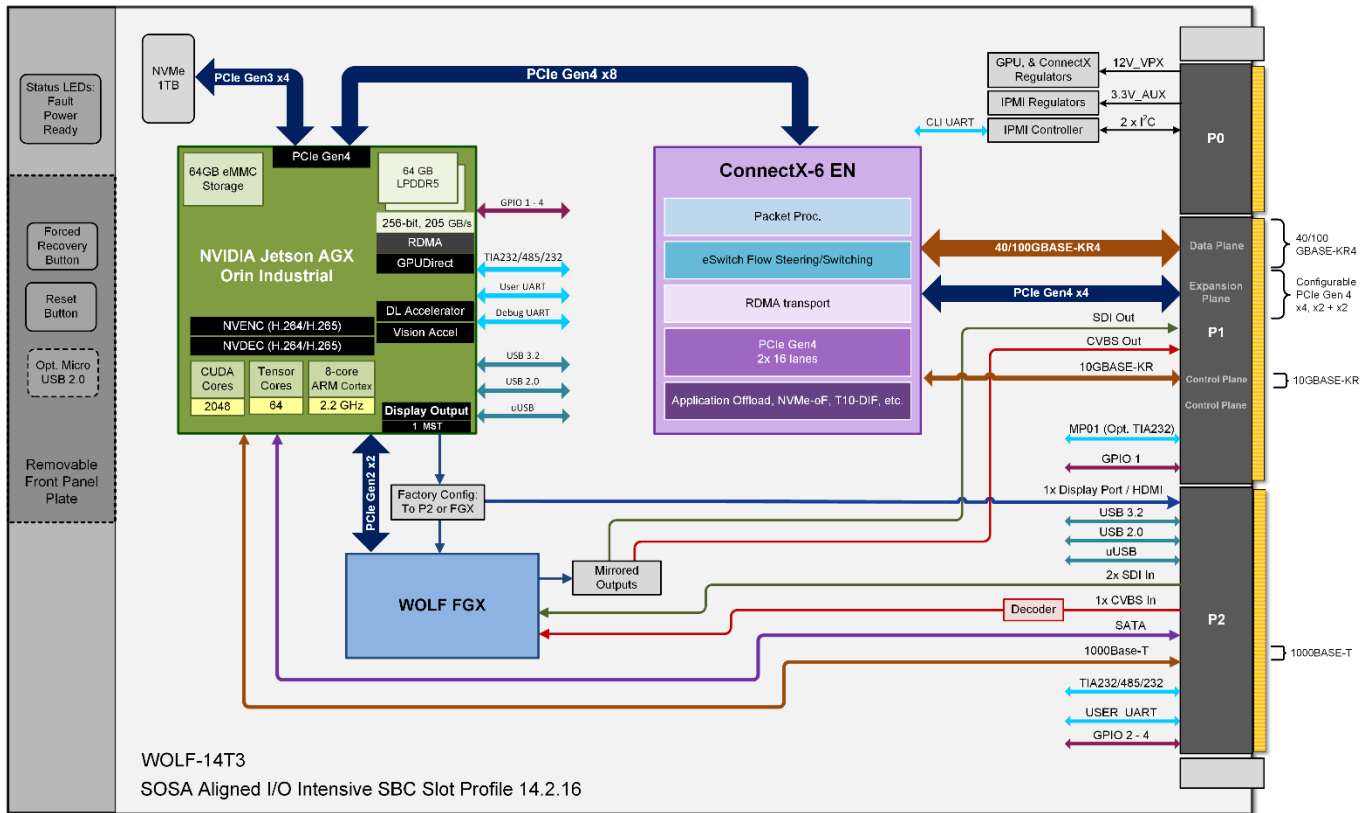
The NVIDIA ConnectX-6 SmartNIC provides secure, high-speed network data transfer and a configurable PCIe switch. ConnectX-6 is ideal to meet the high data transfer requirements for C5ISR tasks. The ConnectX-6 also provides support for RDMA over Converged Ethernet (RoCE) and support for NVIDIA GPUDirect, enabling the fastest method for transferring data across the network to the GPU.

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

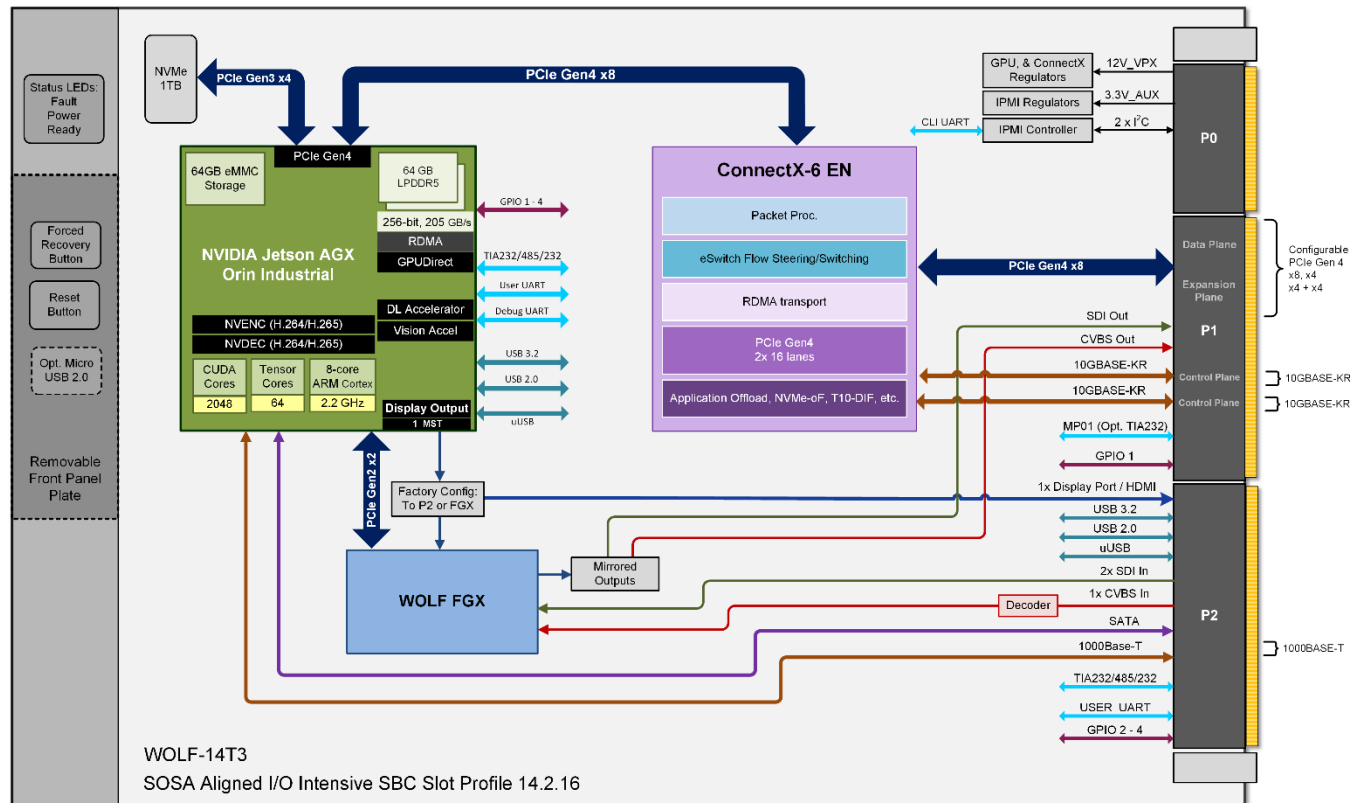


This information is subject to change

The following model provides 40/100GBASE-KR4, one 10GBASE-KR, one 1000BASE-T, and PCIe Gen4 up to 4 lanes.



The following model provides two 10GBASE-KR, one 1000BASE-T and PCIe Gen4 up to 8 lanes.



This information is subject to change

## NVIDIA JETSON AGX ORIN WITH AMPERE GPU AND 12-CORE ARM CPU

Jetson AGX Orin Industrial features an embedded NVIDIA Ampere GPU with 2048 CUDA Cores and 64 Gen3 Tensor Cores, two NVIDIA deep learning accelerators, a vision accelerator, a twelve-core NVIDIA Cortex Arm CPU, and a video encoder and decoder. The NVIDIA CUDA-X accelerated computing stack and JetPack SDK support enables the Jetson AGX Orin to be a fully software-defined platform.

The Jetson AGX Orin 64GB delivers up to eight times the performance compared to the previous generation Jetson AGX Xavier. Orin can deliver up to 4 times more TFLOPS, eight times more AI TOPS, and higher memory bandwidth. Second generation NVIDIA Deep Learning Accelerators (NVDLA) can deliver up to 9 times more TOPS, while the second generation Vision Accelerator can also offer performance improvements. Connectivity has also been improved with more PCIe lanes and more available Ethernet interfaces at higher speeds. All of these performance improvements only require a modest power increase, with power settings from 15W to 75W.

## 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 NVIDIA Video Codec SDK provides a complete set of APIs, samples and documentation for hardware accelerated video encode and decode.

## CONNECTX-6 ETHERNET 100GbE AND PCIe GEN4

Getting large amounts of data into and out of a module is an important system design consideration. This WOLF module includes a ConnectX-6 SmartNIC, which provides a configurable PCIe Gen4 interface. It also provides up to 100GBASE-KR4 on the VPX data plane, RDMA over Converged Ethernet (RoCE) with support for NVIDIA GPUDirect RDMA, and enhanced security features such as hardware-verified secure boot, secure firmware update, and unique ID per device authentication for debug and recovery.

## SOSA SLOT PROFILE SUPPORT

The Sensor Open Systems Architecture (SOSA) Consortium grew out of a U.S. Department of Defense (DoD) initiative to define open standard electronic architectures to ensure component interoperability, reduce costs, encourage innovation, and help to ensure a supply of needed products.

This module supports SOSA aligned SBC slot profiles. The default profile is:

- SLT3-PAY-1F1F2U1TU1T1U1T-14.2.16

WOLF also offers an Orin module which supports the SOSA aligned Payload slot profiles 14.6.11 or 14.6.13.

## ORDERING CODES

The following table defines series of common order codes for the VPX3U-ORIN-CX6-FGX-SBC 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:

- Default Power Threshold
- PCIe Configuration Options
- Variant Locked
- Conformal Coating Options
- Network Configuration Options
- Display Output Formats

Ordering Number	Description
<b>3U VPX Single Slot Configurations</b>	
14T333-F***.***VPX3vA0	3U VPX, Conduction Cooled, 1", NVIDIA Orin, ConnectX-6, 40/100GBASE-KR4, one 10GBASE-KR, one 1000BASE-T, PCIe Gen4 x4, Inputs: 2x SDI, 1x CVBS, Outputs: 1x DP/HDMI, 1x SDI (DMA), 1x CVBS (DMA), 1TB NVMe, USB 3.2 and USB 2.0, SATA interface, GPIO
14T333-F***.***VPX3vA0	3U VPX, Conduction Cooled, 1", NVIDIA Orin, ConnectX-6, two 10GBASE-KR, one 1000BASE-T, PCIe Gen4 x8, Inputs: 2x SDI, 1x CVBS, Outputs: 1x DP/HDMI, 1x SDI (DMA), 1x CVBS (DMA), 1TB NVMe, USB 3.2 and USB 2.0, SATA interface, GPIO

\* 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)

Caveat: integrated third party modules may not meet the same standards as WOLF manufactured modules.

