



V1161

Dual-Port Programmable 100G Rugged Ethernet XMC ASoC Card



Benefits

Programmable interface solution that leverages off-the-shelf world-class network performance with customizable application processor

Heterogeneous computing card combining hard ARM processor cores, large FPGA fabric, and high bandwidth network interface controller

Designed specifically for sensor interface and data processing, multi-level secure networking, and interface protocol bridging applications

Adding to any single board computer provides a high bandwidth interface, configurable ASoC (FPGA) resources, and rugged optics

Embedded focus with VITA 20 and VITA 47 compliance

Versatile design supports electrical or optical interfaces, optical options for both backplane or front-panel VPX support

Modular optics for flexibility in supporting 1-25Gbps per lane

Options for 3U VPX, 6U VPX, and PXle form factor via carrier cards

Features

Up to eight (8) 1G to 25G optical ports via MPO front panel I/O or VITA 66 optical backplane I/O. Electrical I/O via Pn6 also available

Xilinx® Versal® ASoC (FPGA)

NVIDIA® Mellanox® ConnectX®-5 Network Interface Device Hardware offloads for UDP, TCP, RoCE v2, DPDK, GPUDirect, NVMeoF, +more

Supports PCIe Gen4 x8 and Gen3 x8

2 banks of 4GB up to 1866MHz LPDDR4 SDRAM

Onboard embedded PCIe Switch device

Advanced APIs that support multi-core and multi-processor architectures

Wide range of operating system software support

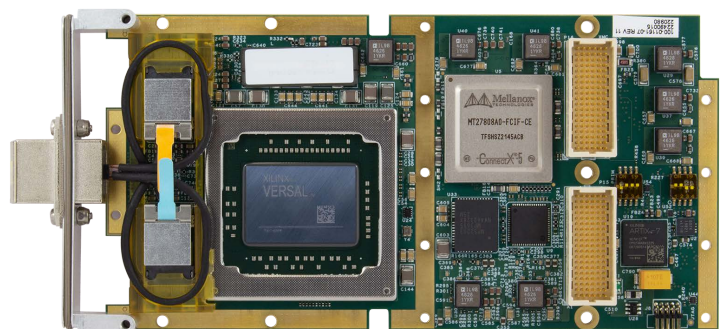
Overview

The V1161 is a next generation high performance embedded computing XMC featuring the Xilinx® Versal™ Adaptive System-on-Chip (ASoC), the NVIDIA® Mellanox® ConnectX®-5 (MC-X5) network interface device, and rugged optical and electrical IO options. The V1161 is specifically targeted at applications requiring a combination of high speed interfaces, network offloads, and onboard payload processing resources. Use cases include sensor interface design with onboard data processing (or pre-processing), multi-level secure networking, and mixed protocol or protocol bridging applications. Radar, SIGINT, video, storage, medical imaging, and embedded communications systems all have the ability to benefit from the V1161 module.

The V1161 is a proven high-bandwidth and low-latency performance leader in 10/25/40/50/100Gbps Ethernet applications. The V1161 includes hardware offloads for UDP, TCP, RoCE v2, DPDK, GPUDirect, NVMeoF, and many other protocol stacks. The combination of the MC-X5 device and the ASoC device allows for system designers to leverage the off-the-shelf world-class Ethernet performance of the MC-X5 while deploying unique data processing and security algorithms in the onboard ASoC device. This combination maximizes the effectiveness of the deployed algorithms while eliminating design efforts required to establish high bandwidth Ethernet, PCIe controllers, efficient DMA engines, or low overhead software drivers.

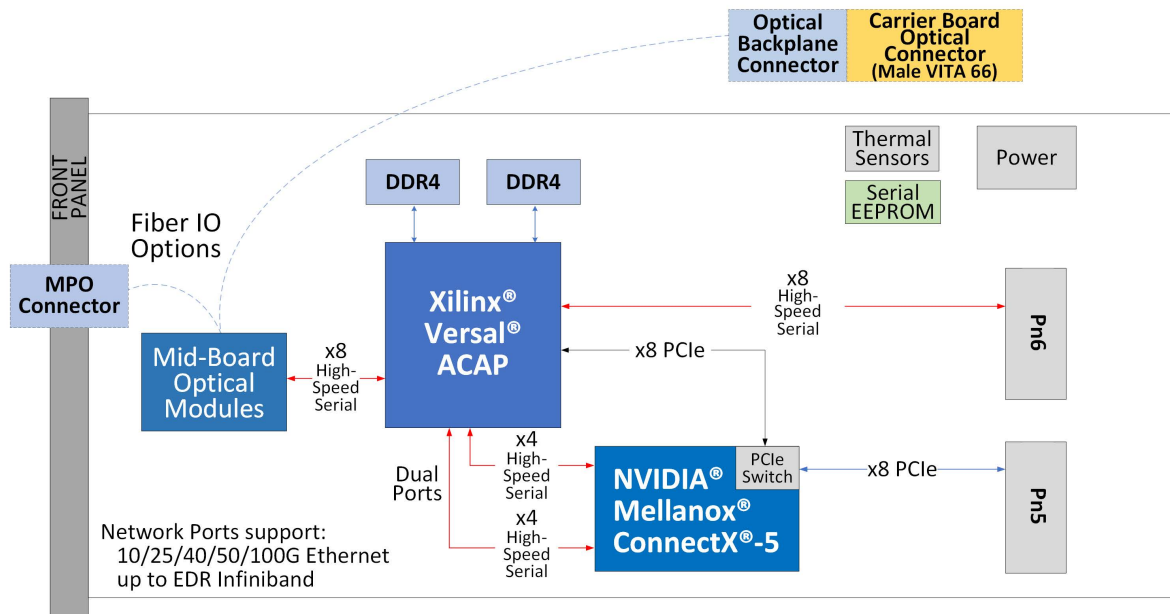
In addition to the Ethernet interfaces described, the FPGA fabric provided within the ASoC part is capable of hosting New Wave DV IP cores for Fibre Channel, ARINC-818, sFPDP, Aurora, and others. This makes the V1161 an ideal hardware platform for mixed interface protocol needs or protocol bridging applications.

The convenient XMC form factor and rugged design of the V1161 can turn a VPX-based single board computer into a single-slot sensor interface and heterogeneous computing solution. The V1161 mounted on a x86 based single board computer will provide 100G optical interfaces, FPGA fabric, and ARM processor cores all in a single slot solution. V1161 is also available from New Wave DV in a 3U VPX form-factor instead of XMC if desired.



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> V1161 XMC Block Diagram

Connector Types

The V1161 offers four different I/O options:

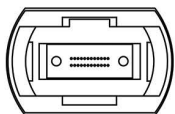
- Electrical Backplane Connector via Pn6
- Optical Front Panel MPO Connector
- Optical Backplane MT Connector for VITA 66.5
- Custom Optical Cabling/Connector Options

Backplane Slot Profile

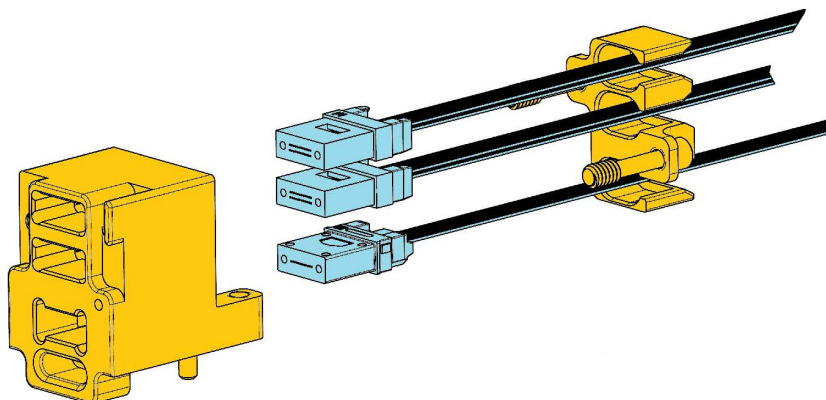
When hosted on a New Wave VPX carrier, VITA 65 slot profiles 14.6.11 or 14.6.13 are supported.

- When hosted on a 3rd party carrier, VITA 46.9 IO is supported.

1. Front Panel MPO (Female) I/O



2. VITA 66.5 Backplane MT I/O¹



KEY

- New Wave-Provided Hardware
- Customer-Provided Hardware

¹Common Terminations: VITA 66.5 Style C, Style D (pictured)

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Multi-Processor Multi-Core Support

The V1161 is uniquely suited for system architectures involving multiple processing cards on a common switched data plane. Specifically, the V1161 supports shared access from multiple host processors, enabling it to function as a cost-effective, high-performance gateway. This feature enables a single high-speed pipe to carry multiple virtual channels in systems that need to spread or load-balance sensor data across processor arrays.

Complete Product Support Program

New Wave DV prides itself on its excellent customer support, a fact that is echoed by our customers. New Wave DV provides industry standard warranty on its products, but it is the human factor that makes our support so valuable to our customers. Our team takes the time and effort to ensure that the customer experience with our products is a positive one.

Our Commitment

New Wave DV is committed to providing the latest innovations in technology, architectures, and techniques to keep our customers one step ahead of the rest. Our products, complete with the Development Framework, are intended to offer our customers an entirely unique out-of-the-box experience.

Alternate Form Factors

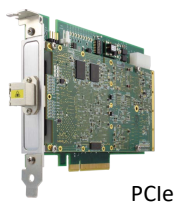
The V1161 is designed for use in a variety of mission-critical applications. Whether you need its capabilities in XMC or other form factors such as VPX, PCIe (double-width), PXIe, or others, we are happy to help accommodate your needs and provide you with the solution best suited for your success.



PXIe



VPX



PCIe

Optional Accessories

The V1161 comes standalone or optionally with a configuration debug board (CDB) accessory. The CDB provides access to all JTAG, GbE, and serial port connections for development and debug.

490-0116X-00: Configuration Debug Board (CDB) kit for V116X providing Ethernet, JTAG and serial connectivity

¹NVIDIA® Mellanox® ConnectX®-5 EN IC Datasheet: https://newwavedv.com/wordpress/wp-content/uploads/2023/01/pb_connectx-5_en_ic.pdf

²NVIDIA® Mellanox® Ethernet Software Support/Datasheet: <https://developer.nvidia.com/networking/ethernet-software>

³Xilinx® Versal® ASoC Datasheet: <https://www.xilinx.com/products/silicon-devices/acap/versal.html>

Technical Specifications

NETWORK INTERFACE

Up to eight (8) 1G to 25G optical ports (front & backplane options)

- 850nm multi-mode optics

Up to eight (8) 1G to 25G electrical ports to Pn6 (high-speed mezzanine connector)

Dual 10/25/40/50/100Gbps Ethernet port to MC-X5

ETHERNET PROTOCOLS

TCP, UDP, ARP, ICMP, RoCE v2, Multicast, Broadcast, + more

Visit NVIDIA® Mellanox® Datasheet¹

ADDITIONAL PROTOCOLS

Fibre Channel, sFPDP, ARINC 818, Aurora

ASoC (FPGA) DEVICE

Xilinx Versal VM1502, VM1802, VC1902

Visit Xilinx® Versal™ Datasheet³

ETHERNET DEVICE

NVIDIA® Mellanox® ConnectX®-5 EN IC

Visit NVIDIA® Mellanox® Datasheet¹

MEMORY

2 banks of 4GB up to 1866MHz LPDDR4 SDRAM

HOST INTERFACE

PCI Express Gen4/Gen3 x8 (Pn5 to MC-X5)

PCI Express Gen4/Gen3 x8 (Pn6 to ASoC)

THERMAL SENSORS

2 digital temperature sensors

COMPLIANCE

VITA20, 42.3, 47, 61.0, 66.5, 88

NVIDIA® Mellanox® ConnectX®-5 EN IC

Visit NVIDIA® Mellanox® Datasheet¹

SOFTWARE SUPPORT

Software drivers available from NVIDIA® Mellanox®²

NWDV Maintained x86 OS's: <https://newwavedv.com/wordpress/wp-content/uploads/2021/08/V1161-software-info-2021.pdf>

PHYSICAL CHARACTERISTICS

Dimensions: 74 mm (width) x 143.75 mm (length)

Weight: 0.276 lbs

POWER CHARACTERISTICS

Power Draw: Maximum 60W

Power Supply: 5V to 12V

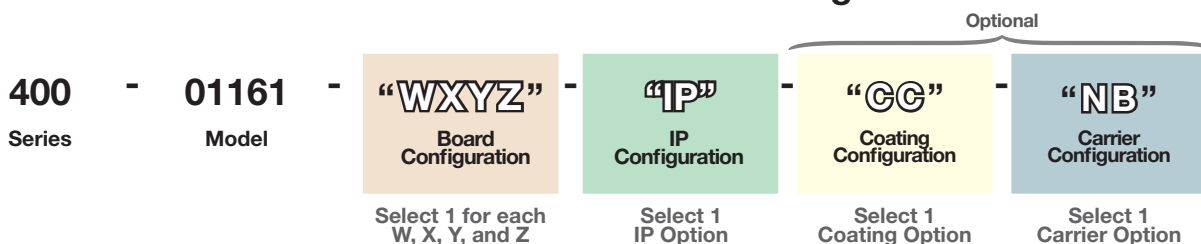
TEMPERATURE

Operating: -40° C to 55° C at 250 LFM (air-cooled)

Operating: -40° C to 85° C (conduction-cooled)

Storage: -55° C to 105° C

V1161 Hardware Part Number Configuration



W

Config # Description

F-4	Reserved
3	Xilinx Versal VC1902 ACAP
2	Reserved
1	Xilinx Versal VM1802 ACAP
0	Xilinx Versal VM1502 ACAP

X

Config # Description

H	No optics populated
F, G	Reserved
E	4-lane 1-10Gbps front panel MPO optics
D	4-lane 1-25Gbps front panel MPO optics
C	Reserved
B	8-lane 1-10Gbps front panel MPO optics
A	8-lane 1-25Gbps front panel MPO optics
9-7	Reserved
6	4-lane 1-10Gbps backplane VITA 66 optics MT-12 V65.0-6.5.2.2
5	4-lane 1-25Gbps backplane VITA 66 optics MT-12 V65.0-6.5.2.2
4	4-lane 1-10Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5
3	4-lane 1-25Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5
2	Reserved
1	8-lane 1-10Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5
0	8-lane 1-25Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5

Y

Config # Connector P16

B	VITA 88	DNP
A	VITA 88	P
9, 8	Reserved	
7	VITA 61	DNP
6	VITA 61	P
5, 4	Reserved	
3	VITA 42	DNP
2	VITA 42	P
1, 0	Reserved	

*P = Populate; DNP = Do Not Populate

Z

Config # Description

3+	Reserved
2	PCIe Gen3, industrial temp, single-host, PCIe switch enabled
1	Reserved
0	PCIe Gen4, commercial temp, single-host, PCIe switch enabled

400-01161- - - -

W X Y Z IP CC NB

IP

Config # Description

1+	Reserved
00	Network Pass Through Example Design

CC

Config # Description

AR	Acrylic conformal coat
UR	Urethane conformal coat
ER	Epoxy conformal coat
SR	Silicone conformal coat
XY	Parylene conformal coat
BLANK	No conformal coat

NB

Config # Description

PE	XMC delivered in double-width PCIe form factor, PCIe carrier card
PX	XMC delivered in PXIe form factor, PXIe carrier card
BLANK	XMC form factor, no carrier card, no heatsink
HC	XMC form factor, no carrier card, conduction-cooled heatsink
HA	XMC form factor, no carrier card, air-cooled heatsink

Additional options available.
Want this technology in 3U VPX?
See the V6061.

V1161 Hardware Part Number Configuration

Part Numbers from Table 2 are available with the shortest lead times.

Table 2
Front Panel Optical Variants

Config #	Description
400-01161-1A60-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VM1802 ACAP, 8-lane 1-25Gbps front panel MPO optics, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen4, commercial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core
400-01161-1A62-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VM1802 ACAP, 8-lane 1-25Gbps front panel MPO optics, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen3, industrial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core
400-01161-3A60-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VC1902 ACAP, 8-lane 1-25Gbps front panel MPO optics, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen4, commercial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core
400-01161-3A62-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VC1902 ACAP, 8-lane 1-25Gbps front panel MPO optics, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen3, industrial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core

VITA 66 Optical Variants

Config #	Description
400-01161-1060-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VM1802 ACAP, 8-lane 1-25Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen4, commercial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core
400-01161-1062-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VM1802 ACAP, 8-lane 1-25Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen3, industrial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core
400-01161-3060-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VC1902 ACAP, 8-lane 1-25Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen4, commercial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core
400-01161-3062-00	V1161 FPGA + Ethernet NIC XMC Card, Xilinx Versal VC1902 ACAP, 8-lane 1-25Gbps backplane VITA 66 optics MT-24 V65.0-6.5.3.5, VITA 61 mezzanine connector(s), P16 populated, PCIe Gen3, industrial temp, single-host, PCIe switch enabled, network pass-through FPGA IP core

FOR MORE INFORMATION

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