



Connect Tech Inc.
Embedded Computing Experts

USERS GUIDE



Graphite VPX

NVIDIA® Jetson AGX Orin™ – SOSA Aligned 3U VPX Module

CTIM-00128 Revision 0.01 2026-05-06



CONNECT TECH

connecttech.com

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PREFACE

Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.

Connect Tech assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide.

Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.

In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Support resources are available 24 hours a day, 7 days a week on our website at: <https://connecttech.com/support/resource-center/>. See the contact information section below for more information on how to contact us directly. Our technical support is always free.

Contact Information

Contact Information	
Mail/Courier	Connect Tech Inc. Technical Support 489 Clair Rd. W. Guelph, Ontario Canada N1L 0H7
Contact Information	sales@connecttech.com connecttech.com Toll Free: 800-426-8979 (North America only) Telephone: +1-519-836-1291 Facsimile: 519-836-4878 (on-line 24 hours)
Support	Please go to the Connect Tech Resource Center for product manuals, installation guides, device drivers, BSPs and technical tips. Submit your technical support questions to our support engineers. Technical Support representatives are available Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time.

Limited Product Warranty

Connect Tech Inc. provides a one (1) year Warranty for this product. Should this product, in Connect Tech Inc.'s opinion, fail to be in good working order during the warranty period, Connect Tech Inc. will, at its option, repair or replace this product at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster or non-Connect Tech Inc. authorized modification or repair.

You may obtain a warranty service by delivering this product to an authorized Connect Tech Inc. business partner or to Connect Tech Inc. along with proof of purchase. Product returned to Connect Tech Inc. must be pre-authorized by Connect Tech Inc. with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured and packaged for safe shipment. Connect Tech Inc. will return this product by prepaid ground shipment service.

The Connect Tech Inc. Limited Warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, Connect Tech Inc. reserves the right to substitute an equivalent product if available or to retract the Warranty if no replacement is available.

The above warranty is the only warranty authorized by Connect Tech Inc. Under no circumstances will Connect Tech Inc. be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

Copyright Notice

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ESD Warning



Electronic components and circuits are sensitive to ElectroStatic Discharge (ESD). When handling any circuit board assemblies, including Connect Tech carrier assemblies, it is recommended that ESD safety precautions be observed. ESD safe best practices include, but are not limited to:

- Leaving circuit boards in their antistatic packaging until they are ready to be installed.
- Using a grounded wrist strap when handling circuit boards, at a minimum you should touch a grounded metal object to dissipate any static charge that may be present on you.
- Only handling circuit boards in ESD safe areas, which may include ESD floor and table mats, wrist strap stations and ESD safe lab coats.
- Avoiding handling circuit boards in carpeted areas.
- Try to handle the board by the edges, avoiding contact with components.

REVISION HISTORY

Revision	Date	Changes
0.00	2024-08-27	Preliminary Release
0.01	2026-05-06	Updated DP_TX pins in P2 Connector Pinout

INTRODUCTION

The Graphite VPX is a 3U VPX single board computer designed with the NVIDIA® Jetson AGX Orin™ Industrial. Aligned to the Sensor Open Systems Architecture (SOSA) standard, it ensures seamless interoperability with SOSA-aligned systems. Meeting MIL-STD-810H and DO-160 for shock and vibration, it is an ideal choice for today's mission-critical aerospace and defense AI applications.

Product Features and Specifications

Specifications	
NVIDIA® GPU SoC Module Compatibility	NVIDIA® Jetson AGX Orin™ NVIDIA® Jetson AGX Orin™ Industrial 2048-core NVIDIA® Ampere GPU 64 Tensor Cores 12-core Arm Cortex-A78AE v8.2 64-bit CPU 2x DL Accelerators 64GB 256-bit LPDDR5 w/ECC 64GB eMMC 5.1
VPX Compatibility	SOSA Aligned 3U VPX Module ANSI/VITA 48, 65 (VPX REDI, OpenVPX) 1.0" Pitch Conduction Cooled 14.2.16 IO Intensive Slot Profile
System Management	VITA 46.11-2022 Tier-3
Data Plane Expansion Plane	1x PCIe Gen4 x8 with bifurcation options Root Port and End Point mode support
Networking	2x 10GBASE-KR (P1, Control Plane) 1x 1000BASE-T (P2, Control Plane)
Display Output	1x DisplayPort (P2)
USB	1x USB 2.0 (P2) 1x USB 3.2 Gen2x1 (P2) 1x USB 3.2 Gen2x1 OTG (Type-C, Front Panel)
Storage	1x M.2 M-Key Slot
UART/Serial	1 x 3.3V Debug UART (P1, Maintenance port) 2x RS232 (P2, Serial)
Misc/IO	4x GPIO (2x GPI, 2x GPO, 3V3 Tolerant)
Input Power	+12V, +3V3AUX
Operating Temperature	-40°C to 85°C
Environmental Compliances	Shock and Vibration Tested as part of specific methods in: MIL-STD-810 and DO-160
Weight	Approximately 600g
MTBF	TBD
Warranty and Support	1 Year

Part Numbers / Ordering Information

Part Number	
VPG004-01	3U VPX AGX Orin™ Module (PCIe Host Mode) Two x4 downstream ports.
VPG004-02	3U VPX AGX Orin™ Module (PCIe Endpoint Mode)
VPG004-XX	For other PCIe configurations, contact sales@connecttech.com
RTG005	RTM for Development on the VPG004

PRODUCT OVERVIEW

Block Diagram

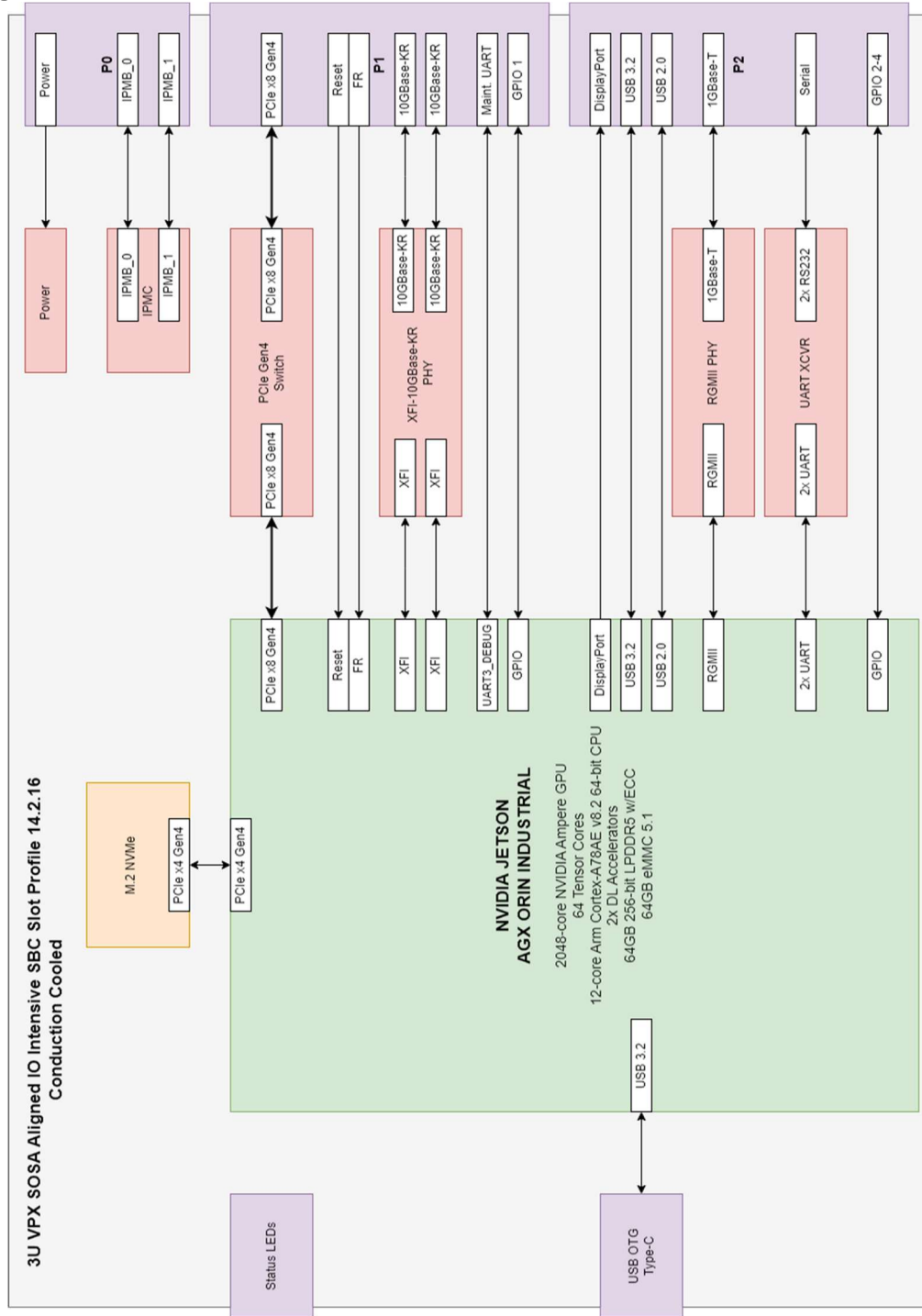


Figure 1: Plug-In Card Block Diagram

Slot Profile

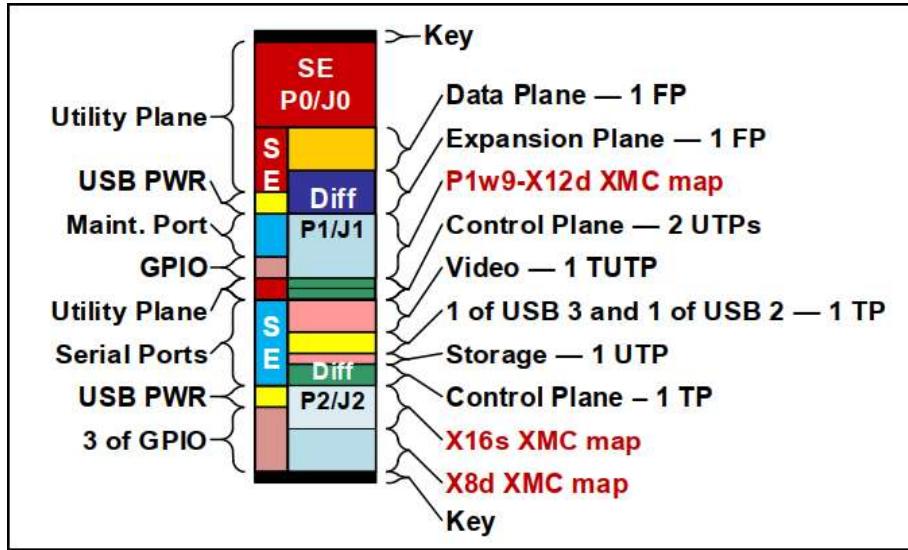


Figure 2: ANSI/VITA 65.0 3U I/O-Intensive SBC Slot Profile SLT3-PAY- 1F1F2U1TU1T1U1T-14.2.16.

Connector & Jumper Summary



Figure 3: Connectors & Jumpers

Designator	Description
P0, P1, P2	VPX Backplane Connectors
P5	USB Type-C Connector for Flashing Orin™ Module
J1	Manufacturer Use ONLY
J3	System Management Settings

LED	Description
OOS/ERR!	Solid Red: Card has power, System not turned on. Orange: NVIDIA® Jetson™ Module is being throttled
OPER	System is powered and operational

DETAILED FEATURE DESCRIPTION – VPG004

Power Input

The VPG004 power input has been designed under the SOSA requirement of using only VS1 (12V), 3.3V_AUX and VBAT for input power

IPMC

A fully compliant IPMC has been implemented to meet Tier-3 and Firewall requirements as defined in VITA 46.11-2022

Maintenance Port

The maintenance port breaks out the NVIDIA® Orin™’s debug UART at 3.3V signal levels. The default settings of this port are 115,200 BAUD, 8 bits, no parity, one stop bit.

Data Plane and Expansion Plane

The Data and Expansion planes implement a Gen 4 x8 PCIe port through a PCIe Switch. When used as a PCIe endpoint device, the card is configured as a single x8 lane device. As a Root Complex device, this allows for the Jetson™ to Bifurcate it’s single x8 port into the follow configurations.

Lane #	0	1	2	3	4	5	6	7	Part #
Supported Settings	x8								Contact Sales
	x4				x4				VPG004-01
	x4				x2		x2		Contact Sales
	x2		x2		x4				
	x2		x2		x2		x2		

Control Plane

The Control plane of this slot profile consists of 2 Ultra Thin Pipes (UTP) and 1 Thin Pipe(TP). The UTP’s have both been implemented as 10Gbase-KR. The TP has been implemented as 1000Gbase-T with the magnetics residing on the PIC.

Due to limitations on the NVIDIA® Jetson™, the 10Gbase-KR is unable support 1000base-KX downlinking.

Display

The display has been implemented as a DisplayPort interface. There is no support DP++. If an HDMI display is required an active cable adapter will be required.

USB & OTG

The card implements a USB 3.2 and USB 2 Port onto the VPX backplane. Each port can source 0.5A from the respective USB Power pins on the connector. One USB 3.2, 1A port can be found on the front face of the card that has OTG capabilities for flashing the NVIDIA® Jetson Orin™ Module. The module must be put into recovery via software or via the associated Force Recovery and Orin™ Reset pins routed onto the VPX Connector

Storage

While this slot profile allows for one UTP for storage onto the backplane, it has not been implemented on this device.

An M.2 NVMe card slot exists on the card for integration by Connect Tech. This slot is not user accessible. The default card installed into this system is a Transcend TS2TMTE760T-I. Its basic specification can be found below

Type	2TB, M.2 2280 PCIe Gen4x4, 3D TLC (BICS5), DRAM-less
DWPD	1.2 (3 years)
MTBF	3,000,000 hours
TBW	Up to 2640
Sequential Read (CrystalDiskMark)	5000 MB/s
Sequential Write	3500 MB/s
IOPS Random Read (IOmeter)	305k
IOPS Random Write	415k
Operating Temp	-40°C to 85°C
Active Write	6.3W
Active Read	5.3W
Idle	0.82W

Serial

Two RS-232 serial ports have been implemented onto this card. They comply with TIA-232 signalling levels.

GPIO

The four available GPIO pins to the backplane have been hard set as two input and two output capable pins.

Designator	Description
GPIO 1 & 2	Output, 3.3V, ±24mA
GPIO 3 & 4	Input, 3.3V Tolerant

XMC Mapping

Several pins have been consumed for programming and debug of various ICs on the board. These interfaces are not intended for customer use in typical applications.

Connectors

Function																																																																									
Location	P0																																																																								
Type	RVPX-P08VM1																																																																								
Signal Names	+12V 12V Power Rail																																																																								
	+3V3_AUX 3.3V Auxiliary Power Rail																																																																								
	GA n # Geographical Address. Specifies Slot Number in Backplane																																																																								
	GAP# Geographical Address Parity Bit																																																																								
	GND Digital Ground																																																																								
	IPMB n _SCL / IPMB n _SDA IPMB Clock/Data. IPMB management bus to PIC IPMC																																																																								
	NVMRO Non-Volatile Memory Read Only																																																																								
	SYSRESET# System Reset. PIC held in reset when asserted low																																																																								
Pinout	<table border="1"> <thead> <tr> <th>Pin</th> <th>G</th> <th>F</th> <th>E</th> <th>D</th> <th>C</th> <th>B</th> <th>A</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>+12V</td> <td>+12V</td> <td>+12V</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>2</td> <td>+12V</td> <td>+12V</td> <td>+12V</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>3</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>4</td> <td>IPMB0_SCL</td> <td>IPMB0_SDA</td> <td>GND</td> <td>-</td> <td>GND</td> <td>SYSRESET#</td> <td>NVMRO</td> </tr> <tr> <td>5</td> <td>GAP#</td> <td>GA4#</td> <td>GND</td> <td>+3V3_AUX</td> <td>GND</td> <td>IPMB0_SCL</td> <td>IPMB0_SDA</td> </tr> <tr> <td>6</td> <td>GA3#</td> <td>GA2#</td> <td>GND</td> <td>-</td> <td>GND</td> <td>GA1#</td> <td>GA0#</td> </tr> <tr> <td>7</td> <td>-</td> <td>GND</td> <td>-</td> <td>-</td> <td>GND</td> <td>-</td> <td>-</td> </tr> <tr> <td>8</td> <td>GND</td> <td>-</td> <td>-</td> <td>GND</td> <td>-</td> <td>-</td> <td>GND</td> </tr> </tbody> </table>	Pin	G	F	E	D	C	B	A	1	+12V	+12V	+12V	-	-	-	-	2	+12V	+12V	+12V	-	-	-	-	3	-	-	-	-	-	-	-	4	IPMB0_SCL	IPMB0_SDA	GND	-	GND	SYSRESET#	NVMRO	5	GAP#	GA4#	GND	+3V3_AUX	GND	IPMB0_SCL	IPMB0_SDA	6	GA3#	GA2#	GND	-	GND	GA1#	GA0#	7	-	GND	-	-	GND	-	-	8	GND	-	-	GND	-	-	GND
	Pin	G	F	E	D	C	B	A																																																																	
	1	+12V	+12V	+12V	-	-	-	-																																																																	
	2	+12V	+12V	+12V	-	-	-	-																																																																	
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	4	IPMB0_SCL	IPMB0_SDA	GND	-	GND	SYSRESET#	NVMRO																																																																	
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	7	-	GND	-	-	GND	-	-																																																																	
8	GND	-	-	GND	-	-	GND																																																																		

Function			
Location		P1	
Type		RVPX-PE16DM1	
Signal Names	Data Plane & Expansion Plane	PCIE_TX [7:0] +/-	PCIe Transmit. Transmits data from PIC to Backplane
		PCIE_RX [7:0] +/-	PCIe Receive. Receives data from Backplane to PIC
	Control Plane	KR n -TX+/-	10Base-KR TX. Port n Transmit from PIC to Backplane
		KR n -RX+/-	10Base-KR RX. Port n Transmit from Backplane to PIC
	Misc Signals	VBAT	Battery Power Rail
		SYS_CON#	System Controller. Indicates system controller slot when asserted low
		USB01-VBUS	USB Port 1 Power. Up to 500mA can be sourced from this pin
		ORIN-TX	Maintenance Port TX. NVIDIA® Orin™ Debug UART3 TX. Transmit from PIC to Backplane. 3V3 Signal leveling.
		ORIN-RX	Maintenance Port RX. NVIDIA® Orin™ Debug UART3 RX. Transmit from Backplane to PIC.
		GPIO 1	General Purpose Output. 3V3 Tolerant, ±24mA
		GND	Digital Ground
		User Defined	IPMC-RX
IPMC-TX	IPMC UART TX. Not intended for customer use		
IPMC-B0	IPMC Boot 0. Not intended for customer use		
IPMC-RST#	IPMC Reset#. Not intended for customer use		
PCIE-TX	PCIe Switch UART TX. Not intended for customer use		
PCIE-RX	PCIe Switch UART RX. Not intended for customer use		
PCIE-SDA	PCIe Switch SDA. Not intended for customer use		
PCIE-SCL	PCIe Switch SCL. Not intended for customer use		
PCIE-BR0	PCIe Switch Boot Recovery 0. Not intended for customer use		
PCIE-BR1	PCIe Switch Boot Recovery 1. Not intended for customer use		
PCIE-SRST#	PCIe Switch TWI Reset. Not intended for customer use		
EEP-SDA	KR PHY EEPROM SDA. Not intended for customer use		
EEP-SCL	KR PHY EEPROM SCL. Not intended for customer use		
EEP-ISO#	KR PHY EEPROM ISO#. Not intended for customer use		
KR-SCL	KR PHY SCL. Not intended for customer use		
KR-SDA	KR PHY SDA. Not intended for customer use		
ORIN-FR#	NVIDIA® Orin™ Force Recovery. When asserted low during reset or power on module enters recovery mode for flashing		

		ORIN-RST#			NVIDIA® Orin™ Reset. When asserted low resets the modules SoC, boot device, etc. but not the power sequencer.					
Plug-in Module P1	G	F	E		D	C	B		A	
			Even	Odd			Even	Odd		
Backplane J1		i	h	g	f	e	d	c	b	a
Data Plane	1	-	GND	GND-J1	PCIE_TX0-	PCIE_TX0+	GND	GND-J1	PCIE_RX0-	PCIE_RX0+
	2	GND	PCIE_TX1-	PCIE_TX1+	GND-J1	GND	PCIE_RX1-	PCIE_RX1+	GND-J1	GND
	3	P1-VBAT	GND	GND-J1	PCIE_TX2-	PCIE_TX2+	GND	GND-J1	PCIE_RX2-	PCIE_RX2+
	4	GND	PCIE_TX3-	PCIE_TX3+	GND-J1	GND	PCIE_RX3-	PCIE_RX3+	GND-J1	GND
Expansion Plane	5	SYS_CON#	GND	GND-J1	PCIE_TX4-	PCIE_TX4+	GND	GND-J1	PCIE_RX4-	PCIE_RX4+
	6	GND	PCIE_TX5-	PCIE_TX5+	GND-J1	GND	PCIE_RX5-	PCIE_RX5+	GND-J1	GND
	7	USB01-VBUS	GND	GND-J1	PCIE_TX6-	PCIE_TX6+	GND	GND-J1	PCIE_RX6-	PCIE_RX6+
	8	GND	PCIE_TX7-	PCIE_TX7+	GND-J1	GND	PCIE_RX7-	PCIE_RX7+	GND-J1	GND
X12d XMC mapping	9	ORIN-TX	GND	GND-J1	IPMC-RX	IPMC-TX	GND	GND-J1	IPMC-B0	IPMC-RST#
	10	GND	PCIE-TX	PCIE-RX	GND-J1	GND	PCIE-SDA	PCIE-SCL	GND-J1	GND
	11	ORIN-RX	GND	GND-J1	PCIE-BR0	PCIE-BR1	GND	GND-J1	EEP-ISO#	PCIE-SRST#
	12	GND	EEP-SDA	EEP-SCL	GND-J1	GND	KR-SCL	KR-SDA	GND-J1	GND
	13	GPIO 1	GND	GND-J1	-	-	GND	GND-J1	ORIN-FR#	ORIN_RST#
	14	GND	-	-	GND-J1	GND	-	-	GND-J1	GND
Control Plane	15	-	GND	GND-J1	KR2-TX-	KR2-TX+	GND	GND-J1	KR2-RX-	KR2-RX+
	16	GND	KR1-TX-	KR1-TX+	GND-J1	GND	KR1-RX-	KR1-RX+	GND-J1	GND

Function																													
Location	P2																												
Type	RVPX-PE16DM1																												
Signal Names	<table border="1"> <tbody> <tr> <td>DP_TX [3:0] +/-</td> <td>DisplayPort Data.</td> </tr> <tr> <td>DP_AUX +/-</td> <td>DisplayPort Auxiliary Channel.</td> </tr> <tr> <td>DP_HPD</td> <td>DisplayPort Hot plug Detect.</td> </tr> <tr> <td>DP_PWR</td> <td>DisplayPort Power.</td> </tr> <tr> <td>USB0n-D+/-</td> <td>USB 2.0 Data.</td> </tr> <tr> <td>USB01-SSR+/-</td> <td>USB 3.2 Gen 2x1 Receiver Pair. From Backplane to PIC</td> </tr> <tr> <td>USB01-SST+/-</td> <td>USB 3.2 Gen 2x1 Transmit Pair. From PIC to Backplane</td> </tr> <tr> <td>GBE_n+/-</td> <td>Ethernet Data. 1000Base-T compliant</td> </tr> <tr> <td>RS232_n_TX</td> <td>RS232 TX. Transmit from PIC to Backplane. TIA-232 Compliant</td> </tr> <tr> <td>RS232_n_RX</td> <td>RS232 TX. Transmit from Backplane to PIC. TIA-232 Compliant</td> </tr> <tr> <td>USB02-VBUS</td> <td>USB Port 2 Power. Up to 500mA can be sourced from this pin</td> </tr> <tr> <td>GPIO 2</td> <td>General Purpose Output. 3V3 Tolerant, ±24mA</td> </tr> <tr> <td>GPIO 3 / GPIO 4</td> <td>General Purpose Input. 3V3 Tolerant</td> </tr> <tr> <td>GND</td> <td>Digital Ground</td> </tr> </tbody> </table>	DP_TX [3:0] +/-	DisplayPort Data.	DP_AUX +/-	DisplayPort Auxiliary Channel.	DP_HPD	DisplayPort Hot plug Detect.	DP_PWR	DisplayPort Power.	USB0n-D+/-	USB 2.0 Data.	USB01-SSR+/-	USB 3.2 Gen 2x1 Receiver Pair. From Backplane to PIC	USB01-SST+/-	USB 3.2 Gen 2x1 Transmit Pair. From PIC to Backplane	GBE_n+/-	Ethernet Data. 1000Base-T compliant	RS232_n_TX	RS232 TX. Transmit from PIC to Backplane. TIA-232 Compliant	RS232_n_RX	RS232 TX. Transmit from Backplane to PIC. TIA-232 Compliant	USB02-VBUS	USB Port 2 Power. Up to 500mA can be sourced from this pin	GPIO 2	General Purpose Output. 3V3 Tolerant, ±24mA	GPIO 3 / GPIO 4	General Purpose Input. 3V3 Tolerant	GND	Digital Ground
DP_TX [3:0] +/-	DisplayPort Data.																												
DP_AUX +/-	DisplayPort Auxiliary Channel.																												
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DP_PWR	DisplayPort Power.																												
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USB01-SSR+/-	USB 3.2 Gen 2x1 Receiver Pair. From Backplane to PIC																												
USB01-SST+/-	USB 3.2 Gen 2x1 Transmit Pair. From PIC to Backplane																												
GBE_n+/-	Ethernet Data. 1000Base-T compliant																												
RS232_n_TX	RS232 TX. Transmit from PIC to Backplane. TIA-232 Compliant																												
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Plug-in Module P2	G	F	E		D	C	B		A	
			Even	Odd			Even	Odd		
Backplane J2	i	h	g	f	e	d	c	b	a	
IO Block 1	1	RS232_0_TX	GND	GND-J1	DP_TX1-	DP_TX1+	GND	GND-J1	DP_TX0-	DP_TX0+
	2	GND	DP_TX3-	DP_TX3+	GND-J1	GND	DP_TX2-	DP_TX2+	GND-J1	GND
	3	RS232_1_TX	GND	GND-J1	DP_PWR	DP_HPD	GND	GND-J1	DP_AUX-	DP_AUX+
	4	GND	USB02-D-	USB02-D+	GND-J1	GND	USB01-D-	USB01-D+	GND-J1	GND
	5	RS232_0_RX	GND	GND-J1	USB01-SST-	USB01-SST+	GND	GND-J1	USB01-SSR-	USB01-SSR+
	6	GND	-	-	GND-J1	GND	-	-	GND-J1	GND
	7	RS232_1_RX	GND	GND-J1	GBE_B-	GBE_B+	GND	GND-J1	GBE_A-	GBE_A+
	8	GND	GBE_D-	GBE_D+	GND-J1	GND	GBE_C-	GBE_C+	GND-J1	GND
X16s XMC Map	9	USB02-VBUS	GND	GND-J1	-	-	GND	GND-J1	-	-
	10	GND	-	-	GND-J1	GND	-	-	GND-J1	GND
	11	GPIO2	GND	GND-J1	-	-	GND	GND-J1	-	-
	12	GND	-	-	GND-J1	GND	-	-	GND-J1	GND
X8d XMC Map	13	GPIO3	GND	GND-J1	-	-	GND	GND-J1	-	-
	14	GND	-	-	GND-J1	GND	-	-	GND-J1	GND
	15	GPIO4	GND	GND-J1	-	-	GND	GND-J1	-	-
	16	GND	-	-	GND-J1	GND	-	-	GND-J1	GND

On Board Connectors and Jumpers


Description

A single USB Type-C Port can be found on the front face of the VPX card. Remove the small cover to access. Two sets of jumpers can also be found on the board. One set for manufacturing use and the second set for IPMC related settings.

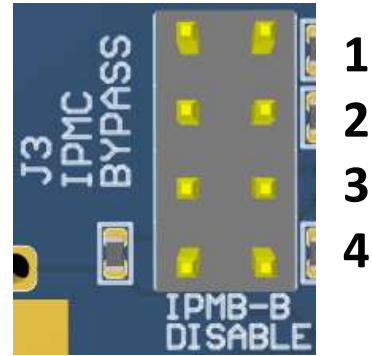
Connector & Jumpers

Function	USB 3.2 Gen2 device port, OTG programming port
Location	P5
Type	24 Pin USB Type C
Connector	Part Number: C-ARA1-AK512 Manufacturer: CNC Tech
Mating Cable	Any Standard Type C interface cable or device Note this port only supports USB devices, it does not support any alternate mode formats.
Notes	This interface doubles as both a standard DFP (Downward facing port) USB 3.2 Gen2 port to support USB 3.2 Gen2 devices and the Jetson AGX Orin™ Programming (flashing) interface port. The port is capable of up to USB 3.2 Gen 2 speeds in normal operation. The USB 2.0 portion of the interface doubles as the OTG programming port when the FORCE RECOVERY function is applied at startup. The power to the port is disabled so an external PC connection is possible to reprogram the module using Jetpack. Maximum power available on this output is 1A @5V.

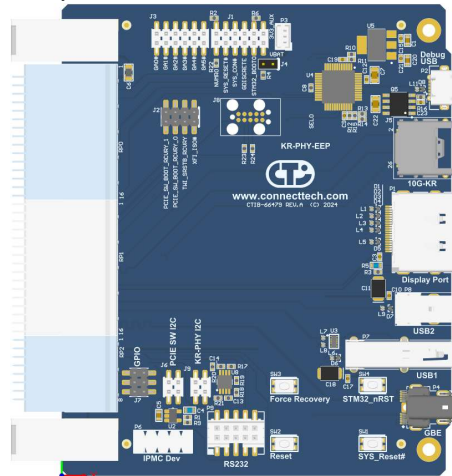
Function		
Function	Manufacturing Use Only	
Location	J1	
Type	2x3 2mm Header	
Jumper settings	Position	Description
	1	CPO - Not intended for customer use
	2	PRSNT - Not intended for customer use
	3	EEP - Not intended for customer use



Function		
Function	IPMC Control	
Location	J3	
Type	2x4 2mm Header	
Jumper settings	Position	Description
	1	IPMC BYPASS – Install jumpers to disable IPMC.
	2	PIC will power on once 12V and 3V3_AUX is applied to the card
	3	
4	IPMB-B Disable – Install jumper to disable second IPMB channel	



Connector & Jumper Summary




Designator	Description
P1	Display Port Connector
P2	Debug micro USB, 3 UARTS for Jetson™, PCIe SW, IMPC
P3	VBAT Connector
P4	iX Ethernet Connector
P6	IPMC Chassis Management Connector
P7	USB 3.0 Connector
P8	USB 2.0 Connector
P9	RS-232 Header
J1	Misc Signal Header
J2	Misc Signal Header
J3	Global Address Header
J4	VBAT Bus Connect Header
J5	Dual 10GBase-KR connector
J6	PCIe Switch I2C Header
J7	GPIO Header
J8	KR PHY EEP Programming Header
J9	KR PHY I2C Header
SW1	VPX SYS_RESET#
SW2	Jetson Orin™ Reset
SW3	Jetson Orin™ Force Recovery
SW4	IPMC Reset


Power Input

The RTG005 Power input has been designed under the SOSA requirement of using only VS1 (12V), 3.3V_AUX and VBAT for input power. Any required rails are generated on board.


USB UART Debug Console

Function	USB UART Debug console	
Location	P2	
Type	5 Pin USB Micro AB connector	
Connector	Part Number: 47589-0001 Manufacturer: Molex	
Mating Cable	Any standard Micro USB to USB Type A	
Pinout	As per USB specification	
Notes	This interface utilizes an FTDI USB to Serial device on board to allow access to the Jetson AGX Orin™ Serial debug console, The PCIe Switch UART and the IPMC UART using any Micro USB to USB A cable and any PC with a USB interface and serial terminal program.	

USB 2.0

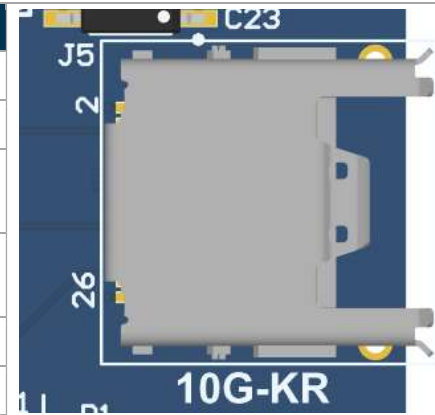
Function	USB 2.0	
Location	P8	
Type	USB 2.0 Type-A Connector	
Connector	Part Number: 67329-8000 Manufacturer: Molex	
Mating Cable	Any standard USB Type-A cable	
Pinout	As per USB specification	
Notes		

USB 3.0

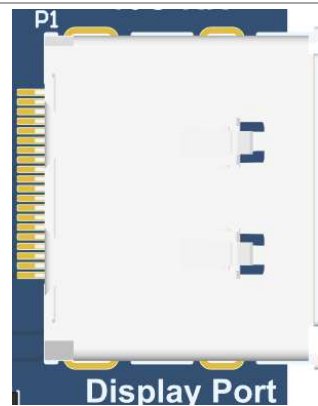
Function	USB 3.0	
Location	P7	
Type	USB 3.0 Type-A Connector	
Connector	Part Number: GSB4116341HR Manufacturer: Amphenol	
Mating Cable	Any standard USB 3.0 Type-A cable	
Pinout	As per USB specification	
Notes	Users may achieve greater than 5GBPS through this port as the link to the Orin™ is 10GBPS.	

10Gbase-KR

Function	2x 10GBase-KR	
Location	J5	
Type	26 Pin / 8 Diff Pairs	
Connector	Part Number: T1M-10-GF-DH Manufacturer: Samtec	
Mating Cable	ARC6-08-xx.x-LU-LD-2-1 "xx.x" - Cable Length	
Pinout	Connector Pins	Description
	1,2,7,8,13,14,19,20,25,26	GND
	3,5,9,11,15,17,21,23	N/C
	4	KR_RX2_N
	6	KR_RX2_P
	10	KR_TX2_N
	12	KR_TX2_P
	16	KR_RX1_N
	18	KR_RX1_P
	22	KR_TX1_N
24	KR_TX1_P	
Notes	Due to limitations on the NVIDIA® Jetson™, the 10Gbase-KR is unable support 1000base-KX downlinking.	

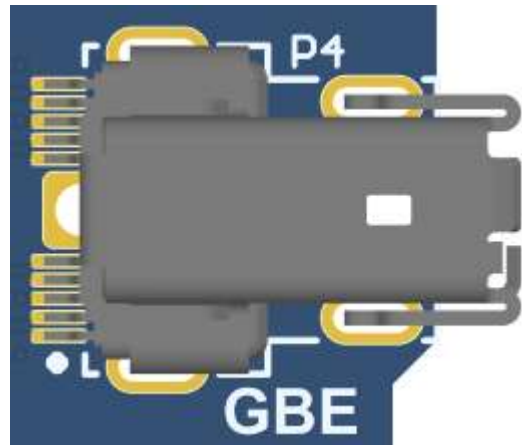

DisplayPort

Function	Display Output
Location	P1
Type	Full size DisplayPort connector
Connector	Part Number: 472720001 Manufacturer: Molex
Mating Cable	Any Standard DisplayPort cable or Active HDMI to DisplayPort Adapter
Pinout	As per DisplayPort specification
Notes	

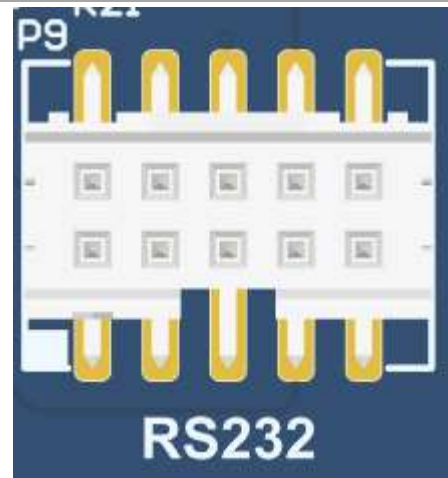


1000Base-T

Function	GBE Network	
Location	P4	
Type	iX Industrial Ethernet Connector	
Connector	Part Number: IX61G-A-10P Manufacturer: Hirose	
Mating Cable	Any iX Industrial Type-A cable	
Pinout	Pin Number	Function
	1	MDIO_P
	2	MDIO_N
	3	GND
	4	MDIO2_P
	5	MDIO2_N
	6	MDI1_P
	7	MDI1_N
	8	GND
	9	MDI3_P
10	MDI3_N	
Notes		


RS-232 Serial Coms

Function	Serial Coms	
Location	P9	
Type	2x5 2mm Minitek	
Connector	Part Number: 98424-G52-10LF Manufacturer: Amphenol FCI	
Mating Cable	Any iX Industrial Type-A cable	
Pinout	Pin Number	Function
	5,6	GND
	3,4,9,10	N/C
	1	SER1_TX
	2	SER1_RX
	7	SER2_TX
8	SER2_RX	



Notes	
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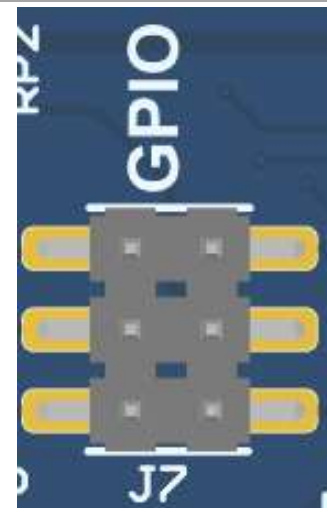
External IPMC Chassis Manager Connector

Function	IPMC Development	
Location	P6	
Type	2x5 0.1" Header	
Connector	Part Number: 5-146254-5 Manufacturer: TE	
Pinout	Pin Number	Function
	2,4,6,8,10	GND
	5	N/C
	1	IPMB1_SCL
	3	IPMB1_SDA
	7	IPMB0_SCL
	9	IPMB0_SDA
Notes	This connector is meant for manufacturing use only. If a user's backplane does not have access to a chassis manager, then this can be used to access the IPMC Bus	



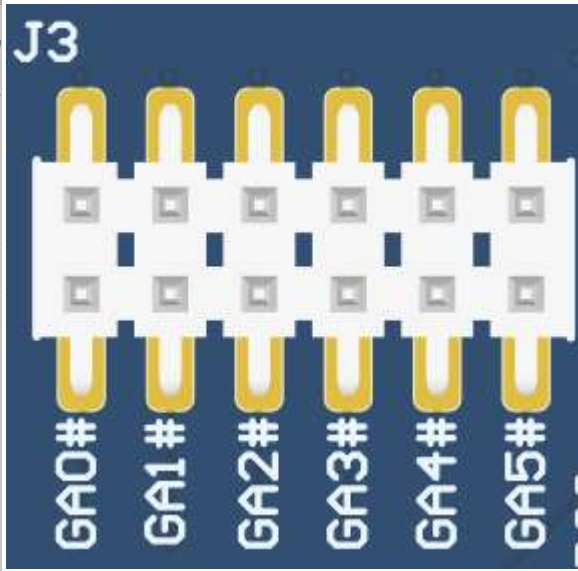
GPIO

Function	GPIO			
Location	J7			
Type	2x3 0.1" Header			
Connector	Part Number: 5-146254-5 Manufacturer: TE			
Pinout	Pin Number	Function	Module ID	Controller ID (sysfs)
	5,6	GND		
	1	GPO1	GPIO04	PA.02 (350)
	2	GPO2	GPIO05	PA.01 (349)
	3	GPI1	GPIO08	PBB.01 (325)
	4	GPI2	GPIO09	PBB.00 (324)
Notes				

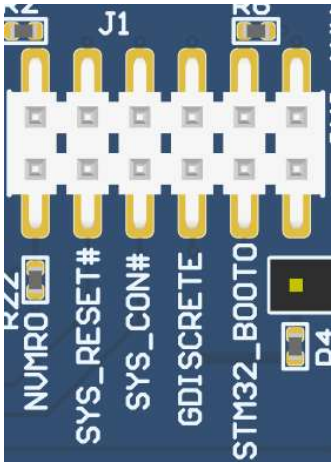


Board Address


Function	Board Addressing	
Location	J3	
Type	2x6 2MM Header	
Jumper Settings	Position	Description
	GA0#	Install to pull low.
	GA1#	
	GA2#	
	GA3#	
	GA4#	
GAP#		
Notes	If user's backplane does not set Global Address then these can be used to force the pins low	


VPX Misc Signals

Function	VPX Misc Signals	
Location	J1	
Type	2x6 2MM Header	
Jumper Settings	Position	Description
	NVMRO	Install to pull high
	SYS_RST#	Install to pull low
	SYS_CON#	Install to pull low
	G Discrete	Install to pull low
	STM32_Boot	Do not use
	N/C	N/C
Notes	Misc VPX signals are routed here for testing if required	

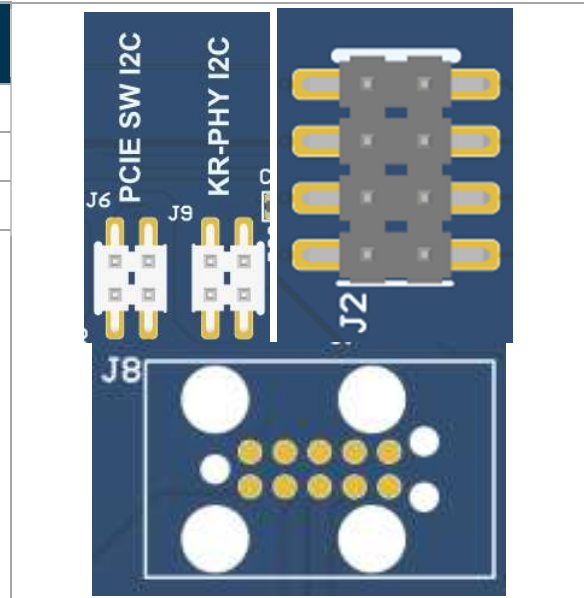

VBAT Connector

Function	VPX Misc Signals	
Location	P3	
Type	1x3 1.25mm PicoBlade	
Jumper Settings	Position	Description
	1	VBat
	2	N/C
	3	GND



Manufacturing use only

Function	GPIO	
Location	J2, J6, J8, J9,	
Type	N/A	
Connector	N/A	
Notes	These headers are intended for manufacturing use only	


Push Buttons

Function	Push Buttons	
Location	Push Buttons	
Type	2x6 2MM Header	
Jumper Settings	Position	Description
	SYS_RST#	Pulls the VPX SYS_RST# pin low
	Reset	Reset Orin™ SOM
	Force Recovery	Used to put Orin™ in recovery mode
	STM32_nRST	Do not use
Notes		



TYPICAL DEVELOPMENT INSTALLATION

1. Ensure all external system power supplies are off.
2. Install the VPG004 and RTG005 (RTM) into a VPX Backplane
3. Install the necessary cables for application into the RTM
4. Switch ON the Power Supply.

SOFTWARE

For L4T (Linux for Tegra) BSPs and Software Support NVIDIA® Jetson AGX Orin™ please follow this link:
<https://connecttech.com/resource-center/l4t-board-support-packages/>

FORCE RECOVERY MODE

The USB 3.2/OTG Port (P5) on the VPG004 can be used to reprogram the AGX Orin™ from another host platform running NVIDIA® Jetpack™.

- 1) Power down the system completely. The system power MUST be OFF, not in suspend or sleep mode.
- 2) Connect the OTG USB port to another host device that will be supplying the new system file.
- 3) Hold down the Force Recovery Button on the RTM Card and then power the board.
- 4) After three (3) seconds release the Recovery button.
- 5) The AGX Orin™ will show up on the host system USB list as a new NVIDIA® target device.
- 6) After successfully updating the system software, power off the system. A clean power up will revert the OTG port back into host mode.

POWER CONSUMPTION & THERMALS

Below is the theoretical maximum stand-alone power consumption of VPG004 (System power)

Theoretical Maximum System power		Watts
AGX ORIN™ Module (MAXN Power Mode)	68W	~105W
1x NVMe (Active Write)	6.3W	
2x 10GBase-KR	1.75W	
1x 1000GBase-T	0.6W	
1x x8 PCIe Gen 4 Link (100% Traffic)	14W	
2x USBs (Through RTM)	5W	
Power losses (~10%)	10W	

MECHANICAL DRAWINGS & MODELS

3D STEP Models

A complete 3D STEP Model file of the VPG004 can be made available upon request. The VPG004 is a Standard 3U VITA 65 unit, compliant with a 1" pitch VPX backplane layout.

