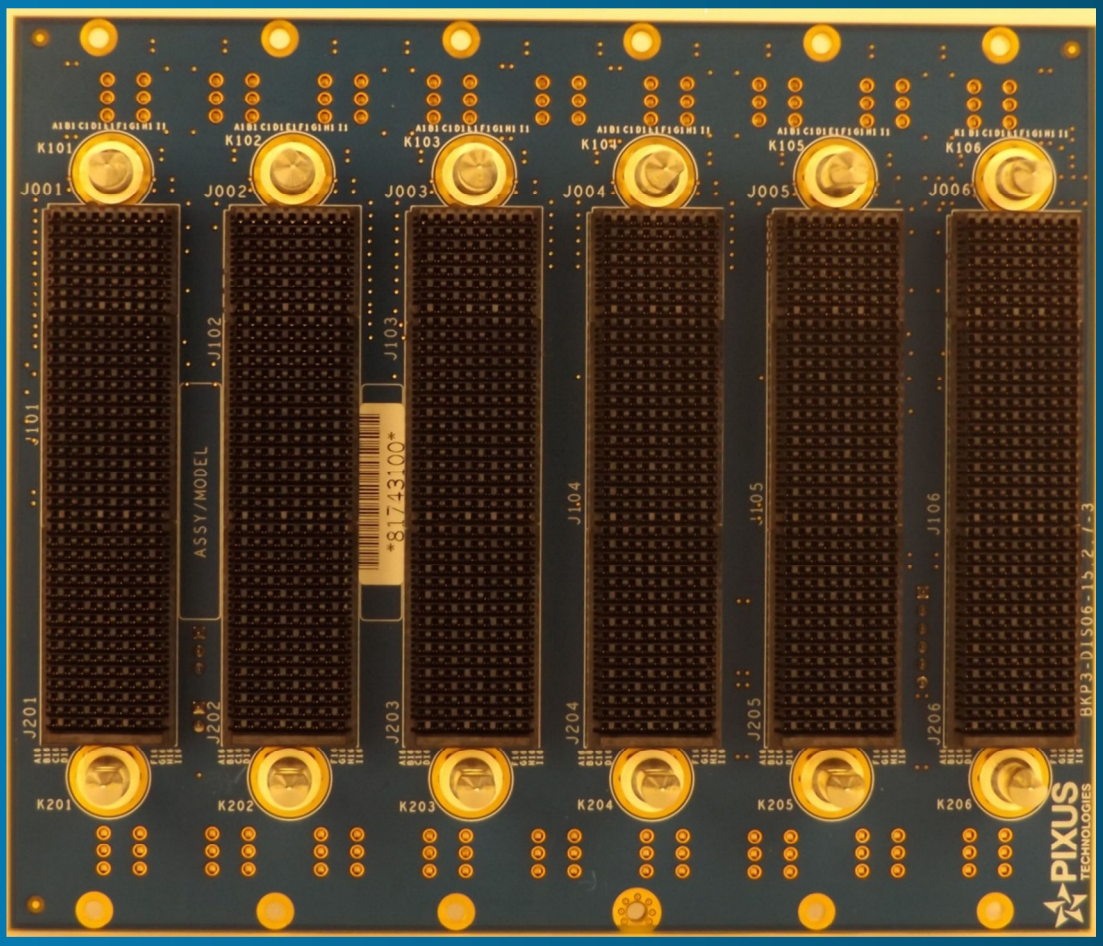
pixus TECHNOLOGIES

USER GUIDE



3U OpenVPX Backplane
BKP3-DIS06-15.2.14-3+

Contacting Us

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Visit our home page at www.pixustechnologies.com for more information about Pixus products and services.

Issue	Date	Description
1.0	27-Nov-2017	Product release

Typographical Conventions Used in This Document

Items	Convention
You will see the following icons periodically throughout this manual:	
	The **WARNING** icon cautions you against an action or treatment that could threaten the responsiveness of the equipment or the integrity of your current work.
	The **INSPECT** icon alerts the reader to follow inspection instructions to ensure product is not damaged and in operational order.
	The **Note** icon notifies you of the information that makes a procedure easier or clarifies an earlier description.
Headings, titles, sections or words of importance.	These items appear in **bold** typeface. Example: **Any changes or modifications…….**
Variable placeholders, references to other documents, new or special terminology, and emphasis.	These items appear in *italic* typeface. Example: ***Table 3-1,*** displays……
References to chapters and sections of documents, and citations of messages displayed to users.	These items appear in “quotation marks.” Example: For more information, refer to “Connections”, section 3….

Revision History

Revision	Date	Description	Author
1.0		Released for product approvals	

TABLE OF CONTENTS

List of Figures

List of Tables

SECTION ONE

1.0 INTRODUCTION

This section provides a brief overview about Pixus Technologies Inc. This section describes the following:

- Pixus Technologies Inc.
- Contact Information
- Background Information
- Applicability

1.1.1. Pixus Technologies Inc.

Pixus Technologies specializes in the design and manufacture of electronic packaging solutions for the global embedded computer market. The company is comprised of three business units: Backplanes, Enclosure & System Solutions and Components.

Leveraging over 20 years of innovative product development, Pixus Technologies' embedded backplanes and systems are focused primarily on xTCA, OpenVPX, CompactPCI, PCIe and custom designs. The company offers unsurpassed thermal management solutions, creative design innovations, and backplane design expertise. Pixus also offers modular 19" rackmount enclosure solutions and instrument cases to a wide range of industries, as well as precision components such as front panels, handles, and card guides.

The approach to each customer requirement is a simple consultative philosophy - understand the specific program requirements and create the best solution that meets the time frame, architecture, technology and cost objectives.

1.1.2. Contact Information

For questions about the Pixus product or about Pixus in general, please contact us using the following information:

Phone Number: (519) 885-5775
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For Pixus product support, see the Pixus Web site: www.pixustechnologies.com

1.1.3. Background Information

When designing OpenVPX systems, use the following documents for reference:

- ANSI/VITA® 62.0 Modular Power Supply Standard
- ANSI/VITA® 48.0 Mechanical Specification for Microcomputers Using Ruggedized Enhanced

Design Implementation (REDI)

- ANSI/VITA® 48.1 Mechanical Specification for Microcomputers Using REDI Air Cooling
- ANSI/VITA® 46.0-2007 VPX Baseline Standard
- ANSI/VITA® 46.1-2007 VMEbus Signal Mapping on VPX
- ANSI/VITA® 46.3-2012 Serial RapidIO® on VPX Fabric Connector
- ANSI/VITA® 46.4-2012 PCI Express® on VPX Fabric Connector
- ANSI/VITA® 46.6-2013 Gigabit Ethernet Control Plane on VPX
- ANSI/VITA® 46.7-2012 Ethernet on VPX Fabric Connector
- ANSI/VITA® 46.8-VDSTU Infiniband® on the VPX Fabric Connector
- ANSI/VITA® 46.9-2010 PMC/XMC Rear I/I Signal Mapping on 3U and 6U VPX Module
- ANSI/VITA® 46.10-2009 Rear Transition Module for VPX
- ANSI/VITA® 46.11-VDSTU System Management for VPX
- ANSI/VITA® 46.9 PMC/XMC Rear I/O Fabric Signal Mapping on 3U and 6U VPX Modules Standard
- ANSI/VITA® 65.0-2017 OpenVPX® System Standard
- ANSI/VITA® 65.1-2017 OpenVPX® System Standard – Profile Tables
- ANSI/VITA® 68.0-VDSTU VPX Compliance Channel
- ANSI/VITA® 68.1-VDSTU VPX Compliance Channel – Fixed Signal Integrity Budget

- RoHS 2002/95/EC

1.1.4. Applicability

This User Guide is applicable to the following model(s):

Model Name	Description
VPX30-06-BC-12[A/X/C]51-0	3U 6-Slot OpenVPX Distributed

Table 1-1: Applicability

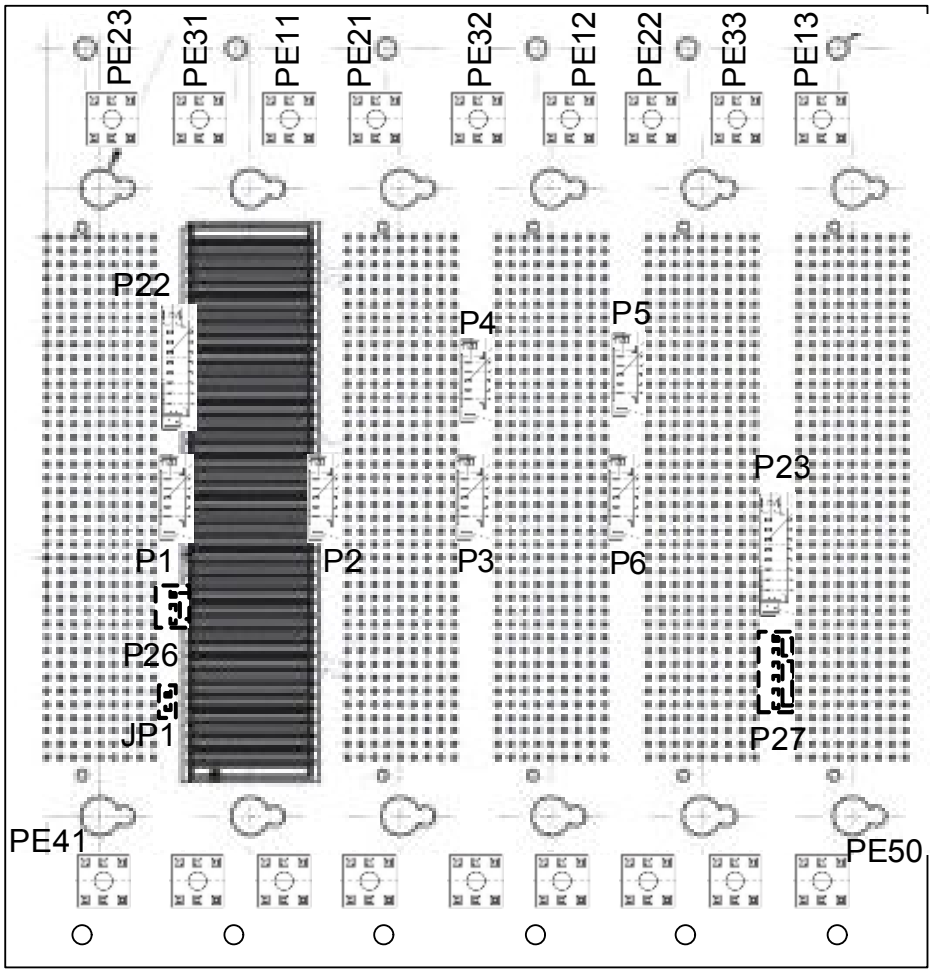
SECTION TWO

2.0 FEATURES

The BKP3-DIS06-15.2.14-3+ Backplane has been designed with the following features:

- Conformance to the latest VITA/ANSI standards.
- Support for up to 6 3U 5HP Modules.
- DC power entry with power studs for Vs1, Vs2, Vs3 and GND. Auxiliary power entry with 5-pin header.
- Individual 5-pin headers for JTAG connectivity at each slot.
- Two 8-pin headers for access to the system management bus and control signals.

Figure 2-1 illustrates the front view of the Backplane. Connectors with dashed outlines (or as noted) are on the rear.



All connectors other than the Multi-Gig are on the rear side

Figure 2-1: Backplane Rear View

SECTION THREE

3.0 QUICK START

The BKP3-DIS06-15.2.14-3+ Backplane complies with the ANSI/VITA standards as they were when the Backplane was created.

This chapter will provide an overview of basic operating procedures, including the following:

- Inspecting your Backplane
- Installing your Backplane in a subrack
- Powering your Backplane

3.1.1. Inspecting your Backplane

Take great care when handling the backplane. Improper handling could cause damage to the connector pins.

Always handle the backplane from the edges, never the connectors.

The first item that must be done before starting to utilize your Backplane is to perform a thorough inspection.

During the course of handling, shipping and assembly, pins, mounting screws and other items could become damaged and/or loose. Operating a damaged Backplane could cause serious damage to the Backplane and/or devices that interface to it.

Take a few minutes to visually inspect that all of the connector pins are straight, screws are tight, etc.

Repair any bent pins, loose screws, etc. before proceeding. If damage to the Backplane is deemed too extensive, call Pixus Customer Service for assistance on how to proceed.

3.1.2. Installing your Backplane in a subrack

The BKP3-DIS06-15.2.14-3+ Backplane mounts into a sub-rack using M2.5 screws along the rows of mounting holes situated at the top and bottom end of each Slot, with all mounting holes connecting to chassis ground with the exception of one.

The mounting rail areas of the Backplane have exposed strips of copper that are connected directly to the chassis ground of the Backplane.

The Backplane must be mounted in the sub-rack with insulator strips between it and the rails. Applications where conductive strips are utilized must be inspected to make sure there is no electrical contact between the rails and any of the power elements.

As stated above, there is one mounting screw that allows digital ground to be tied to chassis (frame) ground.

The arrow in Figure 3-1 illustrates the screw location for the single ground tie point.

Refer to the subrack user guide for information on torque limits for the mounting screws.

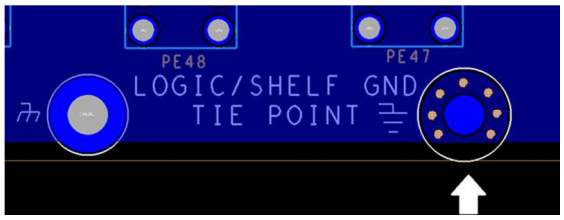


Figure 3-1: Digital Ground – Chassis Ground Tie Point

3.1.3. Powering your Backplane

Slots are powered through power elements and for lower Slot count Backplanes, a combination of power elements and a header.

The power elements are capable of providing 60 Amps in a 70° ambient environment. Each pin on the power element is rated for 10 Amps.

The AUX power connector (P27) for the narrower backplanes is rated at 4 Amps per pin. There is no derating information available.

3.1.4. VS1, VS2, VS3, GND

Per the specification, each Slot can source 22A on Vs1, Vs2 and Vs3.

The Vs1, Vs2 and Vs3 power elements (as applicable) are on the top rear of the Backplane.

Vs1 power elements are referenced from PE11-PE17 and are bused on the Backplane.

Vs2 power elements are referenced from PE21-PE27 and are bused on the Backplane.

Vs3 power elements are referenced from PE31-PE37 and are bused on the Backplane.

There is one corresponding GND power element for each Vs[1-3] power element. GND power elements are on the lower rear of the Backplane.

Ground power elements are referenced from PE40-PE60 and are bused on the Backplane.

3.1.5. AUX

Per the specification, each Slot is able to source 1A on each AUX rail (3.3V_AUX, +12V_AUX and -12V_AUX).

Where space permits, this is done with power elements. If present, these will be located on the top rear of the Backplane.

Where space does not permit, it is done with a PCB-wire header (P27).

Refer to Appendix A for a suitable mating connector and wire crimps. Table 3-1 provides the pinout for the AUX power connections.

Pin	Signal	Signal
1	+12V_AUX	PE71
2	+12V_AUX	
3	3.3V_AUX	PE72
4	3.3V_AUX	
5	-12V_AUX	PE73
6	-12V_AUX	

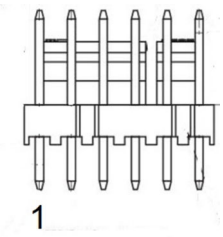


Table 3-1: AUX Header / Power Elements

3.1.6. Decoupling

Each Slot has provisions for decoupling capacitors.

A high frequency decoupling capacitor (0.1 uf) is provided for each power rail at each Slot.

Provisions for optional bulk filtering capacitors are provided for each power rail at each Slot. These can be requested as an option when noisy power rails are expected.

3.1.7. Accessory connections

3.1.7.1 VBAT

One 3 pin header (P26) is supplied on rear side for external connection to VBAT and 3.3V_AUX.

A standard 0.100" shunt is provided to connect VBAT to either GND or 3.3V_AUX.

Refer to Appendix A on page 17 for a suitable mating connector and wire crimps.

Table 3-2 provides the pinout for the VBAT power header.

Pin	Signal
1	GND
2	P1-VBAT
3	3.3V_AUX

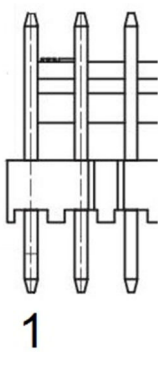


Table 3-2: VBat Header

3.1.7.2 JTAG

Each Slot has a 5 pin header (P[1-21]) to allow access to the Slot's JTAG signals.

Refer to Appendix A on page 17 for a suitable mating connector and wire crimps.

Table 3-3 provides the pinout for the JTAG headers along with the corresponding pin on the Slot.

Pin	Signal	Backplane Pin
1	TRST	J0 a7
2	TMS	J0 b7
3	TDI	J0 e7
4	TDO	J0 f7
5	TCK	J0 i7

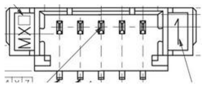


Table 3-3: JTAG Headers

3.1.7.3 System Management

There are two 8 pin headers (P22, P23) to allow access to the System Management signals.

Refer to Appendix A for a suitable mating connector and wire crimps.

Table 3-4 provides the pinout for the System Management headers.

Pin	Signal (P22)	Signal (P23)
1	3.3V_AUX	3.3V_AUX
2	GND	GND
3	MSK_RST*	MSK_RST*
4	NVMRO	NVMRO
5	GND	GND
6	SYSRESET*	SYSRESET*
7	SM0	SM2
8	SM1	SM3

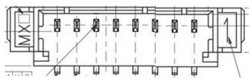


Table 3-4: SM Headers

Note that MSK_RST* is only present on these pins when bussed to all Slots.

3.1.7.4 NVMRO

The Backplane buses this signal to all Slots.

Jumper (JP1) allows for the signal to be grounded on the Backplane.

3.1.8. Slot Keying

Table 3-5 provides the default Slot keying for various length 3U and 6U Backplanes.

Slot#	3U		6U		
	Key 1	Key 2	Key 1	Key 2	Key 3
1	270°	270°	315°	270°	270°
2	315°	270°	315°	315°	270°
3	0°	270°	315°	0°	270°
4	45°	270°	315°	45°	270°
5	90°	270°	315°	90°	270°
6	270°	315°	315°	270°	315°
7	315°	315°	315°	315°	315°
8	0°	315°	315°	0°	315°
9	45°	315°	315°	45°	315°
10	90°	315°	315°	90°	315°
11	270°	0°	315°	270°	0°
12	315°	0°	315°	315°	0°
13	0°	0°	315°	0°	0°
14	45°	0°	315°	45°	0°
15	90°	0°	315°	90°	0°
16	270°	45°	315°	270°	45°
17	315°	45°	315°	315°	45°
18	0°	45°	315°	0°	45°
19	45°	45°	315°	45°	45°
20	90°	45°	315°	90°	45°
21	270°	90°	315°	270°	90°

Table 3-5: Slot Keying

In 6U systems, key 1 should be set to 45° if Vs1 is 48V and 315° if Vs1 is 12V.

3.1.9. Installing Plug-In Modules in your Backplane

The BKP3-DIS06-15.2.14-3+ support up to 6 add-in OpenVPX Plug-In Modules.

The leftmost Slot (viewed from the front) will always have a geographic address of 1 and will increment by one for each Slot to the right.

Table 3-6 illustrates the Slot numbering and geographic addressing on the various length Backplanes.

Slot#	GAP*	GA4*	GA3*	GA2*	GA1*	GA0*
1	Open	Open	Open	Open	Open	GND
2	Open	Open	Open	Open	GND	Open
3	GND	Open	Open	Open	GND	GND
4	Open	Open	Open	GND	Open	Open
5	GND	Open	Open	GND	Open	GND
6	GND	Open	Open	GND	GND	Open
7	Open	Open	Open	GND	GND	GND
8	Open	Open	GND	Open	Open	Open
9	GND	Open	GND	Open	Open	GND
10	GND	Open	GND	Open	GND	Open
11	Open	Open	GND	Open	GND	GND
12	GND	Open	GND	GND	Open	Open
13	Open	Open	GND	GND	Open	GND
14	Open	Open	GND	GND	GND	Open
15	GND	Open	GND	GND	GND	GND
16	Open	GND	Open	Open	Open	Open
17	GND	GND	Open	Open	Open	GND
18	GND	GND	Open	Open	GND	Open
19	Open	GND	Open	Open	GND	GND
20	GND	GND	Open	GND	Open	Open
21	Open	GND	Open	GND	Open	GND

Table 3-6: Slot # / Geographic Addressing

Refer to 4.1.2 for information on which Plug-InModules go into which Slot.

The latching/unlatching mechanism on the Plug-In Module should suffice for insertion/extraction.

Do not use excessive force when installing or removing Plug-In Modules from the Backplane. Use of excessive force can result in damage to the Backplane and/or Plug-In Module. Should excessive force be required, remove the Plug-In Module(s) and verify the alignment of the mechanicals and Backplane.

SECTION FOUR

4.0 UNDERSTANDING YOUR BACKPLANE

4.1.1. Backplane connectors

The complete list of connectors utilized on the Backplane is listed in Table 5-1.

4.1.2. Backplane topology

Figure 4-1 illustrates the Backplane topology. The dotted lines from the Payload and Switch Slots are signals that are available to the complementary RTM.

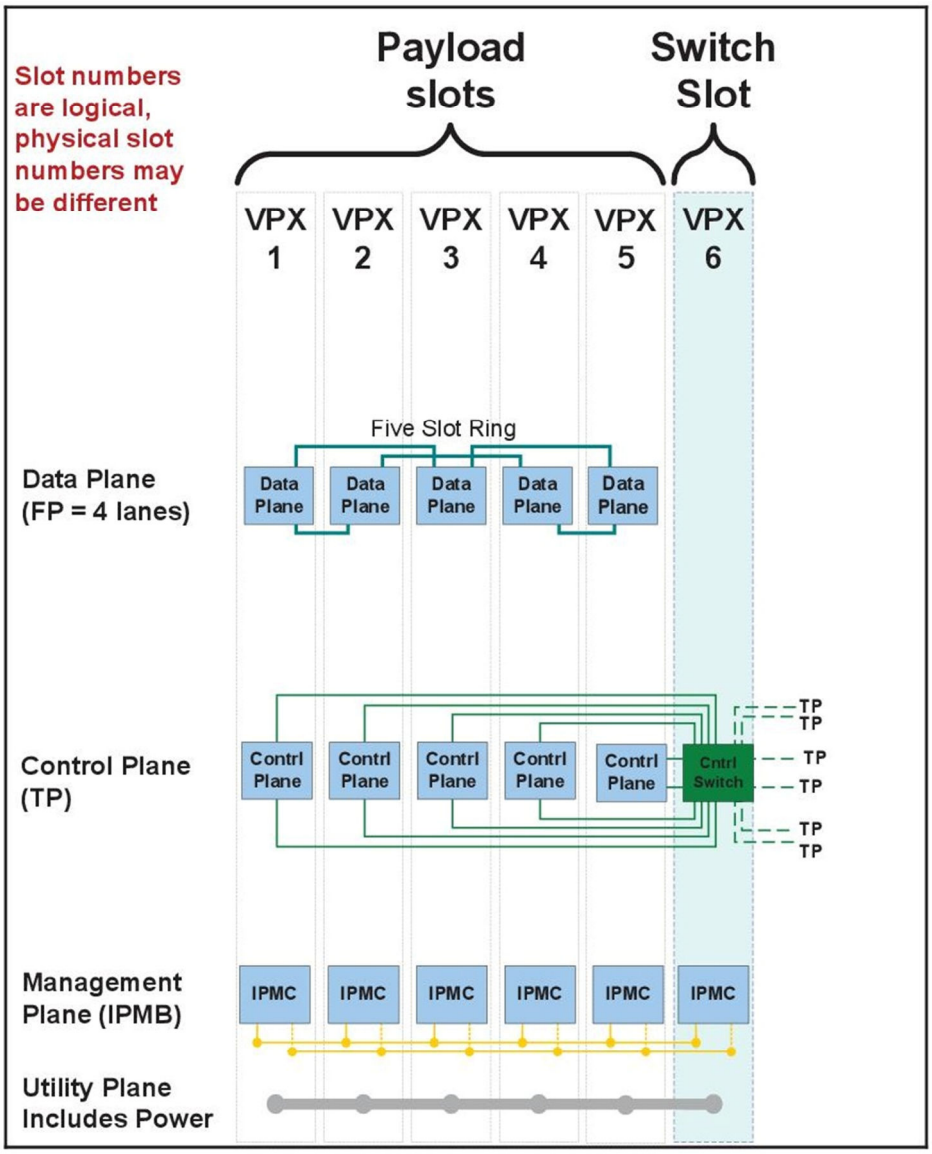


Figure 4-1: Backplane Topology

4.1.3. Backplane profile compatibility

Table 4-2 displays the list of Backplane Profiles that the BKP3-DIS06-15.2.14-3+ is compatible with.

Slot Profile information is also provided.

A “+” at the end of the profile name indicates that this particular profile was not approved as part of ANSI/VITA 65.1 at the time of publication of this document.

4.1.4. SYS_CON*

This signal is pulled low on physical Slot 1.

Each Slot has the option of having this signal pulled low.

Consult Pixus Technologies for information on how this can be accomplished.

4.1.5. Control Plane

The Backplane has the Control Plane Ports connected as shown in Table 4-1.

Slot	Control Port	Switch 1	Switch 2
1	CPtp01	TP05	N/A
	CPtp02	TP06	N/A
2	CPtp01	TP07	N/A
	CPtp02	TP08	N/A
3	CPtp01	TP09	N/A
	CPtp02	TP10	N/A
4	CPtp01	TP11	N/A
	CPtp02	TP12	N/A
5	CPtp01	TP13	N/A
	CPtp02	TP14	N/A

Table 4-1: Control Plane Interconnect

Backplane Profile Names	Mechanical		Channel Gbaud Rate			Payload		Control and Data Plane Switch	
	Pitch (in)	RTM conn	Control Plane (UTP)	Data Plane (FP)		Slots	Slot Profile	Slots	Slot Profile
BKP3-DIS06-15.2.14-1	1.0	46.10	1.25	3.125		1-5	SLT3-PAY-2F2T-14.2.5	3, 5	SLT3-SWH-16T-14.4.6
BKP3-DIS06-15.2.14-2	1.0	46.10	1.25	5.0000		1-5	SLT3-PAY-2F2T-14.2.5	3, 5	SLT3-SWH-16T-14.4.6
BKP3-DIS06-15.2.14-3	1.0	46.10	1.25	6.2500		1-5	SLT3-PAY-2F2T-14.2.5	3, 5	SLT3-SWH-16T-14.4.6
BKP3-DIS06-15.2.14-3+	1.0	46.10	10.000	10.000		1-5	SLT3-PAY-2F2T-14.2.5	3, 5	SLT3-SWH-16T-14.4.6

Table 4-2: Backplane Profile Compatibility

4.1.6. Data Plane

The Backplane has the Control Plane Ports connected as shown in Table 4-3.

Slot/ Channel		DP01	DP02
1	5-Slot Mesh Cluster 1	VPX02-DP01	VPX03-DP01
2		VPX01-DP01	VPX04-DP01
3		VPX01-DP02	VPX05-DP01
4		VPX02-DP02	VPX05-DP02
5		VPX03-DP02	VPX04-DP02

Table 4-3: Data Plane Interconnect

SECTION FIVE

5.0 APPENDIX A

5.1.1. List of Connectors

Description	Reference	Vendor	Connector P/N	Mating Connector P/N	Rating
Power Elements	PE11-PE13 PE21-PE23 PE31-PE32 PE40-PE48	ERNI/ Wurth	225693/7461057		94V-0
Management 1x8	P22, P23	Molex	53398-0871	51021-0800	94V-0
JTAG Connector	P1-P6	Molex	53398-0571	21021-0500	94V-0
MultiGig Keyed Guide Pin 24mm 3.6-7.5mm	K[1-6]1 K[1-2]2	TE	1410956-1		94V-0
MultiGig RT T2.8" Half Left	J0[01-06] RJ2[01-06]	TE/ept	1410186-1 / 308-52200-42		94V-0
MultiGig RT T2.8" Half Center	J1[01-06] RJ1[01-06]	TE/ept	1410140-1 / 308-50100-42		94V-0
MultiGig RT T2.8" Full Right	J2[01-06]	TE/ept	1410142-1 / 308-51100-42		94V-0
MultiGig RT T2.8" Full Center Rear w 1-8	RJ0[01-06]	TE/ept	1410965-1 / 308-50102-42		94V-0
Aux Power (1x6)	P27	Molex	22-11-3067		94V-0
VBat (1x3)	P26	Molex	22-11-3037		94V-0
NVMRO	JP1	Samtec	TSW-102-08-G-S		94V-0

Crimps for P26, P27 - 8550102
Crimps for P1 – P23 – 500588100

Table 5-1: Connectors

The mating headers for P26 and P27 may not have a 1-to-1 pin alignment.

5.1.2. Torque Values

Screw	Torque
Power Element (M3)	0.5 Nm (4.43 in-lb)
Keyed Guide Pin	0.45 Nm (4 in-lb)

Table 5-2: Torque Values

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