USER GUIDE

3U/6U OPEN FRAME DEVELOPMENT SYSTEM CHASSIS

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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		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	

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1. INTRODUCTION

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

- 1.1 Pixus Technologies Inc.
- 1.2 Contact Information
- 1.3 Background Information
- 1.4 Applicability

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.

1.2. 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
Fax Number:	(226) 444-0225
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Mailing Address:	Pixus Technologies Inc. 50 Bathurst Drive, Unit 6 Waterloo, Ontario Canada N2V 2C5

For Pixus product support, see the Pixus web site: www.pixustechnologies.com

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 2011/65/EU

1.4. APPLICABILITY

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

Model	Description
	3U/6U Open Frame VPX Development Systems

Table 1-1: Applicability

SECTION TWO

2. UNDERSTANDING THE CHASSIS

This section provides information on the set up and operation for the chassis.

- Support for 8 Plug-In Modules on a 1” (5HP) pitch, 10 on a 0.8” (4HP) pitch.
- Variable speed fans.
- Convection and/or conduction cooled card guides.
- 6U high for 3U Plug-In Modules, 9U for 6U.
- Carrying handle.
- Side access for Plug-In Module probing.
- Support for rear I/O cards.

2.1. CHASSIS COMPONENTS

The chassis consists of the following components:

- Subrack for 8 Plug-In Modules on a 1” (5HP) pitch.
- Variable speed fans.
- Convection and/or conduction cooled card guides.
- Optional pre-installed backplane.

Figure 2-1 shows the chassis front view. Note that the 3U and 6U chassis are identical except for the size of the Plug-In Module area.

Figure 2-2 shows the rear view.

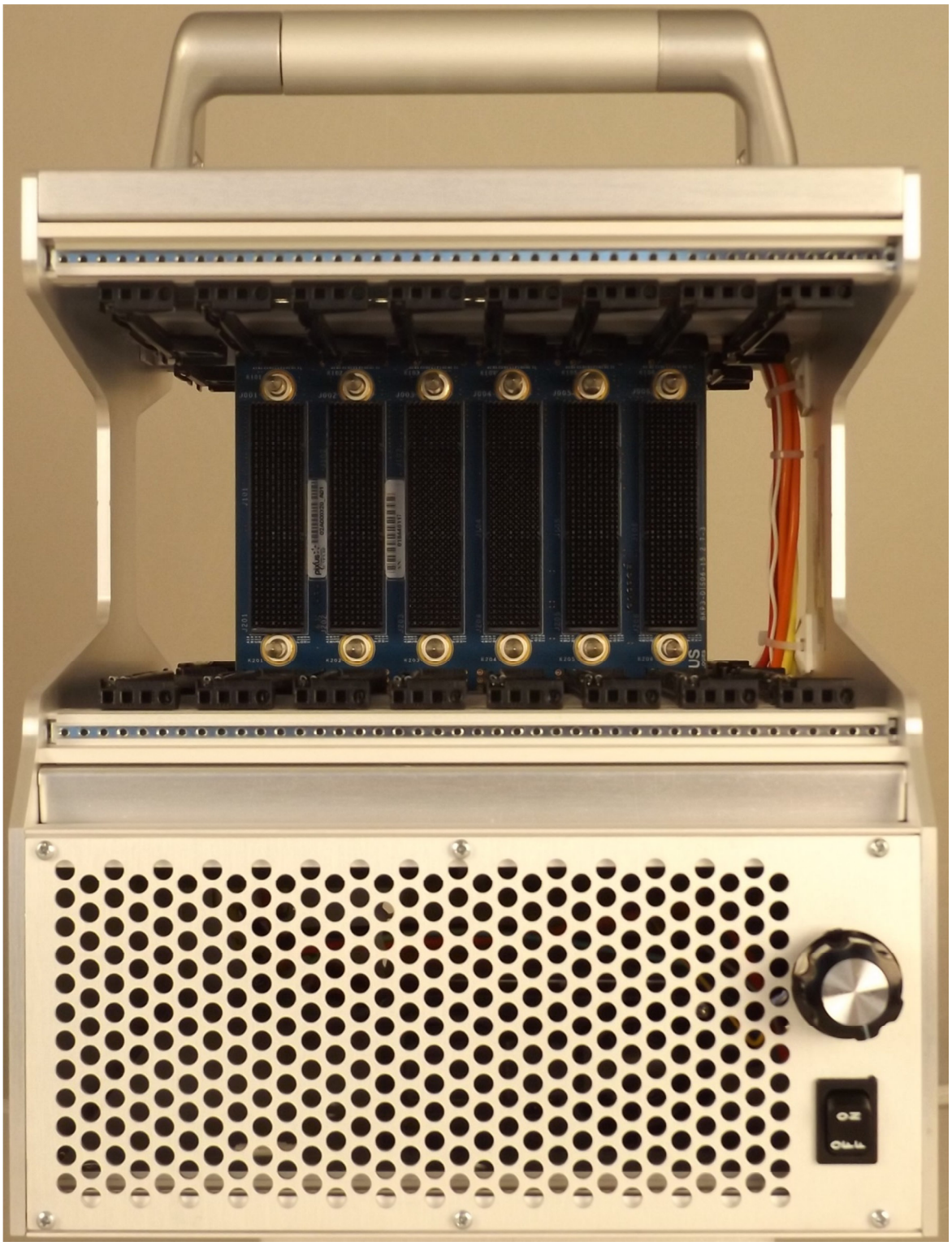

Figure 2-1: Chassis Front View

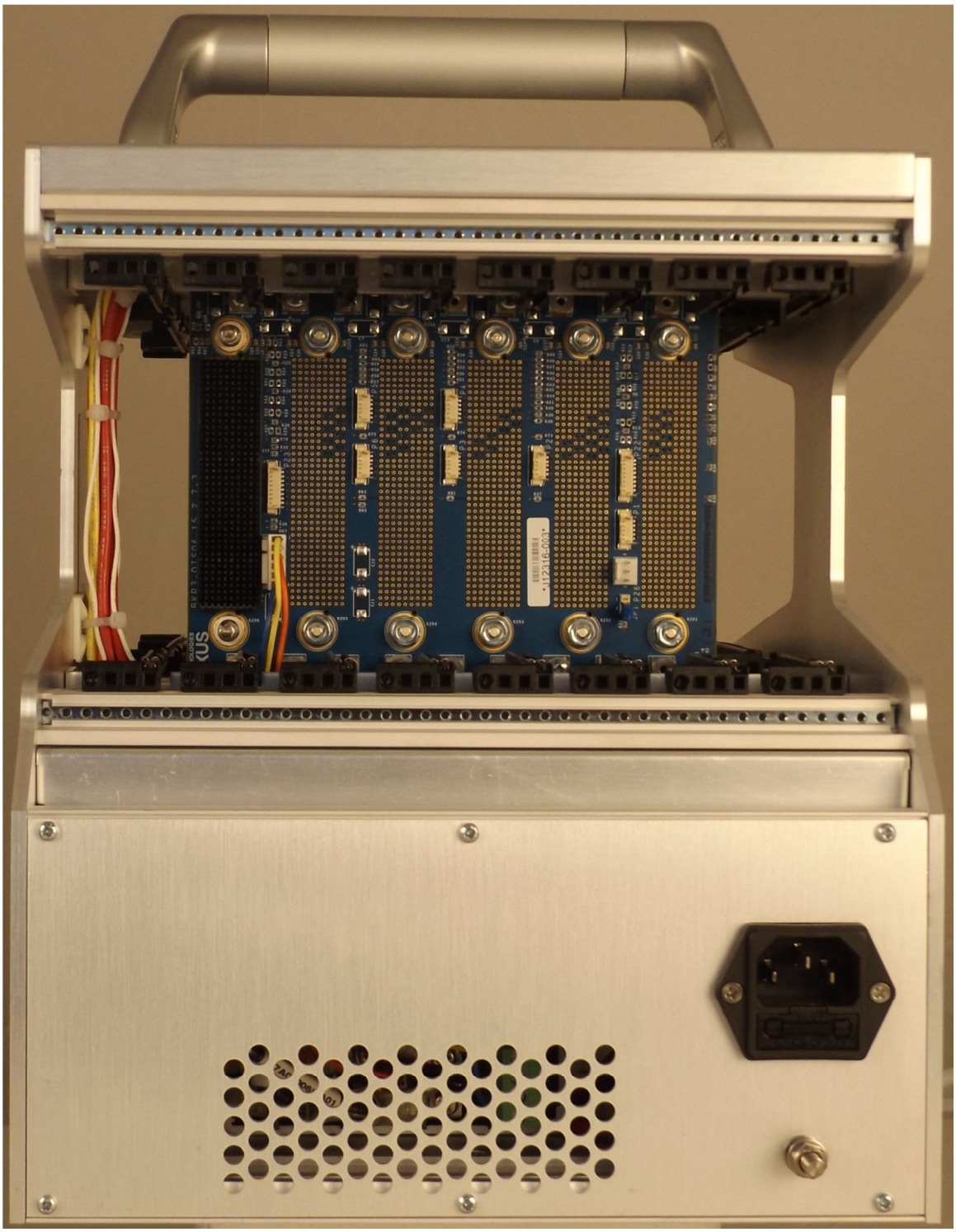

Figure 2-2: Chassis Rear View

2.2. INSPECTING THE CHASSIS COMPONENTS

During the course of handling, shipping, and assembly, pins, shrouds, mounting screws, fans and other items may become damaged and/or loose.

Warning: Before utilizing the chassis, perform a thorough inspection to ensure the chassis and its components are not damaged. Operating a damaged chassis can cause serious damage to the chassis and/or devices that interface to it.

Inspect your chassis :

If equipped with a backplane, visually inspect the backplane to ensure that all of the connector pins are straight, shrouds are properly seated, screws are tight, and so on.

During inspection, it helps to know the specific products that are included with the chassis. For a listing of specific components, refer to Section 2.1.

Check the rails for proper alignment.

Check that cable connections are secure and properly fitted.

Repair any bent pins and shrouds, also tighten loose screws before proceeding.

Carefully repair any bent pins, shrouds, loose screws, etc. before proceeding. If unsure how to proceed or if the damage to the chassis is extensive, contact Pixus Customer Service for assistance at www.pixustechnologies.com .

2.3. GUARDING AGAINST ELECTROMAGNETIC INTERFERENCE

Ensure that the chassis is grounded.

The conduction cooled guide rails are fitted with electrostatic discharge (ESD) contacts for each Plug-In Module. These ESD contacts ensure that the modules are fully discharged as they are plugged into the chassis.

Convection cooled guide rails (if equipped) are electrically connected to the chassis frame.

2.4. PREPARING THE CHASSIS

The chassis measures either 6U (10.5”) or 9U (15.75”) high x 226mm (8.9”) wide x 345mm (13.6”) deep. In preparing the chassis, perform the following:

- Chassis Placement
- Powering the Chassis

2.4.1. CHASSIS PLACEMENT

The chassis has a flat bottom and can be placed on any even surface.

Pick up and carry the chassis by the top handle.

2.4.2. POWERING THE CHASSIS

Warning: If there is no backplane in the chassis, proceed to Section 3.2 first then return to this section.

The chassis is powered by a single IEC 320 inlet.

A standard power cord is supplied with the chassis and is capable of supplying 10 Amps to the chassis.

Before inserting Plug-In Modules, power the chassis to ensure that it is operating properly. Follow the procedure outlined when power the chassis for the first time.

To power the chassis for the first time:

1. Ensure the power switch on the front of the chassis (for location, refer to Figure 2-1) is set to “OFF”. Figure 2-3 shows the power switch and fan speed control knob.

Figure 2-3 Chassis Controls

2. Connect the AC line cord to the AC inlet on the rear of the chassis and then to power.
3. Setting the power switch to the “ON” position will provide DC voltage to the chassis.
    - Verify that the chassis fans are operating.
4. Return the switch to “OFF”.

SECTION THREE

3. QUICK START

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

- Inspecting Your BackplaneFigure 3-1: Digital Ground – Chassis Ground Tie Point
- Installing Your Backplane
- Powering Your Backplane
- Installing Plug-In Modules

3.1. INSPECTING YOUR BACKPLANE

If shipped equipped with a backplane, the first item that must be done before starting to utilize your chassis is to perform a thorough backplane 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.

Some backplanes have all mounting holes connecting to chassis ground whereas some may have one hole connected to digital ground. Chassis are shipped with screws installed in all mounting holes. If the application requires that digital ground and chassis ground are isolated, the screw marked with the corresponding symbol (⏚) on the bottom silkscreen must be removed.

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

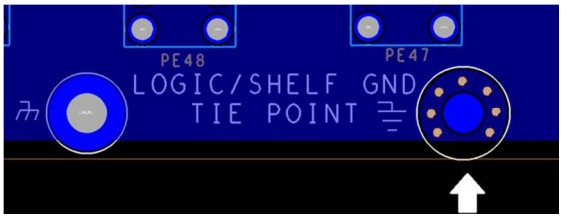

Figure 3-1: Digital Ground – Chassis Ground Tie Point

3.2. INSTALLING YOUR BACKPLANE

Skip this section if your chassis was shipped with a backplane installed.

The backplane mounts into the chassis using M2.5 screws (supplied in a separate bag) along the rows of mounting holes situated at the top and bottom end of each slot.

Some backplanes have all mounting holes connecting to chassis ground whereas some may have one hole that is connected to digital ground. Refer to the backplane documentation on which configuration you have.

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 device on the backplane.

As stated above, there may be one mounting screw that allows digital ground to be tied to chassis (frame) ground. The mounting hole that connects to digital ground should be marked with the corresponding symbol (⏚) on the bottom silkscreen.

Refer to Section 5.2 for information on torque limits for the mounting screws.

3.3. POWERING YOUR BACKPLANE

Skip this section if your chassis was shipped with a backplane installed.

All wiring is colour coded and labelled to allow for easy identification of the various voltages and uses.

Table 3-1 on page 14 defines the colour coding.

Colour	Voltage/Use	Gauge
Red	+5V	16
Orange	3.3V, 3.3V_AUX	16
Yellow	12V, +12V_AUX	16
Blue	-12V_AUX	16
Black	Ground	16/24
White	Sense Line	24

Table 3-1: Wire Colour Coding

The chassis will be shipped with a specific voltage rail configuration based on the model ordered. As such, all voltages listed above may not be present.

Each wire is terminated with a ring terminal for M3 screws.

Connect the appropriate voltage wire(s) to the corresponding terminal(s) on the backplane. The sense line for that voltage must be connected to the backplane as well. It can share the same mounting location as one of the voltage wires.

Failure to connect the sense line(s) will result in the output voltage(s) not being correct and will reduce the power supply's ability to properly compensate for load changes.

Ideally, all of the large gauge black wires should be connected. At a minimum, all of the long or all of the short wires need to be connected (one long and one short wire are connected together at the power supply end for each power rail). This is due to the fact that each power rail has its own ground which is isolated from the other rails.

Failure to connect at least one ground from each rail will cause it to float relative to the other rails.

All of the small gauge black wires need to be connected to a ground point on the backplane. They can share the connection points as the large gauge black wires.

If the chassis did not ship with any of the AUX rails then a connection from 12V or 3.3V may be required. This connection wire will not have been shipped.

3.4. INSTALLING PLUG-IN MODULES

The chassis supports up to 8 OpenVPX® Modules on a 5HP (1”) pitch.

Card guides are available for either conduction or convection cooled Plug-In Modules. Selection/quantity is done at the time of ordering.

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 chassis. 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.

There is no preset order to inserting Plug-In Modules. Refer to the Plug-In Module User Manual(s) for more information on inserting particular Plug-In Modules.

SECTION FOUR

4. UNDERSTANDING YOUR CHASSIS

4.1. CARD GUIDES

At the time of order, the chassis is configured with conduction or convection cooled card guides or a combination of both in the front side area. The rear area only supports convection cooled card guides.

Typically, these are preset and are never moved.

In some instances, reconfiguration of the card guide types is required.

Plastic convection cooled card guides can only be removed if the chassis has been preconfigured for card guide reconfiguration. Otherwise, the locating pins are too long and do not allow the card guide to be lifted high enough to clear the locating pin hole in the rail.

Removing the screw(s) on the conduction cooled card guides will allow them to be easily removed. Pull card guides vertically to disengage the alignment pins. In some instances, the card guides may need to be pried out. This should be done with great care by gently walking the two ends up.

There is a top and bottom version of the card guides. These cannot be mixed otherwise the Plug-In Module will not properly align to the backplane.

The lower convection cooled card guide has ESD features which become ineffective if moved to the top. As well, only the locating pins nearest the backplane will have been modified and as such, they will not fit if swapped.

Conduction cooled card guides are for Plug-In Module retention only. All cooling is by means of convection.

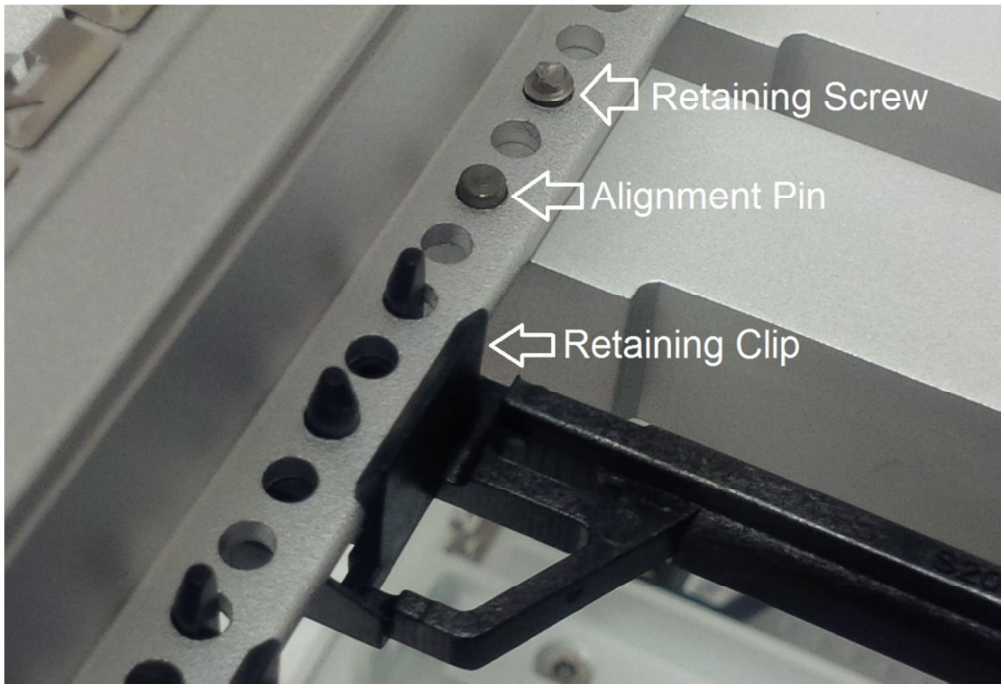

Figure 4-1 Card Guide Features

Removal of the convection cooled card guide is done by gently prying them out at either end with the use of a flat blade screw driver such that the retaining clip is released.

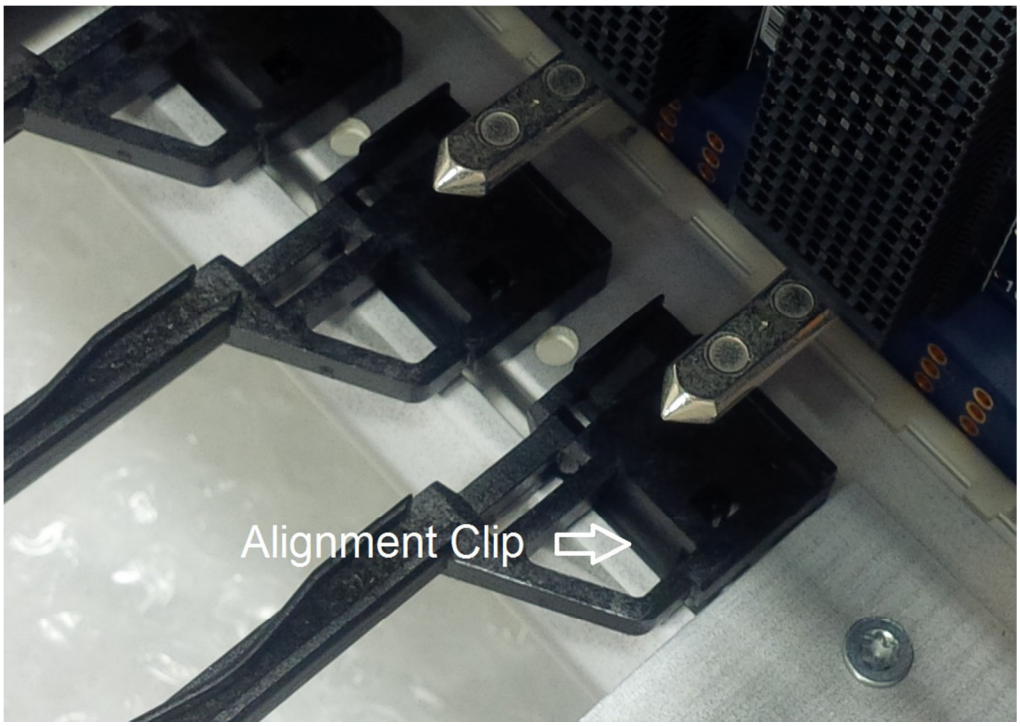

Figure 4-2 Convection Card Guide

4.2. DC POWER

Based on the ordering options, the chassis will be preconfigured with a set of power supply modules to satisfy the backplane requirements.

The modules are factory adjusted to VITA specification and should not require adjustment.

Should adjustment be required, the first step would be to gain access to the power supply area. This is done by loosening the captive screws (x6) on the lower rear panel.

The power supply frame is typically populated from left to right with modules that supply, 12V, 5V, 3.3V and +-12V. Not all systems have all rails.

Locate the rail that needs adjustment by metering the output points.

On the upper right of the PSU module, there will be a multi-turn potentiometer. Turn it clockwise to increase the voltage and counterclockwise to reduce it.

Figure 4-3 illustrates the front side of the two PSU module types. The dual potentiometer type is for a +-12V_AUX module.

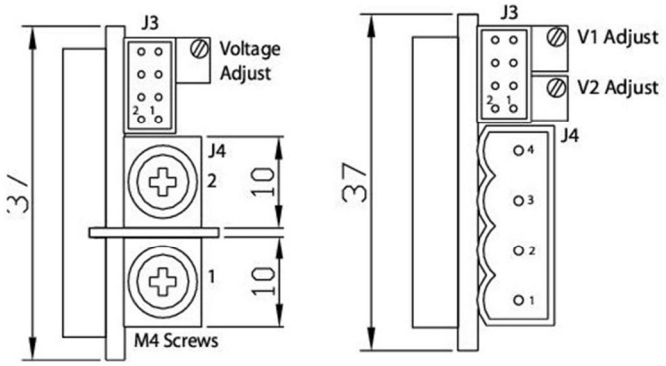

Figure 4-3 PSU Voltage Adjust Points

The sense lines (black + white) and J3 must be connected in order for the voltage sense to operate properly.

Do not attempt to adjust modules that are configured for current sharing. This procedure is more difficult and should only be attempted after consultation with Pixus Technologies support.

4.3. FAN CONTROL

The chassis has a fan speed control knob on the lower front panel.

Turning the knob clockwise increases the fan speed, counterclockwise lowers it.

Refer to Figure 2-3 for the location of the control knob.

4.4. AIR FLOW

The chassis fans are capable of supplying in excess of 150 CFM (250 m³/h) each.

Given the open nature of the chassis, these numbers are not realistic.

Figure 4-4 illustrates the airflow characteristics of the fan.

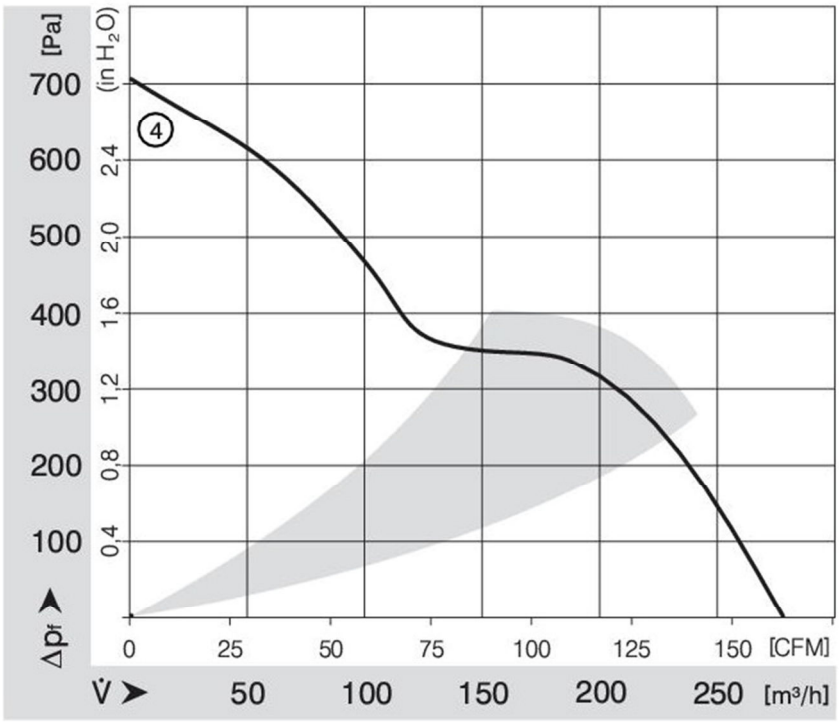

Figure 4-4 Fan Airflow Characteristics

4.5. REGULATORY AND SAFETY

The chassis has been designed to comply with the following standards:

- EN 69050
- UL 1950

SECTION FIVE

5. APPENDIX A

5.1. ACRONYMS

The following list provides definitions of acronyms used throughout this document.

ACRONYM	DEFINITION
BP	Backplane
ECN	Engineering Change Notice
FCC	Federal Communications Commission
GA	Geographical Addressing
GPIO	General Purpose Input Output
HP	Horizontal Pitch (aperture width)
I/O	Input/Output
I^2C	Intelligent Interface Controller
N/C	Not Connected
P/N	Part Number
PCB	Printed Circuit Board
PCI	Peripheral Component Interconnect
SBC	Single Board Computer
SMB	System Management Bus
SMD	System Management Device
U	Unit (vertical height)
UL	Underwriter's Laboratory
V(I/O)	Voltage (Input/Output)
VITA	VMEbus International Trade Association

5.2. TORQUE VALUES

Table 5-1 on page 21 displays the recommended torque values for fasteners used on the backplanes.

Screws	Torque
M2.5	0.68 Nm (6 lbf.in)

Table 5-1: Recommended Torque Values

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