Wolverine Coprocessor Quick Start Guide

September 9, 2014

Version 1.3

900-000042-000

1302 East Collins

Richardson, TX 75081

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Patents

This equipment designed and/or manufactured under the following patent:

Patent No.: US 8,095,735 B2

Revisions

Version	Description
1.0	April 17, 2014. Initial Release
1.1	May 19, 2014. Added information on lithium battery
1.2	August 20, 2014. Updated software installation, system verification and software configuration instructions
1.3	Septermber 9, 2014. Added link to software downloads

Table of Contents

1 Preface

1.1 Intended Audience

This manual is written for users who are responsible for installation, setup, power on and quick validation of the Wolverine Coprocessor. This document provides basic information, and is not intended to be the source for in-depth Coprocessor understanding or troubleshooting. The latest revision of this document is always available under Customer Support at **www.conveycomputer.com** .

2 Safety Information

2.1 Important Safety Instructions

Read all caution and safety statements in this document before performing any of the instructions.

2.2 Wichtige Sicherheitshinweise

Lesen Sie zunächst sämtliche Warn- und Sicherheitshinweise in diesem Dokument, bevor Sie eine der Anweisungen ausführen.

2.3 Consignes de sécurité

Lisez attention toutes les consignes de sécurité et les mises en garde indiquées dans ce document avant de suivre toute instruction.

2.4 Instrucciones de seguridad importantes

Lea todas las declaraciones de seguridad y precaución de este documento antes de realizer cualquiera de las instrucciones.

2.5 Coprocessor Safety Information

This document applies to Convey WX system and installed options. To reduce the risk of bodily injury, electrical shock, fire, and equipment damage, read this document and observe all warnings and precautions in this guide before installing or maintaining your Convey Coprocessor product.

In the event of a conflict between the information in this document and information provided with the product or on the website for a particular product, the product documentation takes precedence.

Your Coprocessor should be integrated and serviced only by technically qualified persons. Some tasks may be performed by the Customer, but only after reading the appropriate documents or having relevant experience on similar products.

You must adhere to the guidelines in this guide and the assembly instructions in your Coprocessor manuals to ensure and maintain compliance with existing product certifications and approvals. Use only the described, regulated components specified in this guide. Use of other products / components will void the NRTL Listing and other regulatory approvals of the product, and may result in noncompliance with product regulations in the region(s) in which the product is sold.

2.6 Safety Warnings & Cautions

To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following safety instructions and information. The following safety symbols may be used throughout the documentation and may be marked on the product and / or the product packaging.

CAUTION	Indicates the presence of a hazard that may cause minor personal injury or property damage if the CAUTION is ignored.
WARNING	Indicates the presence of a hazard that may result in serious personal injury if the WARNING is ignored.
	Indicates potential hazard if indicated information is ignored.

2.7 Warnings

Electrostatic discharge (ESD) and ESD protection: ESD can damage disk drives, boards, and other parts. We recommend that you perform all procedures in this chapter only at an ESD workstation. If one is not available, provide ESD protection by wearing an antistatic wrist strap attached to chassis ground any unpainted metal surface on your Coprocessor when handling parts.

ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the Coprocessor, place the board component side up on a grounded, static free surface. Use a conductive foam pad if available but not the board wrapper. Do not slide board over any surface.

2.8 Lithium Battery

Some models of Wolverine cards contain a non-rechargeable, soldered-on lithium battery. To avoid risk of damage or fire due to reversed polarity or use of an incorrect battery type, batteries are not considered field replaceable and should only be replace by Convey service.

3 Introduction

The Convey Wolverine Coprocessor is a PCIe Gen 3 card capable of delivering enhanced performance to application s running in conjunction with a Host Server. If the Coprocessor is not needed, the Host Server remains available as a computer server.

3.1 Coprocessor Architecture Overview

For a better understand of the internal working of the Convey Wolverine Coprocessor the architecture is explained in the Convey WX Coprocessor Architectural Manual, which is available on line at www.conveycomputer.com under customer service.

3.2 Wolverine Configurations

There are a series of Wolverine Coprocessors optimized for different coprocessor application requirements.

3.2.1 Wolverine 690

The Wolverine 690 is the standard version of the 690 coprocessors. The 75W maximum power is supplied from the PCIe connector. Cooling is provided by fans in the Host Server. Figure 1 shows a view of this configuration.

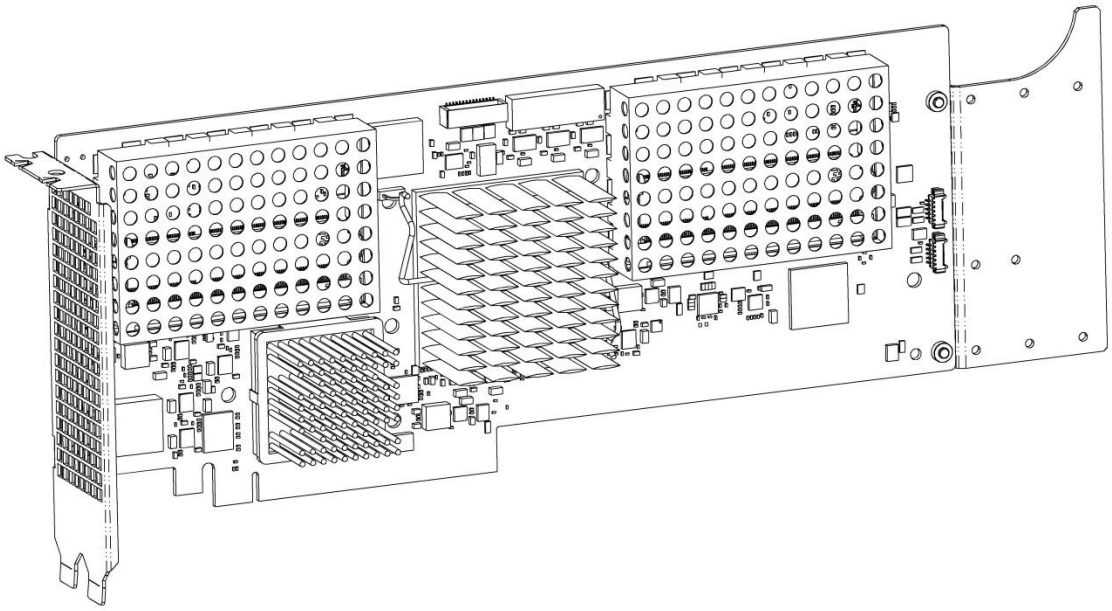

Figure 1 – Wolverine 690 Coprocessor

The Wolverine 690 assembly is a dual PCIe slot wide card. The card edge connector plugs into a single Gen3 PCIe X16 slot. The power for the card is is pulled from the PCIe card edge connector.

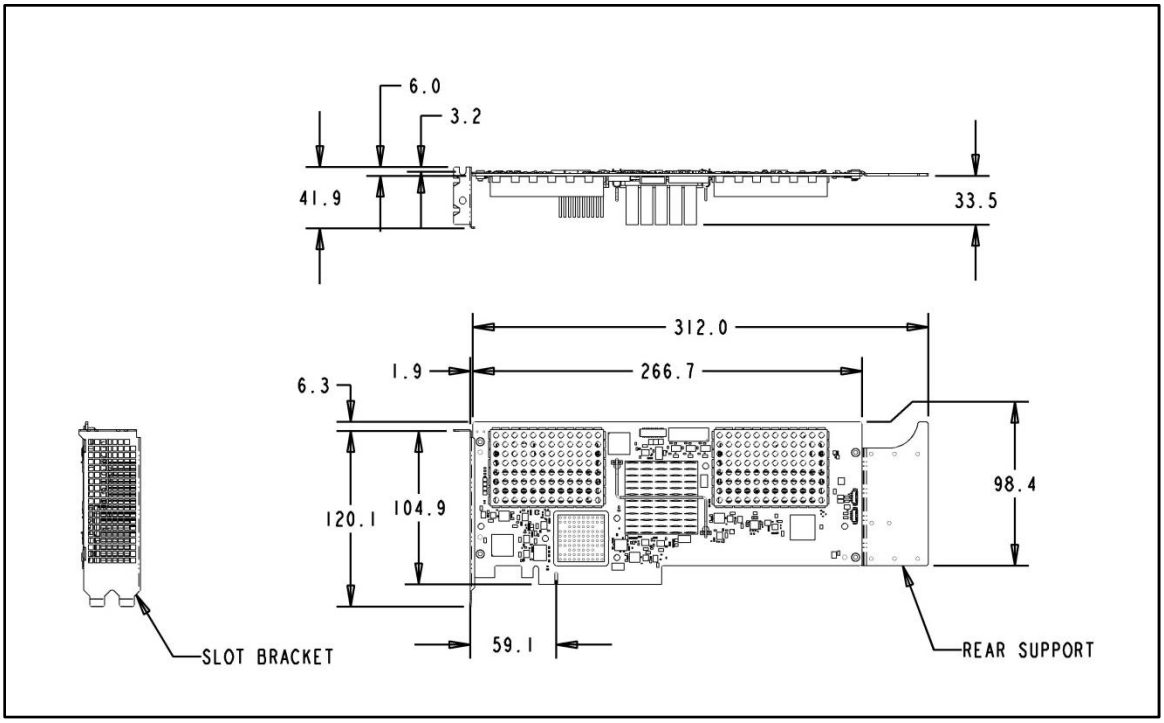

Figure 2 – Wolverine 690 Dimensions

3.2.2 Wolverine 690 SP

The Wolverine 690SP Coprocessor supports higher performance personalities. The 150W total power is supplied from both PCIe connector and a 6-pin connector located on the rear edge of the card. Cooling is provided by a single 80mm impingement fan mounted on the heat pipe assembly. A view of this configuration is shown in Figure 3.

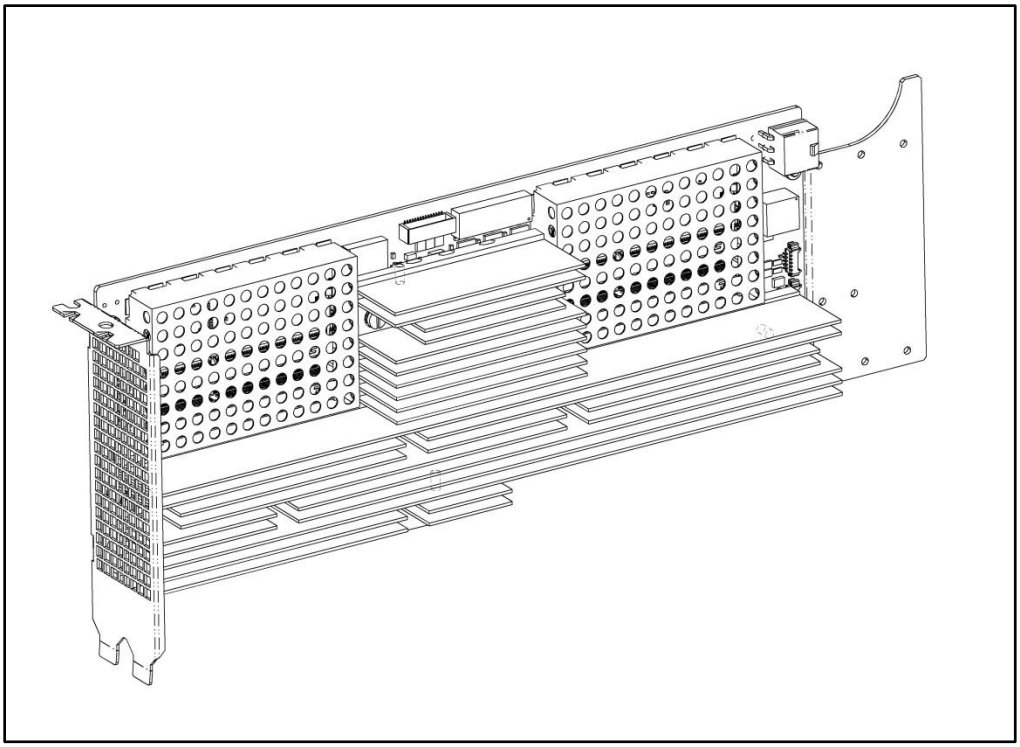

Figure 3 - Wolverine 690SP Coprocessor

The Wolverine 690SP assembly is a dual PCIe slot wide card. The card edge connector plugs into a single Gen3 PCIe X16 slot. The power for the card is is pulled from the PCIe card edge connector (75 Watts max) and from the 6-pin power connector (75 Watts max) located at the rear end of the card.

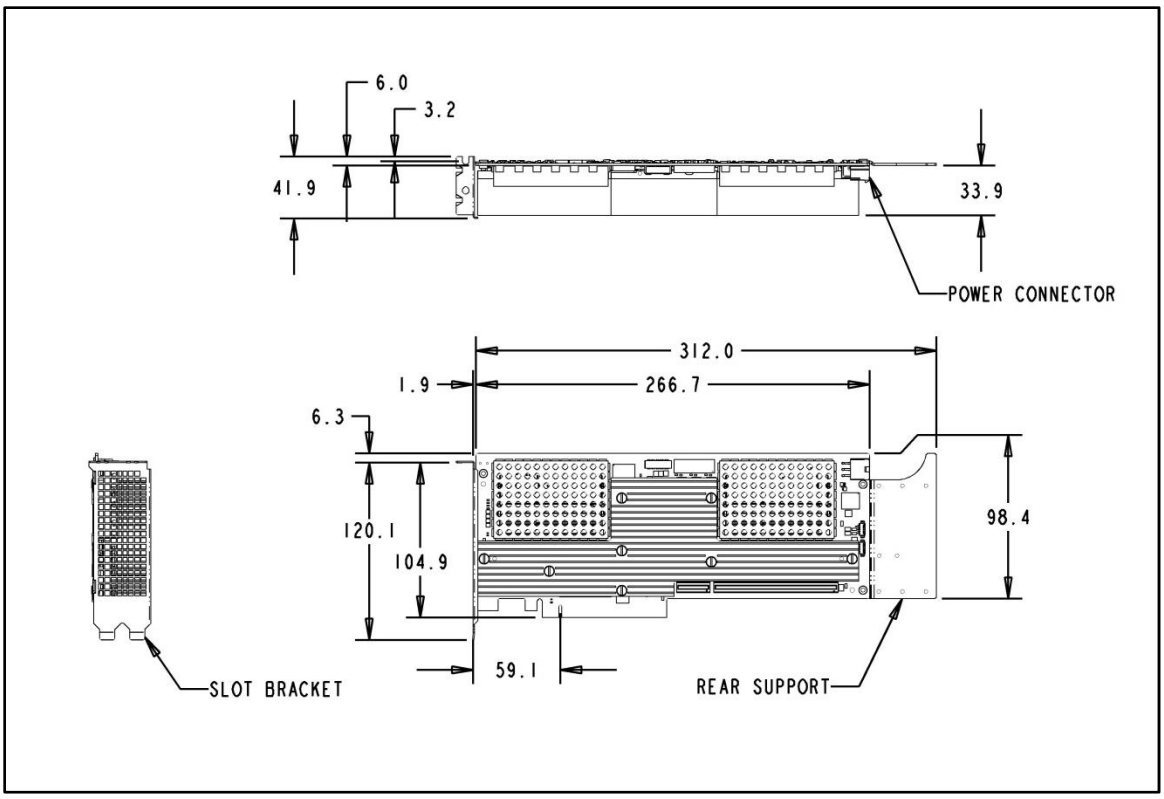

Figure 4 – Wolverine 690SP Dimensions

3.2.3 Wolverine 690 Memory Free

The Wolverine 690 Memory Free Coprocessor is optimized for personalities that do not require coprocessor memory. The 75W total power is supplied from the PCIe connector. Cooling is provided by fans in the Host Server. This configuration has no SODIMM slots. A view of this configuration is shown in Figure 5.

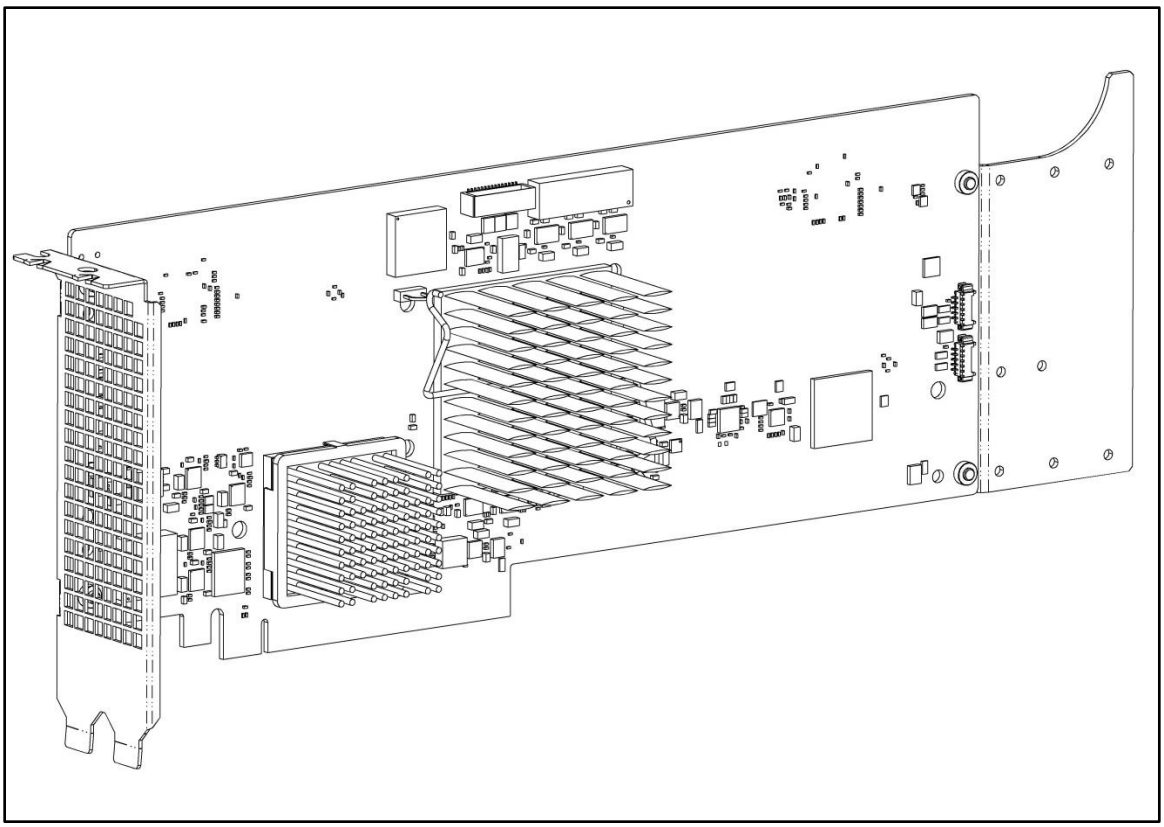

Figure 5 – Wolverine 690 Memory Free Coprocessor

The assembly is a dual PCIe slot wide card. The card edge connector plugs into a single Gen3 PCIe X16 slot. All power for the card is pulled from the PCIe card edge connector (75 Watts max).

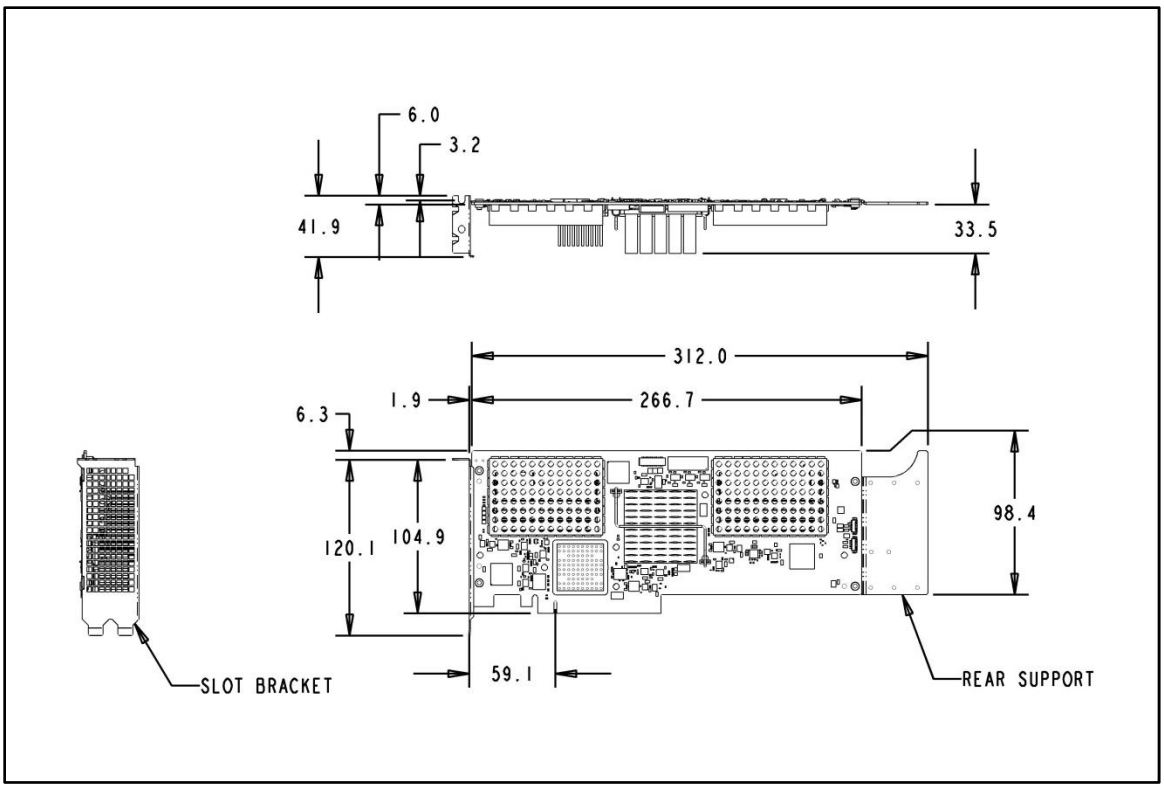

Figure 6 – Wolverine 690 Memory Free Dimensions

3.2.4 Wolverine 2000

This Wolverine 2000 Coprocessor is the version with highest performance. The 150W total power supplied from both the PCIe connector and a 6-pin connector located on the rear edge of the card. Cooling is provided by fans in the Host Server. A view of this configuration is shown in Figure 7.

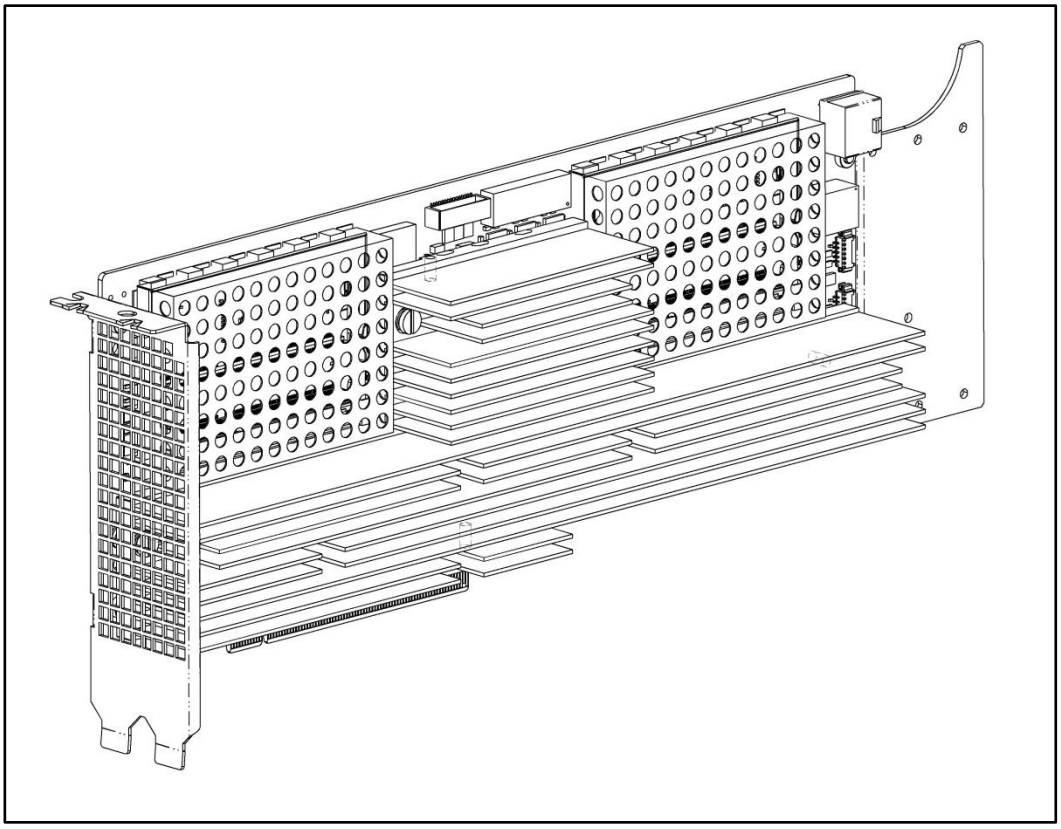

Figure 7 Wolverine 2000 Coprocessor

The Wolverine 2000 assembly is a dual PCIe slot wide card. The card edge connector plugs into a single Gen3 PCIe X16 slot. The power for the card is is pulled from the PCIe card edge connector (75 Watts max) and from the 6-pin power connector located at the rear end of the card (75 Watts max).

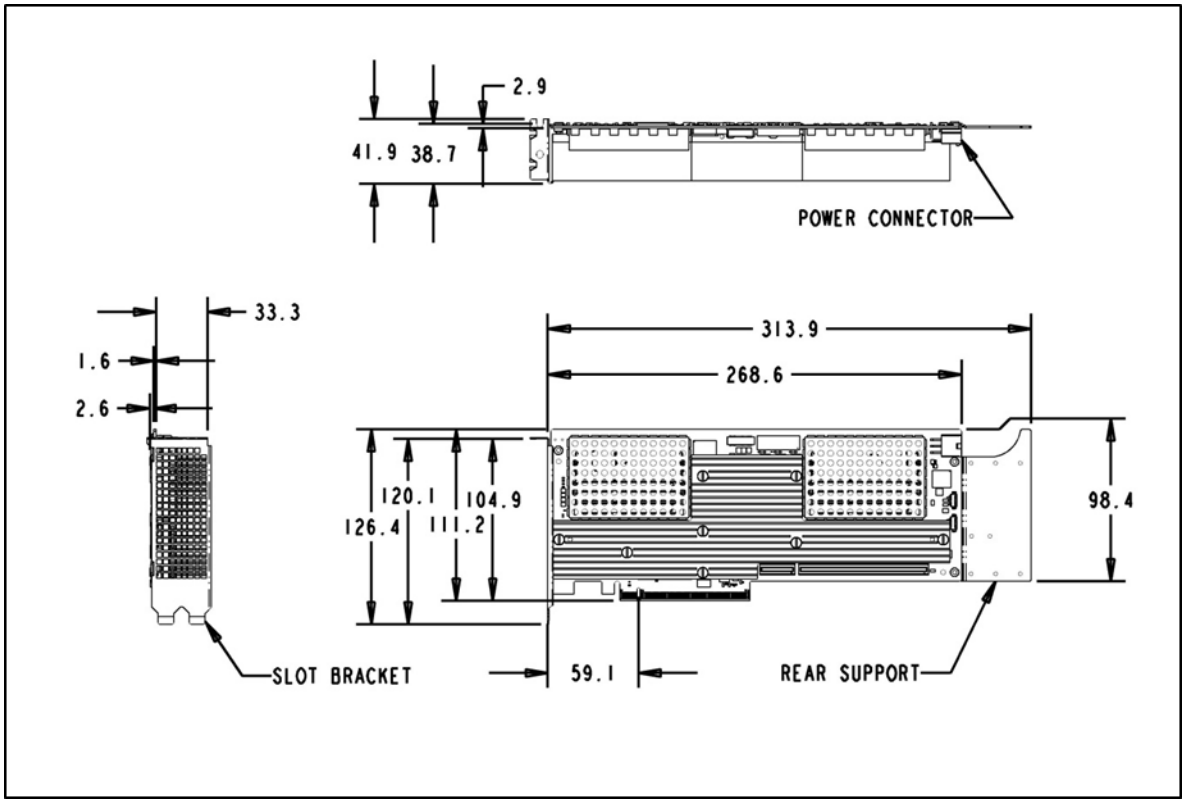

Figure 8 – Wolverine 2000 Dimensions

3.3 Host Servers

3.4 Applicable Host Servers

The Convey Wolverine Coprocessor board should only be installed into a host system that is Listed, Certified, or Approved in compliance with safety and electromagnetic compatibility regulations in the location of operation. The Host Server must be able to house, power and cool a PCIe Gen 3 single or dual width, full height, full length card. The physical connector is X16, and the electrical interface is X8. Wolverine 690SP and Wolverine 2000 Coprocessors each require an auxiliary 12V power receptacle.

In addition, the server must be capable of allocating 64G of MMIOH space to the Wolverine Coprocessor.

The list of validated Host Servers is maintained online at **www.conveycomputer.com.**

3.5 Wolverine Host Requirements

3.5.1 Hardware Requirements

This section outlines the hardware requirements of the host server. Note: Power consumption is the max for the coprocessor power subsystem. Actual power consumption is application dependent.

	Wolverine 690	Wolverine 690SP	Wolverine 690 Memory Free	Wolverine 2000
Slot Type	Double width PCIe gen3 x16 (x8 electrical)	Double width PCIe gen3 x16 (x8 electrical)	Double width PCIe gen3 x16 (x8 electrical)	Double width PCIe gen3 x16 (x8 electrical)
Physical Dimensions	111.2mm (4.376 inches) height x 266.7mm (10.5 inches) depth (312 mm with extender)	111.2mm (4.376 inches) height x 266.7mm (10.5 inches) depth (312 mm with extender)	111.2mm (4.376 inches) height x 266.7mm (10.5 inches) depth (312 mm with extender)	111.2mm (4.376 inches) height x 266.7mm (10.5 inches) depth (312 mm with extender)
Power Consumption	75W max dissipation	150W max dissipation	75W max dissipation	150W max dissipation
Auxiliary Power Connections	None (slot powered)	2x3 auxiliary power connector	None (slot powered)	2x3 auxiliary power connector
Max Operating Temperature	35°C ambient, 45°C inlet to card	35°C ambient, 45°C inlet to card	35°C ambient, 45°C inlet to card	35°C ambient, 45°C inlet to card
Cooling	14CFM airflow at 1.0in H_2O pressure at max temp	14CFM airflow at 1.0in H_2O pressure at max temp	14CFM airflow at 1.0in H2O pressure at max temp	14CFM airflow at 1.0in H_2O pressure at max temp

Table 1 – Wolverine Host Server Requirements

3.5.2 Software Requirements

At least 64GB of MMIOH space is required for each Wolverine Coprocessor. The Convey device driver supports a windowing mechanism that remaps portions of the available MMIOH to support larger coprocessor memory configurations. For maximum performance, the amount of available MMIOH space should be greater than the amount of physical memory on the coprocessor(s).

Host BIOS must support setting Extended Tag Enable. This is a BIOS setting that allows PCIe transaction IDs to be increased from 5-bit values to 8-bit values. This allows more transactions in flight and greatly increases throughput and performance.

See the Convey Support website for supported operating systems and qualified host processors.

4 Installation and Setup

This chapter provides information on the unpacking, installation and basic setup of the Convey Wolverine Coprocessor.

4.1 At Delivery

Each Wolverine Coprocessor comes packaged in its own corrugated box. Confirm that the box is undamaged before releasing the freight carrier. If the packaging is damaged, note that fact and any other damage on the shipping documentation.

4.2 Unpacking

Open the upper flaps of the Convey shipping container and remove the contents of the box. Leave the Wolverine Coprocessor in the protective anti-static bag until time for assembly into the Host Server.

4.2.1 Wolverine Coprocessor Contents

The Convey Wolverine Coprocessor ships with the following items:

- Wolverine Coprocessor assembly
- Open-me-first envelope containing
    - Wolverine Quick Start Guide

4.3 Installation

The following steps are necessary to install the Wolverine Coprocessor into the Host Server.

- Use an anti-static mat and wrist strap or equivalent static prevention area to accomplish the installation.
- Ensure that the target Host Server has the power and cooling capacity needed to support the Wolverine Coprocessor to be installed.
- Unpack the Wolverine Coprocessor and the associated installation kit.
- Remove the top cover and inspect the PCIe card cages located at the rear (air exhaust) end of the Host Server.
- For Wolverine 690SP and Wolverine 2000 Coprocessors
    - Install the Coprocessor power cable into the 12V AUX source connector on the motherboard or riser card.
    - Install the opposite end(s) of the Coprocessor power cable into the 12V input connector(s) on the Wolverine Coprocessor.
- Install the Wolverine Coprocessor into an appropriate PCIe Gen 3 x16 connector slot. Some card cages allow this to be done without removing the riser, however if this is not possible, remove the riser, install the Wolverine Coprocessor, and re-install the riser assembly.
- Secure all card retainers for the PCIe card slots and card cage assembly.

- Replace the top cover on the Host Server.
- Install slides and the Host Server into a rack using instructions appropriate for that computer.
- Attach the front bezel to the Host Server if desired.
- See the Convey Support website (www.conveycomputer.com/downloads) to install the desired Convey software packages.

5 Coprocessor Indicator LEDs

There are several LED indicators visible through the perforations of the slot bracket in which the coprocessor is installed, as shown Figure 9.

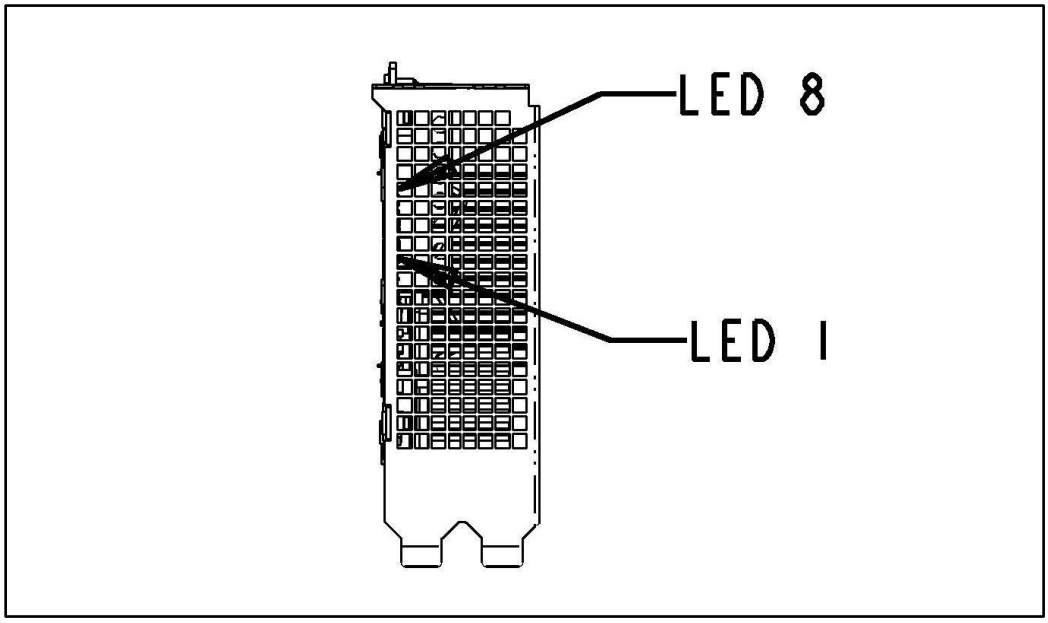

Figure 9 – Coprocessor LED Indicators

LED Position	Name	Definition
8	AEMC Status	Green indicates AEMC FPGA is configured
7	AEMC Power	Green indicates AEMC FPGA power is good
6	HIX Status	Green indicates HIX FPGA is configured
5	HIX Power	Green indicates HIX FPGA power is good
4	PCIe Link Activity	Blinks yellow when activity is detected toward host Blinks green is activity is detected toward coprocessor
3	PCIe Type	Yellow indicates link type unknown Green indicates link is Gen3 and x8

LED Position	Name	Definition
2	PCIe Status	Red indicates PCIe link is down Green indicates PCIe link is good
1	WX Coprocessor Status	Red indicates power or configuration fault Internal power failure Aux power required, but not connected Green indicates power / configuration good

Table 2 – Coprocessor LED Functionality

6 Service

6.1 Replacing Wolverine Coprocessor

The following steps are necessary to replace the Wolverine Coprocessor in the Host Server.

- Use an anti-static mat and wrist strap or equivalent static prevention area to accomplish the installation.
- Remove the top cover
- Remove card retainers for the PCIe card slot containing the card to be replaced.
- Remove the Wolverine Coprocessor to be replaced.
- For Wolverine 690SP or Wolverine 2000 Coprocessors
    - Remove the 12V input connector on the Wolverine Coprocessor.
- Unpack the replacement Wolverine Coprocessor.
- For Wolverine 690SP and Wolverine 2000 Coprocessors
    - Install the Coprocessor power cable into the 12V AUX source connector on the motherboard or riser card.
    - Install the opposite end(s) of the Coprocessor power cable into the 12V input connector on the Wolverine Coprocessor.
- Install the Wolverine Coprocessor into an appropriate PCIe Gen 3 x16 connector slot.
- Secure all card retainers for the PCIe card slots and card cage assembly.
- Replace the top cover on the Host Server.
- Refer to the Convey Wolverine Systems Administration Guide for directions on configuring the coprocessor.

7 Compliance

The following regulatory compliance statements apply to the products documented by this manual.

7.1 US Federal Communications Commission Compliance

FCC– Federal Communications Commission Title 47 of Code of Federal Regulation (CFR) part 15

CAUTION: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user’ s authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

7.2 Canada Compliance Industry Canada

ICES-003:2004 - Digital Apparatus: Spectrum Management and Telecommunications Policy; Interference-Causing Equipment Standard

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de la classe B estconforme a la norme NMB-003 du Canada.

7.3 European Union Compliance CE – European Conformity (Conformité Européenne)

Product complies with both the EMC Directive (2004/108/EC) and the Low Voltage Directive (2006/95/EC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European Norms

(The equivalent international standards are in parenthesis)

- EN 55022:2006 +A1:2007 (CISPR 22): Information technology equipment-Radio disturbance characteristics -limit and methods of measurement

- EN 55024:1998+A1:2001+A2:2003 (IEC 61000-4-2, 3, 4, 5, 6, 8, 11): Information technology equipment - immunity characteristics-limit and methods of measurement
- EN 61000-3-2:2006 (IEC 61000-3-2): Electromagnetic compatibility (EMC)-Part 3-2: Limits-Limits for harmonic current emissions (equipment input current ≤16 A per phase)
- EN 61000-3-3:2008 (IEC 61000-3-3): Electromagnetic compatibility (EMC)-Part 3-3: Limits-Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current ≤16 A per phase and not subject to conditional connection)

7.4 WEEE Return

Convey Computer Corporation and/or its distribution partners welcome WEEE return requests. At the end of product life, please contact Convey Computer support or the reseller from which the unit was originally purchased for instruction on current disposal processes.

A Acronyms

Term	Definition
AEMC	Application Engine / Memory Controller – FPGAs on the coprocessor that contain the custom personality
EMC	Electromagnetic Compatibility
ESD	Electrostatic Discharge
FCC	Federal Communications Commission
FPGA	Field programmable gate array
HIX	Host Interface FPGA
LED	Light emitting diode
NRTL	Nationally Recognized Testing Laboratory
PCIe	Peripheral Component Interconnect Express
RMM	Remote Management Module
WEEE	Waste Electrical and Electronics Equipment

8 Customer Support Procedures

Email	support@conveycomputer.com
Web	Go to Customer Support at www.conveycomputer.com