

Channel Express Installation Guide



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1.0 Introduction

1.1 Contents and Structure

The focus of this manual is the installation of hardware and software for all Channel Express products. It is one component of the complete product documentation suite. Supporting publications are listed in Section 1.2.

Section	Description
Section 1	Introductory information about the manual.
Section 2	Overview of the software suite.
Section 3	Hardware installation instructions for all card types.
Section 4	Instructions for verifying the installation.

The latest product documentation and software is available for download from the Red Rapids website (www.redrapids.com).

1.2 Related Publications

Author	Number	Title
Red Rapids	REF-359-000	Model 359 Hardware Reference Manual
Red Rapids	REF-361-000	Model 361 Hardware Reference Manual
Red Rapids	REF-362-000	Model 362 Hardware Reference Manual
Red Rapids	REF-363-000	Model 363 Hardware Reference Manual
Red Rapids	REF-365-000	Model 365 Hardware Reference Manual
Red Rapids	REF-366-000	Model 366 Hardware Reference Manual
Red Rapids	REF-360-002	Channel Express Reference Design Operating Guide
Red Rapids	REF-360-003	Channel Express FPGA Core Reference Manual
Red Rapids	REF-806-902	Adapter Device Driver and API Reference Manual
Red Rapids	REF-806-950	FastApp Utility Reference Manual
PCI SIG	PCI Express Base Rev 2.0	PCI-SIG, PCI Express Base Specification Revision 2.0

1.3 Conventions

This manual uses the following conventions:

- Hexadecimal numbers are prefixed by "0x" (e.g. 0x00058C).
- **Blue** font is used for names of directories, files and OS commands.
- **Green** font is used to designate source code.
- Active low signals are followed by '#', For example, TRST#.



Text in this format highlights useful or important information.



Text shown in this format is a warning. It describes a situation that could potentially damage your equipment. Please read each warning carefully.

The following are some of the acronyms used in this manual.

- **PCI** Peripheral Component Interconnect
- **PCIe** PCI Express
- **PMC** PCI Mezzanine Card

1.4 Manual Compatibility

The applicable hardware part numbers are defined as follows:

- Model 359-XXX *Channel Express RX2 14/500*
- Model 361-XXX *Channel Express RX2 16/160*
- Model 362-XXX *Channel Express XCVR2 16/160*
- Model 363-XXX *Channel Express RX2 14/400*
- Model 365-XXX *Channel Express XCVR2 14/400*
- Model 366-XXX *Channel Express RX2 8/1500*

1.5 Distribution Disks

All Channel Express products are supported by the following disk archives:

- DSK-806-902-Rxx Adapter Device Driver and API
- DSK-806-950-Rxx FastApp Utility
- DSK-360-002-Rxx Channel Express Reference Design Demonstration Code
- DSK-360-003-Rxx Channel Express FPGA Development Kit
- DSK-360-004-Rxx Channel Express FPGA Binary Files

These archives can be downloaded from the Red Rapids website (www.redrapids.com).

1.6 Revision History

Version	Date	Description
R00	12/10/2008	Initial release.
R01	4/28/2010	Major update corresponding to a new release of the software and FPGA libraries.
R02	5/7/2010	Added required sample clock frequency to verification tests.
R03	6/14/2010	Changed directory structure of DSK-360-003-RXX.
R04	7/5/2011	Major update corresponding to the release of the new Adapter driver/API and the FastApp utility.

2.0 Software Installation

The Channel Express software suite consists of three disk archives:

DSK-806-902-Rxx	Adapter Device Driver and API
DSK-806-950-Rxx	FastApp Utility
DSK-360-002-Rxx	Channel Express Application Example

These archives can be downloaded from the Channel Express product page on the Red Rapids website (www.redrapids.com). Each archive is accompanied by a reference manual that describes the function and operation of the software distributed on that disk.

The distribution number of each archive is also the name of the root directory for that disk. All three archives must be extracted into the same working directory so that they share a common folder on the host. This is necessary for path names between the subdirectories to cross reference correctly.

The Adapter Device Driver needs to be installed on the host computer before the FastApp utility will execute. Consult the *Adapter Device Driver and API Reference Manual* for detailed installation instructions.

The FastApp utility is used to demonstrate the Channel Express reference design. The FastApp software must be loaded on the host before the reference design code will execute. There is no special installation procedure required.

3.0 Hardware Installation

Every Channel Express product is available in both XMC and PCI Express (PCIe) half length form factors. The hardware ships with a x8 physical and x8 electrical PCIe connector. It is possible to load an alternate FPGA bitstream that reduces the number of electrical connections if desired.

3.1 XMC Hardware Installation

The following instructions provide a general guide for mounting a XMC module to a baseboard or carrier host socket. Consult your baseboard documentation for product specific guidance.



This is a static sensitive electronic device; please follow standard ESD guidelines when installing the device.

Load Drivers: Load the appropriate software drivers prior to installing the hardware.

Power Down: Power to the host must be off during hardware installation. Permanent damage may result if the card is plugged into a hot socket.

Identify Socket: Find an open XMC socket on the host. The socket may be keyed for legacy PMC operation. The key consists of a metal post located at the centerline of the socket between the electrical connectors. The position of the post will indicate if the legacy PCI bus is designed for 3.3 Volt or 5 Volt signaling. The Channel Express XMC product does not support legacy PCI operation, but the card is designed to accommodate a 3.3 Volt key for convenience.

Insert Card: Angle the XMC bezel into the host front panel cut-out. The EMI gasket around the bezel may offer resistance, be careful not to dislodge the gasket from the groove. Gently press the XMC down onto the host until the connectors mate.

Secure Card: Secure the XMC hardware with four mounting screws (provided). Be sure that the card does not bow as the screws are fastened.

Check Obstructions: Verify that the card is securely mounted in the XMC socket and not in contact with other components on the host.

Boot Computer: The host will detect the presence of new hardware the first time power is applied. Consult the driver installation instructions if prompted for additional information.



The expansion card can pick up electrical interference from other devices or directly through the host power supply. Try moving the card away from other devices or try a different host platform if you are experiencing interference.

3.2 PCIe Hardware Installation

The following instructions provide a general guide for PCIe expansion card installation. Consult your host documentation for product specific guidance.



This is a static sensitive electronic device; please follow standard ESD guidelines when installing the device.

Load Drivers: Load the appropriate software drivers prior to installing the hardware.

Power Down: Power to the host must be off during hardware installation. Permanent damage may result if the card is plugged into a hot socket.

Identify Slot: Find an open PCIe slot on the host backplane and verify that the socket is compatible with the card you are installing. The PCI Express specification defines each slot by a physical size and electrical size. It is not uncommon to find a socket electrically wired to fewer lanes than the physical size allows. The specific configuration is usually silkscreened on the motherboard.

The interoperability of PCIe cards and slots is summarized in Table 3-1. The Channel Express card ships with a x8 physical connector, but a x4 physical connector is also available as an option.

Table 3-1 PCIe Card Interoperability

Slot	x1	x4	x8	x16
Card				
x1	Required	Required	Required	Required
x4	No	Required	Allowed	Allowed
x8	No	No	Required	Allowed
x16	No	No	No	Required


Remove Metal Insert: The expansion slot opening will typically be covered by a metal insert held in with a single screw. The metal insert may have to be punched out of some cases. Unscrew or punch out the appropriate metal insert. It may help to align the expansion card over the slot to determine which insert to remove.

Insert Card: Align the expansion card edge connector with the PCIe slot making sure the bottom edge of the metal faceplate clears the edge of the backplane motherboard. Apply firm pressure to seat the card in the slot. You may need to rock the card slightly from front to back to get the unit seated properly. *Do not force the card or significantly flex the motherboard.* The expansion board should not require much force to insert provided everything is lined up correctly.

Secure Card: The top side of the faceplate should be flush or close to flush with the card retention bar. If the plate is not close to the bar verify that the board is not canted in the slot. Secure the expansion card to the chassis by inserting a screw into the top of the metal faceplate.

Check Obstructions: Verify that the card is securely mounted in the PCIe slot and not in contact with other items inside the chassis.

Boot Computer: The host will detect the presence of new hardware the first time power is applied. Consult the driver installation instructions if prompted for additional information.

 The expansion card can pick up electrical interference from other devices or directly through the host power supply. Try moving the card away from other devices or try a different host platform if you are experiencing interference.

4.0 Installation Verification

The Channel Express product ships with a default FPGA bitstream preloaded in the PROM that can be used to quickly verify the hardware and software installation. Refer to the *Channel Express Reference Design Operating Guide* for detailed instructions.



It is highly recommended that the user successfully execute the verification procedure outlined in the *Channel Express Reference Design Operating Guide* before proceeding with custom FPGA and software development.

The PROM contents will likely be overwritten as custom applications are developed for the Channel Express FPGA. The original PROM contents can be restored if necessary from the binary files distributed on disk archive DSK-360-004-Rxx.