Flexible x1 PCI Express 3-way Splitter

Hardware Manual

Feb 11, 2014

Revision 1.3

Contents

Figures

Tables

1 About this Document

1.1 Purpose

This document describes Hardware installation, features, specification and operation for AMFELTEC Flexible x1 PCI Express 3-way Bus Splitter.

1.2 Feedback

AMFELTEC Corp. makes every effort to ensure that the information contained in this document is accurate and complete at time of release. Please contact AMFELTEC Corp. if you find any errors, inconsistence or have trouble understanding any part of this document.

To provide your feedback, please send an email to support@amfeltec.com

Your comments or corrections are greatly valued in our effort for excellence and continued improvement.

1.3 Revision History

Rev. No.	Description	Rev. Date
1.0	Initial Release.	December 10, 2009
1.1	Update hardware installation instructions	June 01, 2011
1.2	Added Gen2 support	May 20, 2012
1.3	Added x16 adapter board feature	February 11, 2014

2 General Description

2.1 Introduction

Flexible x1 PCI Express 3-way Bus Splitter (Splitter) (Figure 1) is designed to support expansion of modern motherboards with limited numbers of PCI Express Connectors. Splitter converts the standard x1, x4, x8 or x16 PCI Express motherboard slot up-to 3 independent x1/x4/x16 PCI Express slots.

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It includes one x1 PCI Express Host card (Figure 2/Figure 3) and multiple (up-to 3) x1/x4/x16 PCI Express adapter boards (Figure 4/Figure 5/Figure 6). The x1 PCI Express Host board has to be plugged into an upstream PCI Express motherboard connector. Each PCI Express adapter board connects to the main x1 PCI Express Host card via 12” Flex PCI Express cable. The expansion PCI Express add-in boards have to be plugged into the standard x1/x4/x16 PCI Express female connector on the three x1/x4/x16 PCI Express adapter boards.

Because of the flexible nature of the connection (unlike traditional rigid risers, expansion PCI Express add-in boards can be positioned away from the upstream PCI Express motherboard connector, including around any obstacles inside a computer chassis. Each x1 PCI Express adapter has two mounting holes allowing them to be securely fixed inside a computer chassis. In addition, each x1/x4/x16 PCI Express Adapter has two support tabs for mechanical stabilization expansion add-in boards (US Patent 7,255,570).

x1 PCI Express Host board can be retained inside a computer chassis by using a full size bracket or by using the unique PCI Express add-in board retainer (Patent Pending) to prevent wiggling. The add-in board retainer can securely hold a PCI Express Host board without the use of a bracket.

Figure 2: x1 PCI Express Host board (top view)

Figure 3: x1 PCI Express Host board (bottom view)

The Splitter functions right out of the box, no additional software needs to be installed. The x1 PCI Express Host card has LEDs for displaying upstream and downstream PCI Express ports activities as well as expansion PCI Express add-in boards “PRESENT” status.

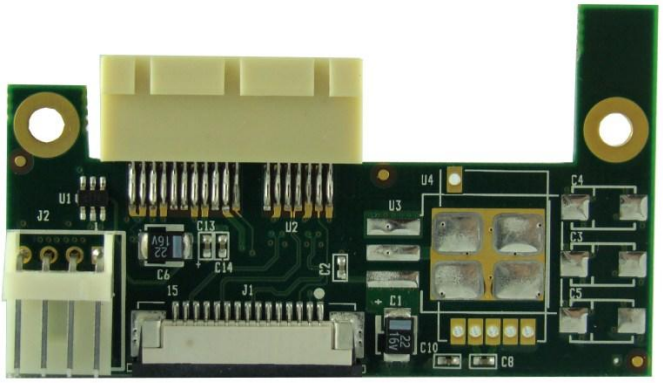

Figure 4: x1 PCI Express adapter board (powered from Host card 12V, 3.3V)

Figure 5: x1 PCI Express adapter board (powered from ATX power supply) (12V, 5V)

Figure 6: x1 PCI Express adapter board (powered from external 12V power supply)

3 Requirements/Features

3.1 Power Source

The power for the expansion PCI Express add-in board can be supplied from tree different sources:

- From x1 PCI Express Host card (12 and 3.3 volt) via power cable and x1 PCI Express adapter board
- From standard ATX power supply (“floppy disk” connector)(12 and 5 volts) via x1 PCI Express adapter board
- From any 12 volt power supply (including ATX) via x1/x4/x16 PCI Express adapter board

3.2 Software

No software required.

4 Hardware Description

4.1 Board Layout

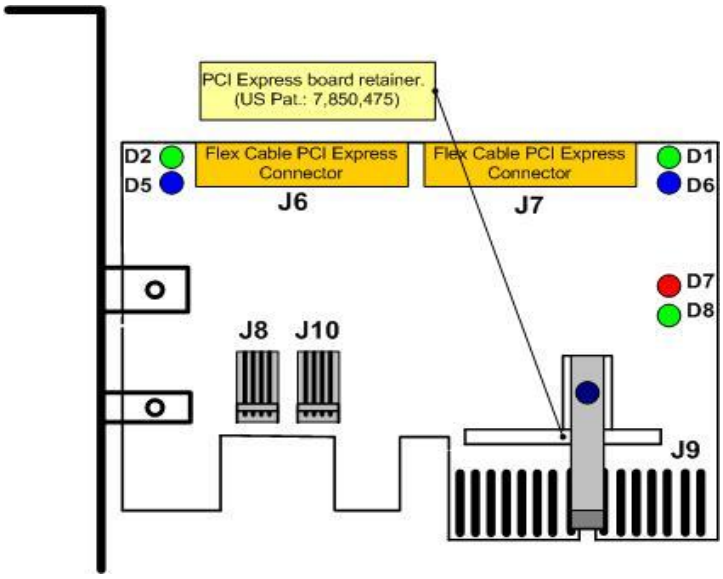

Figure 7: x1 PCI Express Host board layout (top side)

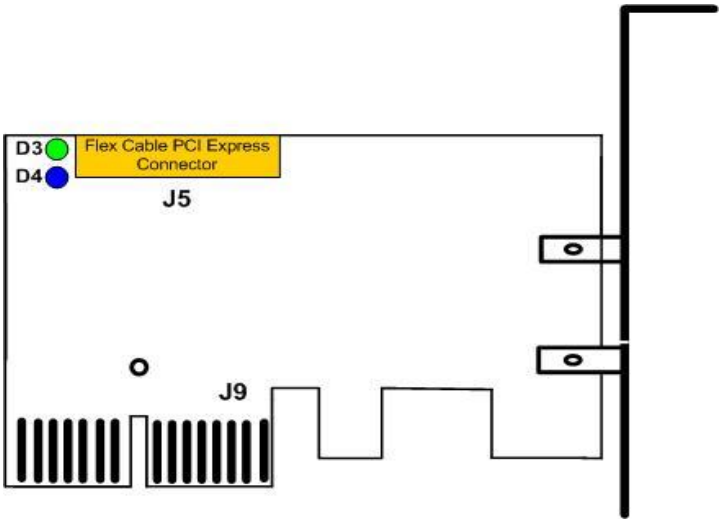

Figure 8: x1 PCI Express Host board layout (bottom side)

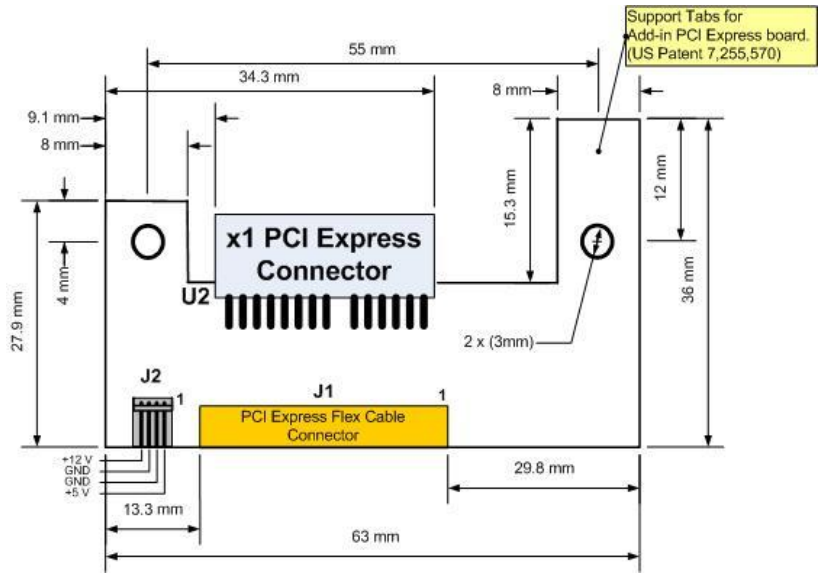

Figure 9: x1 PCI Express adapter board layout

4.2 LEDs

Name	RefDes	Color	Usage
RESET	D7	Red	Global PCI Express RESET signal from upstream connector J9.
LINK	D8	Green	Upstream port 1 link status. (**Solid Off**- Lane is disabled, **Solid On** –Lane is enabled, 5GT/s, **0.5 seconds On, 0.5 seconds Off** – Lane is enabled, 2.5 GT/s)
PRSNT 1	D4	Blue	First downstream port “PRSNT” signal
PRSNT 2	D5	Blue	Second downstream port “PRSNT” signal
PRSNT 3	D6	Blue	Third downstream port “PRSNT” signal
LINK 1	D3	Green	Downstream port 1 link status. (**Solid Off**- Lane is disabled, **0.5 seconds On, 0.5 seconds Off** – Lane is enabled, 2.5 GT/s)
LINK 2	D2	Green	Downstream port 2 link status. (**Solid Off**- Lane is disabled, **0.5 seconds On, 0.5 seconds Off** – Lane is enabled, 2.5 GT/s)
LINK 3	D1	Green	Downstream port 3 link status. (**Solid Off**- Lane is disabled, **0.5 seconds On, 0.5 seconds Off** – Lane is enabled, 2.5 GT/s)

Table 1: x1 PCI Express Host board LEDs

4.3 Connectors

RefDes	Type	Usage
J9	Upstream x1 PCI Express male connector	Connection to the upstream PCI Express bus on motherboard. (bandwidth up to 5 Gbit/sec)
J8,J10	“Floppy disk” male power connectors	Supply power for the expansion add-in PCI Express boards
J5,J6,J7	PCI Express Flex Cable connector	Connector via Flex PCI Express Cable to the x1 PCI Express Adapter boards. (bandwidth 2.5 Gbit/sec)

Table 2: x1 PCI Express Host board connectors

RefDes	Type	Usage
J1	PCI Express Flex Cable connector	Connector via Flex PCI Express Cable to the x4 PCI Express Host card.
J2	“Floppy disk” male power connectors	Incoming power for the expansion add-in PCI Express boards
U2	Downstream 1x PCI Express female connector	Connection to the expansion add-in PCI Express board.

Table 3: x1 PCI Express adapter board connectors

5 Installation

5.1 Hardware Installation

Following steps provide the exact sequence need to be followed in order to properly install the x1 PCI Express 3-Way Splitter product from AMFELTEC Corp.:

> **Warning**: Before touching anything inside the computer or any components, be sure to discharge your body's static electricity by touching a grounded surface.

- Turn off host computer and unplug it from the wall outlet.
- Remove the chassis cover or side panel from host computer. Refer to the computer manual for instructions if you need them.
- If the unit is a tower unit, turn it over on its side to make access easier.
- Ground yourself to the PC case. Attach a grounding wrist strap (if available) to the computer's metal chassis and your wrist. **CAUTION**: If you choose not to use the grounding wrist strap, be sure to take adequate precautions to discharge static electricity from your body before touching any components.
- Insert PCI Express Flex Cables into the connectors on the PCI Express Host card and on the PCI Express Adapters.
- Install the host card into the motherboard PCI Express slot.
- Place and retain PCI Express Adapters inside the chassis.
- Connect power to the PCI Express Adapters.
- Holding your add-in card by its edges and the mounting bracket, position the card with the contacts downward over the PCI Express slot and insert the card into the slot. Do not let it touch any of the components on the motherboard or PCI Express Adapter.
- Now, you can close computer cover and power-up the host computer.

BE SURE THAT BLUE LEDS ARE ON where there is expansion add-in PCI Express board! (Downstream Link connected where expansion PCI Express board is presented)

6 Operation Modes

Multiple x1 PCI Express adapters can be attached together with spacers as shown in a photo below.

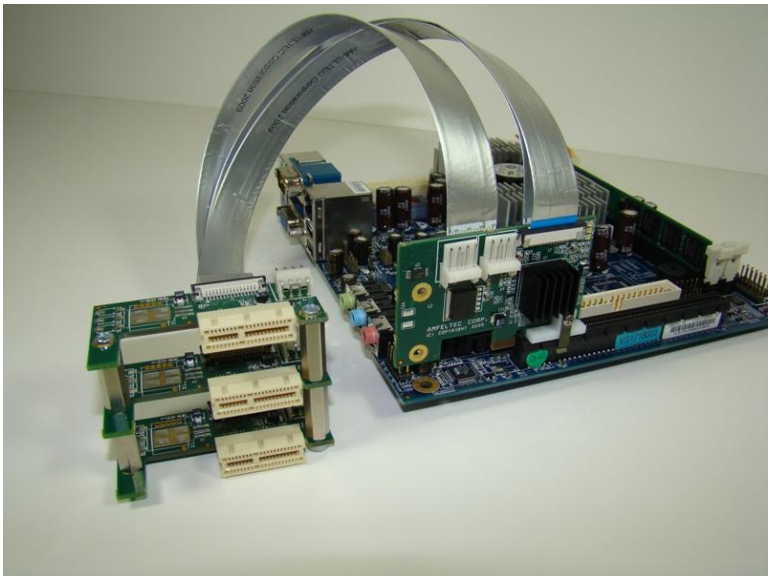

Figure 10: x1 PCI Express adapter board's combination

7 Ordering Information

7.1 Standard package

Standard package include the following components:

- x1 PCI Express Host card with full size bracket and PCI Express Board Retainer
- x1 PCI Express Adapter with Flex PCI Express cable (up to 3 pcs)

8 Appendix A: Limited warranty

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