# PCI Express Expansion Backplane

## Hardware Manual

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**Revision 1.0**

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# 1 About this Document

## 1.1 Purpose

This document describes hardware installation, features, specification and operation of the AMFELTEC Corp. PCI Express Expansion Backplane.

## 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. | February 28, 2013 |
| | | |
| | | |
| | | |

# 2 General Description

## 2.1 Introduction

The “PCI Express Expansion Backplane” (backplane) is a four x16 PCI express slot backplane (each connector has one PCI Express lane). Backplane connects to the upstream Host computer via two cables (standard CAT6 and 10 wires flat cables) and x1 PCI express Host board (optionally ExpressCard® Host board for connection to Laptop). PCI Express Host board should be plugged into the PCI express connector on the upstream Host computer motherboard.

Backplane has standard mounting holes based on ATX Specification 2.0 and can be installed inside any general purpose computer chassis. Backplane has power load circuit and can be powered by any ATX power supply without minimum power load limitation.

Backplane can operate without computer chassis as well. In this case each of x16 PCI Express connector has support spacer for mechanical stabilization of add-in x1 PCI express boards (U.S. Patent 7,255,750).

The backplane has surface-mount LEDs which provide a convenient visual check for the main powers (+5V, +12V, +3.3V, -12V, +5VSB), backplane operation status and status of the upstream PCI express connection.

## 2.2 Package Contents

PCI Express Expansion Backplane package includes:

1. PCI Express Expansion Backplane (Figure 1)
2. PCI express Host board (Figure 2)
3. Data CAT6 cable and control flat cable (both cables 5 ft.)
4. ATX I/O panel
5. “PCI Express filler 4 pcs.

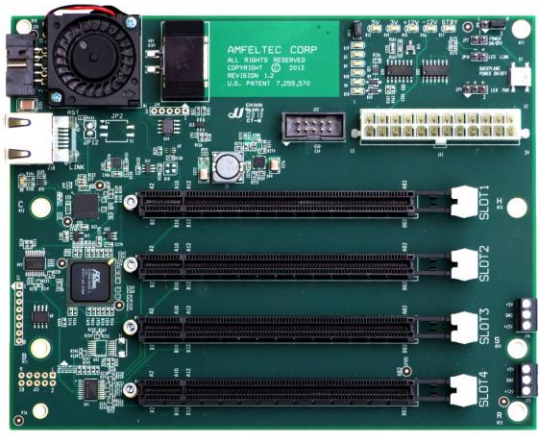


Figure 1: PCI Express Expansion Backplane

Figure 2: PCI Express Host board

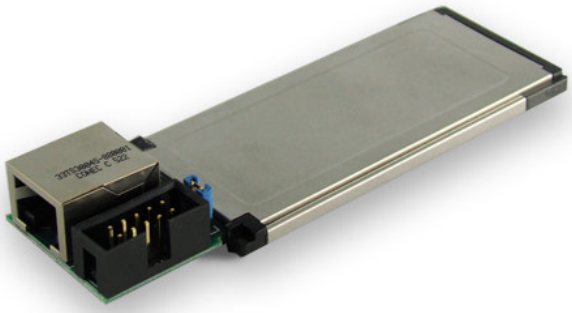

Figure 3: ExpressCard(r) host board

Figure 4: MiniPCIe host board

# 3 Features

## 3.1 Features

- Easy ‘Plug and Play” installation
- Expands Host Desktop computer or Laptop with 4 x16 PCI Express slots
- Can be mounted in any general purpose computer chassis. Meet ATX specification 2.0
- Powered by any standard ATX psu without minimum load limitation
- Connects to Host computer via 5ft. CAT6 cable (optionally 10 ft.)
- Meets PCI Express Bus Specification 2.0 (Gen2) with 5Gbit/sec bandwidth
- RoHS compliant

## 3.2 PCI Express add-in board mechanical stabilization

When Backplane operates without computer chassis the add-in PCI Express boards are mechanically stabilized by support spacers. Four spacers are allocated on the bracket side of each x16 PCI Express connector. An addition package includes 4 “PCI Express fillers”™ that can be installed inside PCI Express connector for add-in card stabilization (Figure 3).

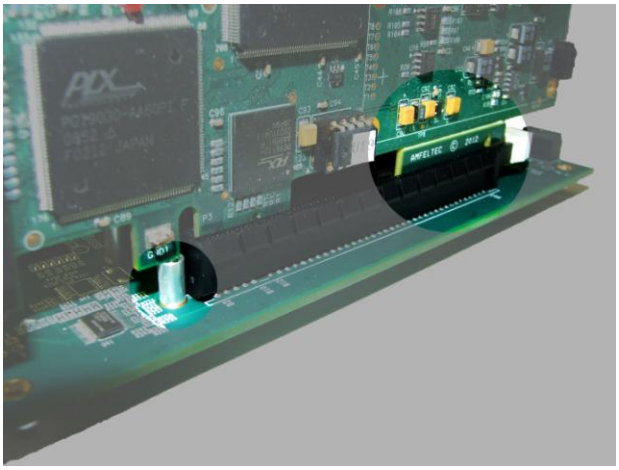

Figure 5: Mechanical stabilization for add-in PCI Express Boards

# 4 Installation

## 4.1

Following steps provide the exact sequence that needs to be followed in order to properly install the PCI Express Expansion Backplane product from AMFELTEC Corp.:

- Turn OFF Host computer before installation.
- Remove the chassis cover from Host computer.
- Locate an unused PCI express slot and remove the corresponding slot cover from computer chassis.
- Plug-in the x1 PCI express Host board to selected PCI express slot and attach its bracket to the computer chassis with a screw.
- Put the chassis cover back on the computer.
- Remove the chassis cover from Expansion chassis.
- Install ATX I/O panel.
- Install PCI Express Expansion Backplane inside computer chassis. Backplane mounting holes have the same labels as on the chassis (A, B, C, H, S, R).
- Connectors J18 and J20 has to fit into ATX I/O panel.
- Connect the CAT6 cable and flat cable to PCI express Host Board and the other end to the connectors on the PCI Express Expansion Backplane J18 and J20 connectors.
- Connect the ATX power supply to the PCI Express Expansion Backplane.
- Check position of the JP8 jumper (default has to be 2-3) and JP11 jumper has to be installed.
- Install add-in PCI Express boards and attach their brackets to the computer chassis with a screw.
- Turn ON ATX power supply power switch. LED D17 (STBY) indicates that the stand by power is present and backplane is ready.

# 5 Hardware Description

## 5.1 Board Layout

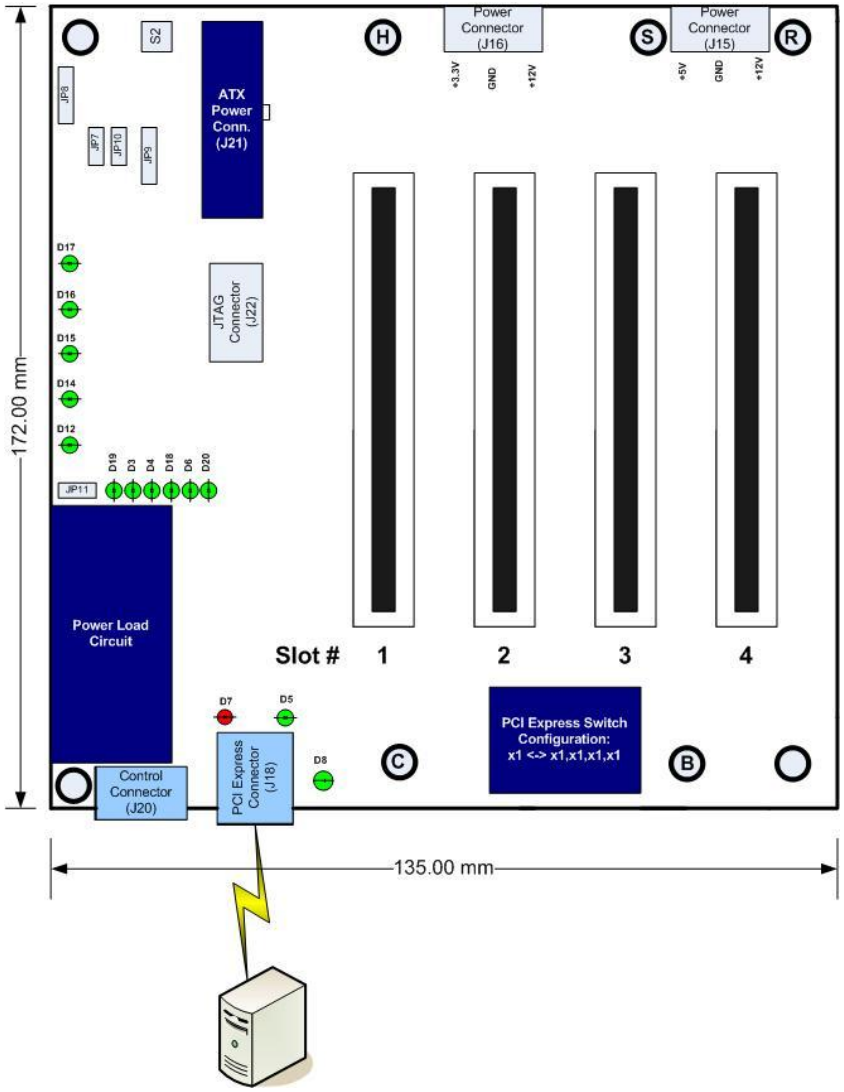


Figure 6: PCI Express Expansion Backplane layout

## 5.2 LEDs

| Name | Ref. Des. | Color | Usage |
|---|---|---|---|
| RST | D7 | RED | RESET from Host computer |
| STBY | D17 | YELLOW | ATX psu stand by power indication |
| +5V | D12 | GREEN | + 5V power indicator |
| +3V | D14 | GREEN | + 3.3V power indicator |
| +12V | D15 | GREEN | + 12V power indicator |
| -12V | D16 | GREEN | - 12V power indicator |
| | | | |
| LINK | D5 | GREEN | Upstream PCI express link status indicator |
| STATUS | D8 | GREEN | Backplane status indicator |
| | D19 | GREEN | PCI express link status for the third PCI Express slot (solid – 5Gbit/s , blink – 2.5Gbit/s) |
| | D3 | GREEN | PCI express link status for the second PCI Express slot (solid – 5Gbit/s , blink – 2.5Gbit/s) |
| | D4 | GREEN | PCI express link status for the first PCI Express slot (solid – 5Gbit/s , blink – 2.5Gbit/s) |
| | D18 | RED | Overheat status |
| | D6 | RED | Interrupt status |
| | D20 | GREEN | PCI express link status for the fouth PCI Express slot (solid – 5Gbit/s , blink – 2.5Gbit/s) |
| | | | |

Table 1: LEDs

## 5.3 Switches/Pushbuttons

| Name | Ref. Des. | Type | Usage |
|---|---|---|---|
| PWR ON | S2 | Push Button | "PWR ON" push button is switching ON and OFF ATX power supply in case that JP8 in position 1-2. (Local backplane Power supply control) |

Table 2: Switches

## 5.4 Jumpers

| Ref. Des. | Type | Usage |
|---|---|---|
| JP11 | 2 pins jumper | When closed - power load circuit is enabled. When open – disabled. |
| JP8 | 3 pins jumper | If 1-2 pins closed, then backplane ATX power supply is controlled by S2 (local control). If 2-3 pins are closed, then backplane ATX power supply is controlled by host computer. (Power On host computer automatically switch power on the backplane). |

Table 3: Jumpers

## 5.5 Connectors

| Ref. Des. | Type | Usage |
|---|---|---|
| JP9 | 3 pins connector | External Power LED connection. (In parallel with D12) |
| JP10 | 2 pins connector | Upstream LINK LED connection. (In parallel with D5) |
| JP7 | 2 pins connector | External Power ON / OFF push button connection. (In parallel with S2) (only when JP8 has jumper 1-2) |
| J15, J16 | 3 pin headers | Power connector (output). Fans or any additional devices can be powered from these connectors |
| J22 | 5x2(2.5 mm) header | JTAG connector. |
| J11, J12, J13, J14 | PCI Express connectors | Four x16 PCI express connectors |
| J21 | Standard ATX power supply 24 pin connector | Connector for ATX power supply. (Supplies power for PCI Express Expansion Backplane). |
| J20 | 5x2 (2.5 mm) header | Connector for control cable between PCI Express Expansion Backplane and host computer. |
| J18 | RJ45 connector for the PCI express cable connection | Connector for CAT6 cable between PCI Express Expansion Backplane and Host computer. |

Table 4: Connectors

# 6 Appendix A: JTAG connector pin-out

| Function | JTAG connector |
|---|---|
| TCK | 1 |
| N/C | 2 |
| TDO (from slot 4) | 3 |
| +3.3V | 4 |
| TMS | 5 |
| SMDAT | 6 |
| TRST | 7 |
| SMCLK | 8 |
| TDI (to slot 1) | 9 |
| GND | 10 |

Table 5: JTAG connector J22

| Function | Power output |
|---|---|
| +12V | 1 |
| GROUND | 2 |
| +5V | 3 |

Table 7: Power connector J15

| Function | Power output |
|---|---|
| +12V | 1 |
| GROUND | 2 |
| +3.3V | 3 |

Table 8: Power connector J16

# 7 Appendix C: Limited warranty

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