Multi-Interface Test Backplane

Hardware Manual

January 28, 2013

Revision 1.1

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1   About this Document

1.1   Purpose

This document describes hardware installation, features, specification and operation of the AMFELTEC Corp. Multi-Interface Test Backplane.

1.2   Feedback

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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.	November 7, 2010
1.1		January 28, 2013

2 General Description

2.1 Introduction

The "Multi-Interface Test Backplane" (*Backplane*) is designed for support hardware and software designers that need to be able to plug in products with different host interfaces to the host computer. Backplane is supporting the follow interfaces:

- 32 bit PCI interface

- x16 PCI express (4 lanes)

- ExpressCard® interface

- MiniPCI interface

- MiniPCI express interface

- PMC interface (optional, request additional expansion module)

The Backplane supports connection to both desktop and laptop host system. It connects to desktop system using x1 PCI Express host card or to laptop using ExpressCard® host card via two cables (standard CAT6 and control flat cables). The x1 PCI express host card has to be plugged into the PCI express connector on the upstream computer motherboard. The ExpressCard® has to be plugged in to the ExpressCard® slot of the laptop.

Using the Test Backplane eliminates the risk of damage to the host computer during debugging, programming and testing MiniPCI/MiniPCI Express/PCI/PCI Express/ExpressCard® cards. It allows easy and fast plug-in/plug-out the test boards with different interfaces, has overcurrent protection for plug-in boards and supports live-insertion functionality that allows user to replace the test boards extremely fast without shutting down the host system.

Using flexible cable connection between Multi-Interface Backplane and host system, allow to remove noisy host system and to free up working area by keeping away host computer.

Backplane is powered from standard single 12V power supply (4.2A minimum). This power supply can be connected to the backplane via 2.1 mm jack connector or standard DIN-5 connector (as the option additional DIN-8 connector can be installed).

Backplane has 3 independent hot-swap controllers for each of the local interfaces (PCI interface, PCI Express Interface and ExpressCard® interface). By using these hot-swap power controllers the power of each interface connector can be shutdown due to the over current protection or under voltage condition for UUT (Unit-under-Test) and host computer protection. The SW1 local power switch controls all power-controllers and can power down all local interfaces without any effect to the upstream host computer. This allows easy replacement of plug in PCI/PCI express cards (referred UUT, Unit-under-Test) on the backplane and significantly decreases testing/verification time.

The *Backplane* has two JTAG connectors (one for 32 bit PCI connector and another for x16 PCI express connector) to provide access from an external programmer/emulator to the PCI/PCI express bus JTAG signals. This feature is unique and cannot found on other PCI/PCI express backplanes or motherboards. It gives the possibility to run JTAG production tests, use a JTAG emulator for UUT debugging and/or to use Amfeltec In-Circuit Programmer/Loader (**eLoader™**) for programming/loading CPLD/FPGA/MCPU on the UUT during debugging or production cycle.

The Backplane has surface-mount LEDs which provide a convenient visual check for the power status and status of the upstream and downstream PCI express connections.

An additional, *Backplane* has two support tabs for mechanical stabilization of add-in PCI express card that plugged into x16 PCI Express connector (U.S. Patent 7,255,750).

2.2   Package Details

The Multi-Interface Test Backplane includes following components:

1. Multi-Interface Test Backplane (Figure 1 and Figure 2)

2. x1 PCI express host card (

3.

4.)

5. or ExpressCard® for laptop connection (Figure 3)
6. Data CAT6 cable and control flat cable (both cables 7 ft.)
7. User manual
8. Power supply 12V / 425A (optional)

Figure 1: Multi-Interface Test Backplane

Figure 2: Multi-Interface Test Backplane

Figure 3: x1 PCI Express Host board

Figure 3: ExpressCard® for connection to laptop

3   Requirements/Features

3.1   Power/Interface signals

- Visualization of UUT power status (Green LED)

- Overloading Protection (OLP) on the UUT +3.3V, +5V, -12V and +12V supplies

- Under-voltage protection (UVP) on the UUT +3.3V, +5V and +12V supplies

- UUT power failure protection (in case OLP or UVP), failure is indicated by red LED per interface

- Backplane is powered from single source 12V power supply 4.2A minimum. Backplane has 2.1 mm Power Jack connector and DIN-5 power connector (additional DIN-8 is a option)

- Meets PCI Express® Bus Specification 1.1.

- Meets PCI Bus Specification 2.3.

- Meets Mini PCI Bus Specification 1.0

- Meets Mini PCI Express® Card Specification 1.1.

- Meets ExpressCard® Standard 2.0.

- Supports hot-swapping on all interfaces

3.2   Debugging support

- Allows access to the PCI and PCI Express JTAG interface signals

3.3   Mechanical stabilization for PCI Express Cards

Backplane has two support tabs for mechanical stabilization of add-in PCI Express Cards (Figure 4).
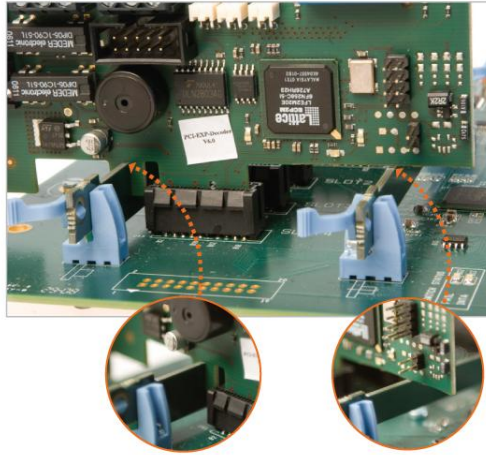
Figure 4: Mechanical stabilization for PCI Express Cards

3.4   Software

AMFELTEC Corp. provides software for supporting live-insertion functionality. The software allows to save and restore the PCI/PCI Express configuration for UUT device (refer to *eX10 Software Manual for more details*).

4   Installation

4.1   Hardware

Following steps provide the exact sequence that needs to be followed in order to properly install the Multi-Interface Test 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 card to selected PCI express slot and attach its bracket to the computer chassis with a screw.

- Put the chassis cover back on the computer.

- Connect the CAT6 cable and flat cable to PCI express host card and the other end to the connectors on the Multi-Interface Test Backplane.

- Check JP1, JP8, JP10, JP12, JP13 and SW1 setting on the Backplane.

- Connect the 12V power supply to the Backplane. LED D4 (STBY) indicates the power from power supply and Backplane is ready for operation.

- You can turn on the host computer (Please check position of the SW1. It has to be in position ON if you need to supply power for the all Backplane interfaces).

- When the system is booted, you can install the software.

<u>NOTE</u>:

1. We recommend adding ground connection to the Host PC and to the mounting holes on the Backplane.

2. The 12V power supply for powering Multi-Interface Test Backplane can be ordered from Amfeltec Corp.

4.2   Software

Multi-Interface Test Backplane doesn't require any software for operation. You will only need to install the software provided by AMFELTLEC Corp. in order to use the live-insertion functionality (Please refer to eX10Suite Manual for software installation details).

5 Operation

5.1 Hot-Swap Support

Perform hot swapping with a certain degree of carefulness. Remember that PCI/PCI Express configuration won't be restored automatically after insertion of a new UUT device unless you use the supplied HOT SWAP software to reload the UUT's PCI/PCI Express configuration.

5.1.1 Remove UUT Device

The following steps describe the sequence for removing UUT device:

1. Save UUT PCI/PCI Express configuration into a file (refer to Software Manual for *more details).*

2. Unload all device drivers associated with the UUT.

3. Set the switch SW1 to "OFF" (disable power).

Now, you can remove UUT device from any of the local interface connectors on the Backplane.

5.1.2 Install UUT Device

The following steps describe the sequence for installing UUT device back to the system:

1. Plug in UUT device into original local interface connector on the Backplane (If you are using multiple UUT devices, please install these device into original local interface connectors).

2. Set the switch SW1 to "ON" (enable power).

3. Restore PCI/PCI Express configuration for the UUT device.

Now, the UUT device is ready for use.

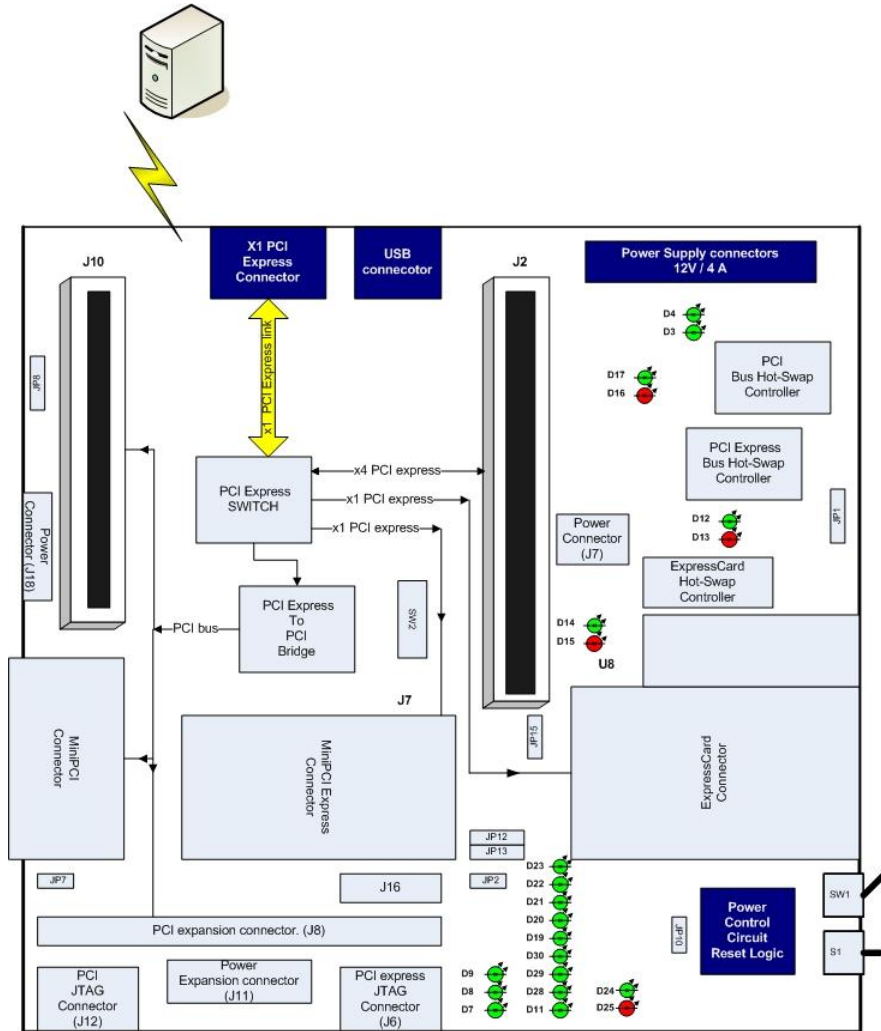# 6   Hardware Description

6.1   Board Layout

Figure 5: Multi-Interface Test Backplane board layout

6.2   LEDs

Name	Ref. Des.	Color	Usage
STBY	D4	GREEN	External 12V Power Supply power indication
PWR	D3	GREEN	Local power status
LRST	D25	RED	Local RESET signal indicator
PWRG	D24	GREEN	All local power Good Indicator
Ext. LINK	D23	GREEN	Upstream PCI express link status indicator
J2/Link 3	D22	GREEN	PCI express link status for the x16 PCI Express slot
J2/Link 2	D21	GREEN	PCI express link status for the x16 PCI Express slot
J2/Link 1	D20	GREEN	PCI express link status for the x16 PCI Express slot
J2/Link 0	D19	GREEN	PCI express link status for the x16 PCI Express slot
J3	D30	GREEN	MiniPCI Express link status
U8	D29	GREEN	ExpressCard® PCI express link status
PCI bus	D28	GREEN	PCI express link to PCI bridge status
PCI bus	D11	GREEN	PCI bridge to PCI express link status
PWR	D17	GREEN	Power Good status of the PCI, MiniPCI, PMC interface connectors
FAIL	D16	RED	Power Fail status of the PCI, MiniPCI, PMC interfaces(In case overload or under voltage)
PWR	D12	GREEN	Power Good status of the PCI Express, MiniPCI Express interface connectors
FAIL	D13	RED	Power Fail status of the PCI Express, MiniPCI Express interfaces (In case overload or under voltage)
PWR	D14	GREEN	Power Good status of the ExpressCard® interface
FAIL	D15	RED	Power Fail status of the ExpressCard® interface (In case overload or under voltage)
LED_WPAN	D7	GREEN	Indication from MiniPCIexpress interface
LED_WLAN	D8	GREEN	Indication from MiniPCIexpress interface
LED_WWAN	D9	GREEN	Indication from MiniPCIexpress interface

6.3 Switches

Follow table shows settings for the Multi-Interface Test Backplane switches:

Name	Ref. Des.	Type	Usage
BACKPLANE POWER	SW1	Switch	Power switch for all local interfaces. In case OFF state – the power on all local interfaces is off. UUT boards can be replaced. (Hot swap mode)
RESET	S1	Push Button	"RESET" push button provides RESET signal for the all local interfaces.

Table 2: Switches

6.4 Jumpers

Ref. Des.	Type	Usage
JP1	3 pin jumper	Jumper has to be in position 2-3
JP10	2 pin jumper	No Jumper
JP2	2 pin jumper	No Jumper. (W_disable# pin from the MiniPCI express interface)
JP12,JP13	3 pin jumpers	Host USB connection. Jumpers on 2-3 host USB connected to MiniPCI Express USB pins. Jumpers on 1-2 host USB connected to ExpressCard®.
JP7	2 pin jumper	Connection 3V_AUX power to MiniPCI connector.
JP8	3 pin jumper	VIO power selection for the 32 bit PCI connector. 1-2 select 5V and 2-3 select 3.3V.
JP15,JP14		Ground pins for Logic analyzer or Oscilloscope.

Table 3: Jumpers

6.5 Connectors

Ref. Des.	Type	Usage
J12,J6	5x2 (2.5 mm) header	JTAG emulator/programmer connection. Direct connection to the "eLoader ™" from Amfeltec Corp. J12 – PCI interface ; J6 – PCI express interface
J2	Standard x16 PCI express connector	PCI express interface
J10	Standard 32 bit PCI connector	PCI interface
J9	MiniPCI connector	MiniPCI interface
J3	MiniPCI Express connector	MiniPCI Express interface
U8	ExpressCard® connector	ExpressCard® interface
J8	PCI bus monitoring 30x2 connector	Connector for monitoring PCI bus (all PCI bus signals) and for connection PMC module.
J7	Power Connector	PCI Express interface local power connector. (12V,GND,3.3V)
J18	Power Connector	PCI interface local power connector. (12V,GND,5V)
J1, JR1,JR2	External 12V power supply connectors	Different type of connectors for support different types of the external 12V power supplies.
J4	USB connector	For MiniPCI Express and for ExpressCard® interfaces
J15	5x2 (2.5 mm) header	Connector for control flat cable between Backplane and host computer.
J14	RJ45 connector for the PCI express cable connection	Connector for data CAT6 cable between Backplane and host computer.

Table 4: Connectors

7 Appendix A: JTAG Programming Interface

Function	JTAG Connector
TCK	1
N/C	2
TDO	3
VIO (power out)	4
TMS	5
N/C	6
TRST	7
N/C	8
TDI	9
GND	10

Table 5: JTAG connectors J12 and J6

8   Appendix B: DIP Switch

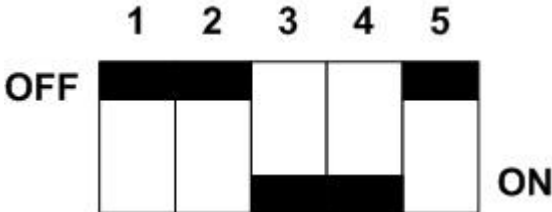Picture of the DIP Switch setting in the normal operation mode:

Table 6: DIP switch

9   Appendix C: Limited warranty

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