PCIe®
Adaptor Cards
USER'S MANUAL

samtec
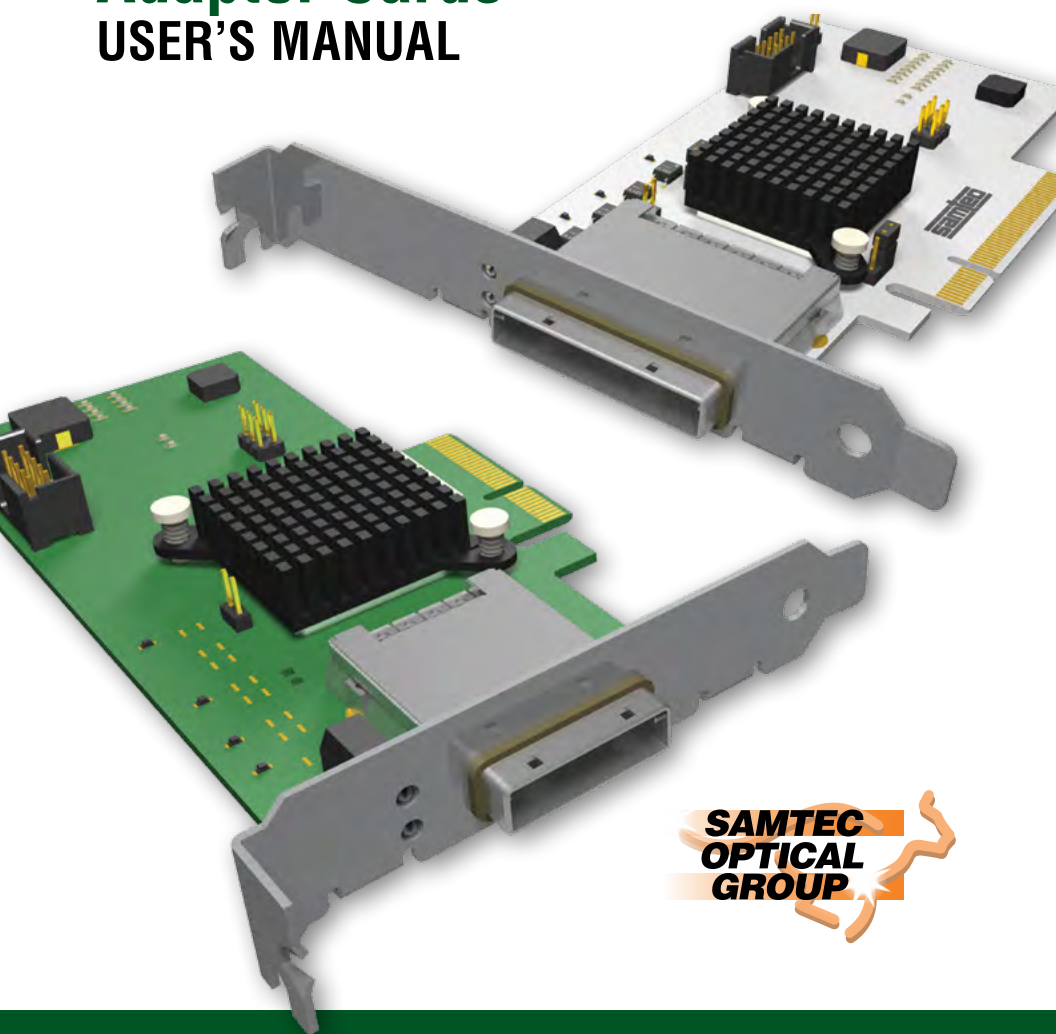
SAMTEC
OPTICAL
GROUP

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PCIe® is a registered trademark of PCI-SIG®.

Note: Samtec PCIe® over Fiber systems have successfully passed the PCI-SIG® Compliance Workshop #85; however as with all PCIe® based systems, there is a risk of interoperability issues with specific systems. Samtec recommends discussing your system with our Optical Group prior to final design. Please contact pcie@samtec.com.

INTRODUCTION

The PCIEA Series* are PCI Express® Gen 2 Compliant Switch Adaptor Cards designed to optimize performance for PCIe® over Fiber Applications enabling links up to 300 m in length. In addition to supporting optical links, PCIe® over copper cable is also supported, allowing use of cost effective copper cables for links up to 7 m.

*Mates with PCIEO Series Samtec active optical cable assemblies.

PCIe® x4 card
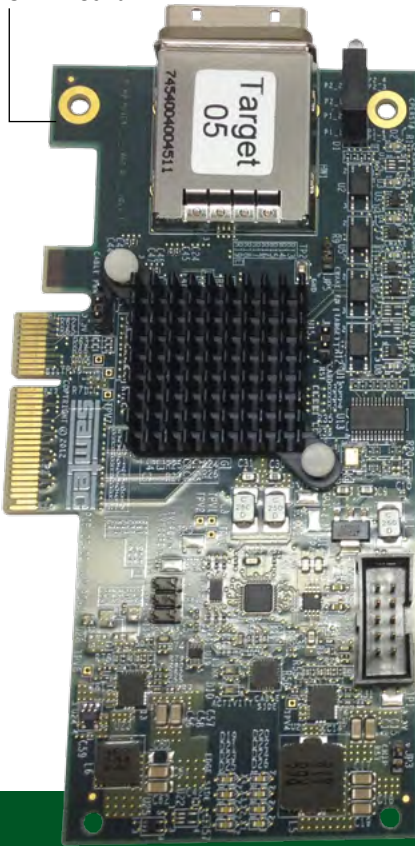
PCIe® x8 card

Product Features

- PCIe® Base Spec 2.1
    - Gen 1 (2.5 GT/s) compliant
    - Gen 2 (5.0 GT/s) compliant
- Low profile card available with full size or low profile bracket
- Supports copper cables up to 7 m in length
- Supports Samtec Active Optical Cables (PCIEO Series) up to 300 m
- Enables Spread-spectrum Clock Support
- Supports PCIe® auxiliary signaling
    - CPWRON
    - CPERST#
    - CPRSNT#
    - CWAKE#
- Diagnostic LEDs
    - link speed and width
    - power
    - sideband status

FUNCTIONAL DESCRIPTION

The block diagram of the adaptor card is shown in Figure 1 [PCIEA-8G2-H-01 shown].
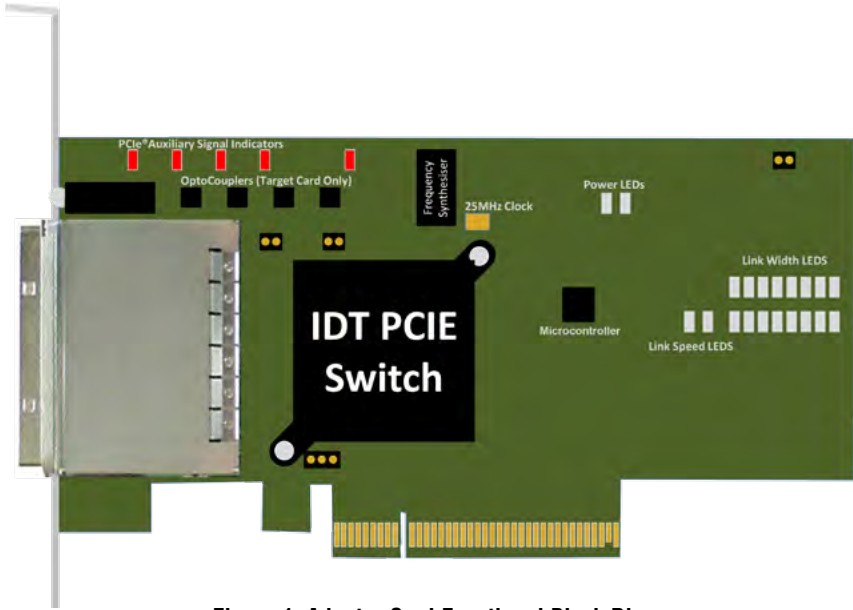
Figure 1: Adaptor Card Functional Block Diagram

FUNCTIONAL DESCRIPTION

Data Path

The cards are based on a 24 lane, 6 port IDT PCIe® switch of which only 16 lanes are used for the x8 cards, and only 8 for the x4 cards. The other lanes are powered off to minimize power consumption. Port0 is connected to the card edge connector and Port8 is connected to the PCIe® External Cabling Specifications compliant x8 cable connector. Port8 lanes are reversed for maximum RF performance. Port0 and Port8 are configured as follows for the host and target modes:

Ports	Host Mode	Target Mode
Port0	Upstream	Downstream
Port8	Downstream	Upstream

Clocking

The two 100 MHz clocks for the switch are supplied by an on-board PCIe® Base Spec 2.1 compliant frequency generator. This generator also supplies the constant clock source that drives the PCIe® cable connector for the host card and the PCIe® edge connector for the target mode.

Reset

At power-up, the card is held in reset until the on-board generated voltages are stable and the auxiliary signal PERST# is disabled.

Target Card Auxiliary Signal Isolation

The target card can be identified by the four optocouplers situated above the cable cage. These provide electrical isolation for the auxiliary signals when a copper cable is used to extend the PCIe® bus.

ON-BOARD DIAGNOSTICS

Diagnostic LEDs

Diagnostic LEDs are included on both host and target adaptor cards. Their functions are described in the below table.
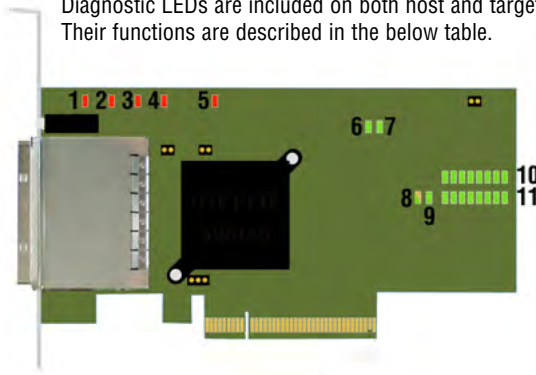
LED	Name	State	Description
1	CPERST#	Off	Auxiliary Signal CPERST# is high
		Red	Auxiliary Signal CPERST# is low (generating reset)
2	CPRSNT#	Off	Auxiliary Signal CPRSNT# is low (downstream system is connected)
		Red	Auxiliary Signal CPRSNT# is high
3	CPWRON	Off	Auxiliary Signal CPWRON is high (power good)
		Red	Auxiliary Signal CPWRON is low
4	CWAKE#	Off	Auxiliary Signal CWAKE# is high
		Red	Auxiliary Signal CWAKE# is low
5	RST	Off	IDT switch operating normally
		Red	IDT switch is held in reset
6	AUX	Off	Aux 3.3 V power supply not present
		Green	Aux 3.3 V power supply present
7	PGOOD	Off	Card generated 1.0 V, 2.5 V and 3.3 V power rails are not stable at correct voltage
		Green	Card generated 1.0 V, 2.5 V and 3.3 V power rails are stable and at correct voltage
8	Card Edge Link Speed	Off	No Link
		Amber	Gen 1 speed (2.5 GT/s) physical link
		Green	Gen 2 speed (5.0 GT/s) physical link
9	Card Edge Activity	Off	No Activity
		Green	Active data transfer through card edge connector
10*	Cable Link Width	Off	No Physical Link negotiated
		Green	Physical link negotiated. Link width corresponds to number of lit LEDs
11*	Card Edge Link Width	Off	No Physical Link negotiated
		Green	Physical link negotiated. Link width corresponds to number of lit LEDs

*x8 card shown; x4 cards have only 4 LEDs for banks 10 and 11

ON-BOARD DIAGNOSTICS

Front Bracket LEDs

In addition, there are two LEDs on the front bracket of the card. These are labeled "Link" and "Activity" and their function is:

Name	State	Description
Link	Off	No Link
	Amber	Gen 1 speed (2.5 GT/s) physical link
	Green	Gen 2 speed (5.0 GT/s) physical link
Activity	Off	No Activity
	Green	Active data transfer through cable

CARD CONFIGURATION

Jumper Headers

There are several jumper connectors on the adaptor card. Their stuffing is dependent on whether the card is a host or a target. In the below table, the shipped condition is **bolded** for the host and underlined for the target.
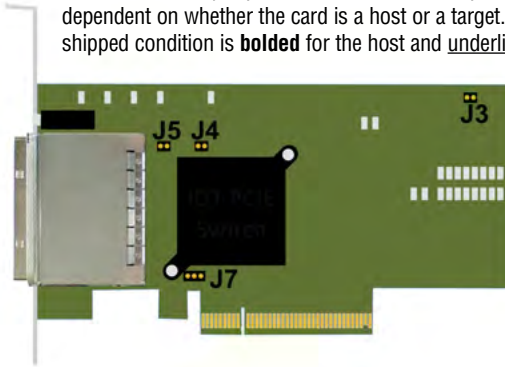
Number	Host/Target	Description	
JP3	Target	Jumper installed	Enables IDT reset from CPERST#
		Jumper not installed	Do not reset IDT on CPERST#
JP4	Target	Jumper installed	Connects CPERST# and PERST#
		Jumper not installed	Isolates PERST# from CPERST#
JP5	Both	Jumper installed	CWAKE# is held low at cable connector*
		Jumper not installed	CWAKE# is propagated
JP7	Both	Open	No power supplied to cable connector
		Jumper installed on pins 1 and 2	Cable is powered by card generated 3.3 V
		Jumper installed on pins 1 and 3	Cable is powered by 3.3 V Aux

* PCIe-over-Fiber AOCs that support sideband propagation will not work in this configuration. If this option is required then the option "NO Sidebands" needs to be chosen when ordering the cables.

INSTALLATION

Warning

Adaptor Cards and Active Optical Cables are ESD sensitive. Always take suitable precautions when installing cards and AOCs to prevent damage to these components.

Installing an Adaptor Card

1. Power down the host system.

2. Open the chassis per manufacturer's instructions.

3. Identify an empty PCIe® x8 or x16 socket to use. Note, not all sockets support x8 or x16 PCIe® lanes even though they have sockets. It is recommended to check the system manual to confirm socket capabilities. The adaptor cards will automatically reconfigure for lower lane counts; however, throughput will be reduced.

4. Remove the blanking plate corresponding to the identified PCIe® socket.

5. Insert the adaptor into the socket, ensuring that the card is well seated.

6. Secure the card with the removed screw from step 4.

7. Close the chassis.

8. When powering up, ensure a cable is connected and the downstream device is powered up first.

Installing an Active Optical Cable

1. Ensure that upstream and downstream systems are powered down.

2. Identify the host end and target end of the AOC. The host end should be installed in the upstream port and the target end should be installed in the downstream port.

3. Based on step 2, insert the correct end of the AOC fully into the chosen port. Note: The port housing is polarized and the connector can only be inserted one way.

4. Ensure the latch mechanism interlocks with the cutouts in the port housing.

INSTALLATION

Installing a Copper Cable

1. Ensure that upstream and downstream systems are powered down.
2. Copper cable connectors are identical and no care needs to be taken with where each end needs to be plugged.
3. Ensure the latch mechanism interlocks with the cutouts in the port housings.

Removing AOCs/Copper Cables

1. Both cable types have a latching mechanism to prevent accidental removal. The latching mechanism needs to be released prior to removal.
    a. For optical cables, this is achieved by squeezing the ridged lever on the end closest to the fiber entry
    b. For copper cables, this is achieved by pulling the green plastic release latch
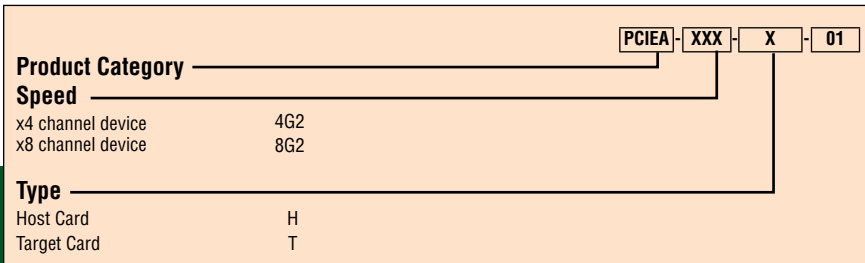
TECHNICAL INFORMATION

Design Specifications

PCIEA Series cards have been designed to meet the following parameters:

Specification	Unit	Min	Typ	Max	Notes
Operating Temperature	°C	0		55	
Relative Humidity	%	5		95	Noncondensing
Altitude	m	0		3000	
Power Consumption	W		9		
Shock	G			30	Acceleration Peak

Ordering Information
PCIe® Adaptor Cards

| PCIEA |-| XXX |-| X |-| 01 |

Product Category
Speed
x4 channel device   4G2
x8 channel device   8G2

Type
Host Card   H
Target Card   T

SAMTEC OPTICAL GROUP

For more information visit
www.samtec.com/active-optics or contact
Samtec's Optical Group at optics@samtec.com

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