



Product Information

SX6-FIREWORKS

CompactPCI® Serial • PCI Express® Optical Cabling
Host Side Adapter • Dual PCIe® Gen3 x8 • MPO/MTP Connectors



General

Most computer systems are based on the PCI Express® standard as a high speed backbone for interconnection of peripheral components with a host CPU. However, sometimes not all PCI Express® based devices are located closely in a common enclosure, and therefore need external cabling for merging distributed subsystems virtually into a single PCI Express® based computer assembly.

With the SX6-FIREWORKS host adapter for CompactPCI® Serial systems, EKF provides a dual port optical fiber cabling solution, which enables Gen3 PCIe® links up to 100m, delivering up to 64Gbps to an associated target system.

The SX6-FIREWORKS is equipped with two MPO/MTP front panel adapters, for attachment of up to two remote (target) systems by PCI Express® Gen3 x8 or x4 links, via 24- or 12-fiber optical patch cables. Samtec FireFly™ PCIe®-over-fiber transceivers provide high performance signal quality with BER better than $1E^{-12}$.

Compared to other cabling solutions e.g. 40Gbps Ethernet, a PCI Express® Gen3 x8 link offers higher data transfer rates at lower latency. The SX6-FIREWORKS has been designed for operation in a CompactPCI® Serial fat pipe slot (PCIe® x8) for optimum performance.



System Integration

The SX6-FIREWORKS allows to control a remote PCI Express® based target system by a CompactPCI® Serial host CPU via PCI Express® Gen3 based fiber optical cabling. The target system may be any PCI Express® device with a suitable cabling adapter organized x8 or x4, not necessarily a CompactPCI® Serial system. Since the SX6-FIREWORKS host adapter is based on Samtec FireFly™ PCUO optical transceivers, also the target system adapter must be equipped with FireFly™ optical engines.

Common optical patch cables with MPO/MTP connectors up to 100m can be used. The PCIe® x8 link requires a 24-fiber cable, while the 12-fiber cable is sufficient for PCIe® x4.

By means of the SX6-FIREWORKS, a CompactPCI® Serial system backplane, with respect to its PCI Express® resources, can be virtually extended. Hence, PCI Express® based devices in a remote target system can be controlled by the host system CPU in an identical manner as its local resources.



Feature Summary

General

- ▶ PCI Express® external optical cabling host side adapter, two cabling ports
- ▶ PICMG® CompactPCI® Serial (CPCI-S.0) fat pipe slot x8 recommended
- ▶ Single Size Eurocard 3U 4HP 100x160mm²
- ▶ CompactPCI® Serial backplane connectors P1, P2 PCI Express® Gen3 x8
- ▶ Gen3 PCI Express® 24-lanes packet switch on-board

Cabling

- ▶ Optical PCIe® Gen3 cabling up to 100m with female/female MTP/MPO patch cable
- ▶ 24-Fiber patch cable for PCIe® x8 link
- ▶ 12-Fiber patch cable for PCIe® x4 link
- ▶ Compliant Specifications: TIA-604-5-D (FOCIS 5), TIA-568-C.3, IEC-61754-7-1
- ▶ On-board Samtec FireFly™ PCUO-G3 optical transceivers, socketed
- ▶ Two cabling ports PCIe® Gen3 x8 or x4, MTP/MPO front panel bulkhead adapters
- ▶ Two target systems or devices can be attached simultaneously
- ▶ Suitable for remote target systems to be controlled by the CompactPCI® Serial host
- ▶ Connects to any target system or target device with PCI Express® optical cabling interface equipped w. Samtec FireFly™ PCUO transceivers

Applications

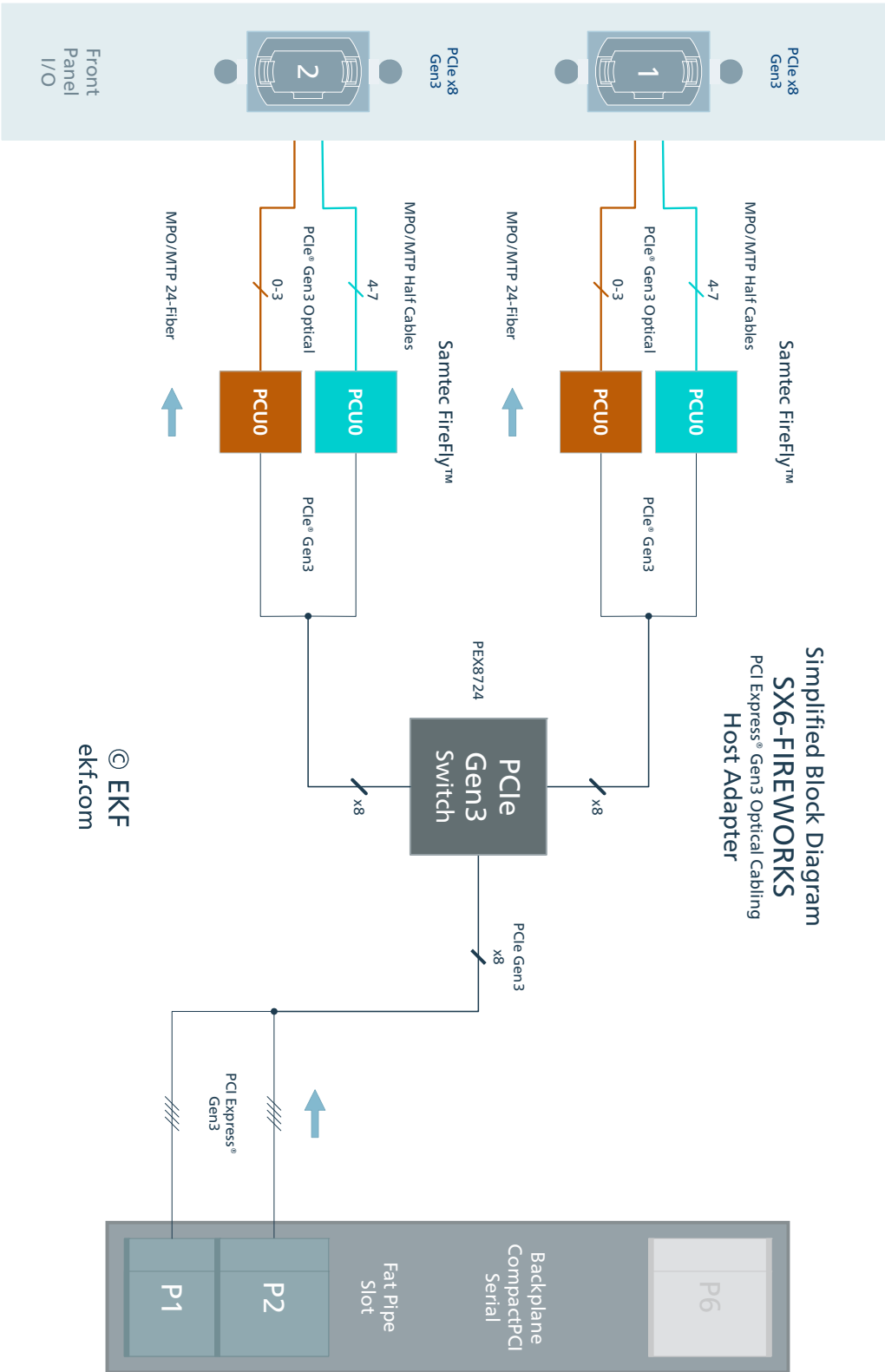
- ▶ For lowest latency at fastest speed connected systems
- ▶ Distributed computing - host to target system hierarchy
- ▶ Option peer to peer computing - special TCP/IP stack (Dolphin) available
- ▶ Split-systems, hybrid systems, or system expansion applications
- ▶ Direct host to target device connection (e.g. SSD mass storage system)
- ▶ Mating target controller board available for CompactPCI® Serial (SXD-FIREWORKS)

Feature Summary

Regulatory

- ▶ Long term availability
- ▶ Designed & manufactured in Germany
- ▶ ISO 9001 certified quality management
- ▶ Rugged solution (coating, sealing, underfilling on request)
- ▶ Lifetime application support
- ▶ RoHS compliant
- ▶ Commercial temperature range 0°C to +70°C
- ▶ Option industrial temperature range -40°C to +85°C w. Samtec™ PTUO transceivers
- ▶ Humidity 5% ... 95% RH non condensing
- ▶ Altitude -300m ... +3000m
- ▶ Shock 15g 0.33ms, 6g 6ms
- ▶ Vibration 1g 5-2000Hz
- ▶ MTBF 65.9 years
- ▶ EC Regulations EN55032, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

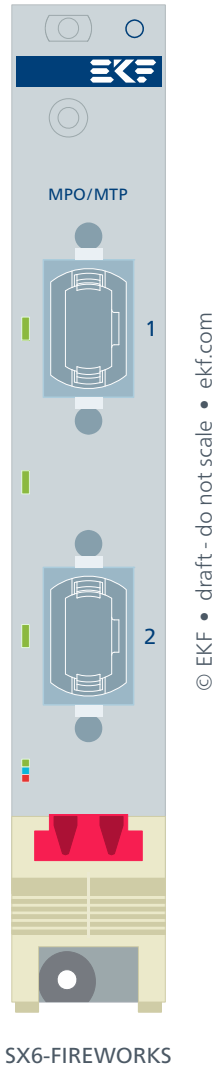
Block Diagram



Simplified Block Diagram
SX6-FIREWORKS
 PCI Express® Gen3 Optical Cabling
 Host Adapter

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Front Panel

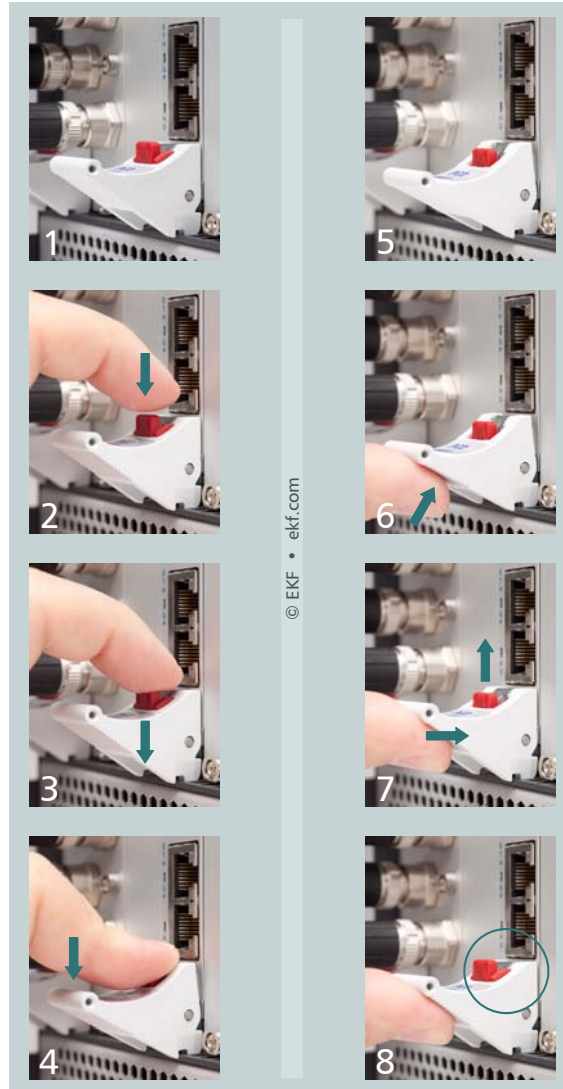


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F/P LEDs from top to bottom: cable port 1 - upstream port - cable port 2 - special function

As result of the PCI Express® link training, links are established which are suitable for communication between both sides, i.e. host controller (SX6-FIREWORKS) and target side adapter. The link width can vary between 1 - 2 - 4 - 8, and the data transfer rate may be either 2.5GT/s (Gen1), 5GT/s (Gen2) or 8GT/s (Gen3). With respect to the SXD-FIREWORKS target side adapters, connected downstream port LEDs and the upstream port LED should be steady on (indicating Gen3).

Please note: The front handle is provided with a built-in microswitch, which is used to disable the on-board power circuit when released. Vice versa, the *on-board devices are enabled not before the handle gets locked*. Please refer to the illustration below and make sure that the eject lever has reached its final position for proper board operation, as shown in picture 8. A gentle click should be audible, when the red actuator pin moves into its raised position, indicating that the board is locked and ready for use.



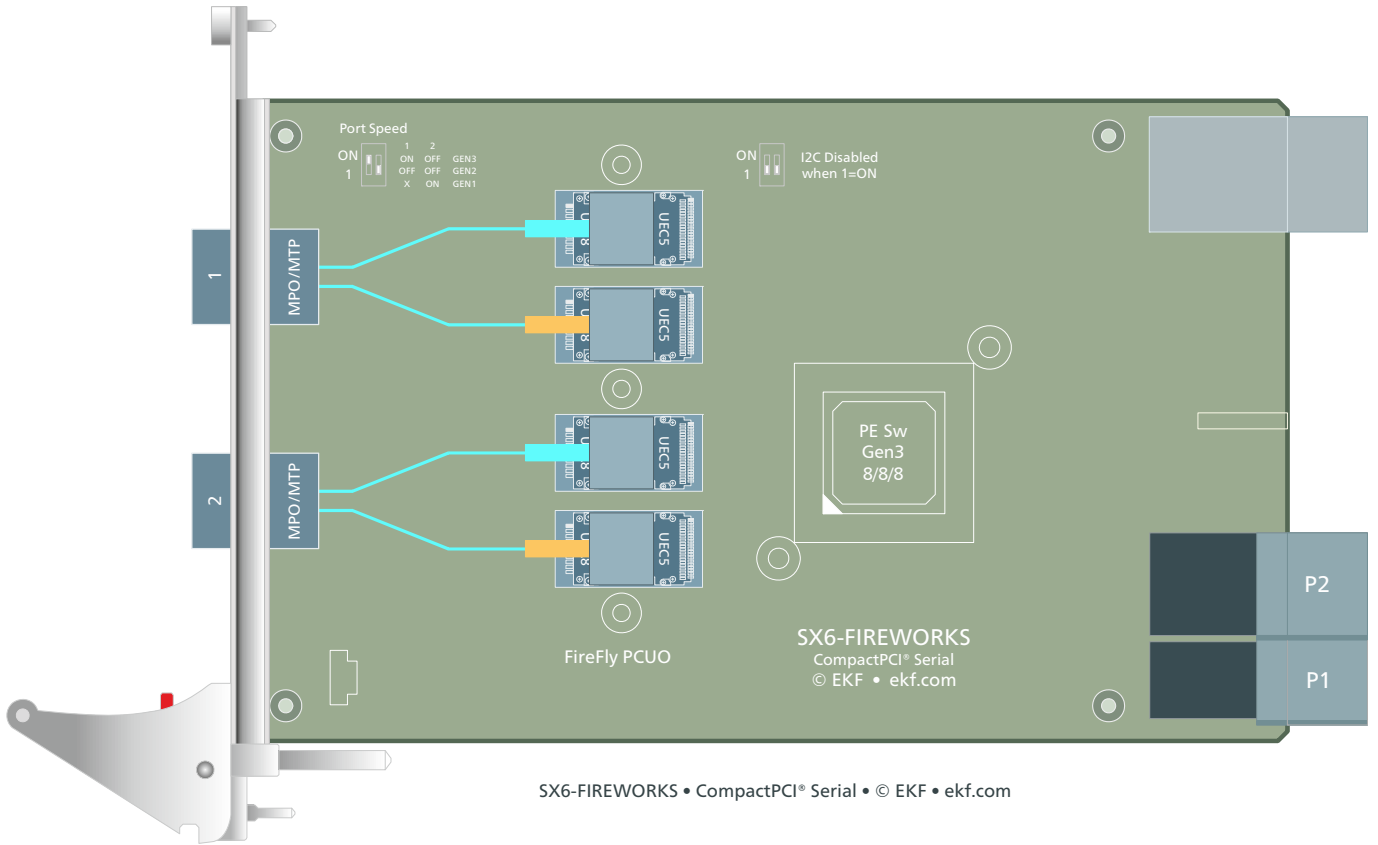
1 - 4: remove board

5 - 8: install board

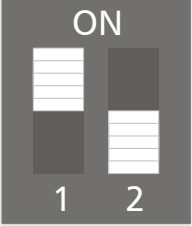
1 & 8: on-board power enabled

2-7: on-board power disabled

Component Assembly



Port Speed Setup

On-Board DIP Switch EKF Part 160.15.02.0			
 <p>160.15.02.0 © EKF • ekf.com</p>	Maximum Link Speed		
	1	ON	PCIe® Gen 3 (8GTps)
	2	OFF	
	1	OFF	PCIe® Gen 2 (5GTps)
	2	OFF	
	1	X	PCIe® Gen 1 (2.5GTps)
	2	ON	

Settings are common to cable ports and upstream (backplane)

By default, this Dip-switch should be set to 1=on, 2=off for up to PCIe® Gen 3 (8GTps), depending on the link training after reset. For testing purposes the transfer speed of all ports can be limited to a maximum of PCIe® Gen 2 (5GTps), and even PCIe® Gen 1 (2.5GTps).

Power Sequencing

Please understand, that host and connected target hardware should be considered as distributed parts of a common computer system. During BIOS POST the whole system will be explored for PCI Express® devices attached to the PCIe® root complex (processor on host system CPU card). Devices which are not active (powered up) at this time, will not be enumerated by the BIOS and are consequently not available for the operating system afterwards.

Hence a power sequencing procedure must be observed for host system and target system. The rule is simple: Power up the target system(s) before the host system, or simultaneously. If power sequencing conditions cannot be maintained, the host system must be restarted again, until the remote target devices are visible to the host CPU.

If the host system is equipped with an EKF processor board such as the SC5-FESTIVAL or later, a startup time delay up to 12s can be configured via BIOS setup:

Setup (F2): Advanced -> Miscellaneous Configuration -> Execute Delay after Reset

The adjusted delay would be executed before enumeration and initialization of PCI Express® devices, thus permitting a reasonable power up time lag for the remote target system. The delay countdown is indicated by a red blinking LED GP in the CPU card front panel.

P1 CompactPCI® Serial Backplane Connector

P1 CompactPCI® Serial Peripheral Slot Backplane Connector												
EKF Part #250.3.1206.20.02 • 72 pos. 12x6, 14mm Width												
P1	A	B	C	D	E	F	G	H	I	J	K	L
6	GND	1 PE TX02+	1 PE TX02-	GND	1 PE RX02+	1 PE RX02-	GND	1 PE TX03+	1 PE TX03-	GND	1 PE RX03+	1 PE RX03-
5	1 PE TX00+	1 PE TX00-	GND	1 PE RX00+	1 PE RX00-	GND	1 PE TX01+	1 PE TX01-	GND	1 PE RX01+	1 PE RX01-	GND
4	GND	<i>1_</i> <i>USB2+</i>	<i>1_</i> <i>USB2-</i>	GND	PE_CLK IN+	PE_CLK IN-	GND	<i>1</i> SATA TX+	<i>1</i> SATA TX-	GND	<i>1</i> SATA RX+	<i>1</i> SATA RX-
3	<i>1</i> USB3 TX+	<i>1</i> USB3 TX-	GA0	<i>1</i> USB3 RX+	<i>1</i> USB3 RX-	GA1	SATA SDI	SATA SDO	GA2	SATA SCL	SATA SL	GA3
2	GND	I2C SCL	I2C SDA	GND	<i>RSV</i>	<i>RSV</i>	GND	RST#	WAKE#	GND	PE_ EN#	SYS EN#
1	+12V	STBY	GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND

pin positions printed white/italic: not connected

For signal descriptions please refer to PICMG CPCI-S.0 R1.0 CompactPCI® Serial Specification

P2 CompactPCI® Serial Backplane Connector

P2 CompactPCI® Serial Fat Pipe Peripheral Slot Backplane Connector												
EKF Part #250.3.1208.20.00 • 96 pos. 12x8, 16mm Width												
P2	A	B	C	D	E	F	G	H	I	J	K	L
8	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>
7	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND
6	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>
5	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND
4	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>
3	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND	<i>IO</i>	<i>IO</i>	GND
2	GND	1 PE TX06+	1 PE TX06-	GND	1 PE RX06+	1 PE RX06-	GND	1 PE TX07+	1 PE TX07-	GND	1 PE RX07+	1 PE RX07-
1	1 PE TX04+	1 PE TX04-	GND	1 PE RX04+	1 PE RX04-	GND	1 PE TX05+	1 PE TX05-	GND	1 PE RX05+	1 PE RX05-	GND

pin positions printed italic/white: not connected

For signal descriptions please refer to PICMG CPCI-S.0 R1.0 CompactPCI® Serial Specification

Optical Cable Assemblies

205.81.1.1.003.0	Optical patch cable, 12 fiber, female/female MTP/MPO, cross over type B cabling, 3m
205.81.1.1.010.0	Optical patch cable, 12 fiber, female/female MTP/MPO, cross over type B cabling, 10m
205.81.2.1.003.0	Optical patch cable, 24 fiber, female/female MTP/MPO, cross over type C cabling, 3m
205.81.2.1.010.0	Optical patch cable, 24 fiber, female/female MTP/MPO, cross over type C cabling, 10m
other lengths on request	

Related Cards Using PCIe® Optical Cabling

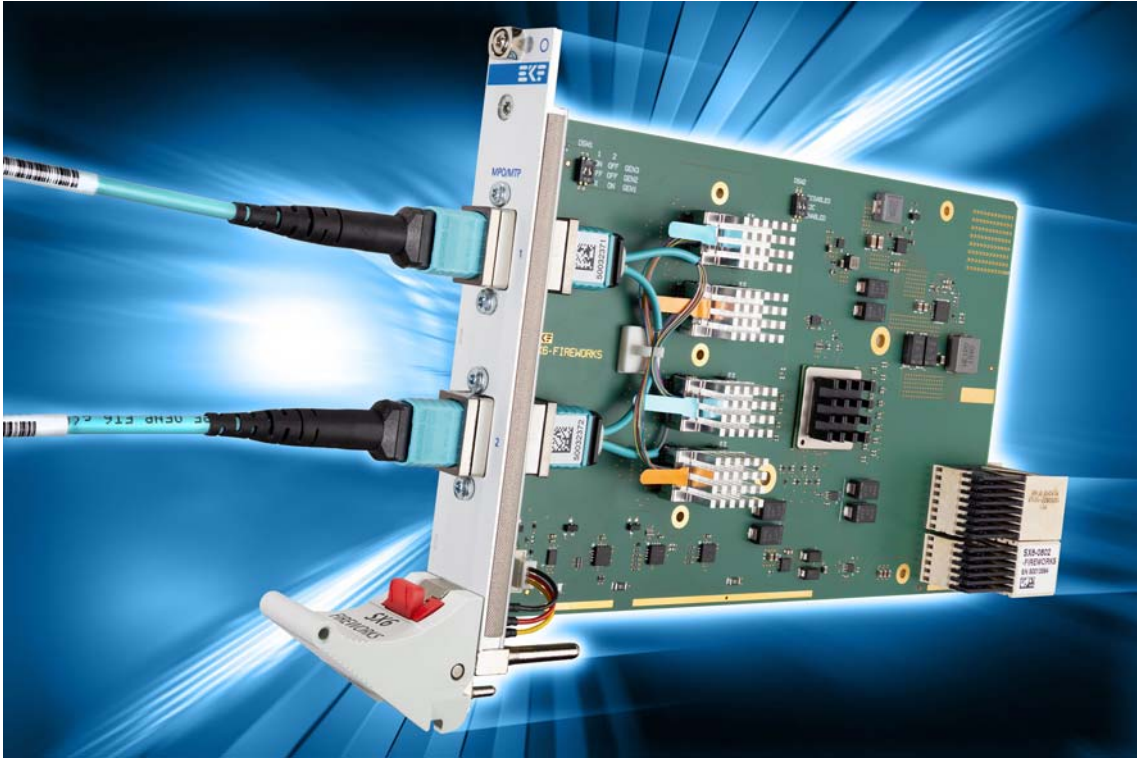
SXD-FIREWORKS	CompactPCI® Serial • PCIe® Optical Cabling x8 • Target Side Adapter www.ekf.de/s/sxd/sxd.html
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Reference Documents

CompactPCI® Serial	CPCI-S.0	www.picmg.org
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Ordering Information

For popular SX6-FIREWORKS SKUs please refer to
www.ekf.com/liste/liste_21.html#SX6



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