



Product Information

SXD-FIREWORKS

CompactPCI® Serial • PCI Express® Optical Cabling
Target Side Adapter • PCIe® Gen3 x8 • MPO/MTP Connector



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.

The SXD-FIREWORKS is a target system adapter card for PCIe® x8 external optical cabling, equipped with an MPO/MTP front panel housing, for attachment of a 24- or 12-fiber optical patch cable as connection to a suitable host system. The SXD-FIREWORKS fits into the system slot of a CompactPCI® Serial backplane, as replacement for a CPU card in the target system.

With its on-board PCIe® packet switch the SXD-FIREWORKS replicates two PCI Express® Gen3 x8 links across a 3-slot CompactPCI® Serial backplane. Thus, two CompactPCI® Serial fat pipe slot cards in the target system can be natively controlled by the remote host system CPU, with a transfer rate of up to 64Gbps.

The SXD-FIREWORKS target adapter for CompactPCI® Serial systems enables a Gen3 PCIe® optical cable link up to 100m. 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.



System Integration

The SXD-FIREWORKS allows a CompactPCI® Serial target system to be controlled by a remote host CPU via PCI Express® optical cabling. The host system may be any computer with a PCI Express® adapter equipped with Samtec FireFly™ PCUO optical transceivers, hence not necessarily a CompactPCI® Serial system.

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

Based on a PCIe® Gen3 packet switch, the SXD-FIREWORKS is organized as a CompactPCI® Serial system slot controller card, delivering two PCIe® Gen3 x8 links to its backplane connectors, for use with fat pipe peripheral boards in the target system such as SSD, GPU or FPGA cards.

By means of the SXD-FIREWORKS, a computer system can be virtually extended. PCIe® based devices in a CompactPCI® Serial target system can be managed by the host CPU in an identical manner as its local resources.



Feature Summary

General

- ▶ PCI Express® external optical cabling target side adapter, Gen3 x8
- ▶ PICMG® CompactPCI® Serial (CPCI-S.0) system slot controller (for PCIe® resources only)
- ▶ Single Size Eurocard 3U 4HP 100x160mm²
- ▶ CompactPCI® Serial backplane connectors P1, P2, P5 PCI Express® Gen3
- ▶ Enables two peripheral slots organized x8/x8 (suitable for fat pipe peripheral slot cards)
- ▶ Gen3 PCI Express® 24-lanes packet switch on-board
- ▶ Protective clamshell version available

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
- ▶ Cabling port PCIe® Gen3 x8 or x4, MTP/MPO front panel bulkhead adapter
- ▶ Suitable for CompactPCI® Serial target systems to be controlled by a remote host
- ▶ Connects to any host adapter equipped w. Samtec FireFly™ PCUO transceivers

Applications

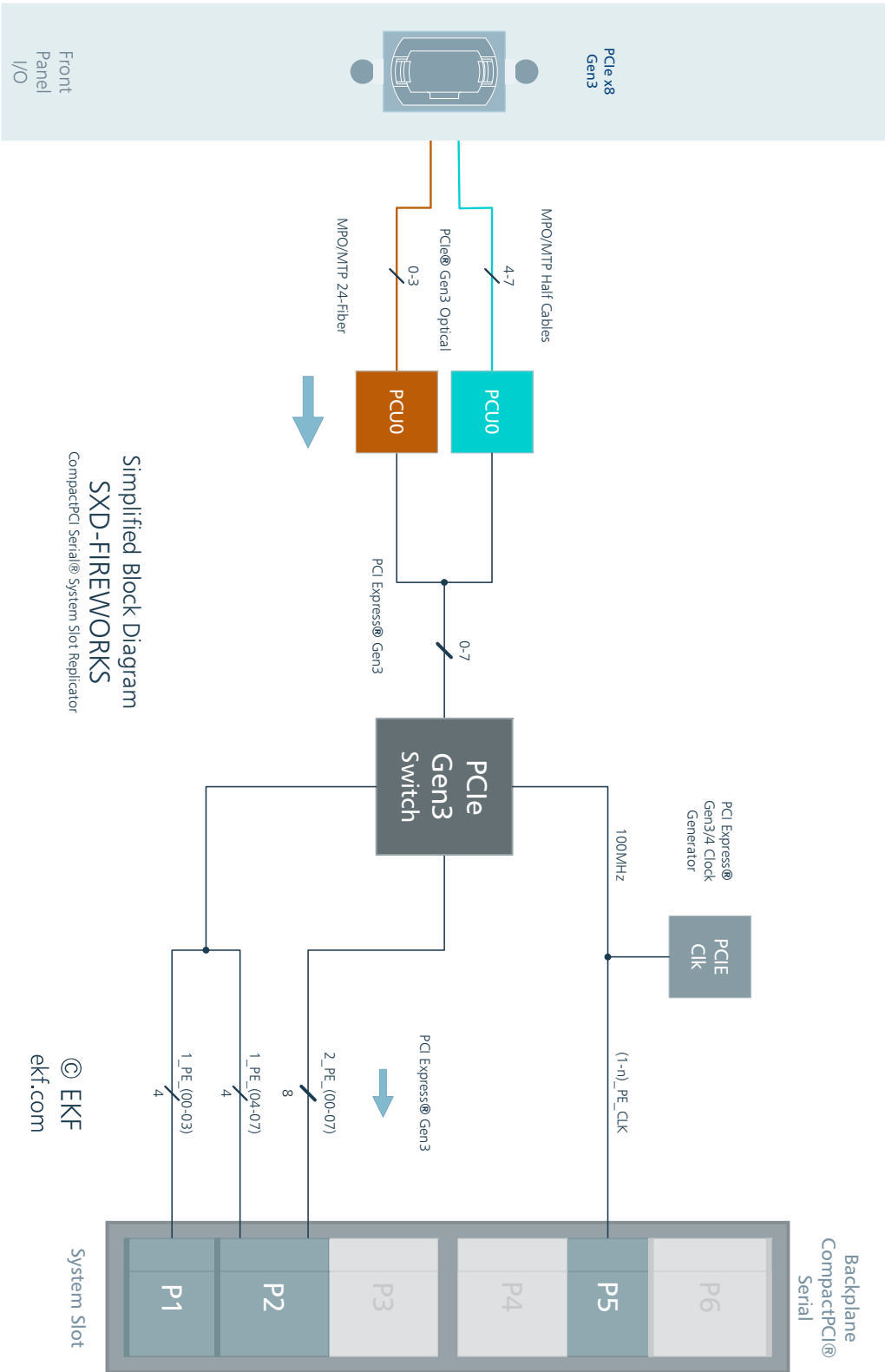
- ▶ For lowest latency at fastest speed connected systems
- ▶ Distributed computing - host to target system hierarchy
- ▶ Split-systems, hybrid systems, or system expansion applications
- ▶ Remote fast storage (e.g. SSD mass storage system)
- ▶ Mating host controller board available for CompactPCI® Serial (SX6-FIREWORKS)
- ▶ Mating PCI Express® host adapter card available from 3rd party vendor

Feature Summary

Regulatory

- ▶ Long term availability
- ▶ Designed & manufactured in Germany
- ▶ ISO 9001 certified quality management
- ▶ Rugged solution (coating, sealing, underfilling on request)
- ▶ 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 93.6 years
- ▶ EC Regulations EN55032, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

Block Diagram



Simplified Block Diagram
SXD-FIREWORKS
 CompactPCI Serial® System Slot Replicator

© EKF
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Front Panel



© EKF • draft - do not scale • ekf.com

Front panel LED off - no PCIe® cable link established

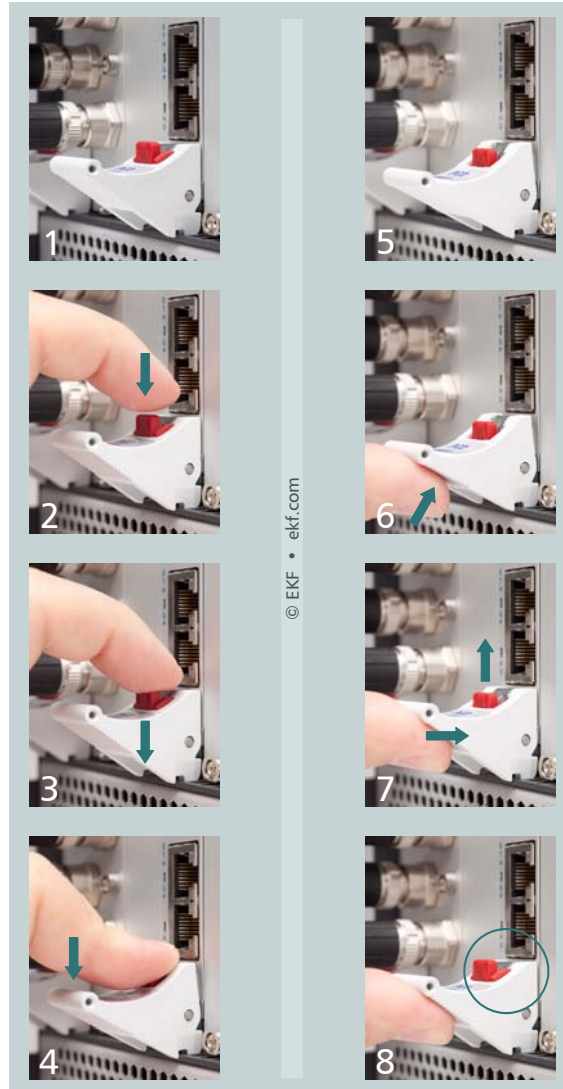
Front panel LED permanently on - PCIe® Gen3 cable link established

Front panel LED blinking 2Hz - PCIe® Gen2 cable link established

Front panel LED blinking 1Hz - PCIe® Gen1 cable link established

As result of the PCI Express® link training, links are established which are suitable for communication between both sides, i.e. host controller (e.g. SX6-FIREWORKS) and target side adapter (SXD-FIREWORKS). 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 SX6-FIREWORKS host adapter, the LEDs on both sides should be steady on (indicating Gen3), and the link width is x8.

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.



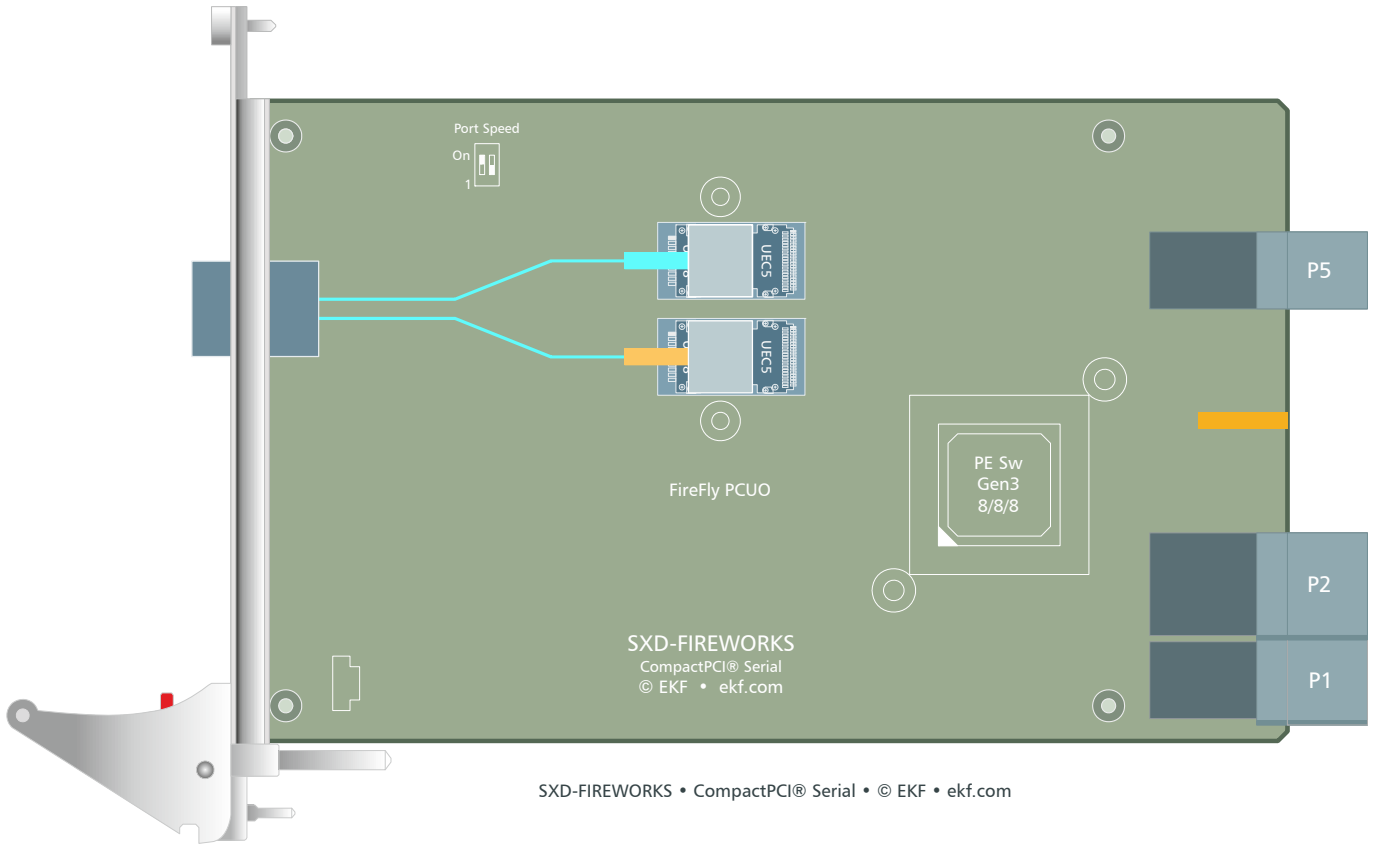
1 - 4: remove board

5 - 8: install board

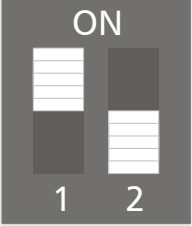
1 & 8: on-board power enabled

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 System 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	1_ USB2+	1_ USB2-	GND	RSV	RSV	GND	1_SAT A TX+	1_SAT A TX-	GND	1_SAT A RX+	1_SAT A RX-
3	1_USB 3 TX+	1_USB 3 TX-	PWR BTN#	1_USB 3 RX+	1_USB 3 RX-	PWR_ FAIL#	SATA SDI	SATA SDO	GND GA2	SATA SCL	SATA SL	GND GA3
2	GND	I2C SCL	I2C SDA	GND	GND PS_ON #	RST#	GND	PRST#	WAKE#	GND	RSV	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 System 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	IO	IO	GND	2_ USB2+	2_ USB2-	GND	3_ USB2+	3_ USB2-	IO	4_ USB2+	4_ USB2-
7	IO	IO	GND	IO	IO	GND	IO	IO	GND	IO	IO	GND
6	GND	2_PE TX06+	2_PE TX06-	GND	2_PE RX06+	2_PE RX06-	GND	2_PE TX07+	2_PE TX07-	GND	2_PE RX07+	2_PE RX07-
5	2_PE TX04+	2_PE TX04-	GND	2_PE RX04+	2_PE RX04-	GND	2_PE TX05+	2_PE TX05-	GND	2_PE RX05+	2_PE RX05-	GND
4	GND	2_PE TX02+	2_PE TX02-	GND	2_PE RX02+	2_PE RX02+	GND	2_PE TX03+	2_PE TX03-	GND	2_PE RX03+	2_PE RX03-
3	2_PE TX00+	2_PE TX00-	GND	2_PE RX00+	2_PERX 00-	GND	2_PE TX01+	2_PE TX01-	GND	2_PE RX01+	2_PE RX01-	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

P5 CompactPCI® Serial System Slot Backplane Connector

P5 CompactPCI® Serial System Slot Backplane Connector												
EKF Part #250.3.1206.20.00 • 72 pos. 12x6, 12mm Width												
P5	A	B	C	D	E	F	G	H	I	J	K	L
6	5_PE	5_PE	5_PE	6_PE	6_PE	6_PE	7_PE	7_PE	7_PE	8_PE	8_PE	8_PE
	CLKE#	CLK+	CLK-	CLKE#	CLK+	CLK-	CLKE#	CLK+	CLK-	CLKE#	CLK+	CLK-
5	1_PE	1_PE	1_PE	2_PE	2_PE	2_PE	3_PE	3_PE	3_PE	4_PE	4_PE	4_PE
	CLK+	CKL-	CLKE#	CLK+	CKL-	CLKE#	CLK+	CKL-	CLKE#	CLK+	CKL-	CLKE#
4	GND	8_PE TX02+	8_PE TX02-	GND	8_PE RX02+	8_PE RX02-	GND	8_PE TX03+	8_PE TX03-	GND	8_PE RX03+	8_PE RX03-
3	8_PE TX00+	8_PE TX00-	GND	8_PE RX00+	8_PE RX00-	GND	8_PE TX01+	8_PE TX01-	GND	8_PE RX01+	8_PE RX01-	GND
2	GND	7_PE TX02+	7_PE TX02-	GND	7_PE RX02+	7_PE RX02-	GND	7_PE TX03+	7_PE TX03-	GND	7_PE RX03+	7_PE RX03-
1	7_PE TX00+	7_PE TX00-	GND	7_PE RX00+	7_PE RX00-	GND	7_PE TX01+	7_PE TX01-	GND	7_PE RX01+	7_PE RX01-	GND

pin positions printed gray: 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

SX6-FIREWORKS	CompactPCI® Serial • Dual PCIe® Optical Cabling x8 • Host Side Adapter www.ekf.de/s/sx6/sx6.html
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Reference Documents

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

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







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