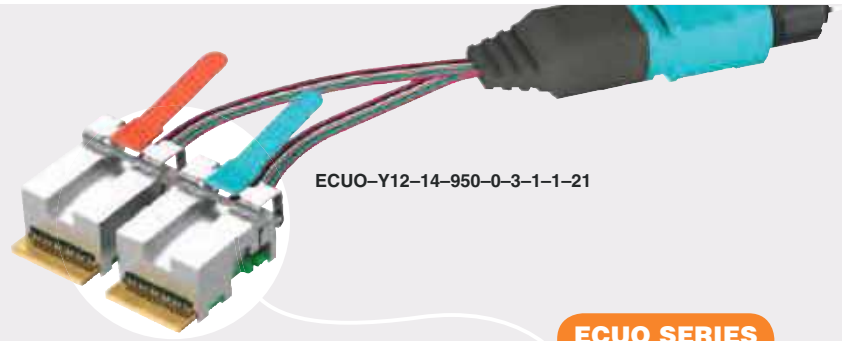


OPTICS

FireFly™ Micro Flyover System™ (ECUO)	200
FireFly™ Extended Temperature Flyover™ System (ETUO)	201
PCIe®-Over-Fiber FireFly™ System (PCUO)	202
Extended Temp PCIe®-Over-Fiber FireFly™ (PTUO)	203
PCIe®-Over-Fiber FireFly™ Adaptor Card (PCOA)	204
Optical Patch Cable & Adaptor (FOPC, OPA)	205
PCIe® Optical System (PCIEO)	206-207
Optical Developmental Kits	208

APPLICATIONS

Optics	26-27
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ECUO-Y12-14-950-0-3-1-1-21

ECUO SERIES

OPTICAL MICRO FLYOVER™ ASSEMBLY

FEATURES

- Standard Temperature range from 0 °C to +70 °C
- Interchangeable with FireFly™ copper using the same micro connector system
- x4 & x12
- 14 Gbps, 16 Gbps, 25 Gbps and 28 Gbps
- Proven 850 nm VCSEL array
- Cost-effective multi-mode fiber
- Integral heat sink
- Angled fiber exit from the housing to minimize keep-out zone on the board
- Bend Radius: 7.5 mm
- Supports data center and HPC protocols, including: Ethernet, InfiniBand™, Fibre Channel, PCIe®. (See firefly@samtec.com)
- Evaluation & development boards available

SPECIFICATIONS

For complete specifications see www.samtec.com?ECUO

Class 1 LASER PRODUCT
per IEC 60825-1 Ed. 2 (2007)

ELECTRICAL SOLUTIONS

- Performance to 28 Gbps
- Easily upgrade to optical with same connector system See ECUO Series.

MTP® is a registered trademark of US Conec Ltd.

Patents:
8588562, 8588561
Additional patents pending

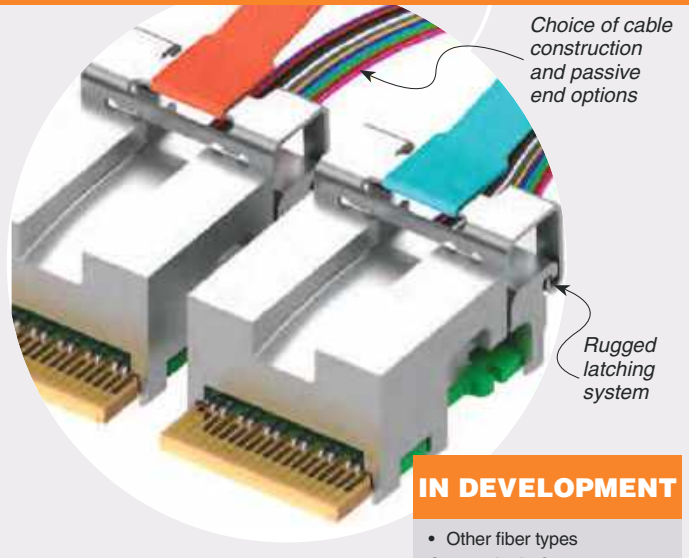
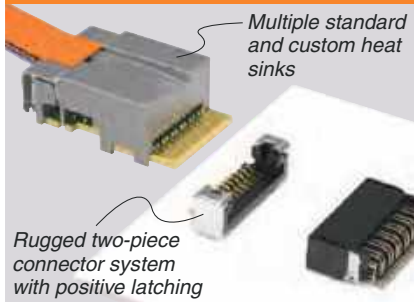
Note:
All FireFly™ designs, specifications and components are preliminary and subject to change without notice.

Mates with:
UEC5, UCC8, OPA

INSERTION TOOL

- CAT-IN-ECUO-02

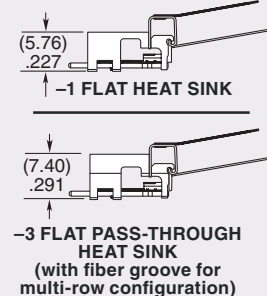
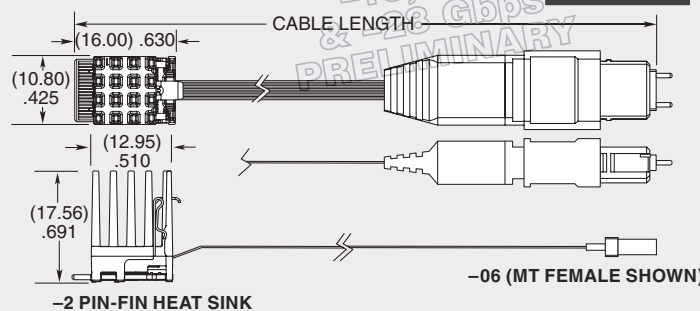
APPLICATION



IN DEVELOPMENT

- Other fiber types
Contact firefly@samtec.com

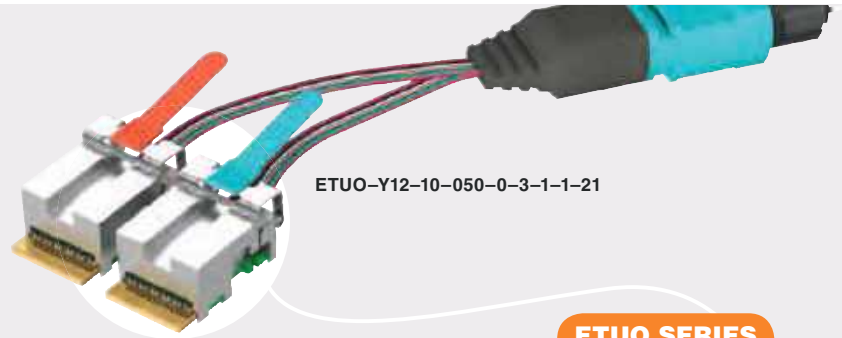
ECUO	WIDTH	DATA RATE	CABLE LENGTH	HEAT SINK	FIBER TYPE	END OPTION
<p>-T12 = x12 Tx Simplex Optical</p> <p>-R12 = x12 Rx Simplex Optical</p> <p>-Y12 = x12 Duplex Optical (Y Configuration)</p> <p>-B04 = x4 Duplex Optical</p>		<p>-14 = 14 Gbps per lane</p> <p>-16 = 16 Gbps per lane (x12 only)</p> <p>-25 = 25 Gbps per lane (x4 only)</p> <p>-28 = 28 Gbps per lane (x4 only)</p>	<p>-“XXX” = Overall Length in Centimeters (011 cm to 999 cm) (Minimum length will depend on fiber type and End 2 option specified.)</p>	<p>-1 = Flat</p> <p>-2 = Pin-fin (-14 & -16 only)</p> <p>-3 = Flat with 3-Ribbon pass-through</p> <p>-4 = PCIe® Pin-fin (-14 & -16 only)</p> <p>-5 = Pin-fin (-28 only)</p>	<p>-1 = OM3 Low Bend Radius Ribbon</p> <p>-2 = OM3 Low Bend Radius Loose Tube</p>	<p>-Y12 requires -2(X) options*</p> <p>-01 = MTP® 12F key down, male</p> <p>-02 = MTP® 12F key down, female</p> <p>-05 = MT 12F male</p> <p>-06 = MT 12F female</p> <p>-21* = MTP 24F key down, male</p> <p>-22* = MTP® 24F key down, female</p> <p>-25* = MT 24F male</p> <p>-26* = MT 24F female</p>



Due to technical progress, all designs, specifications and components are subject to change without notice.

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ETUO-Y12-10-050-0-3-1-1-21

ETUO SERIES

EXTENDED TEMP OPTICAL MICRO FLYOVER™

FEATURES

- Extended temperature range from -40 °C to +85 °C versus standard 0 °C to +70 °C (ECUO Series)
- High-speed performance to 10.3125 Gbps per channel
- x12 simplex, x12 duplex or x4 duplex optical transceiver system
- Demonstrated error-free transmission during applied external vibrations and shock test, to methods specified in MIL-STD-810G
- Integral heat sink provides optimal cooling for thermal operating conditions
- MT & MTP® standard end options (Other options available: MT38999, MTP®, MXC® ARINC 801 and ARIB)
- Micro rugged board level connector system with positive latching, weld tabs and loading guides for secure connection
- Cost-effective OM3 multi-mode fiber
- An angled fiber exit from the housing to minimize keep-out zone on the board

Mates with:
UEC5, UCC8, OPA

INSERTION TOOL

- CAT-IN-ECUO-02

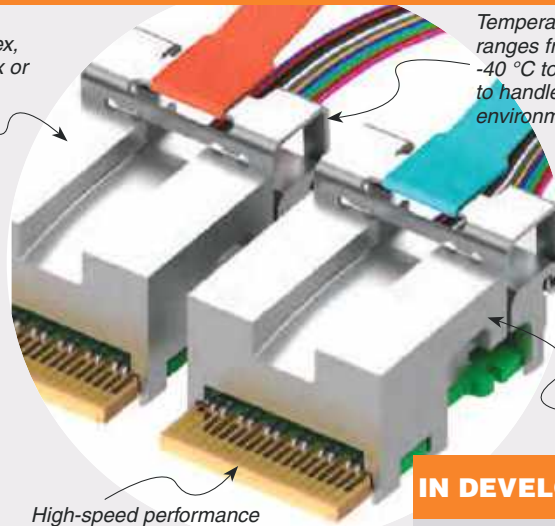
APPLICATION SPECIFIC OPTION



Samtec and Amphenol® Aerospace partner to provide embedded optics for rugged environments.

x12 Simplex,
x12 Duplex or
x4 Duplex

Temperature ranges from -40 °C to +85 °C to handle harsh environments



Integrated heat sinks

High-speed performance to 10.3125 Gbps per channel

IN DEVELOPMENT

- Other fiber types
Contact firefly@samtec.com

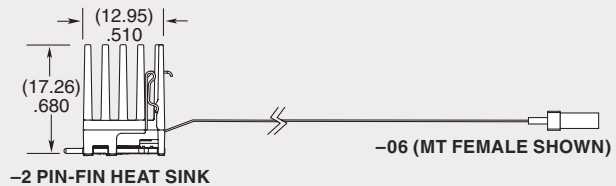
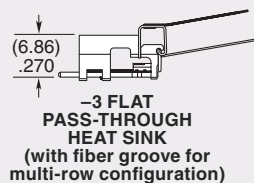
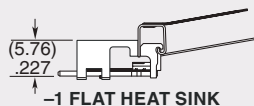
ETUO	TYPE	DATA RATE	CABLE LENGTH	0	HEAT SINK	1	FIBER TYPE	END OPTION
	-T12 = x12 Tx Simplex Optical	-10 = 10.3125 Gbps	-“XXX” = Overall Length in Centimeters (011 cm to 999 cm) (Minimum length will depend on fiber type and End 2 option specified.)		-1 = Flat		-1 = OM3 Low Bend Radius Ribbon	-Y12 requires -2(X) options*
	-R12 = x12 Rx Simplex Optical				-2 = Pin-fin		-2 = OM3 Low Bend Radius Loose Tube	-01 = MTP® 12F key down, male
	-Y12 = x12 Duplex Optical (Y Configuration)				-3 = Flat with 3-Ribbon pass-through			-02 = MTP® 12F key down, female
	-B04 = x4 Duplex Optical				-5 = high-performance Pin-fin			-21* = MTP® 24F key down, male
								-22* = MTP® 24F key down, female
								-05 = MT 12F male
								-25* = MT 24F male
								-06 = MT 12F female
								-26* = MT 24F female

SPECIFICATIONS

For complete specifications see www.samtec.com?ETUO

Class 1 LASER PRODUCT
per IEC 60825-1 Ed. 2 (2007)

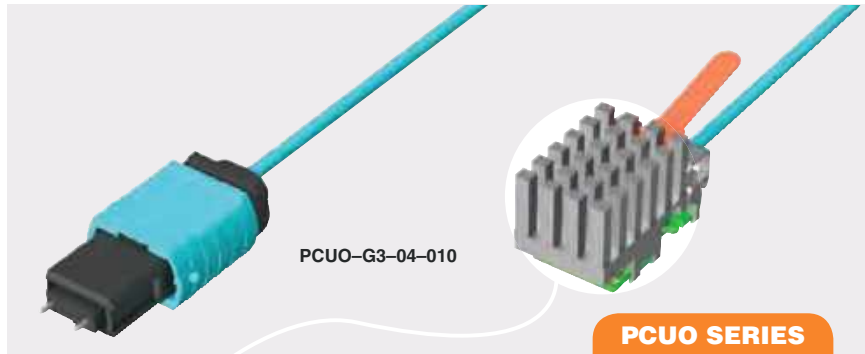
Patents:
8588562, 8588561
Additional patents pending
MTP® & MXC® is a registered trademark of US Conec Ltd.
PCI-SIG®, PCI Express® and the PCIe® design marks are registered trademarks and/or service marks of PCI-SIG.



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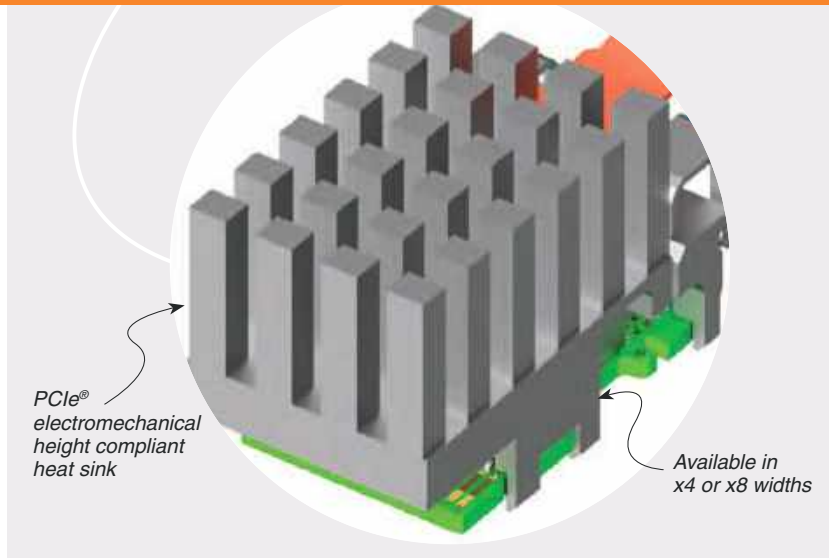


PCIe®-OVER-FIBER OPTICAL FLYOVER™

FEATURES

- PCIe® Gen 3 x4, scalable to x8 and x16 widths
- Duplex auxiliary signals allow both transparent and non-transparent bridging
- High-performance signal quality with BER better than 1E⁻¹²
- Enables links up to 100 m
- Allows nontraditional FPGA/ASIC end points
- Additional heat sink, fiber type and end options available
- Standard temperature range 0 °C to +70 °C; Extended temperature version available (PTUO)
- PCIe® Gen 4 version in development

Mates with:
UEC5, UCC8, OPA



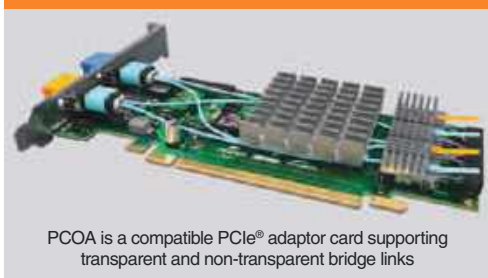
SPECIFICATIONS

For complete specifications see www.samtec.com?PCUO



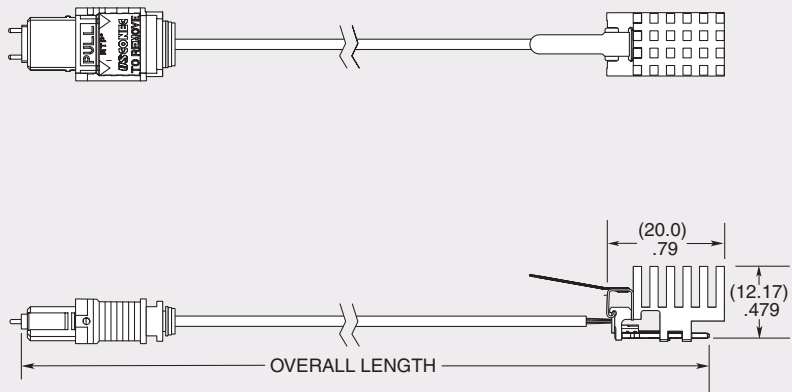
Class 1 LASER PRODUCT
per IEC 60825-1 Ed. 2 (2007)

OTHER SOLUTIONS



PCI-SIG®, PCI Express® and the PCIe® design marks are registered trademarks and/or service marks of PCI-SIG.

Note:
Some lengths, styles and options are non-standard, non-returnable.

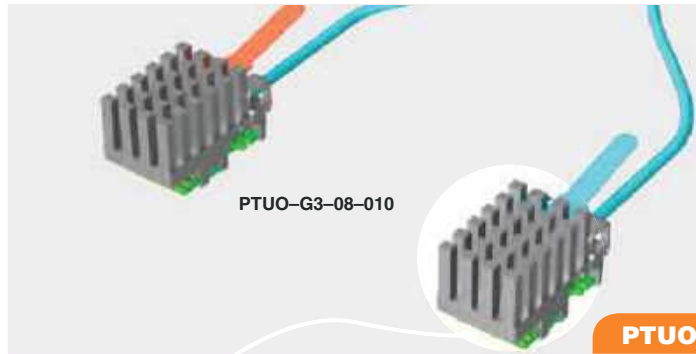


PCUO-G3-04-XXX SHOWN

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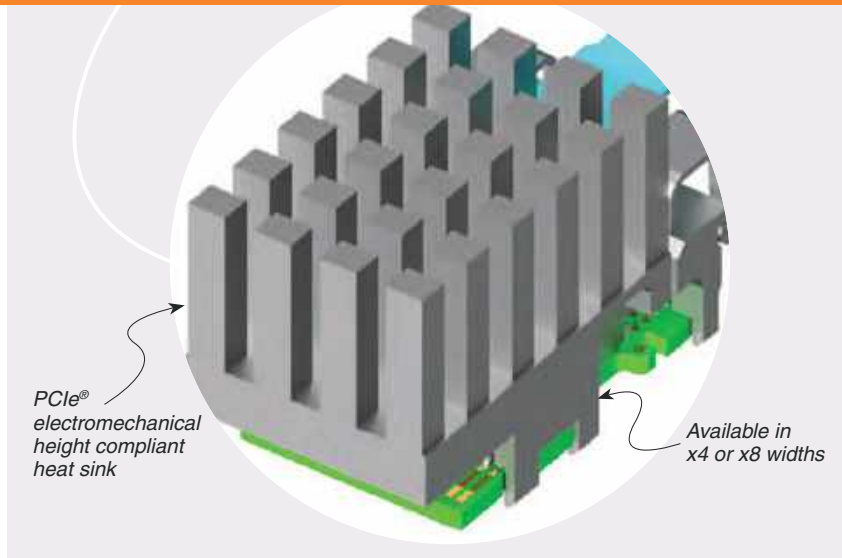
PTUO SERIES

EXTENDED TEMP PCIe®-OVER-FIBER

FEATURES

- Extended temperature range from -40 °C to +85 °C and -5 °C to +85 °C
- PCIe® Gen 3 x4, scalable to x8 and x16 widths
- Duplex auxiliary signals allow both transparent and non-transparent bridging
- High-performance signal quality with BER better than 1E⁻¹²
- Enables links up to 100 m
- Allows nontraditional FPGA/ASIC end points
- Additional heat sink, fiber type and end options available
- PCIe® Gen 4 version in development

Mates with:
UEC5, UCC8, OPA



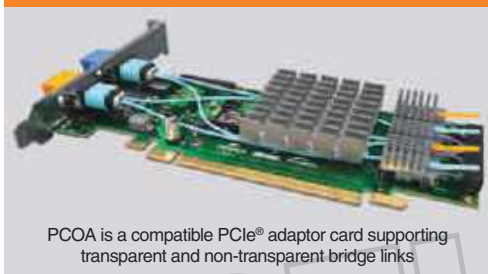
SPECIFICATIONS

For complete specifications see www.samtec.com?PTUO



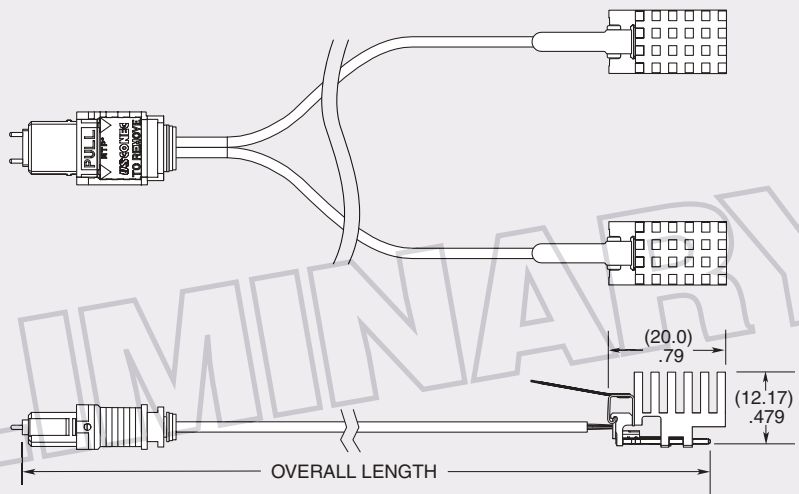
Class 1 LASER PRODUCT
per IEC 60825-1 Ed. 2 (2007)

OTHER SOLUTIONS



PCI-SIG®, PCI Express® and the PCIe® design marks are registered trademarks and/or service marks of PCI-SIG.

Note:
Some lengths, styles and options are non-standard, non-returnable.



PTUO-G3-08-XXX SHOWN

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PCOA-G3-16-01

PCOA SERIES

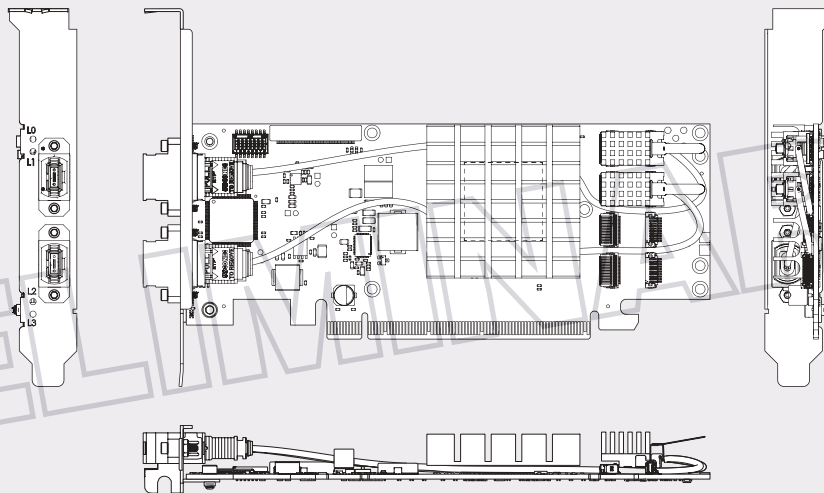
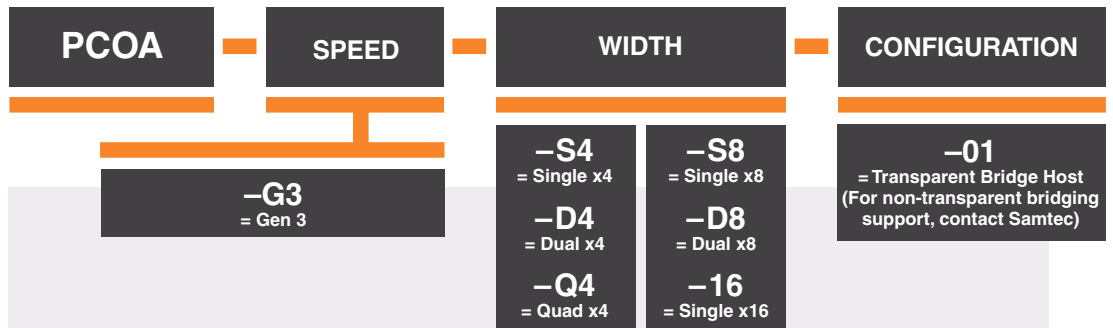
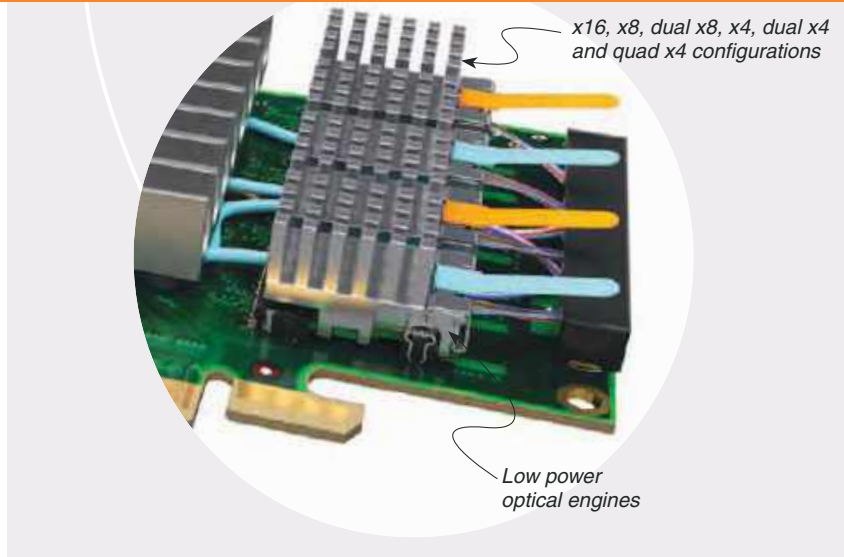
PCIe®-OVER-FIBER ADAPTOR CARD

FEATURES

- Uses PCUO FireFly™ optical cable for clear signal transmissions with increased reach and cost optimization
- Supports PCIe® Gen 3
- PCIe® x16 edge card connector
- Scalable configurations for cost optimized performance
- Transparent or non-transparent bridging for system flexibility and multi-processor support
- Reconfigurable host or target operation
- Gen 4 in development
- Ideal for high-performance and applications requiring robust data transmission

SPECIFICATIONS

For complete specifications see www.samtec.com?PCOA



PCOA-G3-D4-01 SHOWN

Note:
Some sizes, styles and options are non-standard, non-returnable.

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FOPC-02-02-003-12-01

OPA-S-1-F

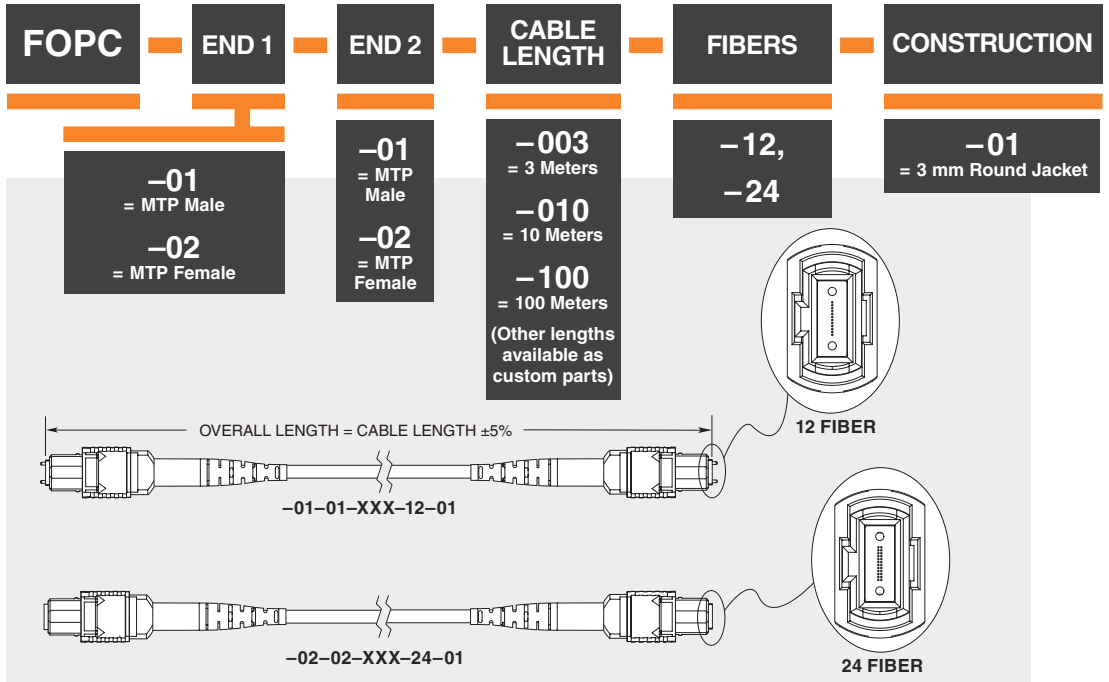
FOPC, OPA SERIES

OPTICAL PATCH CABLE AND ADAPTOR

SPECIFICATIONS

For complete specifications see www.samtec.com?FOPC

Compliant Specifications:
TIA-604-5-D (FOCIS 5)
TIA-568-C.3
IEC-61754-7-1



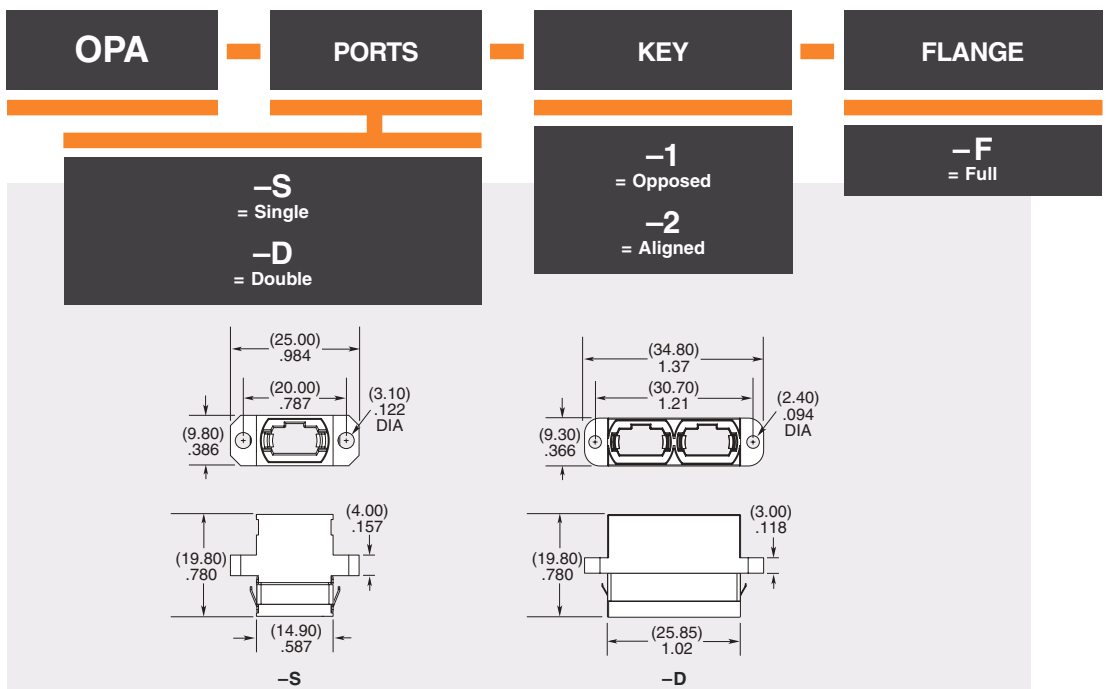
Note: Some lengths, styles and options are non-standard, non-returnable.

SPECIFICATIONS

For complete specifications see www.samtec.com?OPA

Compliant Specifications:
TIA-604-5-D (FOCIS 5)
IEC-61754-7

Recommended Panel Thickness:
(1.75 mm) .069"
(The OPA can be installed with any panel thickness but mounting hardware is needed for any thickness that is not (1.75 mm) .069". Contact the Optics Group at Optics@samtec.com for questions about panel thickness and mounting hardware.)



Note: Some lengths, styles and options are non-standard, non-returnable.

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ACTIVE OPTICAL CABLE ASSEMBLIES

FEATURES

- Drop in replacement for PCIe® electrical cable

SPECIFICATIONS

For complete specifications see www.samtec.com?PCIEO

Fiber Type:

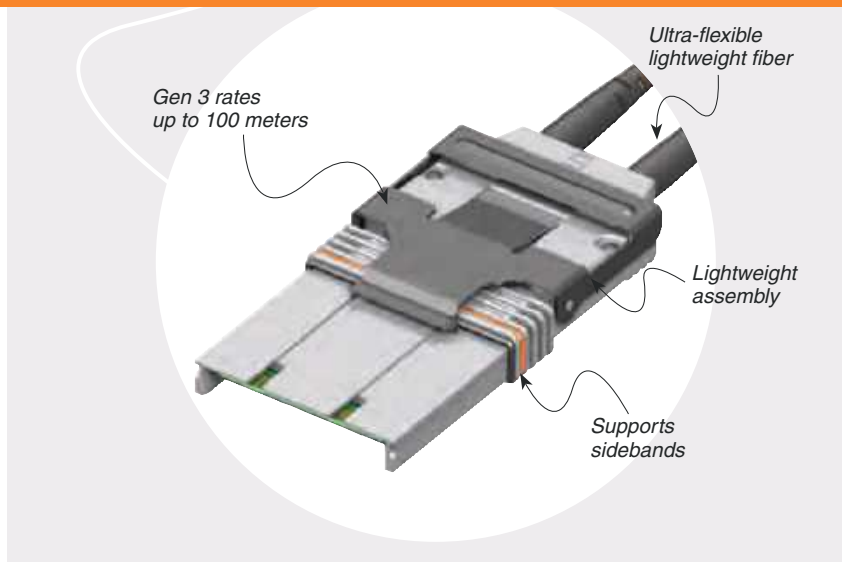
- 1 m to 50 m = OM2
- Over 50 m = OM3
- All Half AOCs = OM3

RECOGNITIONS

For complete scope of recognitions, see www.samtec.com/quality



FILE NO. E357212



PCIEO	DATA RATE	CABLE LENGTH	OPTIONS
<p>Full AOC With Host & Target</p>	<p>-4G3 = x4 PCIe®, GEN 3</p> <p>-8G3 = x8 PCIe®, GEN 3</p> <p>-H8G3 = x4 PCIe® with, x8 PCIe® form factor, GEN 3</p> <p>-4AG3 = x4 PCIe® Host to x8 PCIe® Target, GEN 3</p> <p>-8AG3 = x8 PCIe® Host to x4 PCIe® Target, GEN 3</p>	<p>-000.5 = 500 mm</p> <p>to</p> <p>-100.0 = 100 m</p> <p>Standard lengths</p>	<p>-11 = 100 MHz Clock Frequency (Standard)</p> <p>-12 = 100 MHz Clock Frequency (No Sidebands)</p> <p>-15 = No Clock Output (Standard)</p> <p>-16 = No Clock Output (No Sidebands)</p>

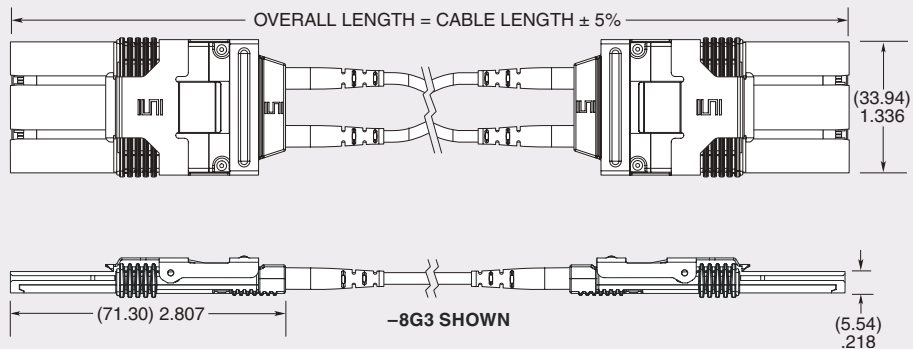
Patents: 7329054, 7824112, 7648287, 7766559, 8098993, additional patents pending

Notes:
Samtec PCIe® over Fiber systems are PCIe® compliant; 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.

PCI-SIG®, PCI Express® and the PCIe® design marks are registered trademarks and/or service marks of PCI-SIG.

MTP is a registered trademark of US Conec Ltd.

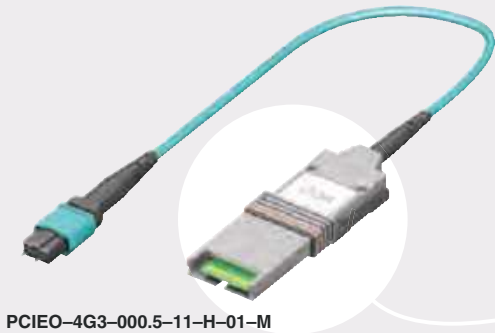
Some sizes, styles and options are non-standard, non-returnable.



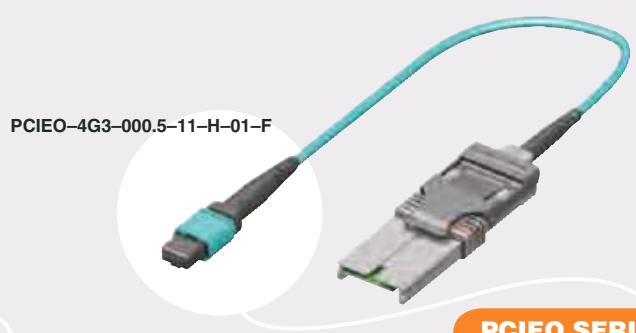
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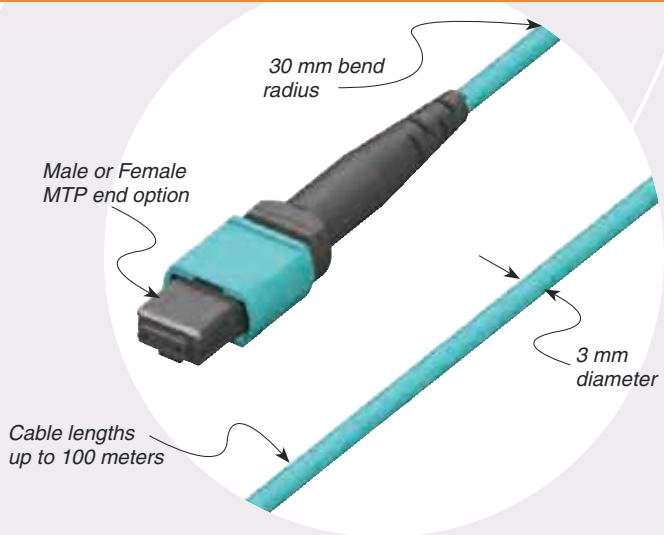
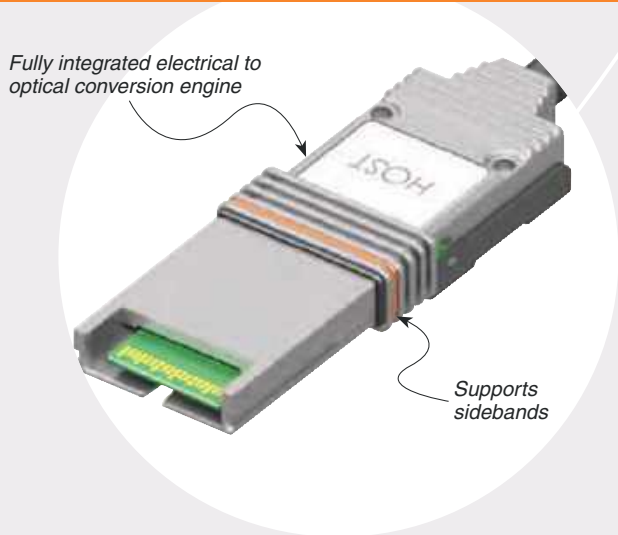


PCIEO-4G3-000.5-11-H-01-M



PCIEO-4G3-000.5-11-H-01-F

PCIEO SERIES



PCIEO	DATA RATE	CABLE LENGTH	OPTIONS	TYPE	END OPTION	GENDER
<p>Half AOC Requires MTP End option</p>	<p>-4G3 = x4 PCIe®, GEN 3</p> <p>-8G3 = x8 PCIe®, GEN 3</p> <p>-H8G3 = x4 PCIe® with, x8 PCIe® form factor, GEN 3</p>	<p>-000.5 = 500 mm</p> <p>to</p> <p>-100.0 = 100 m</p> <p>Standard lengths</p>	<p>-11 = 100 MHz Clock Frequency (Standard)</p> <p>-12 = 100 MHz Clock Frequency (No Sidebands)</p> <p>-15 = No Clock Output (Standard)</p> <p>-16 = No Clock Output (No Sidebands)</p>	<p>Required Callout</p> <p>-H = Host</p> <p>-T = Target</p>	<p>Required Callout</p> <p>-01 = MTP</p>	<p>Required Callout</p> <p>-M = Male</p> <p>-F = Female</p>

Class 1 LASER PRODUCT
per IEC 60825-1 Ed. 2 (2007)

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OPTICAL DEVELOPMENT KITS

TESTING SOLUTIONS

FireFly™ Test Kit (FIK-FIREFLY-XX)

Rated up to 25 Gbps, this kit allows the designer real-time evaluation of an actively running copper or optical FireFly™ system in their lab, with their inputs, via Samtec's Bulls Eye® system.

14 Gbps FireFly™ FMC Development Kit (REF-193429-01)

Samtec's 14 Gbps FireFly™ FMC Module is VITA 57.1 compliant and provides up to 140 Gbps full-duplex bandwidth over 10 channels from an FPGA to an industry-standard multi-mode fiber optic cable.

25/28 Gbps FireFly™ FMC+ Development Kit (REF-200772-XXX-XX-01)

Samtec's 25/28 Gbps FireFly™ FMC+ Module is VITA 57.4 compliant and provides up to 400/448 Gbps full-duplex bandwidth over 16 channels from an FPGA to an industry-standard multi-mode fiber optic cable.

For more information go to
samtec.com/firefly or samtec.com/kits




ACTIVE & PASSIVE OPTICS



FMC+ HSPC Loopback Card (REF-194194-01)

This loopback mezzanine card was based on an elongated version of the VITA 57.4 single width mezzanine card, designed for use with the Xilinx® UltraScale™ + VCU118 Development Board and is included in the VCU118 Development Kit available from Xilinx®.

For more information go to
samtec.com/kits

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