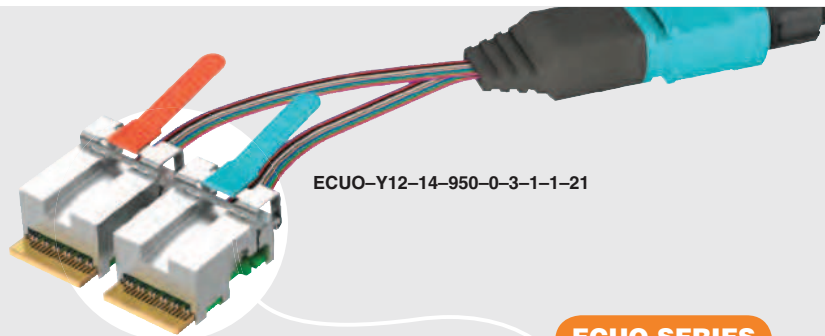


# OPTICS

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## APPLICATIONS

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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](http://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

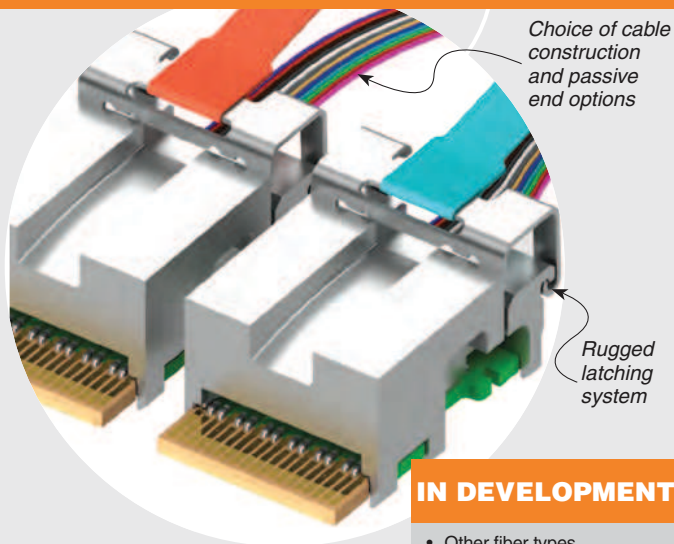
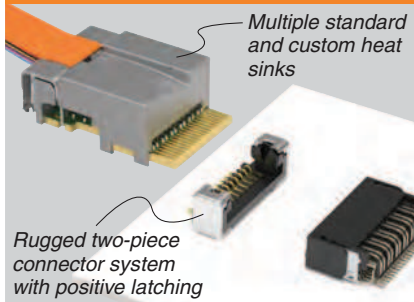
**Note:**  
All FireFly™ designs, specifications and components are preliminary and subject to change without notice.

**Mates with:**  
UEC5, UCC8, OPA

## INSERTION TOOL

- CAT-IN-ECUO-02

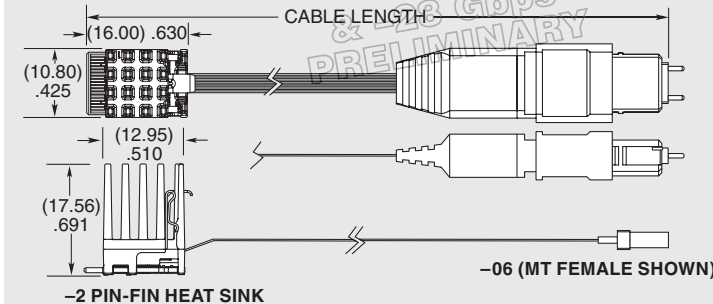
## APPLICATION



## IN DEVELOPMENT

- Other fiber types
- Contact [firefly@samtec.com](mailto:firefly@samtec.com)

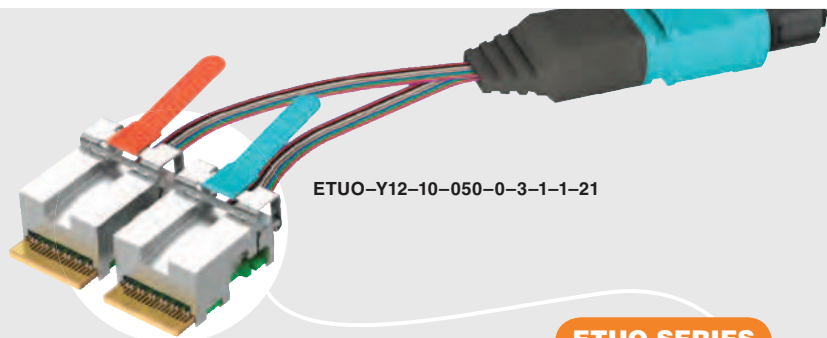
ECUO	WIDTH	DATA RATE	CABLE LENGTH	0	HEAT SINK	1	FIBER TYPE	END OPTION
<div>-T12 = x12 Tx Simplex Optical</div> <div>-R12 = x12 Rx Simplex Optical</div> <div>-Y12 = x12 Duplex Optical (Y Configuration)</div> <div>-B04 = x4 Duplex Optical</div>		<div>-14 = 14 Gbps per lane</div> <div>-16 = 16 Gbps per lane (x12 only)</div> <div>-25 = 25 Gbps per lane (x4 only)</div> <div>-28 = 28 Gbps per lane (x4 only)</div>	<div>-“XXX” = Overall Length in Centimeters (011 cm to 999 cm) (Minimum length will depend on fiber type and End 2 option specified.)</div>	<div>-1 = Flat</div> <div>-2 = Pin-fin (-14 &amp; -16 only)</div> <div>-3 = Flat with 3-Ribbon pass- through</div> <div>-4 = PCIe® Pin-fin (-14 &amp; -16 only)</div> <div>-5 = Pin-fin (-28 only)</div>	<div>-1 = OM3 Low Bend Radius Ribbon</div> <div>-2 = OM3 Low Bend Radius Loose Tube</div>	<div>-Y12 requires -2(X) options*</div> <div>-01 = MTP® 12F key down, male</div> <div>-02 = MTP® 12F key down, female</div> <div>-05 = MT 12F male</div> <div>-06 = MT 12F female</div>	<div>-21* = MTP 24F key down, male</div> <div>-22* = MTP® 24F key down, female</div> <div>-25* = MT 24F male</div> <div>-26* = MT 24F female</div>	



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

[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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Customer specific requirements must be approved by Samtec and identified in a Samtec customer-specific drawing to apply.



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

ETUO SERIES

# EXTENDED TEMP OPTICAL MICRO FLYOVER™

## FEATURES

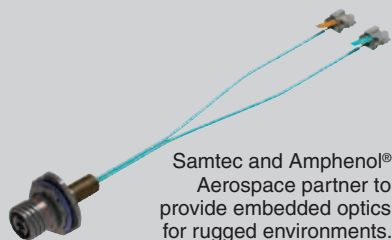
- Extended temperature range from -40 °C to +85 °C versus standard 0 °C to +70 °C (ECUO Series)
- High-speed performance to 10.3125 Gbps per channel
- x12 simplex, x12 duplex or x4 duplex optical transceiver system
- Demonstrated error-free transmission during applied external vibrations and shock test, 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



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

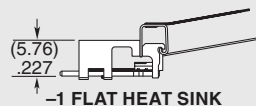
ETUO	TYPE	DATA RATE	CABLE LENGTH	HEAT SINK	FIBER TYPE	END OPTION
	<b>-T12</b> = x12 Tx Simplex Optical  <b>-R12</b> = x12 Rx Simplex Optical  <b>-Y12</b> = x12 Duplex Optical (Y Configuration)  <b>-B04</b> = x4 Duplex Optical	<b>-10</b> = 10.3125 Gbps	<b>-“XXX”</b> = Overall Length in Centimeters (011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

## SPECIFICATIONS

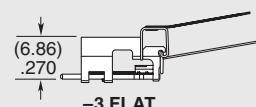
For complete specifications  
see [www.samtec.com?ETUO](http://www.samtec.com?ETUO)

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

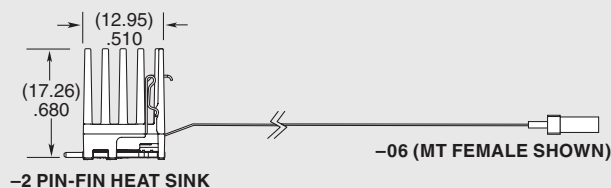
**Patents:**  
8588562, 8588561  
Additional patents pending  
MTP® & MXC® is a registered  
trademark of US Conec Ltd.  
PCI-SIG®, PCI Express® and  
the PCIe® design marks are  
registered trademarks and/or  
service marks of PCI-SIG.



-1 FLAT HEAT SINK



-3 FLAT  
PASS-THROUGH  
HEAT SINK  
(with fiber groove for  
multi-row configuration)

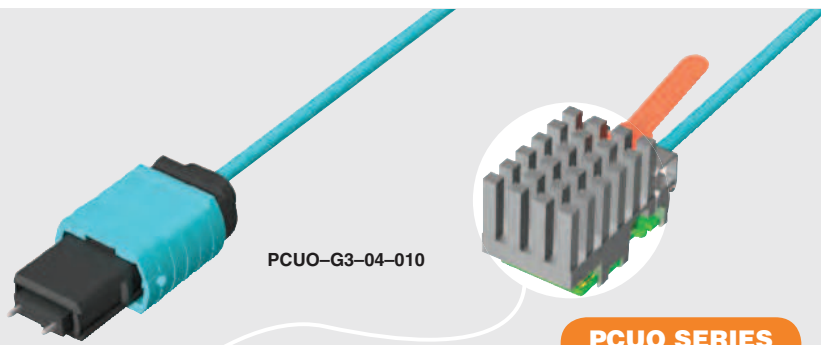


-2 PIN-FIN HEAT SINK

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[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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PCUO SERIES

# 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

PCIe®  
electromechanical  
height compliant  
heat sink

Available in  
x4 or x8 widths

## SPECIFICATIONS

For complete specifications  
see [www.samtec.com?PCUO](http://www.samtec.com?PCUO)

PCUO

SPEED

WIDTH

CABLE  
LENGTH

—G3  
= Gen 3 Speed

—04  
= x4 PCIe® Gen 3  
  
—08  
= x8 PCIe® Gen 3

—“XXX”  
= Overall Length  
in Centimeters  
(10 cm Min)

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

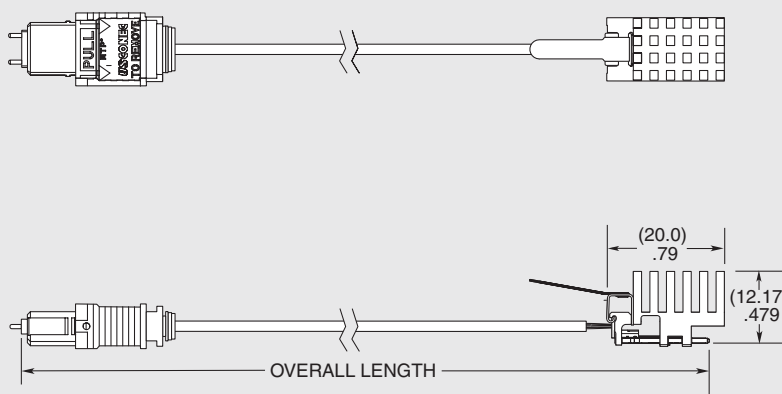
## OTHER SOLUTIONS



PCOA is a compatible PCIe® adaptor card supporting  
transparent and non-transparent bridge links

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

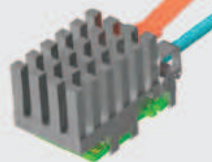
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[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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PTUO-G3-08-010



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<sup>-12</sup>
- 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

PCIe®  
electromechanical  
height compliant  
heat sink

Available in  
x4 or x8 widths

## SPECIFICATIONS

For complete specifications  
see [www.samtec.com?PTUO](http://www.samtec.com?PTUO)

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

## OTHER SOLUTIONS



PCOA is a compatible PCIe® adaptor card supporting transparent and non-transparent bridge links

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

SPEED

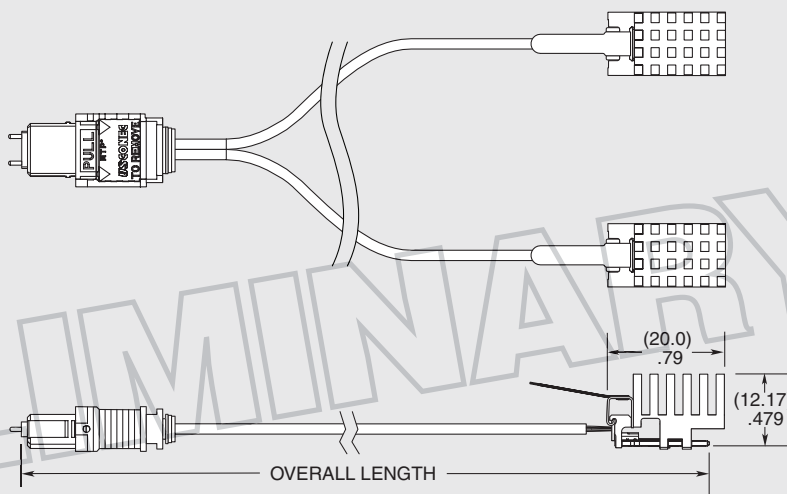
WIDTH

CABLE  
LENGTH

**-G3**  
= Gen 3 Speed

**-04**  
= x4 PCIe® Gen 3  
**-08**  
= x8 PCIe® Gen 3

**-“XXX”**  
= Overall Length  
in Centimeters  
(10 cm Min)



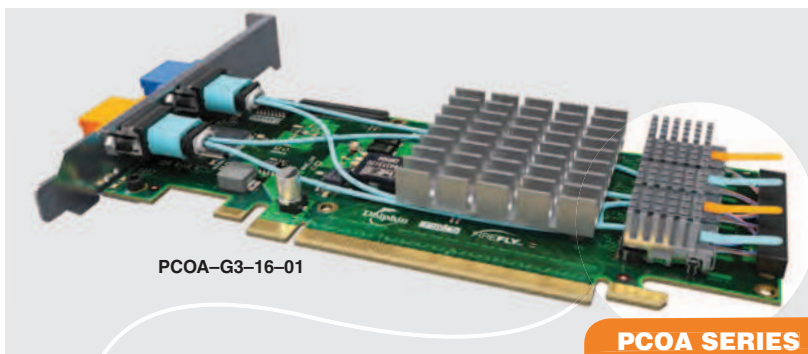
PTUO-G3-08-XXX SHOWN

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[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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PCOA SERIES

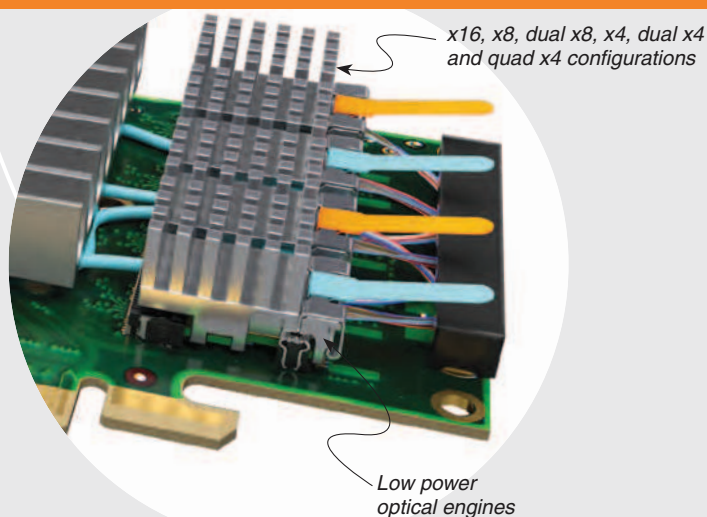
# PCIe®-OVER-FIBER ADAPTOR CARD

## 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](http://www.samtec.com?PCOA)



PCOA

SPEED

WIDTH

CONFIGURATION

–G3  
= Gen 3

–S4

= Single x4

–D4

= Dual x4

–Q4

= Quad x4

–S8

= Single x8

–D8

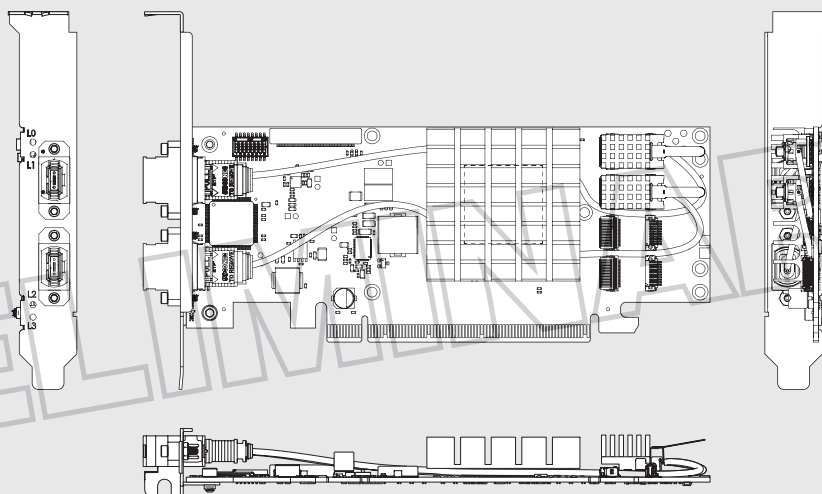
= Dual x8

–16

= Single x16

–01

= Transparent Bridge Host  
(For non-transparent bridging support, contact Samtec)



PCOA-G3-D4-01 SHOWN

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

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

[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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FOPC-02-02-003-12-01

OPA-S-1-F

## FOPC, OPA SERIES

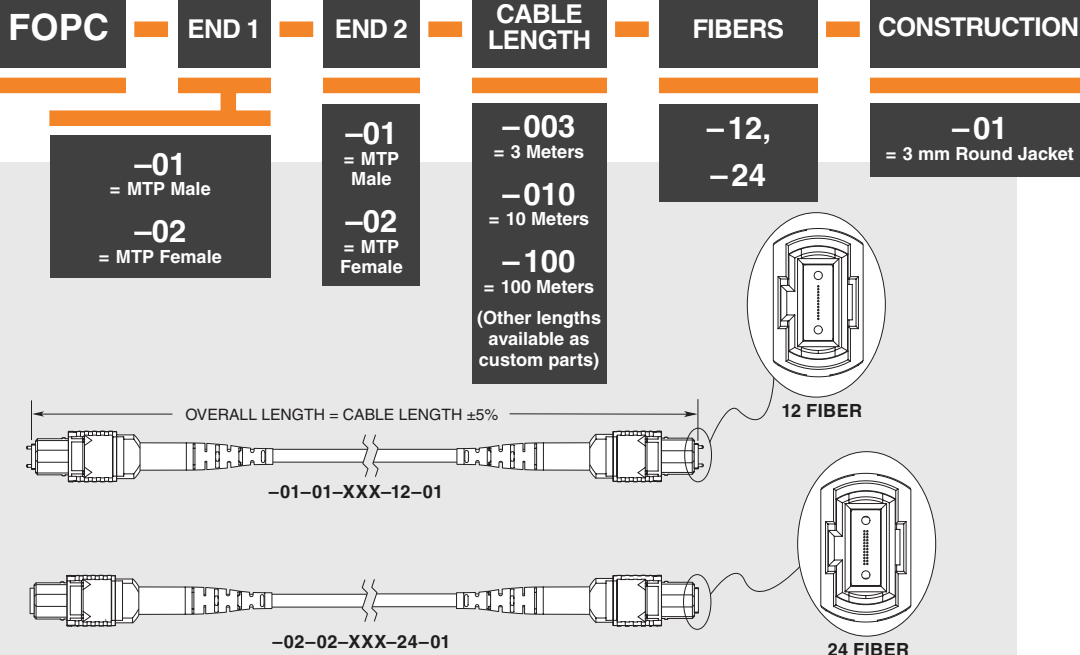
# OPTICAL PATCH CABLE AND ADAPTOR

## SPECIFICATIONS

For complete specifications see [www.samtec.com?FOPC](http://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.



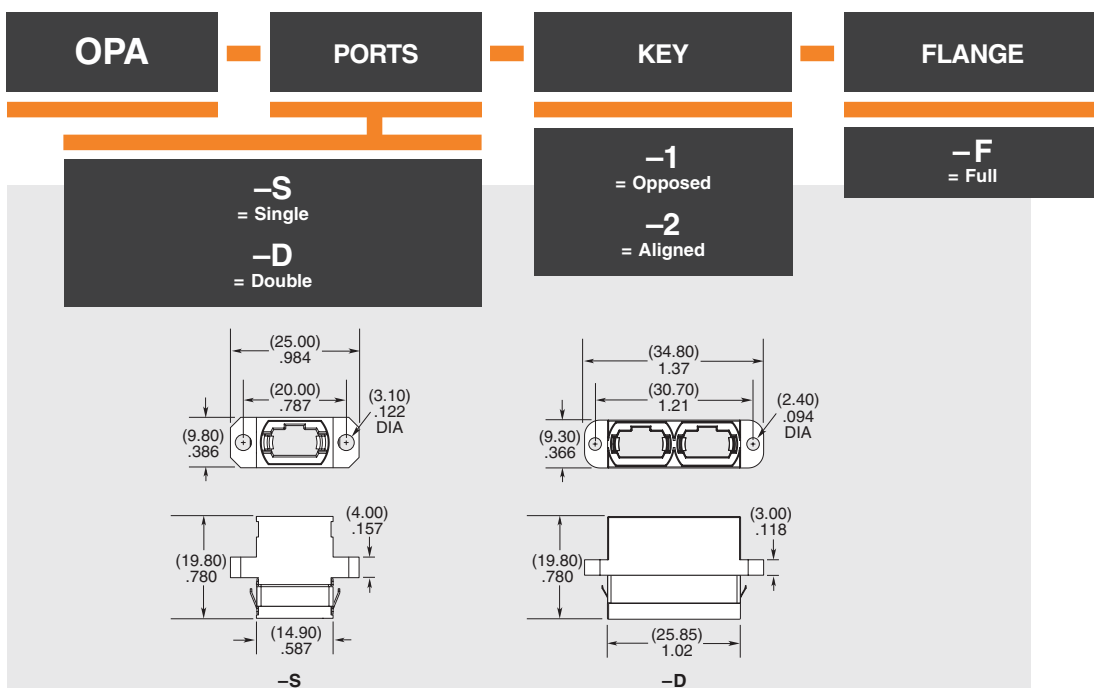
## SPECIFICATIONS

For complete specifications see [www.samtec.com?OPA](http://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](mailto: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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[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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# ACTIVE OPTICAL CABLE ASSEMBLIES

## FEATURES

- Drop in replacement for PCIe® electrical cable

## SPECIFICATIONS

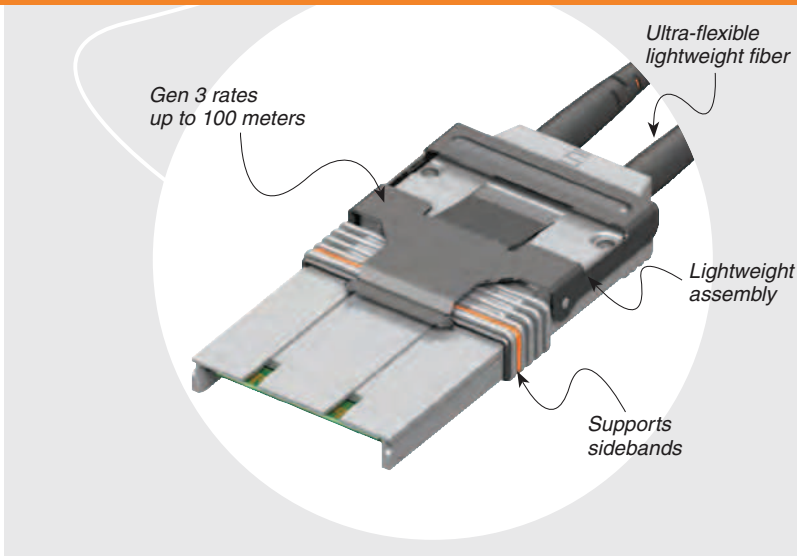
For complete specifications see [www.samtec.com?PCIEO](http://www.samtec.com?PCIEO)

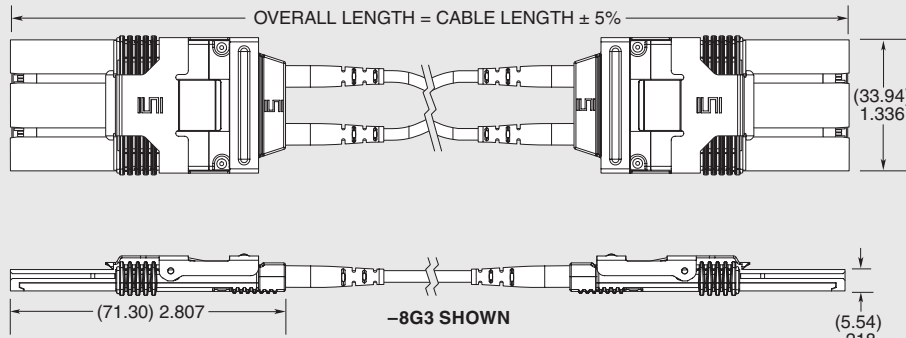
### Fiber Type:

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](http://www.samtec.com/quality)



PCIEO	DATA RATE	CABLE LENGTH	OPTIONS
<b>Full AOC</b> With Host & Target	<b>-4G3</b> = x4 PCIe®, GEN 3  <b>-8G3</b> = x8 PCIe®, GEN 3  <b>-H8G3</b> = x4 PCIe® with, x8 PCIe® form factor, GEN 3  <b>-4AG3</b> = x4 PCIe® Host to x8 PCIe® Target, GEN 3  <b>-8AG3</b> = x8 PCIe® Host to x4 PCIe® Target, GEN 3	<b>-000.5</b> = 500 mm to <b>-100.0</b> = 100 m Standard lengths	<b>-11</b> = 100 MHz Clock Frequency (Standard)  <b>-12</b> = 100 MHz Clock Frequency (No Sidebands)  <b>-15</b> = No Clock Output (Standard)  <b>-16</b> = No Clock Output (No Sidebands)
 <p>OVERALL LENGTH = CABLE LENGTH ± 5%</p> <p>(71.30) 2.807</p> <p>(33.94) 1.336</p> <p>(5.54) .218</p> <p>-8G3 SHOWN</p>			

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[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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

### Notes:

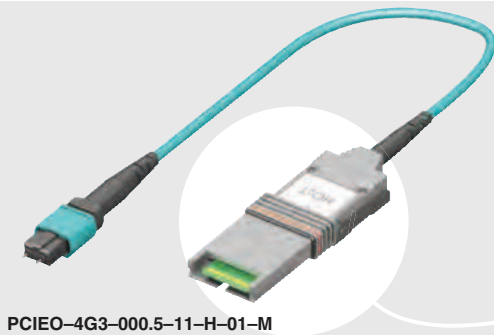
Samtec PCIe® over Fiber systems are PCIe® compliant; however as with all PCIe® based systems, there is a risk of interoperability issues with specific systems. Samtec recommends discussing your system with our Optical Group prior to final design. Please contact [pcie@samtec.com](mailto:pcie@samtec.com).

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.

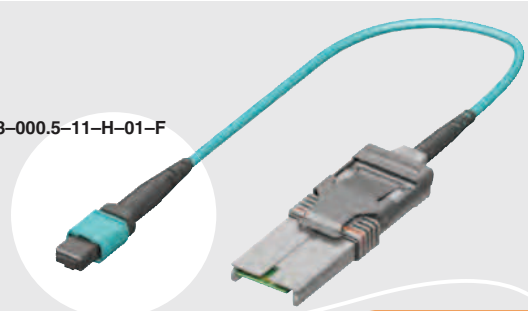
Some sizes, styles and options are non-standard, non-returnable.





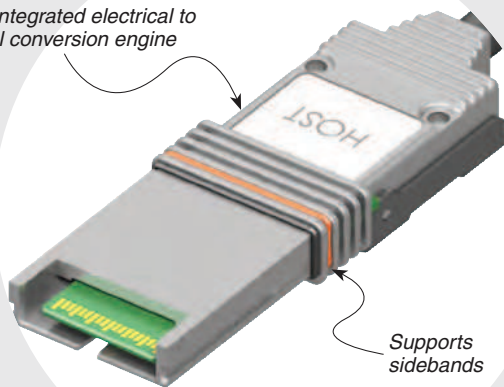
PCIEO-4G3-000.5-11-H-01-M

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



## PCIEO SERIES

Fully integrated electrical to optical conversion engine



Supports sidebands

Male or Female MTP end option

Cable lengths up to 100 meters

30 mm bend radius

3 mm diameter

PCIEO	DATA RATE	CABLE LENGTH	OPTIONS	TYPE	END OPTION	GENDER
Half AOC Requires MTP End option	<b>-4G3</b> = x4 PCIe®, GEN 3  <b>-8G3</b> = x8 PCIe®, GEN 3  <b>-H8G3</b> = x4 PCIe® with, x8 PCIe® form factor, GEN 3	<b>-000.5</b> = 500 mm to <b>-100.0</b> = 100 m Standard lengths	<b>-11</b> = 100 MHz Clock Frequency (Standard)  <b>-12</b> = 100 MHz Clock Frequency (No Sidebands)  <b>-15</b> = No Clock Output (Standard)  <b>-16</b> = No Clock Output (No Sidebands)	Required Callout  <b>-H</b> = Host  <b>-T</b> = Target	Required Callout  <b>-01</b> = MTP	Required Callout  <b>-M</b> = Male  <b>-F</b> = Female
<p>OVERALL LENGTH = CABLE LENGTH ± 5%</p> <p>(21.94) .864</p> <p>(7.60) .299</p> <p>(12.39) .488</p> <p><b>-4G3</b></p> <p><b>-01-M</b></p>						

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

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[WWW.SAMTEC.COM](http://WWW.SAMTEC.COM)

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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.

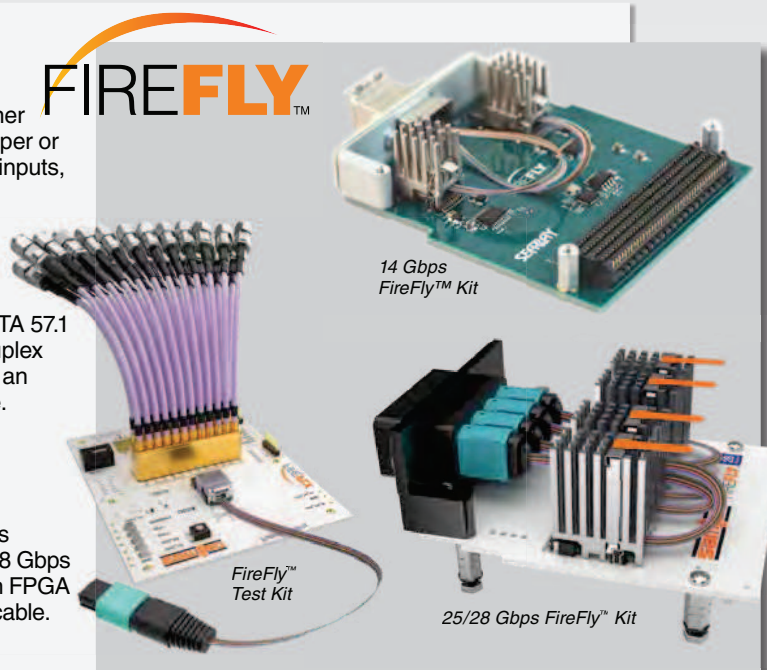
### **14 Gbps FireFly™ FMC Development Kit** (REF-193429-01)

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.

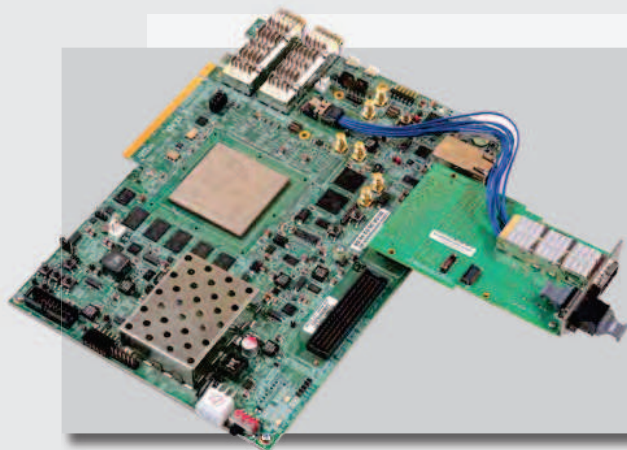
### **25/28 Gbps FireFly™ FMC+ Development Kit** (REF-200772-XXX-XX-01)

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](http://samtec.com/firefly) or [samtec.com/kits](http://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](http://samtec.com/kits)

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

**WWW.SAMTEC.COM**

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