



Pluggable Input / Output Solutions

RoHS
Ready 

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RoHS Compliant — Part numbers in this catalog are RoHS Compliant, unless marked otherwise. These products comply with European Union Directive 2002/95/EC as amended 1 January 2006 that restricts the use of lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE in certain electrical and electronic products sold into the EU as of 1 July 2006.

NOTE: For purposes of this Catalog, included within the definition of RoHS Compliant are products that are clearly "Out of Scope" of the RoHS Directive such as hand tools and other non-electrical accessories.

NOTE: Information regarding RoHS compliance is provided based on reasonable inquiry of our suppliers and represents our current actual knowledge based on the information provided by our suppliers. This information is subject to change. For latest compliance status, refer to our website referenced at right.

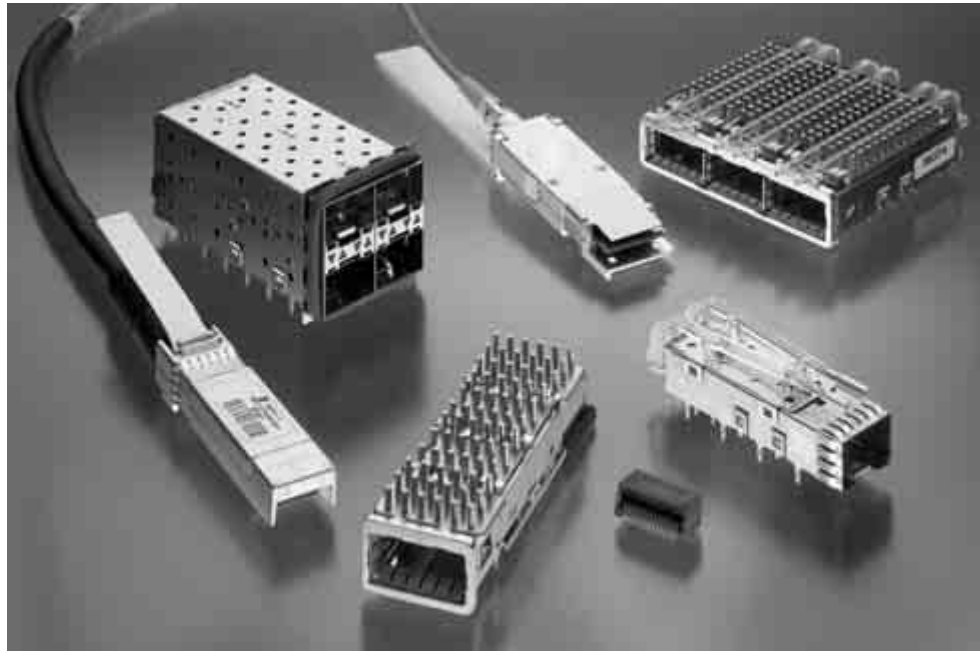
Getting the Information You Need

Our comprehensive on-line RoHS Customer Support Center provides a forum to answer your questions and support your RoHS needs. A RoHS FAQ (Frequently Asked Questions) is available with links to more detailed information. You can also submit RoHS questions and receive a response within 24 hours during a normal work week. The Support Center also provides:

- Cross-Reference from Non-compliant to Compliant Products
- Ability to browse RoHS Compliant Products in our on-line catalog
- Downloadable Technical Data Customer Information Presentation
- More detailed information regarding the definitions used above
- So whatever your questions when it comes to RoHS, we've got the answers at www.tycoelectronics.com/leadfree

RoHS
Customer
Support
Center 

Introduction



The pluggable I/O interface offers significant advantages as a high speed I/O interconnect. With a standard equipment I/O interface and the flexibility of pluggable modules come the options for fiber and copper links, and various data rates and protocols.

Tyco Electronics has always been a leader in the development of pluggable I/O standards. Tyco Electronics continues to be engaged in new pluggable interface standards to support the rapidly changing market needs for higher bandwidth, and remains an industry leader with the technical expertise required to deliver superior designs for signal integrity and EMI at higher data rates.

Tyco Electronics offers a complete SFP product line, including single port and higher density multi-port SFP cages in single row and stacked configurations. As the market's demand for increased functionality and higher data rates continued to grow, Tyco Electronics introduced new options, including integrated light-pipes for port indicators, connectors with improved signal integrity, enhanced EMI springs for increased EMI suppression, and patented riding heat sink technology for thermal management.

As data rates reached 10 Gigabits per second, Tyco Electronics took an active role in developing the 10 Gigabit Serial (XFP)

standard and the X2 MSA, the XAUI-based 10 Gigabit solution. Increased protocol speeds led to the development of the SFP+ interface, which extends the SFP form factor to support applications to 10 Gb/s, such as 8G Fibre Channel and 10G Ethernet. Enhanced EMI springs and elastomeric gaskets are used to address EMI containment at the higher data rates.

To address market needs for greater density in a high speed pluggable solution, the QSFP (Quad Small-Form Factor Pluggable) interface was developed, providing a 4-channel 40Gb/s pluggable interface. Key demonstrated technologies from XFP were adopted in this design.

Fibre Channel is a trademark of the Fibre Channel Industry Association.

XAUI is a trademark of the 10Gigabit Ethernet Alliance XAUI Interoperability Group.

For a full overview of Tyco Electronics' pluggable interfaces with data sheets and part search capability, visit www.tycoelectronics.com/products/pluggableIO

Introduction (Continued)

Applications for Pluggable I/O Interfaces

Application	Data Rate	Pluggable Interface						
		SFP	XFP	X2	XPAK Standard	Xenpak Standard	SFP+	QSFP
Fibre Channel	1G	X						
	2G	X						
	4G	X					X	
	8G						X	
Ethernet	1G	X						
	10G		X	X	X	X	X	X
	40G							X
InfiniBand Standard	2.5G	X						
	5G	X					X	
	10G				X		X	
	20G							X
	40G							X

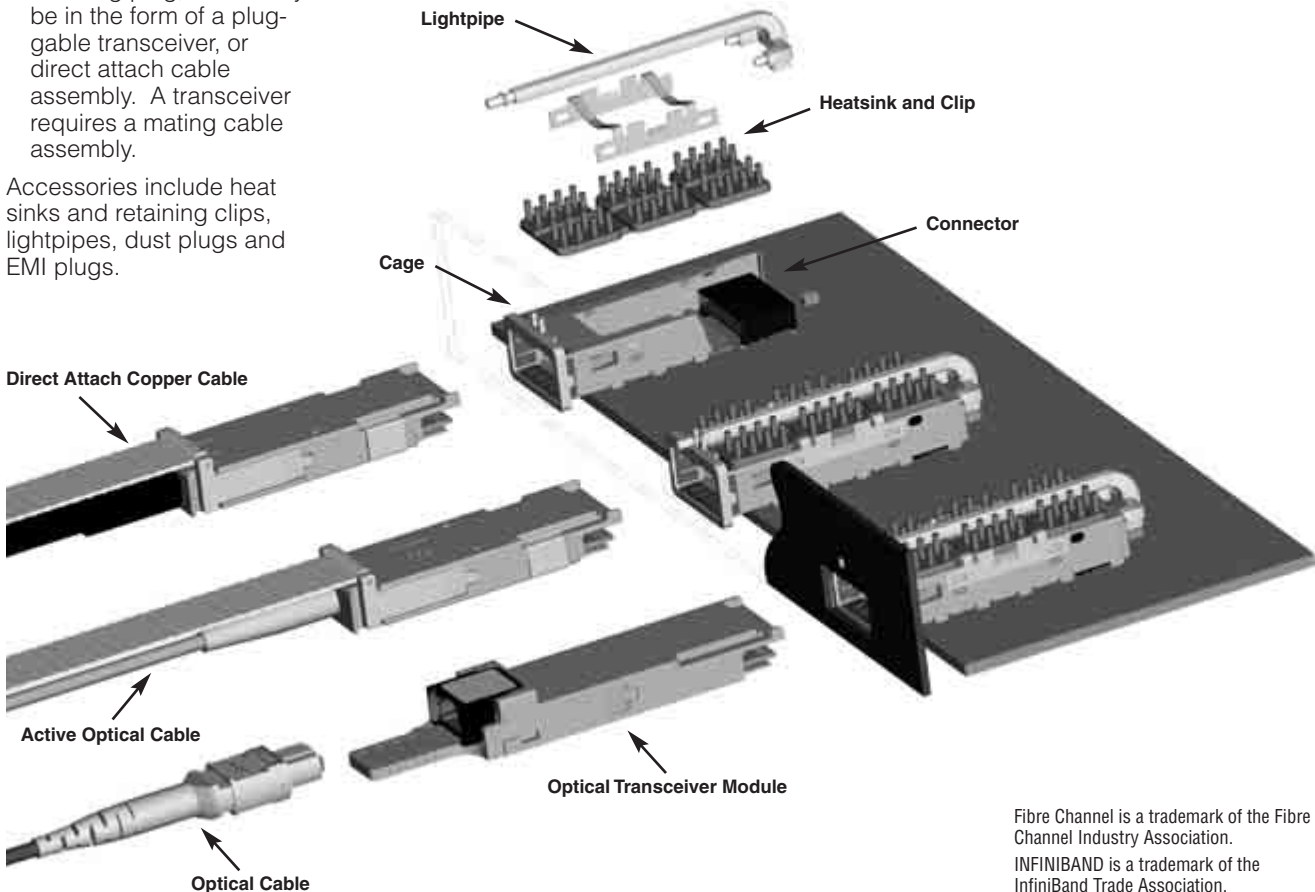
Components of a pluggable I/O interface

A pluggable interface consists of:

- a board-mount connector
- a cage or guide rail which provides EMI containment and guidance for the mating plug
- a mating plug, which may be in the form of a pluggable transceiver, or direct attach cable assembly. A transceiver requires a mating cable assembly.

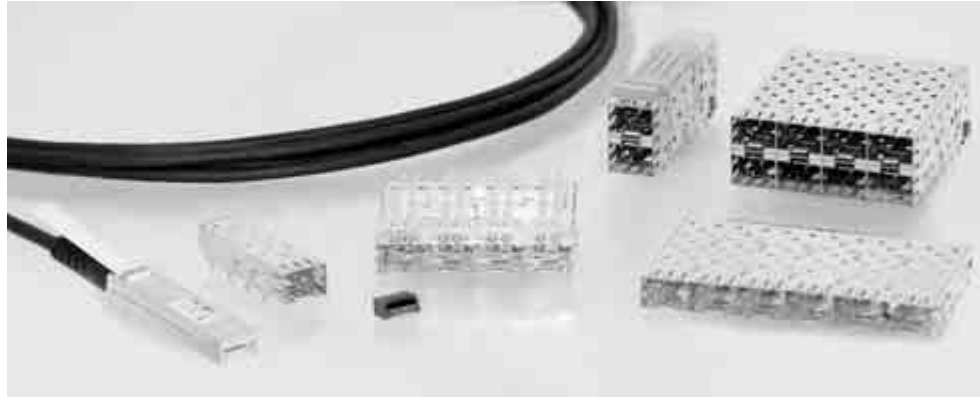
Accessories include heat sinks and retaining clips, lightpipes, dust plugs and EMI plugs.

Illustration below shows a QSFP application:



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SFP (Small Form-factor Pluggable) Products



As a founding member and innovator for the Small Form-factor Pluggable (SFP) Multi-Source Agreement (MSA), Tyco Electronics supports the market with a full range of SFP products.

From the original 20 position pluggable transceiver (PT) connector and single port cage, the product has expanded rapidly to include many other options to increase functionality.

Lightpipes:

Tyco Electronics provides a complete line of lightpipes for single cages, ganged (single row), and stacked (double row) SFP products.

Enhanced EMI fingers:

As the data rates using the SFP form factor increase, the need for increased EMI suppression becomes imperative. Addressing both cabinet and module-generated noise, tests suggest Tyco Electronics'

enhanced EMI fingers on the SFP cages can potentially add up to 20dB of margin.

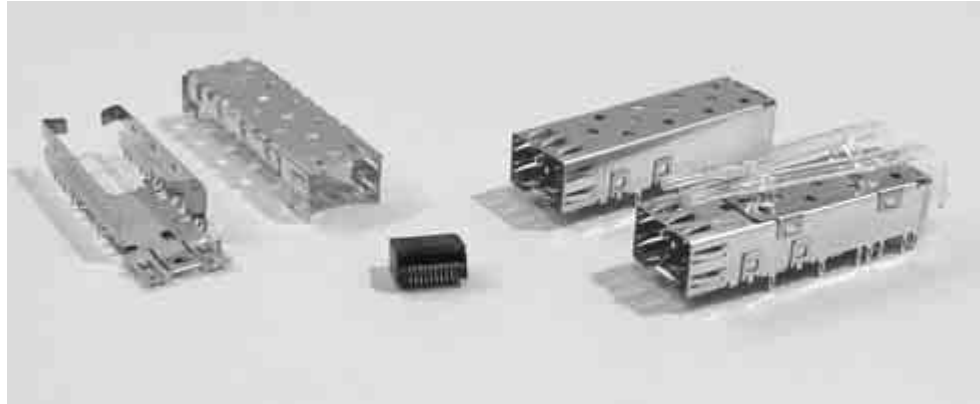
Riding Heat Sinks:

Tyco Electronics addresses the need for increased thermal dissipation by incorporating patented riding heat sink technology. The riding heat sinks use direct contact to the pluggable module to draw heat away from its source.

SFP Single Port Cages and Connectors

Product Facts

- Full metal shield for grounding and EMI suppression
- Solder and Press Fit cage configurations available
- Single piece and two piece cages available
- Used in conjunction with 20 pin SMT SFP Connector
- Hot Swappable
- Compatible with SFP MSA Compliant Modules
- UL/CSA Report File E28476



Tyco Electronics offers various termination options for SFP cages, including press-fit, wave solder and IR reflow compatible with tape and reel packaging. The connector is a reliable

20 position interface offered in 0.38 μm (15 μinch) and 0.76 μm (30 μinch) gold plating thicknesses. The connector is packaged in tape and reel for pick and place SMT application.

The cage material is a copper alloy with nickel subplate and a matte tin finish.

Technical Documents

Instruction Sheet

408-8495 SFP Connector and Cage Assembly

Application Specification

114-13017 SFP Connector and 2-piece Cage Assembly
 114-13120 SFP Connector and Press Fit Cage Assy

Product Specifications

108-1949 SFP Connector
 108-1950 SFP Cage

SFP Standard

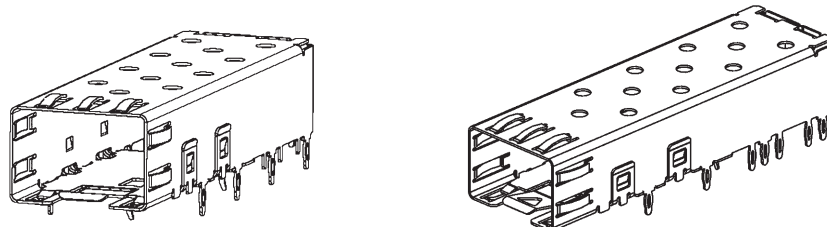
SFF Document INF-8074

Cages

Part Number	Description	Belly-to-Belly Applications
6367034-1	SFP Cage Bottom (Reflow Solder)	Yes
6367035-1	SFP Cage Top	Yes
1489669-1	Press Fit, 8 Pins	Yes
1489779-1	Press Fit, 20 Pins	No
1489962-1	Reflow or Wave Solder, 3.55 mm Tail	No
1489962-3	Reflow or Wave Solder, 1.8 mm Tail	No
1367629-1	Press Fit w/ Lightpipes	No

Connectors and Dust Plugs

Part Number	Description
1367073-1	20 pin, surface mount connector; 0.38 μm (15 μinch) gold plating
1367073-2	20 pin, surface mount connector; 0.76 μm (30 μinch) gold plating
1658197-1	20 pin, surface mount connector; 0.76 μm (30 μinch) gold plating with contact surface treatment
1888247-1	20 pin, surface mount connector; 0.76 μm (30 μinch) higher speed SFP+ compliant
1888247-2	20 pin, surface mount connector; 0.38 μm (15 μinch) higher speed SFP+ compliant
1367147-1	SFP Dust Cap with AMP product logo
1367147-3	SFP Dust Cap without AMP product logo



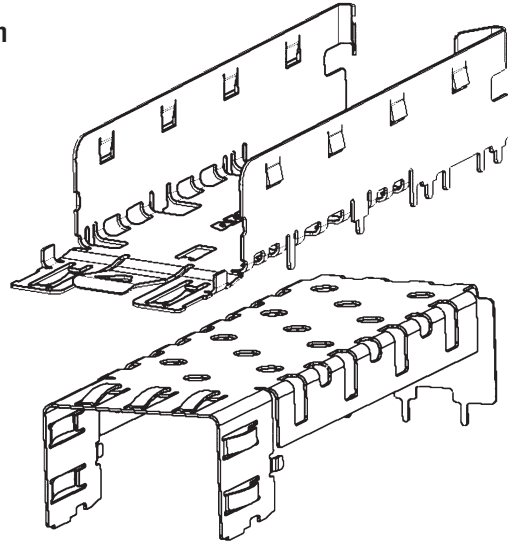
Note: All part numbers are RoHS compliant.

SFP Single Port Cages and Connectors (Continued)

SFP Cage Bottom
Part Number 6367034-1

Cage bottom supplied in
tape and reel packaging for
SMT processing

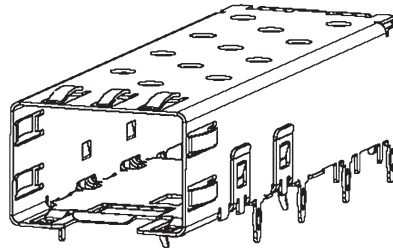
2 Piece Cage System



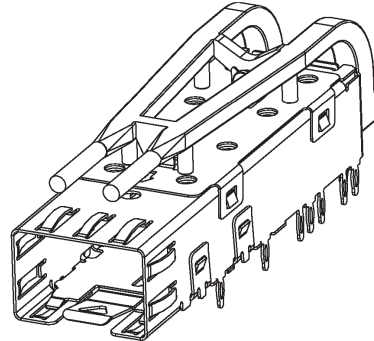
SFP Cage Top
Part Number 6367035-1

Cage top attached after
bottom is soldered

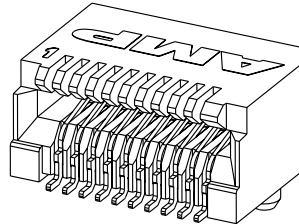
**SFP Press Fit
Cage Assembly**
Part Number 1489669-1



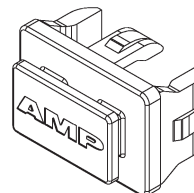
**SFP Press Fit Cage with
Lightpipe Assembly**
Part Number 1367629-1



Connector
Part Number 1367073-1



Dust Plug
Part Number 1367147-1

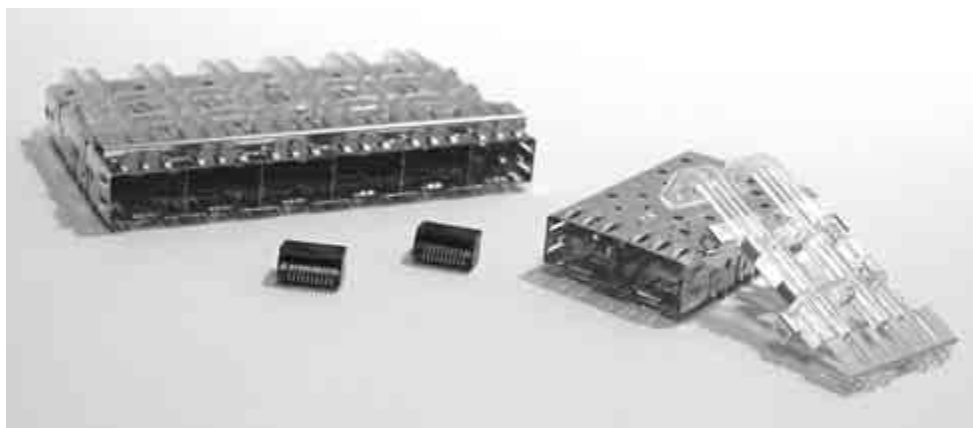


Note: All part numbers are RoHS
compliant.

SFP Ganged (Single Row) Cages

Product Facts

- Full metal shield for grounding and EMI reduction
- Solder and Press Fit configurations available
- Used in conjunction with 20 pin SMT SFP Connector
- Hot Swappable
- Compatible with SFP MSA Compliant Modules
- UL/CSA Report File E28476
- Application tooling available for press fit SFP cages



The Ganged SFP product line allows for single row, high density port designs to maximize the horizontal I/O space. The design allows for belly-to-belly orientation to maximize port density. The lateral port-to-port spacing is minimized to 14.25mm, compared to

16.25mm required spacing between single port cages. Port configurations include 1x2, 1x4 and 1x6, with lightpipes optional.

Application tooling is required for press fit configurations to provide support during insertion into the board.

Technical Documents

Instruction Sheet

- 408-8848 SFP Cage Assembly Seating Tool
408-8849 SFP Cage Assembly Extraction Tool

Application Specification

- 114-13017 SFP Connector and 2-piece Cage Assembly
114-13120 SFP Connector and Press Fit Cage Assy

Product Specifications

- 108-1949 SFP Connector
108-1950 SFP Cage

Part Number	Port Configuration	PCB Attachment	Lightpipes Included
1761014-1	1x2	Press Fit	No
1761007-1	1x2	Press Fit	Yes
1658744-1	1x4	Press Fit	No
1658723-1	1x4	Solder Tail	No
1761008-1	1x4	Press Fit	Yes
1761015-1	1x6	Press Fit	No
1658939-1	1x6	Press Fit	Yes

Note: Tyco Electronics lightpipe assemblies are packaged with the SFP cage assembly. The lightpipes attach to the top of the SFP cage for clear visibility in a high density application.

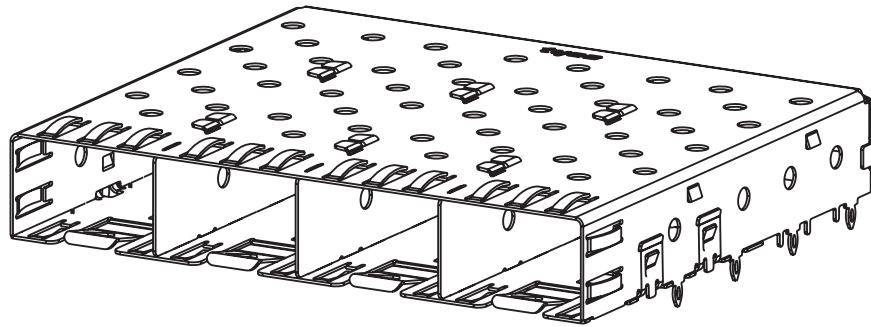
Connectors and Dust Plugs

Part Number	Description
1367073-1	20 pin, surface mount connector; 0.38 μm (15 μin) gold plating
1367073-2	20 pin, surface mount connector; 0.76 μm (30 μin) gold plating
1658197-1	20 pin, surface mount connector; 0.76 μm (30 μin) gold plating with contact surface treatment
1888247-1	20 pin, surface mount connector; 0.76 μm (30 μin) higher speed SFP+ compliant
1888247-2	20 pin, surface mount connector; 0.38 μm (15 μin) higher speed SFP+ compliant
1761394-1	SFP Dust Cap

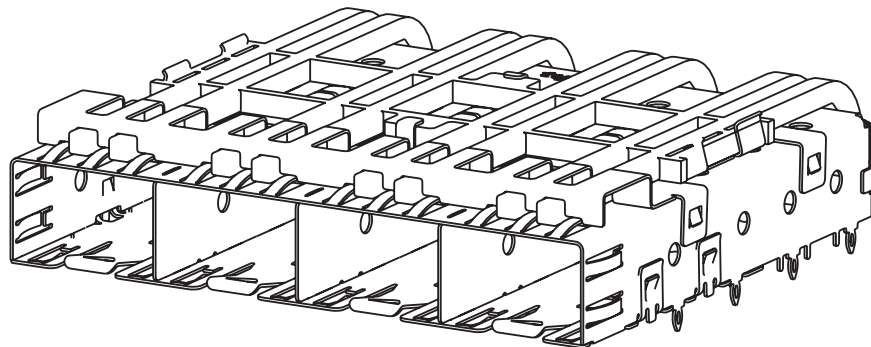
Note: All part numbers are RoHS compliant.

SFP Ganged (Single Row) Cages (Continued)

**Ganged 1x4
Configuration
Part Number 1658744-1**



**Ganged 1x4 w/ Lightpipes
Configuration
Part Number 1761008-1**

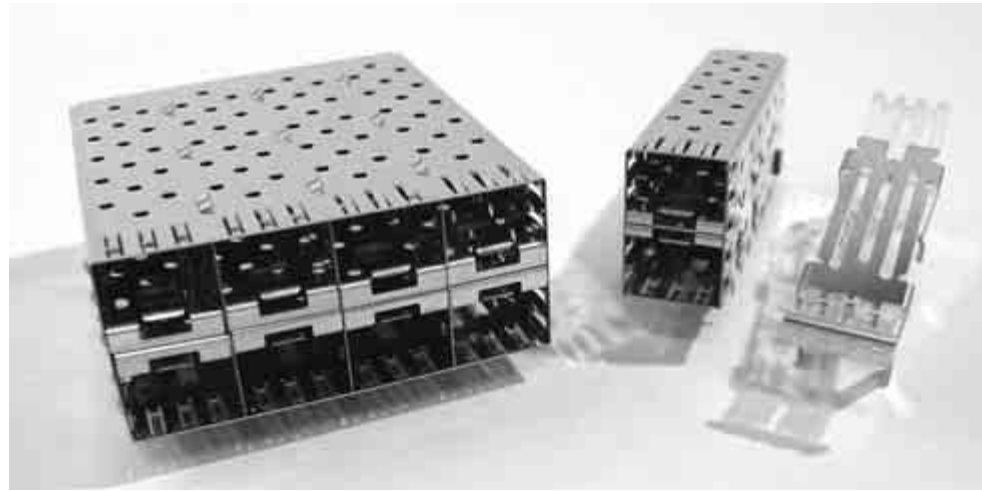


Note: All part numbers are RoHS compliant.

SFP Stacked (Dual Row) Cage/Connector Assemblies

Product Facts

- Utilizes integrated stacked connector with patented wafer construction
- Full metal shield for grounding and EMI reduction
- Incorporates press fit eye-of-the-needle contacts for both mechanical cages and electrical connector
- Hot Swappable
- Compatible with SFP MSA Compliant Modules
- Application tooling available
- UL/CSA Report File E28476



The Stacked SFP product maximizes port density by Taking advantage of the reduced port spacing of the ganged SFP cages, with an added upper port row. The connector is integrated into the cage assembly,

using press-fit technology for one-step insertion for cage and connector. Two heights are offered for stacked SFP cages, and available in 2x1, 2x4, and 2x6 port configurations.

Technical Documents

Instruction Sheet

- 408-8848 SFP Cage Assembly Seating Tool
- 408-8849 SFP Cage Assembly Extraction Tool
- 408-8850 Stacked SFP Connector Extraction Tool

Application Specification

- 114-13103 Stacked SFP Connector & Cage Assembly

Product Specifications

- 108-2161 SFP Connector & Cage Assemblies

Part Number	Port Configuration	Height Profile	Lightpipes Included
1658391-1	2x1	Standard	No
1658628-1	2x1	Low Profile	No
1658859-1	2x1	Low Profile	Yes
1658390-1	2x4	Standard	No
1658629-1	2x4	Low Profile	No
1658758-1	2x4	Low Profile	Yes
1761327-1	2x6	Standard	No
1658894-1	2x6	Low Profile	No
1658895-1	2x6	Low Profile	Yes

Note: Tyco Electronics lightpipe assemblies are packaged with the SFP cage assembly. The lightpipes attach to the top of the SFP cage for clear visibility in a high density application.

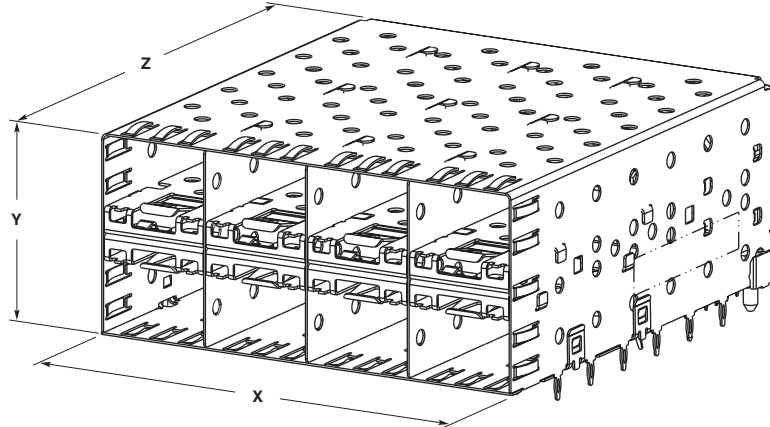
Related Products

Part Number	Description
1761394-1	SFP Dust Cap

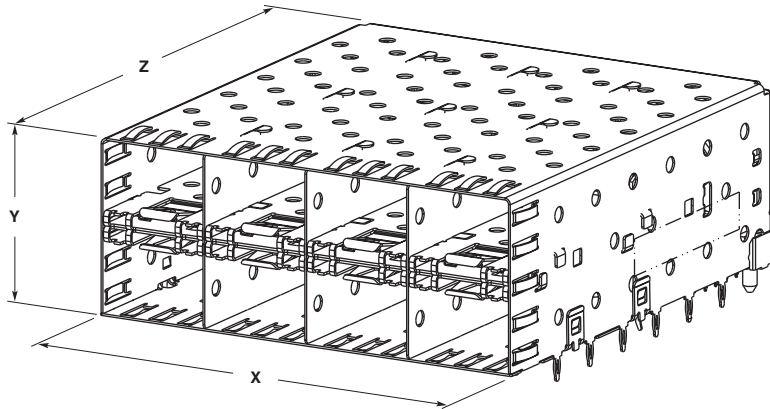
Note: All part numbers are RoHS compliant.

SFP Stacked (Dual Row) Cage/Connector Assemblies (Continued)

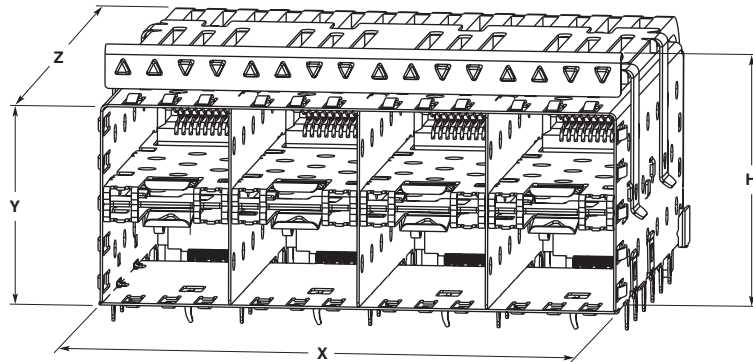
Standard Profile 2x4 Configuration
Part Number 1658390-1



Low Profile 2x4 Configuration
Part Number 1658629-1



Low Profile 2x4 with Lightpipe Configuration
Part Number 1658758-1



Nominal Dimensions

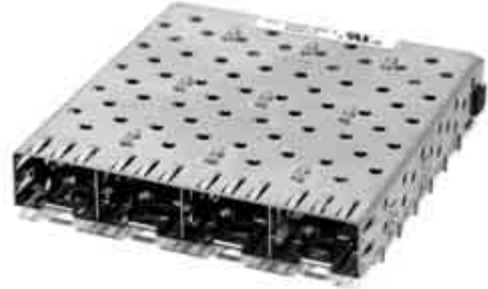
Part Number	Description	X Dim	Y Dim	Z Dim	H Dim.
1658391-1	2x1 SFP Cage	14.50 [.571]	25.50 [1.004]	63.25 [2.490]	—
1658628-1	2x1 Low Profile SFP Cage	14.50 [.571]	22.55 [.888]	63.25 [2.490]	—
1658859-1	2x1 Low Profile SFP Cage w/ Lightpipes	14.50 [.571]	28.35 [1.116]	68.75 [2.707]	28.60 [1.126]
1658390-1	2x4 SFP Cage	57.25 [2.254]	25.50 [1.004]	63.25 [2.490]	—
1658629-1	2x4 Low Profile SFP Cage	57.25 [2.254]	22.55 [.888]	63.25 [2.490]	—
1658758-1	2x4 Low Profile SFP Cage w/ Lightpipes	57.25 [2.254]	28.35 [1.116]	68.75 [2.707]	28.60 [1.126]
1761327-1	2x6 SFP Cage	85.75 [3.376]	25.50 [1.004]	63.25 [2.490]	—
1658894-1	2x6 Low Profile SFP Cage	85.75 [3.376]	22.55 [.888]	63.25 [2.490]	—
1658895-1	2x6 Low Profile SFP Cage w/ Lightpipes	85.75 [3.376]	28.35 [1.116]	68.75 [2.707]	28.60 [1.126]

Note: All part numbers are RoHS compliant.

SFP Cages with Integrated Connectors

Product Facts

- Utilizes fully integrated 20 position SFP connector
- Full metal shield for grounding and EMI reduction
- Incorporates press fit eye-of-the-needle contacts for both mechanical cages and electrical connector
- Hot Swappable
- Compatible with SFP MSA Compliant Modules
- Application tooling available
- UL/CSA Report File E28476

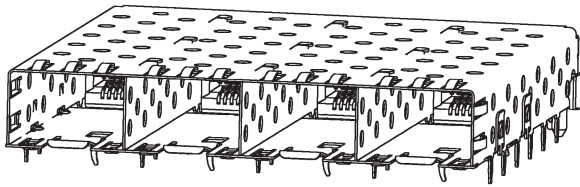


For increased flexibility, Tyco Electronics offers ganged (single Row) SFP cages with integrated connectors that are footprint

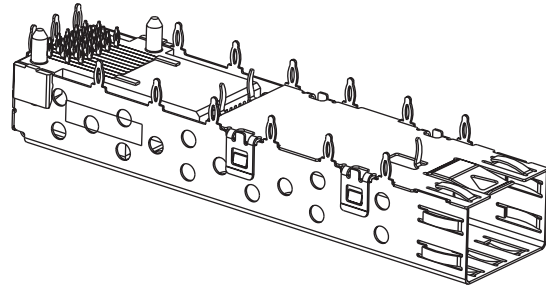
compatible with its Stacked SFP product line. The connector uses the same press fit technology as incorporated in the stacked

SFP cage/connector system, with one-step insertion in the board. Products currently offered are 1x1, 1x4 and 1x6 configurations.

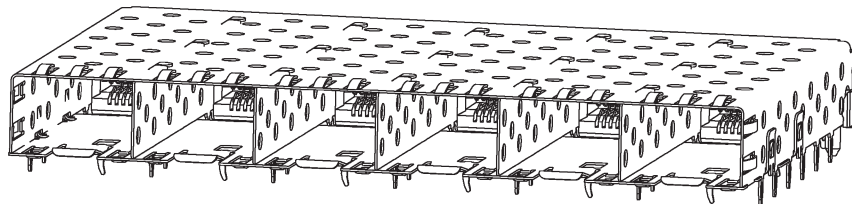
Part Number 1932069-1



Part Number 1888799-1



Part Number 1761967-1



Technical Documents

Instruction Sheet

- 408-8848 SFP Cage Assembly Seating Tool
- 408-8849 SFP Cage Assembly Extraction Tool
- 408-8850 Stacked SFP Connector Extraction Tool

Application Specification

- 114-13121 SFP Ganged Press Fit Connector & Cage Assembly

Product Specifications

- 108-2161 SFP Connector & Cage Assembly

Part Number	Port Configuration	Footprint Compatible with Stacked SFP	Press Fit Exemption Tin Lead on I/O Contacts
1888799-1	1x1	1658391-1 1658628-1	Yes
1932069-1	1x4	1658390-1 1658629-1	Yes
1761967-1	1x6	1761327-1 1658894-1	Yes

Related Products

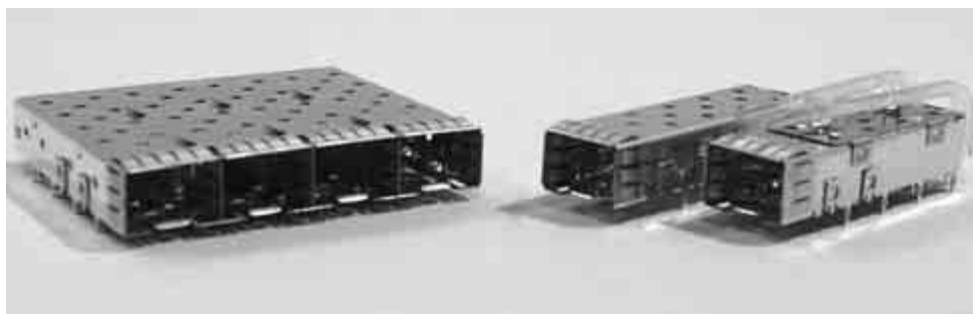
Part Number	Description
1761394-1	SFP Dust Cap

Note: All part numbers are RoHS compliant.

SFP Cages with Enhanced EMI Gaskets

Product Facts

- Full metal shield for grounding and EMI reduction
- Enhanced EMI spring gaskets increase the contact points between cage and bezel opening, cage and module
- 20dB EMI suppression improvement possible
- Compatible with existing SFP MSA compliant modules
- Used in conjunction with 20 pin SMT SFP connector



As data rates exceed 2.5 Gb/s, there is a greater need for higher EMI suppression. Enhanced EMI spring gaskets are added to the SFP cages to meet increased EMI requirements at higher data rates.

The SFP Cages with enhanced EMI Gaskets are compatible with the existing SFP MSA panel cutout. The enhanced EMI gaskets provide increased contact area for improved EMI suppression.

EMI gaskets are double sided (internal and external to the cage) to reduce

emissions between both cage and panel, and cage and SFP module. Testing shows a 20dB improvement on EMI suppression can be achieved.

Enhanced EMI product is offered in single port, 1x2 and 1x4 configurations.

Part Number	Description
1761783-1	Cage Assy, Enhanced EMI, 11 Press Fit Pins
1761896-1	Cage Assy, 8 Press Fit Pins
1761497-1	Cage Assy, 20 Press Fit Pins
1888424-1	Cage Assy, 1x2 Press Fit
1888425-1	Cage Assy, 1x4 Press Fit

Technical Documents

Application Specification

114-13120 SFP Connector and Press-Fit Cage Assembly

Product Specification

108-1950 SFP Cage

Connectors and Dust Plugs

Part Number	Description
1367073-1	20 pin, surface mount connector; 0.38 μm (15 μin) gold plating
1367073-2	20 pin, surface mount connector; 0.76 μm (30 μin) gold plating
1658197-1	20 pin, surface mount connector; 0.76 μm (30 μin) gold plating with contact surface treatment
1888247-1	20 pin, surface mount connector; 0.76 μm (30 μin) higher speed SFP+ compliant
1888247-2	20 pin, surface mount connector; 0.38 μm (15 μin) higher speed SFP+ compliant
1367147-1	SFP Dust Cap with AMP product logo (single port only)
1367147-3	SFP Dust Cap without AMP product logo (single port only)
1761394-1	SFP Dust Cap (ganged cages)

Note: All part numbers are RoHS compliant.

SFP Cages with Riding Heat Sinks

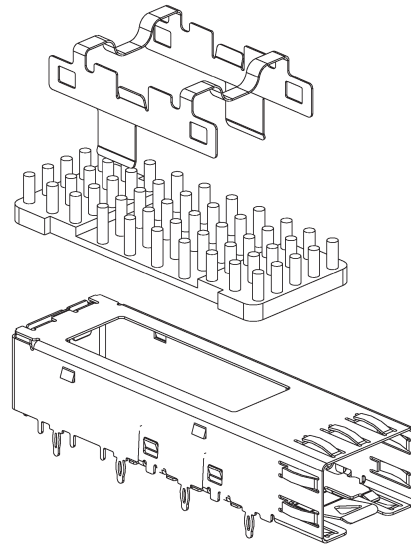
Product Facts

- Designed for DWDM Switch applications
- High Density application requiring additional Thermal Management
- Patented riding heat sink technology addresses thermal management
- Full metal shield for grounding and EMI reduction
- Incorporates press fit eye-of-the-needle contacts for mechanical cages
- Compatible with DWDM MSA compliant transceivers
- Uses 20 pin SMT SFP Connector



Tyco Electronics introduced an SFP system incorporating a riding heat sink to help manage excess heat when using SFP modules. This is especially suited for use with higher wattage transceivers, such as long reach applications like Dense Wavelength Division Multiplexing (DWDM).

The system features a press fit cage, a heat sink clip, and heat sink with various pin heights available.



Cages, Heatsinks, and Clips

Part Number	Product Description
1367643-1	1x1 SFP Cage for heatsink application
1367646-1	Heat Sink Clip
1829903-2	PCI Heat Sink (4.2mm)
1829904-2	SAN Heat Sink (6.5mm)
1829905-2	Networking Heat Sink (13.5mm)
1367645-1	Kit: Cage, Clip and PCI Heat Sink (4.2mm)
1367645-2	Kit: Cage, Clip and SAN Heat Sink (6.5mm)
1367645-3	Kit: Cage, Clip and Networking Heat Sink (13.5mm)

Connectors and Dust Plugs

Part Number	Description
1367073-1	20 pin, surface mount connector; 0.38 μ m (15 μ in) gold plating
1367073-2	20 pin, surface mount connector; 0.76 μ m (30 μ in) gold plating
1658197-1	20 pin, surface mount connector; 0.76 μ m (30 μ in) gold plating with contact surface treatment
1888247-1	20 pin, surface mount connector; 0.76 μ m (30 μ in) higher speed SFP+ compliant
1888247-2	20 pin, surface mount connector; 0.38 μ m (15 μ in) higher speed SFP+ compliant
1367147-1	SFP Dust Cap with AMP product logo
1367147-3	SFP Dust Cap without AMP product logo

PCI is a trademark of PCI-SIG.

Note: All part numbers are RoHS compliant.

SFP Copper Cable Assemblies

Product Facts

- SFF 20 position PCB interface
- Cable wire size 28 through 30 AWG
- Active and passive assemblies available
- Data rates from 2.5Gbps to 4.25Gbps
- Robust pull to release latch mechanism
- Various standard cable assembly lengths
- Breakout cables to CX4 and HSSDC2 are available
- Compatible with MSA compliant SFP cages
- Uses MADISON TURBOTWIN copper cable



Tyco Electronics' SFP copper cable assemblies are high speed, high performance solutions for 2.5 Gbps and 4.25 Gbps applications. Tyco Electronics' SFP copper assemblies provide a cost effective solution

over Fiber for short reach I/O applications. These assemblies support multiple data transfer protocols such as Fibre Channel, InfiniBand Standard and Gigabit Ethernet.

Applications

- Switches, routers and host bus adapters (HBA's)
- Enterprise storage
- High density I/O's
- Multiple channel interconnects

SFP Direct Attach Cable Assembly Part Numbers

Description	Part Number	Length	Equalization
2.5 Gbps Passive	1902495-1	0.5 meter	Unequalized
	1902495-2	1 meter	Unequalized
	1902495-3	2 meter	Unequalized
	1902495-4	3 meter	Equalized
	1902495-5	4 meter	Equalized
	1902495-6	5 meter	Equalized
	1902495-7	6 meter	Equalized
4.25 Gbps Passive	1948134-1	0.5 meter	Unequalized
	1948134-2	1 meter	Unequalized
	1948134-3	2 meter	Equalized
	1948134-4	3 meter	Equalized
	1948134-5	4 meter	Equalized
4.25 Gbps Active	1948135-1	0.5 meter	N/A
	1948135-2	1 meter	N/A
	1948135-3	2 meter	N/A
	1948135-4	3 meter	N/A
	1948135-5	4 meter	N/A
	1948135-6	5 meter	N/A

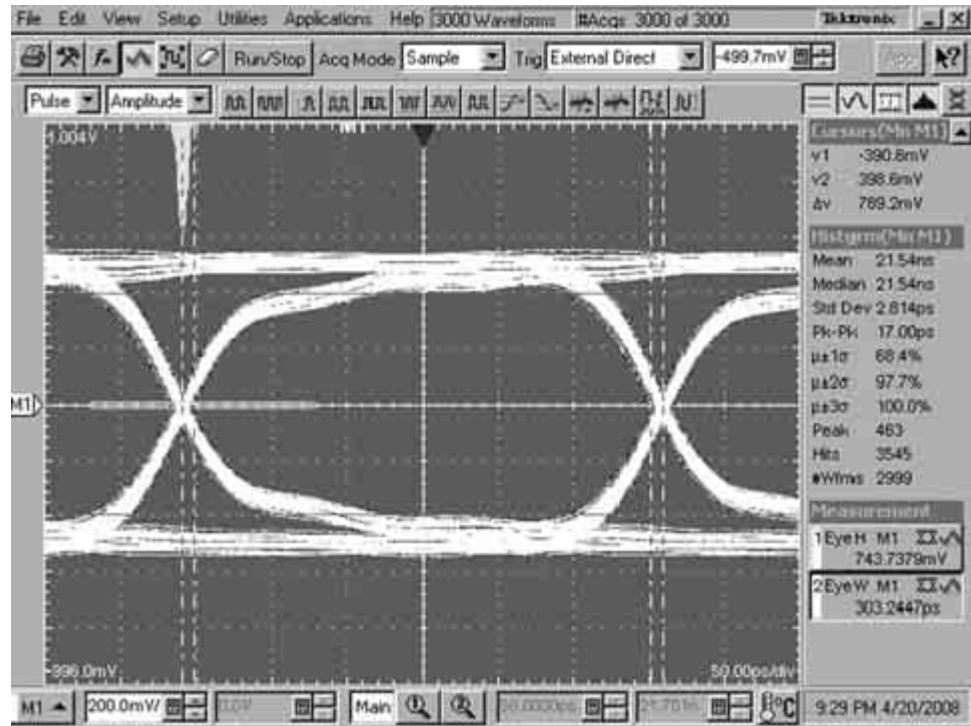
Fibre Channel is a trademark of the Fibre Channel Industry Association.
 INFINIBAND is a trademark of the InfiniBand Trade Association.

Note: All part numbers are RoHS compliant.

SFP Copper Cable Assemblies (Continued)

4.25 Gbps Eye Pattern for SFP Cable Assembly — 1 Meter
Part Number 1948134-2

- Data Rate: 4.25 Gbps
- Input Voltage: 1000 mV
- Data Pattern: PRBS 31
- Eye Height: 744.7 mV
- Jitter: 17.0 ps
- 1 m 28 AWG SFP Equalized Cable Assembly



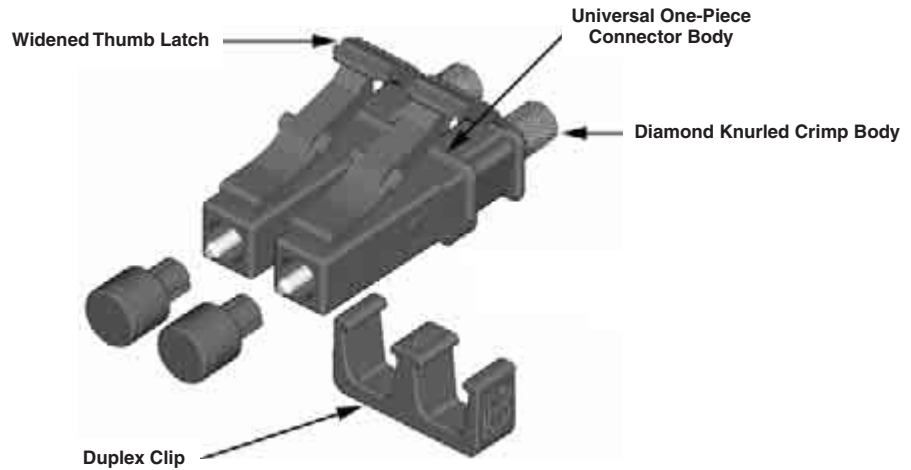
Note: All part numbers are RoHS compliant.

LC Optical Connectors

One-Piece LC Connector

Product Facts

- Singlemode Telecordia GR-326 tested (Report #501-652)
- Multimode TIA/EIA 568-B.3 tested
- Singlemode and Multimode are compatible with both anaerobic adhesives and heat cure epoxy adhesives
- Universal Connector Body
 - Common body for simplex or duplex
 - Common body for jumper or buffer applications
 - Fewer parts to inventory
- Duplex Clip
 - Field installable
 - Makes simplex assemblies duplex
 - Works to correct polarity errors
 - Used for both jumpers and buffered fiber applications
- One-Piece Body
 - Improved rigidity
 - Improved side-load strength



- Color coded to comply with 568 C
 - Aqua for 50/125 laser optimized
 - Black for standard 50/125
 - Beige for 62.5/125
 - Blue for singlemode

- Widened Thumb Latch
 - Increased hit area
 - Increased bend strength
 - Ramped front latch for snag resistance
- Diamond Knurled Crimp Body
 - Increased tensile proof strength
 - Identical to Tyco Electronics' SC/FC design

Performance Characteristics
Insertion Loss — 0.2 dB Typical
Reflectance — -55 dB Typical
Operating Temperature — -40°C to +75°C
Durability — 500 Cycles



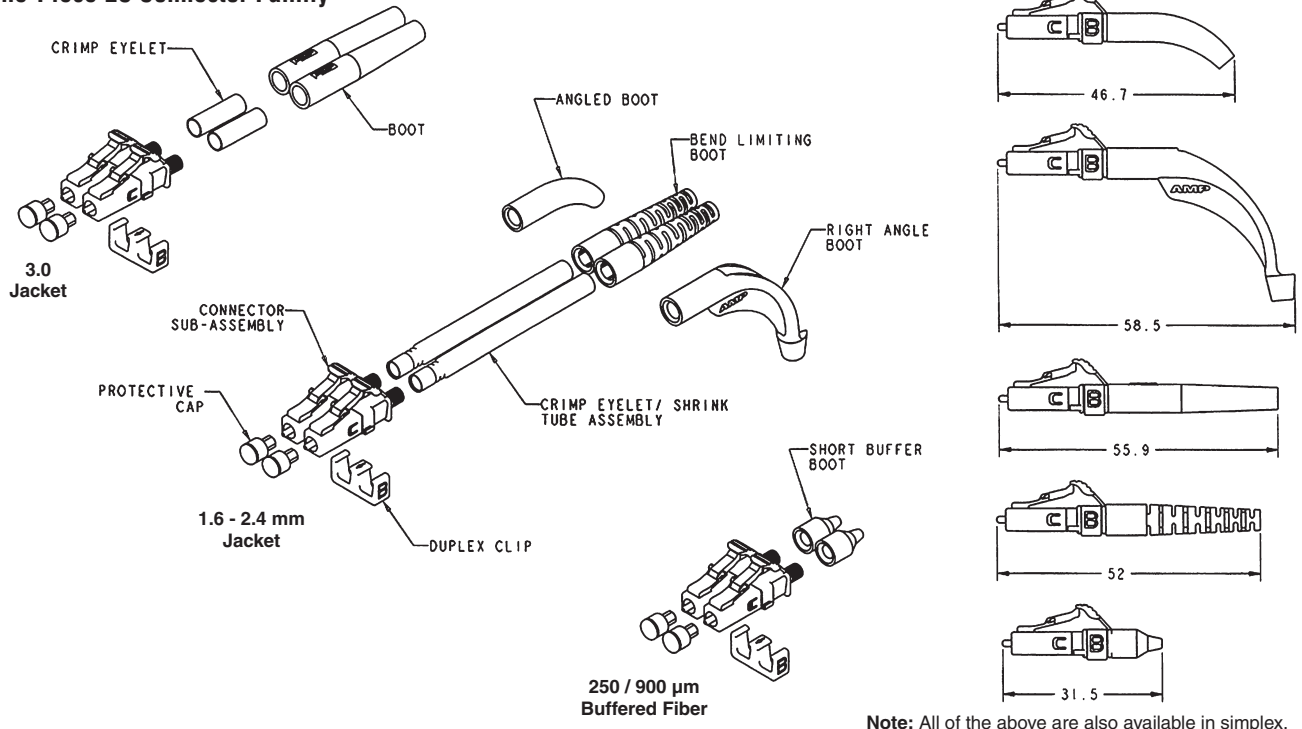
LC Connector Kits

Description	Fiber Type	Housing Color	Boot Color	Used with	Individual Pack Part Number	Bulk Pack Part Number
Simplex	Singlemode	Blue	Blue	900 µm Buffered	1918384-1	1918384-2
				1.6-2.0 mm Jacketed	1918266-1	1918266-2
				3.0 mm Jacketed	1918374-1	1918374-2
				900 µm Buffered	1918385-3	1918385-5
				1.6-2.0 mm Jacketed	1918267-3	1918267-5
				3.0 mm Jacketed	1918375-3	1918375-5
	Multimode	Beige	Black	900 µm Buffered	1918385-4	1918385-6
				1.6-2.0 mm Jacketed	1918267-4	1918267-6
				3.0 mm Jacketed	1918375-4	1918375-6
				900 µm Buffered	1918385-1	1918385-2
				1.6-2.0 mm Jacketed	1918267-1	1918267-2
				3.0 mm Jacketed	1918375-1	1918375-2
Duplex	Singlemode	Blue	Blue	900 µm Buffered	1918387-1	1918387-2
				1.6-2.0 mm Jacketed	1918372-1	1918372-2
				3.0 mm Jacketed	1918376-1	1918376-2
				900 µm Buffered	1918388-3	1918388-5
				1.6-2.0 mm Jacketed	1918373-3	1918373-5
				3.0 mm Jacketed	1918377-3	1918377-5
	Multimode	Beige	Black	900 µm Buffered	1918388-4	1918388-6
				1.6-2.0 mm Jacketed	1918373-4	1918373-6
				3.0 mm Jacketed	1918377-4	1918377-6
				900 µm Buffered	1918388-1	1918388-2
				1.6-2.0 mm Jacketed	1918373-1	1918373-2
				3.0 mm Jacketed	1918377-1	1918377-2
Duplex Clip	For use with Simplex Kits	Black	—	—	1754371-1	—

Note: All part numbers are RoHS compliant.

LC Optical Connectors (Continued)

One-Piece LC Connector Family



Note: All of the above are also available in simplex.

LC Connector Component Selection Chart (bulk packaged)

Fiber Type	Simplex Connector Assembly & Dust Cap	Duplex Clip	Cable Size	Crimp Eyelet with Heat Shrink	Crimp Eyelet	Strain Relief Description	Strain Relief Part Number (see chart below)
Singlemode (blue hsg.)	1828456-1	1754371-1	1.6-2.0 mm	6374150-1	—	Straight/Bend Limiting	1588153-X
			1.6-2.0 mm	6374150-1	—	Angled	1374737-X
			1.6-2.0 mm	6374150-1	—	50 Degree Angle	6457543-X
			2.4 mm	6588189-1	—	Straight/Bend Limiting	1588153-X
			2.4 mm	6588189-1	—	Angled	1374737-X
			2.4 mm	6588189-1	—	50 Degree Angle	6457543-X
			3.0 mm	—	5504118-3	Straight	502716-X
			900 µm	—	—	900 µm Buffer, 10 mm	6588612-X
			1.6-2.0 mm	6374150-1	—	Straight/Bend Limiting	1588153-X
			1.6-2.0 mm	6374150-1	—	Angled	1374737-X
Multimode (beige hsg.)	1754625-1	1754371-1	1.6-2.0 mm	6374150-1	—	50 Degree Angle	6457543-X
			2.4 mm	6588189-1	—	Straight/Bend Limiting	1588153-X
			2.4 mm	6588189-1	—	Angled	1374737-X
			2.4 mm	6588189-1	—	50 Degree Angle	6457543-X
			3.0 mm	—	5504118-3	Straight	502716-X
			900 µm	—	—	900 µm Buffer, 10 mm	6588612-X



Crimp Tool Dieset only - 1588175-1
Crimp Tool with Dieset - 1588176-1
Instruction Sheet: 408-8675
<http://www.tycoelectronics.com/documents>

Termination Kit - 1754462-1
Upgrade Kit for Anaerobic terminations - 1754603-1

Strain Relief Color

Base Part Number	Beige	Blue	Black	Red	Aqua
1588153	-5	-2	-3	—	-8
1374737	-2	-1	-3	—	—
6457543	-1	-2	-4	—	—
502716	-3	-4	-1	-5	-11
6588612	-1	-2	-5	-4	-8

Note: All part numbers are RoHS compliant.

LC Optical Cable Assemblies

Product Facts

- For high performance applications/high density
- 125 µm Ceramic Ferrule Technology
- Small size — 1/2 size of standard SC and FC products
- Singlemode and multimode
- Tuned singlemode assemblies
- High performance small size cable
 - 900 µm buffered fiber assemblies
 - 2.0 mm cable assemblies
- Hybrid assemblies available with all standard connectors
- Hybrid SC's and FC's terminated to 2.0 mm cable and 900 µm buffered fiber
- Factory terminated/factory tested



LC Cable Assembly

Performance Characteristics

Insertion Loss —

Singlemode — .25 dB max.; < .1 dB typ.

Multimode — .1 dB typ.;

.1 dB typ. σ

Return Loss —

Singlemode — 55 dB; PC endface

Multimode — 20 dB

Description	Cable Type	Part Numbers/Lengths (m)					
		1	2	3	4	5	10
Simplex							
Singlemode	2.0 mm Jacketed Riser	6374110-1	6374110-2	6374110-3	6374110-4	6374110-5	1-6374110-0
Duplex							
50/125 µm Multimode	2.0 mm Jacketed Riser	6374658-1	6374658-2	6374658-3	6374658-4	6374658-5	1-6374658-2
Laser Optimized (10 Gig) (850 nm) 50/125 µm Multimode	2.0 mm Aqua Jacketed Riser	6828317-1	6828317-2	6828317-3	6828317-4	6828317-5	1-6828317-0
62.5/125 µm Multimode	2.0 mm Jacketed Riser	6374659-1	6374659-2	6374659-3	6374659-4	6374659-5	1-6374659-0

Note: All part numbers are RoHS compliant.

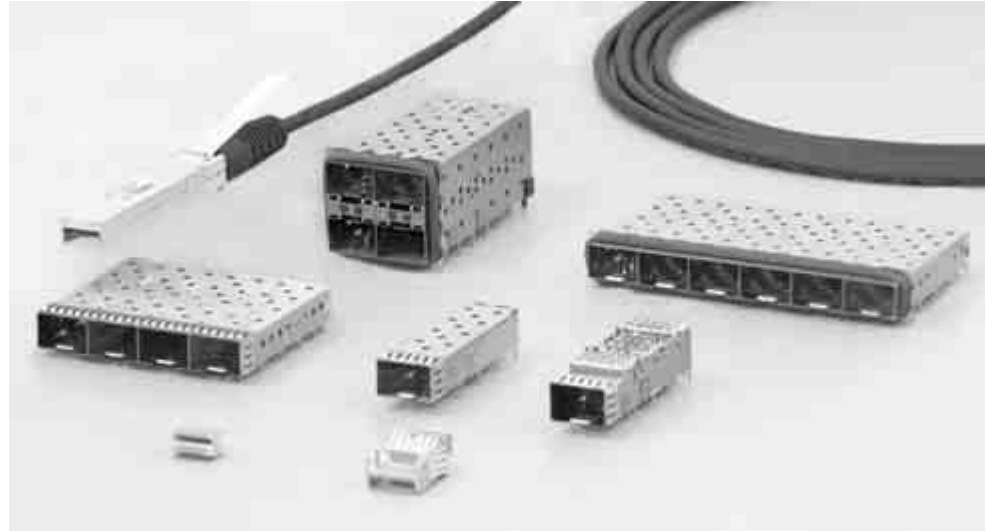
SFP+ Products

Product Facts

- SFP+ interconnect system supports data rates of 10 Gb/s
- Connector designed to support 10 Gb/s+ signal speeds, backward compatible with SFP
- Both EMI spring and gasket options for cages provide excellent shielding
- All cage configurations are offered with lightpipes for LED applications
- Heat sink optional for single port cages
- Cages are available for PCI card applications (one degree mounting angle)
- Cages accommodate belly-to-belly mounting
- Stacked cages include integrated high speed connector using patented wafer construction
- Active and passive copper cable assemblies provide a cost-effective solution for short reach applications

Applications

- Storage
- Servers
- Networking
- Switches
- Routers
- Hubs
- Network Interface Cards (NICs)



SFP+ extends the use of the Small Form-Factor Pluggable (SFP) interconnect up to 10 Gb/s. This system meets the performance requirements of SFF (Small Form-Factor) specification SFF-8431 and supports 8G Fibre Channel and 10G Ethernet applications. The SFP+ product family includes cages, connectors, and copper cable assemblies. SFP+ cages are offered with both EMI springs and elastomeric

conductive gaskets for EMI containment at the panel opening, and come in single port, ganged and stacked port configurations. Connectors are designed to optimize performance at higher data rates. A conductive EMI plug is available to reduce EMI through an empty (unused) SFP+ cage port. Tyco Electronics also offers LC optical connectors and cable assemblies to link with SFP+ transceivers.

Technical Documents

Application Specifications

114-13120 Single & Ganged Cages
114-13219 Stacked Cages

Product Specification

108-2331

Industry Standards

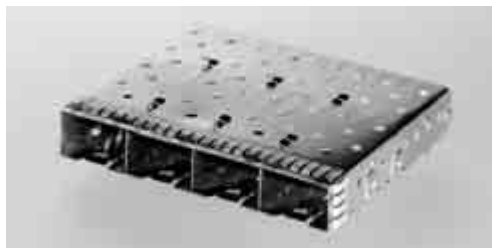
SFF-8432 Cage and module definition
SFF-8083 Mating Interface and performance requirements
SFF-8431 Electrical Interface Specifications

Fibre Channel is a trademark of the Fibre Channel Industry Association.

PCI is a trademark of PCI-SIG.

SFP+ Single Port and Ganged Cages

Cages with EMI Springs



Description	Single Port	1x2	1x4	1x6
Cage Assy w/ Lightpipes	2007254-1	2007262-1	2007178-1	2007250-1
Cage Assy	2007198-1	2007263-1	2007132-1	2007251-1
Cage Assy w/ PCI Heat Sink	2007464-1	—	—	—
Cage Assy w/ SAN Heat Sink	2007464-2	—	—	—
Cage Assy w/ Networking Heat Sink	2007464-3	—	—	—

Cages with Elastomeric Gaskets



Description	1x2	1x4	1x6
Cage Assy w/ Lightpipes	2007180-1	2007093-1	2007169-1
Cage Assy	2007181-1	2007135-1	2007170-1

Cages for PCI Applications

One degree mounting angle to meet requirements of SFF-8075



Description	Solder	Press-Fit
Cage Assy	2007194-1	2007215-1
Cage Assy w/ PCI Heat Sink & Clip	2007193-1	2007277-1

Connectors



Contact Plating	Part Number
0.76 μm (30 μin) gold	1888247-1
0.38 μm (15 μin) gold	1888247-2

PCI is a trademark of PCI-SIG.

Note: All part numbers are RoHS compliant.

SFP+ Stacked (Dual Row) Cage/Connector Assemblies

Stacked SFP+ Cage/ Connector Assemblies



Description

EMI Containment Style	Lightpipe Option	2x1	2x2	2x4	2x6
Elastomeric Gasket	Four Per Column	2007538-5	2007417-5	2007399-5	2007567-5
Elastomeric Gasket	Inner Lightpipes Only	2007538-6	2007417-6	2007399-6	2007567-6
Elastomeric Gasket	Outer Lightpipes Only	2007538-7	2007417-7	2007399-7	2007567-7
Elastomeric Gasket	None	2007538-8	2007417-8	2007399-8	2007567-8
EMI Springs	Four Per Column	2007492-5	2007637-5	2007394-5	2007562-5
EMI Springs	Inner Lightpipes Only	2007492-6	2007637-6	2007394-6	2007562-6
EMI Springs	Outer Lightpipes Only	2007492-7	2007637-7	2007394-7	2007562-7
EMI Springs	None	2007492-8	2007637-8	2007394-8	2007562-8

Note: Tin plated compliant pins listed, tin-lead compliant pins available for signal connector.
See Tyco Electronics drawing.

Dust Plug (Non-conductive)

For Uses In	Part Number
Single Port Cages	1367147-1 or 1761394-1
Ganged and Stacked (Multi-port) Cages	1761394-1

Note: Dust plug 1761394-1 has narrow width, required for port density in ganged and stacked cages.

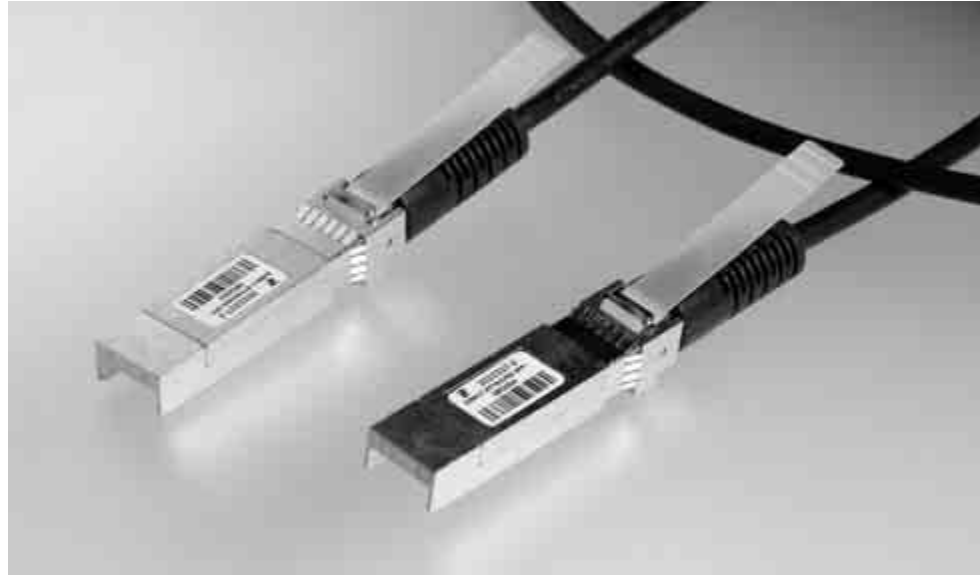
EMI Plug Part Number 1888901-1 Springs comply with SFF-8432 requirements for Improved Pluggable Form-factor (IPF)



SFP+ Copper Cable Assemblies

Product Facts

- Truly broadband — operates from 1 Gbps to 10 Gbps
- Compatible with industry standard SFP cages
- 100 Ohm differential impedance
- 3.3 V input source voltage
- EEPROM signature which can be customized
- Pull-to-release retractable pin latch design
- Pull tab allows compact belly-to-belly application
- 360 degree cable braid crimp and enhanced EMI skirt
- Various wire gauges provide flexible cable management options
- Uses MADISON TURBOTWIN copper cable



The Tyco Electronics SFP+ direct attach copper cable assembly is a low cost alternative for short reach applications. The design allows for a serial data transmission up to 10 Gbps in each direction. These SFP+ assemblies are hot swappable and the programmed EEPROM

signature enables the host to differentiate between a copper cable assembly and a fiber optic module. The mechanical design of the braid crimp and EMI skirt help ensure that EMI radiation is sufficiently suppressed. Additionally, the copper cable acts as a natural heat sink. The low

power consumption assists in making the passive copper cable assembly an economic solution for within rack, or rack to rack applications. Standard SFP+ assemblies are offered in 24 AWG, however, several smaller wire gauges are available.

Type	Part Number	AWG	Description
Standard Passive	2032237-1	24	0.5 meter SFP+ Cable Assembly
	2032237-2	24	1 meter SFP+ Cable Assembly
	2032237-4	24	3 meter SFP+ Cable Assembly
	2032237-6	24	5 meter SFP+ Cable Assembly
	1-2032237-1	24	10 meter SFP+ Cable Assembly
Other AWG Passive	2032247-1	26	0.5 meter SFP+ Cable Assembly
	2032247-2	26	1 meter SFP+ Cable Assembly
	2032247-4	26	3 meter SFP+ Cable Assembly
	2032247-6	26	5 meter SFP+ Cable Assembly
	1-2032247-1	26	10 meter SFP+ Cable Assembly
	2053649-1	28	0.5 meter SFP+ Cable Assembly
	2053649-2	28	1 meter SFP+ Cable Assembly
	2053649-4	28	3 meter SFP+ Cable Assembly
	2053649-6	28	5 meter SFP+ Cable Assembly
	2052246-1	30	0.5 meter SFP+ Cable Assembly
2052246-2	30	1 meter SFP+ Cable Assembly	
2052246-4	30	3 meter SFP+ Cable Assembly	
2052246-6	30	5 meter SFP+ Cable Assembly	
Active (Coming Soon)	2032757-1	24	1 meter SFP+ Cable Assembly
	2032757-5	24	5 meter SFP+ Cable Assembly
	1-2032757-0	24	10 meter SFP+ Cable Assembly
	1-2032757-5	24	15 meter SFP+ Cable Assembly

Note: All part numbers are RoHS compliant.

SFP+ Copper Cable Assemblies (Continued)

High Speed Electrical Measurements

Tyco Electronics SFP+ passive copper cable assemblies are fully compliant to SFF-8431.

WDP Measurements

WDP measurements listed in the table below are for set lengths at two different cable gauges. Any cable with the same gauge and a shorter length than the length listed will have a lower dWDP number. Measurements were taken with an input signal that had pre-emphasis applied to achieve a WDPi of 2.4 dBe while using the SFP+ Module Compliance Board (MCB) and Host Compliance Board (HCB). A copper cable assembly will be compliant with the SFP+ MSA Rev 3.2 if the dWDP number is less than 6.75 dBe.

WDP Specifications

Cable Gauge	Cable Length	WDPo (dB)	WDPi (dB)	dWDP
Spec Limit	—	—	—	6.75
30 AWG	3 meter	6.16	2.4	3.76
28 AWG	5 meter	7.49	2.4	5.09
26 AWG	6 meter	8.36	2.4	5.96
24 AWG	7 meter	7.44	2.4	5.04

VMA and VCR Measurements

VMA and VCR measurements listed in the table below are for the set lengths. To be compliant with SFF 8431 Rev 3.2 the VMA measurements must be less than 4.5 dB while testing with the module compliance test board. The VCR measurement is determined by computing VMA and NEXT RMS voltage measurements. The VCR measurement must be greater than 33 dB to be SFF-8431 Rev 3.2 compliant.

VMA and VCR Specifications



Cable Gauge	Cable Length	VMA (dB)	VCR (dB)
Spec Limit	—	4.5	33
30 AWG	3 meter	3.03875	40.6572
28 AWG	5 meter	3.93609	38.53281
26 AWG	6 meter	3.94267	35.82669
24 AWG	7 meter	2.86154	37.79826

For additional SFP+ cable assembly technical information, see customer drawing 2032237.

Note: All part numbers are RoHS compliant.

XFP Products

Product Facts

- 10 Gb/s serial link
- EMI containment features
 - Module to XFP Cage
 - XFP Cage to Chassis
- Uses 30 pin surface mount connector
- Patented riding heat sink for thermal management
- Press fit cage termination
- Designed to support belly-to-belly applications
- UL/CSA Report File E28476  



XFP was developed to provide 10Gb/s serial links for a wide range of applications including standards such as OC192/STM-64, G.709, and 10 Gigabit Ethernet.

The cage /plug interface features an intuitive latch system, gasketing features for excellent EMI contain-

ment, and was the first pluggable interface to incorporate patented riding heat sink technology for thermal dissipation. The heat sink is mounted to the cage using a clip, which provides a load to maintain contact between heat sink and module. Heat sinks are

available in three heights, and custom heat sinks are possible. This heat sink technology has extended to SFP and QSFP applications. The XFP connector is a 30 position PT connector, using the same design as used in SFP for established performance and reliability.

Technical Documents

Instruction Sheet
408-8723

Application Specification
114-13096

Product Specifications
108-2127

XFP Standard
SFF Document INF-8077

Cages

Part Number	Description	PCB Attachment
1489951-1	XFP Cage	Press Fit
1658871-1	XFP Cage w/Insulating Tape	Press Fit
1888101-1	XFP Cage without Rear Gasket	Press Fit
1658945-1	XFP Cage w/Insulating Tape & without Rear Gasket	Press Fit
1888116-1	XFP Kit: XFP Cage with SAN Heat Sink (6.5mm)	Press Fit
1888116-2	XFP Kit: XFP Cage with PCI Heat Sink (4.2mm)	Press Fit
1888065-1	XFP Kit: XFP Cage with Networking Heat Sink (13.5mm)	Press Fit
1888481-1	XFP Kit: XFP Cage w/insulating tape and SAN Heat Sink (6.5mm)	Press Fit
1888481-2	XFP Kit: XFP Cage w/insulating tape and PCI Heat Sink (4.2mm)	Press Fit
1888481-3	XFP Kit: XFP Cage w/insulating tape w/Networking Heat Sink (13.5mm)	Press Fit

Connectors, Heatsinks, and Accessories

Part Number	Description
788862-1	30 Pos SMT XFP Conn. 0.38 μ m (15 μ in) gold plating
788862-2	30 Pos SMT XFP Conn. 0.76 μ m (30 μ in) gold plating
1367500-1	30 Pos SMT XFP Conn. 0.76 μ m (30 μ in) gold plating with contact treatment, and enhanced contact for high speed signals
1489948-2	XFP Heat Sink Clip
1888810-2	XFP EMI/Dust Plug
1542656-2	SAN Heat Sink (6.5mm)
1542618-2	PCI Heat Sink (4.2mm)
1542706-2	Networking Heat Sink (13.5mm)

PCI is a trademark of PCI-SIG.

Note: All part numbers are RoHS compliant.

XFP Copper Cable Assemblies

Product Facts

- SFF 30 position PCB interface
- Designed for 10Gbps serial systems
- Hot pluggable
- Cable wire size 24 AWG
- Active or passive assemblies
- Standard lengths up to 1 meter for passive and 5 meters for active
- Excellent EMI/RFI shielding
- Compatible with MSA compliant XFP cages

Applications

- Data networking
- Telecommunications switches (SONET)
- Enterprise storage
- Network switches and routers



Tyco Electronics XFP (10 G Small Form Factor Pluggable) copper cable assemblies support all 10 GBPS Fibre Channel and 10 Gbps Ethernet applications.

SFP Direct Attach Cable Assembly Part Numbers

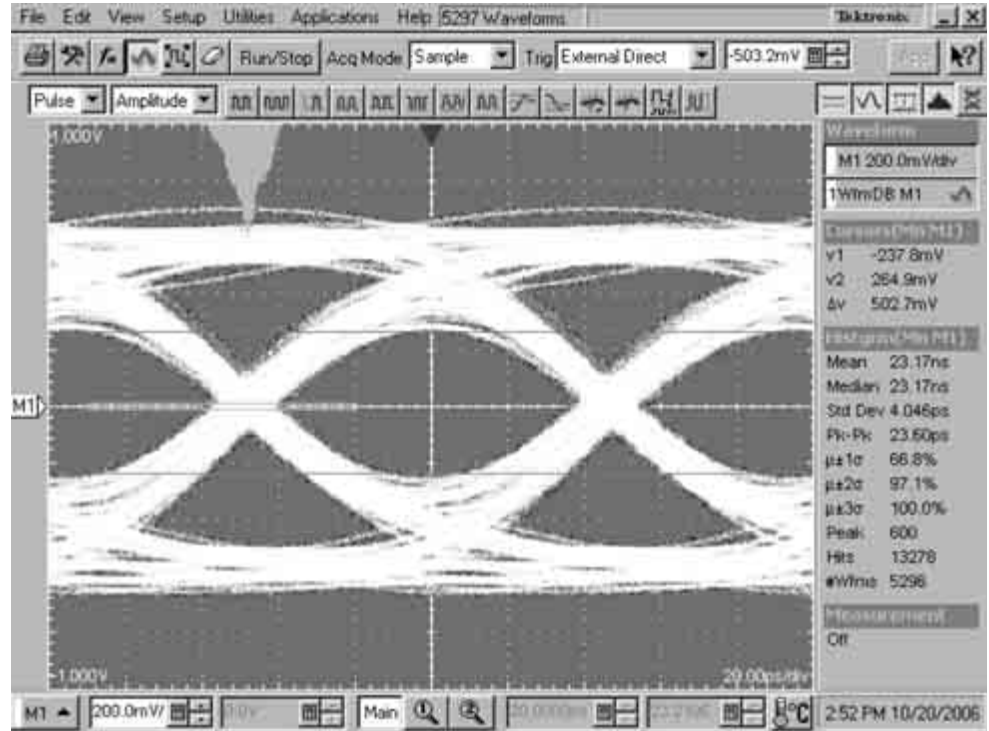
Description	Part Number	Length
Passive Unequalized	1902480-1	0.17 meter
	1902480-2	0.5 meter
	1902480-3	0.66 meter
	1902480-4	1 meter
Active	1902639-1	1 meter
	1902639-2	2 meter
	1902639-3	3 meter
	1902639-4	4 meter
	1902639-5	5 meter

Note: All part numbers are RoHS compliant.

XFP Copper Cable Assemblies (Continued)

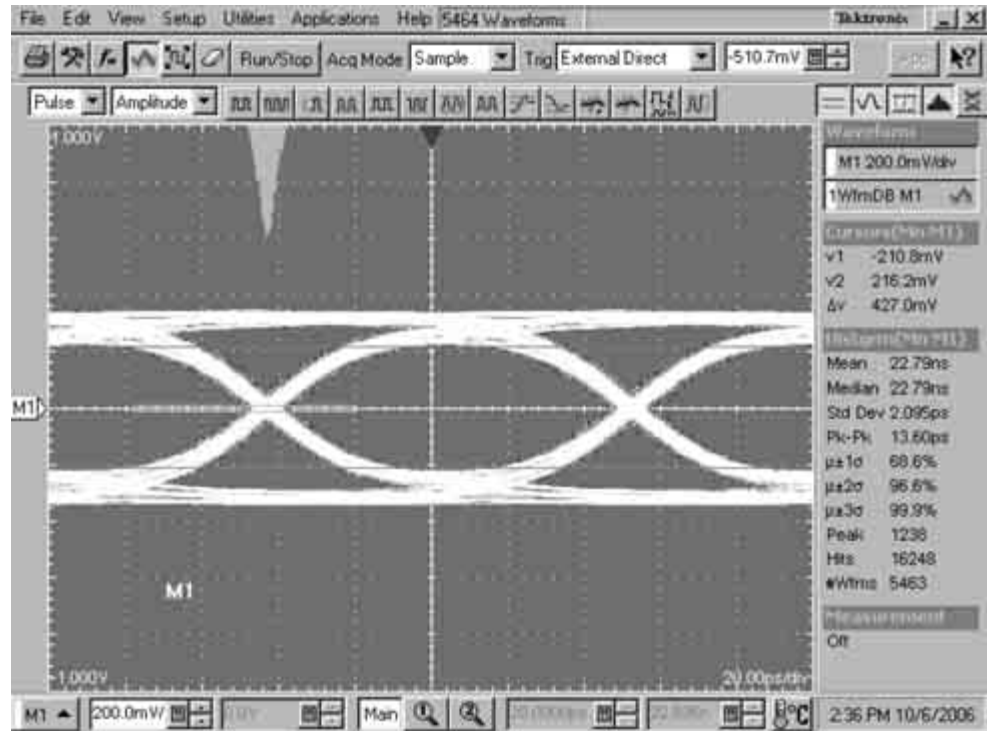
**Passive XFP 0.5 Meter
28 AWG Stressed Eye at
10.5 Gbps**

- Data Rate: 10.51875 Gbps
- Data Pattern: PRBS 2⁷-1
- Eye Height: 427.0 mV
- Jitter: 13.6 ps



**Active XFP 5 Meter 24 AWG
Stressed Eye at 10.5 Gbps**

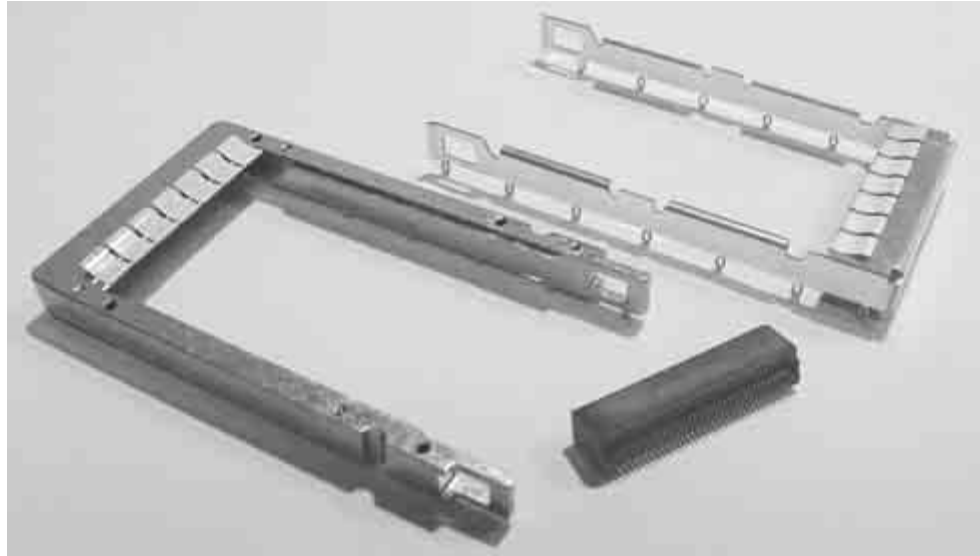
- Data Rate: 10.51875 Gbps
- Data Pattern: PRBS 2⁷-1
- Eye Height: 427.0 mV
- Jitter: 13.6 ps



X2 Standard Guide Rails and Connectors

Product Facts

- XAUI-based, 4 channels at 3.125 Gb/s
- Supports X2 MSA
- Uses 70 position SMT connector
- EMI spring gasket provides shielding to X2 compliant module
- Die cast (screw mount) and stamped (press-fit) designs available
- Application tooling available
- Belly-to-belly mounting possible



Technical Documents

Instruction Sheets

- 408-10102 X2 Die Cast Guide Rails
408-8997 X2 Press-fit Guide Rails

Tyco Electronics offers a guide rail system that meets X2 standard specifications. X2 standard is a XAUI-based system that offers four channels of data throughput operating up to 3.125 Gb/s. The guide rail and connector are used in conjunction with an X2 compliant module.

Tyco Electronics offers both a stamped guide rail which is designed for press-fit application, and a robust die cast rail which is screw-mounted. The connector is a 70 position PT connector, using the same design as used in SFP for demonstrated performance and reliability.

Rails

Part Number	PCB Configuration	Material	PCB Attachment
1367610-1	Belly-to-Belly	Stamped Copper Alloy, Tin Plate	Press Fit
1367608-1	Standard	Stamped Copper Alloy, Tin Plate	Press Fit
1367709-1	Standard	Die Cast Zinc Alloy, Nickel Plate	Screw Mount
1367710-1	Belly-to-Belly	Die Cast Zinc Alloy, Nickel Plate	Screw Mount

Connectors

Part Number	Description
1367337-1	70 pin, surface mount connector; 0.38 μm (15 μin) gold plating
1367337-2	70 pin, surface mount connector; 0.76 μm (30 μin) gold plating
1658198-1	70 pin, surface mount connector; 0.76 μm (30 μin) gold plating with surface treatment

XAUI is a trademark of the 10Gigabit Ethernet Alliance XAUI Interoperability Group.

Note: All part numbers are RoHS compliant.

QSFP (Quad Small Form-factor Pluggable) Products

Product Facts

- 4x solution featuring Tyco Electronics 38 position EVERCLEAR connector
- Lightpipe and heat sink options available
- Through-bezel and behind-bezel cage options with proven EMI containment
- Direct attach copper cables for short reach applications
- Quick release latching system
- MPO connectors plug into QSFP parallel optic transceiver modules

Applications

- Switches, routers, and host bus adapters (HBA's)
- Enterprise storage
- High density, high speed I/O
- Multiple channel interconnects

Technical Documents

Product Specification

108-2286

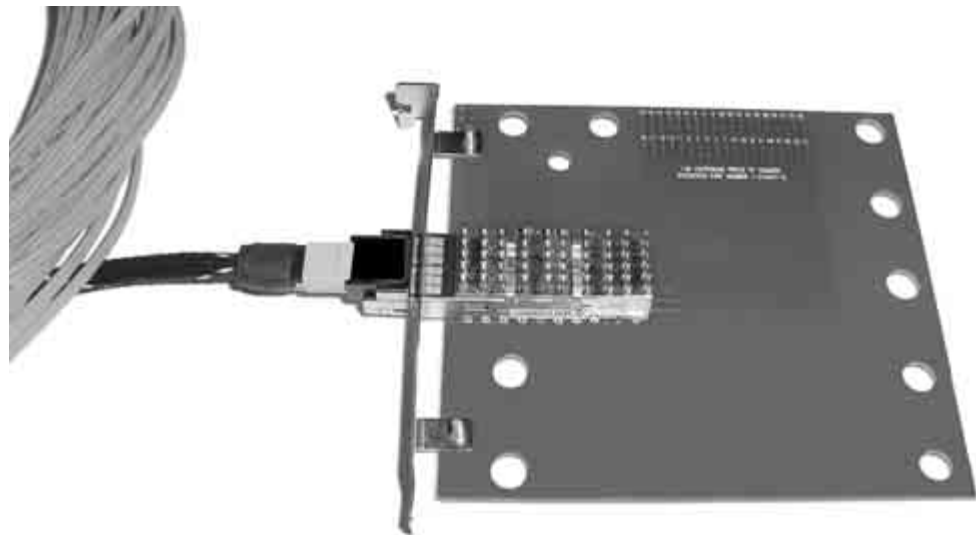


Tyco Electronics is a leading developer of Quad Small Form-factor Pluggable, a new high speed pluggable I/O interface. This interconnect system offers 4 channels, providing 3 times the density of SFP/SFP+ ports and 4 times the density of XFP. QSFP cages and connectors are

designed for data rates up to 10 Gb/s, supporting Fibre Channel, Ethernet, SDH/SONET and InfiniBand standards. The cage/connector system will accept optical or copper interfaces. The QSFP product family includes cages in single and ganged configurations with various heatsink and

lightpipe options. The connector is a 38 position high speed SMT connector, and EMI plugs are offered for empty ports. Cabling options including direct attach copper cable assemblies, active optical assemblies, and MPO optical cable assemblies that plug into a QSFP transceiver module.

Connector/Cage Application



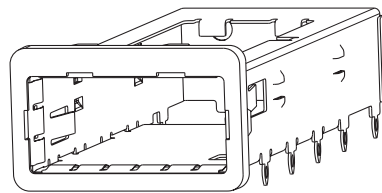
Fibre Channel is a trademark of the Fibre Channel Industry Association.

INFINIBAND is a trademark of the InfiniBand Trade Association.

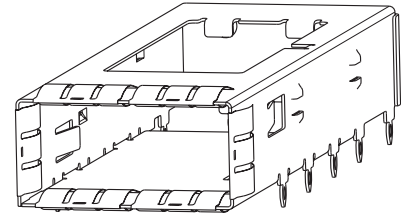
QSFP Cages and Connectors

Cages

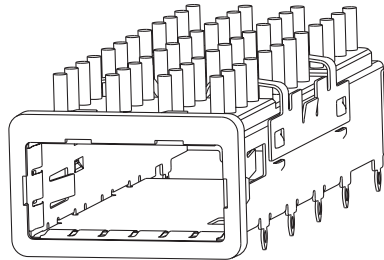
- Reliable springs and gasket designs for EMI containment
- Single and dual lightpipe options
- Riding heat sinks for thermal dissipation, various pin heights available
- Belly-to-belly compatible (double-sided PCB's)
- Press-fit termination
- Port-to port spacing — 21.0 mm (through-bezel)/ 23.5 mm (behind-bezel)
- Behind bezel design eliminates potential for mismatching plug



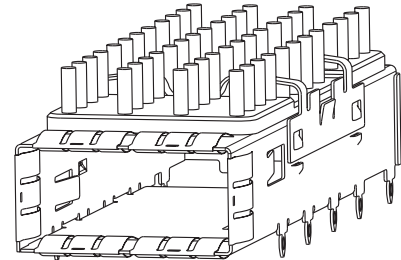
Behind-Bezel Cage



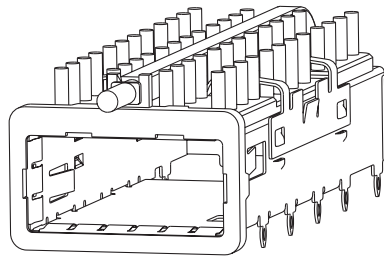
Through-Bezel Cage



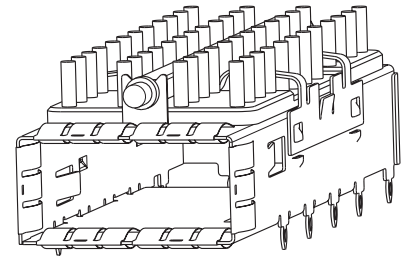
Behind-Bezel Cage with Heat Sink



Through-Bezel Cage with Heat Sink



Behind-Bezel Cage with Heat Sink and Lightpipe



Through-Bezel Cage with Heat Sink and Lightpipe

QSFP Cage Kits

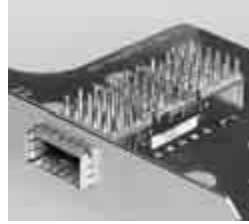
Part Number	Bezel Mount	Heat Sink	Lightpipe
1888617-1	Through-bezel	None	None
1888674-1	Through-bezel	None	Customer Applied
1888631-1	Through-bezel	PCI	None
1888631-2	Through-bezel	SAN	None
1888631-3	Through-bezel	Networking	None
1888972-1	Through-bezel	SAN	Yes
1888972-2	Through-bezel	Networking	Yes
1888781-1	Behind-bezel	None	None
1888968-1	Behind-bezel	PCI	None
1888968-2	Behind-bezel	SAN	None
1888968-3	Behind-bezel	Networking	None

Note: All part numbers are RoHS compliant.

QSFP Cages and Connectors (Continued)

Cages (Continued)

Cage Applications:



Through Bezel



Behind Bezel



Ganged QSFP Cages

Part Number	Configuration	Heat Sink	Max. Height of Heat Sink Above Board	Lightpipe
2057042-1	1x3	PCI	13.7 mm	Included
2057042-2	1x3	SAN	16.0 mm	Included
2057042-3	1x3	Networking	23.0 mm	Included
2007456-1	1x3	PCI	13.7 mm	None
2007456-2	1x3	San	16.0 mm	None
2007456-3	1x3	Networking	23.0 mm	None
2007473-1	1x3	None	—	Option for lightpipe attachment (sold separately)
2007474-1	1x3	None	—	None
2057183-1	1x4	PCI	13.7 mm	Included
2057183-2	1x4	SAN	16.0 mm	Included
2057183-3	1x4	Networking	23.0 mm	Included
2007625-1	1x4	SAN	16.0 mm	None
2007625-2	1x4	Networking	23.0 mm	None
2007668-1	1x4	None	—	Option for lightpipe attachment (sold separately)
2007667-1	1x4	None	—	None

Dual Lightpipe

Part Number	Recommended LED Height
2007477-3	0.8 – 1.1 mm

Note: Other lightpipe options available.

Connector
Part Number 1761987-9

- Tape and reel packaged for pick and place SMT processing
- 38 position EVERCLEAR connector
- Designed to optimize signal integrity through 10 Gb/s



Connector (Front)



Connector (Bottom)

EMI/Dust Plug
Part Number 1888810-2

- Provides EMI containment for unused ports
- Keeps interface free of contamination or debris
- Ergonomic Design



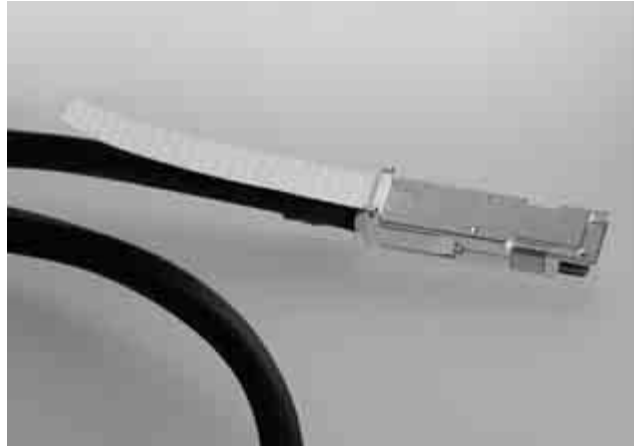
PCI is a trademark of PCI-SIG.

Note: All part numbers are RoHS compliant.

QSFP Copper Cable Assemblies

Product Facts

- Assemblies available at DDR (5Gbps/lane) and QDR (10Gbps/lane) data rates
- Compatible with industry standard QSFP cages
- EEPROM signature which can be customized
- Pull tab unlatching allows compact belly to belly application
- 360 degree cable braid crimp suppresses EMI
- Specialty and cross-over cables are available
- Optimum cable performance is obtained when cable equalization is customized to system architecture
- Uses MADISON TURBOTWIN copper cable



Tyco Electronics is a leading developer of Quad Small Form Factor Pluggable (QSFP) high speed, high performance cable assemblies. The QSFP assembly offers 4 channels of data, providing

3 times the density of SFP/SFP+ ports. QSFP cable assemblies can support data rates up to 10Gbps per differential pair, and support Fibre Channel, Ethernet and InfiniBand standards.

Applications

- Switches, routers and host bus adapters (HBA's)
- Enterprise storage
- High density I/O's
- Multiple channel interconnects

Fibre Channel is a trademark of the Fibre Channel Industry Association.

INFINIBAND is a trademark of the InfiniBand Trade Association.

Note: All part numbers are RoHS compliant.

QSFP Copper Cable Assemblies (Continued)

QSFP Direct Attach Cable Assembly Part Numbers

Type	Part Number	AWG	Equalized	Assembly Length
DDR (5Gbps) Passive	2074739-1	28	No	0.5 meter
	2074739-2	28	No	1 meter
	2074739-3	28	No	2 meter
	2074739-4	26	No	3 meter
	2074739-5	26	Yes	4 meter
	2074739-6	26	Yes	5 meter
	2074739-8	26	Yes	7 meter
	1-2074739-1	26	Yes	10 meter
QDR (10Gbps) Passive	2015234-1	28	No	1 meter
	2015234-2	28	No	2 meter
	2015234-3	28	No	3 meter
	2015234-4	26	No	4 meter
	2015234-5	26	Yes	5 meter
	2015234-6	26	Yes	6 meter
	2015234-7	26	Yes	7 meter
	2015234-8	26	Yes	8 meter
	2015234-9	26	No	0.5 meter
QDR (10Gbps) Unequalized Passive*	2053638-1	26	No	1 meter
	2053638-2	26	No	2 meter
	2053638-3	26	No	3 meter
	2053638-4	26	No	4 meter
	2053638-5	26	No	5 meter
	1-2053638-0	26	No	10 meter
QDR (10Gbps) Active (In Development)	2015446-1	26	N/A	1 meter
	2015446-2	26	N/A	2 meter
	2015446-3	26	N/A	3 meter
	2015446-4	26	N/A	4 meter
	2015446-5	26	N/A	5 meter
	1-2015446-0	26	N/A	10 meter
	1-2015446-5	26	N/A	15 meter
Optical Fiber Nonconductive Plenum	1985861-9	—	N/A	2 meter
	1985861-1	—	N/A	3 meter
	1985861-2	—	N/A	5 meter
	1985861-3	—	N/A	10 meter
	1-1985861-0	—	N/A	15 meter
	1985861-4	—	N/A	20 meter
	1985861-5	—	N/A	30 meter
	1985861-6	—	N/A	40 meter
1985861-7	—	N/A	50 meter	
	1985861-8	—	N/A	100 meter

*Engineered for use in systems that utilize self-equalizing features (EDC).

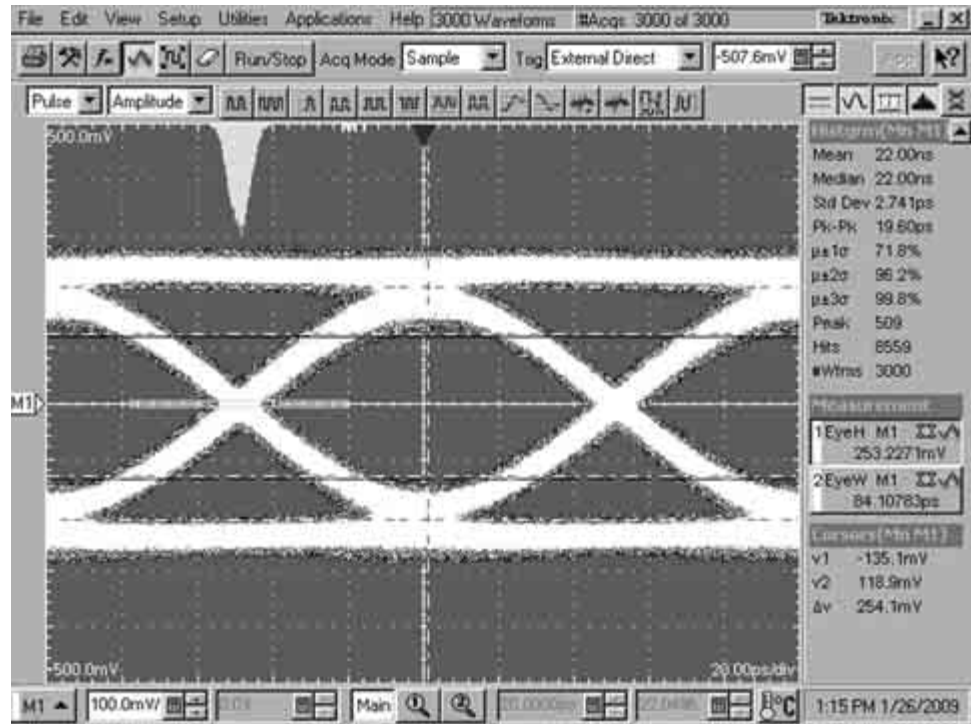
Note: All part numbers are RoHS compliant.

QSFP Copper Cable Assemblies (Continued)

10 Gbps Stressed Eye Pattern for QSFP QDR Cable Assembly — 2 Meters

Part Number 2015234-2

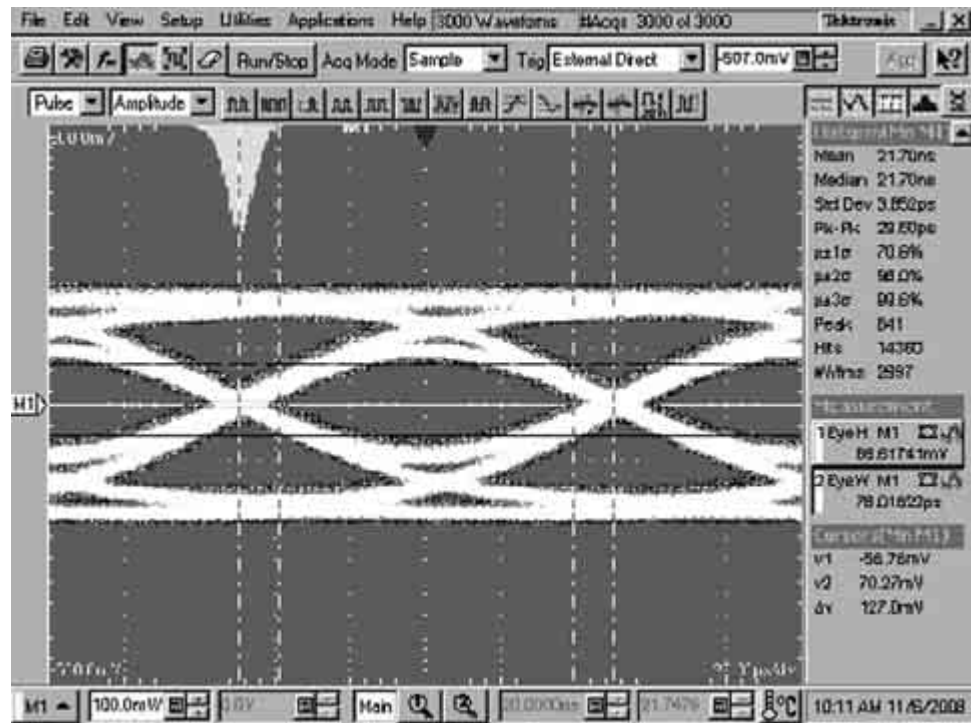
- Data Rate: 10 Gbps
- Input Voltage: 800 mV
- Data Pattern: PRBS 9
- Eye Height: 254.1 mV
- Jitter: 19.6 ps
- 2 m 28 AWG QSFP Equalized QDR Cable Assembly



10 Gbps Stressed Eye Pattern for QSFP QDR Cable Assembly — 5 Meters

Part Number 2015234-5

- Data Rate: 10 Gbps
- Input Voltage: 800 mV
- Data Pattern: PRBS 9
- Eye Height: 127.0 mV
- Jitter: 29.6 ps
- 5 m 26 AWG QSFP Equalized QDR Cable Assembly

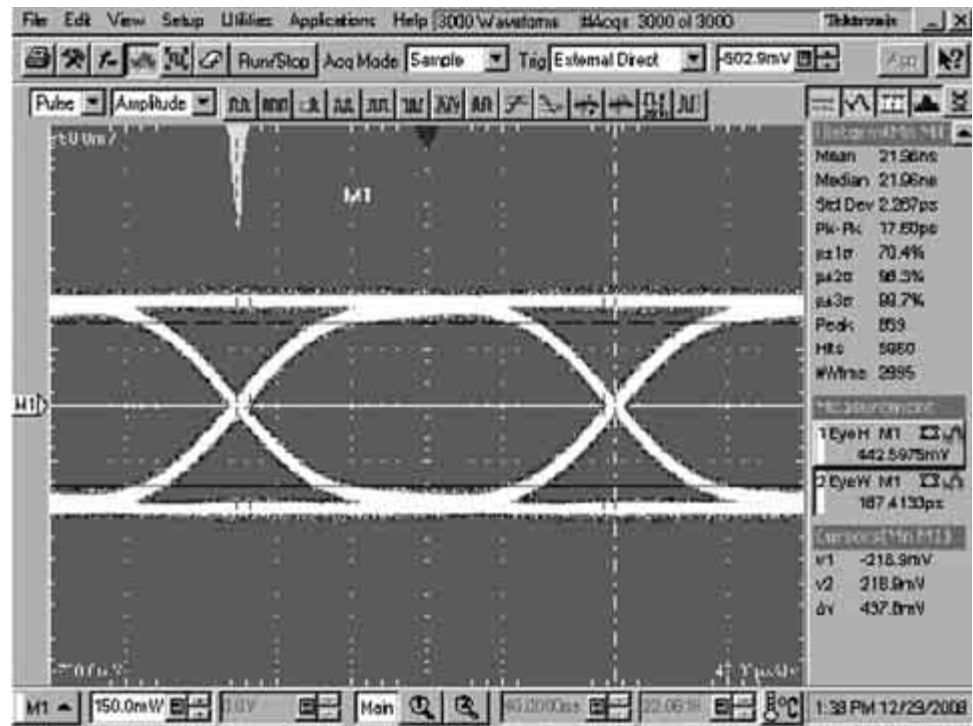


Note: All part numbers are RoHS compliant.

QSFP Copper Cable Assemblies (Continued)

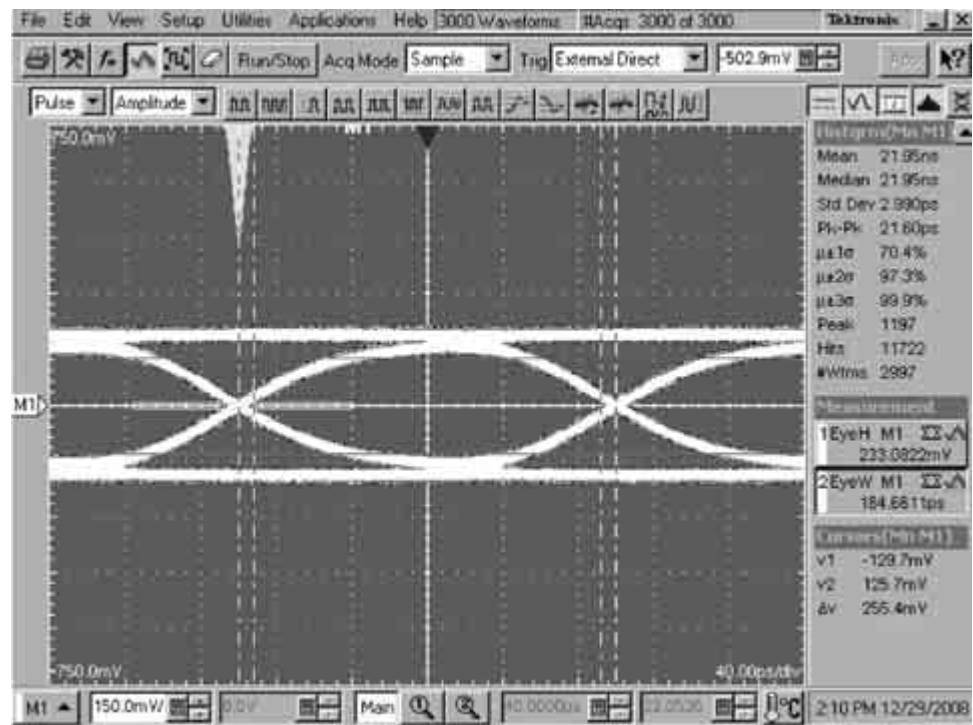
5 Gbps Stressed Eye Pattern for QSFP DDR Cable Assembly — 2 Meters
Part Number 2053638-2

- Data Rate: 10 Gbps
- Input Voltage: 800 mV
- Data Pattern: PRBS 9
- Eye Height: 437.8 mV
- Jitter: 17.6 ps
- 2 m 28 AWG QSFP Unequalized DDR Cable Assembly



5 Gbps Stressed Eye Pattern for QSFP DDR Cable Assembly — 5 Meters
Part Number 2053638-5

- Data Rate: 10 Gbps
- Input Voltage: 800 mV
- Data Pattern: PRBS 9
- Eye Height: 255.4 mV
- Jitter: 21.6 ps
- 5 m 26 AWG QSFP Equalized DDR Cable Assembly



Note: All part numbers are RoHS compliant.

MPO Optical Connectors and Cable Assemblies

QSFP Optical Jumper

- Uses 50/125µm MM fiber (500MHz-km BW at 850nm and 1300nm wavelengths) with OFNR-rated jacket
- Fiber path is reversed (1 to 12, 2 to 11, 3 to 10, 4 to 9, fibers 5, 6, 7, 8 not used)



Other options include

- Custom lengths
- High bandwidth cable (up to 2000MHz-km)
- OFNP rated jacket
- Fanout to LC for interface to SFP optical ports

MPO to MPO Suitable for Interface to Transceiver

Part Number	Standard Length
1938208-1	1 m
1938208-5	5 m
1-1938208-0	10 m
2-1938208-0	20 m
5-1938208-0	50 m

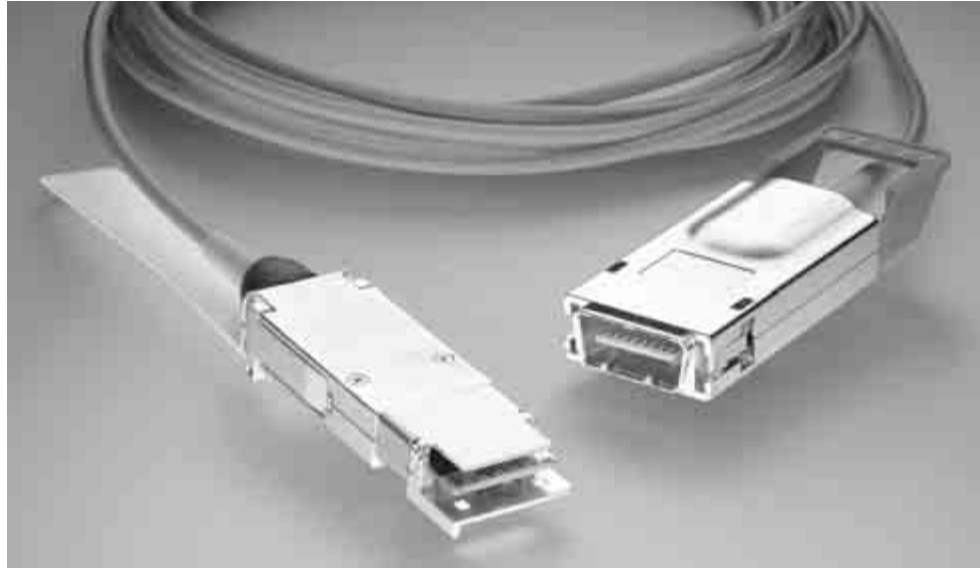
Note: See drawing for part numbers of other standard lengths.

Note: All part numbers are RoHS compliant.

QSFP PARALIGHT Active Optical Cable Assemblies

Applications

- High Performance Computing Clusters
- Supercomputers
- High End Servers
- Mass Storage
- Metro Network Switch/Cross Connect
- High End Carrier Class Routers
- DDR InfiniBand Applications (QDR available end of 2008)
- Other 2.5–5.0 Gb/s Applications (e.g. 10 Gb Fibre Channel or 10 Gig Ethernet XAUI on ports providing InfiniBand pinout 3.3 V power)



Electrical/Optical

- 20 Gb/s bidirectional — 40 Gb/s product available late 2008
- Compatible with SDR and DDR (InfiniBand) standards (QDR available early Q2 2009)
- Low power consumption — under 1 watt per end

Mechanical/Environmental

- Up to 150 meters — longer lengths available upon request
- 25 mm bend radius
- Operating temperature 0°C to 60°C
- Storage Temperature -25°C to 70°C
- 4 channels each direction

Materials

- OFNR/CSA-FT-6 (plenum) cable
- OFN-LS (LSZH rated) cable

Fibre Channel is a trademark of the Fibre Channel Industry Association.
 INFIBAND is a trademark of the InfiniBand Trade Association.
 XAUI is a trademark of the 10Gigabit Ethernet Alliance XAUI Interoperability Group.

Part Numbers

Length (meters)	Cable Type	InfiniBand 4X** Part Numbers	InfiniBand 4X to QSFP Part Numbers	QSFP to QSFP Part Numbers
2	OFNP*	1985427-9	1985554-9	1985861-9
3	OFNP*	1985427-1	1985554-1	1985861-1
5	OFNP*	1985427-2	1985554-2	1985861-2
10	OFNP*	1985427-3	1985554-3	1985861-3
15	OFNP*	1-1985427-0	1-1985554-0	1-1985861-0
20	OFNP*	1985427-4	1985554-4	1985861-4
30	OFNP*	1985427-5	1985554-5	1985861-5
40	OFNP*	1985427-6	1985554-6	1985861-6
50	OFNP*	1985427-7	1985554-7	1985861-7
100	OFNP*	1985427-8	1985554-8	1985861-8

*OFNP = Optical Fiber Nonconductive Plenum

**Also known as CX4 and SFF-8470

Note: Longer lengths available upon request.

Note: All part numbers are RoHS compliant.

Part Number Index

Note: This index lists all cataloged parts by base no. only. Complete part nos. (with prefixes and/or suffixes) are shown on the page(s) indicated.

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1367337	28	1829904	14	2007198	21
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1489962	6	1888901	22	2007477	31
1542618	25	1888968	30	2007492	22
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1588153	18	1902495	15	2007567	22
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Americas

Argentina – Buenos Aires
 Phone: +54-11-4733-2200
 Fax: +54-11-4733-2211

Brasil – São Paulo
 Phone: +55-11-3611-1311
 Fax: +55-11-3611-0397

Canada – Toronto
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 Fax: +905-474-5520

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United States – Harrisburg, PA
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 Fax: +717-986-7575
**Product Information Center:
 (Technical Support)**
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 Fax: +717-986-7575

**For Latin/South American
 Countries not shown**
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 Fax: +54-11-4733-2083

Asia/Pacific

Australia – Sydney
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 Fax: +61-2-9502-2556
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 Fax: +61-2-9634-6188

India – Bangalore
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 Fax: +91-80-285-40820

Indonesia – Jakarta
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 Fax: +65-6482-1012

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New Zealand – Auckland
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 Fax: +64-9-634-4586

Philippines – Makati City
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 Fax: +632-867-8661

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 Fax: +852-2735-0243

Shanghai
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 Fax: +86-21-2407-1599

Taiwan – Taipei
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 Fax: +886-2-8768-2268

Singapore – Singapore
 Phone: +65-6482-0311
 Fax: +65-6482-1012

Thailand – Bangkok
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 Fax: +66-2-955-0505

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Bulgaria – Sofia
 Phone: +359-2-971-2152
 Fax: +359-2-971-2153

Czech Republic – Kurim
 Phone: +420-5-41-162-111
 Fax: +420-5-41-162-223

Denmark – Glostrup
 Phone: +45-43-480-452
 Fax: +45-43-441-414

Egypt – Cairo
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 Fax: +20-2-41 92 334

Estonia – Tartu
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Finland – Helsinki
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 Fax: +49-6251-133-1988

Germany – Langen
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 Fax: +49-6103-709-1223

Germany – Speyer
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 Fax: +49-6232-30-2243

Germany - HTS Division – Neunkirchen
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 Fax: +49-2247-305-122

Greece – Athens
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 Fax: +30-210-9370-655

Hungary – Budapest
 Phone: +36-1-289-1000
 Fax: +36-1-289-1010

Ireland – Dublin
 Phone: +353-1-820-3000
 Fax: +353-1-820-9790

Israel – Yokneam
 Phone: +972-4-959-0508
 Fax: +972-4-959-0506

Italy – Collegno (Torino)
 Phone: +39-011-4012-111
 Fax: +39-011-4031116

Lithuania – Vilnius
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 Fax: +370-5-2131-403

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 Phone: +31-73-624-62-46
 Fax: +31-73-621-23-65

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 Phone: +47-66-77-8886
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 Fax: +48-22-45-76-720

Romania – Bucharest
 Phone: +40-21-311-3479/3596
 Fax: +40-21-312-0574

Russia – Moscow
 Phone: +7-495-926-5506/07/08/09
 Fax: +7-495-926-5505

Russia – St. Petersburg
 Phone: +7-812-718-8192
 Fax: +7-812-718-8193

Slovenia – Ljubljana
 Phone: +386-1561-3270
 Fax: +386-1561-3240

South Africa – Port Elizabeth
 Phone: +2741-503-4500
 Fax: +2741-581-0440

Spain – Barcelona
 Phone: +34-93-291-0330
 Fax: +34-93-201-7879

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Sweden – Upplands Väsby
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 Phone: +41-71-447-0447
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Turkey – Istanbul
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Ukraine – Kiev
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