

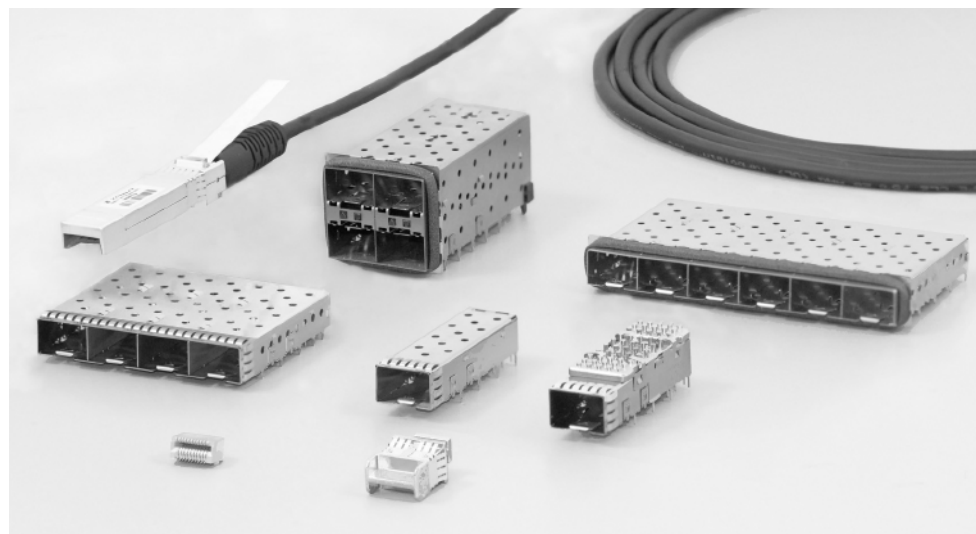
## SFP+ Products

### 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

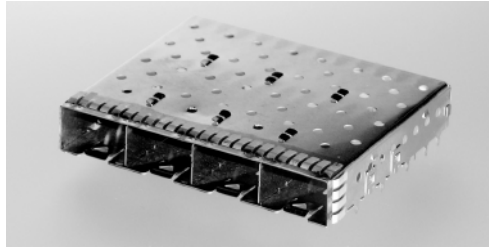
#### Industry Standards

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.

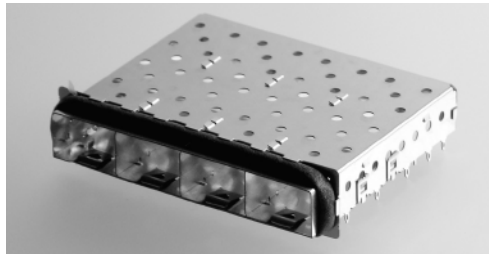
## SFP+ Single Port and Ganged Cages

### 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 |

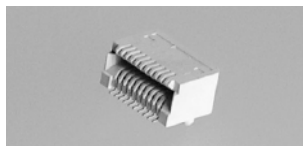
### Cages for PCI Applications

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 $\mu$ m (30 $\mu$ in) gold | 1888247-1   |
| 0.38 $\mu$ m (15 $\mu$ in) 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 |

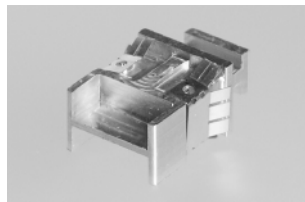
**Note:** Tin plated compliant pins listed, tin-lead compliant pins available for signal connector.  
See Tyco Electronics drawing.

### 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   |
|                      | 2032246-1   | 30  | 0.5 meter SFP+ Cable Assembly |
|                      | 2032246-2   | 30  | 1 meter SFP+ Cable Assembly   |
|                      | 2032246-4   | 30  | 3 meter SFP+ Cable Assembly   |
|                      | 2032246-6   | 30  | 5 meter SFP+ Cable Assembly   |
|                      | 2032757-1   | 24  | 1 meter SFP+ Cable Assembly   |
|                      | 2032757-5   | 24  | 5 meter SFP+ Cable Assembly   |
| Active (Coming Soon) | 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        |
|-------------------|--------------|-----------|-----------|-------------|
| <b>Spec Limit</b> | —            | —         | —         | <b>6.75</b> |
| 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)  |
|-------------------|--------------|------------|-----------|
| <b>Spec Limit</b> | —            | <b>4.5</b> | <b>33</b> |
| 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.