



# Quad Small Form-factor Pluggable (QSFP) Products

## DESCRIPTION

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

## 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

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

## KEY FEATURES

- 4x solution featuring Tyco Electronics 38 position EVERCLEAR connector
- Light pipe and heat sink options available
- Through-bezel and behind-bezel cage options with proven EMI containment
- Direct attach copper cables for short reach applications
- Cable assemblies compatible with industry standard cages
- Quick release cable latching system
- Copper cable 360 degree braid crimp minimizes EMI
- Various specialty copper cable assemblies available
- MPO connectors plug into QSFP parallel optic transceiver modules
- Copper cable assembly performance is optimized when cable is engineered to system architecture

## FOR MORE INFORMATION

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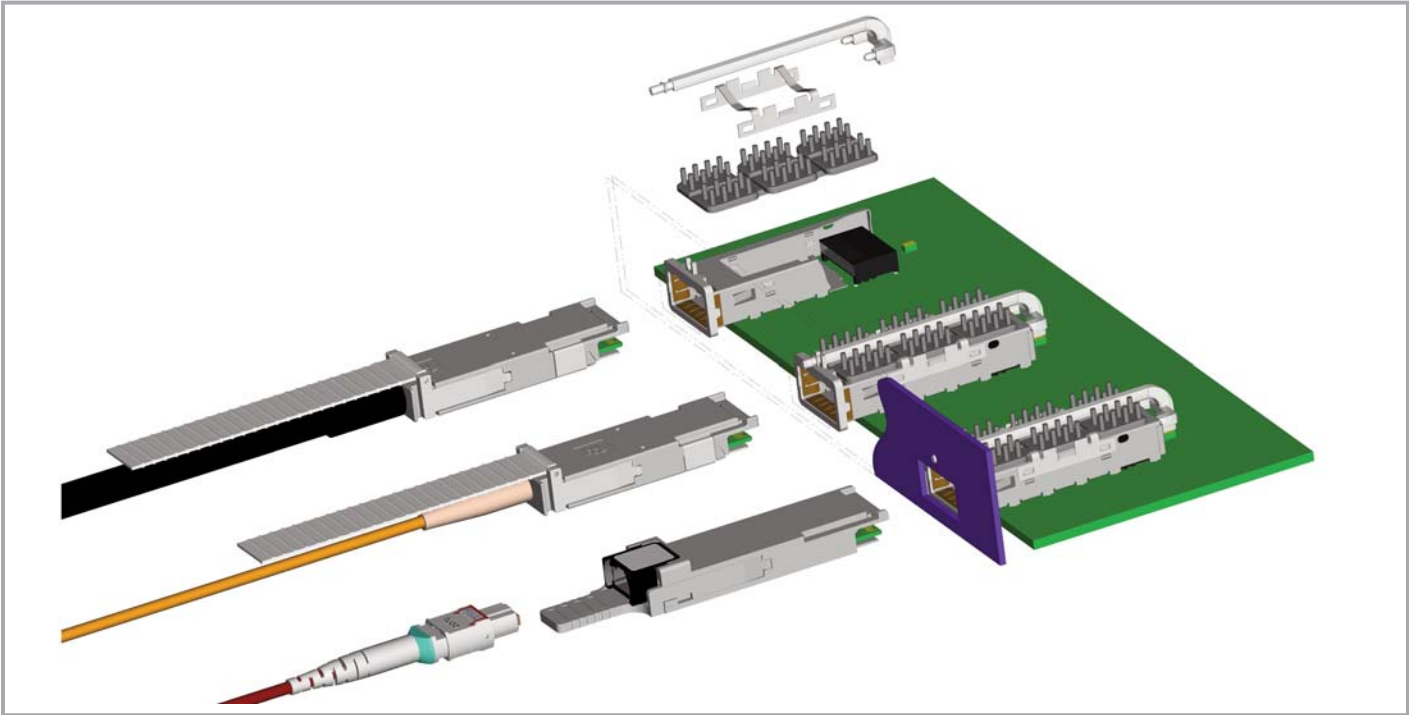
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DESCRIPTION

The QSFP application consists of:

- a 38-position high speed surface mount connector for the host board
- a cage which provides EMI containment and guidance for the mating plug
- a mating plug, which may be in the form of:
  - a pluggable transceiver, which accepts an MPO optical cable
  - a direct-attach QSFP copper cable assembly
  - a direct-attach PARALIGHT active optical cable
- Cage accessories include heatsinks, lightpipes, and EMI/dust plugs.

APPLICATIONS FOR PLUGGABLE I/O INTERFACES:

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

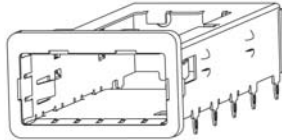
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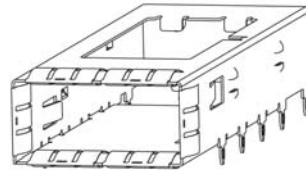
## Quad Small Form-factor Pluggable (QSFP) Products

### CAGES

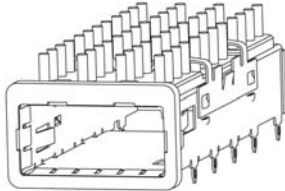
- Proven springs and gasket designs for EMI containment
- Single and dual lightpipes
- Riding heatsinks for thermal dissipation, various fin heights available
- Belly-to-belly compatible (double-sided PCB's)
- Press-fit termination
- Port-to-port spacing-21.0mm (through-bezel)/23.5 (behind-bezel)



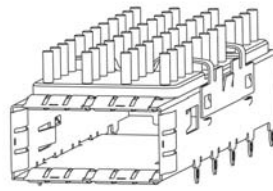
Behind-Bezel Cage



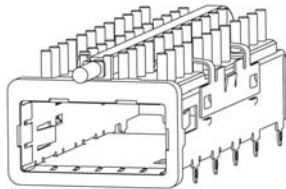
Through-Bezel Cage



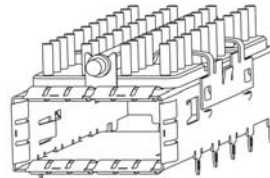
Behind-Bezel Cage with Heatsink



Through-Bezel Cage with Heatsink



Behind-Bezel Cage with Heatsink and Lightpipe



Through-Bezel Cage with Heatsink and Lightpipe

| QSFP Cage Kits: | Part Number | Bezel Mount   | Heatsink   | Max height of heatsink above PCB | Lightpipe        |
|-----------------|-------------|---------------|------------|----------------------------------|------------------|
|                 | 1888617-1   | Through-bezel | None       | --                               | None             |
|                 | 1888674-1   | Through-bezel | None       | --                               | customer applied |
|                 | 1888631-1   | Through-bezel | PCI        | 13.7 mm                          | None             |
|                 | 1888631-2   | Through-bezel | SAN        | 16.0 mm                          | None             |
|                 | 1888631-3   | Through-bezel | Networking | 23.0 mm                          | None             |
|                 | 1888972-1   | Through-bezel | SAN        | 16.0 mm                          | Yes              |
|                 | 1888972-2   | Through-bezel | Networking | 23.0 mm                          | Yes              |
|                 | 1888781-1   | Behind-bezel  | None       | --                               | None             |
|                 | 1888968-1   | Behind-bezel  | PCI        | 13.7 mm                          | None             |
|                 | 1888968-2   | Behind-bezel  | SAN        | 16.0 mm                          | None             |
|                 | 1888968-3   | Behind-bezel  | Networking | 23.0 mm                          | None             |

## Quad Small Form-factor Pluggable (QSFP) Products *continued*



### Ganged QSFP Cages:

|                       | Part Number | Port Configuration | Heatsink   | Max height of heatsink above PCB     | Lightpipe                                         |
|-----------------------|-------------|--------------------|------------|--------------------------------------|---------------------------------------------------|
| <b>Cage Kits</b>      | 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                | PCI        | 13.7 mm                              | none                                              |
|                       | 2007625-2   | 1x4                | SAN        | 16.0 mm                              | none                                              |
|                       | 2007625-3   | 1x4                | Networking | 23.0 mm                              | none                                              |
|                       | 2007668-1   | 1x4                | none       | -                                    | option for lightpipe attachment (sold separately) |
|                       | 2007667-1   | 1x4                | none       | -                                    | none                                              |
| <b>Dual Lightpipe</b> | 2007477-3   |                    |            | Recommended LED height: 0.8 - 1.1 mm | other lightpipe options available                 |



# Direct Attach Copper Cables (QSFP) Products

## DIRECT ATTACH COPPER CABLES

### DESCRIPTION

Tyco Electronic's QSFP direct attach copper cable assembly is a low cost alternative for short reach 4X applications. The design allows for a serial data transmission up to the QDR rate of 10Gbps/lane, for an aggregate 40Gbps. QSFP cable 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 ensures that EMI radiation is suppressed. Additionally, the copper cable acts as a natural heat sink. Low power consumption assists in making the passive copper cable assembly an economic solution for within rack, or rack-to-rack applications. Standard QSFP assemblies are offered in 26AWG and 28AWG, however, other wire gauges can be engineered.



### KEY FEATURES

- 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
- Equalized and unequalized assemblies
- 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 Cable's high speed TurboTwin parallel pair copper cable

### Standard QSFP to QSFP:

| Type                                       | Part Number | AWG | Equalized | Assembly Length |
|--------------------------------------------|-------------|-----|-----------|-----------------|
| DDR (5Gbps)<br>PASSIVE                     | 2074739-1   | 28  | No        | 0.5 meter       |
|                                            | 2074739-2   | 28  | No        | 1 meter         |
|                                            | 2074739-3   | 28  | Yes       | 2 meter         |
|                                            | 2074739-4   | 28  | Yes       | 3 meter         |
|                                            | 2074739-5   | 28  | Yes       | 4 meter         |
|                                            | 2074739-6   | 26  | Yes       | 5 meter         |
|                                            | 2074739-8   | 26  | Yes       | 7 meter         |
|                                            | 1-2074739-1 | 26  | Yes       | 10 meter        |
| QDR (10Gbps)<br>PASSIVE                    | 2015234-1   | 28  | No        | 1 meter         |
|                                            | 2015234-2   | 28  | No        | 2 meter         |
|                                            | 2015234-3   | 26  | Yes       | 3 meter         |
|                                            | 2015234-4   | 26  | Yes       | 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   | 28  | No        | 0.5 meter       |
| QDR (10Gbps)<br>UNEQUALIZED<br>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)<br>ACTIVE (IN<br>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        |

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

## Direct Attach Copper Cables (QSFP) Products Continued

### DIRECT ATTACH COPPER CABLES

#### QSFP Specialty Cable Assemblies:

| Type                                                | Part Number | AWG | Equalized | Assembly Length |
|-----------------------------------------------------|-------------|-----|-----------|-----------------|
| QSFP to 4 SFP+<br>10Gbps per<br>Channel             | 2053453-1   | 26  | No        | 1 meter         |
|                                                     | 2053453-2   | 26  | No        | 2 meter         |
|                                                     | 2053453-3   | 26  | No        | 3 meter         |
|                                                     | 2053453-4   | 26  | Yes       | 5 meter         |
| QSFP to<br>InfiniBand Standard<br>5Gbps per Channel | 2074119-1   | 28  | No        | 1 meter         |
|                                                     | 2074119-2   | 26  | No        | 3 meter         |
|                                                     | 2074119-3   | 26  | No        | 5 meter         |
| QSFP to Mini<br>SAS 3.125Gbps<br>per Channel        | 2053877-1   | 28  | No        | 1 meter         |
|                                                     | 2053877-2   | 28  | No        | 2 meter         |
|                                                     | 2053877-3   | 28  | No        | 3 meter         |
|                                                     | 2053877-4   | 26  | No        | 4 meter         |
|                                                     | 2053877-5   | 26  | Yes       | 5 meter         |
|                                                     | 1-2053877-1 | 28  | No        | 0.5 meter       |
| QSFP to 16<br>SMA RF Coax<br>Test Assembly          | 2053606-1   | N/A | No        | 0.5 meter       |

## PARALIGHT (QSFP) Products

### PARALIGHT

- 4 transmit and 4 receive channels at up to 5 Gb/s per channel
- 10 Gb/s samples available early 2009
- Industry standard (SFF-8470) electrical connector (aka InfiniBand Standard 4X, IB 4X, CX4, Fiber Channel)
- Internally terminated optics — no optical connector to clean



| 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

**Note:** InfiniBand Standard 4x is also known as CX4 and SFF-8470.

**Note:** Longer lengths available upon request.

**Note:** All part numbers are RoHS compliant.

# Quad Small Form-factor Pluggable (QSFP) Products

## FIBER OPTIC CABLES

### QSFP Optical Jumper:

- Uses 50/125um 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   | 1m              |
| 1938208-5   | 5m              |
| 1-1938208-0 | 10m             |
| 2-1938208-0 | 20m             |
| 5-1938208-0 | 50m             |

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

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