Quick Reference Guide
High Speed Input/Output Solutions

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.

TE Connectivity (TE) has always been at the forefront of development of pluggable I/O standards. TE continues to be engaged in new pluggable interface standards to support the rapidly changing market needs for higher bandwidth, and remains at the forefront with the technical expertise required to deliver superior designs for signal integrity and EMI at higher data rates.

FEATURES AND BENEFITS
- High speed I/O solutions that support higher data rates than traditional copper interfaces (e.g. RJ-45)
- Provides a standard interface at the equipment and allows customer to choose between transceiver modules and direct attach cable assemblies based on the application
- All cages are full metal shielded for grounding and EMI suppression
- Standards supported include Fibre Channel, Ethernet, and InfiniBand, and SAS

PRODUCT APPLICATIONS
- Cellular Infrastructure
- Access Routers/ Switches
- High End Servers
- Medical Diagnostic Equipment
- Network Hubs

www.te.com**/products/pluggableIO**

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HIGH SPEED I/O SOLUTIONS

|	SFP	SFP+	QSFP/ QSFP+	XFP	CFP	X2	CXP	zSeries
PT Connectors	1367073-X 1658197-1 1888247-X	1888247-X 2110759-1	1761987-9 2110819-1	788862-1 1367500-1	2057630-1	1367337-X 1658198-1	Included in Assembly	2170088-2 1551920-2

SFP Products
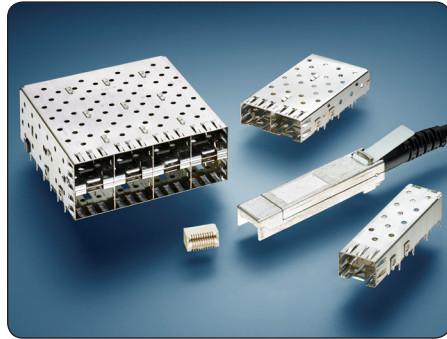
- Supports data rates up to 4 Gb/s
- 20 position PT (Pluggable Transceiver) connecter
- Single port, ganged, and stacked cages available
- Standard and low profile options available for stacked ports

Reference Part Numbers:
1367073-1
1658391-1
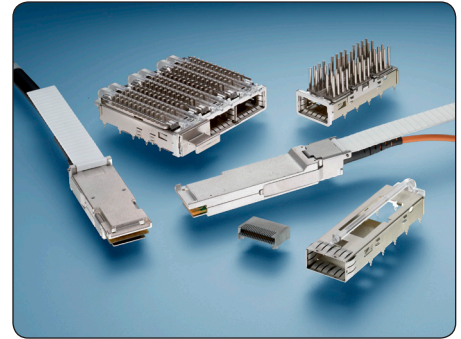1489669-1

SFP+ Products
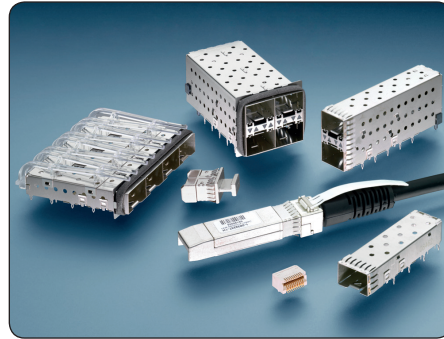
- Supports data rates up to 16 Gb/s
- 20 position PT (Pluggable Transceiver) connecter
- EMI spring or gasket, light pipes, and heat sink options
- Connecter and cable assembly are backward compatible with SFP

Reference Part Numbers:
2110759-1
2007198-1
2007637-5

QSFP/ QSFP+ Products

- Supports data rates up to 40 Gb/s with 10 Gb/s per channel
- Four-channel package offering 3X the density of traditional SFP ports
- 38 Position EVERCLEAR SMT Connector
- Through-bezel and behind-bezel cage options available

Reference Part Numbers:
1888968-1
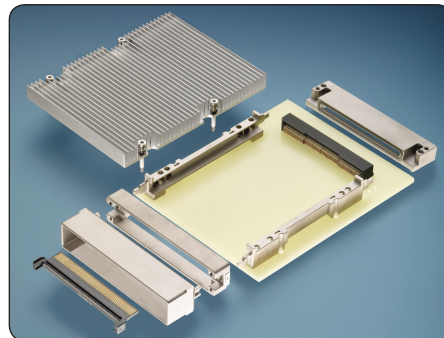1888674-1
1761987-9

XFP Products

- Supports data rates up to 10 Gb/s
- 30 Position SMT connector
- Gasket EMI containment features
- Patented riding heat sink for thermal dissipation

Reference Part Numbers:
1489951-1
1489948-2
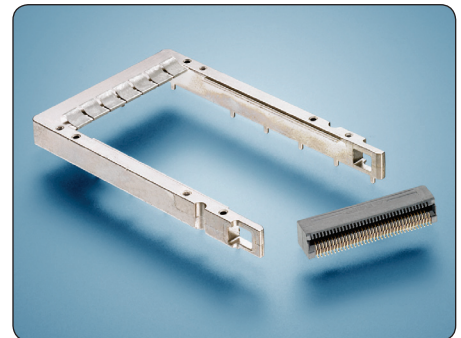1888116-1

CFP Products

- Designed for Ethernet "long reach"
- Supports data rates up to 100 Gb/s with 10 Gb/s per channel
- 148 Position interconnect
- Excellent EMI shielding

Reference Part Numbers:
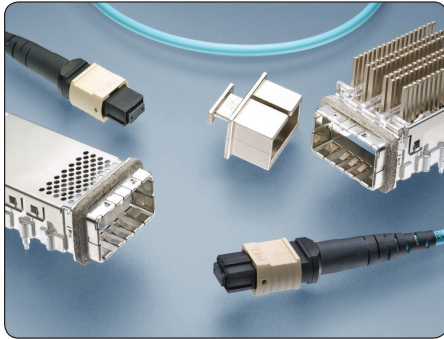2057631-1
2057630-1
2057592-2

X2 Products

- Design for a 10 Gb/s solution (transmitting 4 channels of data at a rate of 3.125 Gb/s each)
- TE connector and guide rails accept X2 MSA compliant module
- XAUI Interface
- 70 Position PT connector

Reference Part Numbers:
1367337-1
1367608-1
1367710-1

CXP Products

- Designed for Ethernet "short reach"
- Supports 150 Gb/s solutions with 12 channels of 12.5 Gb/s data
- Includes both EMI spring and an EMI gasket
- Set position integrated connector

Reference Part Numbers:
  2149701-1
  2149152-1
  2149731-1

Mini-SAS and Mini-SAS HD Products

- Multi-lane solutions designed to support 6 Gb/s and 12Gb/s data rates
- Meet the SAS 2.0 and SAS 2.1 specifications; Mini-SAS HD products have been proposed for the SAS 3.0 specification
- Mini-SAS products support both internal and external solutions
- Reduced size of the Mini-SAS HD system provides additional space for system designers
- Mini-SAS HD is a one-piece assembly featuring a cage and integrated connector

Reference Part Numbers:
  1888321-2
  1761987-7
  2149375-1

zSeries Products

- Next generation high speed I/O pluggable products designed to support 25+ Gbps data rates
- zSFP+ and zQSFP+ products support Infiniband and Fibre Channel applications
- Enhanced EMI protection and high levels of heat dissipation
- Exhibits superior signal integrity along with mechanical and electrical performance

Reference Part Numbers:
  1551920-1
  1551892-1
  2170164-5

High Speed Cable Assemblies

SFP+ Copper Cable Assemblies

- MSA SFF-8431 compliant
- Supports serial data rates up to 10Gbps
- Enhanced EMI supression
- 24AWG through 30AWG cable available
- Uses MADISON CABLE brand twin-axial bulk cable
- Passive and active assemblies

Reference Part Numbers:
  2127931
  2127932
  2127934

QSFP+ Copper Cable Assemblies

- MSA compliant
- Supports data rates up to 10Gbps per channel
- Low cost alternative to fiber optic assemblies
- 26AWG through 30AWG cable available
- Uses MADISON CABLE brand twin-axial bulk cable
- QSFP+ to SFP+ break-out assembly

Reference Part Numbers:
  2053638
  2053453

Mini-SAS Cable Assemblies

- SFF-8088 and SAS 2.0 compliant
- Supports trained and untrained systems
- Up to 6Gbps data rate
- Universal key and standard key slots
- 24, 28 and 30AWG MADISON CABLE brand bulk cable

Reference Part Number:
  1-2127833-4

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Mini-SAS HD Cable Assemblies

- SFF-8644 and SAS 2.1 compliant
- Broad band design for both 6Gbps (SAS 2.1) and 12Gbps (SAS 3.0)
- Improved cable latch design
- Scalable 4x and 8x cable plug configurations
- 26, 28 and 30AWG MADISON CABLE brand bulk cable

Reference Part Number:
2202503-1

Fiber Optic

- Asynchronous, internally AC coupled inputs and outputs
- Light weight and tight bend radius
- Passively cooled design — low thermal resistance heat path from chip to connector shell
- Small 3.0mm diameter cable
- Utilized in applications over 15 meters

Reference Part Number:
2123287-1

STANDARDS FOR HIGH SPEED I/O INTERFACES

Standard	Data Rate	Pluggable Interface										
		XFP	X2	SFP	SFP+	zSFP+	QSFP/ QSFP+	zQSFP+	CFP	CXP	Mini-SAS	Mini-SAS HD
Fibre Channel	1G			X	X	X						
	2G			X	X	X						
	4G			X	X	X						
	8G				X	X						
	16G*				X	X	X					
	32G					X	X					
	64G						X					
Ethernet	1G			X								
	10G	X	X		X		X	X				
	25G*					X		X				
	40G						X	X	X			
	100G							X	X	X		
InfiniBand	2.5G											
	5G											
	10G											
	14G*						X	X				
	26G*						X					
	100G							X		X		
SAS	3G										X	
	6G						X				X	X
	12G											X
TE Cable Availability	Copper			X	X		X				X	X
	Fiber					O	X	O	O	O		O

* Data rate per lane

O = Proposed addition to the Fiber Optic offering

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Components of a High Speed I/O Interface

Lightpipe

Heat sink and Clip

Cage

PT Connector

Direct Attach Copper Cable

Optical Transceiver Module

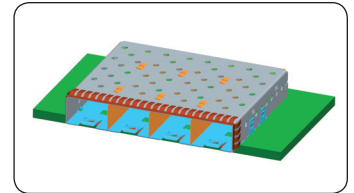Active Optical Cable

Optical Cable
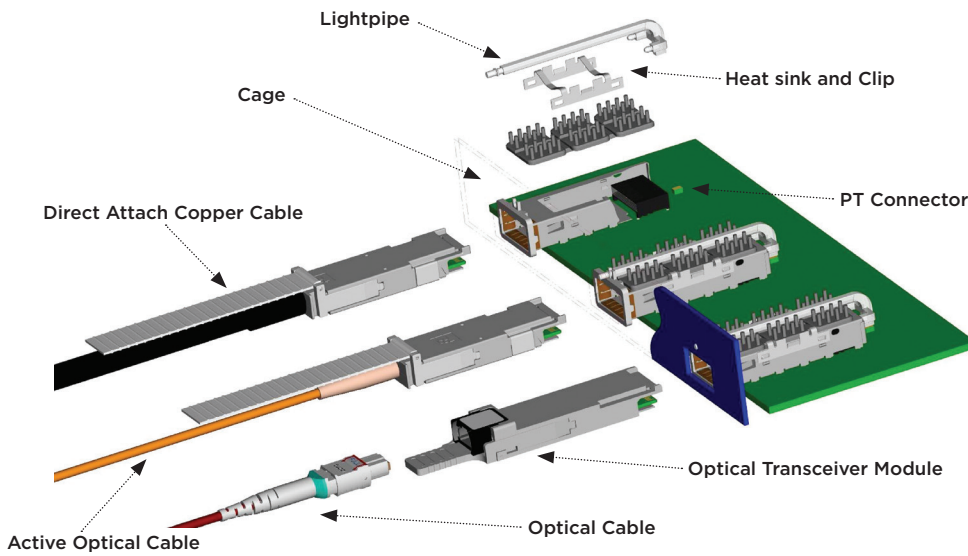
Typical Cage Port Configurations
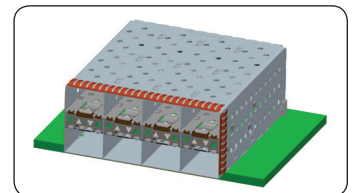
Single Port
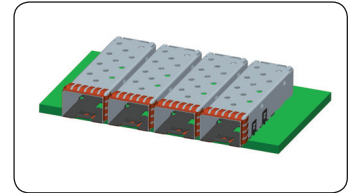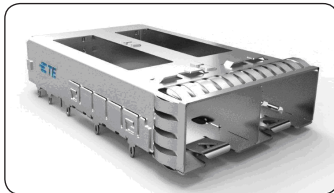
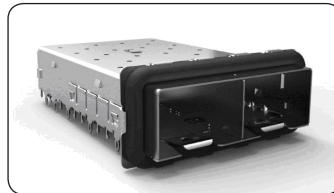**Ganged**

Belly-to-Belly
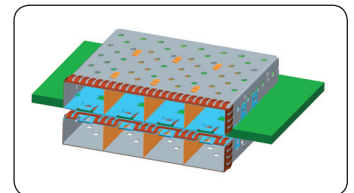
Stacked

Features

EMI Springs

- Lower cost
- Less force applied to bezel

EMI Gasket

- Tighter tolerances between board edge and bezel are required
- Shielding slightly better in single row cage designs
- Less susceptible to damage

Accessories

Lightpipe Application: TE provides surface mounted LED bulbs on the PCB that carry light signal through the lightpipe clipped onto the cage to the faceplate. Lightpipes are available in standard, low profile, reduced length or square.

Lightpipes
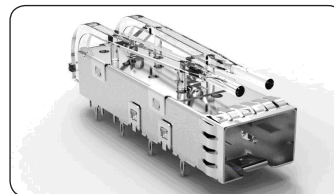
Heat Sinks
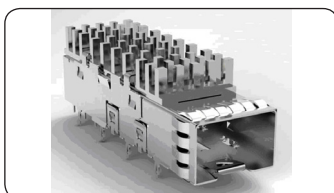
Heat Sink Technology for Thermal Management:
The riding heat sinks use direct contact to the pluggable module to draw heat away from the source. TE heat sinks are available in three standards networking, SAN, PCI, or can be designed to customer specifications.

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Questions to Ask at Design In:

What standard and data rate is required?
Please reference the standards for high speed I/O interface table on page 5

Does the application have specific density requirements?
Assemblies can be configured by the number of ports and to meet height/width restrictions

Does the application require light pipes?
Light pipes are available for SFP, SFP+, QSFP/ QSFP+, and CXP

Does the application require thermal dissipation?
Heat sinks are available for SFP, SFP+, QSFP/QSFP+, XFP, CFP, and CXP

What are your cable requirements?
Depending on the pluggable I/O interface, copper or optical cable assemblies and transceiver or direct attach assemblies are available. Many different cable lengths and options are available.

FOR MORE INFORMATION

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*as defined www.te.com/leadfree

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