QSFP28/56 and zQSFP+ Interconnects

TE Connectivity's (TE) Quad Small Form-Factor Pluggable (QSFP28/56) and z-Quad Small Form-Factor Pluggable Plus (zQSFP+) interconnects offer increased data rates of 28 Gbps NRZ and 56 Gbps PAM-4 in an industry standard, scalable design that allows for backwards compatibility with QSFP+ cables and transceivers, providing a simple upgrade path from 10 Gbps to 28 Gbps and 56 Gbps. The complete portfolio of interconnects deliver a large range of simple and customizable design options to meet most customer requirements. TE's zQSFP+ interconnects are dual sourced with Molex, LLC.

Key Features

- Data transfer rates of 28 Gbps NRZ and 56 Gbps PAM-4
- Supports Ethernet and InfiniBand (IB) Enhanced Data Rate (EDR) requirements
- Supports single, dual and quad channel implementations

Key Benefits

- Superior signal integrity and EMI protection through 56 Gbps
- Industry standard interface
- Backwards compatible with QSFP+ cables and transceivers
- Comprehensive product portfolio

Applications

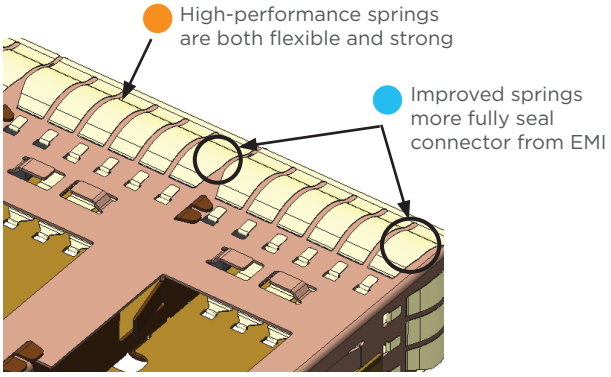
- Network interface
- Switches
- Servers
- Routers
- Wireless Base Stations
- Test and Measurement Equipment

Applications By Protocol

- 50, 100 and 200 Gigabit Ethernet
- 100 Gbps Infiniband (IB) Enhanced Data Rate (EDR) requirements
- 128G Fibre Channel
- 25G/50G Consortium
- 28G NRZ and 56G PAM-4

Enhanced QSFP28/56 and zQSFP+ Cages

EMI Enhanced



Reference base part number 2170709 on page 7

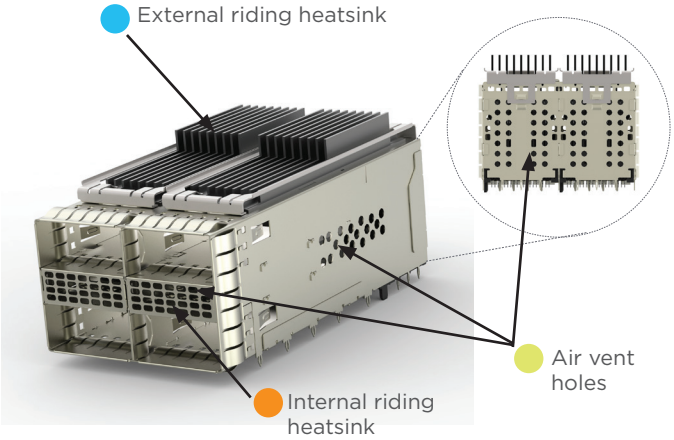
Lower Assembly Insertion Force

Help increase assembly throughput by providing a 55% reduction in force needed to insert the line card into the front bezel. The reduction in insertion force makes assembly easier, faster, and reduces the risk for damage which can lead to reduced EMI performance.

Improved EMI Performance

EMI sealing enhancements on these new cages provide 10 dB EMI performance improvement over current QSFP28 products.

Thermally Enhanced



Reference base part numbers 2299940, 2299870, 2299924, 2321666 and 2321630 on page 7

Lower Port Cooling

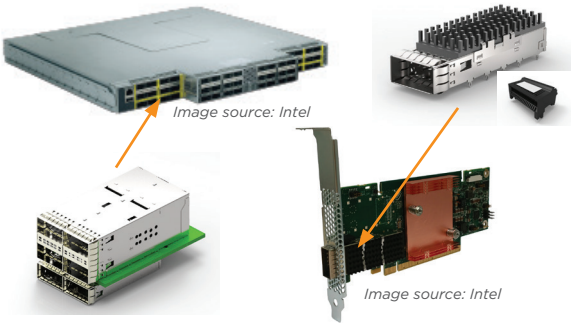
Internal riding heatsink in the seperator plate area provides enhanced cooling to the lower ports and a 12-15°C improvement over standard stacked zQSFP+ cages.

Optimized Airflow

External riding heatsinks on the upper port are optimized for airflow direction (also available without heatsinks).

Air vent holes allow for air to pass through and exit out the sides and rear of the cage.

Intel Omni-Path Architecture



Reference part numbers 2227670-7, 2300281-1, 2170704-1 and 1551920-2 on page 7

Designed for Intel Omni-Path Architecture

These QSFP28/56 and zQSFP+ 2x2 and 1x2 cages are specifically designed for Intel Omni-Path Architecture (OPA) switch architectures, and 1x1 QSFP28/56 cages for OPA NIC cards. Designing with these cages allows access to proven technology to support high performance applications.

Stacked Belly-to-Belly

Reference base part numbers 2314790, 2308171 and 2315050 on page 7

High Density

Certain stacked cages can be used in belly-to-belly applications to support high density 2RU+ box designs and switch designs using next-gen 48 and 64 silicon ports.

Low Cost

Using a stacked belly-to-belly design enables single PCB architecture versus two PCBs per line card, saving significant system costs.

1xN QSFP28/56 Mechanical Options

Bezel Mount

- Behind bezel cages use a gasket applied by the customer to the cage or bezel sheet metal
- EMI spring versions and gasket versions share the same PCB footprint and bezel cutout
- TE offers low insertion force EMI springs to assist in assembly of high density products

Through Bezel with EMI Springs

Through Bezel with EMI Gasket

Behind Bezel (customer applies gasket)

Single

Dual

Quad

Lightpipe Options

- TE offers 1, 2 or 4 lightpipe options per port
- Standard lightpipes are designed to support up to 1.00mm height 0805 style LEDs
- Lightpipes are shipped with an organizer to prevent optical cross-talk

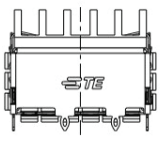
Heat Sink Styles

- TE offers SAN, LAN and Networking height heatsinks
- Custom heatsinks are available upon request
- Height is max height of assembly from surface of PCB

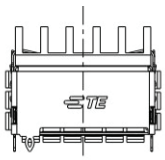
PCI (13.7mm height)

SAN (16.0mm height)

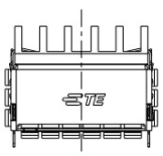
NET (23.0mm height)



2 rear EONs



1 rear EONs



0 rear EON's

Rear EONs

- Rear pins are used to improve EMI grounding and cage retention to the PCB
- TE offers all styles outlined in the SFF-8662 footprint
- Rear EONs will be dependent upon the customer's routing preference and technical specifications

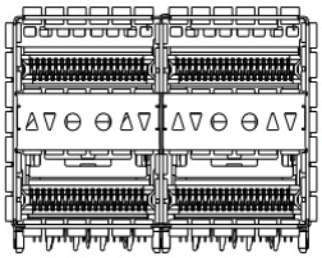
2xN zQSFP+ Mechanical Options

Bezel Mount

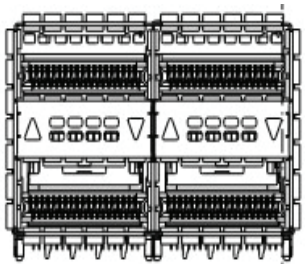
- Through bezel assemblies with EMI springs or EMI gaskets are available
- Custom gasketing options are available upon request

Through Bezel with EMI Springs

Through Bezel with EMI Gasket



Single (per port)



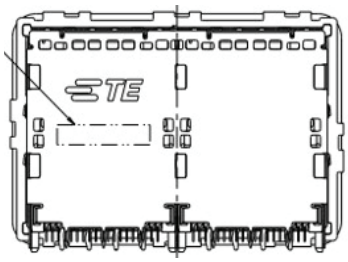
Dual (per port)

Lightpipe Options

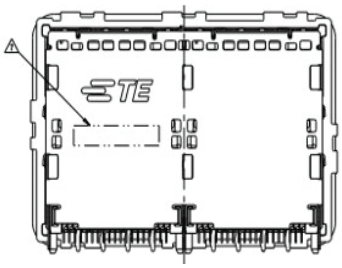
- TE offers zero, single and dual lightpipe options per port
- For higher lightpipe counts, the customer may add lightpipes underneath their PCB to indicate lower port activity
- The thermal footprint design offers 4x lightpipes assembled above the cage
- Lightpipes are designed to support up to 0.80mm height 0805 style LEDs

Rear EONs

- Rear pins are used to improve EMI grounding and cage retention to the PCB
- TE offers zero or three rear pins per port column
- Rear EONs will be dependent upon the customer's routing preference and technical specifications



3 rear EONs



0 rear EONs

Part Number Detail

Cages

Base Part Number	Ports	Cage Applications	EMI Suppression	Lightpipes Applied Per Port			Heat Sinks	Applied	
				Single	Dual	Quad	NET	PCI	SAN
2170754	1x1	Through Bezel	EMI Gasket	Yes	Yes	Yes	Yes	Yes	Yes
2170705	1x1	Through Bezel	EMI Springs	Yes	Yes	Yes	Yes	Yes	Yes
2170773	1x1	Through Bezel	EMI Springs	Yes	Yes	Yes	No	No	No
2170753	1x1	Through Bezel	EMI Gasket	No	No	No	Yes	Yes	Yes
2170752	1x1	Through Bezel	EMI Gasket	No	No	No	No	No	No
2170704	1x1	Through Bezel	EMI Springs	No	No	No	Yes	Yes	Yes
2170703	1x1	Through Bezel	EMI Springs	No	No	No	No	No	No
1551892	1x1	Behind Bezel	C	No	No	No	Yes	Yes	Yes
1551891	1x1	Behind Bezel	C	No	No	No	No	No	No
2170814	1x2	Through Bezel	EMI Gasket	Yes	Yes	Yes	Yes	Yes	Yes
2170813	1x2	Through Bezel	EMI Gasket	Yes	Yes	Yes	No	No	No
2170808	1x2	Through Bezel	EMI Springs	Yes	Yes	Yes	Yes	Yes	Yes
2170807	1x2	Through Bezel	EMI Springs	Yes	Yes	Yes	No	No	No
2170812	1x2	Through Bezel	EMI Gasket	No	No	No	Yes	Yes	Yes
2170811	1x2	Through Bezel	EMI Gasket	No	No	No	No	No	No
2170806	1x2	Through Bezel	EMI Springs	No	No	No	Yes	Yes	Yes
2170805	1x2	Through Bezel	EMI Springs	No	No	No	No	No	No
2227103	1x2	Behind Bezel	C	Yes	Yes	No	Yes	Yes	Yes
2227103	1x2	Behind Bezel	C	No	No	No	Yes	Yes	Yes
2227104	1x2	Behind Bezel	C	No	No	No	Open Top		
2170769	1x3	Through Bezel	EMI Gasket	Yes	Yes	Yes	Yes	Yes	Yes
2170740	1x3	Through Bezel	EMI Springs	Yes	Yes	Yes	Yes	Yes	Yes
2170739	1x3	Through Bezel	EMI Springs	Yes	Yes	Yes	No	No	No
2170768	1x3	Through Bezel	EMI Gasket	No	No	No	Yes	Yes	Yes
2170767	1x3	Through Bezel	EMI Gasket	No	No	No	No	No	No
2170738	1x3	Through Bezel	EMI Springs	No	No	No	Yes	Yes	Yes
2170737	1x3	Through Bezel	EMI Springs	No	No	No	No	No	No
2173239	1x3	Behind Bezel	C	No	No	No	Yes	Yes	Yes
2173238	1x3	Behind Bezel	C	No	No	No	Open Top		
2170785	1x4	Through Bezel	EMI Gasket	Yes	Yes	Yes	Yes	Yes	Yes
2170784	1x4	Through Bezel	EMI Gasket	Yes	Yes	Yes	No	No	No
2170747	1x4	Through Bezel	EMI Springs	Yes	Yes	Yes	Yes	Yes	Yes
2170746	1x4	Through Bezel	EMI Springs	Yes	Yes	Yes	No	No	No

Part Number 1551920-2: zQSFP+ Surface Mount Connector for use with all 1xN QSFP28/56 cages

Notes:
C = Customer Applied Gasket
1xN cages: require a SMT connector to complete the assembly
2xN cages: connectors and cages come as one integrated assembly
All cages use EMI Plug 1888810-2

Cages (con't)

Base Part Number	Ports	Cage Applications	EMI Suppression	Lightpipes Applied Per Port			Heat Sinks	Applied	
				Single	Dual	Quad	NET	PCI	SAN
2170783	1x4	Through Bezel	EMI Gasket	No	No	No	Yes	Yes	Yes
2170782	1x4	Through Bezel	EMI Gasket	No	No	No	No	No	No
2170745	1x4	Through Bezel	EMI Springs	No	No	No	Yes	Yes	Yes
2170744	1x4	Through Bezel	EMI Springs	No	No	No	No	No	No
2227249	1x4	Behind Bezel	C	No	No	No	Yes	Yes	Yes
2227250	1x4	Behind Bezel	C	No	No	No	Open Top		
2315050	1x2	Behind Bezel	EMI Springs	No	No	Yes	No	No	No
2170790	1x4	Through Bezel	EMI Springs	No	No	Yes	Custom Height		
2299940	2x1	Through Bezel	EMI Springs	Yes	Yes	No	Custom Height		
2321666	2x1	Through Bezel	EMI Springs	Yes	Yes	No	Single Piece Press Fit		
2299870	2x2	Through Bezel	EMI Springs	Yes	Yes	No	Custom Height		
2321630	2x2	Through Bezel	EMI Springs	Yes	Yes	No	Single Piece Press Fit		
2299924	2x3	Through Bezel	EMI Springs	Yes	Yes	No	Custom Height		
2227670	2x2	Belly-to-Belly	EMI Springs	No	No	No	No	No	No
2300281	1x2	Belly-to-Belly	EMI Springs	No	No	No	No	No	No
2314790	2x1	Belly-to-Belly	EMI Springs	Yes	Yes	Yes	No	No	No
2308171	2x2	Belly-to-Belly	EMI Springs	Yes	Yes	Yes	No	No	No
2170708	1x6	Through Bezel	EMI Springs	Yes	Yes	Yes	Yes	Yes	Yes
2170734	1x6	Through Bezel	EMI Springs	Yes	Yes	Yes	No	No	No
2170707	1x6	Through Bezel	EMI Springs	No	No	No	Yes	Yes	Yes
2170706	1x6	Through Bezel	EMI Springs	No	No	No	No	No	No
2334626-1	1x6	Behind Bezel	C	No	No	No	No	No	Yes
2334626-2	1x6	Behind Bezel	C	No	No	No	No	No	Yes
2198373	2x1	Through Bezel	EMI Gasket	0/1			No	No	No
2227224	2x1	Through Bezel	EMI Gasket	0/1			No	No	No
2287054	2x1	Through Bezel	EMI Gasket	2			No	No	No
2227666	2x1	Through Bezel	EMI Springs	0/1			No	No	No
2227669	2x1	Through Bezel	EMI Springs	0/1			No	No	No
2227669	2x1	Through Bezel	EMI Springs	2			No	No	No
2170608	2x1	Through Bezel	EMI Gasket	2**			Thermal Footprint		
2214593	2x2	Through Bezel	EMI Gasket	0/1			No	No	No
2227225	2x2	Through Bezel	EMI Gasket	0/1			No	No	No
2287054	2x2	Through Bezel	EMI Gasket	2			No	No	No
2227667	2x2	Through Bezel	EMI Springs	0/1			No	No	No
2227670	2x2	Through Bezel	EMI Springs	0/1			No	No	No
2289129	2x2	Through Bezel	EMI Springs	2			No	No	No
2214565	2x3	Through Bezel	EMI Gasket	0/1			No	No	No
2227226	2x3	Through Bezel	EMI Gasket	0/1			No	No	No
2287054	2x3	Through Bezel	EMI Gasket	2			No	No	No
2227668	2x3	Through Bezel	EMI Springs	0/1			No	No	No
2227671	2x3	Through Bezel	EMI Springs	0/1			No	No	No
2227671	2x3	Through Bezel	EMI Springs	2			No	No	No
2170610	2x3	Through Bezel	EMI Gasket	1/2**			Thermal Footprint		

Enhanced

Part Number 1551920-2: zQSFP+ Surface Mount Connector for use with all 1xN QSFP28/56 cages

Notes:
C = Customer Applied Gasket
1xN cages: require a SMT connector to complete the assembly
2xN cages: connectors and cages come as one integrated assembly
All cages use EMI Plug 1888810-2

Accessories

Type	Description	Part Number(s)
Surface Mount Connector	zQSFP+ SMT connector (For use with all 1xN QSFP28/56 cages)	1551920-2
Behind Bezel	1x1 Heat Sink Clip	2007304-5
	1xN Heat Sink Clip	2227644-3, -4, -6
	1x1 Single Lightpipe	2173481-1
	1xN Single Lightpipe	2173482-1, -2, -3, -7
Through Bezel	1x1 Heats Sink Clip	2007304-5
	1xN Heat Sink Clip	2227644-3, -4, -6
	1x1 Single Lightpipe	2170720-1
	1x1 Dual Lightpipe	2170762-1
	1x1 Quad Lightpipe	2170777-1
	1xN Single Lightpipe	2170720-1
	1xN Dual Lightpipe	2170761-1
	1xN Quad Lightpipe	2170762-1

Specifications

1xN QSFP28/56 cages and zQSFP+ SMT connector

- Cage and Connector Product Spec: 108-19428
- zQSFP+ SMT Connector Application Spec: 114-32022
- QSFP28/56 Cage Assembly Applications Spec: 114-32023

2xN Stacked zQSFP+

- Product Spec: 108-60102
- Application Spec: 114-60015

Direct Attach Copper Cable Assemblies

TE's QSFP28 and QSFP56 passive copper cable assemblies feature eight differential copper pairs, providing four data transmission channels at speeds up to 28 Gbps NRZ and 56 Gbps PAM-4, and meet 100G Ethernet, 200G Ethernet and Infiniband Enhanced Data Rate (EDR) requirements.

Offered in a broad range of wire gauges – from 32AWG up to 26AWG – this 100G copper cable assembly features low insertion loss and low cross talk. This next generation cable assembly shares the same mating interface with QSFP+ and QSFP28 form factors, making it backward compatible with existing QSFP ports. QSFP28 and QSFP56 form factors can be used with current 40G, 100G and 200G applications with substantial signal integrity margin.

Features and Benefits

- Compatible with IEEE 802.3cd, IEEE 802.3bj, IEEE 802.3by and InfiniBand EDR
- Optimized construction to minimize insertion loss and cross talk
- Customized 360° cable braid termination limits EMI radiation
- Compatible with all existing QSFP connectors and cages
- Pull-to-release slide latch design
- 32AWG up to 26AWG
- Straight and breakout assembly configurations available
- Customizable EEPROM mapping for cable signature
- RoHS compliant
- Low smoke zero halogen options available by request
- Contact your TE Representative for customized lengths

Part Number Detail

QSFP28 Cable Assemblies

Base Part Number	Description	AWG	Dash to Length (meters)									
			0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
2336313	QSFP28 to QSFP28 Straight Assembly	32	-1	-2	-3	-4						
2333393		30	-1	-3	-4	-5	-6	-7				
2333841		28	-1	-2	-3	-4	-5	-6	-7	-8		
2333842		26	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
2340655	QSFP28 to 2xQSFP28 Breakout Cable	32	-1	-2	-3	-4						
2333801		30	-1	-2	-3	-4	-5	-6				
2333843		28	-1	-2	-3	-4	-5	-6	-7	-8		
2333844		26	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10
2340654	QSFP28 to 4xSFP28 Breakout Cable	32	-1	-2	-3	-4						
2334236		30	-1	-2	-3	-4						
2334877		28	-1	-2	-3	-4	-5	-6	-7	-8		
2334878		26	-1	-2	-3	-4	-5	-6	-7	-8	-9	-10

QSFP56 Cable Assemblies

Base Part Number	Description	AWG		Dash to Length (meters)				
			0.5	1	1.5	2	2.5	3
2336313	QSFP56 to QSFP56 Straight Assembly	32	-41	-42	-43			
2333393		30	-41	-43	-44	-45		
2333841		28	-41	-42	-43	-44	-45	
2333841		26	-41	-42	-43	-44	-45	-46
2340655	QSFP56 to 2xQSFP56 Breakout Cable	32	-41	-42	-43			
2333801		30	-41	-42	-43	-44		
2333843		28	-41	-42	-43	-44	-45	
2333844		26	-41	-42	-43	-44	-45	-46
2340654	QSFP28 to 4xSFP56 Breakout Cable	32	-41	-42	-43			
2334236		30	-41	-42	-43	-44		
2334877		28	-41	-42	-43	-44	-45	
2334878		26	-41	-42	-43	-44	-45	-46

Frequently Asked Questions

What data rates do QSFP28/56 and zQSFP+ support?

These products provide four data transmission channels at speeds up to 28 Gbps NRZ and 56 Gbps PAM-4 per channel.

Is TE's footprint compatible with other suppliers?

TE's 1xN QSFP28/56 cages are designed to SFF-8663 and are industry standard. TE's zQSFP+ SMT connector and 2xN assemblies are dual sourced with Molex, LLC.

Are heat sinks available?

Yes, TE offers a generous portfolio of heat sink heights and styles, as well as custom heat sinks upon request.

Is application tooling required?

Single port cage assemblies require only flat-rock tooling, while 1xN and stacked assemblies normally require specific application tooling.

For More Information

TE Technical Support Center

USA:	1.800.522.6752
Canada:	1 .905.475.6222
Mexico:	52.0.55.1106.0800
Latin/S. America:	54.0.11.4733.2200
Germany:	49.0.6251.133.1999
UK:	44.0.800.267666
France:	33.0.1.3420.8686
Netherlands:	31.0.73.6246.999
China:	86.0.400.820.6015

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