

SFP+ Connectors, Cages and Copper Cable Assemblies For 10Gigabit-Ethernet (10GbE), 8G Fibre Channel and 10G Fibre Channel over Ethernet applications

DESCRIPTION

FCI's SFP+ connector, cage and cable assembly I/O system offerings are designed to meet data center, networking and high performance computing application needs for a high density cabling interconnect system capable of 10Gb/s per channel transmission rates. This interconnect system is designed to meet the requirements of Small Form Factor industry standards SFF-8431 and 8461. FCI offers both passive & actively equalized cable assemblies each tailored to meet specific cable lengths while meeting all performance requirements. Multiple cage configurations are offered to allow customers the ability to maximize useable linear board real estate. The pick-n-place compatible 20 position SMT terminated connector meets all interface and standard requirements. The SFP+ I/O system supports the bandwidth transmission requirements as defined by 10Gigabit-Ethernet (10G Base-CU), 8G Fibre Channel (FC) and 10G Fibre Channel over Ethernet (FCoE) specifications.



FEATURES & BENEFITS

- Fully compatible with all SFP+ interfaces & mechanical backwards compatibility with SFP
- Designed to be compliant with SFF-8431 and SFF-8461 industry standards
- 100 ohm differential impedance
- Allows for 10Gb/s per channel transmission up to 7 meters (passive cable assembly)
- Allows for 10Gb/s per channel transmission up to 15 meters (actively equalized cable assembly)
- Optimized PCB interface board to minimize crosstalk and insertion loss
- Stamped EMI girdle to assure superior EMI shielding effectiveness
- EEPROM for cable signature & system communications
- Actively equalized cables will enable longer cable lengths or can enable the use of smaller cable diameters for shorter cable lengths
- Lower cost and lower power solution when compared to fiber optic links
- 32 AWG to 24 AWG cable sizes available
- RoHS compliant

TARGET MARKETS / APPLICATIONS

- Data
 - Servers
 - Networked storage systems
 - External storage systems
 - High Performance Computing (HPC) applications
 - Data Center networking
- Communications
 - Switches
 - Routers
- Industry Standards
 - 10 Gigabit-Ethernet (10 GBASE-CU)
 - Gigabit-Ethernet (IEEE 802.3ae)
 - 8G FC and 10G FCoE
 - SFF-8431 & SFF-8461

Cable Assemblies

The SFP+ cable assembly's printed circuit paddle card has been designed to not only address the stringent mechanical interface requirements but also the higher-bandwidth signal integrity requirements for 10Gb/s per channel transmission. It has also been designed to accommodate industry defined EEPROM cable signature requirements needs as well as address requirements for both passive and active equalized cable assembly applications. The cable assembly also includes robust diecast covers and an EMI girdle to assure proper EMI shielding effectiveness and termination. Cable assembly removal is enabled via a user friendly pull tab. In addition, FCI manufactures these cable assemblies using highly controlled and stable cable assembly manufacturing processes that minimizes wire management and termination variations that can impact the performance of the cable assembly. Robust final test and quality systems assure high quality cable assemblies conforming to the high-speed electrical performance requirements in industry specifications.

TECHNICAL DATA

PHYSICAL

- Shells: Diecast zinc – Copper underplate with a nickel overplate
- PCB: FR-4 laminate with gold plated contact pads
- Raw cable: 2 individually shielded parallel pair cables with fully braided EMI shield with low smoke, zero halogen or PVC jacketing
- EMI girdle: Stainless steel
- Pull tab: Thermoplastic polymer
- Release plate: Stainless steel
- Drive screws: Stainless steel

ELECTRICAL PERFORMANCE

- Differential Impedance: 100Ω +/- 10Ω @ 70ps rise time (20-80%)
- Within Pair skew: < 10 ps / meter
- Pair-to-pair skew: < 50 ps / meter
- Withstanding voltage: 300V DC
- Current rating: 0.5 amps maximum per contact

MECHANICAL PERFORMANCE

- Durability: 100 cycles
- Mating force: 18N maximum
- Latch Strength; axial load: 180N minimum
- Cable axial strain relief: 90N minimum
- Cable flex: 180° flex: 15 cycles per EIA 364-41

ENVIRONMENTAL

- Operating temperature: -20°C to 85°C
- RoHs compliant
- Thermal shock: EIA 364-32, condition1, 25 cycles, -55°C to 85°C
- Temperature life: EIA 364-17, Method A, Condition 2, Time Condition C, 500 hours, 70°C
- Mixed Flowing gas – EIA 364-65, Class IIA – 7 days unmated and 7 days mated

APPLICABLE INDUSTRY STANDARDS

- SFF-8074i SFP Small Form-Factor Pluggable Transceiver rev 1.0
- SFF-8431 Specification for Enhanced SFP Pluggable mod.SFP+
- SFF-8432 Improved Pluggable Form Factor
- SFF-8461 SFP+ Active Cable Specification & Alternate Test Methods
- IEEE 802.3 Gigabit-Ethernet standard

REFERENCE DATA

- GS- 12-616 – Product specification- SFP+ connectors, cages and cable assemblies – passive & actively equalized

CERTIFICATIONS & APPROVALS

- Ethernet Alliance Interoperability compliance



PART NUMBERS

10101497 – SFP+ cable assembly – passive – Leoni raw cable

10101498 - SFP+ cable assembly – actively equalized - Leoni raw cable

10110818 - SFP+ cable assembly – passive – Standard raw cable

10110819 - SFP+ cable assembly – actively equalized - Standard raw cable

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CABLE ASSEMBLY CAPABILITY MATRIX

SFP+		Unequalized cable length														
Performance Level	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m	
SFF-8431	32	30	30	28	28	26	24									
IEEE 802.3ba	TBD	TBD	TBD	TBD	TBD	TBD	TBD									
Fibre Channel	TBD	TBD	TBD	TBD	TBD	TBD	TBD									

		Actively equalized cable length														
Performance Level	1m	2m	3m	4m	5m	6m	7m	8m	9m	10m	11m	12m	13m	14m	15m	
SFF-8431	32	32	32	32	32	30	30	28	28	26	26	24	24	24	24	
IEEE 802.3ba	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD				
Fibre Channel	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD				

TBD - Cables currently being tested to this standard

Connectors and Cages

FCI's SFP+ connector & cage product portfolio includes a 20 position, 0.8mm contact centerline spaced, SMT terminated card edge connector that is pick-n-place compatible. The EMI metal cages are offered in a single 1x1 configuration and also in 1x2 and 1x4 ganged configurations. The 1x1 and 1x4 cage configurations are also offered with light pipes that allows for displaying network activity via LED's mounted on the system PCB. The edge card connector and cages are designed to meet all signal integrity requirements and EMI requirements as defined by the SFF-8431 and 8461 specifications. Robust EMI fingers are included with each cage port in order to assure a robust and reliable EMI shield & termination when placed through the chassis opening. All connector and cage offerings are fully RoHs compliant.

TECHNICAL DATA

PHYSICAL Connector

- Housing: Black thermoplastic, UL94V-0 rated
- Contact: Phosphor-bronze
- Contact plating : 30 micro-inch minimum gold plating on edge card interface with 50 micro-inch nickel under-plate
150 micro-inch minimum tin plating on SMT leads with 50 micro-inch nickel underplate

Cages

- Cage: Copper alloy
- EMI fingers: Copper alloy
- Cage plating: 50 micro-inch minimum nickel plating
- EMI finger plating: 50 micro-inch minimum tin over 50 micro-inch minimum nickel
- Light pipe: Clear polycarbonate
- Light pipe bracket : Stainless steel
- EMI gasket: Conductive elastomeric



ELECTRICAL PERFORMANCE

- Differential Impedance: 100Ω +/- 10Ω @ 70ps rise time (20-80%)

MECHANICAL PERFORMANCE

- Durability: Connectors - 100 cycles
- Connector mating force: 18N maximum
- Cage: Press fit tail termination – insertion force – 40 N per tail

ENVIRONMENTAL

- Operating temperature: -20°C to 85°C
- RoHs compliant
- Thermal shock: EIA 364-32, condition1, 25 cycles, -55°C to 85°C
- Temperature life: EIA 364-17, Method A, Condition 2, Time Condition C, 500 hours, 70°C
- Mixed Flowing gas – EIA 364-65, Class IIA – 7 days unmated and 7 days mated

APPLICABLE INDUSTRY STANDARDS

- SFF-8083 Improved 0.8mm Card Edge Connector rev 2.0
- SFF-8074i SFP Small Form-Factor Pluggable Transceiver rev 1.0
- SFF-8431 Enhanced SFP Pluggable
- SFF-8432 Improved Pluggable Form Factors
- IEEE 802.3 Gigabit-Ethernet standard

REFERENCE DATA

- GS- 12-616 – Product specification- SFP+ connectors, cages and cable assemblies – passive & actively equalized
- GS- 20-125 – Application specification – SFP+ connectors & cages

PART NUMBERS

10099099 – SFP+ 20 position connector

10099100 – SFP+ 1x1 cage with EMI fingers

10099101 – SFP+ 1x2 cage with conductive elastomeric gasket

10099102 – SFP+ 1x4 cage with EMI fingers



10099103 – SFP+ 1x1 cage with light pipes

10099104 – SFP+ 1x4 cage with elastomeric gasket and light pipes

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