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SFF Committee

SFF-8672

Specification for

QSFP+ 4X 28 Gb/s Connector (Style B)

Rev 1.0 January 9, 2013

Secretariat: SFF Committee

Abstract: This specification defines the mechanical specifications and general performance requirements of the 28 Gbs 0.8mm connector that is designed for use in high speed serial interconnect applications. One such use is as the 28 Gbs QSFP+ host receptacle and mating cable Plug as well as the mating interface in the 28 Gbs pluggable QSFP+ modules.

The mechanical dimensioning for 28 Gbs style QSFP connector allows backwards compatibility between QSFP modules and QSFP cages that have been developed in accordance with SFF-8436. It is anticipated that manufacturers will be able to supply existing QSFP cages, developed in accordance with SFF-8436 that will accept 28 Gbs style QSFP connector and 28 Gbs style QSFP modules.

This specification provides a common reference for systems manufacturers, system integrators, and suppliers. This is an internal working specification of the SFF Committee, an industry ad hoc group.

This specification is made available for public review, and written comments are solicited from readers. Comments received by the members will be considered for inclusion in future revisions of this specification.

The description of a connector in this specification does not assure that the specific component is actually available from connector suppliers. If such a connector is supplied it must comply with this specification to achieve interoperability between suppliers.

Support: This specification is supported by the identified member companies of the SFF Committee.

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EXPRESSION OF SUPPORT BY MANUFACTURERS

The following member companies of the SFF Committee voted in favor of this industry specification.

Amphenol
Cinch
EMC
ENDL
Finisar
Foxconn
Hewlett Packard
Hitachi GST
JDS Uniphase
Luxshare-ICT
NetApp
NetLogic uSyst
QLogic
Sandisk
Volex

The following member companies of the SFF Committee voted to abstain on this industry specification.

Dell Computer
FCI
ICT-Lanto
Intel
LSI
Molex
Seagate
Sumitomo
TE Connectivity
Toshiba

The user's attention is called to the possibility that implementation to this Specification may require use of an invention covered by patent rights. By distribution of this specification, no position is taken with respect to the validity of a claim or claims or of any patent rights in connection therewith. Members of the SFF Committee which advise that a patent exists are required to provide a statement of willingness to grant a license under these rights on reasonable and non-discriminatory terms and conditions to applicants desiring to obtain such a license.

Change History:

T/E	Section	Page	Problem Description	Suggested Solution	Date Updated	Comments
E	3	9	Top of the page. References figure 5-1 but shows figure 3-1. We think this is a typo and should say Figure 3-1 in both places.	Change text to "Figure 3-1 is an example etc...	1-Jun-11	ACCEPTED: Changed according to suggestion

T	4.2	13	In Table 4-2, B-13 Peg to Row B at 7.69 +/- 0.01. For a molded part this is very tight. We suggest the following:	Change text to: Peg to Row B 7.69 +/- 0.10	1-Jun-11	ACCEPTED: Changed according to suggestion
T	4.3	15	Table 6-3 is Miss Labeled. We think it should be Table 4-3. The next table on the same page is labeled 5-1. Why would numbering go down?	Re-Label Table 6-3 making it Table 4-3.	1-Jun-11	ACCEPTED: Changed according to suggestion
T	5	16	Table 5-2 References: Insertion Loss - EIA 364-101 (under Test Condition) 50 Hz to 12.5 GHz. Should reference: 50 MHz - 14 GHz Making it consistent with SFF-8662.	Should read: 50 MHz - 14 GHz	1-Jun-11	ACCEPTED: Changed according to suggestion
T	F	16	Table 5-2 also references: Return Loss and Common Mode through Conversion to 25 Ghz. This too should be 14 Ghz to be consistent with SFF-8662.	Change to: (Frequencies up to 14 GHz)	1-Jun-11	ACCEPTED: Changed according to suggestion
T	F	16	Table 5-2 also references: Return Loss and Common Mode through Conversion to 25 Ghz. This too should be 14 Ghz to be consistent with SFF-8662.	Change Test Condition for Return Loss and Common Mode Through Conversion to: 10 MHz to 14 GHz	1-Jun-11	ACCEPTED: Will be changed to 50 MHz to 14GHz
E	4.1	11	Correct typing mistakes regarding dimensions A07, A09, A10 and A11	A07 should be 0.60. A09 should be 1.45 +/- 0.10 A10 should be 0.90 A11 should be 0.45 +/- 0.05	2-Jun-11	ACCEPTED: Changed according to suggestion
E	4.2	13	Correct typing mistakes regarding dimension B13	B13 should be 0.10	2-Jun-11	ACCEPTED: Changed according to suggestion
E	5.2	16	Better define the following statement: "Includes connector cable to connector interface and board termination pads"	Change to: "Includes host board interface, connector and card interface"	2-Jun-11	ACCEPTED: Changed according to suggestion
E	5.2	16	Better define the parameter: Return Loss	Change to: Differential Return Loss	2-Jun-11	ACCEPTED: Changed according to suggestion
E	5.2	16	NO Common Mode Return Loss	Add Common Mode Return Loss	2-Jun-11	ACCEPTED: Changed according to suggestion

E	5.2	16	Better define the parameter: Common Mode Conversion (SCD21)	Change to: Differential to Common Mode Conversion	2-Jun-11	ACCEPTED: Changed according to suggestion
E	5.2	16	Following statement is confusing in table 5.2 regarding the Near End Isolation "Frequency up to 14.0 GHz"	Remove: "Frequency up to 14.0 GHz"	2-Jun-11	ACCEPTED: Changed according to suggestion
E	5.2	16	Following statement is confusing in table 5.2 regarding the Insertion Loss "Frequency up to 6.25 GHz"	Remove: "Frequency up to 6.25 GHz"	2-Jun-11	ACCEPTED: Changed according to suggestion
E	4.1	9	No pictorial reference regarding the datum	Add figure 4-1 to define the location for datums A, K, L and N	23-Jun-11	ACCEPTED: Changed according to suggestion
E	1	1	Change the title of the document from 25 Gbs to 28 Gbs	Title change to 28 Gbs	23-Jun-11	ACCEPTED: Changed according to suggestion
T	4.2	12&13	There is definition for round peg 1.45+/-0.05. We think the "diamond" peg on the other side should be dimensioned also.	Add dimensions for diamond peg on left side of Figure 4-2	23-Jun-11	ACCEPTED: Dimension B27 and B28 added accordingly
T	4.2	12	There is a dimension .21 referenced above and to the left of B06. On Rev .2 this was B21. The "B" was deleted.	Add the "B" to B21 in Figure 4-2.	23-Jun-11	ACCEPTED: Letter "B" added to dimension 21
E	6.2	20	Incorrect frequency (16 GHz) used on Common Mode Return Loss	Change frequency to 14 GHz	23-Jun-11	ACCEPTED: Changed according to suggestion
E	1	6	Clarify compatibility to 10Gbs application	Add to 1.0 Scope: This connector is completely backwards compatible when mated to a connector and Cage/Shield that is in accordance with SFF-8436. When mating a 28G connector to a 10G backwards compatible connector per SFF-8436 the EMI shielding shall pass the application 10G EMI requirements. When mating a 28G connector to a 28G connector the EMI shielding shall pass the application 28G EMI requirements.	20-Jul-11	ACCEPTED: Changed according to suggestion
E	Rev 0.6		Minor editorial changes after balloted to Publish	For example, alphabetize Glossary.	10-3-11	

T	Rev 0.7		Table 6-2 has 0.5A per contact and needs to be updated to 1.0A per contact. The agreed limitation is that this rating applies only to the 3 power supply pins. This is needed for modules with power dissipation > 3.5W.	Corrected rating on power pins.	12-30-11	ACCEPTED
T	Rev 0.8		"Fixed" and "Free" designations are reversed in Fig 2-1 and Section 3/4th paragraph should be "was".	Corrected	1-8-12	ACCEPTED
T	Rev 0.8		Complaint about inconsistent speed usage between similar specifications.	Added Section 1.2 on titling. Changed 28G references to 28 Gbs	1-16-12	ACCEPTED
T	Rev 0.9		The definitions of datums H and J in Figure 5-1 are reversed	Replaced Figure 5-1	2-6-12	ACCEPTED
P	Rev 1.0		Letter committing to SFF Patent Policy not yet received.	Reverted to Development Status	1-9-13	COMPLETED

Foreword

The development work on this specification was done by the SFF Committee, an industry group. The membership of the committee since its formation in August 1990 has included a mix of companies which are leaders across the industry.

When 2 1/2" diameter disk drives were introduced, there was no commonality on external dimensions e.g. physical size, mounting locations, connector type, connector location, between vendors.

The first use of these disk drives was in specific applications such as laptop portable computers and system integrators worked individually with vendors to develop the packaging. The result was wide diversity, and incompatibility.

The problems faced by integrators, device suppliers, and component suppliers led to the formation of the SFF Committee as an industry ad hoc group to address the marketing and engineering considerations of the emerging new technology.

During the development of the form factor definitions, other activities were suggested because participants in the SFF Committee faced more problems than the physical form factors of disk drives. In November 1992, the charter was expanded to address any issues of general interest and concern to the storage industry. The SFF Committee became a forum for resolving industry issues that are either not addressed by the standards process or need an immediate solution.

Those companies which have agreed to support a specification are identified in the first pages of each SFF Specification. Industry consensus is not an essential requirement to publish an SFF Specification because it is recognized that in an emerging product area, there is room for more than one approach. By making the documentation on competing proposals available, an integrator can examine the alternatives available and select the product that is felt to be most suitable.

SFF Committee meetings are held during T10 weeks (see www.t10.org), and Specific Subject Working Groups are held at the convenience of the participants. Material presented at SFF Committee meetings becomes public domain, and there are no restrictions on the open mailing of material presented at committee meetings.

Most of the specifications developed by the SFF Committee have either been incorporated into standards or adopted as standards by EIA (Electronic Industries Association), ANSI (American National Standards Institute) and IEC (International Electrotechnical Commission).

If you are interested in participating or wish to follow the activities of the SFF Committee, the signup for membership and/or documentation can be found at:
www.sffcommittee.com/ie/join.html

The complete list of SFF Specifications which have been completed or are currently being worked on by the SFF Committee can be found at:
ftp://ftp.seagate.com/sff/SFF-8000.TXT

If you wish to know more about the SFF Committee, the principles which guide the activities can be found at:
ftp://ftp.seagate.com/sff/SFF-8032.TXT

Suggestions for improvement of this specification will be welcome. They should be sent to the SFF Committee, 14426 Black Walnut Ct, Saratoga, CA 95070.

CONTENTS

FIGURES

TABLES

SFF Committee --

QSFP+ 4X 28 Gb/s Connector (Style B)

1 Scope

This specification defines the terminology and mechanical requirements for a mating interface and physical embodiment of the 28 Gbs 0.8mm QSFP Connector. This connector is completely backwards compatible when mated to a connector and Cage/Shield that is in accordance with SFF-8436. When mating a 28 Gbs connector to a 10G backwards compatible connector per SFF-8436 the EMI shielding shall pass the application 10G EMI requirements. When mating a 28 Gbs connector to a 28 Gbs connector the EMI shielding shall pass the application 28 Gbs EMI requirements. See SFF-8436 for the mechanical design of the QSFP Cage/Shield which enables a shielded interface and SFF 8661 for the physical embodiment of the mating Module/Plug.

InfiniBand, Ethernet, Fibre Channel, SAS, and other standards define requirements on the characteristic impedance and ability to transmit multi-gigabit signals for cable assemblies and backplanes. When this connector is used in such an application, it is subject to the requirements of the appropriate standard.

1.1 Description of Clauses

Clause 1 contains the Scope
Clause 2 contains the References
Clause 3 contains the General Description.
Clause 4 contains the Datums
Clause 5 defines the Connector Dimensions
Clause 6 defines the Connector Performance Requirements

1.2 Application Specific Criteria

This connector is capable of meeting the interface requirements for the operation of:

- 26G-1B-EDRR InfiniBand
- 28 Gbs Ethernet
- 32G Fibre Channel

2 References

The SFF Committee activities support the requirements of the storage industry, and it is involved with several standards.

2.1 Industry Documents

The following interface standards and specification are relevant to this specification.

- T10/ SAS 2-1 (Serial Attached SCSI - 2.1)
- T11/ FC-PI-5 Fibre Channel Physical Interface -5
- IEEE 802.3ba 40G Ethernet
- InfiniBand IBTA Specification
- SFF-8410 HSS Copper Testing and Performance Requirements
- SFF-8661 QSFP+ 28 Gbs 4X Pluggable Module (Style A)
- SFF-8436 QSFP+ 10 Gbs 4X Pluggable Transceiver

2.2 SFF Specifications

There are several projects active within the SFF Committee. The complete list of specifications which have been completed or are still being worked on are listed in the specification at ftp://ftp.seagate.com/sff/SFF-8000.TXT

2.3 Sources

Those who join the SFF Committee as an Observer or Member receive electronic copies of the minutes and SFF specifications (http://www.sffcommittee.com/ie/join.html).

Copies of ANSI standards may be purchased from the InterNational Committee for Information Technology Standards (http://tinyurl.com/c4psg).

Copies of SFF, INCITS T10 (SCSI), T11 (Fibre Channel) and standards still in development are available on the HPE version of CD_Access (http://tinyurl.com/85fts).

2.4 Conventions

The ISO convention of numbering is used i.e., the thousands and higher multiples are separated by a space and a period is used as the decimal point. This is equivalent to the English/American convention of a comma and a period.

English	French	ISO
0.6	0,6	0.6
1,000	1 000	1 000
1,323,462.9	1 323 462,9	1 323 462.9

2.5 Definitions

For the purpose of this specification, the following definitions apply:

Advanced Grounding Contacts: Connector contacts that make first and break last and are capable of carrying power ground return currents and performing electrostatic discharge. Other terms sometimes used to describe these features are grounding pins, ESD contacts, grounding contact, static drain, and pre-grounding contacts.

Alignment Guides: Connector features that preposition insulators prior to electrical contact. Other terms sometimes used to describe these features are: guide pins, guide posts, blind mating features, mating features, alignment features, and mating guides.

Board Termination Technologies: Surface mount single row, surface mount dual row, through hole, hybrid, and straddle mount.

Cable Termination: The attachment of wires to the termination side of a connector. Schemes commonly used in the industry are IDC (Insulation Displacement Contact) IDT (Insulation Displacement Termination), wire slots, solder, weld, crimp, braise, etc.

Contact Mating Sequence: Order of electrical contact during mating/unmating process. Other terms sometimes used to describe this feature are: contact sequencing, contact positioning, make first/break last, EMLB (early make late break) staggered contacts, and long pin / short pin.

Fixed: Used to describe the gender of the mating side of the connector that accepts its mate upon mating. This gender is frequently, but not always, associated with the common terminology "receptacle". Other terms commonly used are "female" and "socket connector". The term "fixed" is adopted from EIA standard terminology as the gender that most commonly exists on the fixed end of a connection, for example, on the board or bulkhead side. In this specification "fixed" is specifically used to describe the mating side gender illustrated in Figure 2-1.

Fixed Board: A connector that uses a fixed gender mating side and a termination side suitable for any of the printed circuit board termination technologies.

Free: Used to describe the gender of the mating side of the connector that penetrates its mate upon mating. This gender is frequently, but not always, associated with the common terminology "plug". Other terms commonly used are "male" and "pin connector". The term "free" is adopted from EIA standard terminology as the gender that most commonly exists on the free end of a connection, for example, on the cable side. In this specification "free" is specifically used to describe the mating side gender illustrated in Figure 2-1.

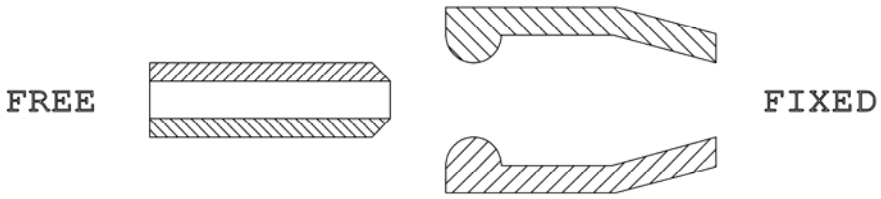
Free Board: A connector that uses a free gender mating side and a termination side suitable for any of the printed circuit board termination technologies.

Frontshell: Metallic part of a connector body that directly contacts the backshell or other shielding material that provides mechanical and shielding continuity between the connector and the cable. Other terms sometimes used to describe this part of a cable assembly are: housing, nosepiece, cowling, and metal shroud.

Gull Wing: An SMT lead that is shaped like the outstretched wing of a seagull.

Height: Distance from board surface to farthest overall connector feature.

Mating Side: The side of the connector that joins and separates from the mating side of a connector of opposite gender. Other terms commonly used in the industry are mating interface, separable interface and mating face



Note: The fixed gender is used on the device side except in the case of wire termination.

FIGURE 2-1 MATING SIDE GENDER DEFINITION

Optional: This term describes features which are not required by the SFF Specification. However, if any feature defined by the SFF Specification is implemented, it shall be done in the same way as defined by the Specification. Describing a feature as optional in the text is done to assist the reader. If there is a conflict between text and tables on a feature described as optional, the table shall be accepted as being correct.

QSFP: Quad Small Formfactor Pluggable.

Reference Dimension: A dimension used for information purposes only. A reference dimension is a repeat of a dimension or is derived from other values shown on the drawing or on related drawings. It is considered auxiliary information and does not govern production or inspection operations.

Reserved: Where this term is used for defining the signal on a connector pin its actual function is set aside for future standardization. It is not available for vendor specific use. Where this term is used for bits, bytes, fields and code values; the bits, bytes, fields and code values are set aside for future standardization. The default value shall be zero. The originator is required to define a reserved field or bit as zero, but the receiver should not check Reserved fields or bits for zero.

Right Angle: A connector design for use with printed circuit board assembly technology where the mating direction is parallel to the plane of the printed circuit board.

Single Row: A connector design for use with surface mount printed circuit board assembly technology where the termination side points are arranged in one line.

Single Sided Termination: A cable termination assembly style and connector design style where only one side of the connector is accessible when attaching wires. This style frequently has IDC termination points that point in the same direction.

SMT: Surface Mount Technology

Straddle Mount: A connector design style and printed circuit board design style that uses surface mount termination points on both sides of the boards. The connector is frequently centered between the top and bottom surface of the board.

Straight: A connector design for use with printed circuit board assembly technology.

Surface Mount: A connector design and a printed circuit board design style where the connector termination points do not penetrate the printed circuit board are subsequently soldered to the printed circuit board.

Termination Side: The side of the connector opposite the mating side that is used for permanently attaching conductor to the connector. Due to pin numbering differences between mating side genders the termination side shall always be specified in conjunction with a mating side of a specific gender. Other terms commonly used in the industry are: back end, non-mating side, footprint, pc board side, and post side.

Through Hole: A connector design and a printed circuit board design style where the connector termination points penetrates the printed circuit board and are subsequently soldered to the printed circuit board.

3 General Description

The 28 Gbs 0.8mm connection system is based on industry-proved card edge style contacts, which mate with a single wipe, and are physically robust.

The mating interface of paddle card to receptacle body and receptacle body to circuit board are enabled with SFF-8436 Cage.

The cage/shield is mounted separately to the host board so that the stress imposed by insertion and removal of the cable plug does not affect the signal/body solder joints.

This connector system was designed to satisfy the needs for gigabit serial data transmission applications where signals have rise times typically in the range of 20ps over a nominal 100 ohm differential balanced copper link with a common mode balance of 32.5 ohm. Design goals where Minimization of crosstalk and Minimum common mode and differential impedance discontinuity across the connector interface and speeds of up to 28 Gigabits/second on both rows of contacts.

The transmission line impedance of the connector itself (not including the termination interface to the wire or board) matches the electrical bulk cable within the tolerance allowed for the bulk cable. This connection scheme may be used in multiple places within a cabling environment. Though it has been designed for a 100 ohm environment this connector will function acceptably at other impedance levels (to be optimized on a case by case basis)

This specification includes the Minimum lengths, widths and positional tolerances of the contacts.

The connector is of a straightforward construction that does not rely on advanced materials or processes while offering superior performance, utilizing gull wing termination and grounding structure.

The 28 Gbs 0.8mm connector relies on a receiving body and paddle card, which are the primary elements to construct connectors

The primary elements provide flexible means to implement solutions for diverse applications e.g., direct board-to-board implementations can incorporate the plug into the side of one board and mate directly to a receiving body on the other.

This specification defines the complete mechanical dimensions of the 28 Gbs 0.8mm connector. The 28 Gbs 0.8mm connector and cage system provide a superior alternative, in terms of data transfer rate per real estate used.

Figure 3-1 is an example, which illustrates a receiving body of the 28 Gbs 0.8mm QSFP receptacle body.

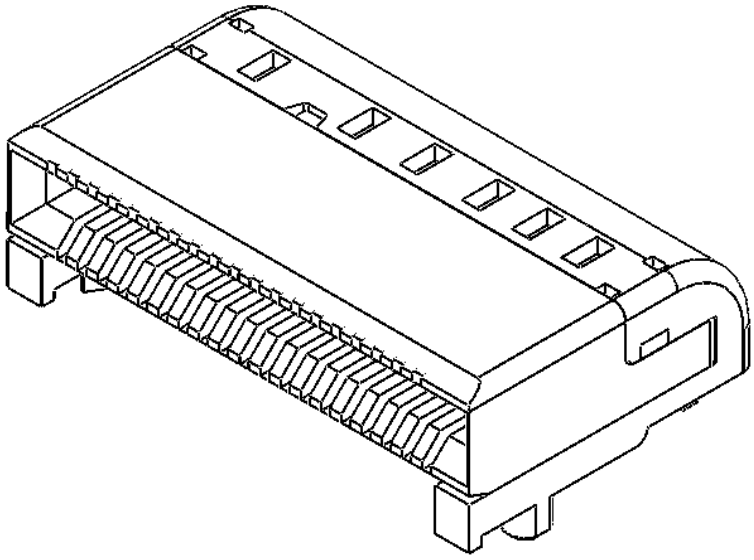


FIGURE 3-1 GENERAL VIEW OF FIXED (RECEPTACLE)

SFF-8661 defines the free (plug) cable plug/pluggable module that incorporates the paddle card and the shell, which are used to form a complete assembly for use in shielded application.

SFF-8436 defines the shell/cage which provides guidance and retention for the free (plug) cable connector, and absorbs the stress imposed by insertion and removal of the free (plug) cable connector of pluggable module. This protects the signal quality of the solder joints to the body.

4 Datums

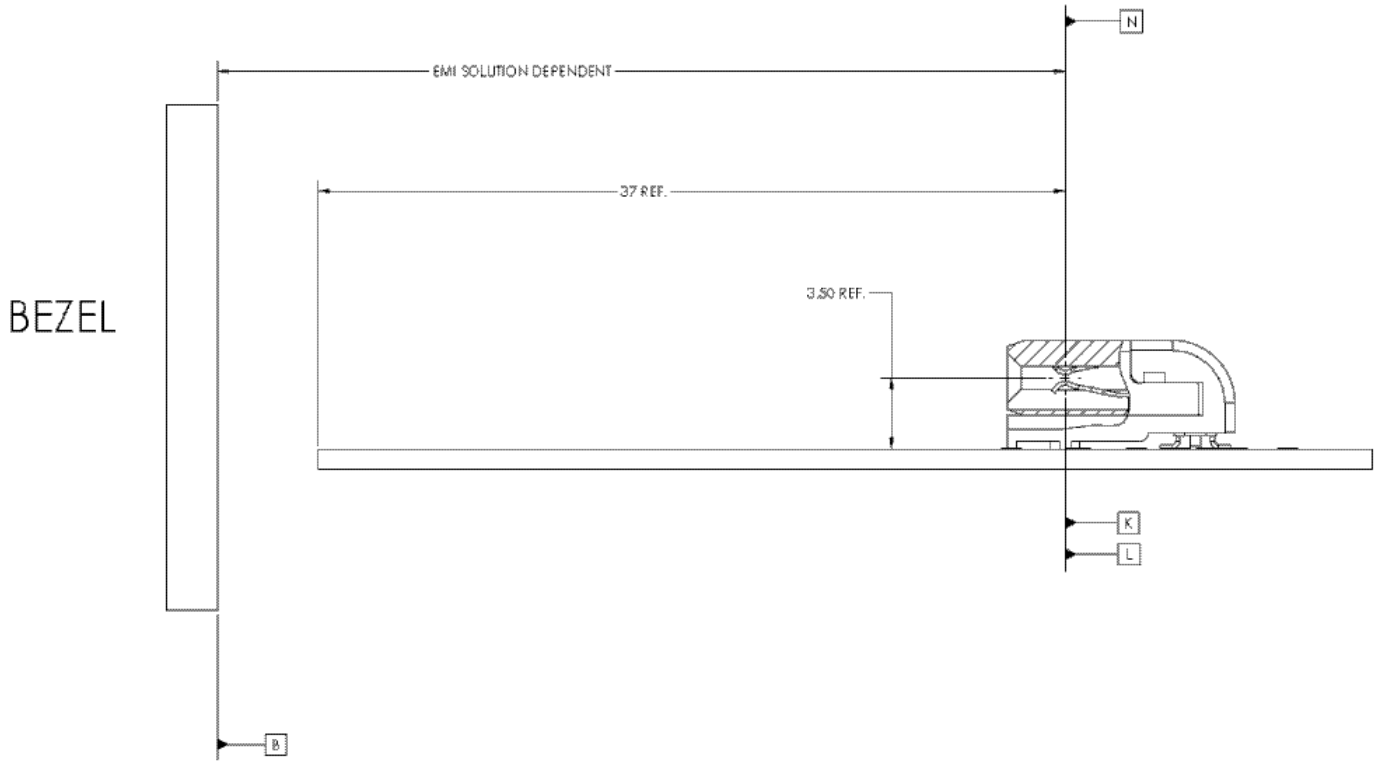


FIGURE 4-1 DATUM DEFINITIONS

Table 4-1 Datum Definitions

Datum	Description	Reference
A	Host board top surface	See figure 4-1
C	Distance between connector housing pegs on host board	See figure 5-3
G	Width of module PC board	See figure 5-1
H	Leading edge of signal contact pads on module PC board	See figure 5-1
J	Top surface of module PC board	See figure 5-1
K	Host board thru hole #1 to accept connector guide post	See figure 4-1
L	Host board thru hole #2 to accept connector guide post	See figure 4-1
N	Connector alignment post	See figure 4-1
AA	Connector slot width	See figure 5-2

5 Connector dimension

The dimensioning convention are described in ANSI-Y14-5M, Dimensioning and Tolerancing. All dimensions are in millimeters.

Dimension related requirements for the connector system addressed in this specification are specified in the tables and figures in this clause

5.1 Free (Plug) Paddle card

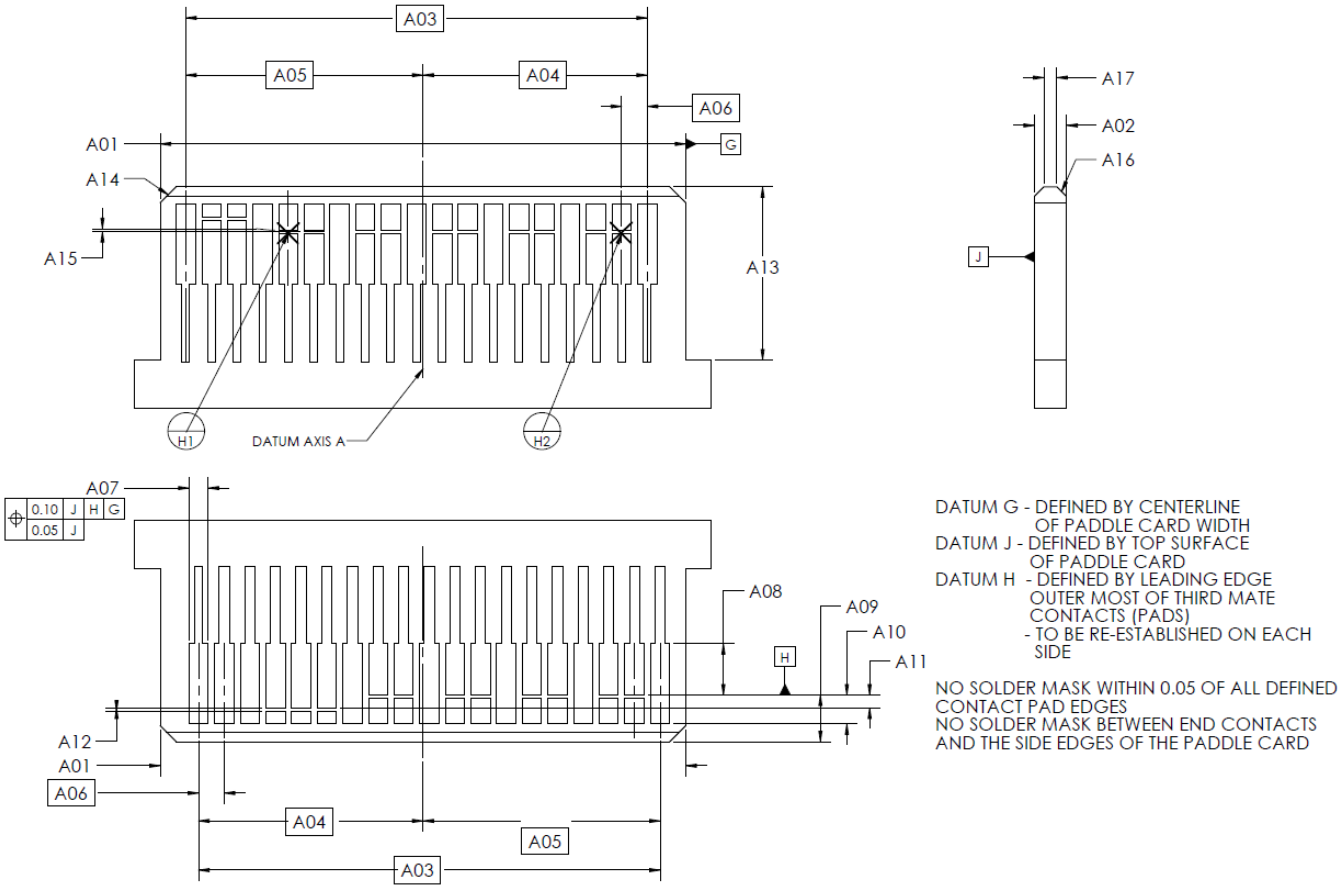


FIGURE 5-1 FREE (PLUG) PADDLE CARD

TABLE 5-1 FREE (PLUG) PADDLE CARD

Designator	Description	Dimension	Tolerance
A01 (*)	Paddle Card Width	16.42	+/- 0.08
	Paddle Card Width (SFF-8436)	16.40	+/- 0.10
A02	Paddle Card Thickness (across pads)	1.00	+/- 0.10
A03	First to Last Pad Centers	14.40	Basic
A04	Card Center to Outer Pad Center	7.00	Basic
A05	Card Center to Outer Pad Center	7.40	Basic
A06	Pad Center to Center (Pitch)	0.80	Basic
A07 (*)	Pad Width (16.42 Paddle Card Width)	0.54	+/- 0.04
	Pad Width (16.40 Paddle Card Width)	0.60	+/- 0.03
A08	Pad Length – Third Mate	1.6	Min.
A09	Card Edge to Third Mate Pad	1.45	+/- 0.10
A10	Third Mate to First Mate	0.90	+/- 0.05
A11	Third Mate to Second Mate	0.40	+/- 0.05
A12	Pad to Pre-Pad	0.10	+/- 0.03
A13	Component Keep Out Area	5.40	Min.
A14	Lead-in Chamfer x 45 degrees	0.50	+/- 0.05
A15	Third Mate Pad to Datum C	0.00	+/- 0.03
A16	Lead-in Chamfer x 45 degrees	0.30	+/- 0.05
A17	Lead-in Flat	0.40	Ref

(*) Note: Dimensions of the Pad Width and the Paddle Card Width are such that the centerline of the terminal does not go off the edge of the Pad.

5.2 Fixed (Receptacle) Right Angle Connector

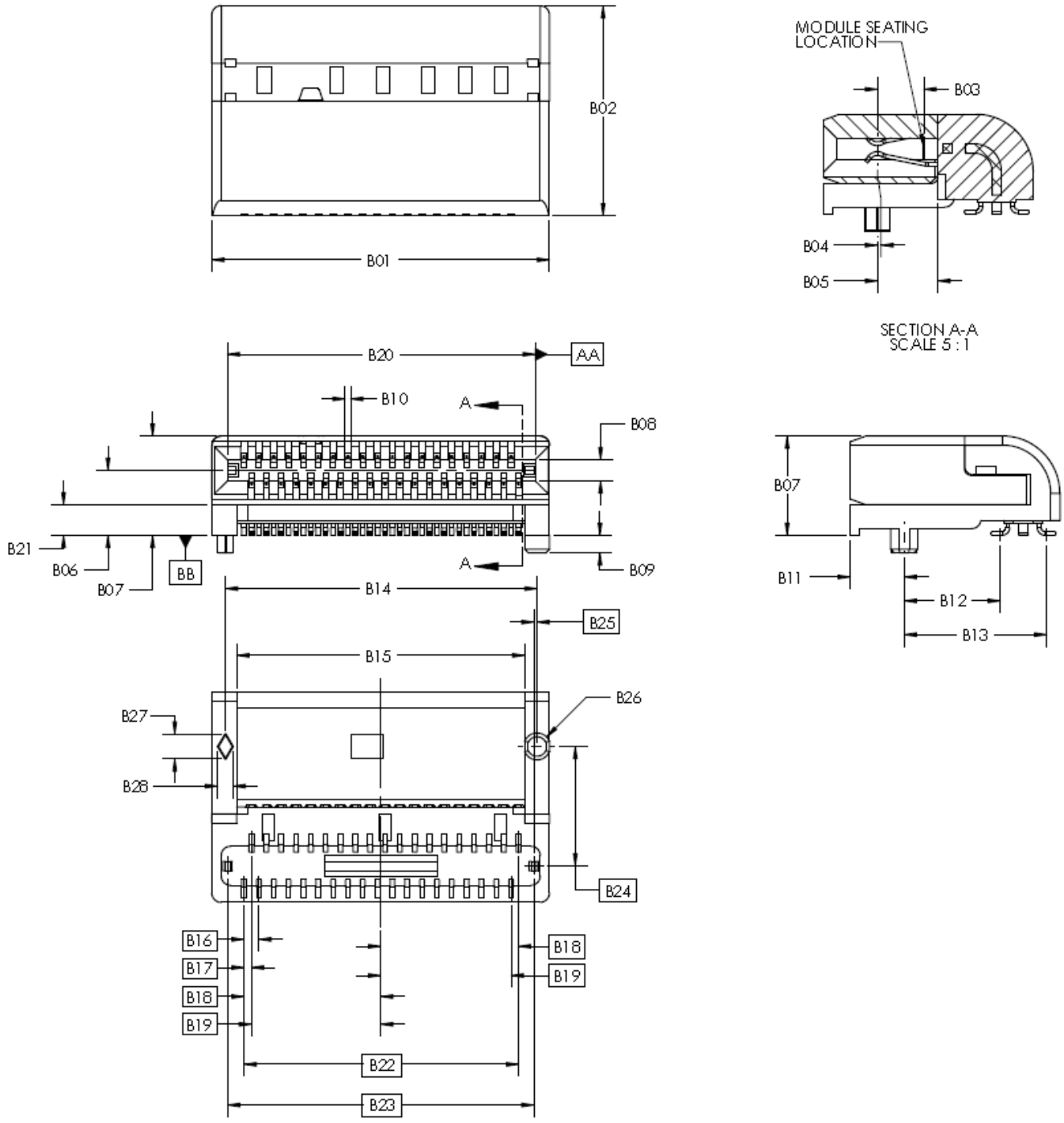


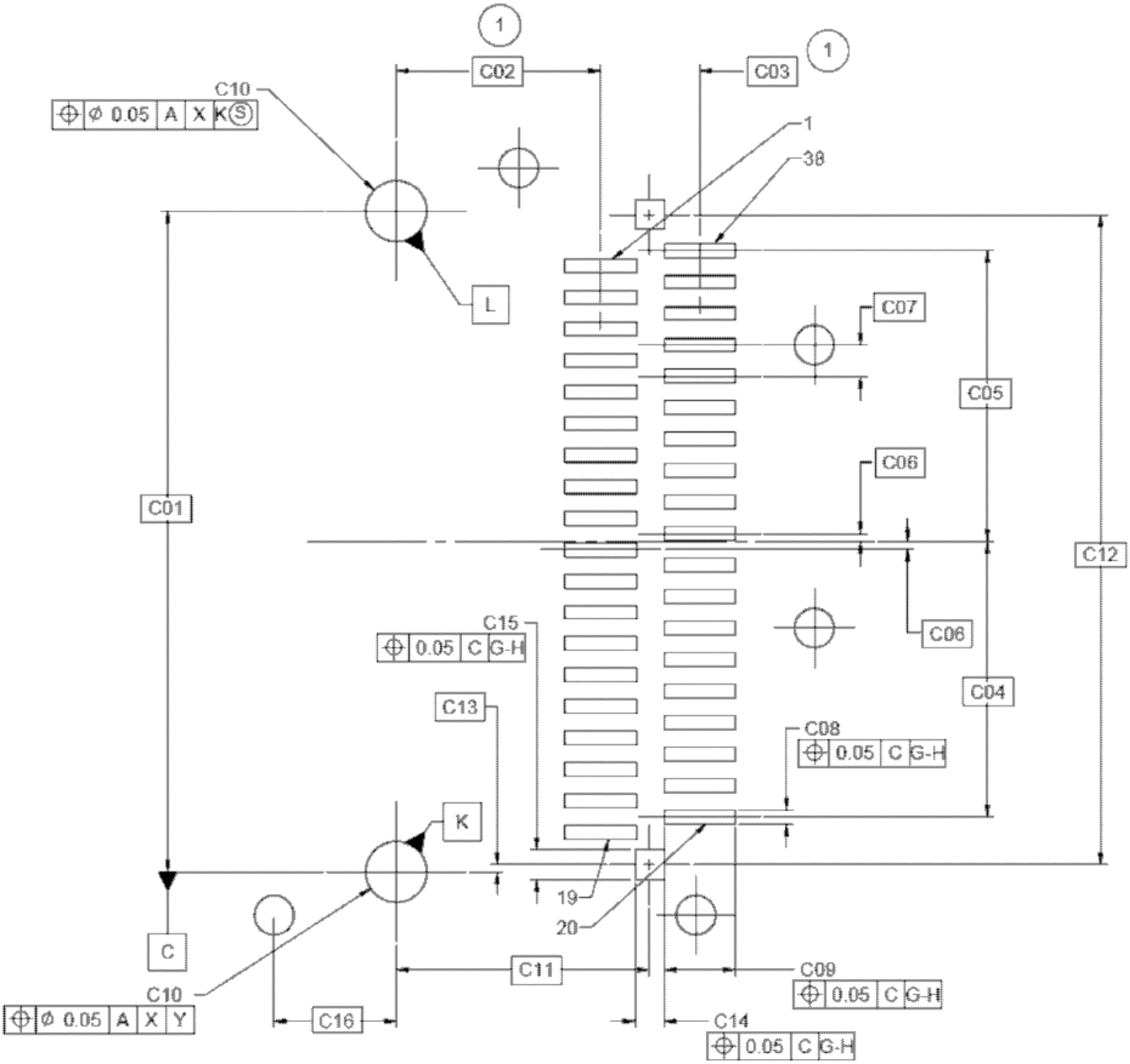
FIGURE 5-2 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR

TABLE 5-2 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR

Designator	Description	Dimension	Tolerance
B01	Receptacle Width	18.2	+/- 0.10
B02	Receptacle Length	11.3	+0.33/-0.13
B03	Module Seating Location	2.5	Ref
B04	Peg to Contact Centerline	0.00	+/- 0.10
B05	Card Slot Depth	3.25	Min
B06	PCB to Card Slot Centerline	3.5	+/- 0.10
B07	Overall Height	5.35	+/- 0.13
B08	Card Slot Height	1.14	Min
B09	Peg Length	0.95	+/- 0.13
B10 (*)	Contact Zone (0.18 wide terminal)	0.3	Max
	Contact Zone (0.20 wide terminal)	0.32	Max
	Contact Zone (0.22 wide terminal)	0.34	Max
	Contact Zone (0.25 wide terminal)	0.37	Max
B11	Front Face to Peg	2.90	Basic
B12	Peg to Row A	5.18	+/- 0.10
B13	Peg to Row B	7.69	+/- 0.10
B14	Peg to Peg	16.8	Basic
B15	Leg to Leg	15.53	+/- 0.13
B16	Contact Pitch (within Row)	0.8	Basic
B17	Contact Pitch (Row to Row)	0.4	Basic
B18	Centerline to Last Contact	7.4	Basic
B19	Centerline to First Contact	7.0	Basic
B20	Card Slot Width	16.6	+/- 0.05
B21	Height under Receptacle	1.65	+/- 0.08
B22	First to Last Contact	14.8	Basic
B23	Ground Tab to Ground Tab	16.53	Basic
B24	Locating Post to Ground Tab (Y)	6.42	Basic
B25	Locating Post to Ground Tab (X)	0.18	Basic
B26	Peg Diameter	1.45	+/- 0.05
B27	Diamond peg height	1.45	+/- 0.05
B28	Diamond peg width	0.85	+/- 0.10

(*) Note: Contact Zone is defined as a zone with its centerline located at the theoretical contact centerline and the contact must always be completely located within it.

5.3 Fixed (Receptacle) Right Angle Connector Footprint



NOTES:
1. DIMENSION TO CENTERLINE OF PAD.
2. DATUM X AND Y ARE ESTABLISHED BY THE CUSTOMER FIDUCIAL.
3. FOR COMPONENT AND TRACE KEEP-OUT AREA REFER TO SFF-8436

FIGURE 5-3 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR FOOTPRINT

TABLE 5-3 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR FOOTPRINT

Designator	Description	Dimension	Tolerance
C01	Locating Hole to Locating Hole	16.80	Basic
C02	Locating Hole to Row A	5.18	Basic
C03	Row A to Row B	2.51	Basic
C04	Card Center to Outer Pad Center	7.00	Basic
C05	Card Center to Outer Pad Center	7.40	Basic
C06	Card Center to Inner Pad Center	0.20	Basic
C07	Pad Pitch	0.80	Basic
C08	Pad Width	0.35	+/- 0.03
C09	Pad Length	1.80	+/- 0.03
C10	Locating Hole Diameter	1.55	+/- 0.05
C11	Locating Hole to Ground Pad	6.42	Basic
C12	Grounding Pad to Grounding Pad	16.53	Basic
C13	Locating Hole to Grounding Pad	0.18	Basic
C14	Grounding Pad Width	0.75	+/- 0.05
C15	Grounding Pad Length	0.75	+/- 0.05
C16	Locating hole to cage hole	3.10	Basic

6 Connector Performance Requirements

The connector conforms to the test sequence as defined in EIA-364 TS-1000.

The following tables define the performance criteria and test procedures for those test sequences.

TABLE 6-1 TS-1000 TEST PARAMETERS AND CRITERIA

Test Parameter	Criteria
Rated Durability Cycles	250
Field Life (3, 5, 7, or 10 years)	10 year
Field Temperature (57, 60, 65, 75, or 85C)	65 C
Test Group 4 Option	Not Applicable
Plating Type (Precious / non-Precious)	Precious
Surface Treatment (Lubricated or non-Lubricated)	Manufacturer to specify

TABLE 6-2 ELECTRICAL TEST PARAMETERS AND CRITERIA

Parameter	Test Condition	Specification
Current		0.5 A per contact *1
Voltage		30V DC per contact
Low Level Contact Resistance	EIA 364-23 20 mVdc, 10 mA	Baseline
Insulation Resistance	100V DC	1000M ohms minimum Between adjacent contacts
Dielectric Withstanding Voltage	300V DC minimum for 1 minute	No defect or breakdown between adjacent contacts
Differential Impedance (connector area)	EIA 364-108 Rise time: 9.6ps (20-80%) Includes host board interface, connector and card interface.	For Reference Only 90-110 ohms (distribution) 100+/-5 ohms (distribution of average value)
Within Pair Skew	EIA 364-103	2ps maximum (By design)
Near End Isolation Loss	EIA 364-90 50 MHz to 14 GHz	45 dB minimum
Insertion Loss	EIA 364-101 50 MHz to 14 GHz	1.0 dB maximum
Return Loss	EIA 364-108 50 MHz to 14 GHz	12.0 dB minimum
Differential to Common Mode Through Conversion Loss	50 MHz to 14 GHz	−24.0 dB maximum
Far End Isolation Loss	EIA 364-90 50 MHz to 14 GHz	40.0 dB maximum
*1 Rating on designated power pins is 1.0 A per contact (Vcc T, Vcc R, and Vcc 1) Note: Testing is as per recommendations of OIF (Optical Internet Forum)		

TABLE 6-3 MECHANICAL PERFORMANCE REQUIREMENT

Parameter	Test Condition	Specification
Mating Force	EIA 364-13	60 N maximum
Unmating Force	EIA 364-13	30 N maximum
Contact Normal Force		0.5 N minimum
Vibration	EIA 364-28	No Damage No discontinuity longer than 1 usec allowed. 20 mOhms maximum change from initial (baseline) contact resistance
Mechanical Shock	EIA 364-27	No Damage 20 mOhms maximum change from initial (baseline) contact resistance

TABLE 6-4 ENVIRONMENTAL PERFORMANCE REQUIREMENT

Parameter	Test Condition	Specification
Storage Temperature		-20C to + 85C
Humidity		80% Relative Humidity