SFF Committee documentation may be purchased in electronic form.
SFF specifications are available at ftp://ftp.seagate.com/sff

SFF-8614 Specification

for

Mini Multilane 8/4X Shielded Cage/Connector (HDsh)

Rev 3.4 September 22, 2014

Secretariat: SFF Committee

Abstract: This specification defines the physical interface and general performance requirements for the Mini Multilane connector, which is designed for use in high speed serial, interconnect applications at multi-gigabit speeds. This connector is popularly referred to as the Mini-SAS HD (High Density) Connector system.

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.

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Amphenol
Cinch
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The following member companies of the SFF Committee voted against this industry specification.

FCI
TE Connectivity

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

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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 this claim 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.

Update History:

The content of this specification was formerly contained in SFF-8644, and it was broken out into a separate specification so that it could be referenced by higher speed variations.

November 5, 2010:
- Sorted dimension designators to alphabetic order for all figures
- Changed Figure 5.1: from 18.01 to 18.00 and from 0.86 to 0.88
- Changed TR01 from 15.61 to 15.46
- Changed R03 from 10.50 to 10.43
- Changed R04 from 1.25 to 1.18
- Changed R07 from 1.95 to 1.80
- Changed R08 from 22.25 Min to 22.10 +/- 0.15
- Changed P01 from 3.75 to 3.00
- Changed P02 from 5.50 to 4.75
- Changed P03 from 14.25 to 13.50
- Changed P04 from 16.00 to 15.25
- Changed P05 from 24.75 to 24.00
- Changed P06 from 26.50 to 25.75
- Changed P15 from 14.22 to 13.24
- Changed P16 from 12.59 to 11.62
- Changed P17 from 2.80 to 2.05
- Changed P18 from 1.17 to 0.42

November 19, 2010:
- Dimension values replaced with dimension designators on Datums figure
- Changed P06 from 25.25 to 25.75
- Added P10 as 'application specific'

December 7, 2010
- Changed title to 'Shielded 8/4 Channel for 6 Gbs Applications'

Rev 2.5 January 11, 2011
- Changed R07 from 1.80 to 1.70
- Changed N03 from 2.15 to 2.25
- Changed A11 from 0.105 +/- 0.025 to 0.10 +/- 0.05
- Added note to G11 to clarify contact zone
- Title added for Section 8.1

Rev 2.8 May 5, 2011
- Changed title to 'Mini Multilane 12 Gbs 8/4X Shielded Connector'
- Expanded notes on Plug Latch figure
- Added Datum E, hard stop text and updated description on Plug EMI figure
- Added notes to 8X Plug figure

Rev 2.9 August 9, 2012
- Editorial revision to adopt latest template
- Removed electrical performance requirements specified by the using interface
- Simplified titling of sections, figures and tables
- Replaced double drawings of Figure 2-1
- Sections made consistent between SFF-8643 and SFF-8644

Rev 3.0 April 22, 2013
- Adopt editorial convention of Gb/s
- Title change for commonality in style with QSFP

Rev 3.1 May 29, 2014
- Added plug versions to Table 3-1
- Renamed B20 as 'Snout Groove Lead-in Width'
- Corrected the descriptions of G17-G24
- Renamed H01 as 'Cage Attachment Hole Diameter'
- Changed use of 'nut' to 'fastener' throughout Section 6.3
- Removed the M2 location notes from Figures 6-7, 6-8, 6-9
- Table 8-3 revised
  - o Expanded plug only Mating/Un-mating descriptions
  - o Changed mating force requirement from 150 to 60N maximum
  - o Added Latched Plug Pullout Force of 75N minimum
  - o Added Primary Key Withstand Force Strength of 70N minimum
  - o Added test criteria notes

Rev 3.2 June 11, 2014
- G20 changed to 1.12 MIN

Rev 3.3 August 4, 2014
- Completed revisions agreed to in the SSWG
  - o deleted test criteria notes
  - o blocking key withstand force removed
  - o added cautionary note to Figures 6-7, 6-8, 6-9 regarding choice of attachment screw length
  - o changed Mating Force from 60N to 62N in Table 8-3

Rev 3.4 September 22, 2014
- This specification created with the connector content removed from SFF-8644

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, and 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 http://www.sffcommittee.com/ie/join.html

The complete list of SFF Specifications which have been completed or are current projects 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.

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1 Scope

This specification defines the Mini Multilane shielded cable plug, the shielded host board receptacle, and the latching requirements for them based upon the mating interface defined herein.

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 specifications are relevant to this Specification.

- T10 2212-D SAS-3
- SFF-8410 High Speed Serial Testing for Copper Links
- SFF-8643 Mini Multilane 12 Gb/s 8/4X Unshielded Connector (HD12un)
- SFF-8644 Mini Multilane 12 Gb/s 8/4X Shielded Connector (HD12sh)
- SFF-8673 Mini Multilane 24 Gb/s 8/4X Unshielded Connector (HD24un)
- SFF-8674 Mini Multilane 24 Gb/s 8/4X Shielded Connector (HD24sh)

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 Inter-National Committee for Information Technology Standards (http://tinyurl.com/c4psg).

Copies of SFF, ASC T10 (SCSI), T11 (Fibre Channel) and T13 (ATA/SATA) standards and standards still in development are available on the HPE version of CD_Access (http://tinyurl.com/85fts).

2.4 Conventions

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

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.

American	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

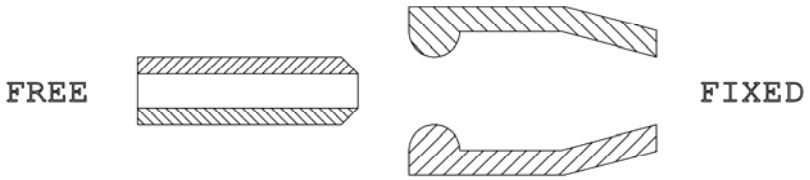
For the purpose of SFF Specifications, the following definitions apply:

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 3-1.

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 3-1.

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

Press-fit: Press-fit is a compliant pin, solder free process used to connect connector pins and tabs to a PCB. The mechanical and electrical interfaces between the connector and the PCB are made by a spring-like compliant pin and a plated thru hole (via).

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.

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

Surface Mount: A connector design and a printed circuit board design style where the connector termination points do not penetrate the printed circuit board and 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 conductors 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 Description

The connector system is based upon an integrated right angle receptacle (fixed) connector and guide shell. The host board footprint positioning holes contain the critical dimensions for locating the integrated receptacle/guide shell. The receptacle guide shell functions as the guide and strain relief for the free (plug) connector interface and also provides the latching points for the plug connector. This connector system provides positive retention along with ease of insertion and removal.

3.1 General View

This specification provides for a 1x1, 1x2 and 1x4 integrated receptacle/cage (fixed side) as well as a 1x1 (4X) and a 1x2 (8X) mating cable plug (free side)

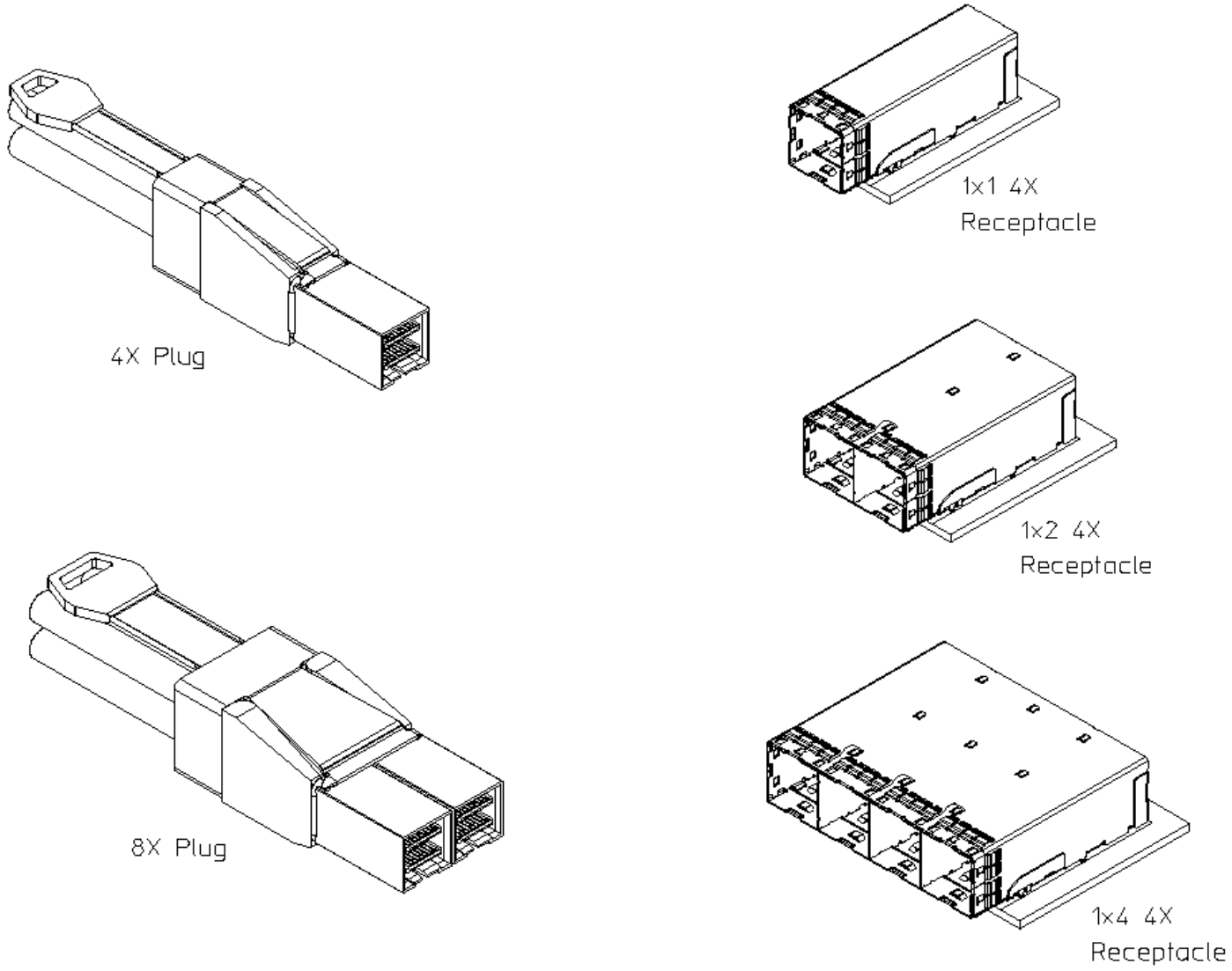


FIGURE 3-1 GENERAL VIEW OF CONFIGURATIONS

TABLE 3-1 CONFIGURATIONS SUPPORTED

Port	Positions	Host Connector Orientation	Plug
1x1	36	Right Angle	1x1
1x2	72	Right Angle	1x2
1x4	144	Right Angle	N/A

3.2 Pin Assignments

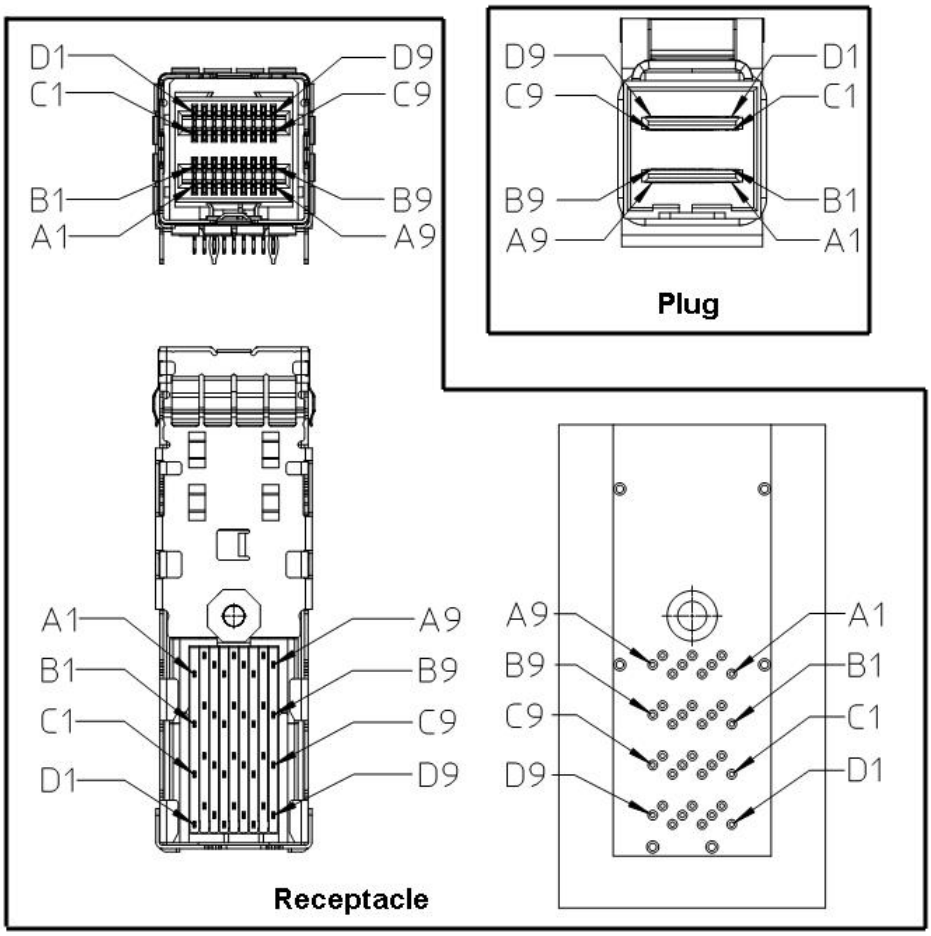


FIGURE 3-2 PIN ASSIGNMENTS

4 Datums

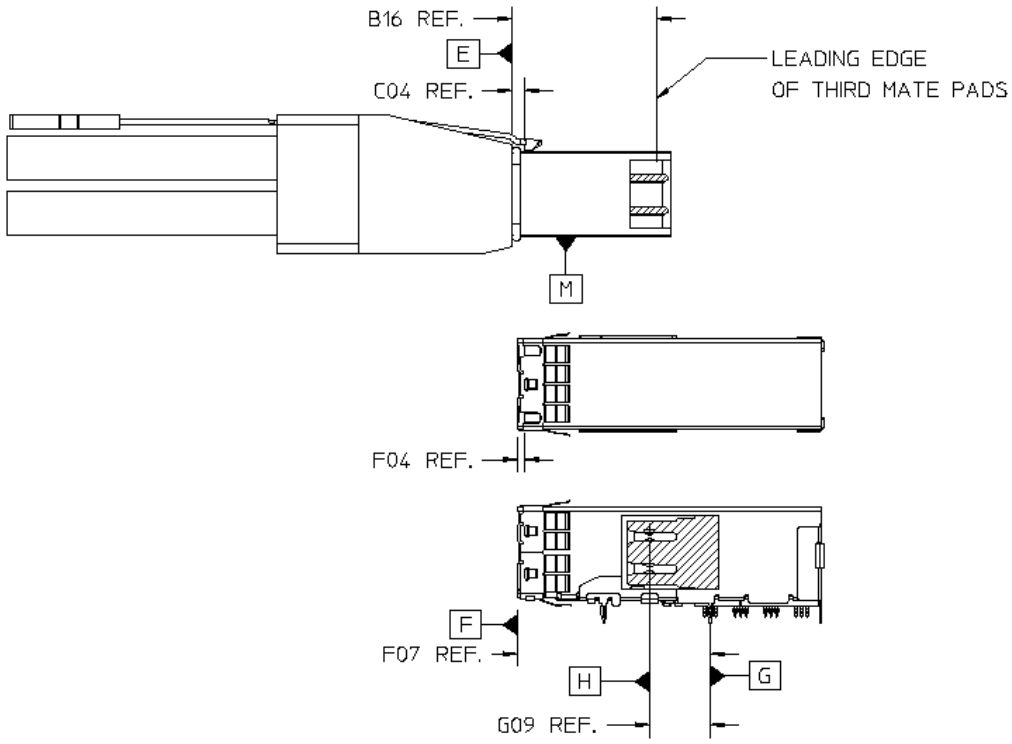


FIGURE 4-1 DATUMS (NOT ALL SHOWN)

TABLE 4-1 DATUM DESCRIPTIONS

Datum	Description
A	Width of Paddle Card
B	Top Surface of Paddle Card
C	Leading Edge of Third Mate Signal Pad on Paddle Card
D	Width of Plug Snout
E	Leading Edge of Plug Body
F	Front Edge of Receptacle Snout
G	Centerline of Second Row of First Group of Compliant Tails
H	Centerline of Receptacle Contacts - Lower Row
J	Centerline of Outer Holes
K	Centerline of Second Row of First Group of PCB Holes
L	Surface of PCB
M	Bottom of Plug Body
P	Width of Receptacle Snout
R	Bottom of Receptacle (PCB Interface)
X, Y	Reference 0, 0 on Host Board

5 Plug Requirements

5.1 Plug Paddle Card

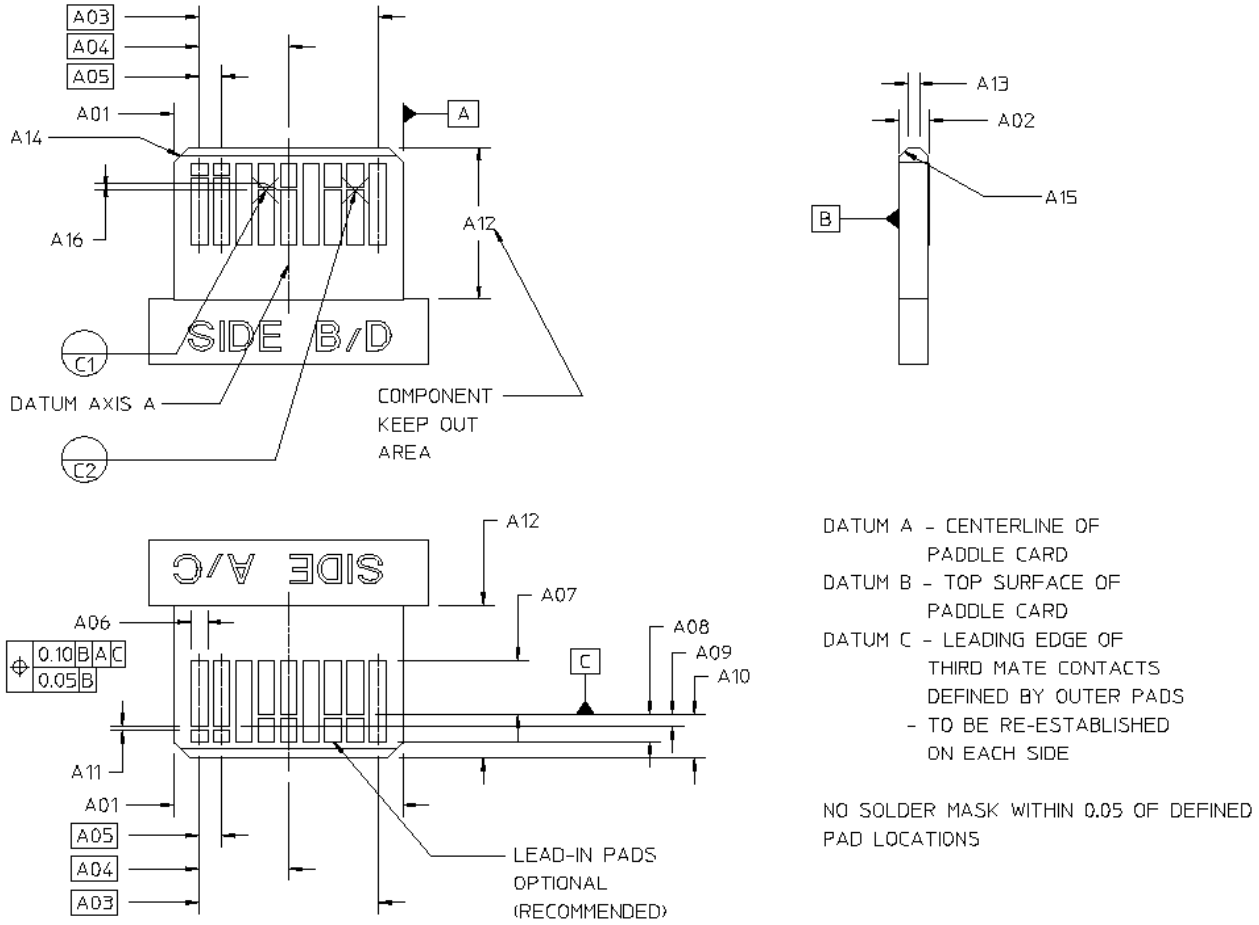


FIGURE 5-1 PLUG PADDLE CARD

TABLE 5-1 PLUG PADDLE CARD DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
A01	Paddle Card Width	7.65	0.10
A02	Paddle Card Thickness (across pads)	1.00	0.10
A03	First to Last Pad Centers	6.00	Basic
A04	Card Center to Outer Pad Center	3.00	Basic
A05	Pad Center to Center (Pitch)	0.75	Basic
A06	Pad Width	0.57	0.03
A07	Pad Length - Third Mate	1.85	Min
A08	Third Mate to First Mate	0.90	0.05
A09	Third Mate to Second Mate	0.40	0.05
A10	Card Edge to Third Mate Pad	1.45	0.10
A11	Pad to Pre-Pad	0.10	0.05
A12	Component Keep Out Area	5.40	Min
A13	Lead-in Flat	0.40	Ref
A14	Lead-in Chamfer x 45 degrees	0.50	0.05
A15	Lead-in Chamfer x 45 degrees	0.30	0.05
A16	Third Mate Pad to Datum C	0.00	0.03

5.2 4X Plug

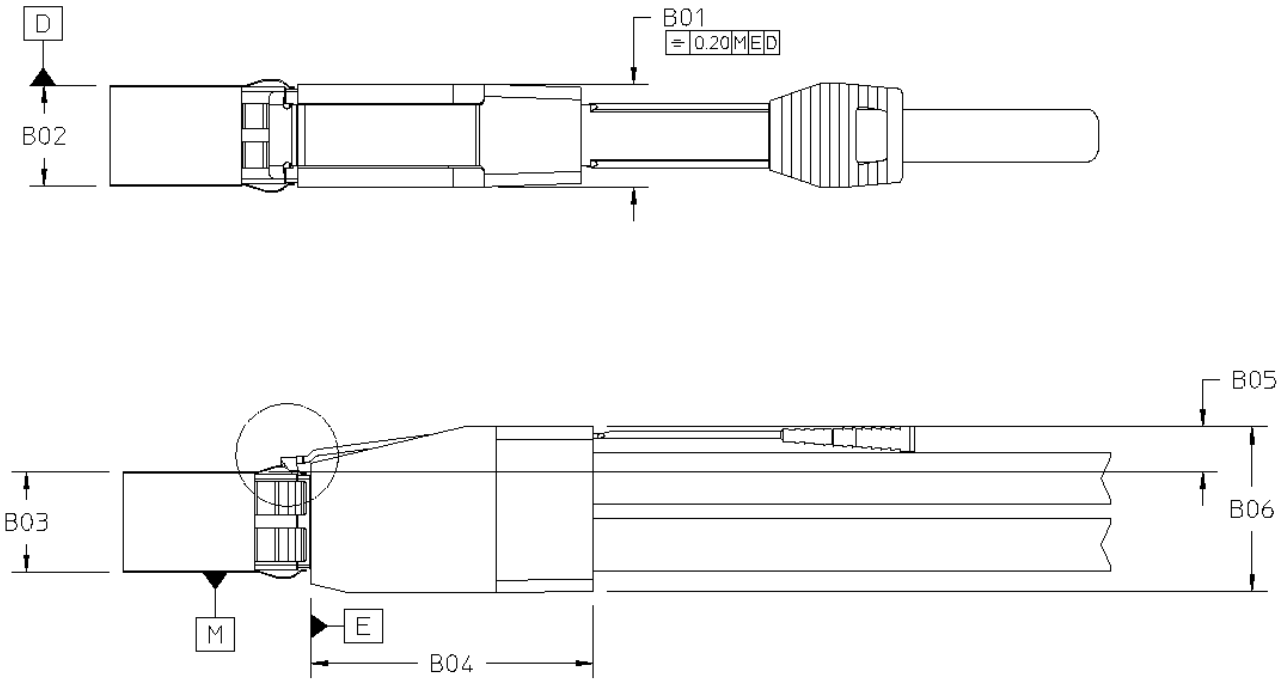
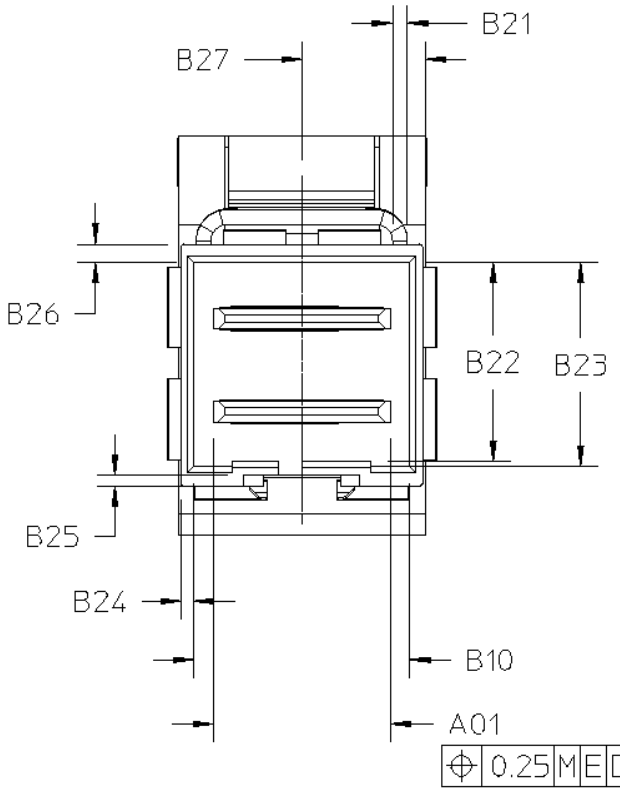


FIGURE 5-2 4X PLUG



THE GEOMERY OF LATCH RETENTION FEATURES MUST MATE WITH THE CAGE LATCH HOLES AS DEFINED BY F03 & F05 IN FIGURE 7.1.1

FIGURE 5-3 4X PLUG RETENTION

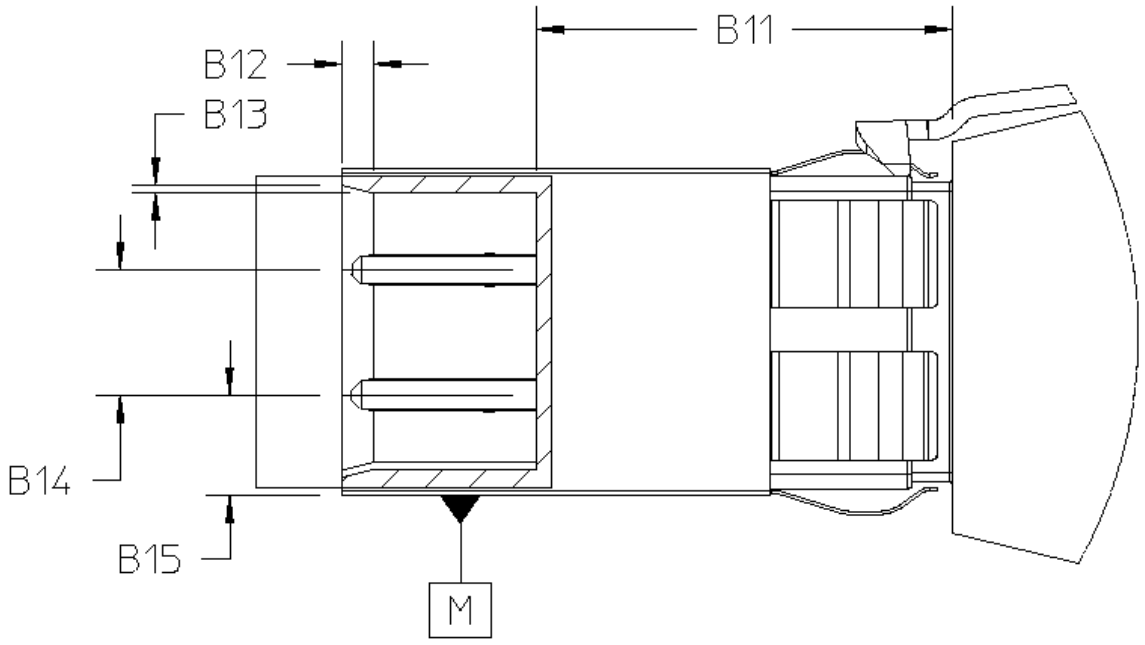


FIGURE 5-4 4X PLUG HOUSING

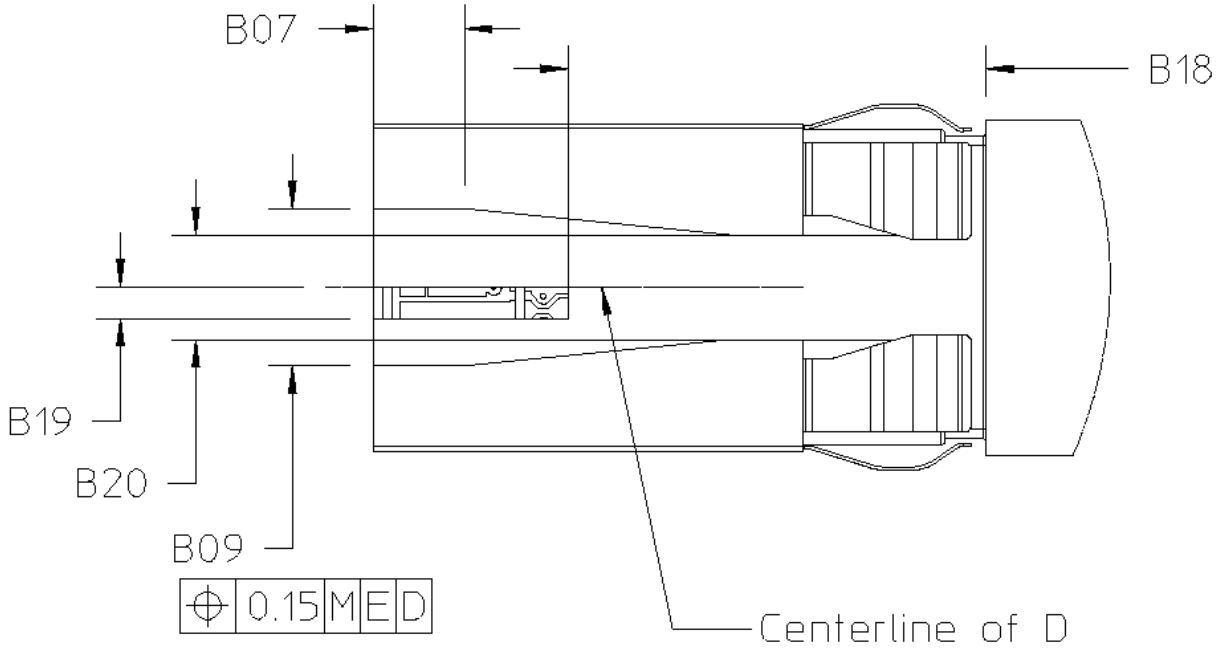


FIGURE 5-5 4X PLUG KEY SLOT

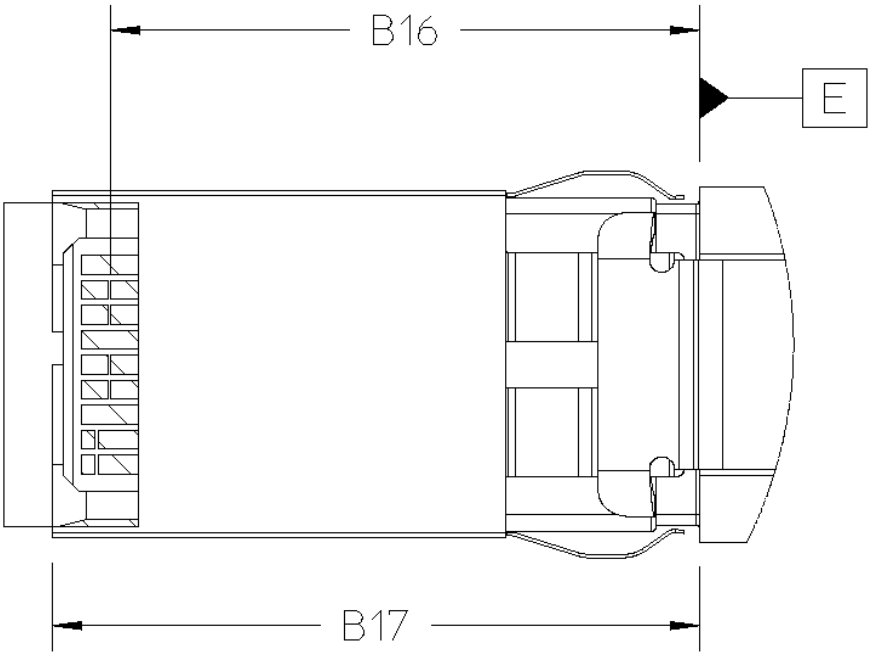
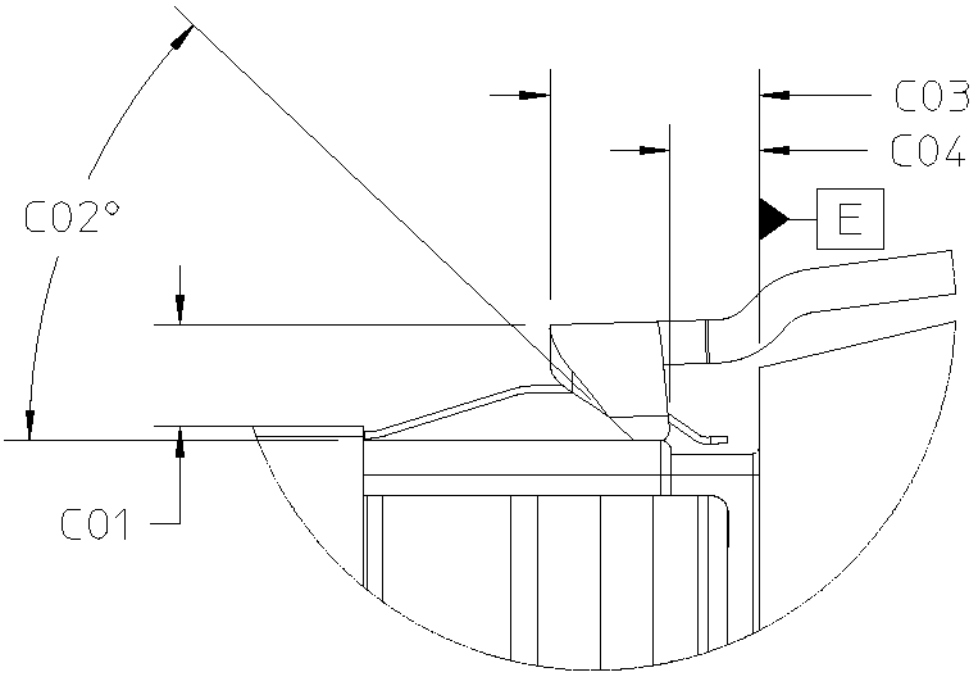


FIGURE 5-6 4X PLUG LATCH STOP TO CONTACT

TABLE 5-2 4X PLUG DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
B01	Plug Body Width	10.85	Max
B02	Snout Width	10.45	0.15
B03	Snout Height	10.45	0.15
B04	Plug Body Length	32.00	Max
B05	Snout Top to Plug Body Top	4.70	0.15
B06	Plug Body Height	20.30	Max
B07	Snout Groove Lead-in Length	2.92	0.25
B08	Datum E to Snout Groove End	1.50	0.10
B09	Snout Groove Lead-in Width	5.00	0.15
B10	Snout Inside Width	9.35	Ref
B11	Datum E to Internal Keep Out Area	13.33	0.10
B12	Lead-in Chamfer	1.00	0.15
B13	Lead-in Chamfer	0.25	0.10
B14	PCB Centerline to PCB Centerline	4.00	0.10
B15	Snout Bottom to Lower PCB Centerline	3.22	0.10
B16	Plug Body to PCB Datum	17.80	0.25
B17	Snout Length	19.56	0.10
B18	Datum E to Blocking Key Slot End	13.33	0.10
B19	Blocking Key Slot Width	1.00	0.15
B20	Snout Groove Lead-in Width	3.34	0.15
B21	Latch Barb Zone	0.70	Ref
B22	Snout Inside Height	8.62	0.10
B23	Snout Inside Height	8.85	0.10
B24	Plug Side Wall Thickness	0.55	0.08
B25	Snout Groove Height	0.45	0.10
B26	Snout Top Thickness	0.78	0.10
B27	Latch Catch Width	4.57	Ref

5.3 4X Plug Latch

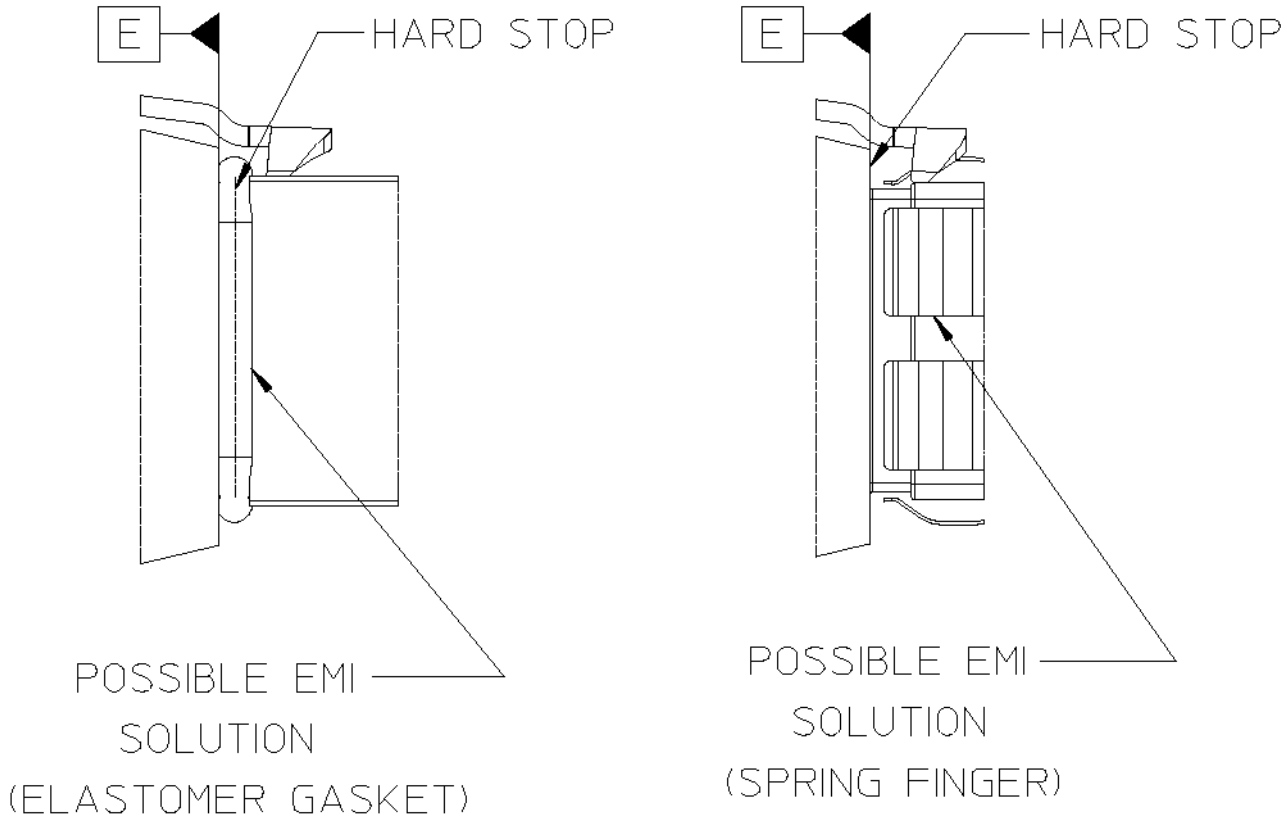


- Figure shown is one possible EMI solution / Latch configuration.
- Datum E is the leading edge of the plug body and in this configuration acts as the hard stop for the plug against the receptacle cage.
- For other configurations, dimensions taken from Datum E (i.e. C03 and C04) must be adjusted to reflect the equivalent hard stop location from Datum E (i.e. using the compression of the elastomeric gasket to define the hard stop).

FIGURE 5-7 4X PLUG LATCH

TABLE 5-3 4X PLUG LATCH DIMENSIONS

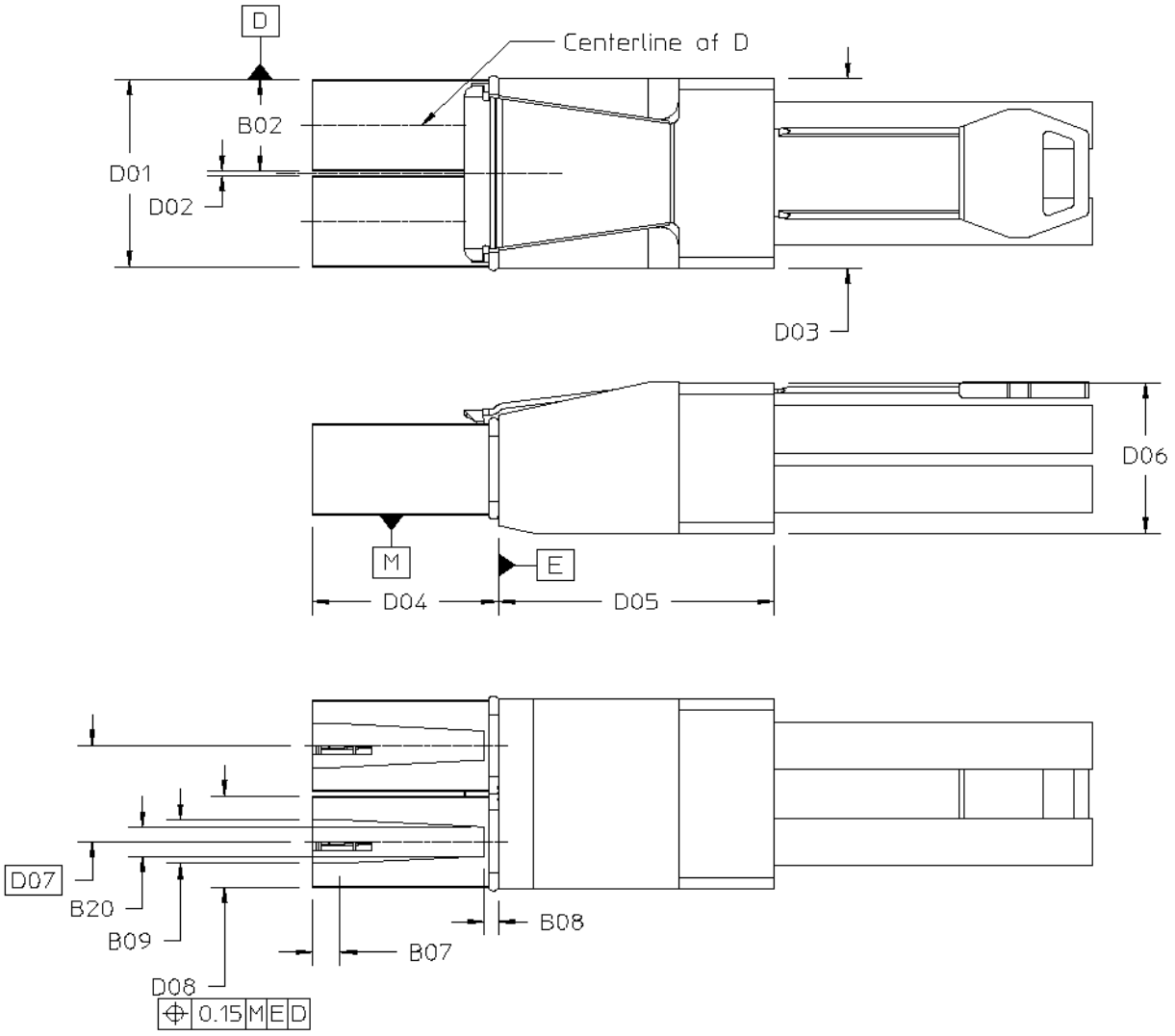
Designator	Description	Dimension	Tolerance +/-
C01	Latch Height	1.51	Ref.
C02	Latch Lead-In Angle	43°	Ref.
C03	Latch Length	3.70	Max
C04	Latch Barb Location	1.32	0.15



- Figure shows two possible EMI solutions.
- Other EMI solutions or configurations are possible based on the application requirements.

FIGURE 5-8 4X PLUG EMI OPTIONS

5.4 8X Plug



Note: This Figure is shown with one possible elastomeric gasket solution and Datum E and the dimensions established from that datum have been adjusted accordingly for this solution's equivalent hard stop.

FIGURE 5-9 8X PLUG

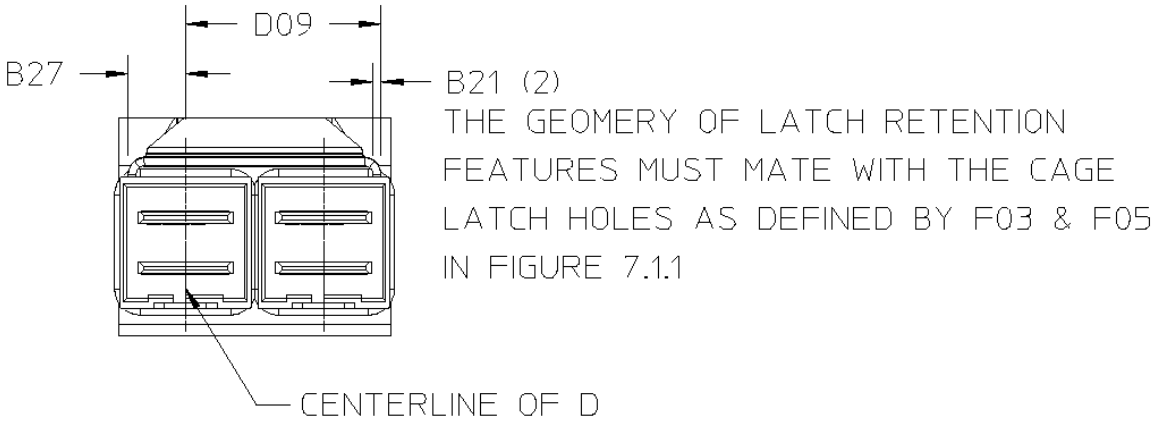


FIGURE 5-10 8X PLUG RETENTION

TABLE 5-4 8X PLUG DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
D01	Snout Width - Overall	21.45	0.20
D02	Snout Gap	0.55	Ref.
D03	Plug Body Width	21.90	Max
D04	Snout Length	19.76	0.10
D05	Plug Body Length	32.00	Max
D06	Plug Body Height	20.30	Max
D07	Snout to Snout Pitch	11.00	Basic
D08	Snout Width	10.45	0.15
D09	Datum D to Latch Catch	15.57	Ref.

5.5 Plug Pull Tab

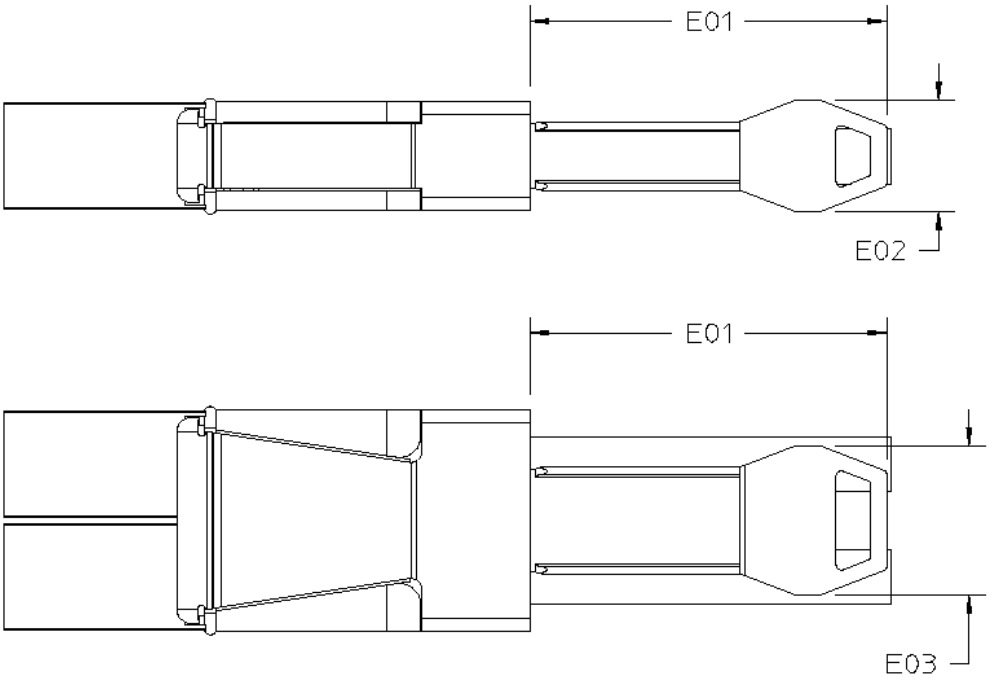


Figure shown is one possible solution.
Other configurations to remain within the E02 dimensions
Specific standards may employ color coding for Pull Tabs

FIGURE 5-11 PLUG PULL TAB

TABLE 5-5 PLUG PULL TAB DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
E01	Latch Pull Length	40.00	Ref
E02	4X Latch Pull Width	10.90	Max
E03	8X Latch Pull Width	15.00	Max

5.6 Plug Thermal Interface

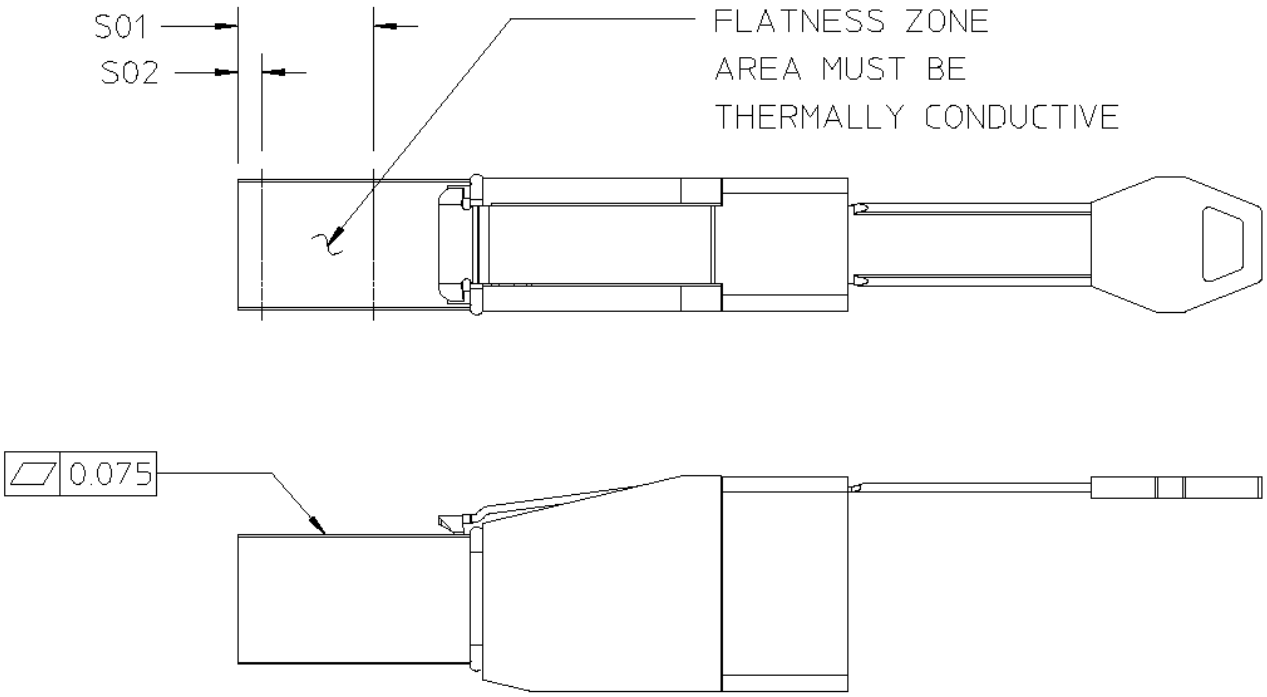


FIGURE 5-12 PLUG THERMAL INTERFACE

TABLE 5-6 PLUG THERMAL INTERFACE DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
S01	Heat Sink Engagement Zone	11.00	Min
S02	Heat Sink Engagement Zone	2.00	Max

6 Receptacle Requirements

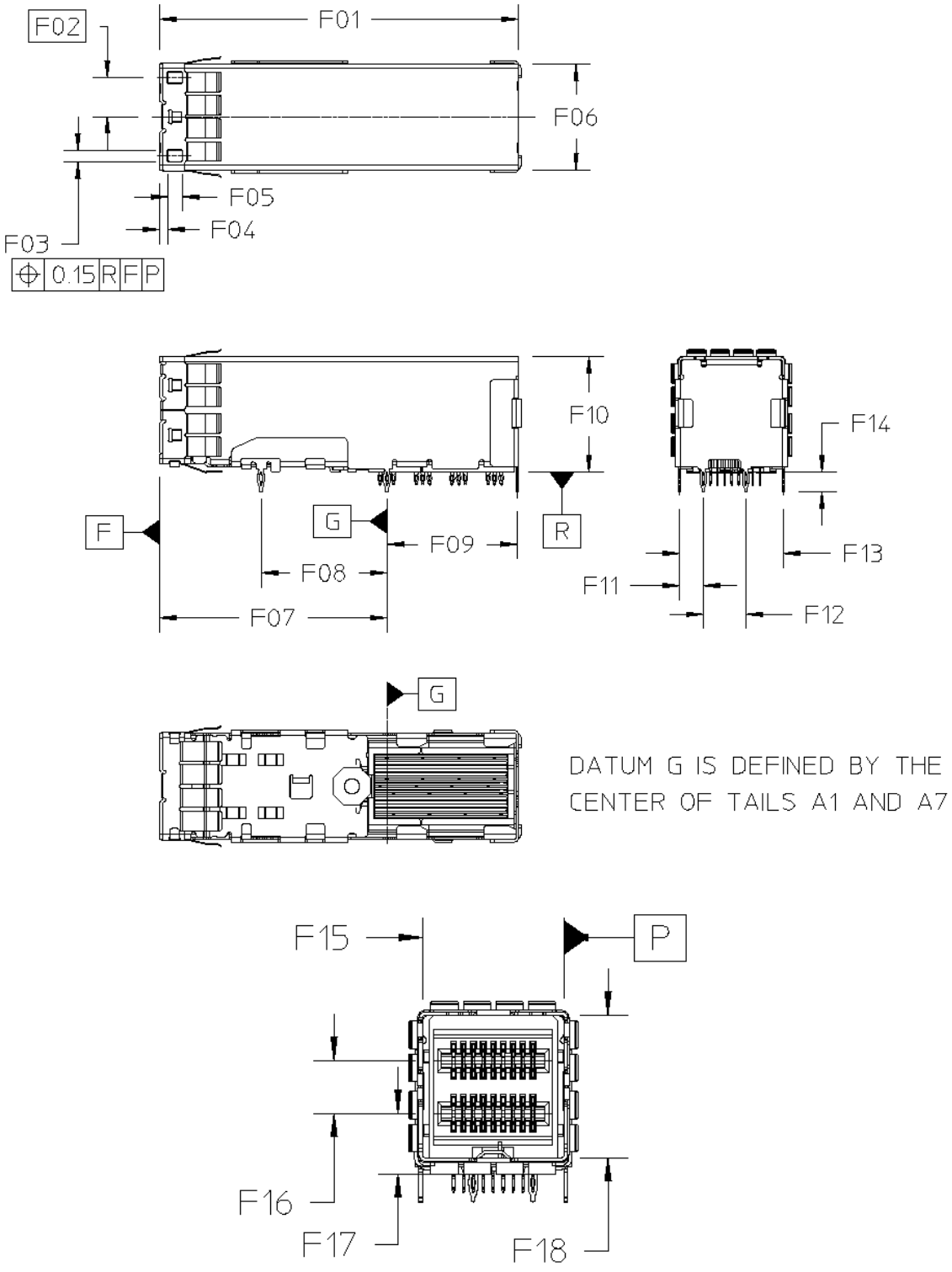


FIGURE 6-1 RECEPTACLE

TABLE 6-1 RECEPTACLE DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
F01	Cage Length	38.00	0.15
F02	Cage Center to Latch Hole Center	4.15	Basic
F03	Latch Hole Width	1.20	0.10
F04	Cage Front to Latch Hole Front	0.88	0.05
F05	Latch Hole Length	1.40	Min
F06	Cage Width	11.25	0.10
F07	Datum G to Front Face	24.06	0.10
F08	Datum G to Cage Tail	13.31	0.05
F09	Datum G to Cage Tail	13.81	0.05
F10	Cage Height	12.24	0.13
F11	Cage Tail to Tail	2.51	0.10
F12	Cage Tail to Tail	4.50	0.05
F13	Cage Tail to Tail	11.00	0.10
F14	Cage Tail Length	2.50	Max.
F15	Cage Opening - Width	10.75	0.08
F16	Lower Card Slot to Upper Card Slot	4.00	0.05
F17	Datum R to Lower Card Slot	4.55	0.10
F18	Cage Opening - Height	10.76	0.08

6.1 Receptacle Contact Locations

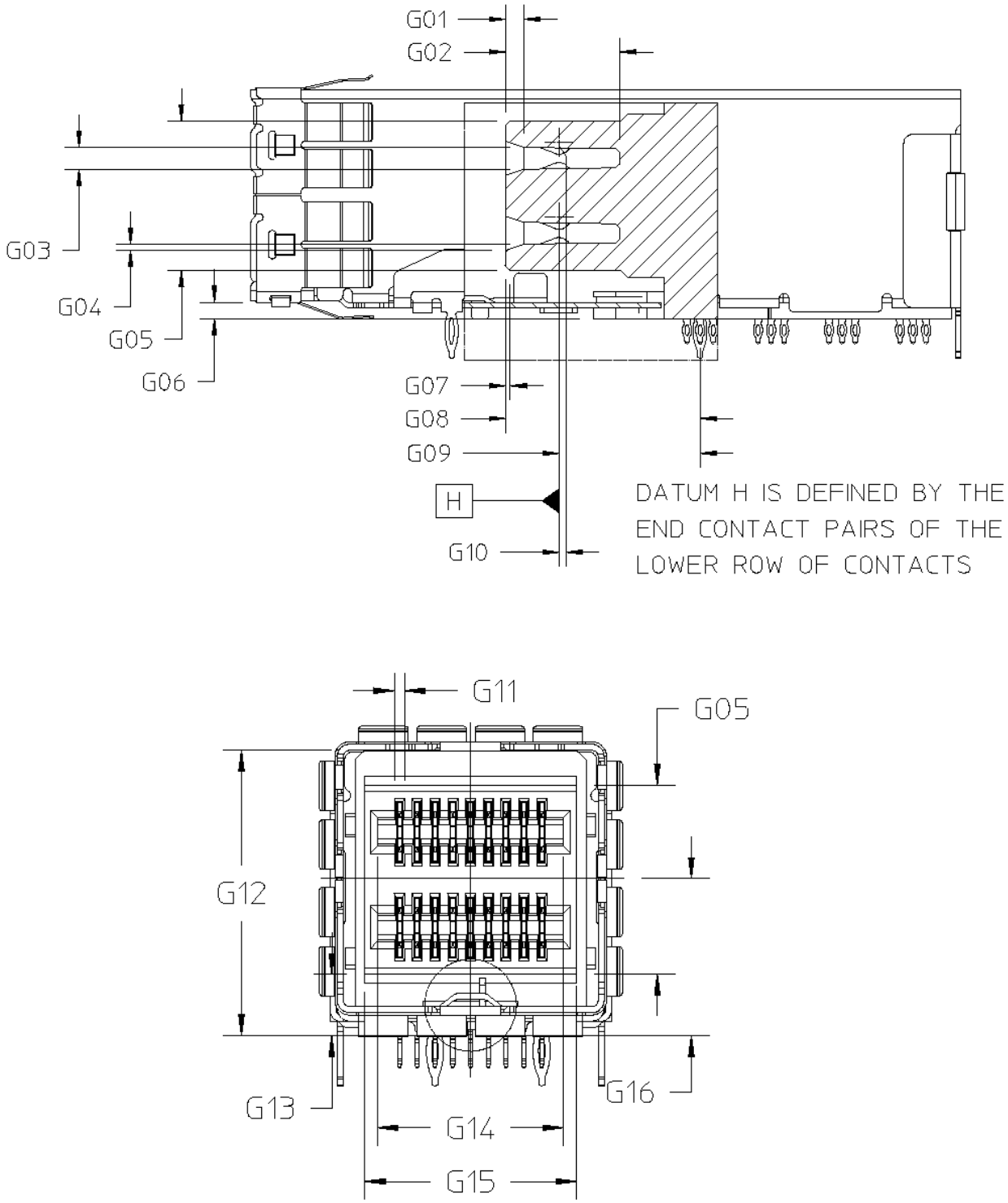


FIGURE 6-2 RECEPTACLE CONTACT LOCATIONS

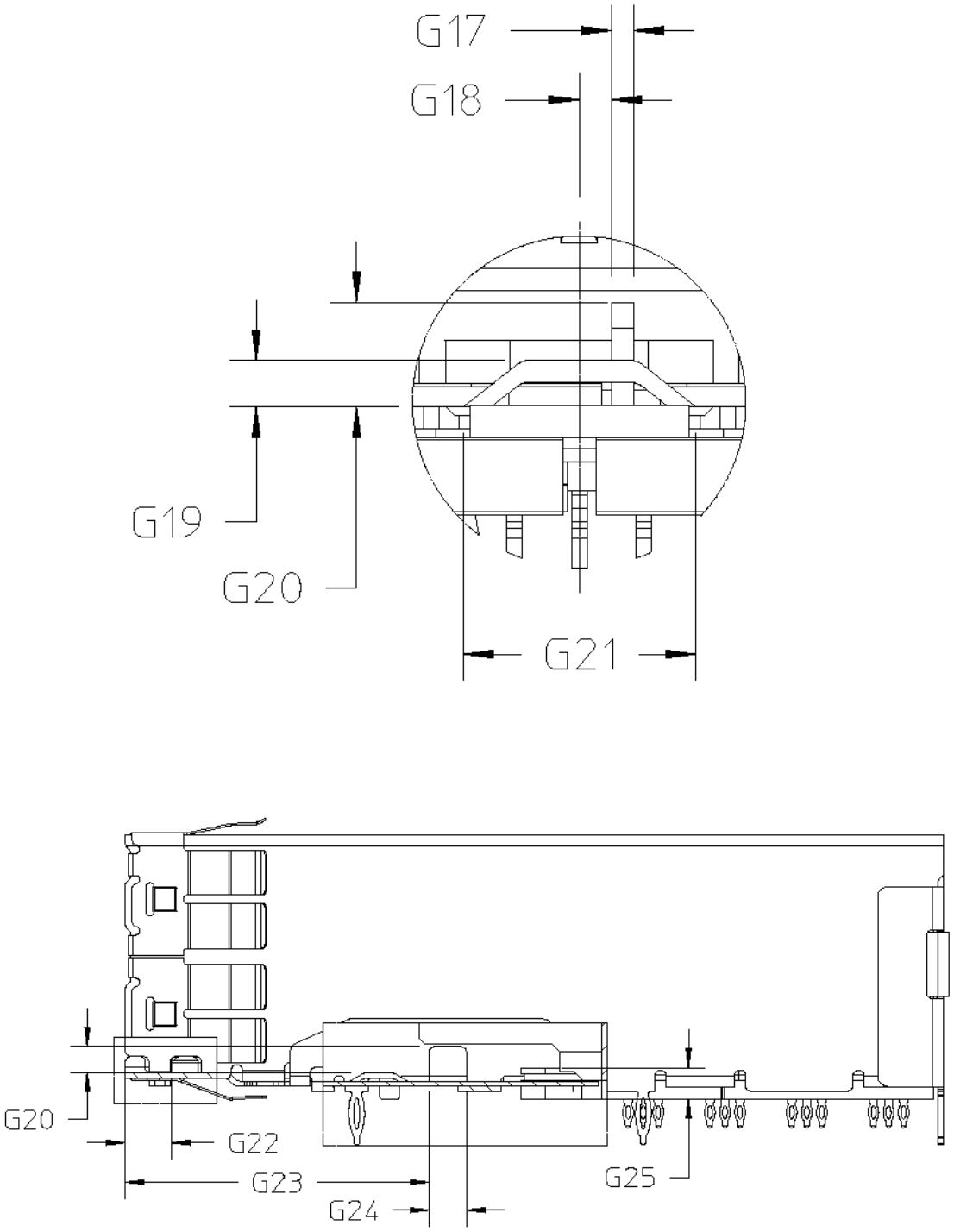


FIGURE 6-3 RECEPTACLE BLOCKING KEY

TABLE 6-2 RECEPTACLE CONTACT LOCATION AND BLOCKING KEY DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
G01	Receptacle Card Slot Lead-In	1.00	0.25
G02	Receptacle Snout Length	6.13	0.08
G03	Receptacle Card Slot Height	1.20	0.08
G04	Receptacle Card Slot Lead-In	0.30	0.10
G05	Receptacle Snout Height	7.94	0.10
G06	Cage Snout Offset	0.86	0.15
G07	Housing Chamfer x 45°	0.25	0.10
G08	Datum G to Receptacle Front	10.43	0.10
G09	Datum G to Lower Contact Interface	7.56	0.10
G10	Lower Contact to Upper Contact	0.00	0.05
G11 (*)	Contact Zone (0.18 wide terminal)	0.30	Max
	Contact Zone (0.20 wide terminal)	0.32	Max
	Contact Zone (0.22 wide terminal)	0.34	Max
G12	Cage Opening to Cage Bottom	11.98	0.10
G13	Datum R to Receptacle Snout	2.58	0.08
G14	Receptacle Card Slot Width	7.85	0.05
G15	Receptacle Body Width	8.95	0.10
G16	Datum R to Centerline of Cage Snout Opening	6.60	0.10
G17	Primary Blocking Key Width	0.25	0.05
G18	Primary Blocking Key Location 1	0.37	0.10
G19	Preliminary Blocking Key Height	0.54	0.10
G20	Primary Blocking Key Height	1.12	Min
G21	Preliminary Blocking Key Width	3.00	Max
G22	Preliminary Blocking Key Location	2.10	0.13
G23	Primary Blocking Key Location 2	14.10	0.13
G24	Primary Blocking Key Length	1.75	Min
G25	M2 Threaded Height to Cage Bottom	1.45	Max

(*) 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.

6.2 Receptacle Footprints

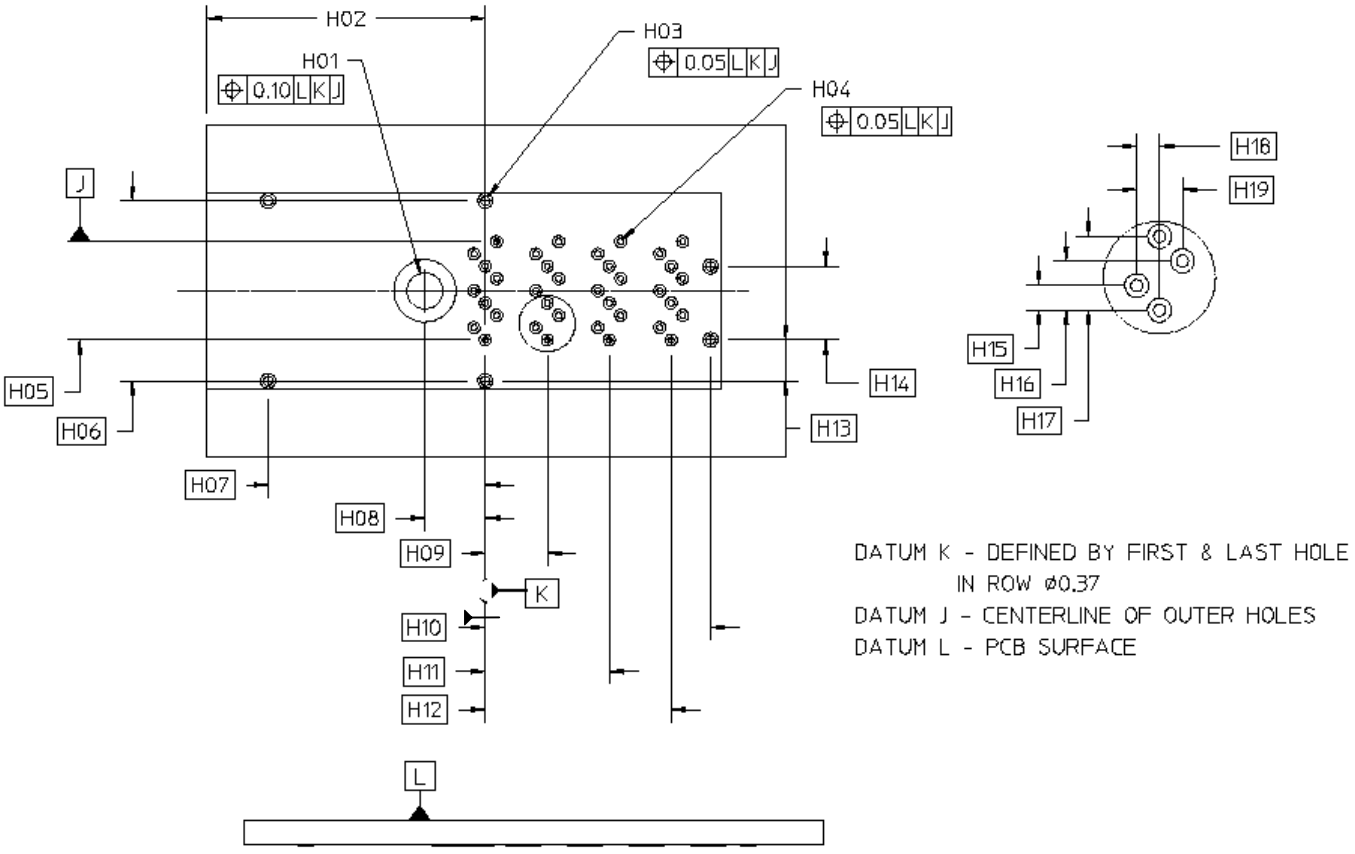


FIGURE 6-4 1X1 RECEPTACLE FOOTPRINT

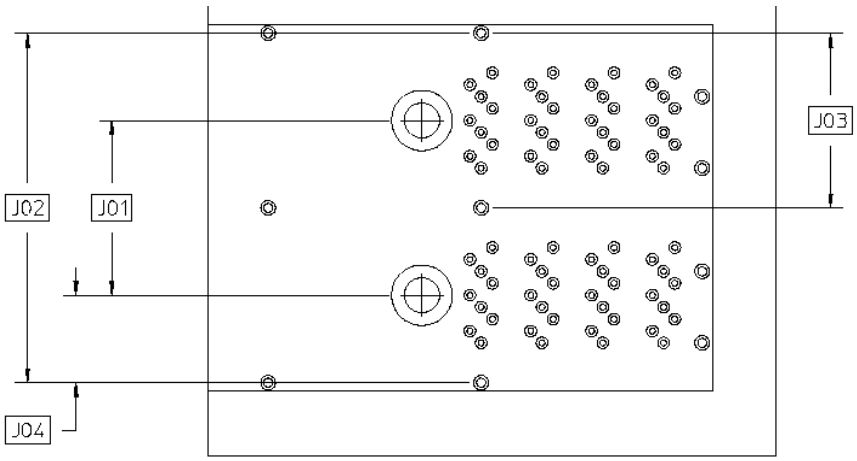


FIGURE 6-5 1X2 RECEPTACLE FOOTPRINT

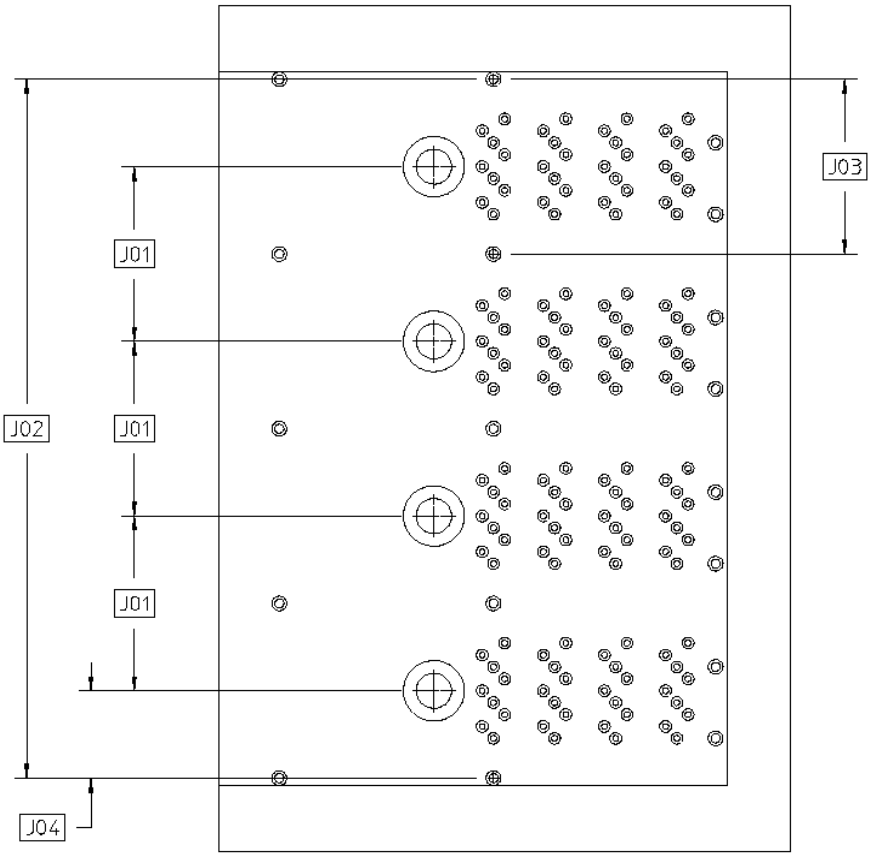
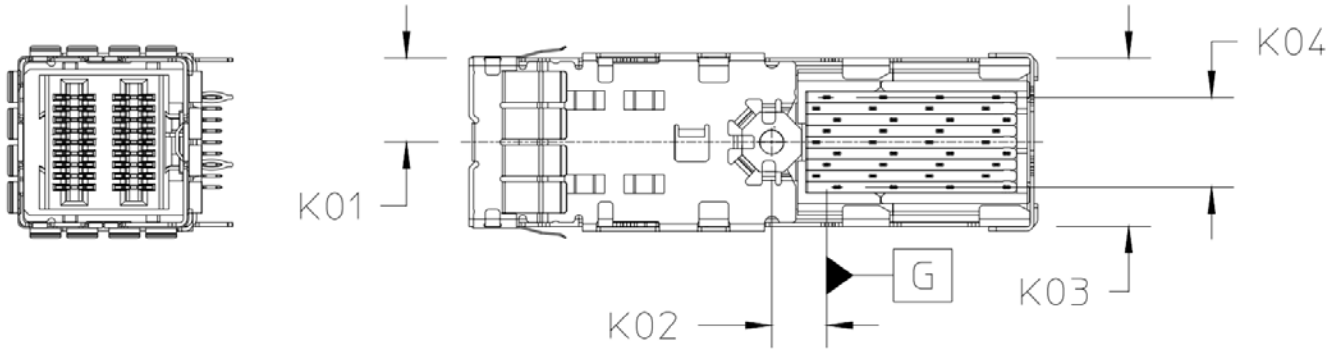


FIGURE 6-6 1X4 RECEPTACLE FOOTPRINT

TABLE 6-3 RECEPTACLE FOOTPRINT DIMENSIONS

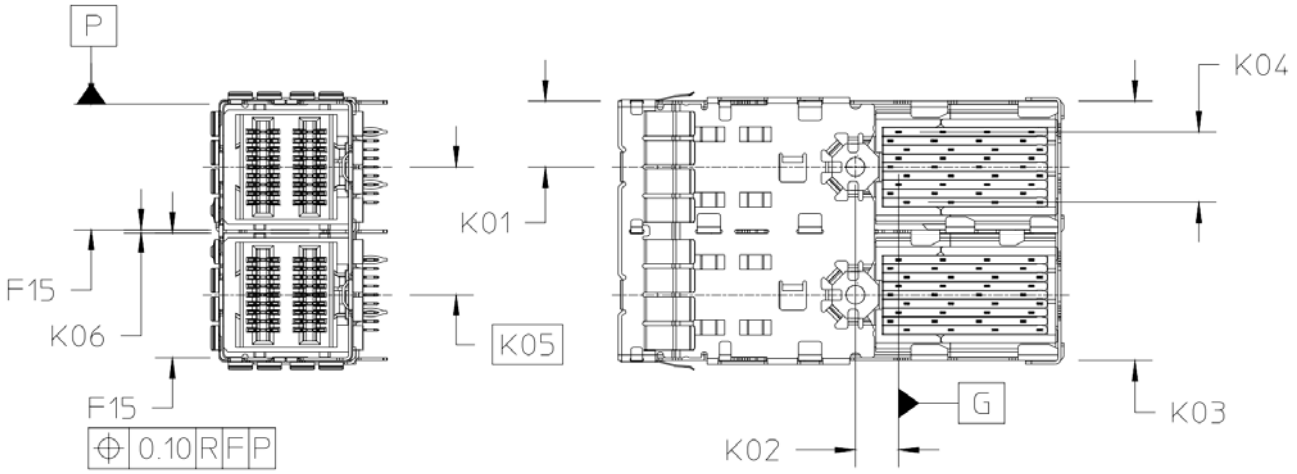
Designator	Description	Dimension	Tolerance +/-
H01	Cage Attachment Hole Diameter	2.20	0.10
H02	Datum to Front Edge of PCB PCI Add-in Card Applications	17.10	0.15
H02	Datum to Front Edge of PCB All other (M/B) Applications	18.19	0.15
H03	EMI Cage Hole Diameter	0.57	0.05
H04	Receptacle Hole Diameter	0.37	0.05
H05	Receptacle Pin, Center to Center	6.00	Basic
H06	EMI Cage Hole to Hole	11.00	Basic
H07	Datum K to Front Holes	13.31	Basic
H08	Datum K to Mounting Hole	3.70	Basic
H09	Datum K to Second Group	3.80	Basic
H10	Datum K to Back Holes	13.81	Basic
H11	Datum K to Third Group	7.60	Basic
H12	Datum K to Fourth Group	11.40	Basic
H13	EMI Cage Hole to Hole	2.50	Basic
H14	EMI Cage Hole to Hole	4.50	Basic
H15	Receptacle Hole to Hole	0.75	Basic
H16	Receptacle Hole to Hole	1.50	Basic
H17	Receptacle Hole to Hole	2.25	Basic
H18	Receptacle Hole to Hole	0.70	Basic
H19	Receptacle Hole to Hole	1.40	Basic
J01	Port to Port Spacing	11.00	Basic
J02	1x2 Shield Hole to Hole	22.00	Basic
J02	1x4 Shield Hole to Hole	44.00	Basic
J03	Shield Hole to Hole	11.00	Basic
J04	Shield Hole to Mounting Hole	5.50	Basic

6.3 Receptacle Compliant Tail to Attachment Fastener



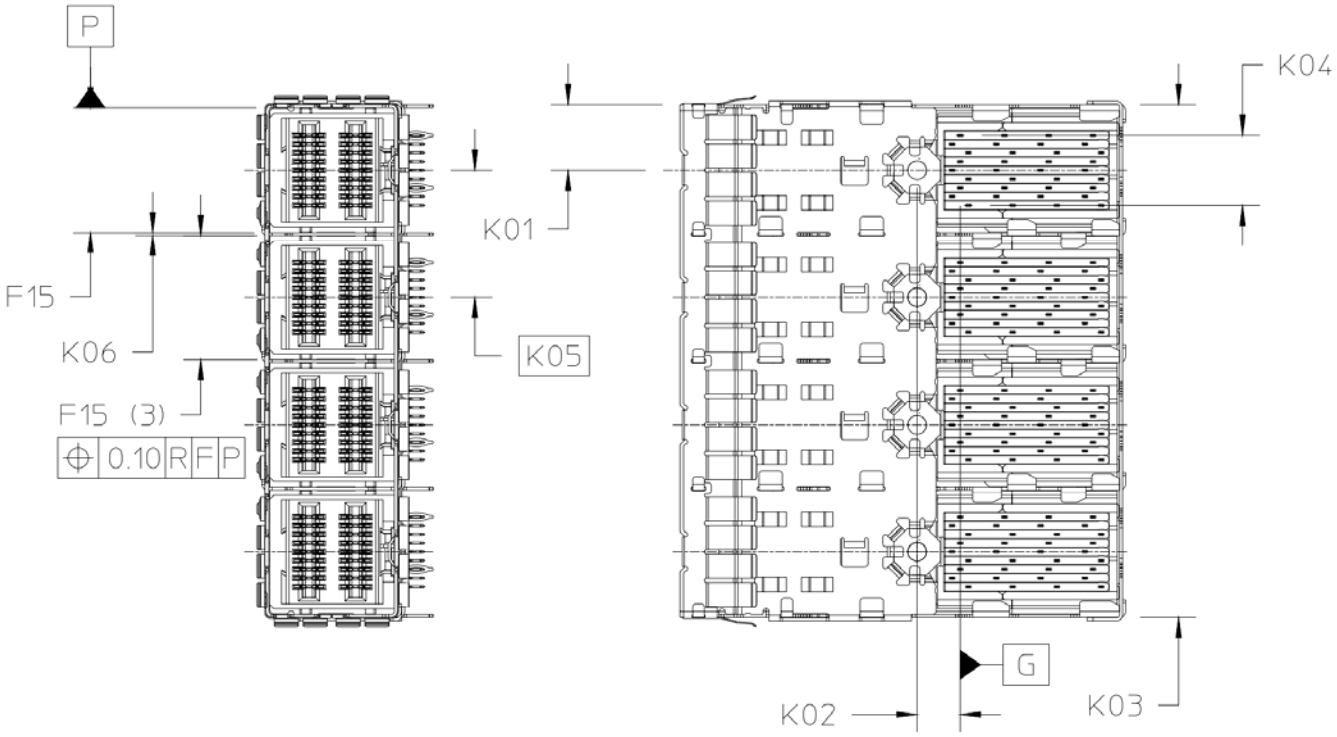
Caution – Special attention is required when choosing the length of the required M2 connector to PCB attachment screw. The end of the screw must not interfere with full insertion of the mating plug. The appropriate length is determined by the thickness of the PCB and its associated tolerances.

FIGURE 6-7 1X1 RECEPTACLE COMPLIANT TAIL TO ATTACHMENT FASTENER



Caution – Special attention is required when choosing the length of the required M2 connector to PCB attachment screw. The end of the screw must not interfere with full insertion of the mating plug. The appropriate length is determined by the thickness of the PCB and its associated tolerances.

FIGURE 6-8 1X2 RECEPTACLE COMPLIANT TAIL TO ATTACHMENT FASTENER



Caution – Special attention is required when choosing the length of the required M2 connector to PCB attachment screw. The end of the screw must not interfere with full insertion of the mating plug. The appropriate length is determined by the thickness of the PCB and its associated tolerances.

FIGURE 6-9 1X4 RECEPTACLE COMPLIANT TAIL TO ATTACHMENT FASTENER

TABLE 6-4 RECEPTACLE ATTACHMENT FASTENER DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
K01	Outside of Cage to M2 Fastener Centerline	5.625	Ref
K02	Datum G to Shield M2 Fastener Thread	3.70	Ref
K03	1x1 Connector	11.25	0.10
K03	1x2 Connector	22.25	0.10
K03	1x4 Connector	44.25	0.10
K04	Receptacle Tail to Receptacle Tail	6.00	Ref
K05	Port to Port Spacing	11.00	Basic
K06	Cage Internal Wall Thickness	0.25	0.03

6.4 Receptacle to Bezel

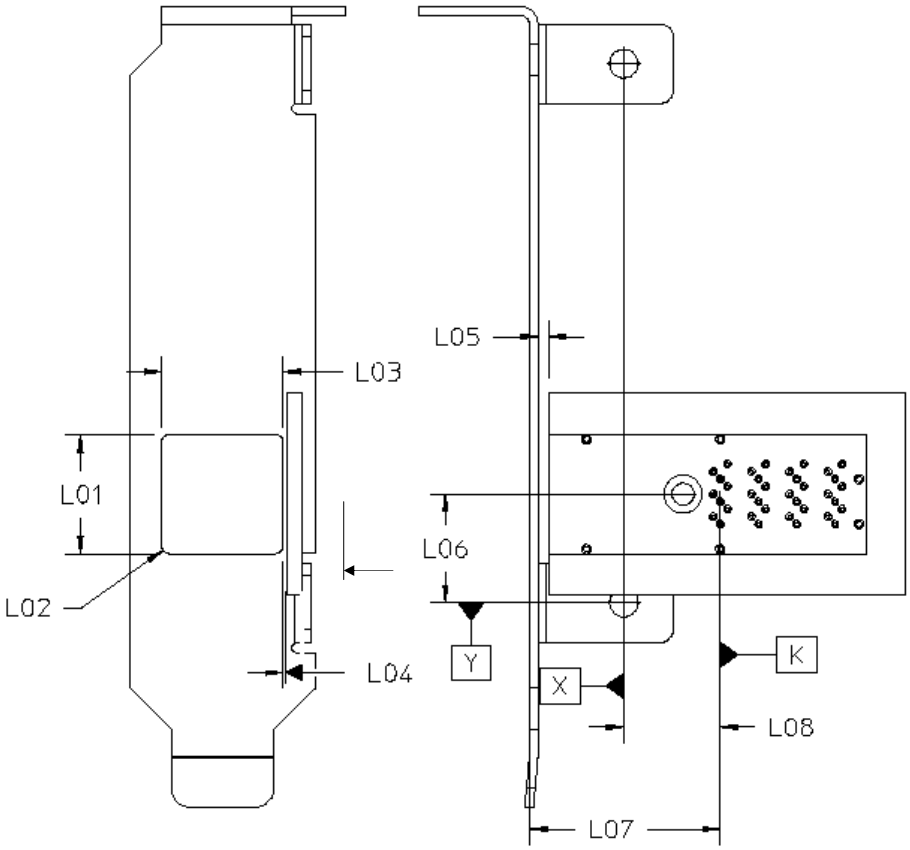


FIGURE 6-10 1X1 RECEPTACLE TO BEZEL

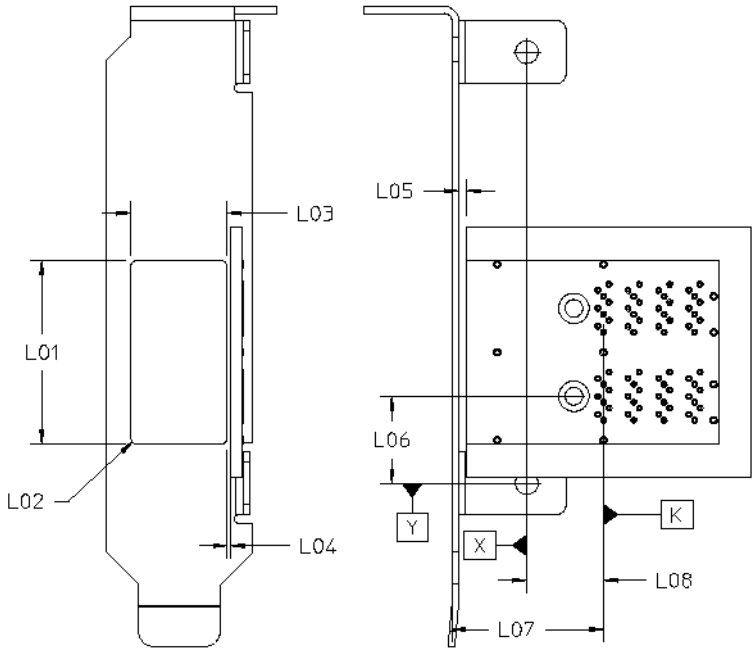


FIGURE 6-11 1X2 RECEPTACLE TO BEZEL

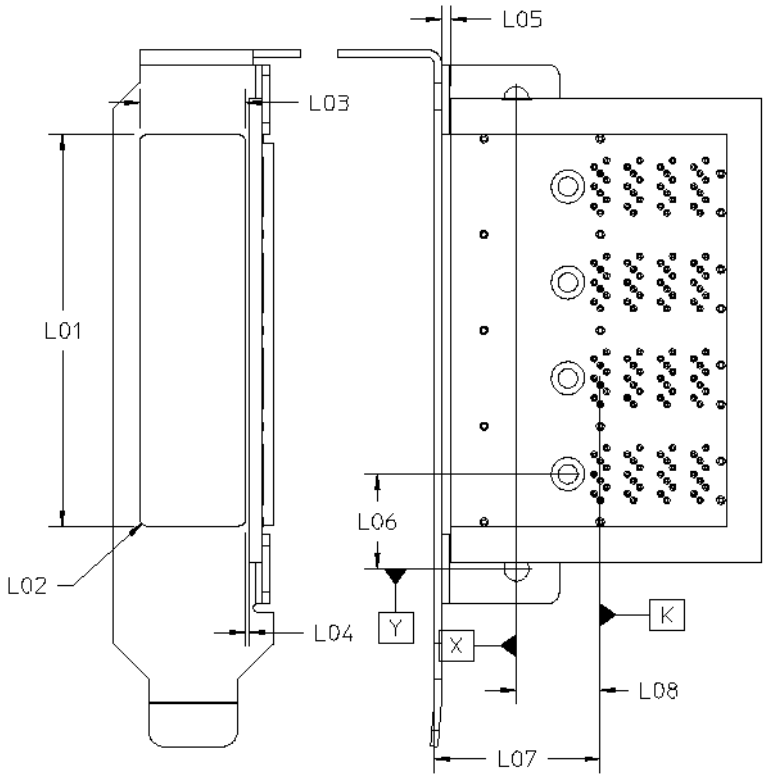


FIGURE 6-12 1X4 RECEPTACLE TO BEZEL

TABLE 6-5 1X1 RECEPTACLE TO BEZEL DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
L01	1x1 Bracket Cut Out Width	11.90	0.10
L01	1x2 Bracket Cut Out Width	22.90	0.10
L01	1x4 Bracket Cut Out Width	44.90	0.10
L02	Bracket Cut Out Radius	0.75	Max
L03	Bracket Cut Out Height	12.07	0.10
L04	PCB Surface to Bracket Cut Out	0.38	0.10
L05	Bracket Back to PCB Front Edge	1.03	Ref
L06	Mounting Hole to Manufacturer Fiducial	Basic	N/A
L07	Bracket Front to Datum K PCI Add-in Card Applications	19.00	0.15
L07	Bracket Front to Datum K All Other (M/B) Applications	20.08	0.15
L08	Mounting Hole to Manufacturer Fiducial	Basic	N/A

6.5 Receptacle Minimum Pitch

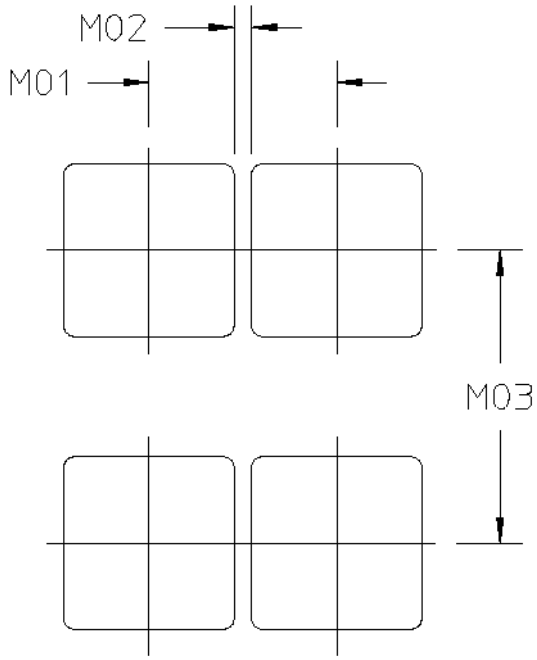


FIGURE 6-13 RECEPTACLE MINIMUM PITCH DIMENSIONS

TABLE 6-6 RECEPTACLE MINIMUM PITCH DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
M01	Port to Port - Horizontal	13.25	Min
M02	Bracket Web	1.00	Min
M03	Port to Port - Vertical	20.50	0.10

6.6 Receptacle Dust Cover

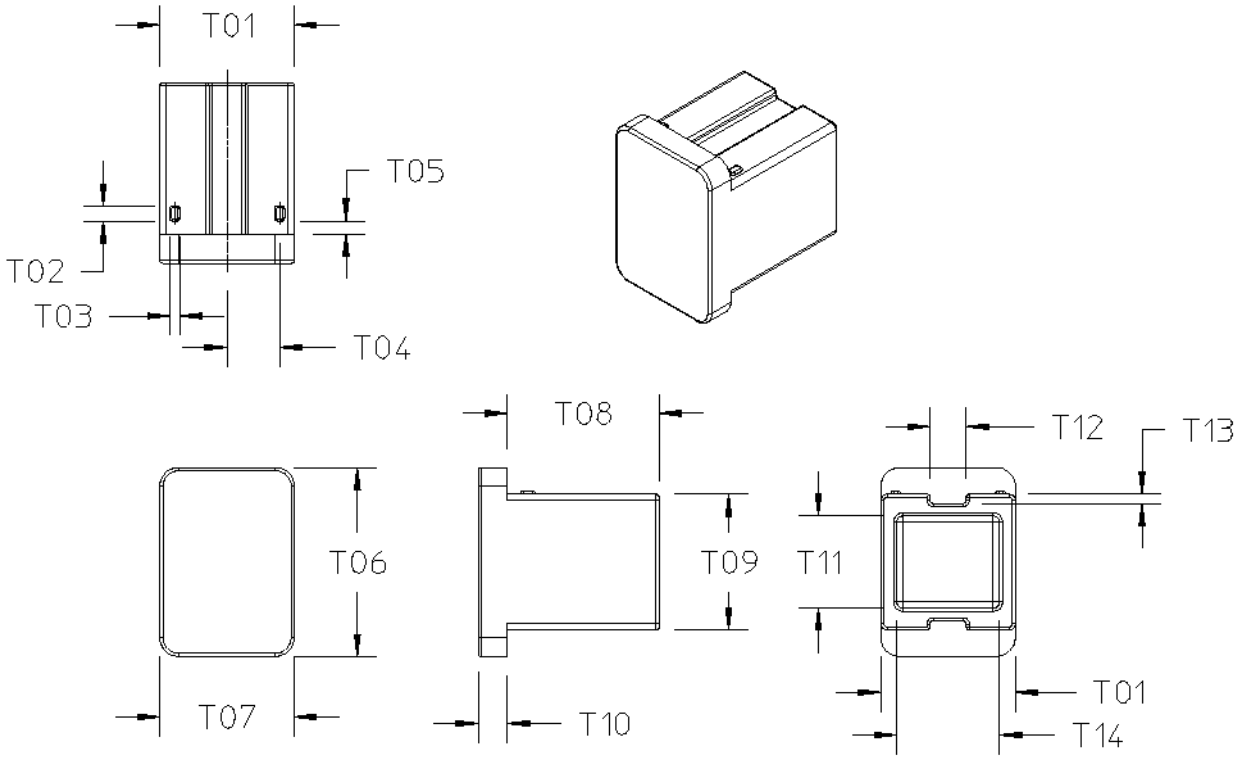


FIGURE 6-14 RECEPTACLE DUST COVER

TABLE 6-7 RECEPTACLE DUST COVER DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
T01	Plug Body Width	10.65	0.10
T02	Dimple Length	1.20	0.10
T03	Dimple Width	0.80	0.10
T04	Dimple Location	4.15	0.10
T05	Dimple Location	1.03	0.10
T07	Plug Front Width	10.65	Max
T06	Plug Front Height	14.95	0.25
T08	Plug Body Length	12.00	Max
T09	Plug Body Height	10.76	0.10
T10	Plug Front Thickness	2.00	Min
T11	Plug Body Height - Inside	7.30	0.25
T12	Groove Width	2.85	0.25
T13	Groove Depth	0.73	0.25
T14	Plug Body Width - Inside	8.15	0.25

7 Thermal Solutions

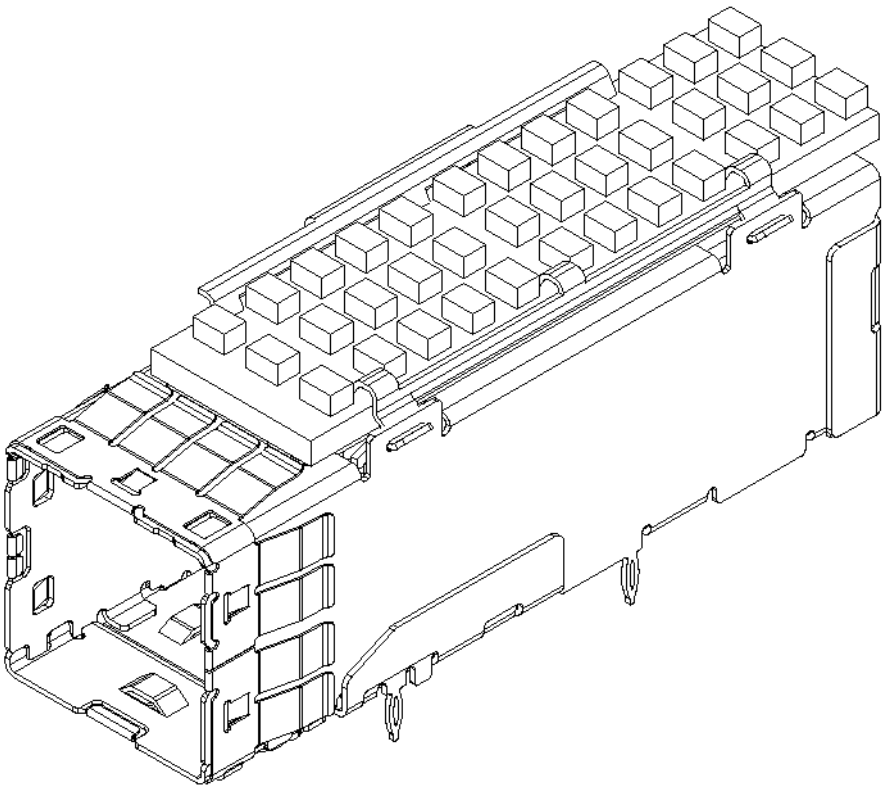


FIGURE 7-1 CAGE WITH HEAT SINK

7.1 Cage Heat Sink

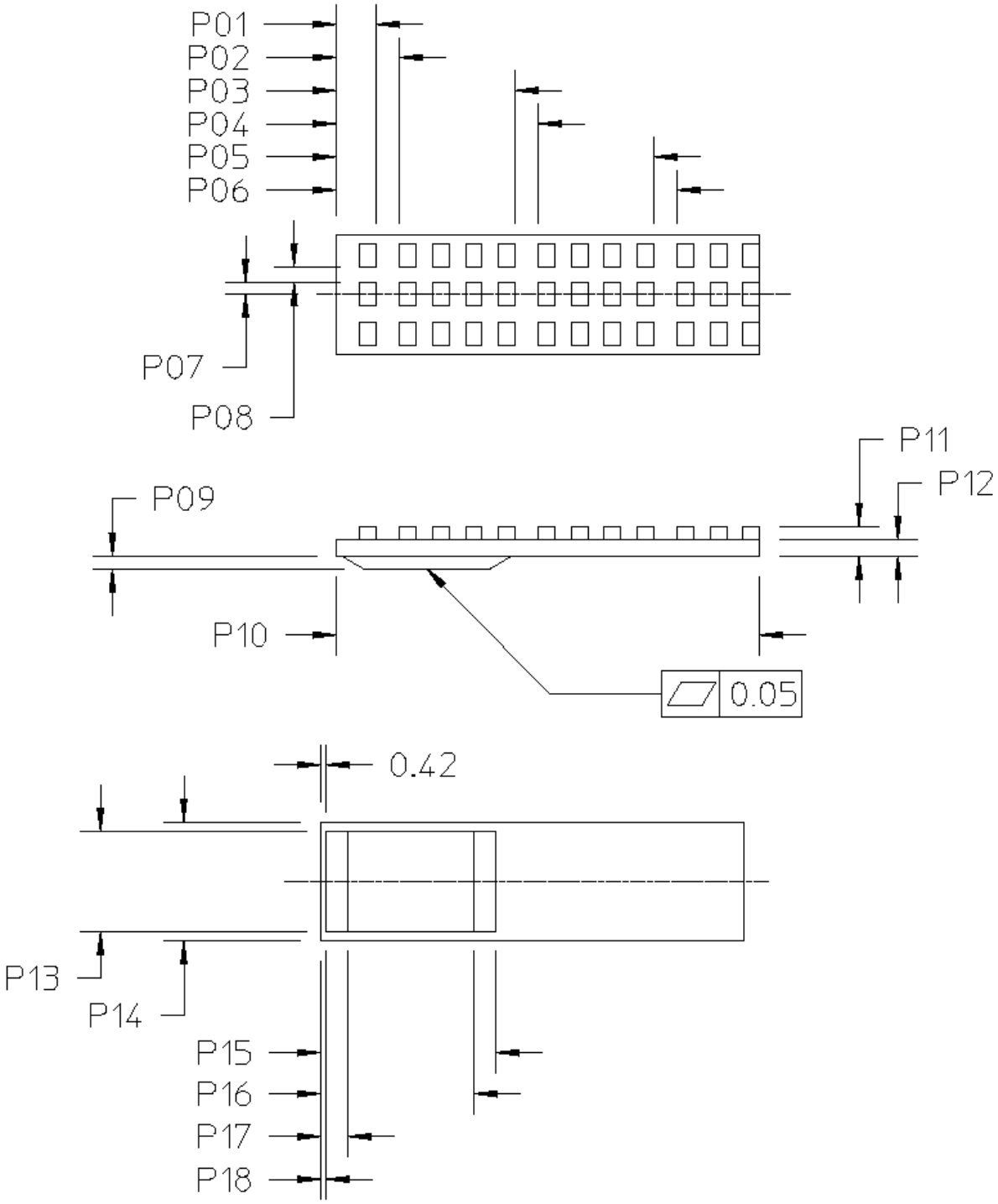


FIGURE 7-2 CAGE HEAT SINK

TABLE 7-1 CAGE HEAT SINK DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
P01	Heat Sink Clip Groove Start	3.00	0.10
P02	Heat Sink Clip Groove End	4.75	0.10
P03	Heat Sink Clip Groove Start	13.50	0.10
P04	Heat Sink Clip Groove End	15.25	0.10
P05	Heat Sink Clip Groove Start	24.00	0.10
P06	Heat Sink Clip Groove End	25.75	0.10
P07	Heat Sink Clip Groove End	0.88	0.10
P08	Heat Sink Clip Groove End	1.25	0.10
P09	Heat Sink Pad Height	0.94	0.10
P10	Heat Sink Length (application specific)	32.75	Ref.
P11	Heat Sink Height (application specific)	2.27	Ref.
P12	Heat Sink Base Thickness	1.25	0.15
P13	Heat Sink Pad Width	7.50	0.15
P14	Heat Sink Width	9.00	0.25
P15	Heat Sink Front to Chamfer End	13.24	0.15
P16	Heat Sink Front to Chamfer Start	11.62	0.15
P17	Heat Sink Front to Chamfer End	2.05	0.15
P18	Heat Sink Front to Chamfer Start	0.42	0.15

7.2 Cage Heat Sink Attachment

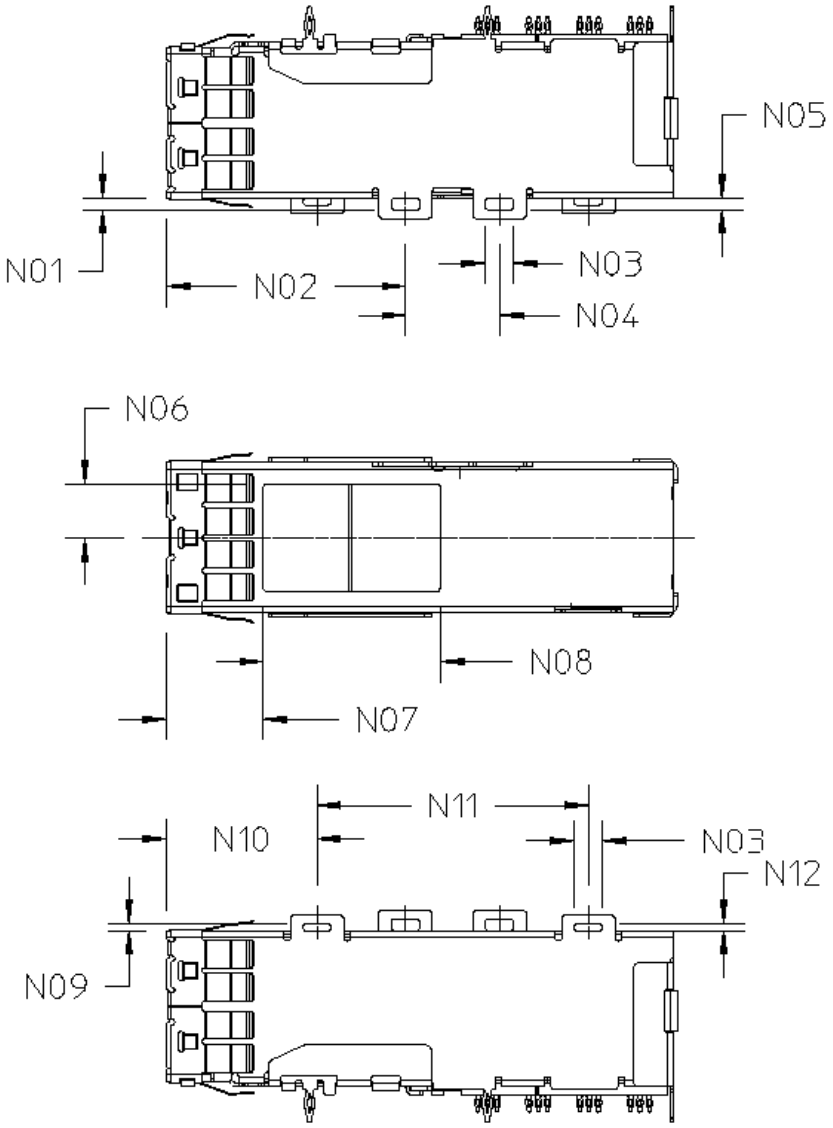


FIGURE 7-3 CAGE HEAT SINK ATTACHMENT

TABLE 7-2 CAGE HEAT SINK ATTACHMENT DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
N01	Top of Cage to Top of Slot	0.86	0.10
N02	Front of Cage to Front Slot Centerline	17.93	0.10
N03	Slot Width	2.25	0.10
N04	Front Slot to Back Slot	7.03	0.10
N05	Slot Height	0.85	Min
N06	Heat Sink Cut Out Width	4.00	0.10
N07	Shield Front to Heat Sink Cut Out	7.28	0.10
N08	Heat Sink Cut Out Length	13.25	0.10
N09	Top of Cage to Top of Slot	0.50	0.10
N10	Front of Cage to Front Slot Centerline	11.30	0.10
N11	Front Slot to Back Slot	20.30	0.10
N12	Slot Height	0.40	Min

7.3 Cage Heat Sink Attachment Clip Design

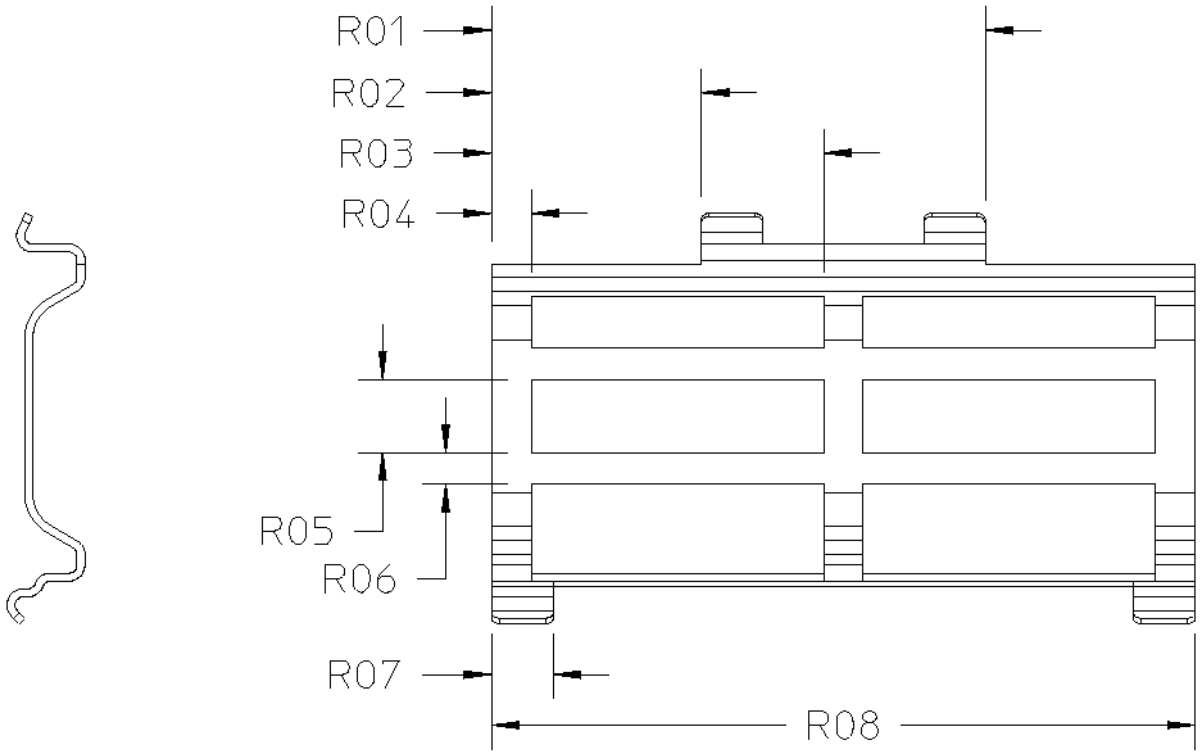


FIGURE 7-4 CAGE HEAT SINK ATTACHMENT CLIP

TABLE 7-3 CAGE HEAT SINK ATTACHMENT CLIP DIMENSIONS

Designator	Description	Dimension	Tolerance +/-
R01	Tab Location	15.46	0.10
R02	Tab Location	6.63	0.10
R03	Strap Location	10.43	0.10
R04	Strap Width	1.18	0.10
R05	Window Height	2.30	0.10
R06	Strap Height	1.00	0.10
R07	Latch Tab Width	1.70	0.10
R08	Clip Length	22.10	0.15

8 Performance Requirements

This specification conforms to the test sequences as defined in EIA-364 TS-1000.

TABLE 8-1 TS-1000 REQUIREMENTS

Description	Requirement
Rated Durability Cycles	250
Field Life (3, 5, 7, or 10 years)	10 year
Field Temperature (57, 60, 65, 75, or 85C)	65C degrees
Test Group 4 Option	1B
Plating Type (Precious / non-Precious)	Precious
Surface Treatment (Lubricated or non-Lubricated)	Manufacturer to specify

TABLE 8-2 ELECTRICAL REQUIREMENTS

Description	Requirement	Procedure
Current	0.5 A per contact	
Voltage	30 VDC per contact	
Low Level Contact Resistance	Baseline	EIA 364-23 20 mVDC, 10 mA
Insulation Resistance	1000 Megaohms minimum between adjacent contacts	100 VDC
Dielectric Withstanding Voltage	No defect or breakdown between adjacent contacts	300 VDC minimum for 1 minute

TABLE 8-3 MECHANICAL REQUIREMENTS

Description	Requirement	Procedure
Mating Force (plug only, latch de-activated)	62N maximum	EIA 364-13
Un-mating Force (plug only, latch de-activated)	30N maximum	EIA 364-13
Latched Plug Pullout Force	75N minimum	
Vibration	- No Damage - No discontinuity longer than 1 microsecond allowed. - 20 milliohms maximum change from initial (baseline) contact resistance	EIA 364-28
Mechanical Shock	- No Damage - 20 milliohms maximum change from initial (baseline) contact resistance	EIA 364-27

TABLE 8-4 ENVIRONMENTAL REQUIREMENTS

Description	Requirement	
Storage Temperature	-20C to +85C degrees	
Humidity	80 percent Relative Humidity	