



## SFF-8614

Specification for

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

Rev 3.5.4

~~June 11, 2026~~ July 10, 2023

SECRETARIAT: SFF ~~TA~~-TWG

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

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.

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## 1 Foreword

2 The development work on this specification was done by the SNIA SFF TWG, an industry group. Since its formation  
3 as the SFF Committee in August 1990, as well as since SFF's transition to SNIA in 2016, the membership has  
4 included a mix of companies which are leaders across the industry.

5  
6 For those who wish to participate in the activities of the SFF TWG, the signup for membership can be found at  
7 <https://www.snia.org/sff/join>.

## 10 Revision History

11 Note: Document revision numbers were not included in the revision history for all earlier versions of this document.  
12 In these instances, only the revision date is included in the history. Revision history for versions published before  
13 November 5, 2010 is not available.

### 15 *November 5, 2010:*

- 16 - Sorted dimension designators to alphabetic order for all figures
- 17 - Changed Figure 5.1: from 18.01 to 18.00 and from 0.86 to 0.88
- 18 - Changed TR01 from 15.61 to 15.46
- 19 - Changed R03 from 10.50 to 10.43
- 20 - Changed R04 from 1.25 to 1.18
- 21 - Changed R07 from 1.95 to 1.80
- 22 - Changed R08 from 22.25 Min to 22.10 +/- 0.15
- 23 - Changed P01 from 3.75 to 3.00
- 24 - Changed P02 from 5.50 to 4.75
- 25 - Changed P03 from 14.25 to 13.50
- 26 - Changed P04 from 16.00 to 15.25
- 27 - Changed P05 from 24.75 to 24.00
- 28 - Changed P06 from 26.50 to 25.75
- 29 - Changed P15 from 14.22 to 13.24
- 30 - Changed P16 from 12.59 to 11.62
- 31 - Changed P17 from 2.80 to 2.05
- 32 - Changed P18 from 1.17 to 0.42

### 33 *November 19, 2010:*

- 34 - Dimension values replaced with dimension designators on Datums figure
- 35 - Changed P06 from 25.25 to 25.75
- 36 - Added P10 as 'application specific'

### 37 *December 7, 2010:*

- 38 - Changed title to 'Shielded 8/4 Channel for 6 Gbs Applications'

### 39 **Rev 2.5** *January 11, 2011:*

- 40 - Changed R07 from 1.80 to 1.70
- 41 - Changed N03 from 2.15 to 2.25
- 42 - Changed A11 from 0.105 +/- 0.025 to 0.10 +/- 0.05
- 43 - Added note to G11 to clarify contact zone
- 44 - Title added for Section 8.1

### 45 **Rev 2.8** *May 5, 2011:*

- 46 - Changed title to 'Mini Multilane 12 Gbs 4/8X Shielded Connector'
- 47 - Expanded notes on Plug Latch figure
- 48 - Added Datum E, hard stop text and updated description on Plug EMI figure
- 49 - Added notes to 8X Plug figure

### 50 **Rev 2.9** *August 9, 2012:*

- 51 - Editorial revision to adopt latest template
- 52 - Removed electrical performance requirements specified by the using interface
- 53 - Simplified titling of sections, figures, and tables
- 54 - Replaced double drawings of Figure 2-1
- 55 - 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

**Rev 3.5** *July 10, 2023:*

- Converted to new document template
- Added several missing document references to Section 2.1
- Added SMT footprint option in Section 5.4
- Added drawings for the SMT footprint in Section 5.4.2
- Added dimension values to ~~Table 5-6~~[Table 5-6](#)
- Added tolerances for the following dimensions: V11, V12, V30, V31, V38, V62, and V63
- Filled in missing reliability information in Section 8.1
- Added "Manufacturer to specify" to vibration & mechanical shock tests in ~~Table 8-2~~[Table 8-2](#) and ~~Table 8-3~~[Table 8-3](#)

**Rev 3.5.1** *March 25, 2025:*

- ~~Converted to new boiler plate~~
- ~~Added Datums N and S to Table 5-1~~
- ~~Changed Figure 5-2, Figure 5-3, and Table 5-2 for dimensions F16, F17, G03, added pin positional tolerance, and added Datum R.~~
- ~~Consolidated figures for Cage for SMT Connector in section 5.3.2~~
- ~~Redid the measurements based on Datum S for all SMT receptacle PCB footprints in section 5.4.2 and Table 5-6~~
- ~~Added new figures in Section 5.5 (Receptacle-to-Bezel) for SMT~~
- ~~Added "Enhanced" dimensions in Table 7-1 to help with PCIe 5.0 signaling.~~
- ~~Updated Figure for 4X Plug Housing which also changed a couple measurements in corresponding table.~~
- ~~Other minor changes.~~

**Rev 3.5.2** *April 25, 2025:*

- ~~Incorporated comment resolution feedback~~

**Rev 3.5.3** *May 27, 2025:*

- ~~Removed "enhanced" wording and replaced with 2 sets of dimensions. Changed Table 7-1 as a result.~~
- ~~Incorporated comment resolution feedback~~

**Rev 3.5.4** *June 11, 2026:*

- ~~Editorial changes.~~

- 1 - Fixed B14 value and naming of B14 and B15
- 2 - Deleted new value of A08, A09, A10 (reverted to original value).
- 3 - Tightened value of A07 and B16
- 4 - Added (e.g., for PCIe 5.0) to note 2 of Table 7-1 and 7-2
- 5
- 6

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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 and Conventions

### 2.1 Industry Documents

The following documents are relevant to this specification:

- ASME Y14.5 Dimensioning and Tolerancing
- EIA-364-09 Durability Test Procedure for Electrical Connectors and Contacts
- EIA-364-13 Mating and Unmating Force Test Procedure for Electrical Connectors and Sockets
- EIA-364-20 Dielectric Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts
- EIA-364-23 Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets
- EIA-364-27 Mechanical Shock (Specified Pulse) Test Procedure for Electrical Connectors and Sockets
- EIA-364-28 Vibration Test Procedure for Electrical Connectors and Sockets
- EIA-364-31 Humidity Test Procedure for Electrical Connectors and Sockets
- EIA-364-32 Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors and Sockets
- EIA-364-65 Mixed Flowing Gas Test Procedure for Electrical Connectors and Sockets
- EIA-364-70 Temperature Rise Versus Current Test Procedure for Electrical Connectors and Sockets
- EIA-364-1000 Environmental Test Methodology for Assessing the Performance of Electrical Connectors and Sockets Used in Controlled Environment Applications
- INCITS 519 SAS-3 (Serial Attached SCSI 3)
- INCITS 534 SAS-4 (Serial Attached SCSI 4)
- [PCI Express® \(PCIe®\) External Cabling Specification revision 5.0, Version 1.0](#)
- SFF-8410 High Speed Serial Testing for Copper Links
- SFF-8643 Mini Multilane 4/8X 12 Gb/s Unshielded Connector (HD12un)
- SFF-8644 Mini Multilane 4/8X 12 Gb/s Shielded Connector (HD12sh)
- SFF-8673 Mini Multilane 4/8X 24 Gb/s Unshielded Connector (HD24un)
- SFF-8674 Mini Multilane 4/8X 24 Gb/s Shielded Connector (HD24sh)

### 2.2 Sources

The complete list of SFF documents which have been published, are currently being worked on, or that have been expired by the SFF Committee can be found at <https://www.snia.org/sff/specifications>. Suggestions for improvement of this specification will be welcome, they should be submitted to <https://www.snia.org/feedback>.

Other standards may be obtained from the organizations listed below:

| <u>Standard</u>               | <u>Organization</u>   | <u>Website</u>  |
|-------------------------------|---|---|
| <a href="#">ASME</a>          | <a href="#">American Society of Mechanical Engineers (ASME)</a>                       | <a href="https://www.asme.org">https://www.asme.org</a>                                   |
| <a href="#">PCIe</a>          | <a href="#">PCI-SIG</a>   | <a href="https://www.pcisig.com/specifications">https://www.pcisig.com/specifications</a> |
| <a href="#">SAS standards</a> | <a href="#">International Committee for Information Technology Standards (INCITS)</a> | <a href="https://www.incits.org">https://www.incits.org</a>                               |

~~Copies of SAS standards may be obtained from the International Committee for Information Technology Standards (INCITS) (<https://www.incits.org>).~~

~~Copies of ASME standards may be obtained from the American Society of Mechanical Engineers (<https://www.asme.org>).~~

1  
2

## 2.3 Conventions

The following conventions are used throughout this document:

### **DEFINITIONS:**

Certain words and terms used in this standard have a specific meaning beyond the normal English meaning. These words and terms are defined either in the definitions or in the text where they first appear.

### **ORDER OF PRECEDENCE:**

If a conflict arises between text, tables, or figures, the order of precedence to resolve the conflicts is text; then tables; and finally figures. Not all tables or figures are fully described in the text. Tables show data format and values.

LISTS: Lists sequenced by lowercase or uppercase letters show no ordering relationship between the listed items.

EXAMPLE 1 - The following list shows no relationship between the named items:

a. red (i.e., one of the following colors):

A. crimson; or

B. pink;

b. blue; or

c. green.

Lists sequenced by numbers show an ordering relationship between the listed items.

EXAMPLE 2 -The following list shows an ordered relationship between the named items:

1. top;

2. middle; and

3. bottom.

Lists are associated with an introductory paragraph or phrase and are numbered relative to that paragraph or phrase (i.e., all lists begin with an a. or 1. entry).

### **DIMENSIONING CONVENTIONS:**

The dimensioning conventions are described in ASME-Y14.5, Geometric Dimensioning and Tolerancing. All dimensions are in millimeters, which are the controlling dimensional units (if inches are supplied, they are for guidance only).

### **NUMBERING 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.

| 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 |

### 3. Keywords, Acronyms, and Definitions

For the purposes of this document, the following keywords, acronyms, and definitions apply.

#### 3.1 Keywords

**May:** Indicates flexibility of choice with no implied preference.

**May or may not:** Indicates flexibility of choice with no implied preference.

**Obsolete:** Indicates that an item was defined in prior specifications but has been removed from this specification.

~~**May/ may not:** Indicates flexibility of choice with no implied preference.~~

**Optional:** 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 implemented as defined by the specification. Describing a feature as optional in the text is done an informational callout to assist the reader.

**Prohibited:** Describes a feature, function, or coded value that is defined in a referenced specification to which this SFF specification makes a reference, where the use of said feature, function, or coded value is not allowed for implementations of this specification.

**Reserved:** Where the term is used for a signal on a connector contact; the 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.

**Restricted:** Refers to features, bits, bytes, words, and fields that are set aside for other standardization purposes. If the context of the specification applies to the restricted designation, then the restricted bit, byte, word, or field shall be treated as a value whose definition is not in scope of this document, and is not interpreted by this specification.

**Shall:** Indicates a mandatory requirement. Designers are required to implement all such mandatory requirements to ensure interoperability with other products that conform to this specification.

**Should:** Indicates flexibility of choice with a strongly preferred alternative.

**Vendor specific:** Indicates something (e.g., a bit, field, code value) that is not defined by this specification. Specification of the referenced item is determined by the manufacturer and may be used differently in various implementations.

1 **3.2 Acronyms and Abbreviations**

2 **HDsh:** Mini Multilane ~~4~~/8X Shielded Cage/ Connector

3 **PCB:** Printed Circuit Board

4 **PF:** Press Fit

5 **PTH:** Plated Through Hole

6 **NPTH:** Non-plated Through Hole

7 **SMT:** Surface Mount Technology

8

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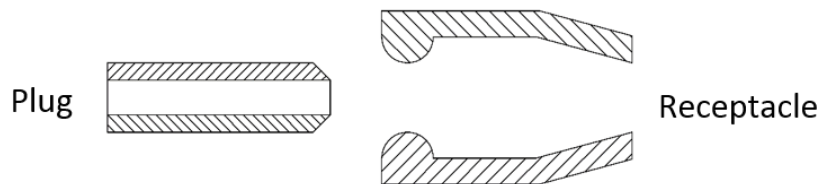
### 3.3 Definitions

**Connector:** Each half of an interface that, when joined together, establish electrical contact and mechanical retention between two components. In this specification, the term connector does not apply to any specific gender; it is used to describe the receptacle, the plug or the card edge, or the union of receptacle to plug or card edge. Other common terms include: connector interface, mating interface, and separable interface.

**Contacts:** A term used to describe connector terminals that make electrical connections across a separable interface.

**Module:** In this specification, module may refer to a plug assembly at the end of a copper (electrical) cable (passive or active), an active optical cable (AOC), an optical transceiver, or a loopback.

**Plug:** A term used to describe the connector that contains the penetrating contacts of the connector interface as shown in ~~Figure 3-1~~Figure 3-1. Plugs typically contain stationary contacts. Other common terms include male connector, pin connector, and card edge.



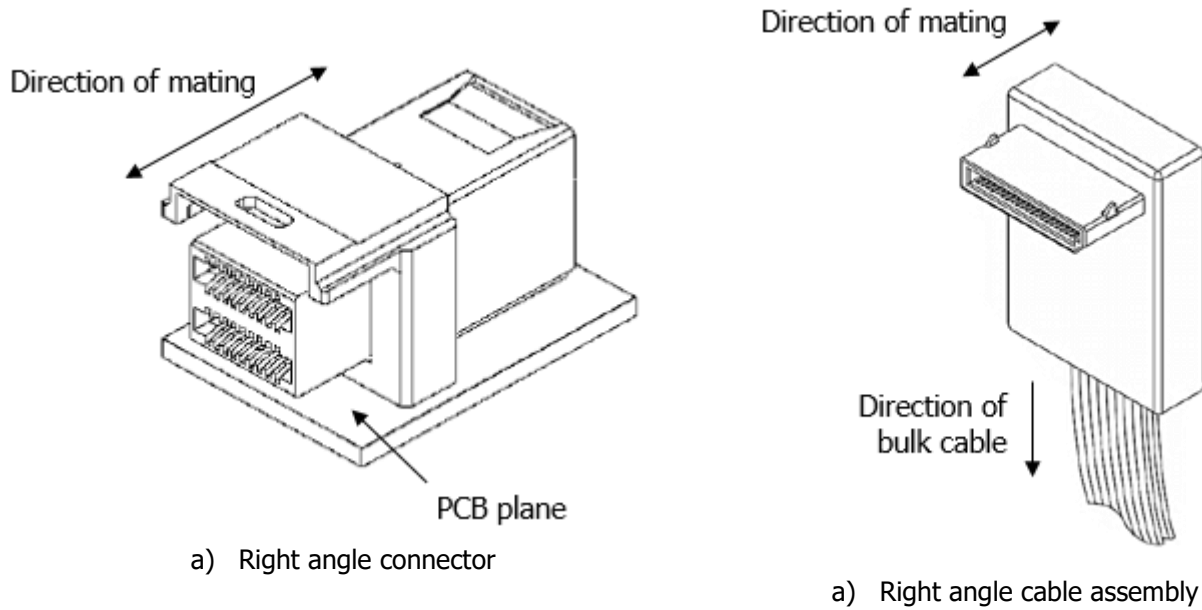
**Figure 3-1 Plug and Receptacle Definition**

**Plated through hole termination:** A term used to describe a termination style in which rigid pins extend into or through the PCB. Pins are soldered to keep the connector or cage in place. Other common terms ~~are~~include plated through hole ~~or~~ (PTH).

**Press fit:** A term used to describe a termination style in which collapsible pins penetrate the surface of a PCB. Upon insertion, the pins collapse to fit inside the PCB's plated through holes. The connector or cage is held in place by the interference fit between the collapsed pins and the PCB.

**Receptacle:** A term used to describe the connector that contains the contacts that accept the plug contacts as shown in ~~Figure 3-1~~Figure 3-1Figure 3-1. Receptacles typically contain spring contacts. Other common terms include female connector and socket connector.

- 1 **Right Angle:** A term used to describe either a connector design where the mating direction is parallel to the plane
- 2 of the printed circuit board upon which the connector is mounted or a cable assembly design where the mating
- 3 direction is perpendicular to the bulk cable.



**Figure 3-23-2 Right Angle Connector and Cable Assembly**

- 4
- 5
- 6 **Straight:** A term used to describe a connector design where the mating direction is parallel to the bulk cable.
- 7
- 8 **Surface mount:** A term used to describe a termination style in which solder tails sit on pads on the surface of a
- 9 PCB and are then soldered to keep the connector or cage in place. Other common terms are include surface mount
- 10 technology or (SMT).

# 4. General Description

## 4.1 Configuration Overview/Descriptions

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 provides the latching points for the plug connector. This connector system provides positive retention along with ease of insertion and removal.

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).

The Plug Paddle Card has 2 sets of dimensions for its wipe lengths and chamfer. Both sets of dimensions are mechanically compatible to all SFF-8614 cage and connectors, however the newer dimensions improve the signal integrity of the connector by shortening the wipe lengths and are recommended for use at signal rates greater than 16GT/s. See Table 7-1 for these dimensions.

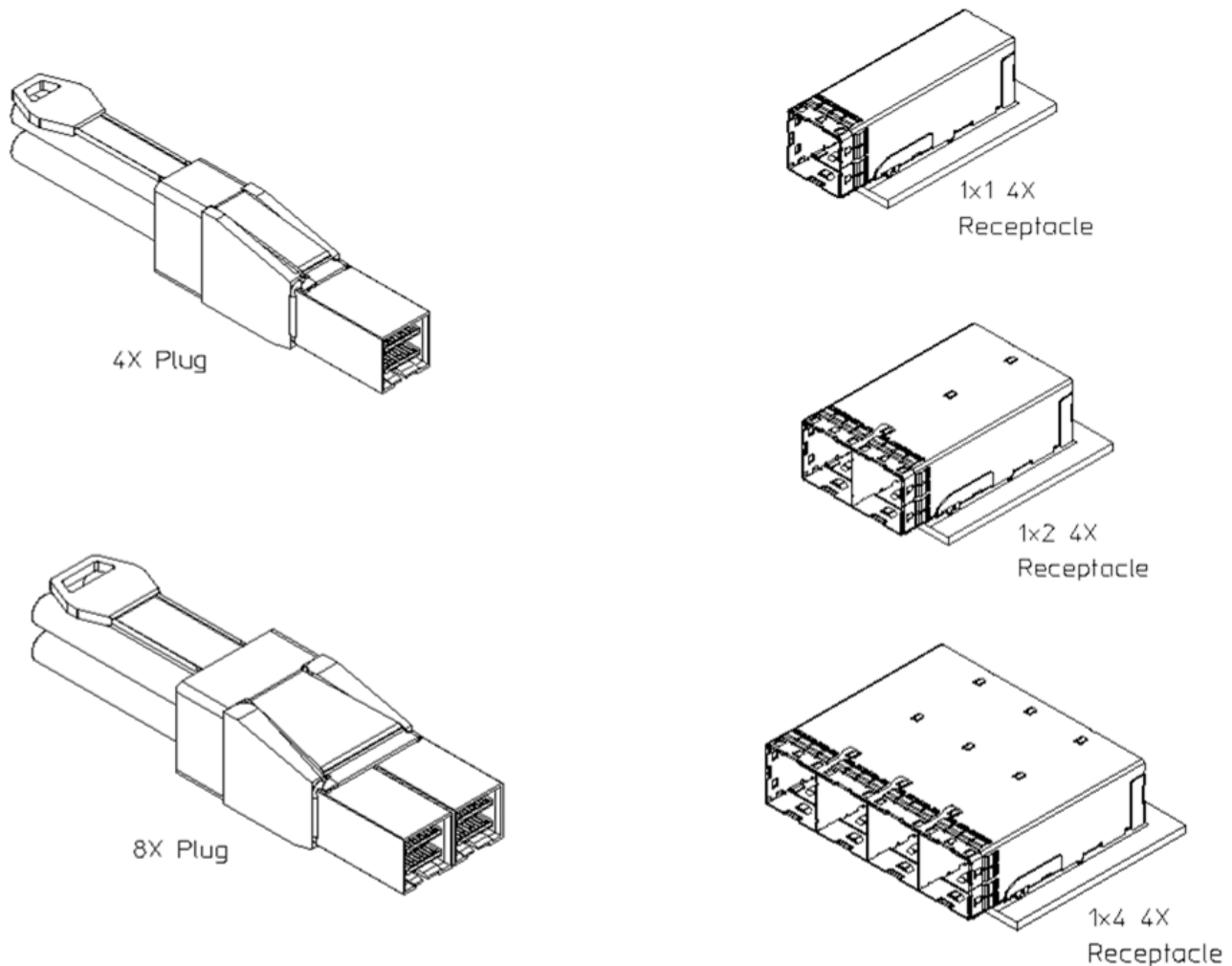


Figure 4-14-1 General View of Configurations

Table 4-1 Configurations Supported

| Port | Positions | Host Connector Orientation | Plug |
|------|-----------|----------------------------|------|
| 1x1  | 36        | Right-angle                | 1x1  |
| 1x2  | 72        | Right-angle                | 1x2  |
| 1x4  | 144       | Right-angle                | NA   |

1  
2

## 4.2 Contact Numbering

The pins or electrical contacts in this connector are numbered as shown in ~~Figure 4-2~~Figure 4-2. NOTE: Through hole pins are shown for illustrative purposes only. Receptacle tails implemented are dependent on the footprint type used. Refer to ~~1.1.1.1.1.1.1.1~~ for footprint information.

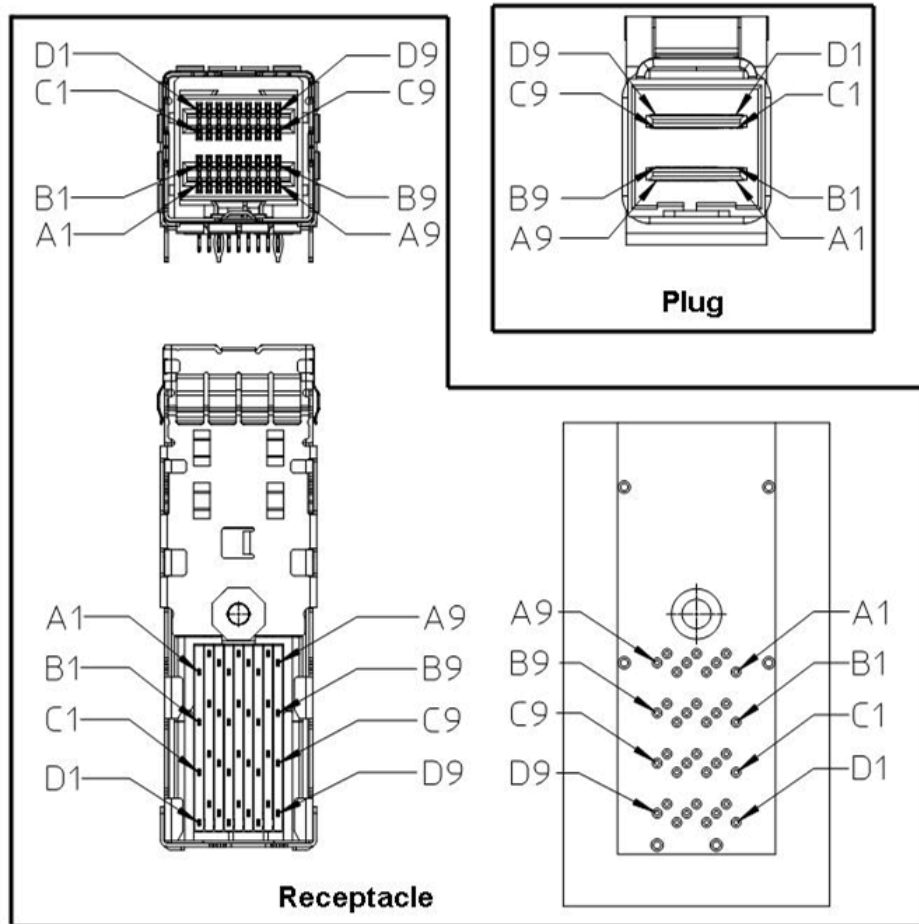


Figure 4-24-2 Contact Numbering

## 5. Connector/ Cage Mechanical Specification

### 5.1 Datums

The datums defined in [Figure 5-1](#) and [Table 5-1](#) are used throughout the rest of the document to describe the dimensional requirements of this connector.

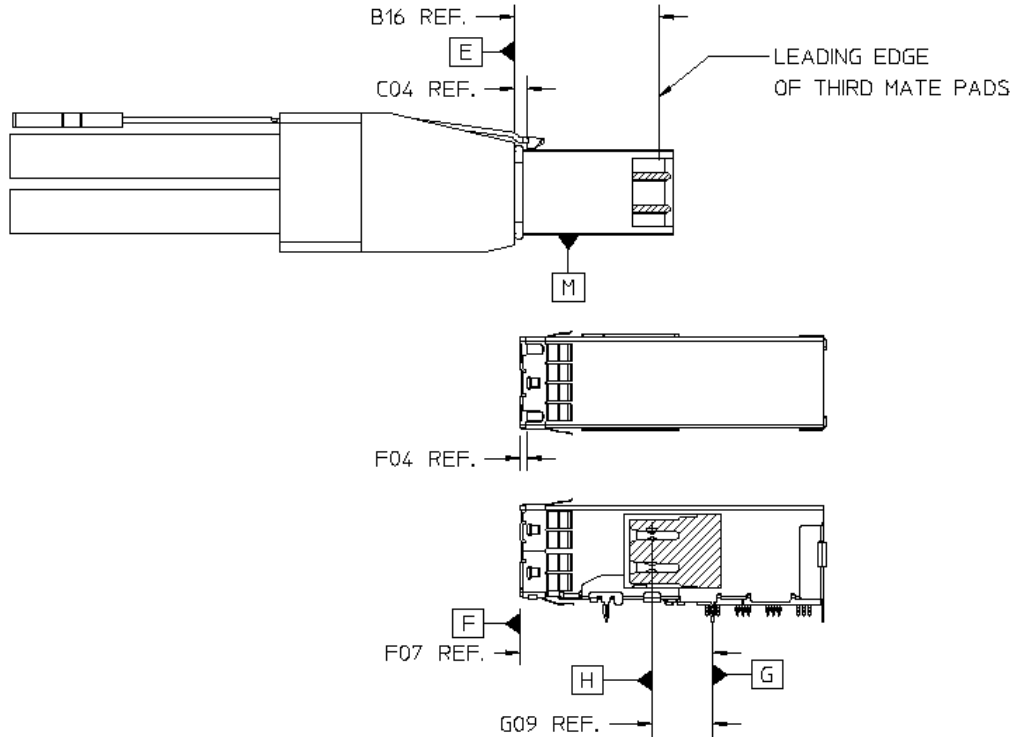
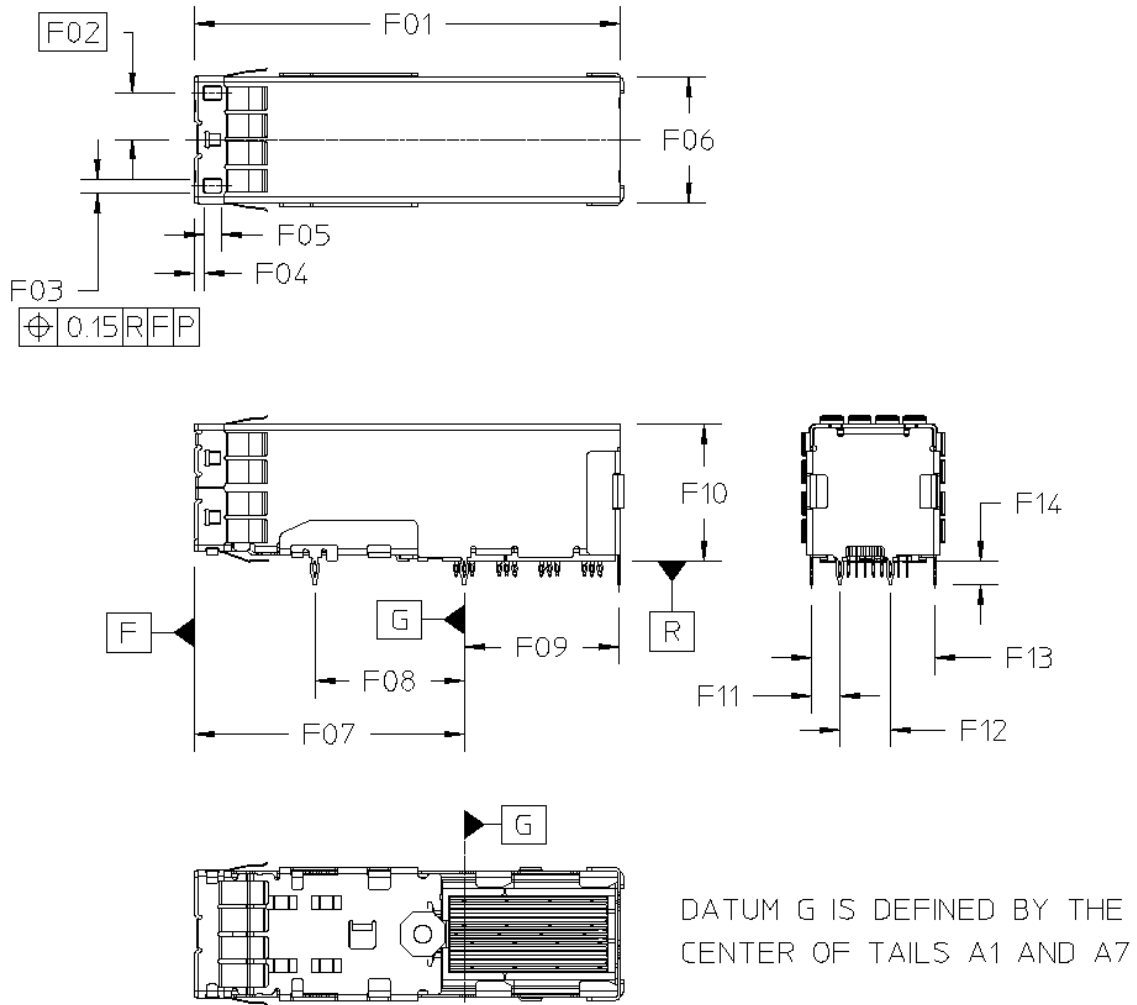


Figure 5-15-1 Datums (Not All Shown)

Table 5-1 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 <b>complaint compliant</b> 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   |
| N     | <b>Centerline of SMT connector post</b>                                     |
| P     | Width of receptacle snout   |
| R     | Bottom of receptacle (PCB interface)  |
| S     | <b>Centerline of SMT connector post PCB hole</b>                            |
| X, Y  | Reference 0, 0 on host board  |

1 **5.2 Mechanical Description: Press Fit Connector and Cage**



DATUM G IS DEFINED BY THE CENTER OF TAILS A1 AND A7

**Figure 5-25-2 Receptacle**

2  
3  
4

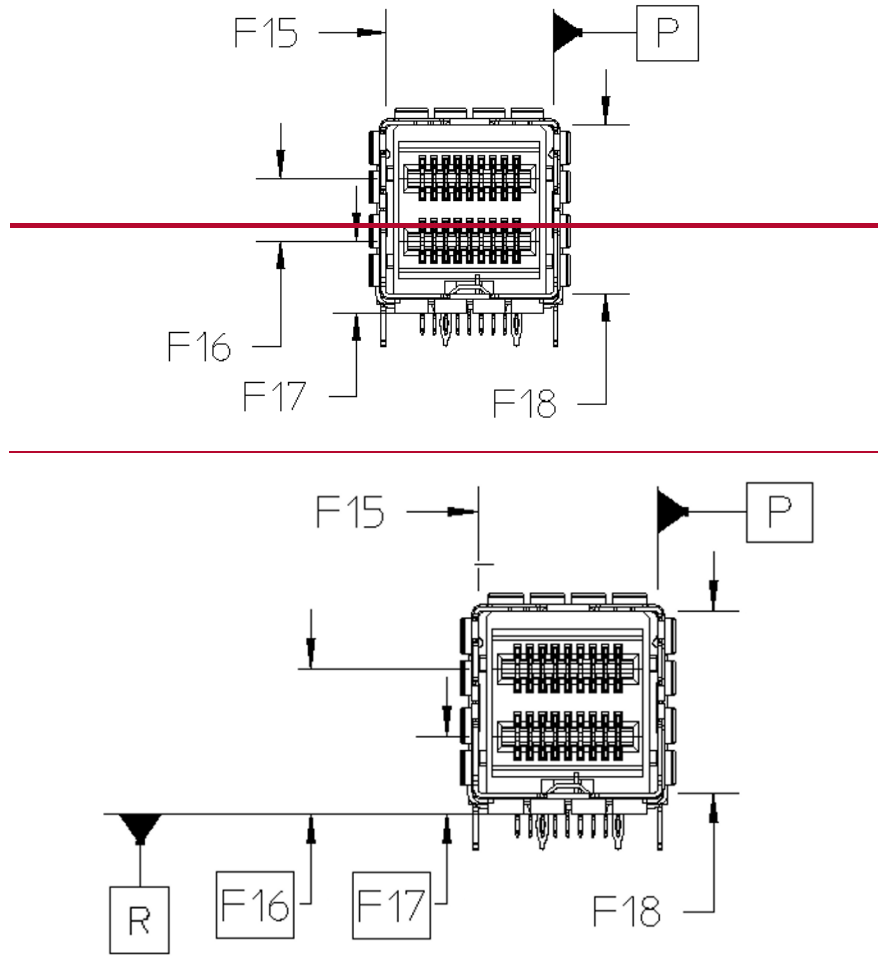
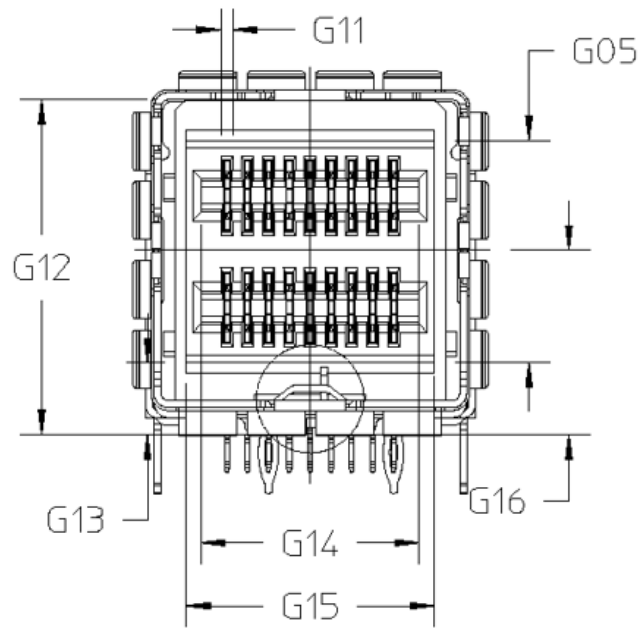
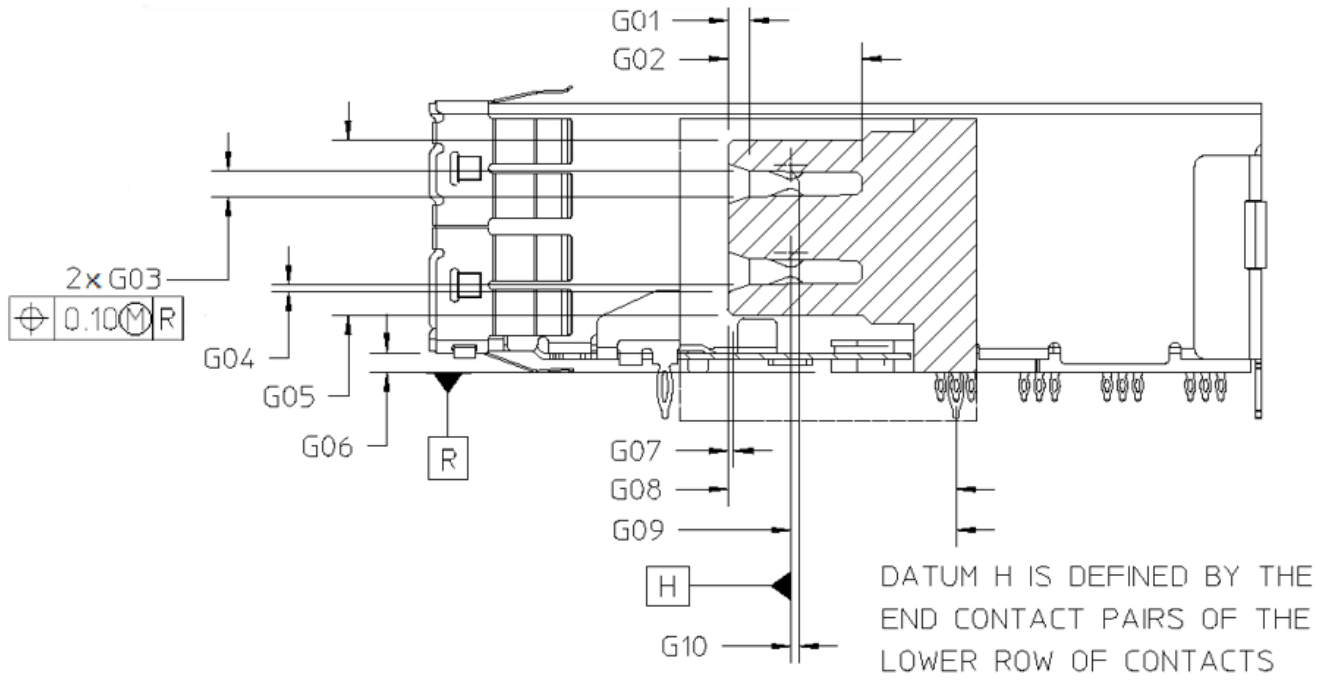


Figure 5-35-3 Front View of Receptacle

Table 5-2 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 | 8.554-00  | Basic0-05     |
| F17        | Datum R to lower card slot         | 4.55      | Basic0-10     |
| F18        | Cage opening height                | 10.76     | 0.08          |

1



2

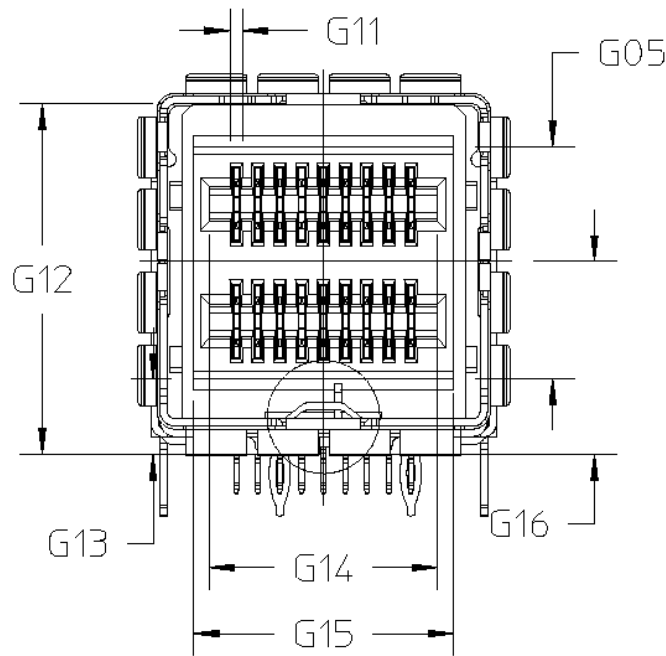
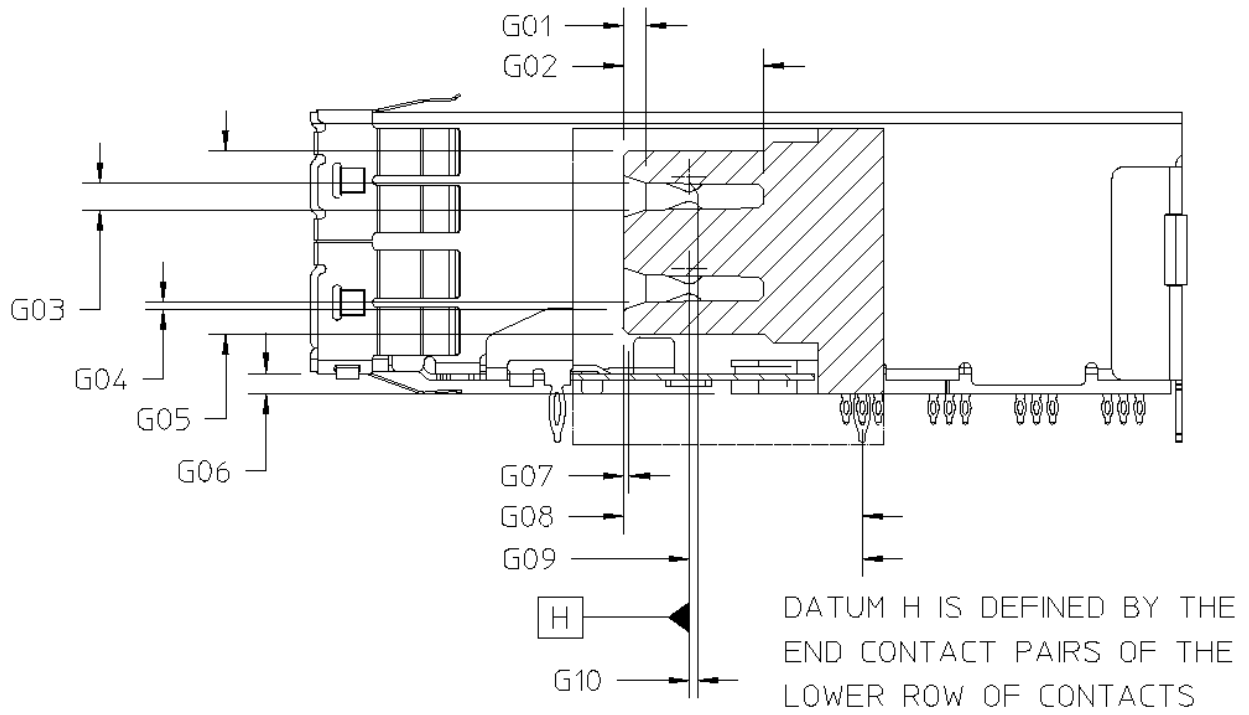


Figure 5-45-4 Receptacle Contact Locations

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3

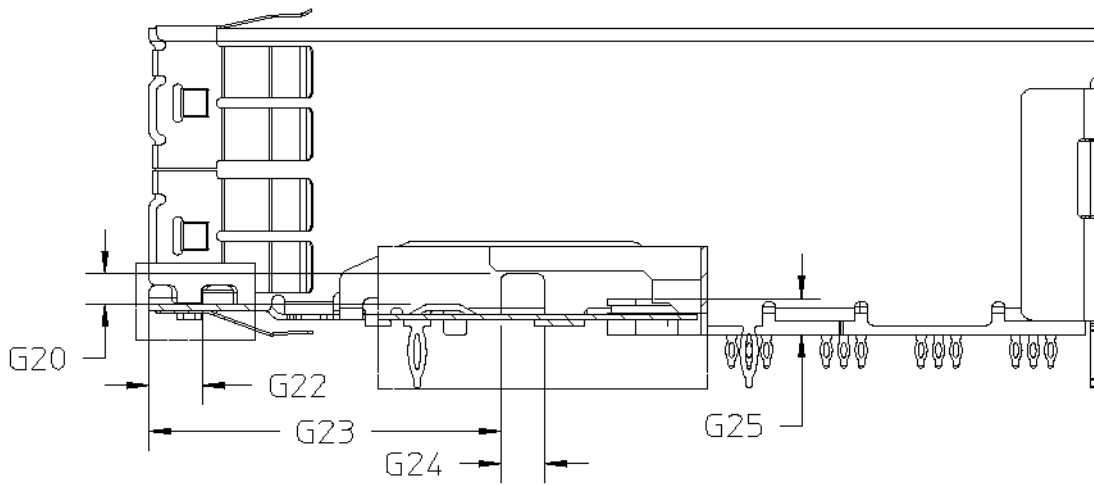
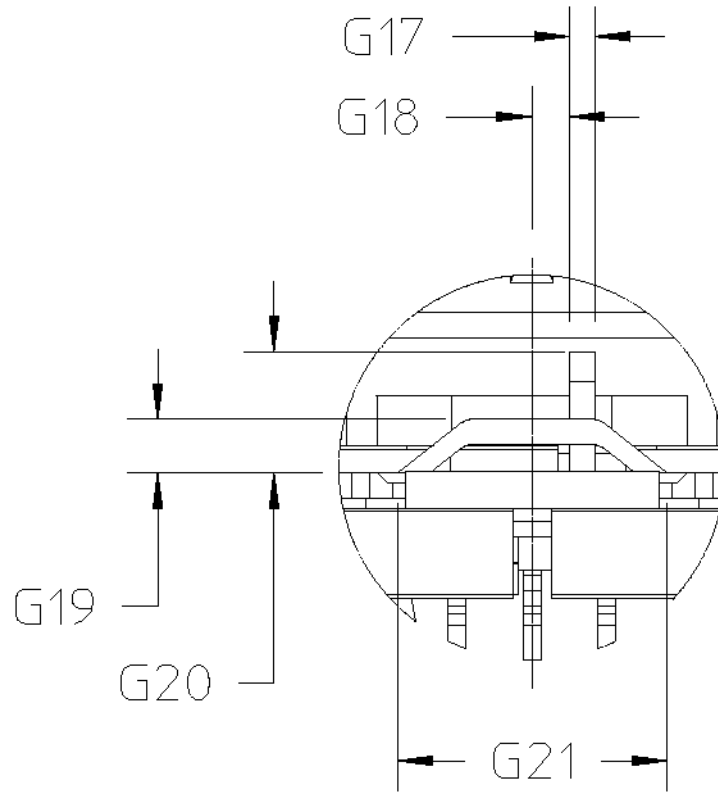


Figure 5-55-5 Receptacle Blocking Key

1  
2  
3

1

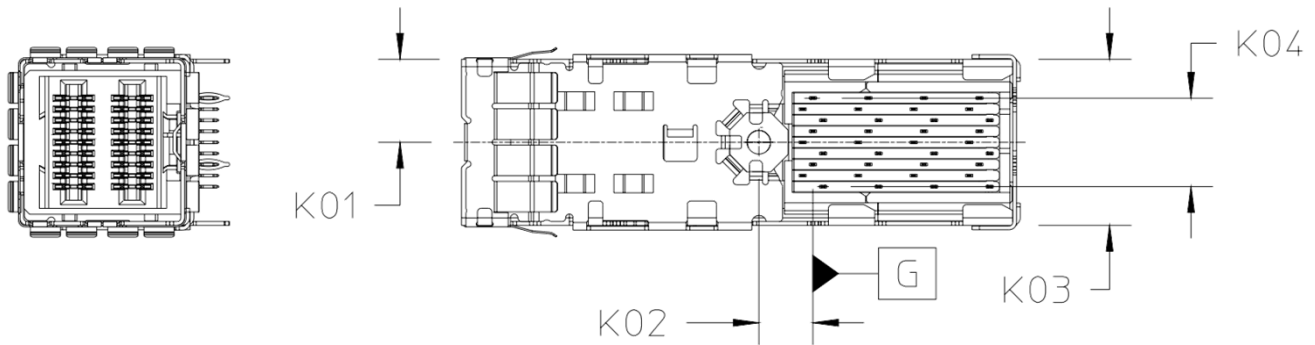
**Table 5-3 Receptacle Contact Location and Blocking Key Dimensions**

| 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 <b>mustshall</b> always be completely located within it. |   |           |               |

2

3

1 **5.2.1 1x1 Press Fit Cage Retention Feature**



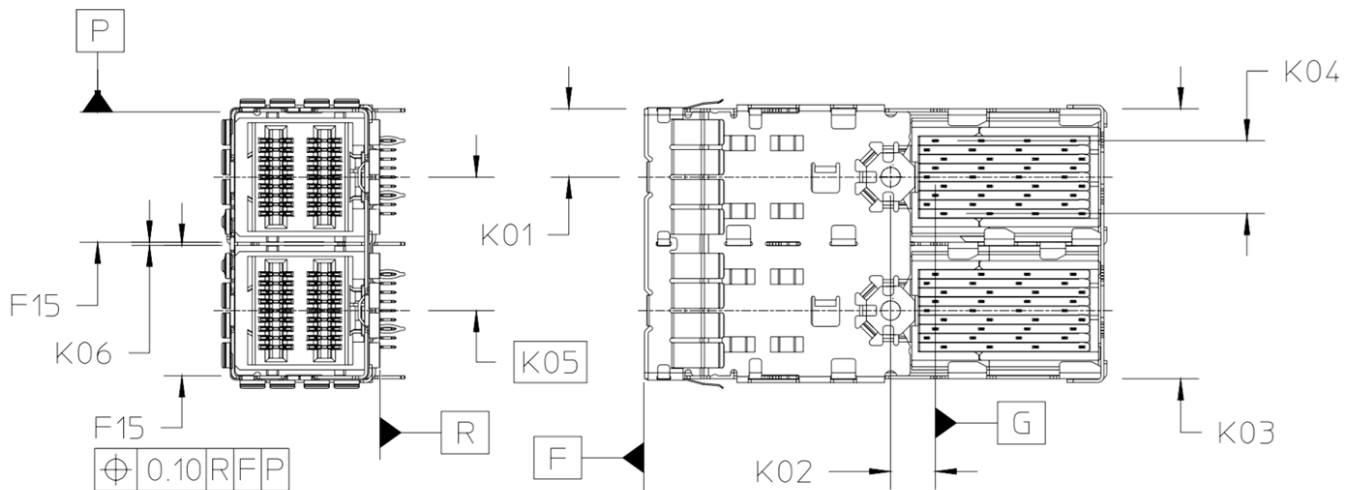
3 ~~5.2.1~~

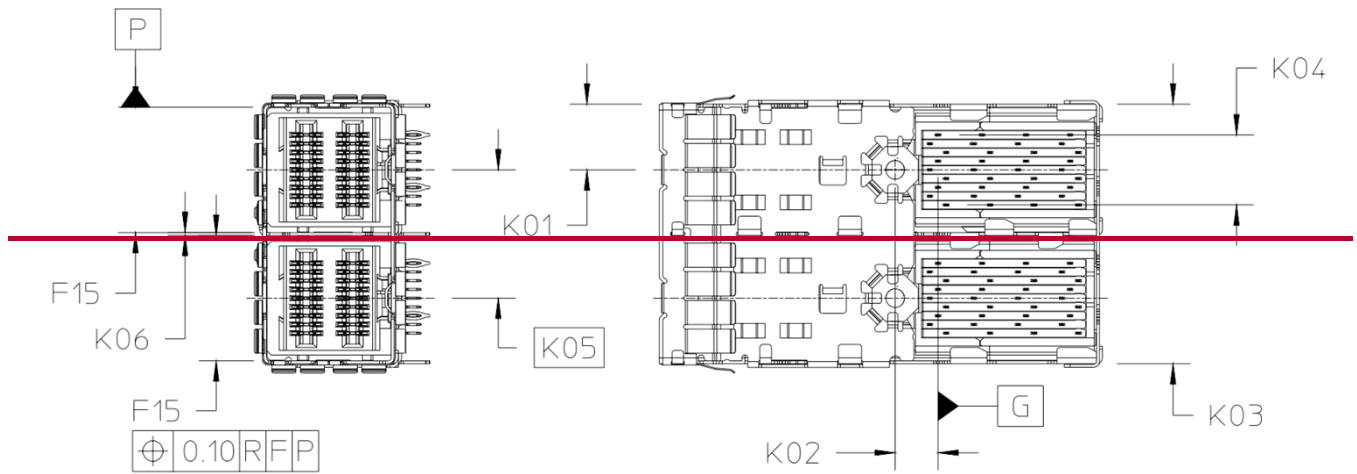
4  
5  
6 CAUTION: Special attention is required when choosing the length of the requires M2 connector to PCB attachment  
7 screw. The ~~end of the screw~~ must shall not interfere with full insertion of the mating plug. The appropriate length  
8 is determined by the thickness of the PCB and its associated tolerances.

9 **Figure 5-65-6 1x1 Press Fit Cage Retention Feature**

10  
11 **5.2.2 1x2 Press Fit Cage Retention Feature**

12 ~~5.2.2~~



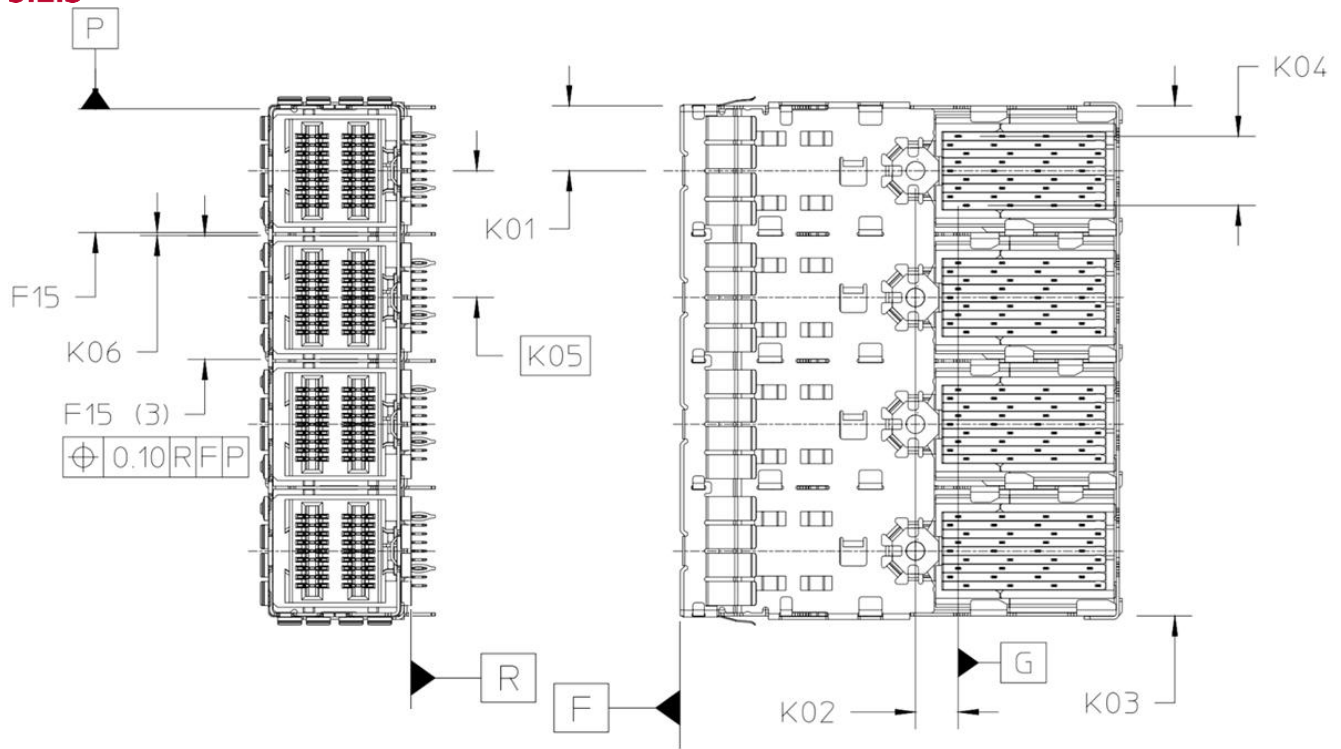


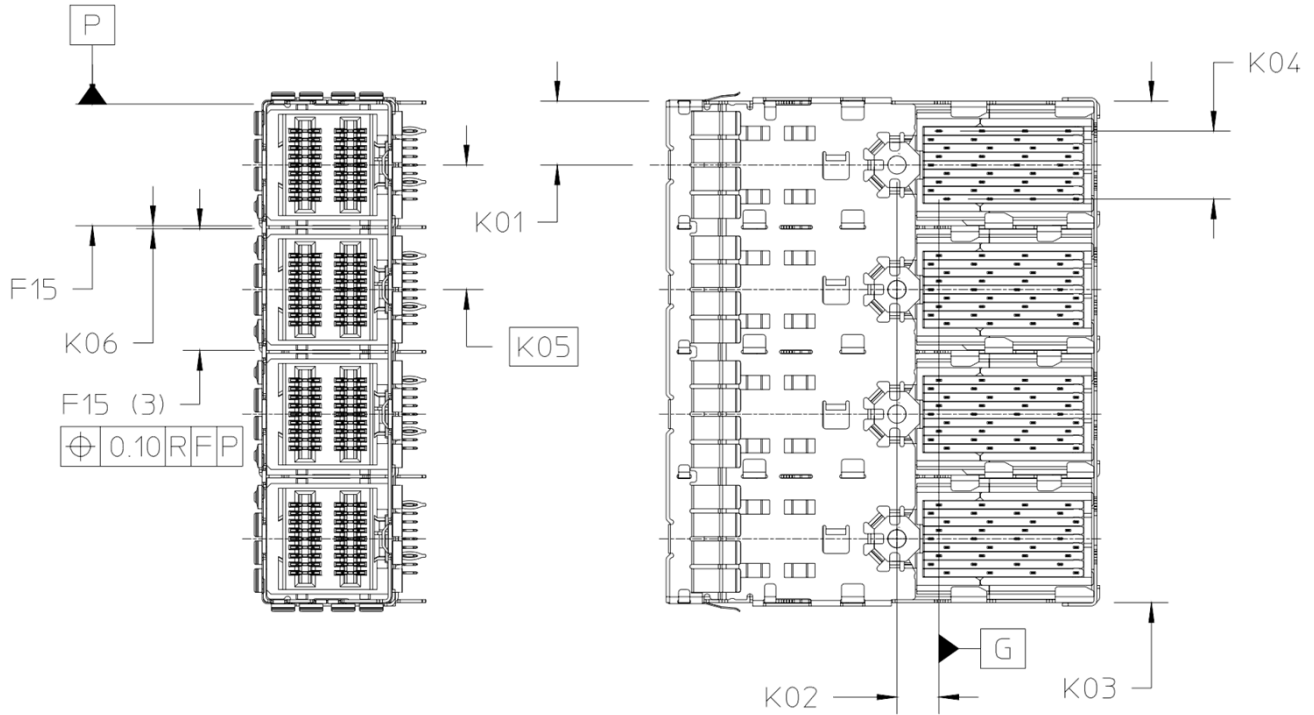
1  
 2 CAUTION: Special attention is required when choosing the length of the requires M2 connector to PCB attachment  
 3 screw. The ~~end of the~~ screw ~~must shall~~ not interfere with full insertion of the mating plug. The appropriate length  
 4 is determined by the thickness of the PCB and its associated tolerances.

5 **Figure 5-75-7 1x2 Press Fit Cage Retention Feature**

6  
 7 **5.2.3 1x4 Press Fit Cage Retention Feature**

8 **5.2.3**





1 CAUTION: Special attention is required when choosing the length of the requires M2 connector to PCB attachment  
 2 screw. The ~~end-of-the-screw~~ must-shall not interfere with full insertion of the mating plug. The appropriate length  
 3 is determined by the thickness of the PCB and its associated tolerances.

4 **Figure 5-85-8 1x4 Press Fit Cage Retention Feature**

5 **Table 5-4 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          |
|            | 1x2 connector                             | 22.25     | 0.10          |
|            | 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          |

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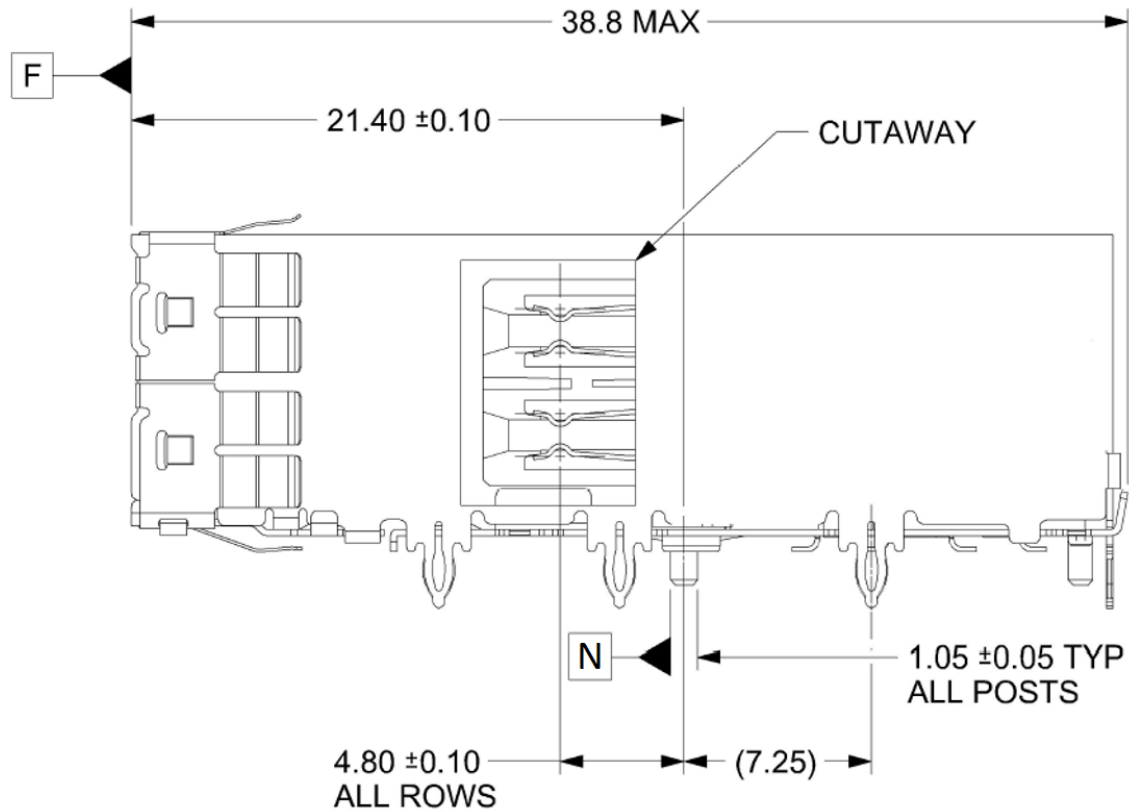
1 **5.3 Mechanical Description: SMT Connector & Cage**

2 **5.3.1 SMT Connector**

3 The SMT connector variants must-shall fit within the cages defined in Sections 5.3.2, 5.3.2.1 for 1x1, 5.3.2.2 for  
4 1x2, and 5.3.2.3 for 1x4. Additionally, SMT connectors must-shall accept the plugs defined in Section 7, and must  
5 shall fit with the appropriate SMT footprints defined in Section 5.4.2.

6 **5.3.2 Cage for SMT Connector**

7 Cages for the SMT connector come in 1x1, 1x2, and 1x4 configurations as defined in the following subsections below.  
8 Views and dimensions not shown below follow the press fit cage dimensions described in Section 5.2.  
9



**Figure 5-9 Cage for SMT Connector**

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1 5.3.2.1 1x1 Cage for SMT Connector

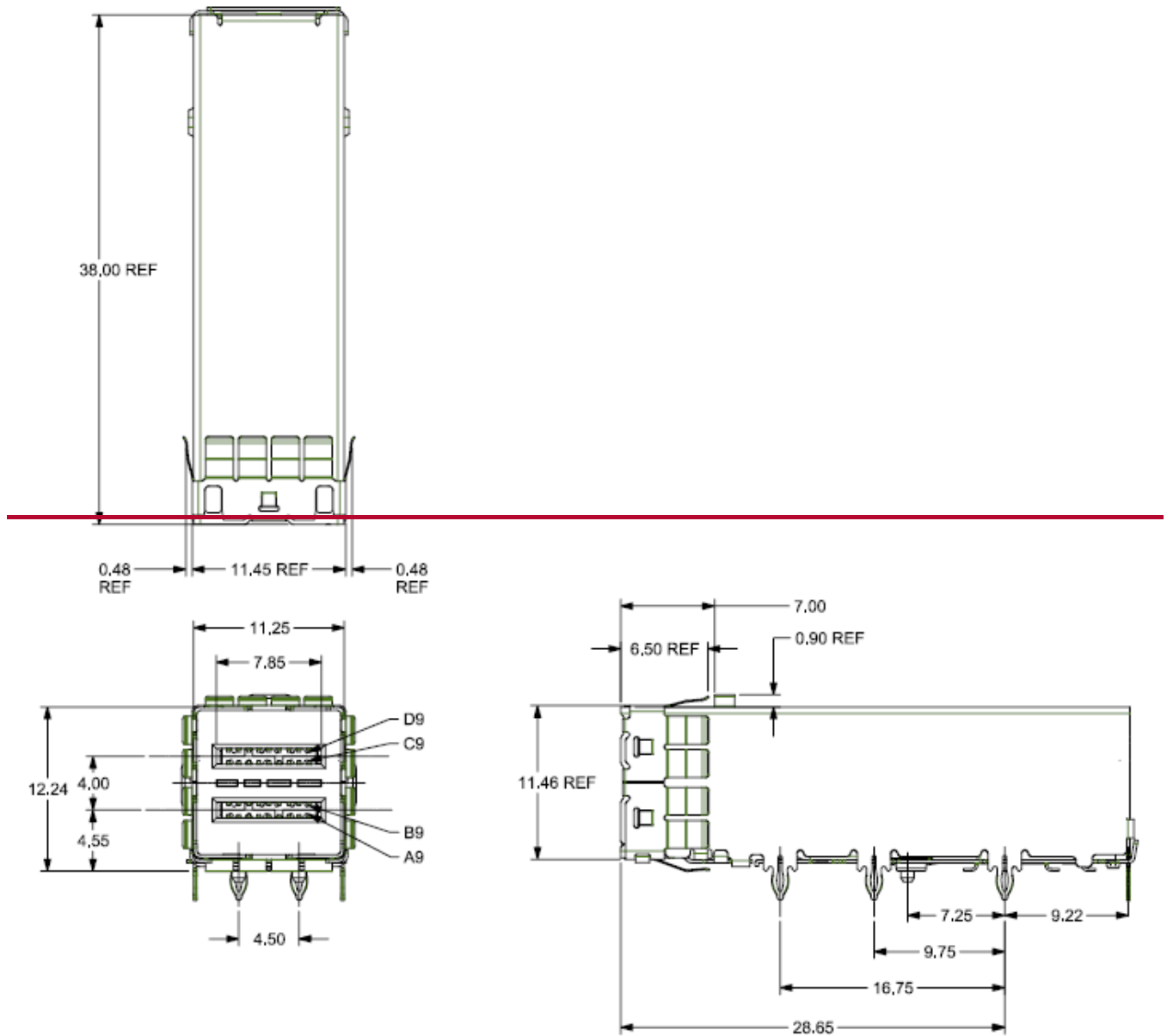


Figure 5-9 Cage for 1x1 SMT Connector

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1 5.3.2.2 1x2 Cage for SMT Connector

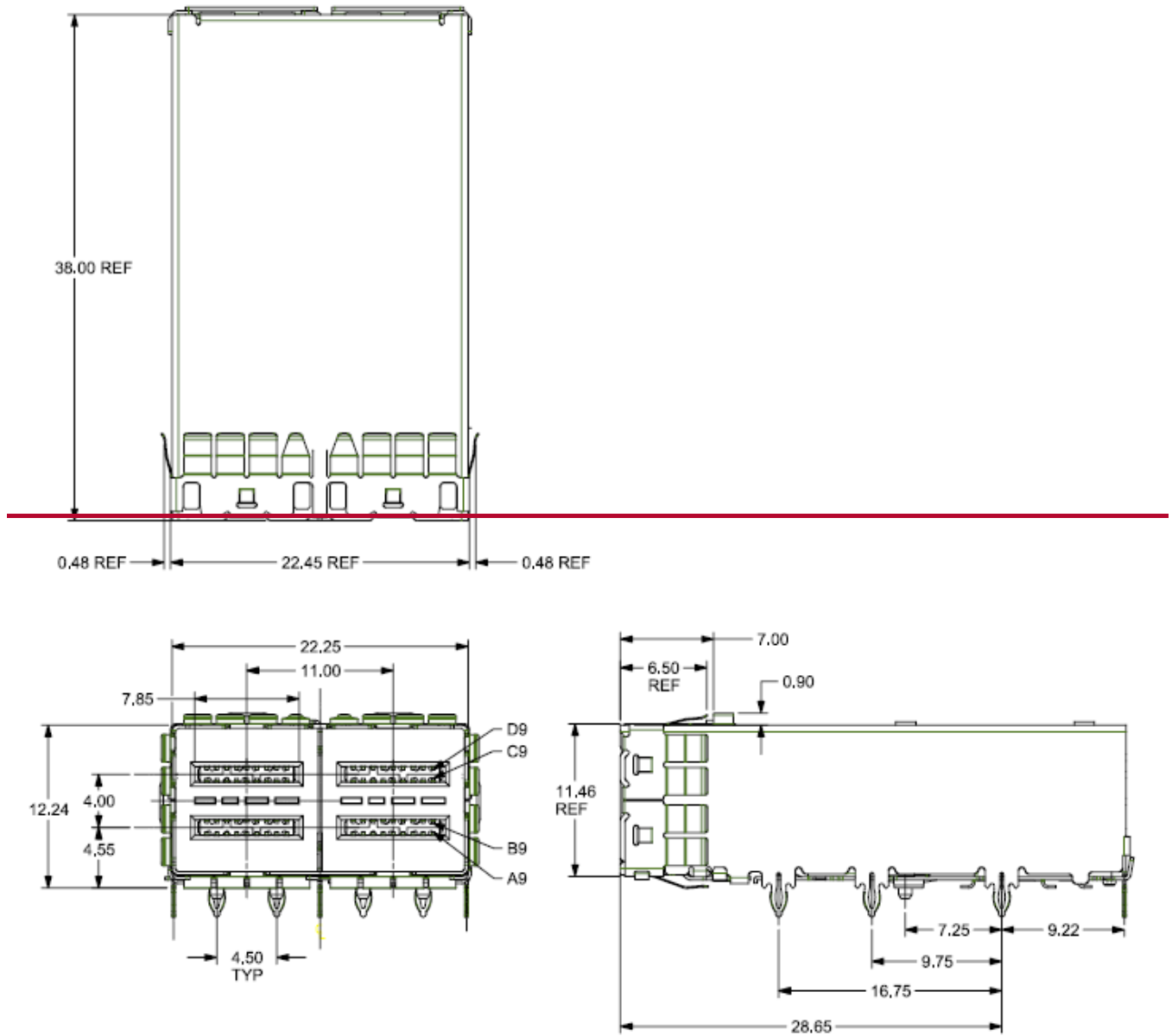
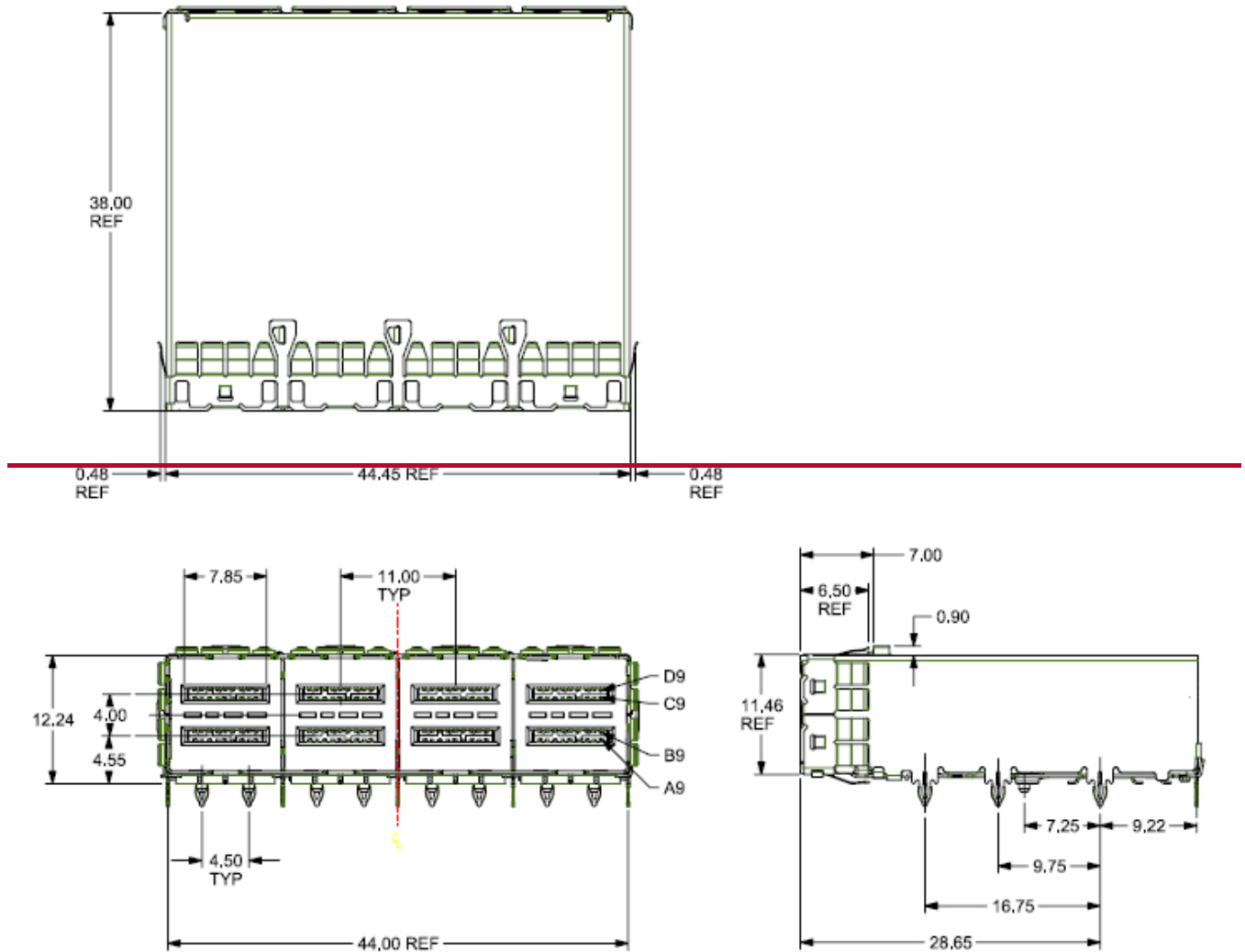


Figure 5-10 Cage for 1x2 SMT Connector

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1 **5.3.2.3 1x4 Cage for SMT Connector**

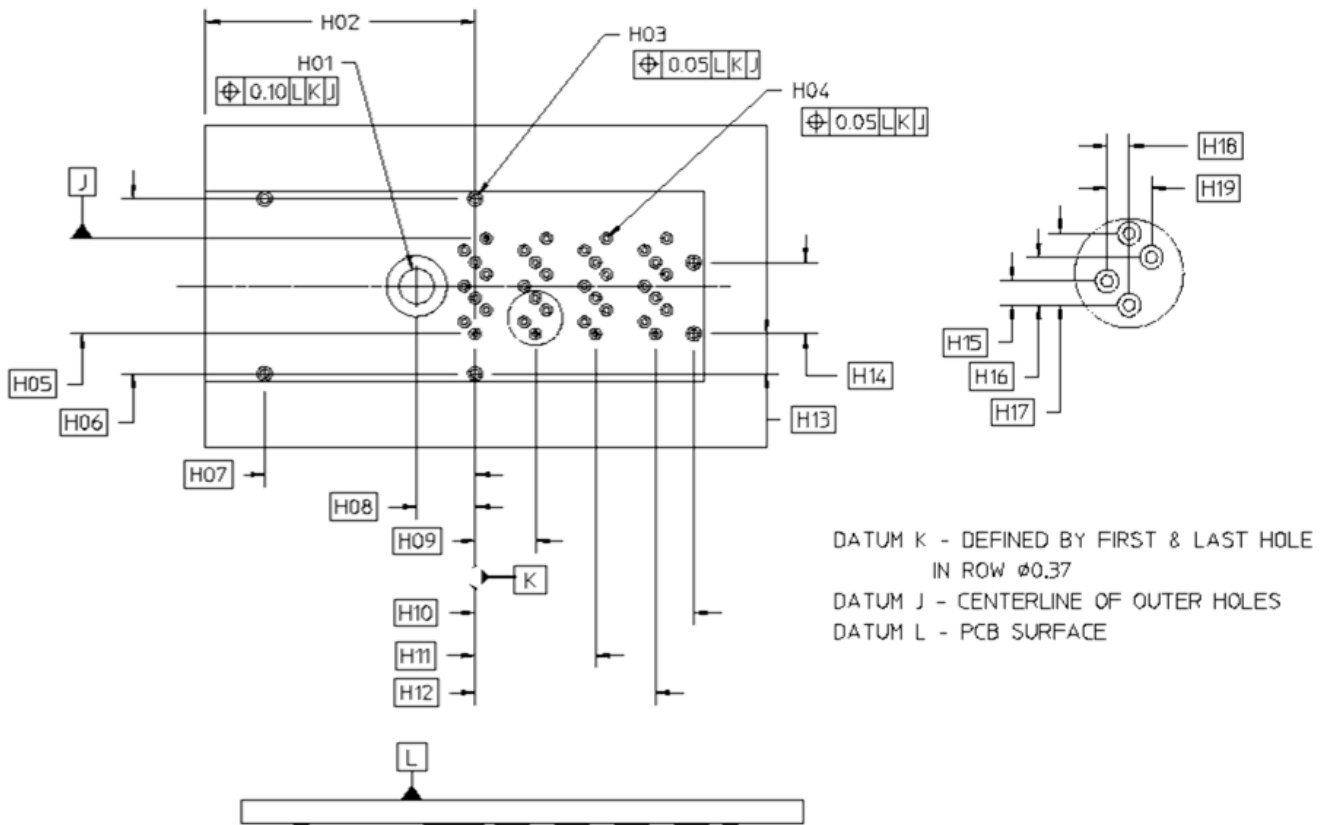


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**Figure 5-11 Cage for 1x4 SMT Connector**

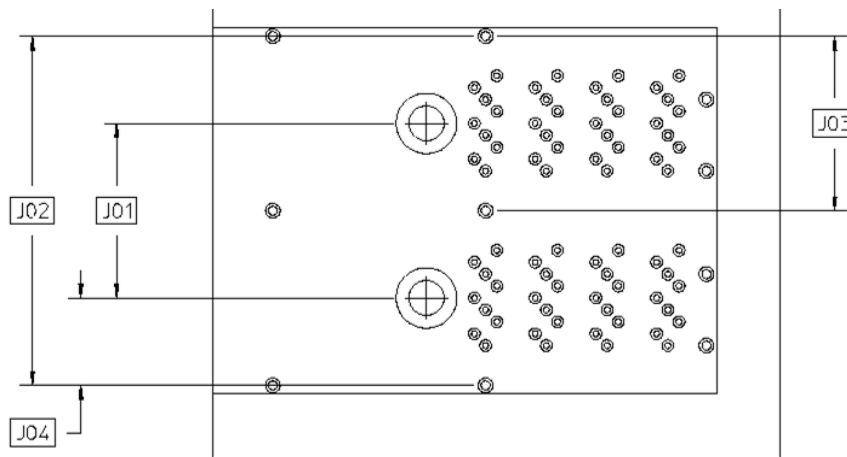
5 **5.4 Receptacle Footprints**

6 Two footprint options are specified: through hole and SMT.

1 5.4.1 Press Fit Option



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Figure 5-105-10 1x1 Receptacle Press Fit Footprint Option



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Figure 5-115-11 1x2 Receptacle Press Fit Footprint Option

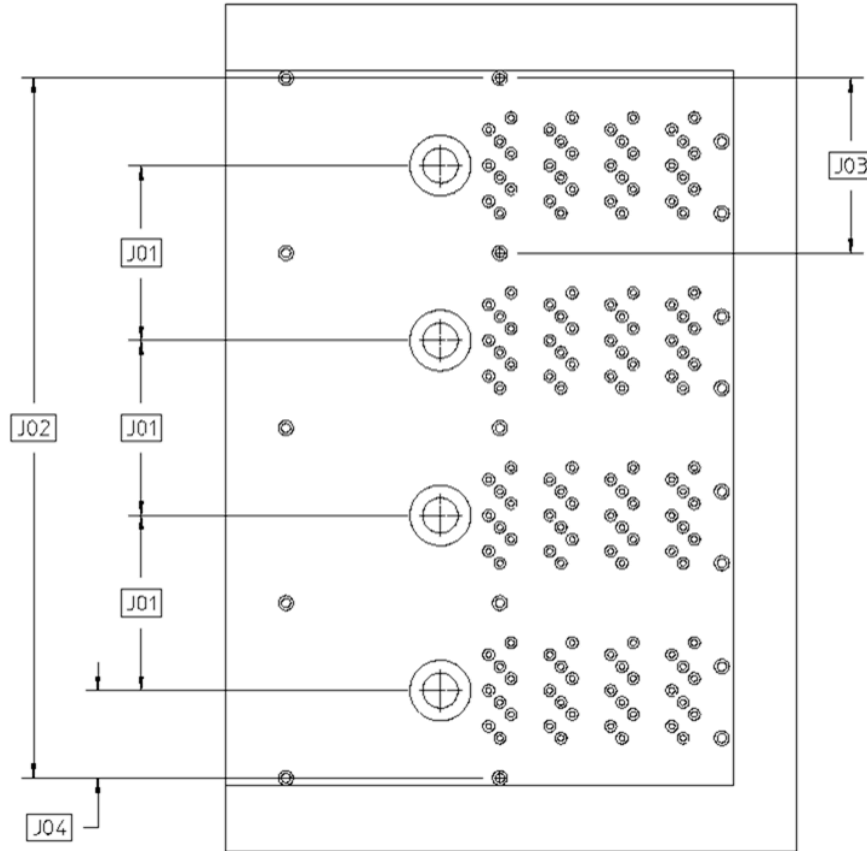


Figure 5-125-12 1x4 Receptacle Press Fit Footprint Option

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**Table 5-5 Receptacle Press Fit Footprint Option Dimensions**

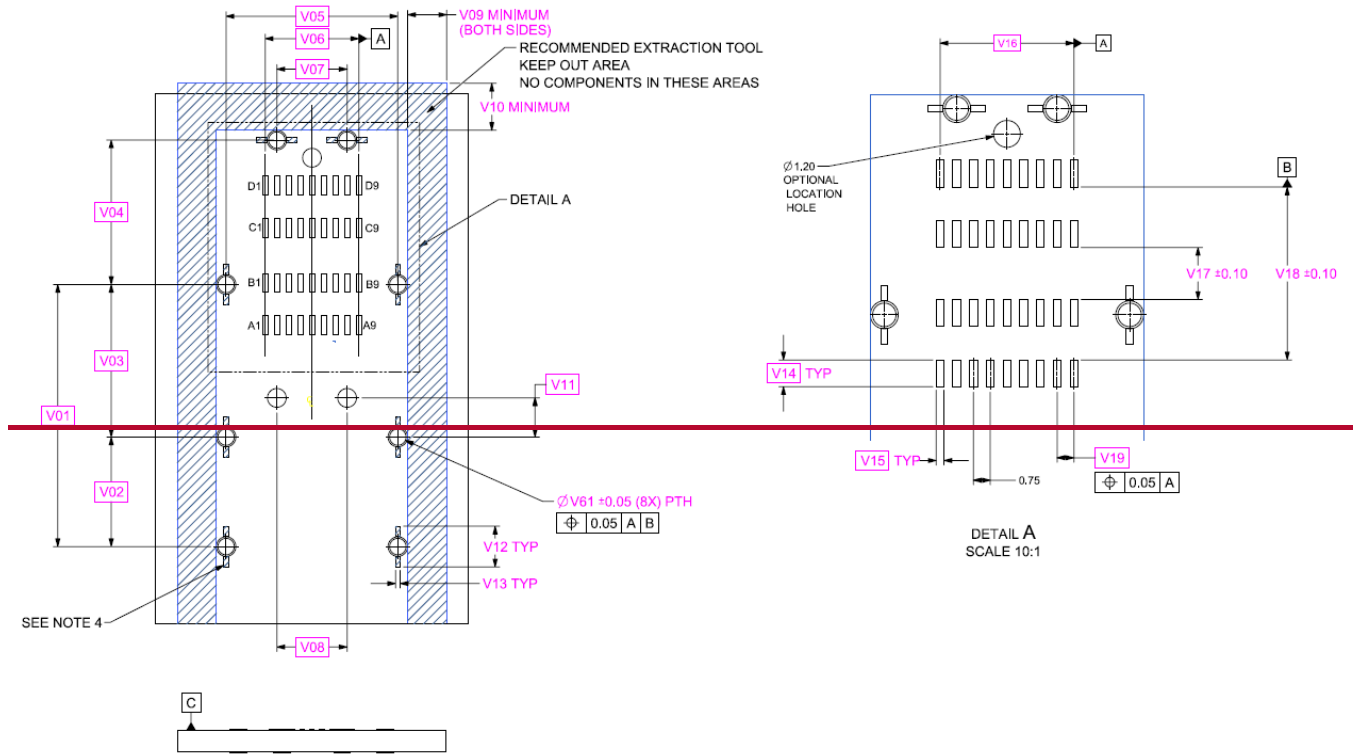
| <b>Designator</b> | <b>Description</b>   | <b>Dimension</b> | <b>Tolerance +/-</b> |
|-------------------|--|------------------|----------------------|
| H01               | Cage attachment hole diameter                                | 2.20             | 0.10                 |
| H02               | Datum to front edge of PCB<br>(PCI add-in card applications) | 17.10            | 0.15                 |
| H02               | Datum to front edge of PCB<br>(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                |

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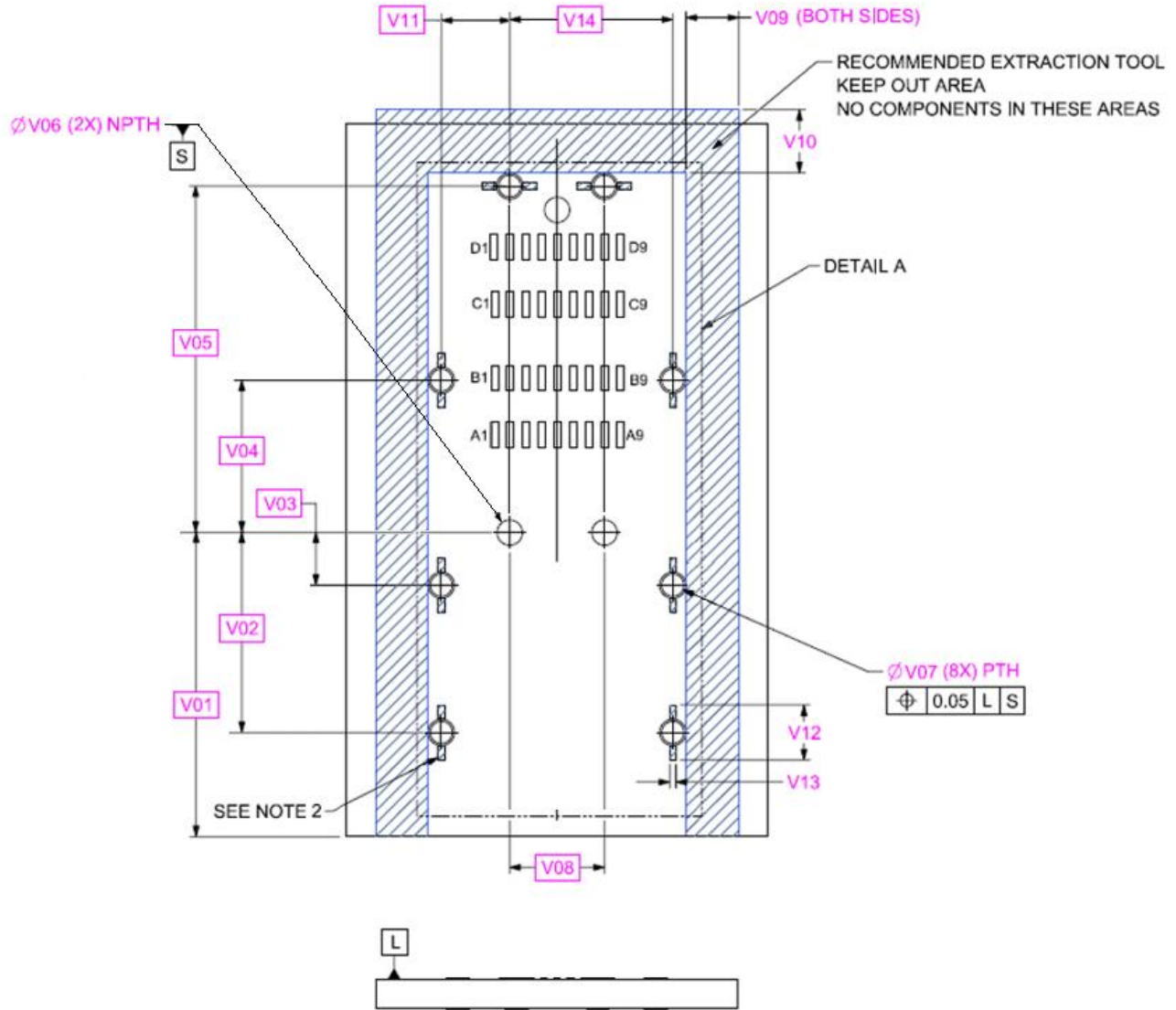
1 **5.4.2 SMT Option**

2



- NOTES:  
1. MINIMUM PCB THICKNESS: 1.57MM  
2. CAGE KEEP OUT ZONE: TRACES AND VIAS ARE NOT ALLOWED ON SURFACE OF PCB IN THESE AREAS.

1



- NOTES:
1. MINIMUM PCB THICKNESS: 1.57MM
  2. CAGE KEEP OUT ZONE: TRACES AND VIAS ARE NOT ALLOWED ON SURFACE OF PCB IN THESE AREAS.

Figure 5-135-13 1x1 Receptacle SMT Footprint Option

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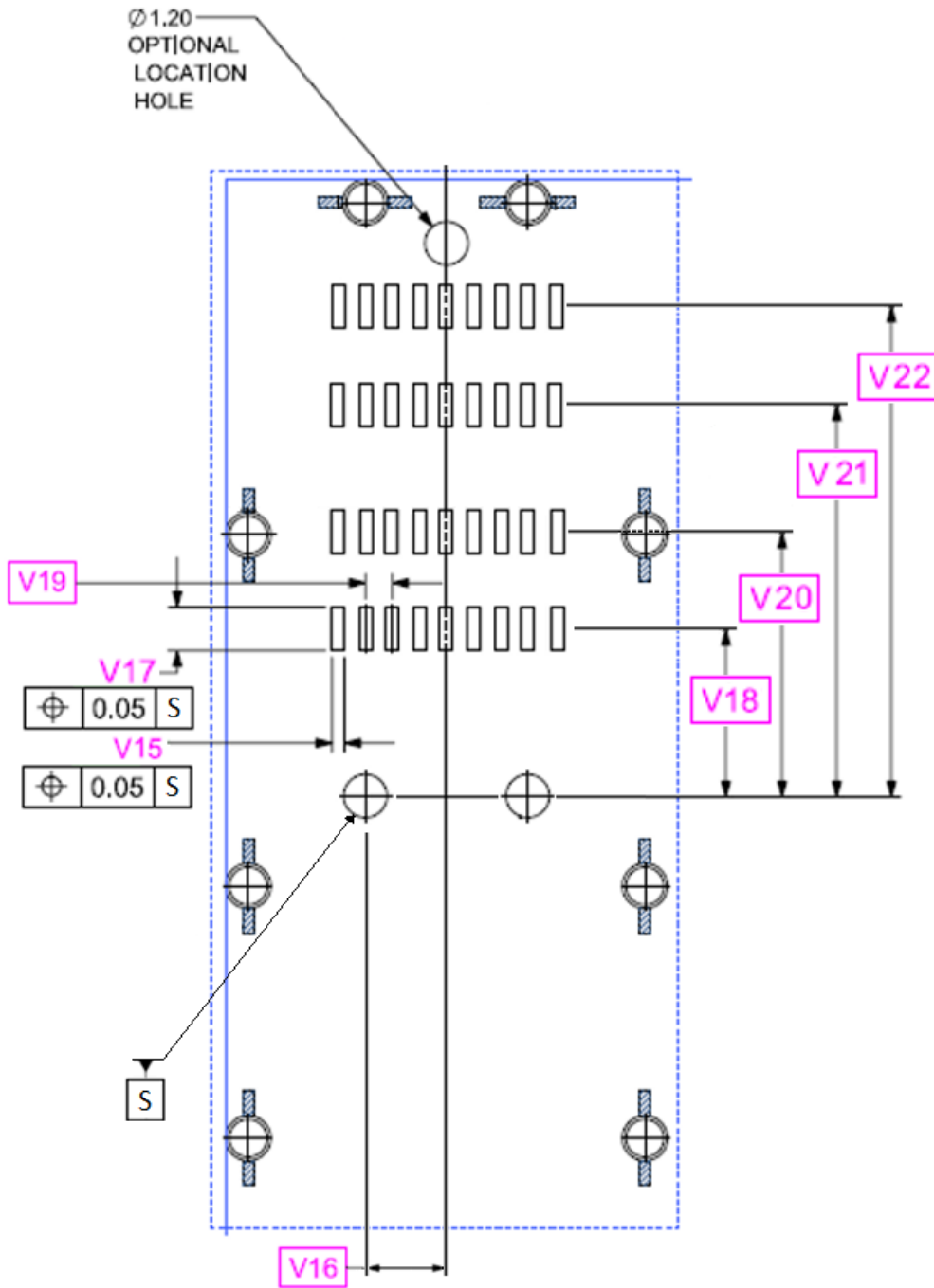
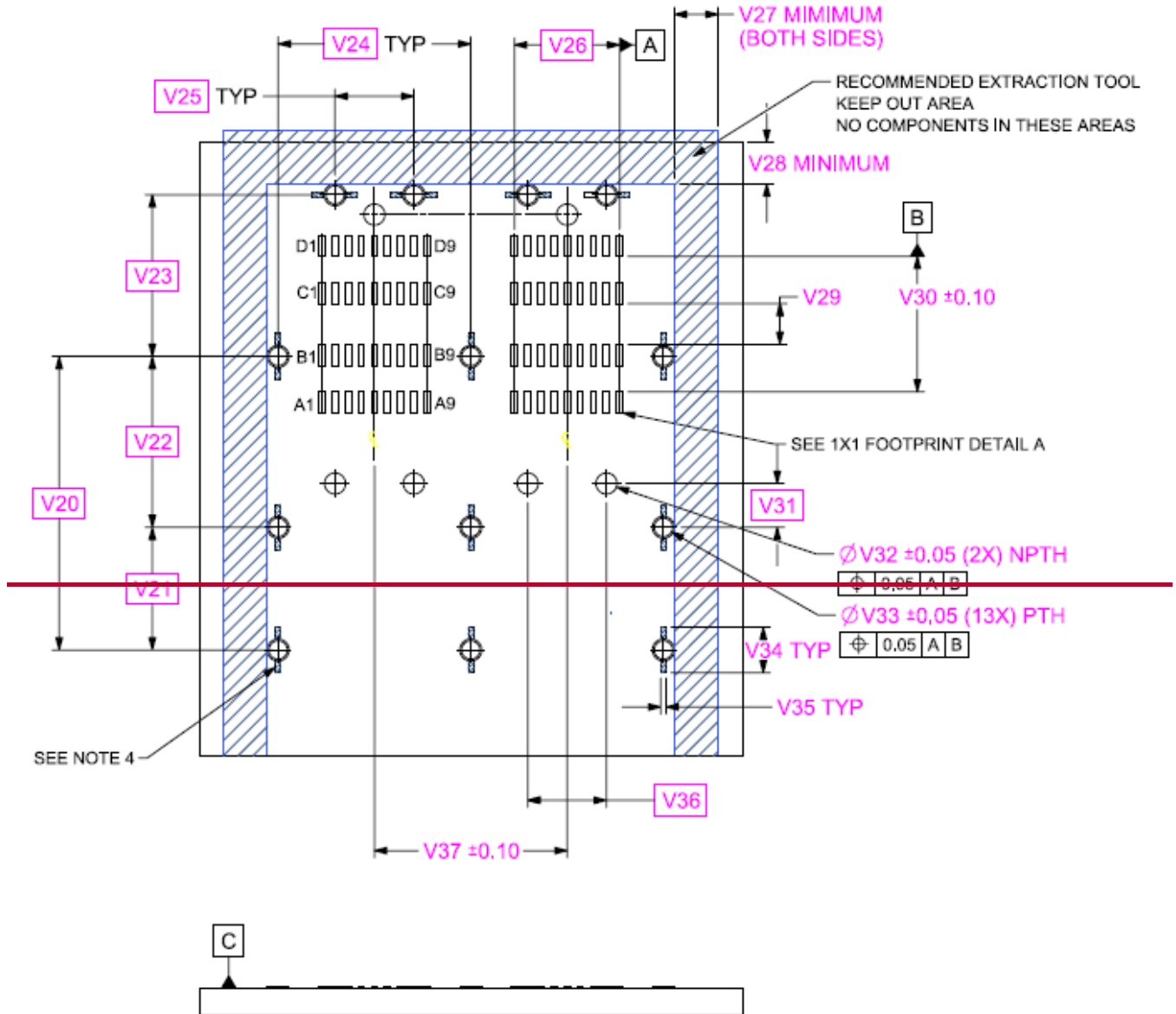


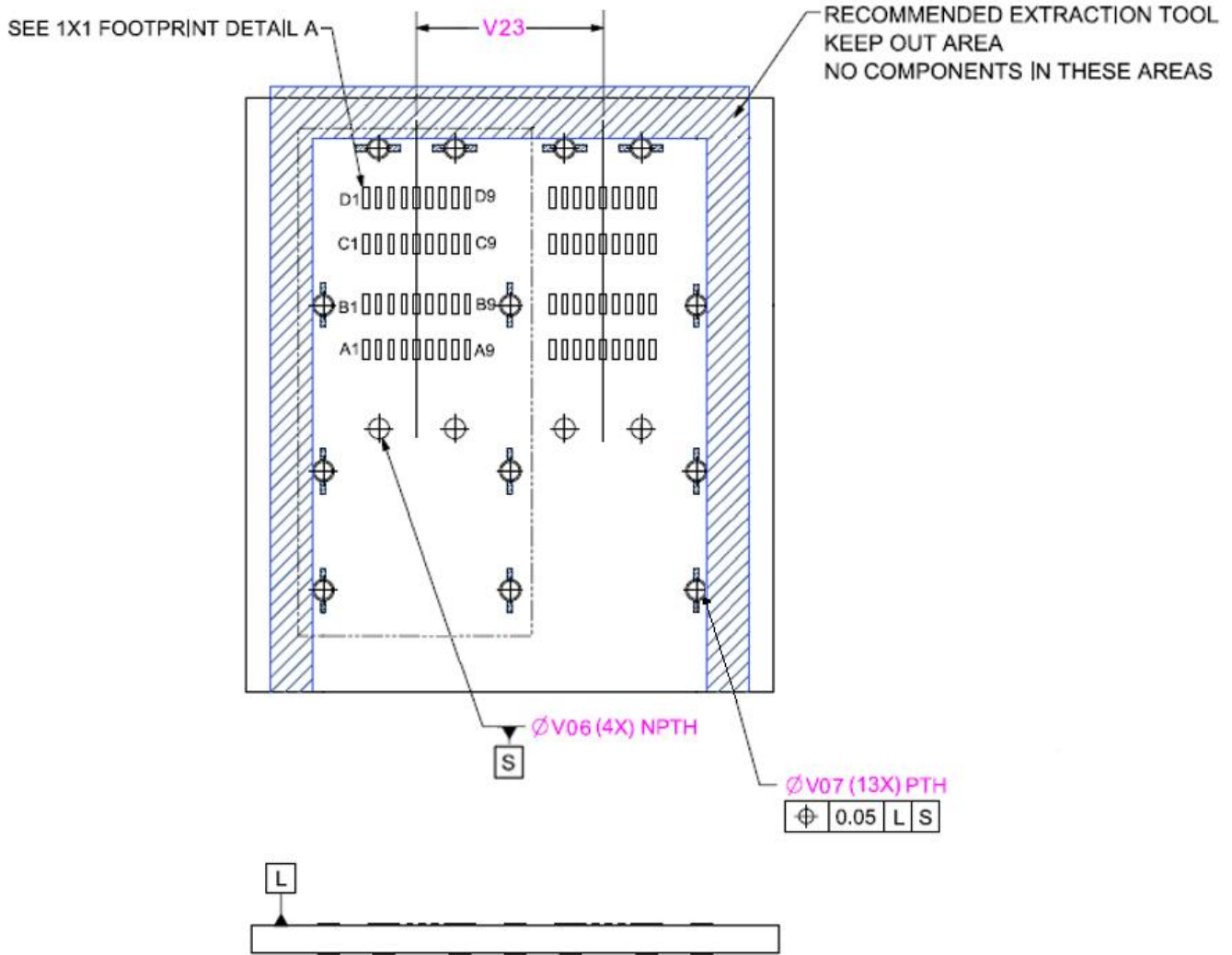
Figure 5-14 1x1 Receptacle SMT Footprint Detail A

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NOTES:

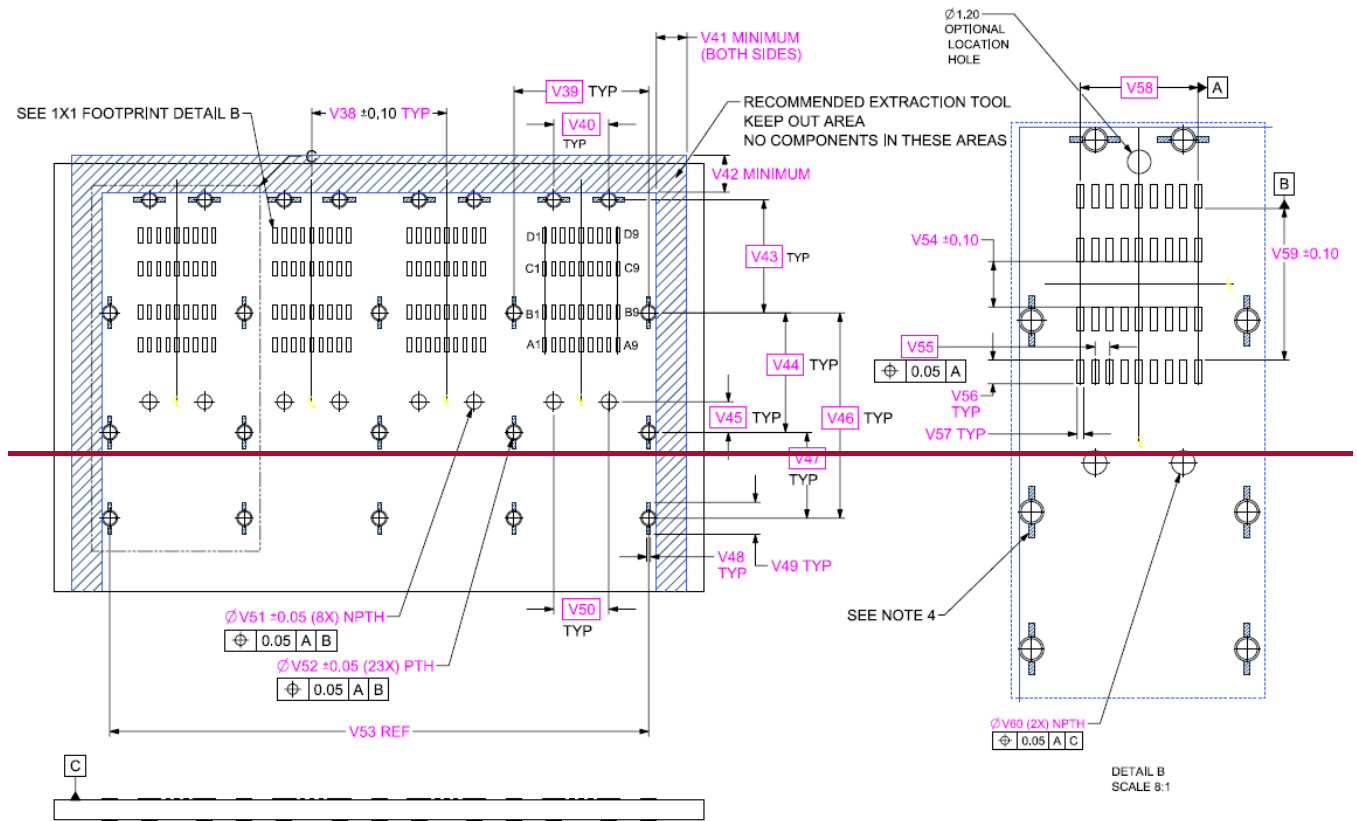
1. MINIMUM PCB THICKNESS: 1.57MM
2. CAGE KEEP OUT ZONE: TRACES AND VIAS ARE NOT ALLOWED ON SURFACE OF PCB IN THESE AREAS.



- NOTES:
1. MINIMUM PCB THICKNESS: 1,57MM
  2. CAGE KEEP OUT ZONE: TRACES AND VIAS ARE NOT ALLOWED ON SURFACE OF PCB IN THESE AREAS.

Figure 5-155-15 1x2 Receptacle SMT Footprint Option

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NOTES:  
1. MINIMUM PCB THICKNESS: 1.57MM  
2. CAGE KEEP OUT ZONE: TRACES AND VIAS ARE NOT ALLOWED ON SURFACE OF PCB IN THESE AREAS.

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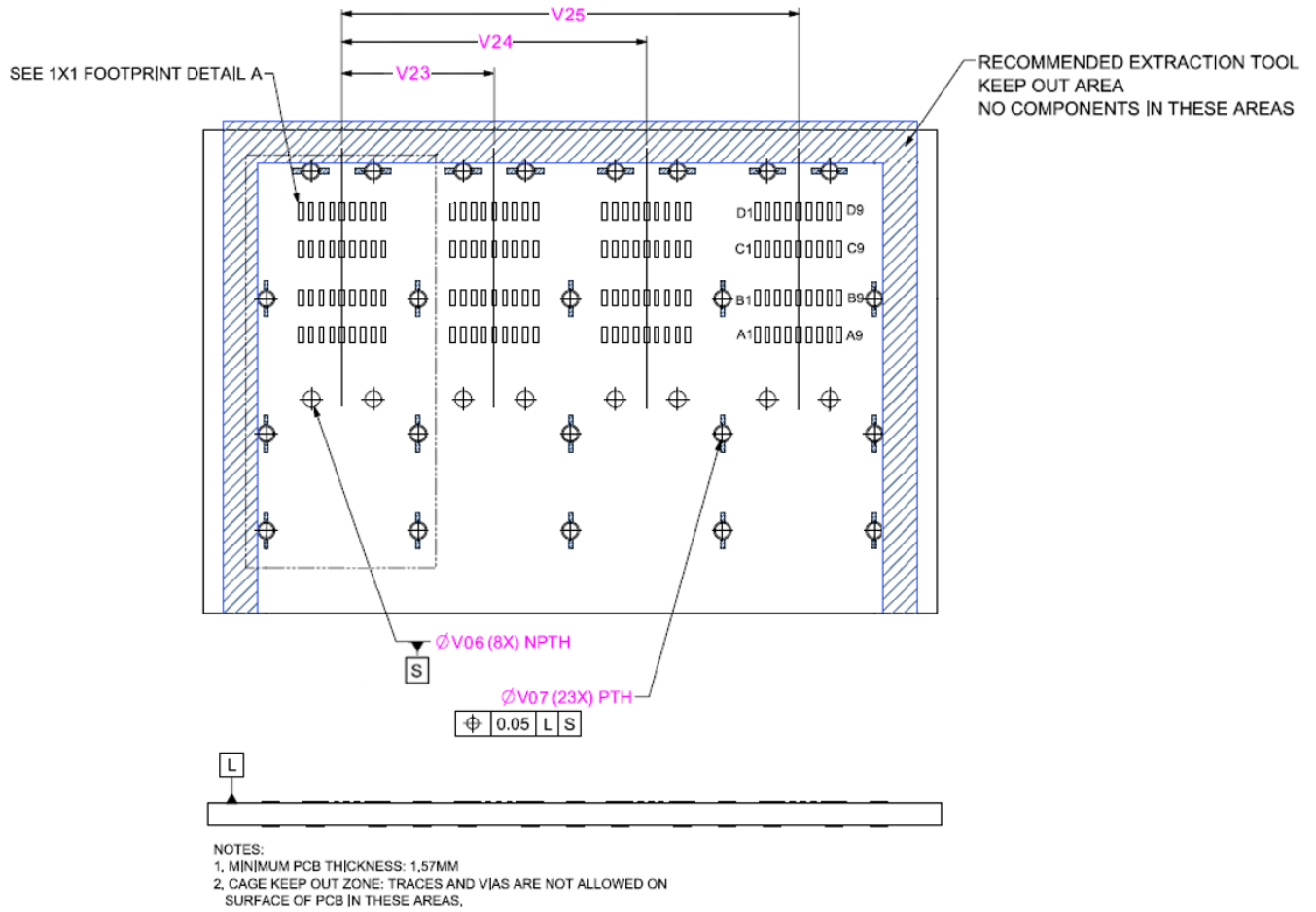


Figure 5-165-16 1x4 Receptacle SMT Footprint Option

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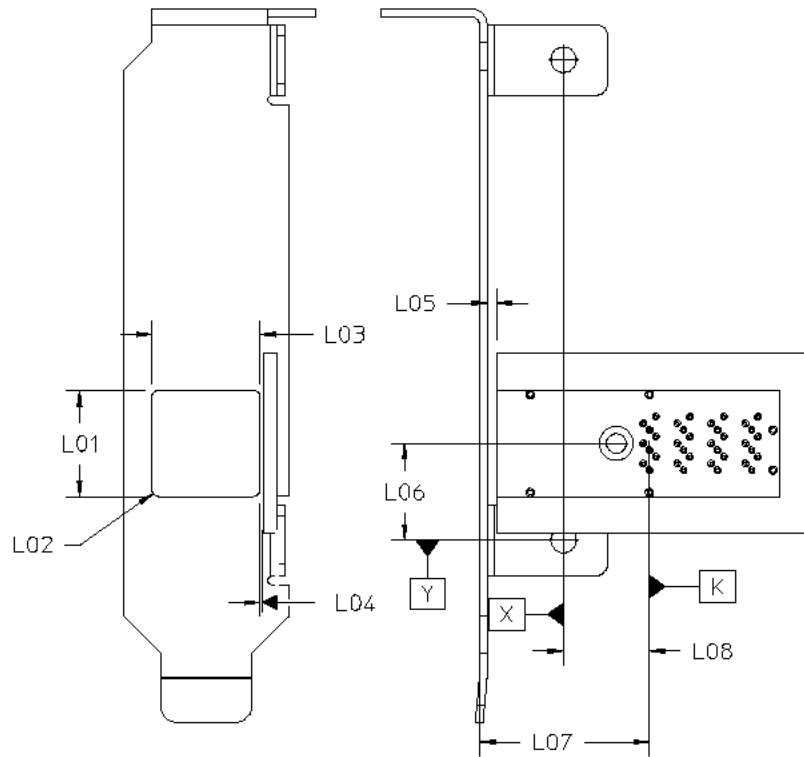
Table 5-6 Receptacle SMT Footprint Option Dimensions

| Designator | Description  | Dimension                     | Tolerance +/-                |
|------------|--|-------------------------------|------------------------------|
| V01        | <del>Datum S to front edge of PCB</del> Horizontal distance between center of left first row hold-down to center of third left hold-down                       | <del>16.75</del> <u>15.53</u> | Basic                        |
| V02        | <del>Datum S to</del> Horizontal distance between center of first row hold-down to center of second left hold-down   | <del>7.00</del> <u>9.50</u>   | Basic                        |
| V03        | <del>Datum S to</del> Horizontal distance between center of second row left hold-down to center of third left hold-down  | <del>9.75</del> <u>2.5</u>    | Basic                        |
| V04        | <del>Datum S to</del> Horizontal distance between center of fourth row right hold-down to center of third row left hold-down                                   | <del>9.22</del> <u>7.25</u>   | Basic                        |
| V05        | <del>Datum S to center of fourth row hold-down</del> Horizontal distance between center of left first row hold-down to the center of right first row hold-down | <del>11.00</del> <u>16.47</u> | Basic                        |
| V06        | <del>Diameter NPTH</del> Center-to-center distance between first and ninth receptacle contacts   | <del>6.00</del> <u>1.20</u>   | <u>0.05</u> Basic            |
| V07        | <del>Diameter PTH</del> Center-to-center distance between back hold-downs  | <del>4.50</del> <u>1.05</u>   | <u>0.05</u> Basic            |
| V08        | Horizontal distance between locating pegsDatum S to center of third column hold-down and locating peg  | 4.50                          | Basic                        |
| V09        | Connector keep-out zone width  | 2.50                          | MIN                          |
| V10        | Connector keep-out zone height   | 3.00                          | MIN                          |
| V11        | <del>Vertical distance between center of first row locating pegs to right first row hold-down</del> Datum S to center of first column hold-down                | <del>2.50</del> <u>3.25</u>   | <u>Basic</u> Basic           |
| V12        | Height of trace keep out zonehold-down slot  | 2.60                          | <u>FYP</u> MIN               |
| V13        | Width of trace keep out zonehold-down slot   | 0.30                          | <u>FYP</u> MIN               |
| V14        | Receptacle contact lengthDatum S to center of fourth column hold-down  | <del>1.20</del> <u>7.75</u>   | <u>Basic</u> Basic-TYP       |
| V15        | Receptacle contact width   | 0.35                          | <u>Basic-TYP</u> <u>0.05</u> |
| V16        | <del>Datum S to Center</del> to-center distance between first and ninthof fifth receptacle contacts  | <del>6.00</del> <u>2.25</u>   | Basic                        |
| V17        | Receptacle contact lengthDistance between Row B and Row C receptacle contacts  | <del>2.33</del> <u>1.20</u>   | <u>0.10</u> <u>0.05</u>      |
| V18        | <del>Datum S to center of Row A receptacle contacts</del> Distance between Row A and Row D receptacle contacts   | <del>7.73</del> <u>4.64</u>   | <u>0.10</u> Basic            |
| V19        | Distance between adjacent receptacle contacts  | 0.75                          | Basic                        |
| V20        | <del>Datum S to center of Row B receptacle contacts</del> Horizontal distance between center of left first row hold-down to center of third left hold-down     | <del>16.75</del> <u>7.34</u>  | <u>Basic</u> Basic           |
| V21        | <del>Datum S to center of Row C receptacle contacts</del> Horizontal distance between center of first row hold-down to center of third left hold-down          | <del>7.00</del> <u>10.87</u>  | <u>Basic</u> Basic           |
| V22        | <del>Datum S to center of Row D receptacle contacts</del> Horizontal distance between center of second row left hold-down to center of third left hold-down    | <del>9.75</del> <u>13.57</u>  | <u>Basic</u> Basic           |
| V23        | First port to second port spacingHorizontal distance between center of fourth row right hold-down to center of third left hold-down                            | <del>9.22</del> <u>11.00</u>  | <u>Basic</u> <u>0.10</u>     |

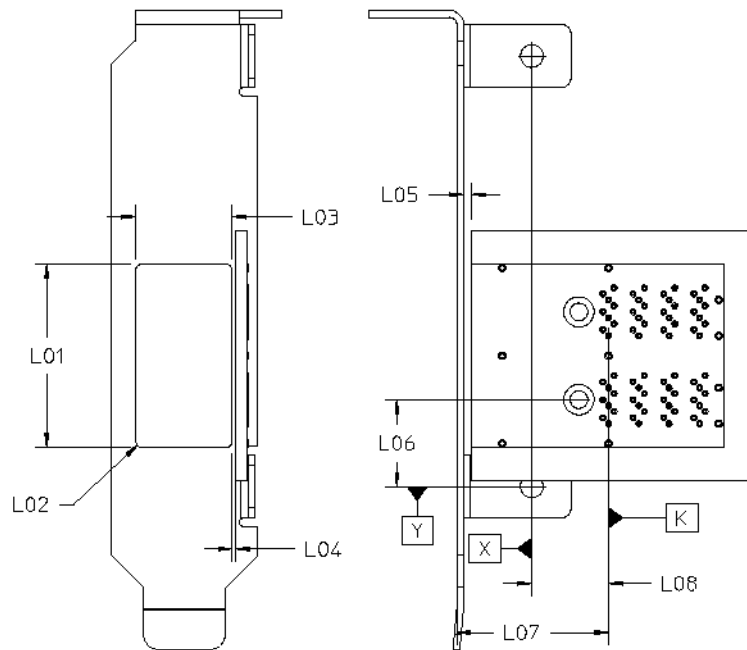
|     |   |                               |                       |
|-----|---|-------------------------------|-----------------------|
| V24 | <del>First port to third port spacing</del> Horizontal distance between center of left first row hold-down to right first row hold-down | <del>11.00</del> <u>22.00</u> | Basic-TYP <u>0.10</u> |
| V25 | <del>First port to fourth port spacing</del> Center-to-center distance between back hold-downs  | <del>4.50</del> <u>33.00</u>  | Basic-TYP <u>0.10</u> |
| V26 | <del>Center-to-center distance</del>  | 6.00                          | Basic                 |
| V27 | <del>Connector keep-out zone width</del>  | 2.50                          | MIN                   |
| V28 | <del>Connector keep-out zone height</del>   | 3.00                          | MIN                   |
| V29 | <del>Distance between Row B and Row C receptacle contacts</del>   | 2.33                          | 0.10                  |
| V30 | <del>Distance between Row A and Row D receptacle contacts</del>   | 7.73                          | 0.10                  |
| V31 | <del>Vertical distance between center of first row locating pegs to first row hold-down center</del>                                    | 2.50                          | Basic                 |
| V32 | <del>1.20 diameter NPTH (2X)</del>  | 1.20                          | 0.05                  |
| V33 | <del>1.05 diameter PTH (13X)</del>  | 1.05                          | 0.05                  |
| V34 | <del>Width of hold-down slot</del>  | 2.60                          | TYP                   |
| V35 | <del>Width of hold-down slot</del>  | 0.30                          | TYP                   |
| V36 | <del>Distance between locating holes within a port</del>  | 4.50                          | BASIC                 |
| V37 | <del>Port-to-port spacing</del>   | 11.00                         | 0.10                  |
| V38 | <del>Port-to-port spacing</del>   | 11.00                         | 0.1 TYP               |
| V39 | <del>Horizontal distance between center of left first row hold-down to the center of right first row hold-down</del>                    | 11.00                         | Basic TYP             |
| V40 | <del>Center-to-center distance between back hold-downs</del>  | 4.50                          | Basic TYP             |
| V41 | <del>Connector keep-out area</del>  | 2.50                          | MIN                   |
| V42 | <del>Connector keep-out area</del>  | 3.00                          | MIN                   |
| V43 | <del>Horizontal distance between center of fourth row right hold-down to center of third left hold-down</del>                           | 9.22                          | Basic TYP             |
| V44 | <del>Right second row hold-down to right third row hold-down</del>  | 9.75                          | Basic TYP             |
| V45 | <del>Vertical distance between center of first row locating pegs to first row hold-down center</del>                                    | 2.50                          | Basic TYP             |
| V46 | <del>Right second row hold-down to right third row hold-down</del>  | 16.75                         | Basic TYP             |
| V47 | <del>Right first row hold-down to right second row hold-down</del>  | 7.00                          | Basic TYP             |
| V48 | <del>Width of hold-down slot</del>  | 0.30                          | TYP                   |
| V49 | <del>Length of hold-down slot</del>   | 2.60                          | TYP                   |
| V50 | <del>Horizontal distance between locating pegs within port</del>  | 4.50                          | Basic TYP             |
| V51 | <del>(8X) NPTH diameter</del>   | 1.20                          | 0.05                  |
| V52 | <del>(23X) PTH diameter</del>   | 1.05                          | 0.05                  |
| V53 | <del>Horizontal spacing between outer most hold-downs</del>   | 44.00                         | REF                   |
| V54 | <del>Distance between Row B and Row C receptacle contacts</del>   | 2.33                          | 0.10                  |
| V55 | <del>Distance between adjacent receptacle contacts</del>  | 0.75                          | Basic 0.05            |
| V56 | <del>Receptacle contact length</del>  | 1.20                          | TYP                   |
| V57 | <del>Receptacle contact width</del>   | 0.35                          | TYP                   |
| V58 | <del>Center-to-center distance between first and ninth receptacle contacts</del>  | 6.00                          | BASIC                 |
| V59 | <del>Distance between Row A and Row D receptacle contacts</del>   | 7.73                          | 0.10                  |
| V60 | <del>1.20 diameter NPTH (2X)</del>  | 1.20                          | 0.05                  |
| V61 | <del>1.05 diameter PTH (8X)</del>   | 1.05                          | 0.05                  |

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1 **5.5 Receptacle-to-Bezel**



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**Figure 5-175-17 1x1 Press Fit Receptacle to Bezel**



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**Figure 5-185-18 1x2 Press Fit Receptacle to Bezel**

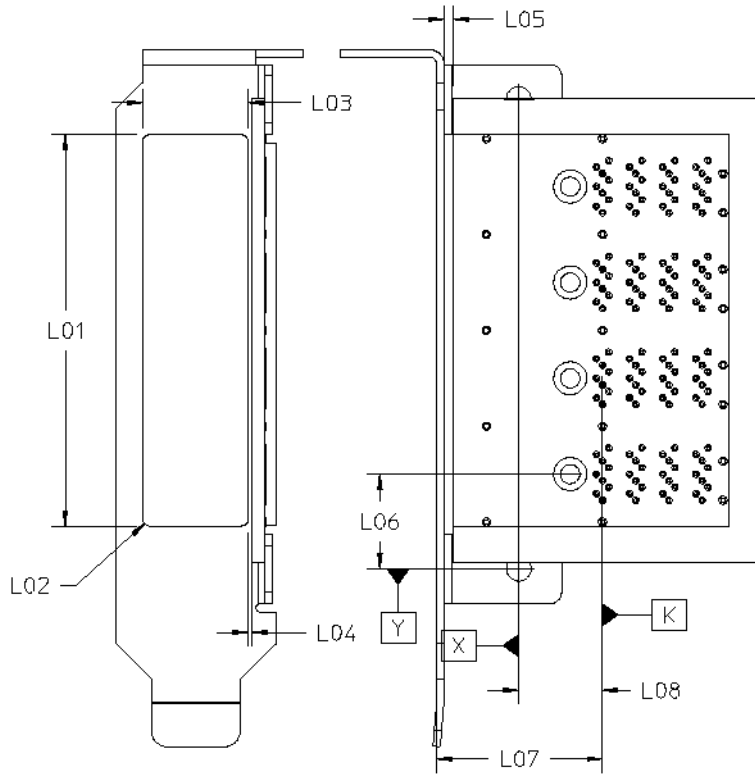


Figure 5-195-19 1x4 Press Fit Receptacle to Bezel

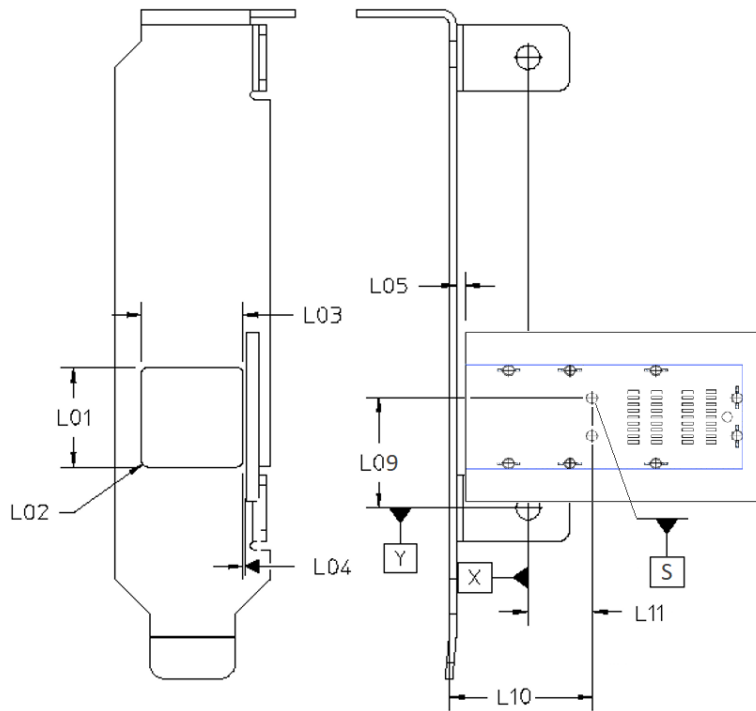
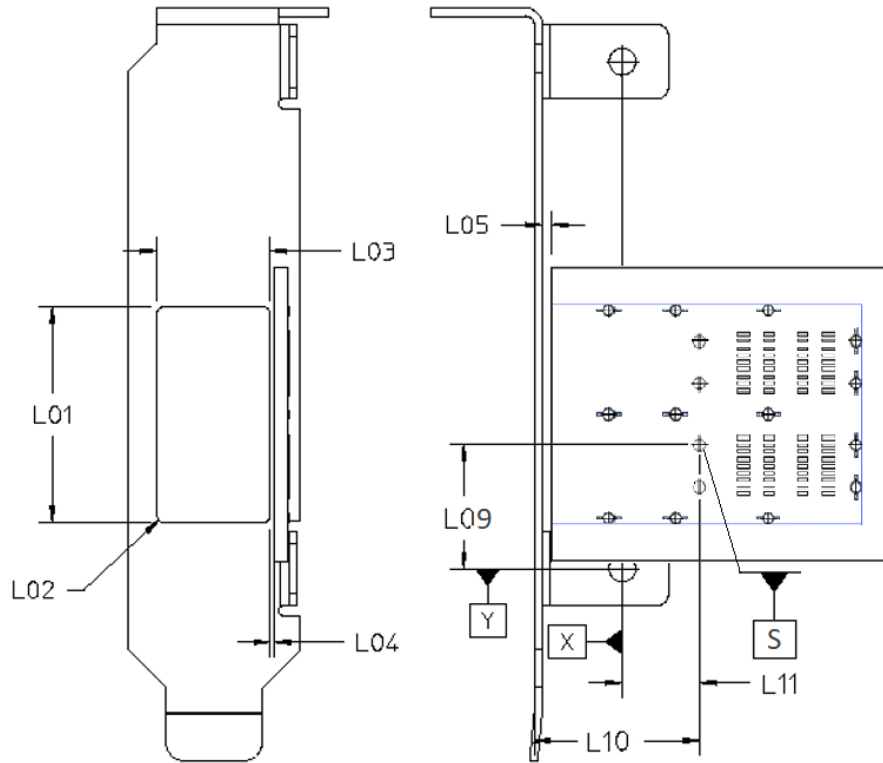


Figure 5-20 1x1 SMT Receptacle to Bezel

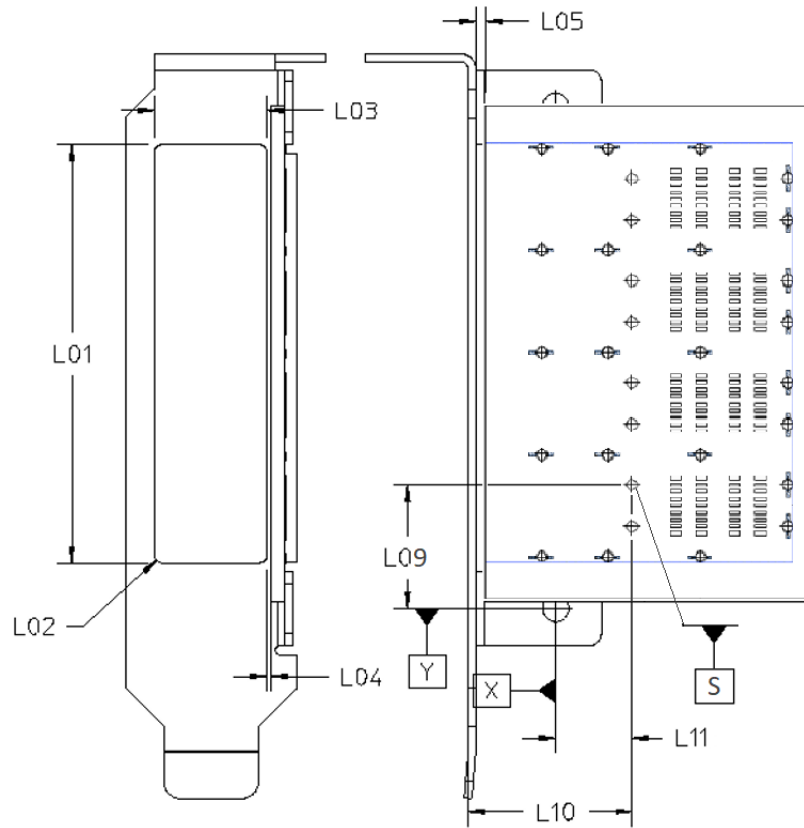
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**Figure 5-21 1x2 SMT Receptacle to Bezel**

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**Figure 5-22 1x4 SMT Receptacle to Bezel**

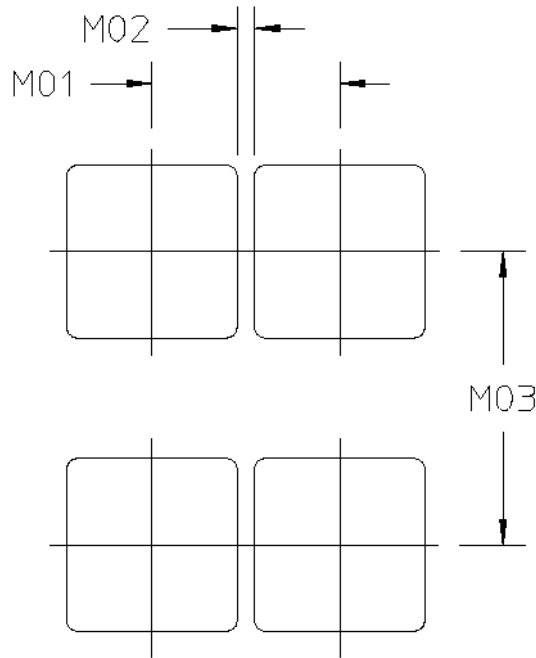
**Table 5-7 Receptacle to Bezel Dimensions**

| Designator | Description  | Dimension    | Tolerance +/- |
|------------|--|--------------|---------------|
| L01        | 1x1 bracket cut-out width  | 11.90        | 0.10          |
|            | 1x2 bracket cut-out width  | 22.90        | 0.10          |
|            | 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<br>(PCI add-in card applications)               | 19.00        | 0.15          |
|            | Bracket front to Datum K<br>(all other (M/B) applications)               | 20.08        | 0.15          |
| L08        | Mounting hole to manufacturer fiducial                                   | Basic        | N/A           |
| <u>L09</u> | <u>Mounting hole to Datum S</u>  | <u>Basic</u> | <u>N/A</u>    |
| <u>L10</u> | <u>Bracket front to Datum S</u><br><u>(PCI add-in card applications)</u> | <u>16.34</u> | <u>0.15</u>   |
|            | <u>Bracket front to Datum S</u><br><u>(all other (M/B) applications)</u> | <u>17.42</u> | <u>0.15</u>   |
| <u>L11</u> | <u>Mounting hole to Datum S</u>  | <u>Basic</u> | <u>N/A</u>    |

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### 1 5.6 Minimum Receptacle Pitch



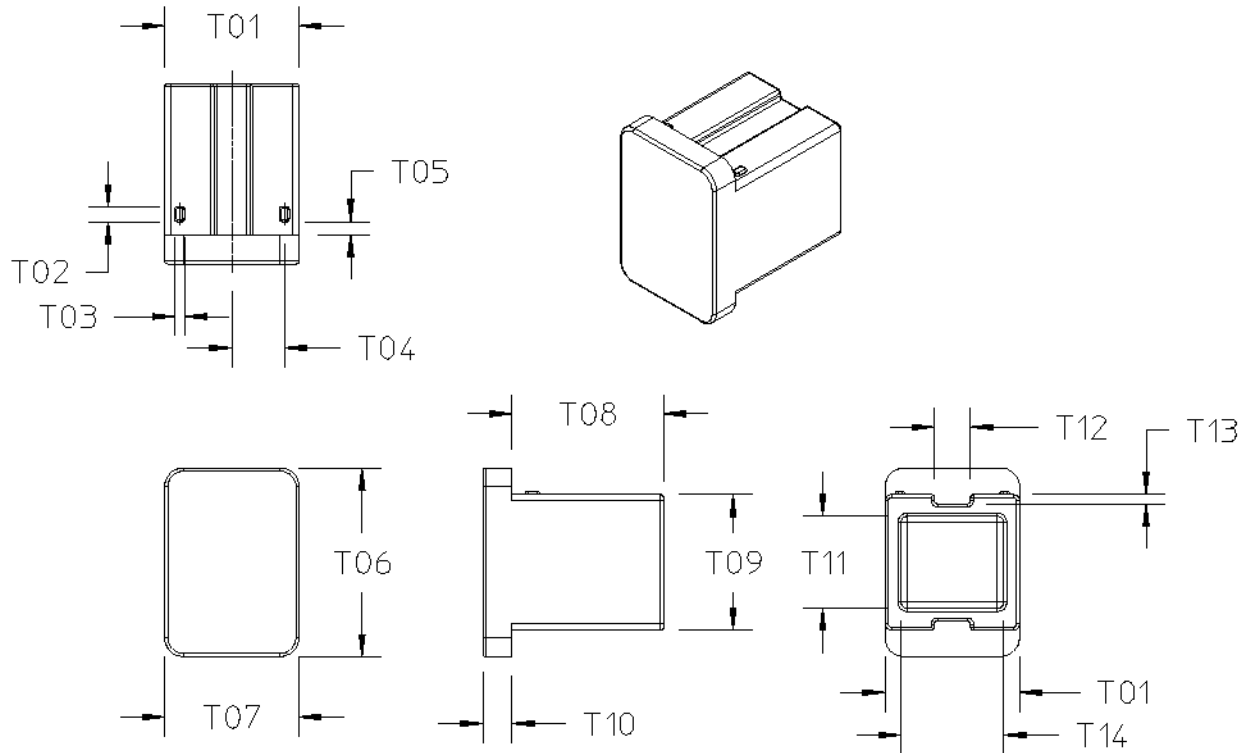
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**Figure 5-235-23 Minimum Receptacle Pitch**

**Table 5-8 Minimum Receptacle 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          |

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1 **5.7 Receptacle Dust Cover**



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5 **Figure 5-245-24 Receptacle Dust Cover**

**Table 5-9 Receptacle Dust Cover Dimensions**

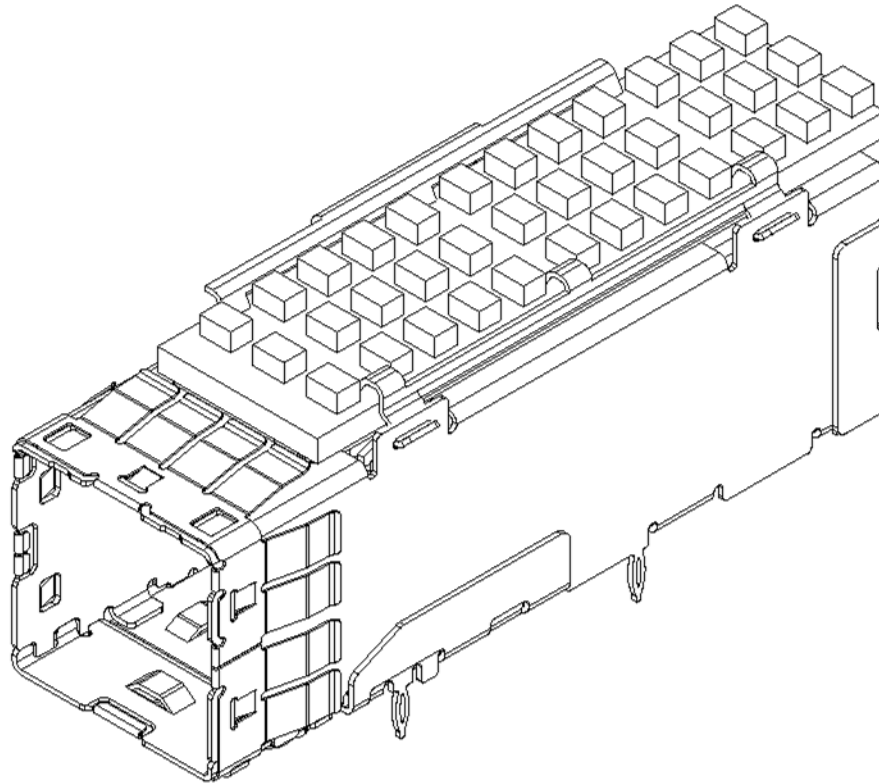
| Designator | Description              | Dimension | Tolerance +/- |
|------------|--------------------------|-----------|---------------|
| T01        | Plug body width          | 10.65     | 0.10          |
| T02        | Dimple length            | 1.20      | 0.10          |
| T03        | Dimple width             | 0.80      | 0.10          |
| T04        | Dimple location          | 4.15      | 0.10          |
| T05        | Dimple location          | 1.03      | 0.10          |
| T06        | Plug front width         | 10.65     | MAX           |
| T07        | 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          |

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1 **6. Thermal Solutions**

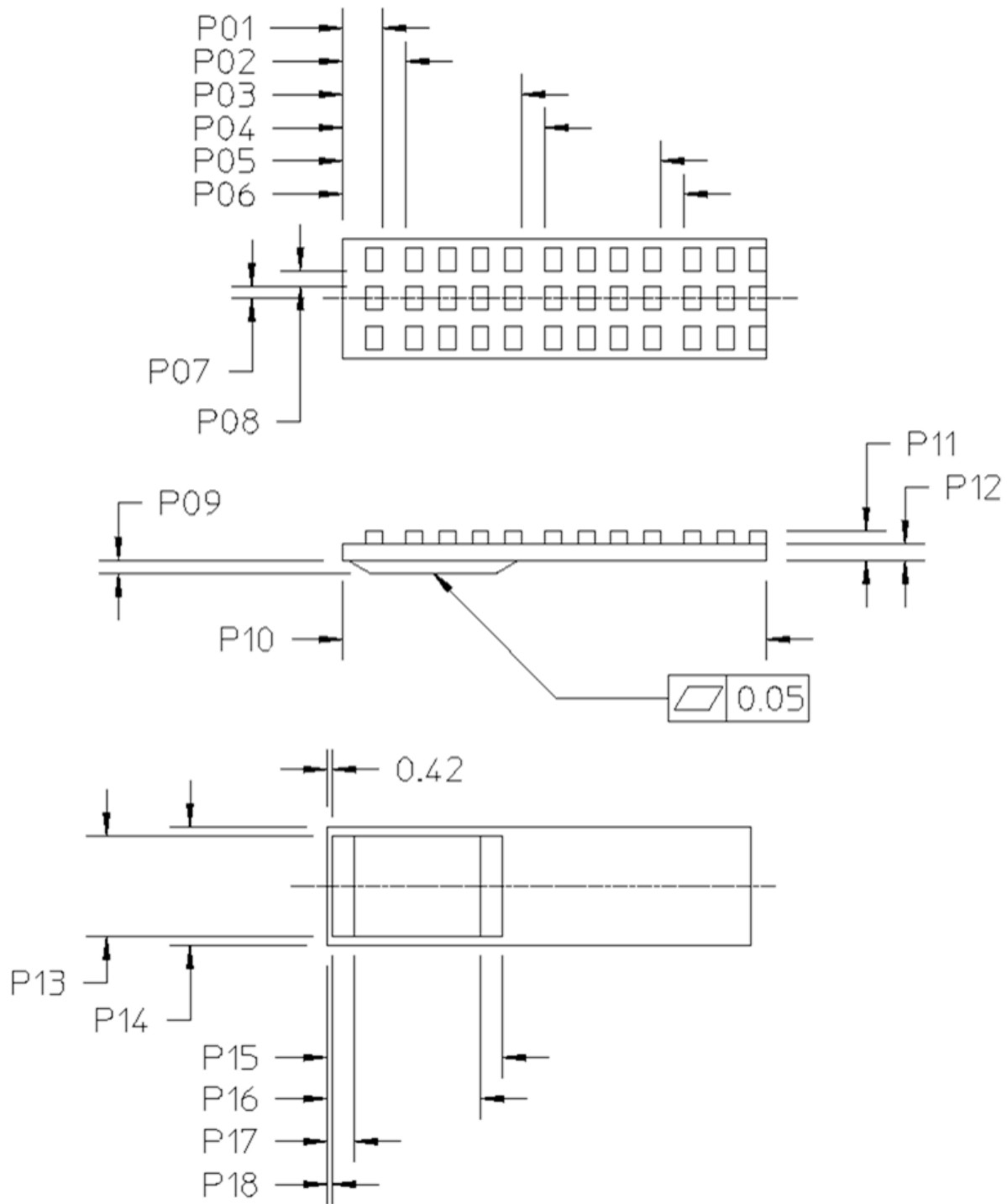
2 **6.1 Overview**

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5 **Figure 6-16-1 Cage with heat sink**  
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1 **6.2 Cage Heat Sink**



**Figure 6-26-2 Cage Heat Sink**

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Table 6-1 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          |

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1 **6.3 Cage Heat Sink Attachment**

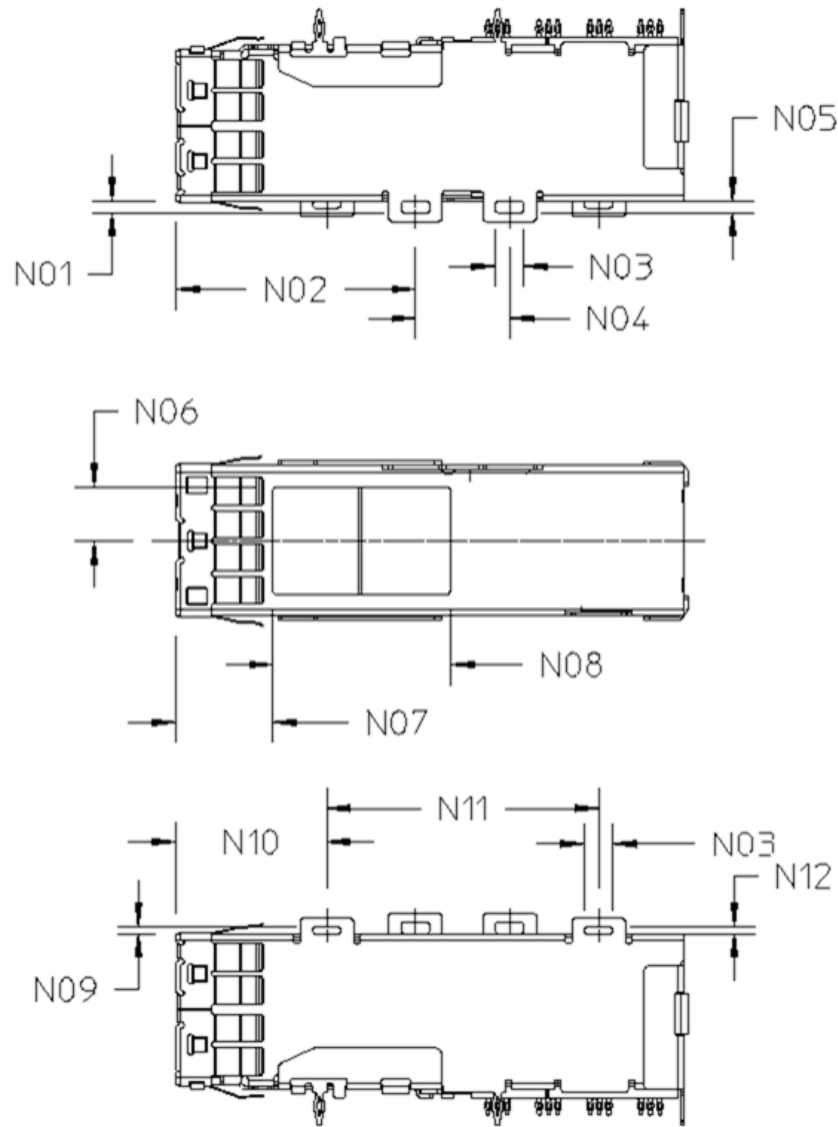


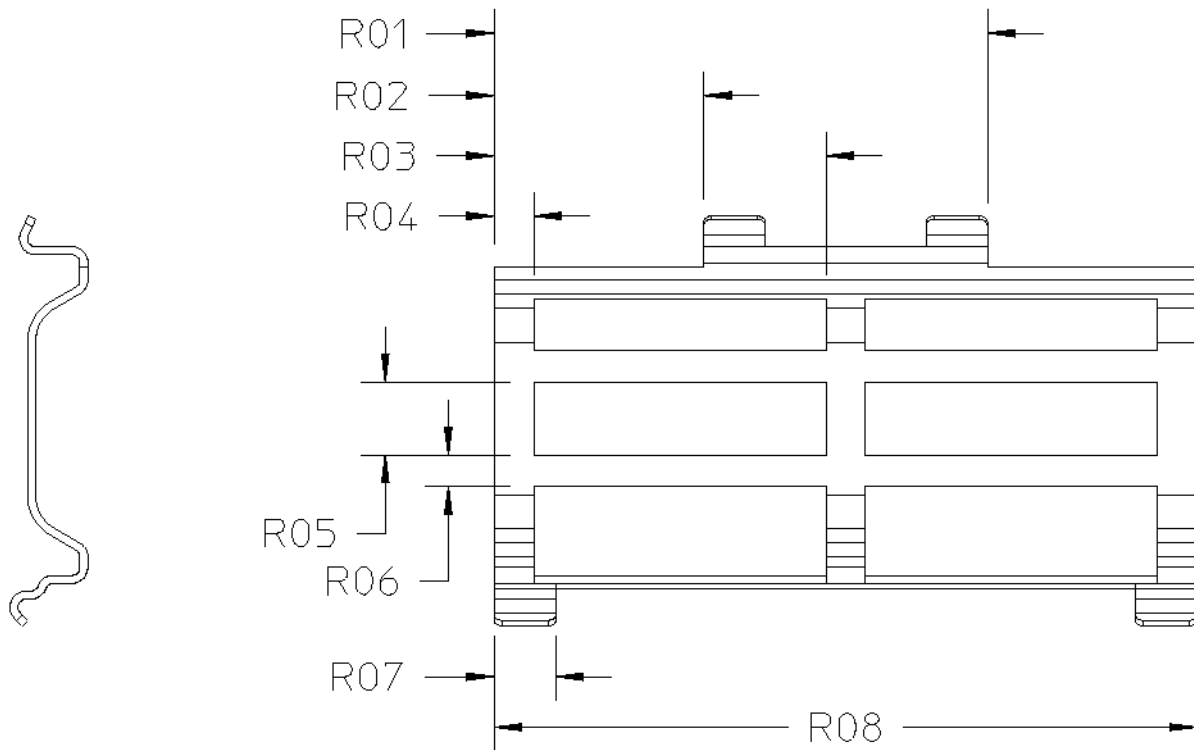
Figure 6-36-3 Cage Heat Sink Attachment

Table 6-2 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           |

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1 **6.4 Cage Heat Sink Attachment Clip Design**



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5 **Figure 6-46-4 Cage Heat Sink Attachment Clip**

**Table 6-3 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 window | 1.70      | 0.10          |
| R08        | Clip length      | 22.10     | 0.15          |

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# 7. Plug Mechanical Specification

## 7.1 Paddle Card

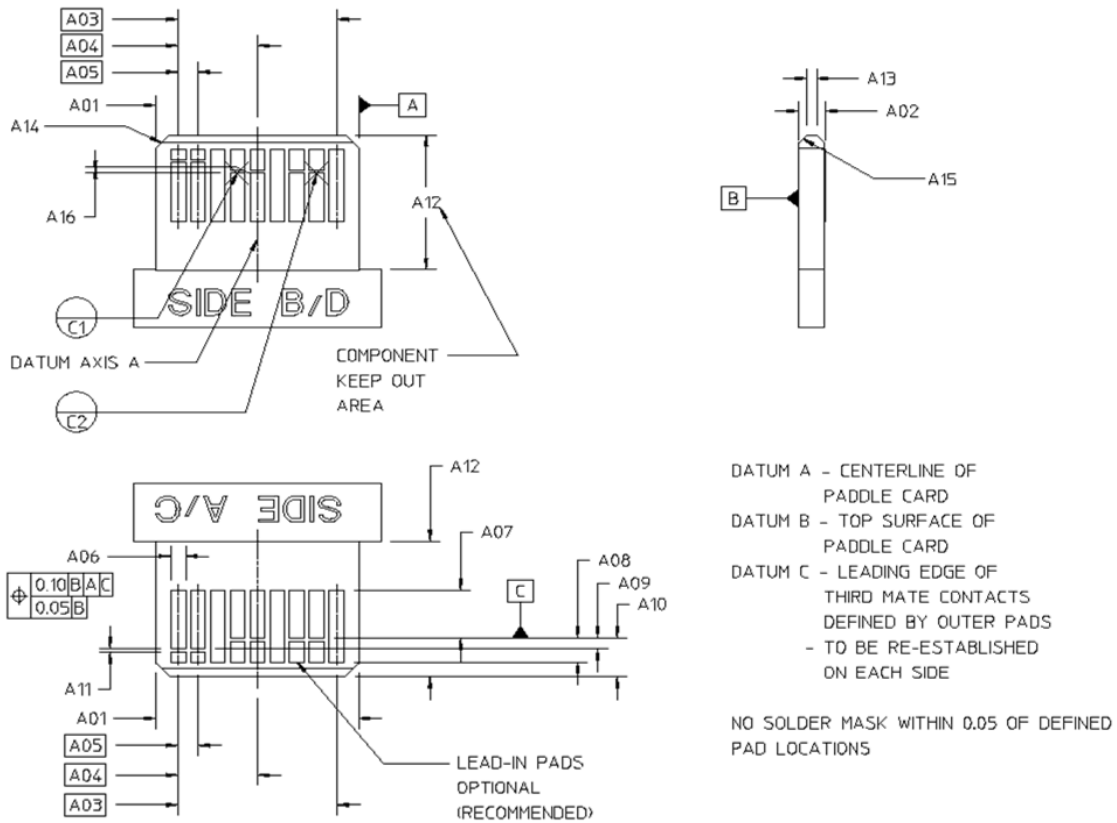


Figure 7-17-1 Plug Paddle Card

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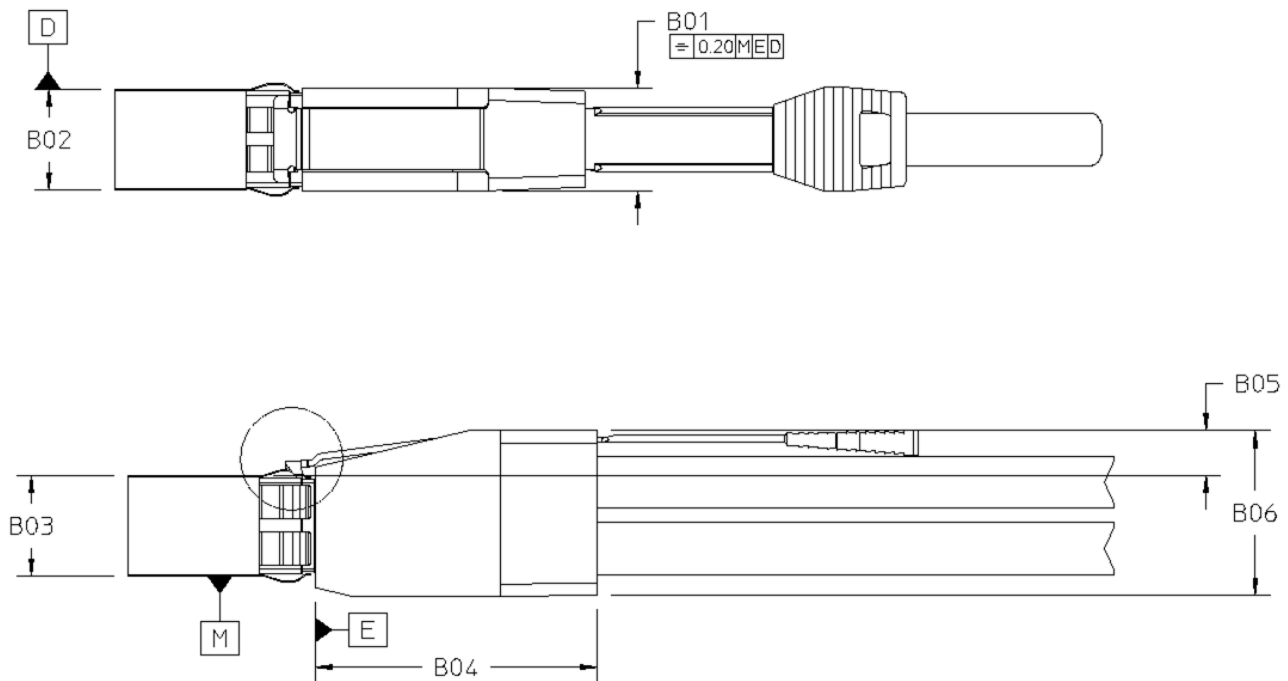
**Table 7-1 Plug Paddle Card Dimensions**

| 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 <sup>1</sup> | Pad length – Third mate             | 1.85        | MIN           |
| A07 <sup>2</sup> | <u>Pad length – Third mate</u>      | <u>1.34</u> | <u>MIN</u>    |
| 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 <sup>1</sup> | Lead-in chamfer x 45 degrees        | 0.50        | 0.05          |
| A14 <sup>3</sup> | <u>Lead-in chamfer x 45 degrees</u> | <u>0.3</u>  | <u>0.05</u>   |
| A15              | Lead-in chamfer x 45 degrees        | 0.30        | 0.05          |
| A16              | Third mated pad to Datum C          | 0.00        | 0.03          |

**Notes:**

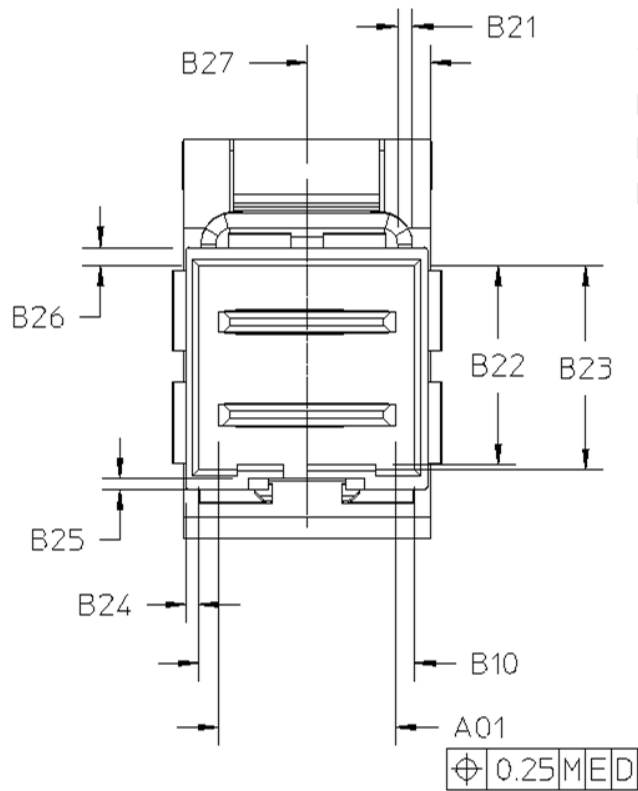
1. Dimensions prior to revision 4.0
2. New designs should use the updated dimensions for A07 in addition to B16 for improved signal performance (e.g., PCIe 5.0).
3. New designs should use the updated chamfer of 0.30 mm for A14

**2 7.2 X4 Plug**



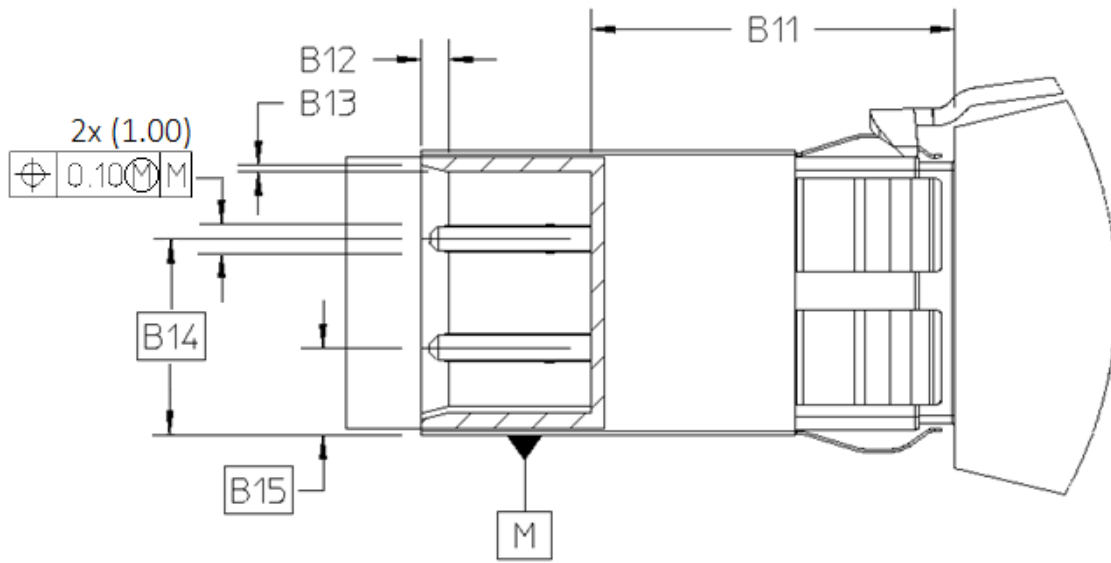
**Figure 7-27-2 X4 Plug**

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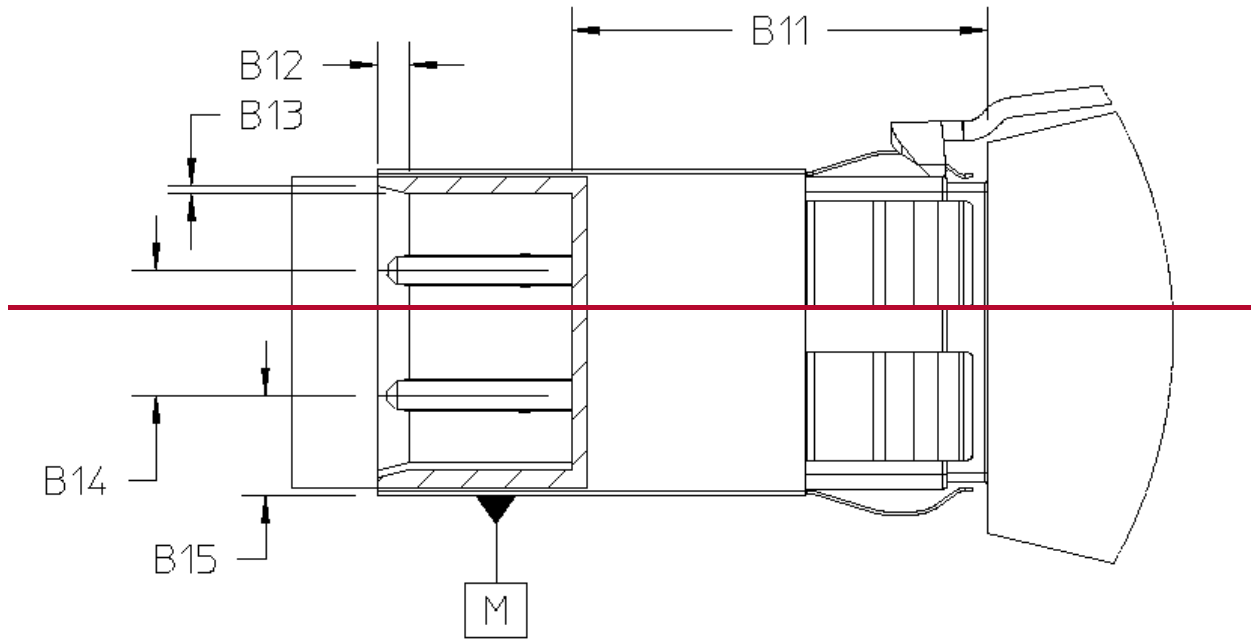
THE GEOMETRY OF LATCH RETENTION FEATURES MUST MATE WITH THE CAGE LATCH HOLES AS DEFINED BY F03 & F05 IN FIGURE 7.1.1

Figure 7-37-3 4X Plug Retention



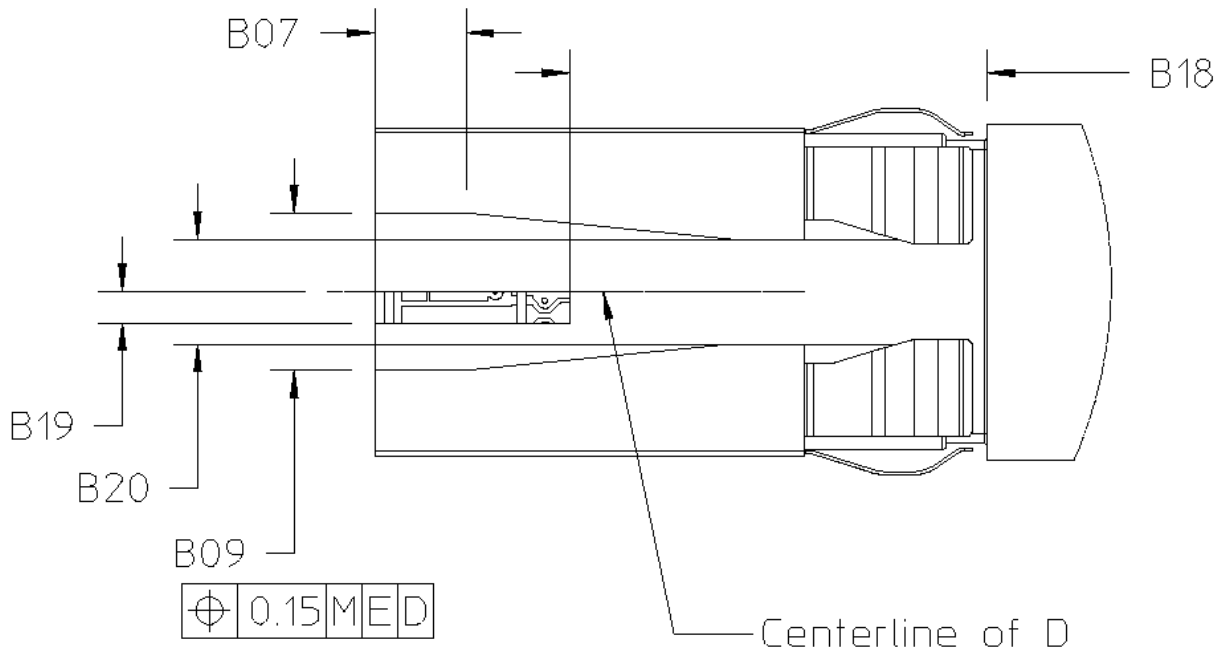
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Figure 7-47-4 4X Plug Housing



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Figure 7-57-5 4X Plug Key Slot

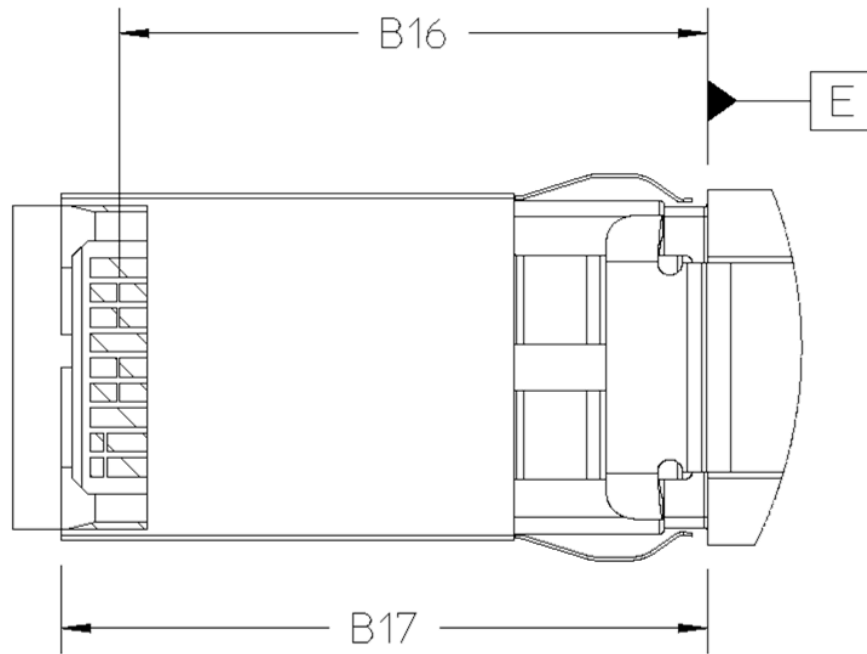


Figure 7-67-6 4X Plug Latch Stop to Contact

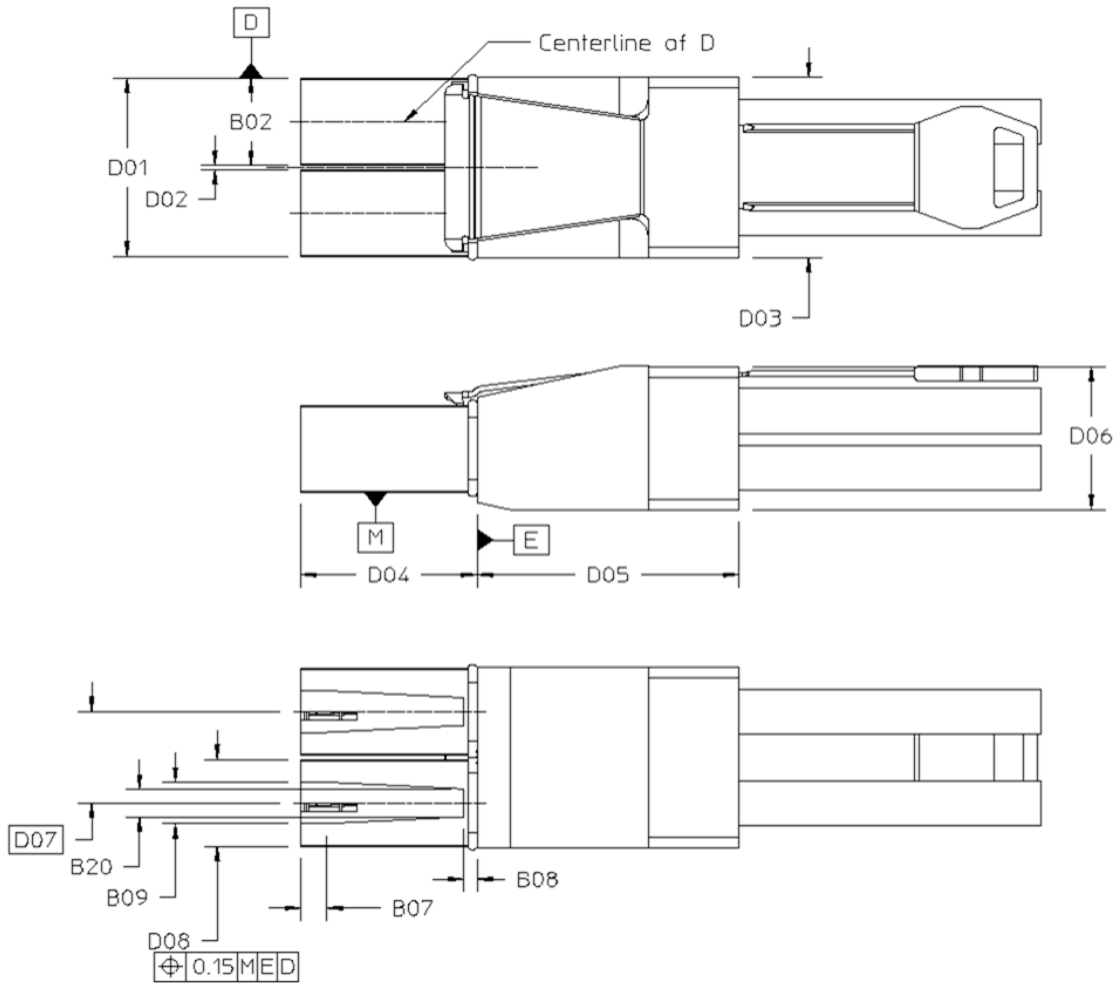
Table 7-2 4X Plug Dimensions

| 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 Datum M to upper PCB centerline | 7.224.00  | Basic0.10     |
| B15              | Snout bottom Datum M to lower PCB centerline   | 3.22      | Basic0.10     |
| B16 <sup>1</sup> | Plug body to PCB datum                         | 17.80     | 0.25          |
| B16 <sup>2</sup> | Plug body to PCB datum                         | 17.44     | 0.25          |
| B17              | Snout length                                   | 19.56     | 0.10          |
| B18              | Datum E to blocking key slot end               | 13.3343   | 0.10MAX       |
| B19              | Blocking key slot width                        | 1.00      | 0.15          |
| B20              | Snout groove lead-in width                     | 3.34      | 0.15          |
| B21              | Latch barbd 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  |
| <p><b>Notes:</b></p> <p>1. <u>Dimensions prior to revision 4.0</u></p> <p>2. <u>New designs should use the updated dimension for B16 in addition to changes for A07 for improved signal performance (e.g., PCIe 5.0).</u></p> |                     |      |      |

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2 **7.3 8X Plug**



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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.

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**Figure 7-77-7 8X Plug**

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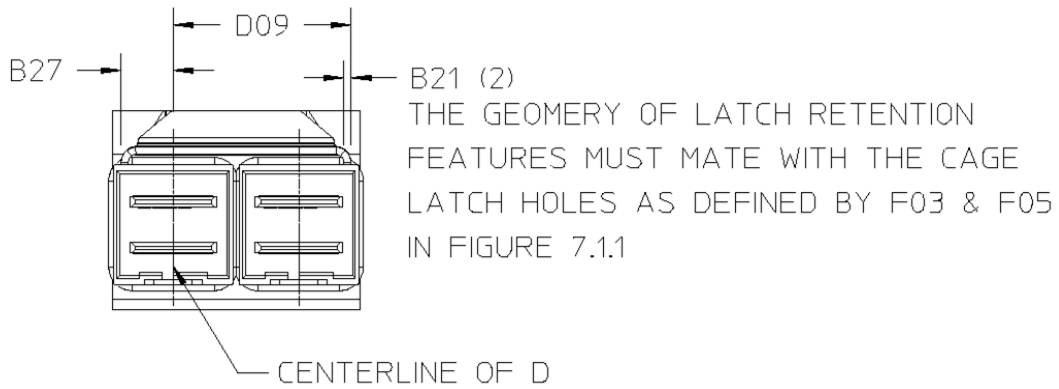
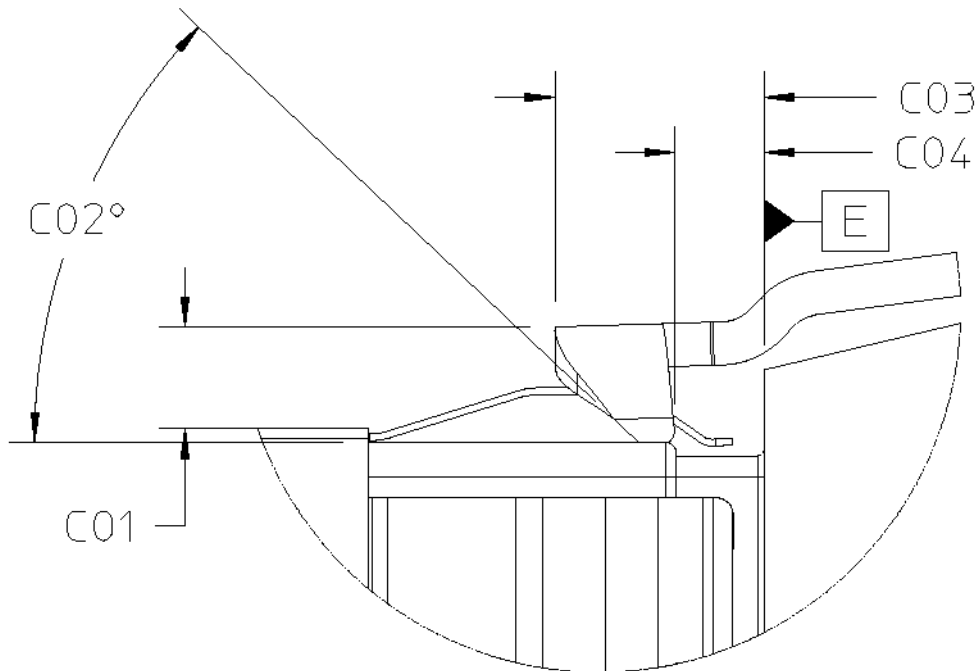


Figure 7-87-8 8X Plug Retention

Table 7-3 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           |

7.4 4X Plug Latch



NOTES:

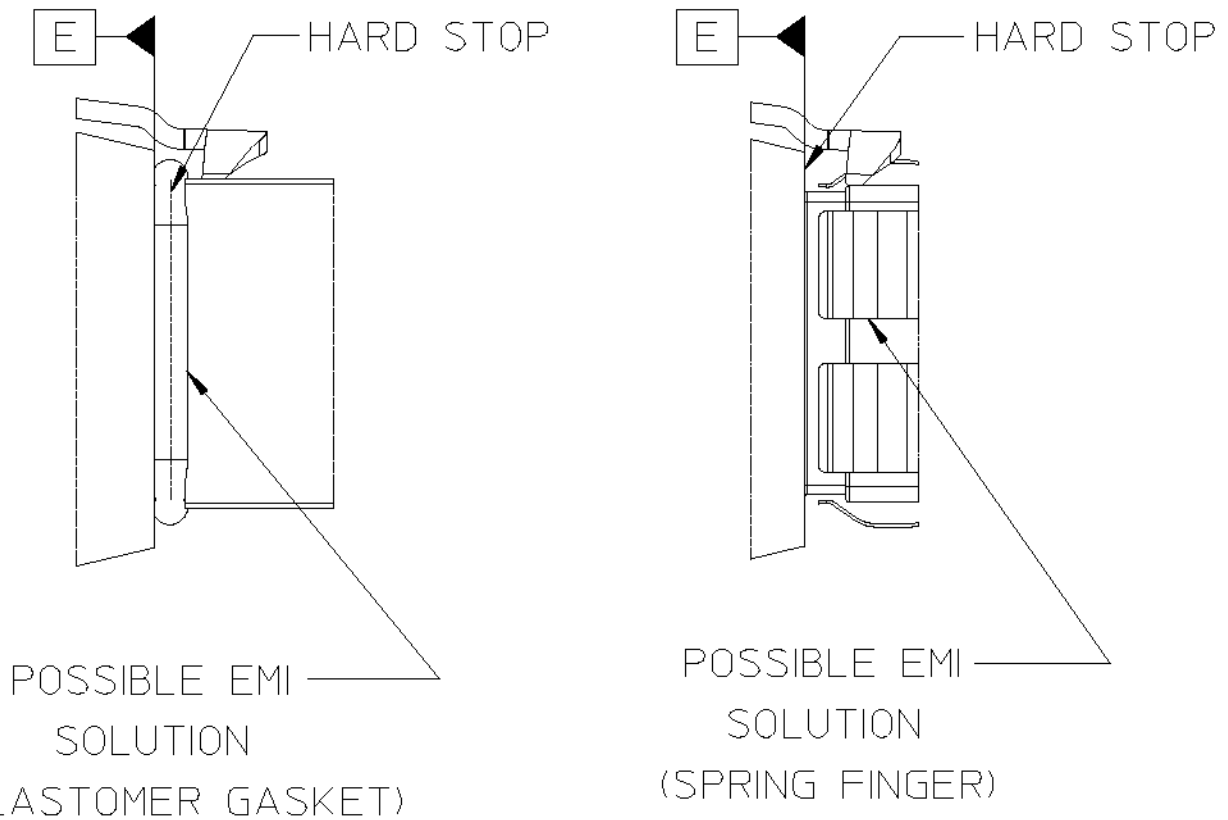
- Figure shown is one possible EMI solution/ latch configuration

- 2. 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
- 3. For other configurations, dimension taken from Datum E (i.e., C03 and C04) ~~must~~ shall 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 7-97-9 4X Plug Latch

Table 7-4 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          |

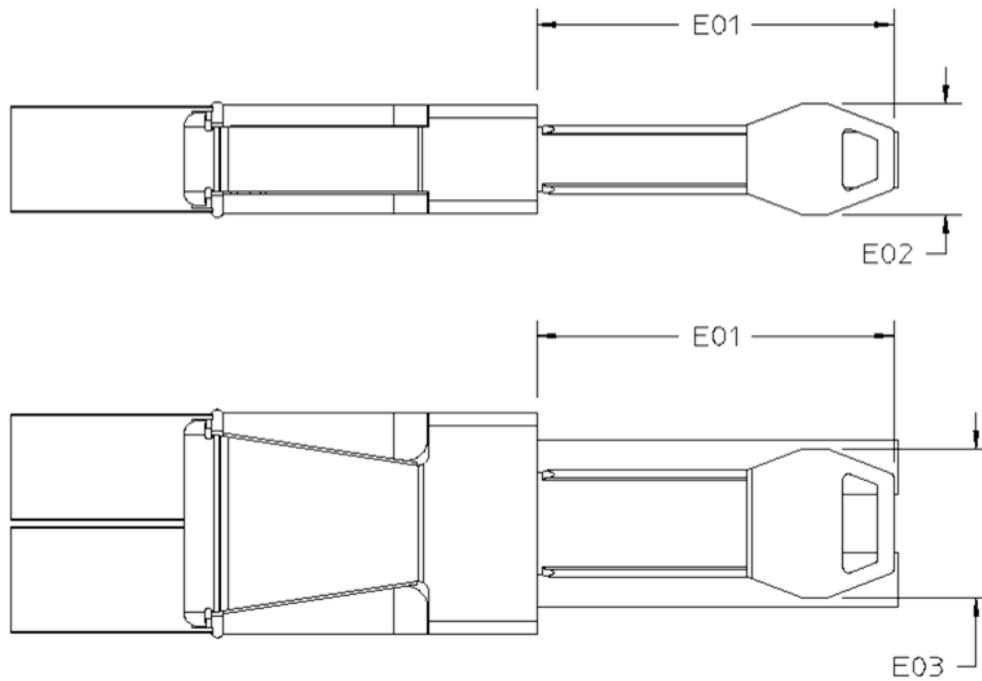


NOTES:

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

Figure 7-107-10 4X Plug EMI Options

1 **7.5 Plug Pull tab**



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3 NOTES:

- 4 1. Figure shown is one possible solution. Other configurations to remain with the E02 dimensions.  
5 2. Specific standards may employ color coding for pull tabs.

6 **Figure 7-~~117-11~~ Plug Pull tab**

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8 **Table 7-5 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           |

# 7.6 Plug Thermal Interface

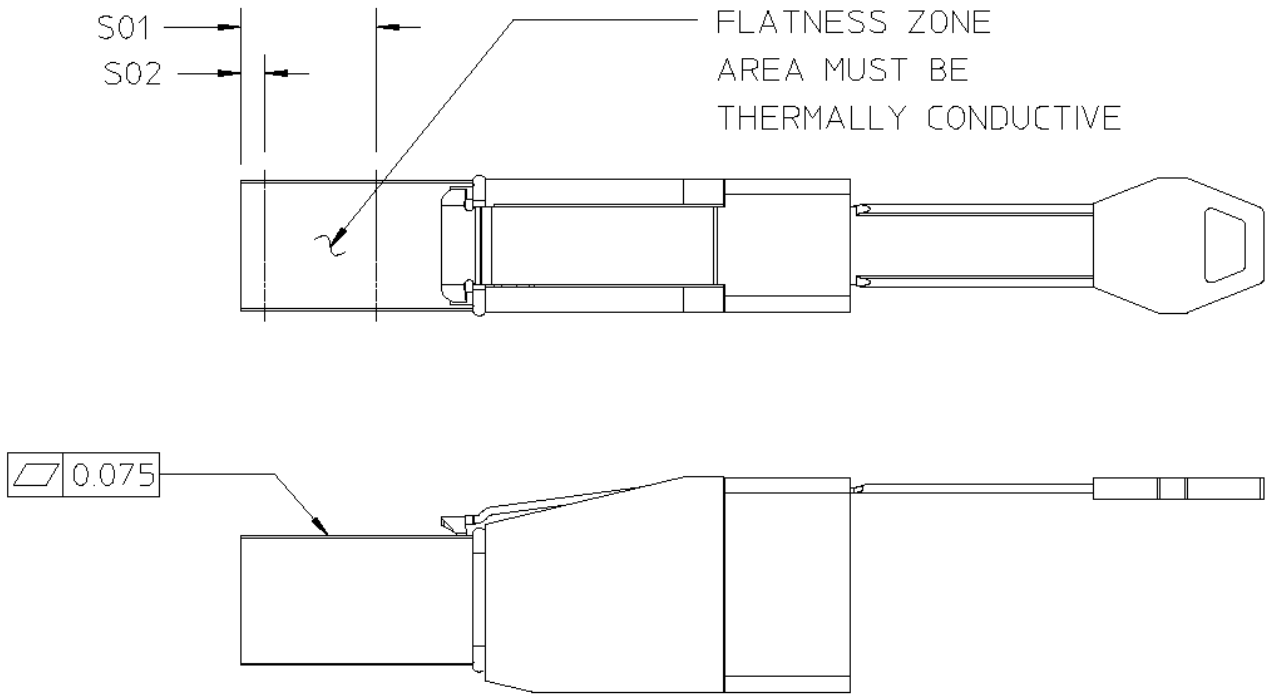


Figure 7-127-12 Plug Thermal Interface

Table 7-6 Plug Thermal Interface Dimensions

| Designator | Description               | Dimension | Tolerance +/- |
|------------|---------------------------|-----------|---------------|
| S01        | Heat sink engagement zone | 11.00     | MIN           |
| S02        | Heat sink engagement zone | 2.00      | MAX           |

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## 8. Test Requirements and Methodologies (TS-1000, etc.)

### 8.1 Performance Tables

EIA-364-1000 (TS-1000) shall be used to define the test sequences and procedures for evaluating the connector system described in this document. Where multiple test options are available, the manufacturer shall select the appropriate option where not previously specified. The selected procedure shall be noted when reporting data. If there are conflicting requirements or test procedures between EIA-364 procedures and those contained within this document, this document shall be considered the prevailing authority.

Unless otherwise specified, procedures for sample size, data, and collection to be followed as specified in EIA-364-1000. See EIA-364-1000 Annex B for objectives of tests and test groups.

~~Table 8-1~~ ~~Table 8-1~~ summarizes the performance criteria that are to be satisfied by the connector described in this document. Most performance criteria are validated by EIA-364-1000 testing, but this test suite leaves some test details to be determined. To ensure that testing is repeatable, these details are identified in ~~Table 8-2~~ ~~Table 8-2~~. Finally, testing procedures used to validate any performance criteria not included in EIA-364-1000 are provided in ~~Table 8-3~~ ~~Table 8-3~~.

**Table 8-1 Form Factor Performance Requirements**

| Performance Parameters                   | Description/ Details  | Requirement             |
|--|---|-------------------------|
| <b>Mechanical/ Physical Requirements</b> |   |                         |
| <b>Plating Type</b>                      | Plating type on connector contacts  | Precious                |
| <b>Surface Treatment</b>                 | Surface treatment on connector contacts; Test Group 6 required if surface treatment is applied  | Manufacturer to specify |
| <b>Wipe length</b>                       | Designed distance a contact traverses over a mating contact surface during mating and resting at a final position; Test Group 6 is required if wipe length is less than 0.127mm | Manufacturer to specify |
| <b>Rated Durability Cycles</b>           | The expected number of durability cycles a component is expected to encounter over the course of its life   | 250 cycles              |
| <b>Mating Force*</b>                     | Amount of force needed to mate a module with a connector when latches are deactivated   | 62 N MAX                |
| <b>Unmating Force*</b>                   | Amount of force needed to separate a module from a connector when latches are deactivated   | 30 N MAX                |
| <b>Latch Retention*</b>                  | Amount of force the latching mechanism can withstand  | 75 N MIN                |
| <b>Environmental Requirements</b>        |   |                         |
| <b>Field Life</b>                        | The expected service life for a component   | 10 years                |
| <b>Field Temperature</b>                 | The expected service temperature for a component  | 0-65°C                  |
| <b>Storage Temperature*</b>              | The expected storage temperature for a component when not in use  | -20°C to +85°C          |

|  |   |   |
|--|---|---|
| <b>Storage Humidity*</b>   | The expected storage humidity for a component when not in use | 80% Relative Humidity                           |
| <b>Environmental Requirements</b>  |   |   |
| <b>Current*</b>  | Maximum current to which a contact is exposed in use          | 0.5_A per contact MAX                           |
| <b>Operating Rating Voltage</b>  | Maximum voltage to which a contact is exposed in use          | <del>30V</del> <u>29.9 V</u> DC per contact MAX |
| NOTE: Performance criteria denoted with starts (*) are not validated by EIA-364-1000 testing. Refer to <del>Table 8-3</del> <u>Table 8-3</u> for test procedures and pass/fail criteria. |   |   |

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2 ~~Table 8-2~~ Table 8-2 describes the details necessary to perform the tests described in the EIA-364-1000 test  
3 sequences. Testing shall be done in accordance with EIA-364-1000 and the test procedures it identifies in such a  
4 way that the parameters/ requirements defined in ~~Table 8-1~~ Table 8-1 are met. Any information in this table  
5 supersedes EIA-364-1000.  
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**Table 8-2 EIA-364-1000 Test Details**

| Test  | Test Descriptions and Details   | Pass/ Fail Criteria  |
|---|---|--|
| <b>Mechanical/ Physical Tests</b>   |   |  |
| <b>Durability (preconditioning)</b>   | EIA-364-09<br>To be tested with connector, cage, and module (Latches should be locked)                          | No evidence of physical damage                             |
| <b>Durability</b>   | EIA-364-09<br>To be tested with connector, cage, and module (Latches should be locked out per EIA-364-1000)     | No visual damage to mating interface or latching mechanism |
| <b>Environmental Tests</b>  |   |  |
| <b>Mixed Flowing Gas (see Note 1)</b>   | EIA-364-65 Class II<br>See Table 4.1 in EIA-364-1000 for exposure times<br>Test option Per EIA-364-1000: 1B     | No intermediate test criteria                              |
| <b>Electrical Tests</b>   |   |  |
| <b>Low Level Contact Resistance (see Note 2)</b>  | EIA-364-23<br>20 mV DC MAX, 100 mA MAX<br>To include wire termination or connector-to-board termination         | 20 mΩ MAX change from baseline                             |
| <b>Dielectric Withstanding Voltage</b>  | EIA-364-20<br>Method B<br>300 VDC minimum for 1 minute<br>Applied voltage may be product / application specific | No defect or breakdown between adjacent contacts           |
| <b>NOTES:</b>   |   |  |
| 1. Temperature and duration <del>must</del> <u>shall</u> be reported.   |   |  |
| 2. The first low level contact resistance reading in each test sequence is used to determine a baseline measurement. Subsequent measurements in each sequence are measured against this baseline. |   |  |

1 ~~Table 8-3~~ ~~Table 8-3~~ describes the testing procedures necessary to validate performance criteria not validated by  
 2 EIA-364-1000 testing. The tests are to be performed in such a way that the parameters/ requirements defined in  
 3 ~~Table 8-1~~ ~~Table 8-1~~ are met.

**Table 8-3 Additional Test Procedures**

| Test                              | Test Descriptions and Details  | Pass/ Fail Criteria  |
|-----------------------------------|--|--|
| <b>Mechanical/ Physical Tests</b> |  |  |
| <b>Mating Force</b>               | EIA-364-13<br>To be tested with cage, connector, and module without heat sinks<br>Latching mechanism deactivated (locked out)  | Refer to <del>Table 8-1</del> <del>Table 8-1</del><br>-AND-<br>No physical damage to any components                  |
| <b>Unmating Force</b>             | EIA-364-13<br>To be tested with cage, connector, and module without heat sinks<br>Latching mechanism deactivated (locked out)  |  |
| <b>Latch Retention</b>            | EIA-364-13<br>To be tested with cage, connector, and module without heat sinks<br>Latching mechanism engaged (not locked out)  |  |
| <b>Vibration</b>                  | EIA-364-28<br>Manufacturer to report test details  | No physical damage<br>-AND-<br>No discontinuity longer than 1 microsecond<br>-AND-<br>20 mΩ MAX change from baseline |
| <b>Mechanical Shock</b>           | EIA-364-27<br>Manufacturer to report test details  | No physical damage<br>-AND-<br>20 mΩ MAX change from baseline  |
| <b>Environmental Tests</b>        |  |  |
| <b>Storage Temperature</b>        | EIA-364-32<br>Method A, Test Condition 1, Duration 4<br>Use min and max Field Temperatures listed in <del>Table 8-1</del> <del>Table 8-1</del> for temperature range | Refer to <del>Table 8-1</del> <del>Table 8-1</del>   |
| <b>Storage Humidity</b>           | EIA-364-31   | Refer to <del>Table 8-1</del> <del>Table 8-1</del>   |
| <b>Electrical Tests</b>           |  |  |
| <b>Current</b>                    | EIA-364-70<br>Method 3, 30-degree temperature rise<br>Contacts energized: Manufacturer to specify  | Refer to <del>Table 8-1</del> <del>Table 8-1</del> for current magnitude   |
| <b>Insulation Resistance</b>      | 100 VDC  | 1000 Megaohms minimum between adjacent contacts  |

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