

This document was developed by the SFF Committee prior to it becoming the SFF TA (Technology Affiliate) TWG (Technical Working Group) of the SNIA (Storage Networking Industry Association) in 2016.

*The information below should be used instead of the equivalent herein.*

**POINTS OF CONTACT:** SFF TA TWG Chair Email: [sff-chair@snia.org](mailto:sff-chair@snia.org).

**LOCATION OF SFF DOCUMENTS:** <http://www.snia.org/sff/specifications>.

Suggestions for improvement of this specification are welcome and should be submitted to <http://www.snia.org/feedback>.

If you are interested in participating in the activities of the SFF TA TWG, additional information and the membership application can be found at:  
<http://www.snia.org/sff>.

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

SFF Committee

**SFF-8087 Specification for**

**Mini Multilane 4X Unshielded Connector Shell and Plug**

Rev 2.6

August 31, 2018

Secretariat: SFF Committee

**Abstract:** This specification defines the physical interface and general performance requirements for the Unshielded Mini Multilane connector. One such use is as the Serial Attached SCSI Mini SAS 4i (wide compact internal connector).

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 document.

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.

|                 |                  |
|-----------------|------------------|
| Adaptec         | Hitachi GST      |
| AMCC            | IBM              |
| Amphenol        | Intel            |
| Comax           | LSI              |
| Dell            | Molex            |
| EMC             | Seagate          |
| ENDL            | Sun Microsystems |
| FCI             | Toshiba America  |
| Fujitsu CPA     | Tyco             |
| Hewlett Packard | Unisys           |
| Hitachi Cable   |                  |

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

|          |                       |
|----------|-----------------------|
| Emulex   | Picolight             |
| Foxconn  | Sumitomo              |
| Infineon | Vitesse Semiconductor |
| Maxtor   |                       |

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 that 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:**

Rev 2.3 (March 10, 2011)

- Rev 2.1 PDF with annotations was replaced by a Rev 2.3 DOC many months later
- Rev 2.2 had issues:
  - o Page 1 was identified as 2.2 but subsequent pages were identified as 2.1
  - o The date of 2.2 was the same as 2.1
- Updated Title to reflect changes made to title structure in January 2011
- Updated boilerplate to current content

Rev 2.4 (April 16, 2011)

- Editorial revision to incorporate 2011 titling and review content for consistency prior to being submitted for EIA standardization.

Rev 2.5 (March 14, 2013)

- Letter ballot for EIA-975 distributed for approval
- EIA ballot drew the comment that SFF-8087 and SFF-8088 are shells, and have no speed or electrical characteristics. The title and affected text were changed to reflect this correction.

Rev 2.6 (August 31, 2018)

- Document to be withdrawn from EIA; other than the changes to the header and cover page, no content or formatting changes have been made since Rev 2.5 of this document.

**Foreword**

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

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

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

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

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

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

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

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

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

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

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

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

SFF Committee --

## **Mini Multilane 4X Unshielded Connector Shell and Plug**

### **1. Scope**

This specification defines the plug, guide/strain relief shell, and latching requirements for the Mini Multilane Unshielded Connector based upon the primary elements defined in SFF-8086.

### **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.

- T10/1601D SAS 1-1 (Serial Attached SCSI - 1.1)
- SFF-8410 High Speed Serial Testing for Copper Links
- SFF-8086 Mini Multilane 10 Gb/s 4X Common Elements Connector

#### **2.2 SFF Specifications**

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

#### **2.3 Sources**

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

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

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### 3. General Description

This specification defines the free (plug) cable connector, guide/strain relief, and latching requirements for the Unshielded Mini Multilane connector. This specification plus the mating interface and connector footprint defined in SFF-8086 defines the requirements to enable functional multiple sourcing.

The fixed (receptacle) connector provides positive retention along with ease of insertion and removal. The guide/strain relief is incorporated in the shell and works together with the free (plug) cable connector and latching mechanism to ensure that stress induced by normal cable routing and management is not passed through to the solder joints that attach the receptacle body to the printed circuit board.

The latch is designed to prevent the free (plug) cable connector from bottoming, and a hard stop has been defined to prevent bottoming out should the free (plug) cable connector be out of spec.

This specification defines the contact range that the retention scheme has to provide to assure acceptable connector performance.

The low profile and small size is well suited to high-speed transmission applications where space is limited.

### 4. Definitions and Conventions

#### 4.1 Definitions

For the purpose of this specification, the definitions in SFF-8086 apply.

#### 4.2 Conventions

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

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

## 5. Connector Description

### 5.1 Performance Requirements

The performance requirements of this connector are defined in SFF-8086 Mini Multilane 10 Gb/s 4X Common Elements Connector. For the free (plug) cable connector, the latch retention force shall be 10 lbf minimum.

### 5.2 General View

The connector system is based upon a common footprint for the receiving body. The footprint positioning holes contain the critical dimensions for locating the receptacle shell. The receptacle shell also functions as the guide and strain relief for the free (plug) cable connector interface. Figure 5-1 illustrates an example of one such configuration.

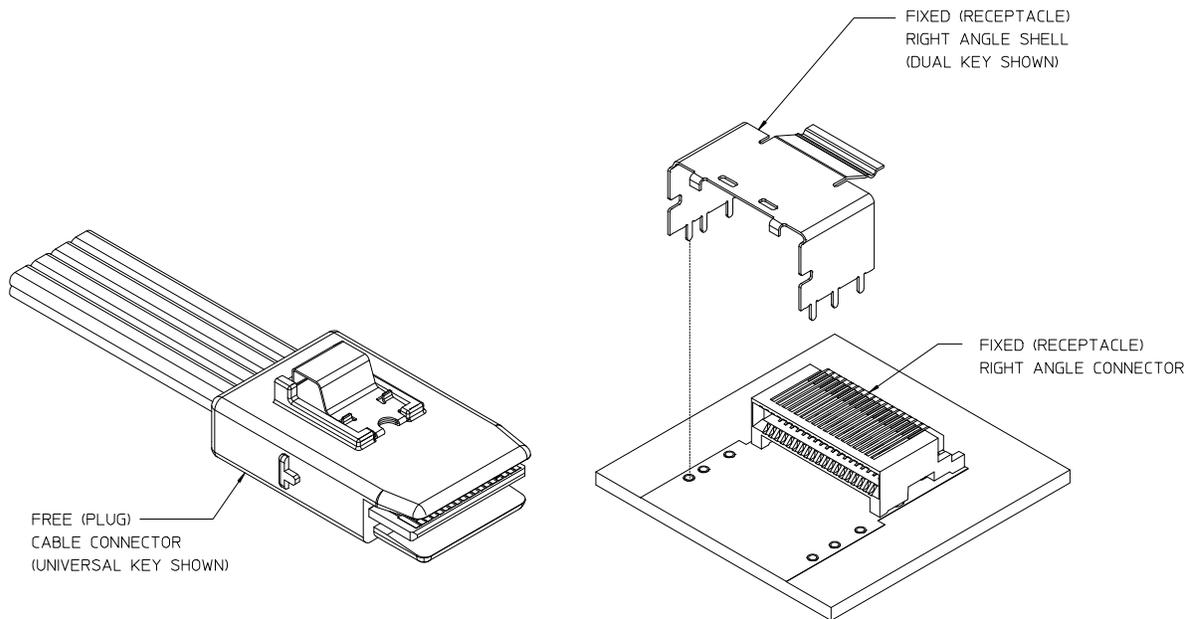


FIGURE 5-1 GENERAL VIEW

### 5.3 Configurations

Figure 5-1 lists the configurations described in this specification.

TABLE 5-1 CONFIGURATIONS

| Description                                    | Right Angle | Straight |
|--|-------------|----------|
| 26-circuit Unshielded Mini Multilane Connector | Y           | Y        |
| 36-circuit Unshielded Mini Multilane Connector | Y           | Y        |
| 50-circuit Unshielded Mini Multilane Connector | Y           | Y        |
| 68-circuit Unshielded Mini Multilane Connector | Y           | Y        |

Note: The 36-circuit Unshielded Mini Multilane Connector is defined in SAS as the "Mini SAS 4i" connector.

## 6. Connector Dimensions

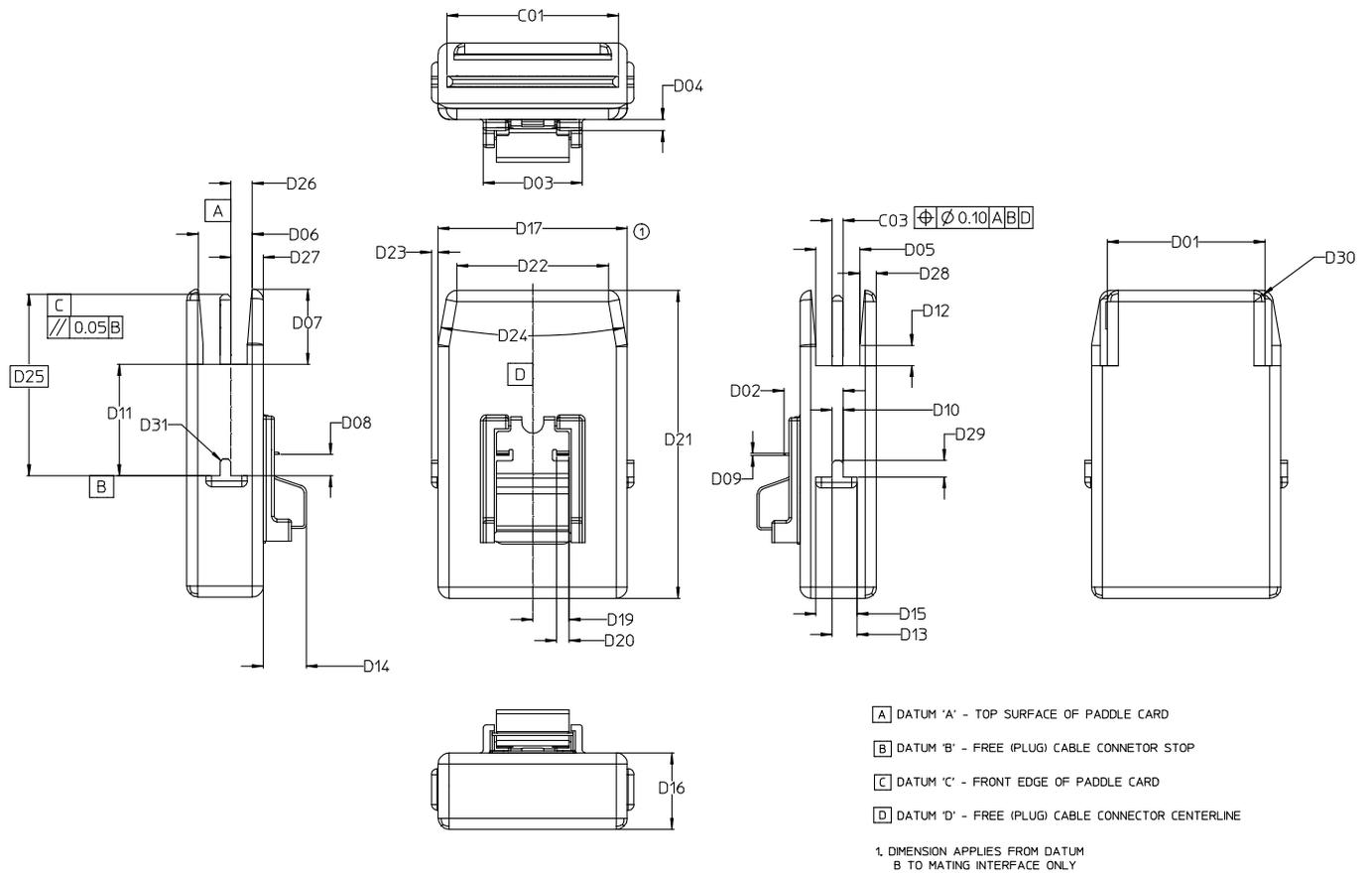
The dimensioning conventions are described in ANSI-Y14.5M, Dimensioning and Tolerancing. All dimensions are in millimeters.

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

### 6.1 Free (Plug) Cable Connector

**TABLE 6-1 FREE (PLUG) CABLE CONNECTOR**

| Designator | Description                                   | 26    | 36    | 50    | 68    | Tolerance |
|------------|---|-------|-------|-------|-------|-----------|
| C01        | Interface Width                               | 11.60 | 15.60 | 21.20 | 28.40 | ±0.10     |
| C03        | Paddle Card Thickness                         | 1.00  | =     | =     | =     | ±0.10     |
| D01        | Plug Lower Shroud Width                       | 10.33 | 14.33 | 19.93 | 27.13 | ±0.13     |
| D02        | Latch Tab Height (When Free)                  | 5.45  | =     | =     | =     | Minimum   |
| D02        | Latch Tab Height (When Tab is Pressed)        | 5.15  | =     | =     | =     | Maximum   |
| D03        | Latch Body Width                              | 9.00  | =     | =     | =     | ±0.13     |
| D04        | Plug Key Surface                              | 1.00  | =     | =     | =     | ±0.05     |
| D05        | Plug Clearance to Connector                   | 4.00  | =     | =     | =     | ±0.10     |
| D06        | Plug Lead in to Connector                     | 4.88  | =     | =     | =     | ±0.15     |
| D07        | Plug Shroud Length                            | 6.83  | =     | =     | =     | ±0.10     |
| D08        | Plug Datum B to Latch Tab                     | 1.80  | =     | =     | =     | ±0.10     |
| D09        | Latch Tab Thickness                           | 0.20  | =     | =     | =     | ±0.05     |
| D10        | Anti-Rotation Rib Width                       | 1.00  | =     | =     | =     | ±0.05     |
| D11        | Plug Datum B to Shroud Start                  | 10.13 | =     | =     | =     | ±0.13     |
| D12        | Plug Shroud Length                            | 1.83  | =     | =     | =     | ±0.13     |
| D13        | Plug Datum A to Plug Stop                     | 2.25  | =     | =     | =     | Minimum   |
| D14        | Plug Top Surface to Latch                     | 3.90  | =     | =     | =     | Maximum   |
| D15        | Plug Stop Width                               | 3.75  | =     | =     | =     | Minimum   |
| D16        | Plug Body Thickness                           | 6.95  | =     | =     | =     | ±0.10     |
| D17        | Plug Body Width                               | 13.20 | 17.20 | 22.80 | 30.00 | ±0.10     |
| D19        | Plug Datum D to Latch Tab                     | 3.30  | =     | =     | =     | ±0.10     |
| D20        | Latch Tab Width                               | 1.13  | =     | =     | =     | ±0.10     |
| D21        | Plug Length                                   | 28.00 | =     | =     | =     | Minimum   |
| D22        | Plug Face                                     | 9.76  | 13.76 | 19.36 | 26.56 | ±0.13     |
| D23        | Plug Stop Height                              | 0.60  | =     | =     | =     | Minimum   |
| D24        | Plug Lead in Angle                            | 20°   | =     | =     | =     | ±1°       |
| D25        | Datum B to Edge of Paddle Card                | 16.50 | =     | =     | =     | Basic     |
| D26        | Datum A to Shroud Lead-in                     | 1.93  | =     | =     | =     | ±0.10     |
| D27        | Datum A to Top of Plug                        | 2.98  | =     | =     | =     | ±0.05     |
| D28        | Lower Shroud Width                            | 1.50  | =     | =     | =     | ±0.10     |
| D29        | Datum B to End of Anti-Rotation Rib           | 1.50  | =     | =     | =     | ±0.05     |
| D30        | Radius  | 1.00  | =     | =     | =     | ±0.25     |
| D31        | Anti-Rotation Rib Lead-in (Chamfer or Radius) | 0.25  | =     | =     | =     | ±0.05     |

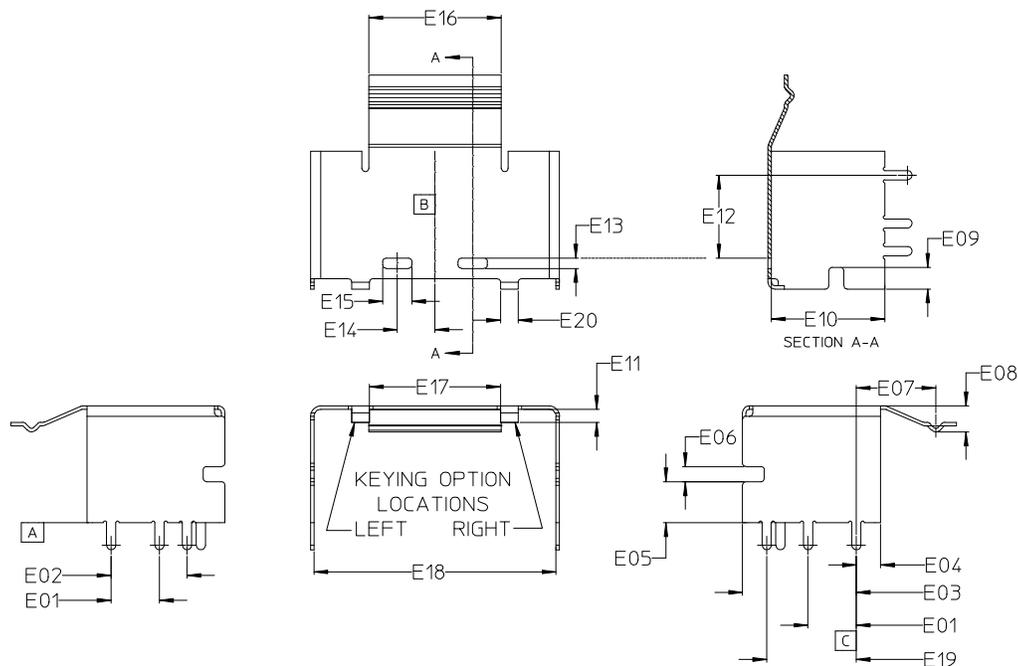


**FIGURE 6-1 FREE (PLUG) CABLE CONNECTOR**

6.2 Fixed (Receptacle) Right Angle Connector

TABLE 6-2 FIXED (RECEPTACLE) RIGHT ANGLE SHELL

| Designator | Description                   | 26    | 36    | 50    | 68    | Tolerance |
|------------|-------------------------------|-------|-------|-------|-------|-----------|
| E01        | Datum C to Peg                | 3.50  | =     | =     | =     | Basic     |
| E02        | Datum C to Peg                | 5.50  | =     | =     | =     | Basic     |
| E03        | Datum C to Plug Stop          | 8.25  | =     | =     | =     | Basic     |
| E04        | Datum C to Back of Shell      | 1.75  | =     | =     | =     | ±0.13     |
| E05        | Datum A to Slot               | 2.97  | =     | =     | =     | ±0.03     |
| E06        | Slot Width                    | 1.10  | =     | =     | =     | ±0.03     |
| E07        | Datum C to Passive Latch      | 5.76  | =     | =     | =     | ±0.13     |
| E08        | Top of Shell to Passive Latch | 1.89  | =     | =     | =     | ±0.13     |
| E09        | Slot Depth                    | 1.58  | =     | =     | =     | Basic     |
| E10        | Datum A to Shell Inside       | 8.22  | =     | =     | =     | ±0.10     |
| E11        | Tab Length                    | 0.95  | =     | =     | =     | ±0.13     |
| E12        | Datum C to Latch Slot         | 6.00  | =     | =     | =     | Basic     |
| E13        | Latch Slot Width              | 0.75  | =     | =     | =     | ±0.05     |
| E14        | Shell CL to Latch Slot CL     | 2.74  | =     | =     | =     | Basic     |
| E15        | Latch Slot Length             | 2.13  | =     | =     | =     | ±0.05     |
| E16        | Passive Latch Width           | 9.60  | =     | =     | =     | ±0.13     |
| E17        | Width between Keys            | 9.50  | =     | =     | =     | ±0.10     |
| E18        | Width of Shell                | 13.55 | 17.55 | 23.15 | 30.35 | ±0.10     |
| E19        | Datum C to Peg                | 6.50  | =     | =     | =     | Basic     |
| E20        | Tab Width                     | 1.28  | =     | =     | =     | ±0.13     |

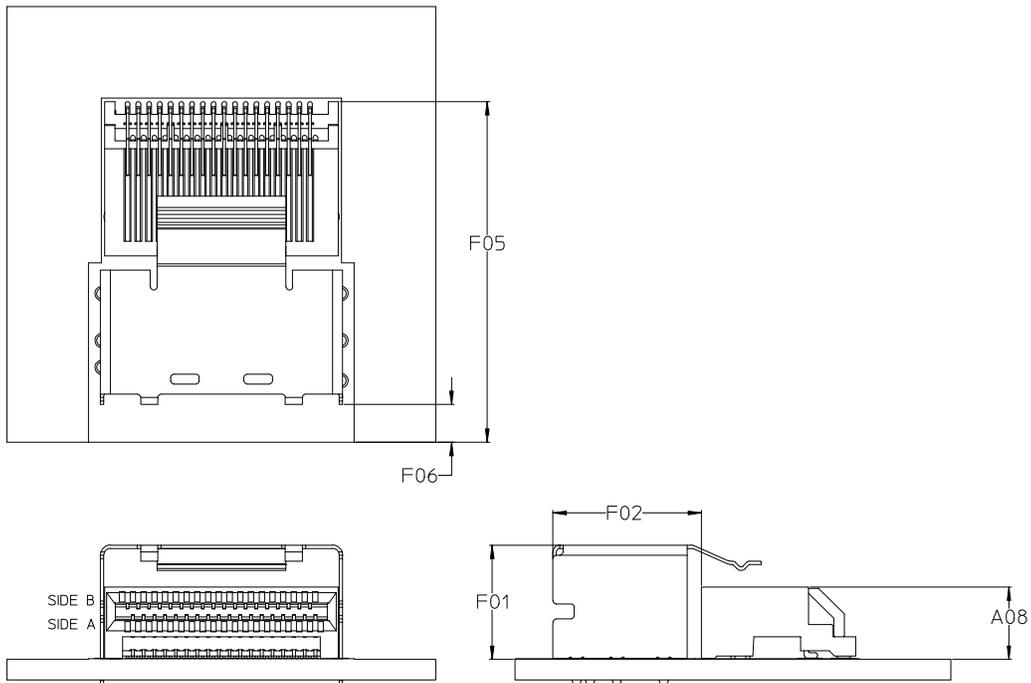


- [A] DATUM 'A' - FIXED (RECEPTACLE) RIGHT ANGLE SHELL LOWER EDGE
- [B] DATUM 'B' - FIXED (RECEPTACLE) RIGHT ANGLE SHELL CENTERLINE
- [C] DATUM 'C' - FIXED (RECEPTACLE) RIGHT ANGLE SHELL LOCATING PEG

FIGURE 6-2 FIXED (RECEPTACLE) RIGHT ANGLE SHELL

**TABLE 6-3 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR WITH SHELL**

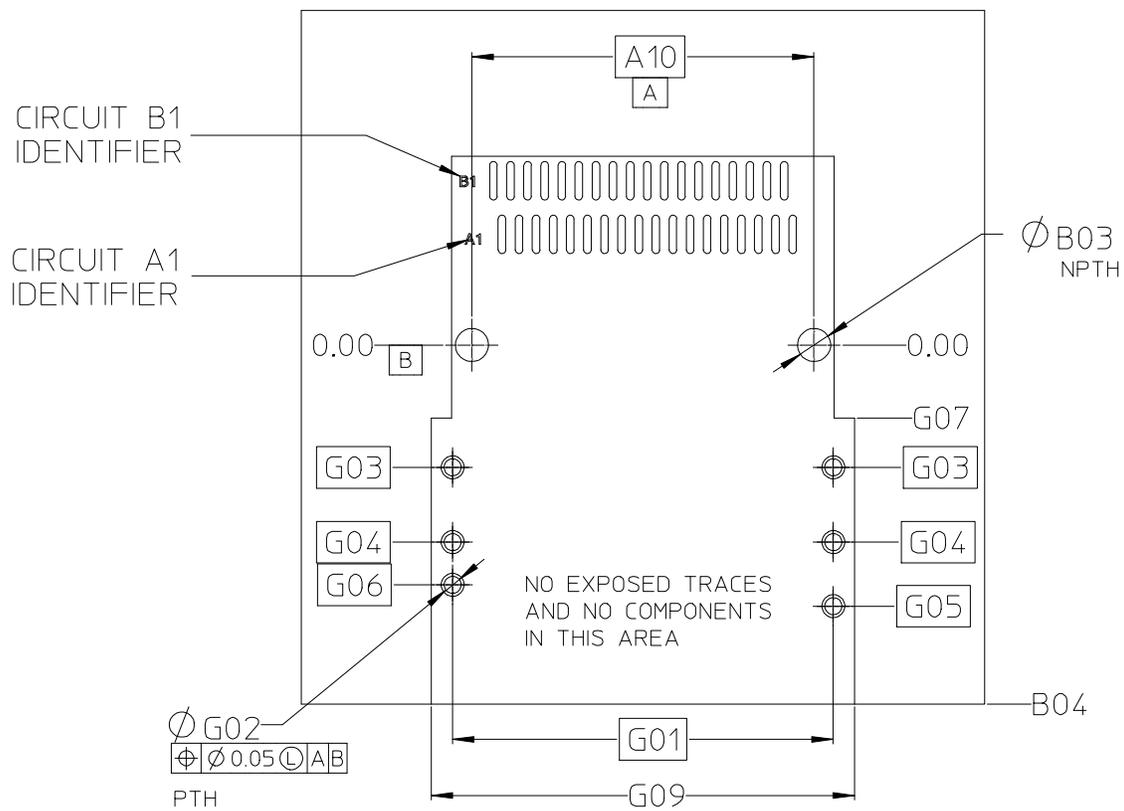
| Designator | Description                  | 26    | 36 | 50 | 68 | Tolerance |
|------------|------------------------------|-------|----|----|----|-----------|
| A08        | OAH Connector Housing        | 5.35  | =  | =  | =  | ±0.13     |
| F01        | Overall Height of Shell      | 8.47  | =  | =  | =  | ±0.13     |
| F02        | Shell Plug Stop to Connector | 11.07 | =  | =  | =  | ±0.10     |
| F05        | Connector to Edge of PCB     | 25.40 | =  | =  | =  | ±0.13     |
| F06        | Shell to Edge of PCB         | 2.83  | =  | =  | =  | ±0.13     |



**FIGURE 6-3 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR WITH SHELL**

**TABLE 6-4 FIXED (RECEPTACLE) RIGHT ANGLE SHELL FOOTPRINT**

| Designator | Description               | 26    | 36    | 50    | 68    | Tolerance |
|------------|---------------------------|-------|-------|-------|-------|-----------|
| A10        | Peg to Peg                | 12.00 | 16.00 | 21.60 | 28.80 | Basic     |
| B03        | Hole Diameter             | 1.55  | =     | =     | =     | ±0.05     |
| B04        | Peg CL to Edge of PCB     | 16.80 | =     | =     | =     | ±0.13     |
| G01        | Shell Hole to Hole        | 13.80 | 17.80 | 23.40 | 30.60 | Basic     |
| G02        | Hole Diameter             | 0.80  | =     | =     | =     | ±0.05     |
| G03        | Datum B to Shell Hole     | 5.72  | =     | =     | =     | Basic     |
| G04        | Datum B to Shell Hole     | 9.22  | =     | =     | =     | Basic     |
| G05        | Datum B to Shell Hole     | 12.22 | =     | =     | =     | Basic     |
| G06        | Datum B to Shell Hole     | 11.22 | =     | =     | =     | Basic     |
| G07        | Datum B to Shell Keep Out | 3.40  | =     | =     | =     | ±0.13     |
| G09        | Shell Keep Out            | 15.80 | 19.80 | 25.40 | 32.60 | ±0.13     |



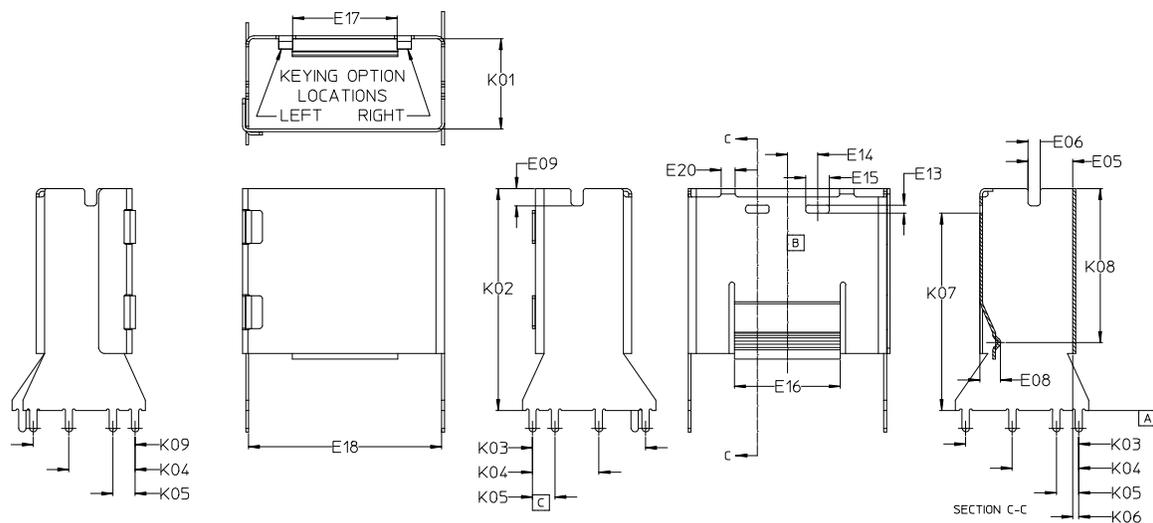
[A] DATUM 'A' - CENTERLINE LOCATING PEG HOLES

[B] DATUM 'B' - CONNECTOR LOCATING PEG HOLES

**FIGURE 6-4 FIXED (RECEPTACLE) RIGHT ANGLE SHELL FOOTPRINT**

**TABLE 6-5 FIXED (RECEPTACLE) STRAIGHT SHELL**

| Designator | Description                   | 26    | 36    | 50    | 68    | Tolerance |
|------------|-------------------------------|-------|-------|-------|-------|-----------|
| E05        | Inside of Shell to Slot       | 2.97  | =     | =     | =     | ±0.03     |
| E06        | Slot Width                    | 1.10  | =     | =     | =     | ±0.03     |
| E08        | Top of Shell to Passive Latch | 1.89  | =     | =     | =     | ±0.13     |
| E09        | Slot Depth                    | 1.58  | =     | =     | =     | Basic     |
| E13        | Latch Slot Width              | 0.75  | =     | =     | =     | ±0.05     |
| E14        | Shell CL to Latch Slot CL     | 2.74  | =     | =     | =     | Basic     |
| E15        | Latch Slot Length             | 2.13  | =     | =     | =     | ±0.05     |
| E16        | Passive Latch Width           | 9.60  | =     | =     | =     | ±0.13     |
| E17        | Width Between Keys            | 9.50  | =     | =     | =     | ±0.10     |
| E18        | Width of Shell                | 13.55 | 17.55 | 23.15 | 30.35 | ±0.10     |
| E20        | Tab Width                     | 1.28  | =     | =     | =     | ±0.13     |
| K01        | Inside Shell                  | 8.22  | =     | =     | =     | ±0.25     |
| K02        | Shell Height                  | 20.18 | =     | =     | =     | ±0.05     |
| K03        | Datum C to Peg                | 10.27 | =     | =     | =     | Basic     |
| K04        | Datum C to Peg                | 6.03  | =     | =     | =     | Basic     |
| K05        | Datum C to Peg                | 2.03  | =     | =     | =     | Basic     |
| K06        | Datum C to Peg                | 0.52  | =     | =     | =     | Basic     |
| K07        | Datum A to Latch Slot         | 17.93 | =     | =     | =     | Basic     |
| K08        | Plug Stop to Passive Latch    | 14.01 | =     | =     | =     | ±0.13     |
| K09        | Datum C to Peg                | 9.27  | =     | =     | =     | Basic     |

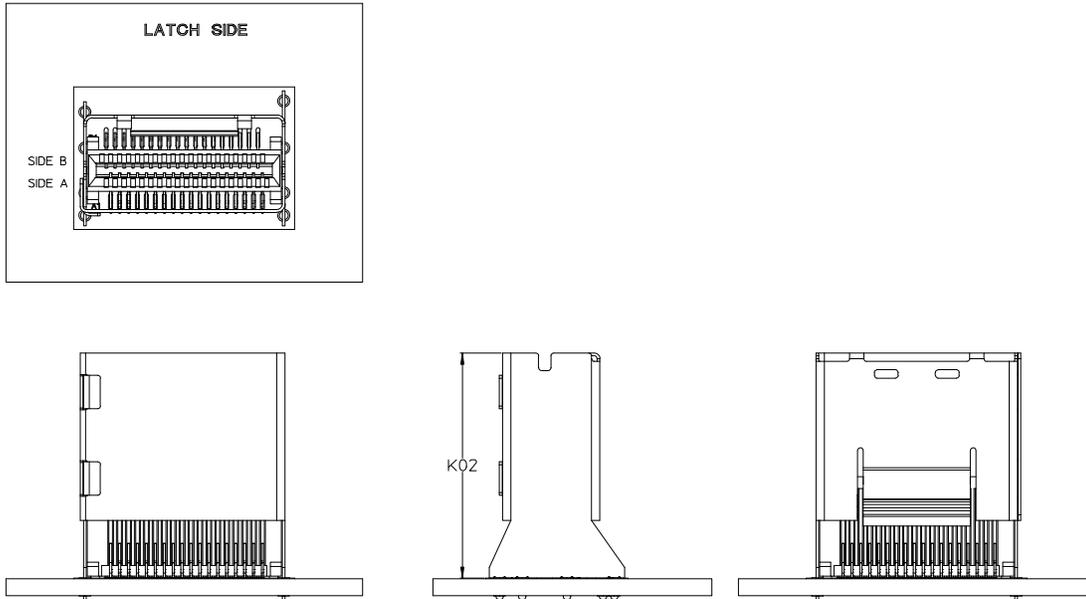


- [A] DATUM 'A' - FIXED (RECEPTACLE) STRAIGHT SHELL LOWER EDGE
- [B] DATUM 'B' - FIXED (RECEPTACLE) STRAIGHT SHELL CENTERLINE
- [C] DATUM 'C' - FIXED (RECEPTACLE) STRAIGHT SHELL LOCATING PEG

**FIGURE 6-5 FIXED (RECEPTACLE) STRAIGHT SHELL**

**TABLE 6-6 FIXED (RECEPTACLE) STRAIGHT CONNECTOR WITH SHELL**

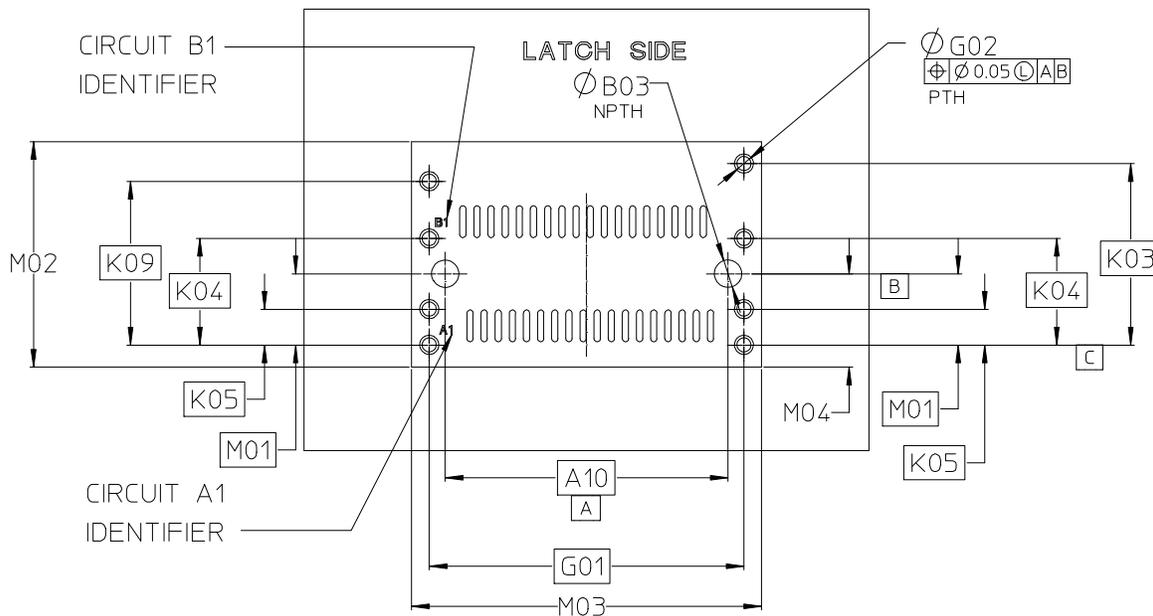
| Designator | Description  | 26    | 36 | 50 | 68 | Tolerance |
|------------|--------------|-------|----|----|----|-----------|
| K02        | Shell Height | 20.18 | =  | =  | =  | ±0.05     |



**FIGURE 6-6 FIXED (RECEPTACLE) STRAIGHT CONNECTOR WITH SHELL**

**TABLE 6-7 FIXED (RECEPTACLE) STRAIGHT SHELL FOOTPRINT**

| Designator | Description                   | 26    | 36    | 50    | 68    | Tolerance |
|------------|-------------------------------|-------|-------|-------|-------|-----------|
| A10        | Peg to Peg                    | 12.00 | 16.00 | 21.60 | 28.80 | Basic     |
| B03        | Hole Diameter                 | 1.55  | =     | =     | =     | ±0.05     |
| G01        | Shell Hole to Hole            | 13.80 | 17.80 | 23.40 | 30.60 | Basic     |
| G02        | Hole Diameter                 | 0.80  | =     | =     | =     | ±0.05     |
| K03        | Datum C to Shell Hole         | 10.27 | =     | =     | =     | Basic     |
| K04        | Datum C to Shell Hole         | 6.03  | =     | =     | =     | Basic     |
| K05        | Datum C to Shell Hole         | 2.03  | =     | =     | =     | Basic     |
| K09        | Datum C to Shell Hole         | 9.27  | =     | =     | =     | Basic     |
| M01        | Datum B to Datum C            | 4.03  | =     | =     | =     | ±0.13     |
| M02        | Connector Keep Out            | 12.77 | =     | =     | =     | ±0.13     |
| M03        | Connector Keep Out            | 15.80 | 19.80 | 25.40 | 32.60 | ±0.13     |
| M04        | Datum B to Connector Keep Out | 5.28  | =     | =     | =     | ±0.13     |



- [A] DATUM 'A' - CENTERLINE OF FIXED (RECEPTACLE) STRAIGHT CONNECTOR LOCATING PEG HOLES
- [B] DATUM 'B' - FIXED (RECEPTACLE) STRAIGHT CONNECTOR LOCATING PEG HOLES
- [C] DATUM 'C' - FIXED (RECEPTACLE) STRAIGHT SHELL LOCATING PEG HOLES

**FIGURE 6-7 FIXED (RECEPTACLE) STRAIGHT SHELL FOOTPRINT**

6.3 Keying (Optional)

TABLE 6-8 KEYING (OPTIONAL)

| Designator | Description             | 26   | 36 | 50 | 68 | Tolerance |
|------------|-------------------------|------|----|----|----|-----------|
| N01        | Shell CL to Edge of Key | 4.75 | =  | =  | =  | ±0.10     |
| N02        | Key Width               | 1.28 | =  | =  | =  | Minimum   |
| N03        | Plug CL to Edge of Key  | 5.50 | =  | =  | =  | ±0.10     |
| N04        | Plug Key Width          | 1.00 | =  | =  | =  | Minimum   |
| N05        | Shell Slot to Key       | 2.25 | =  | =  | =  | ±0.13     |
| N06        | Key Thickness           | 1.00 | =  | =  | =  | Minimum   |
| N07        | Latch to Key            | 3.45 | =  | =  | =  | ±0.13     |

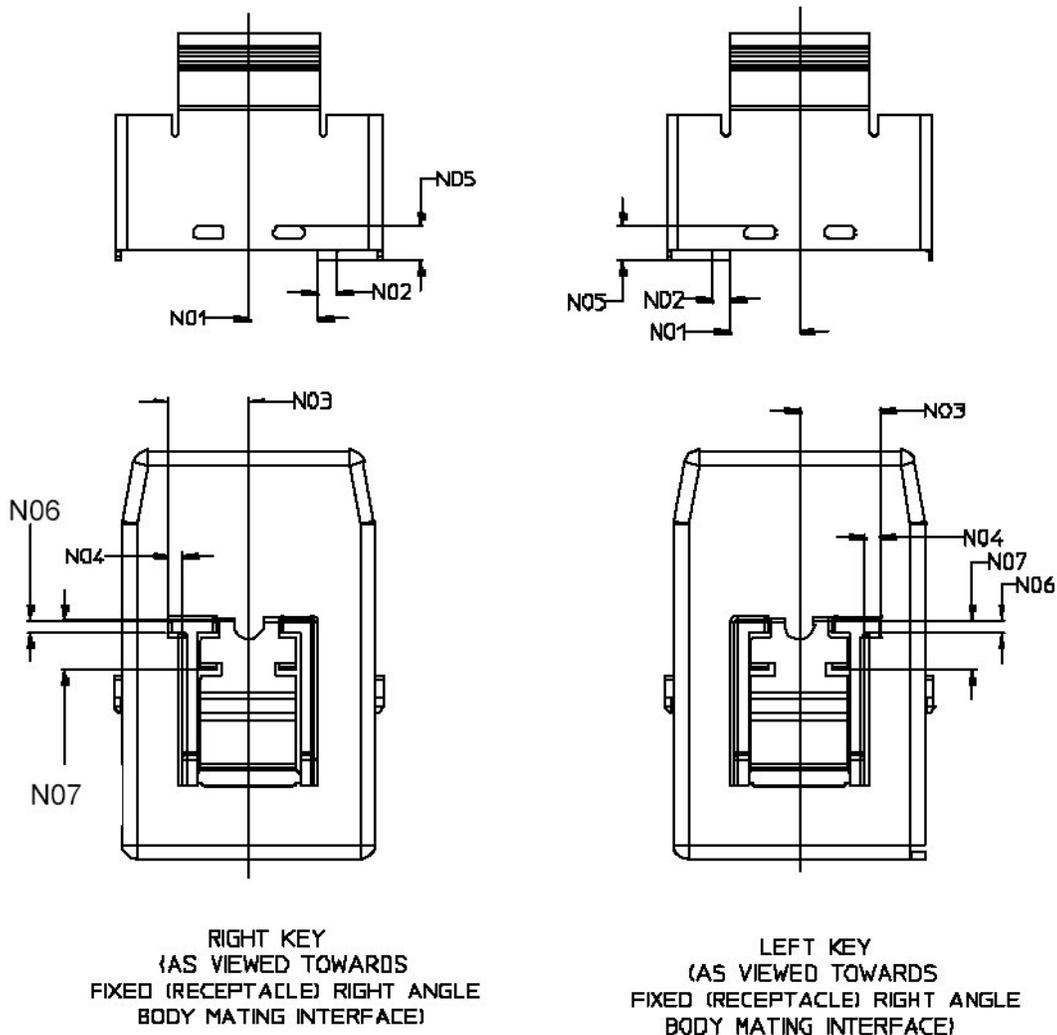
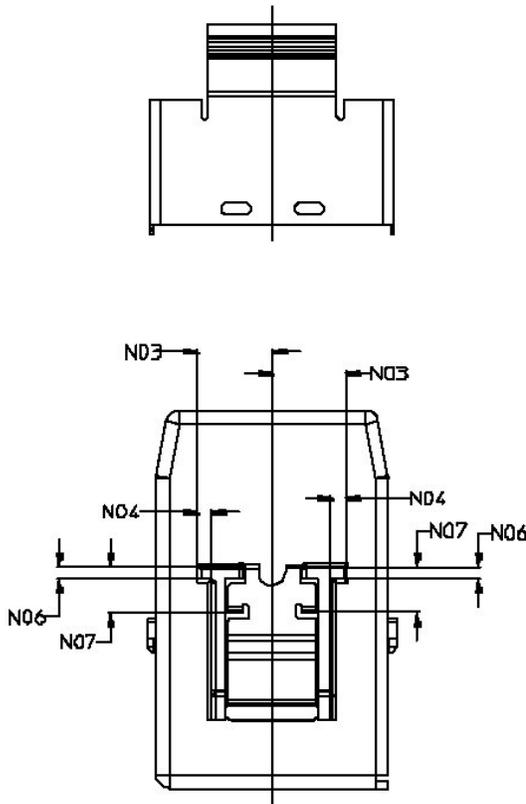


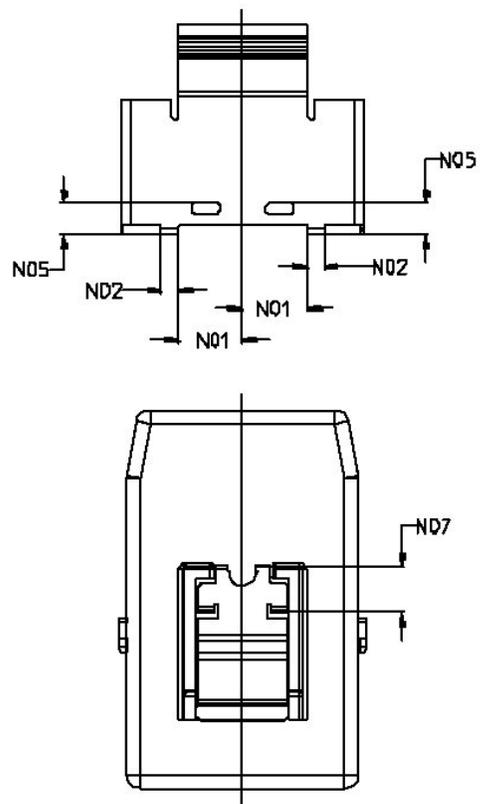
Figure 6-8a

Figure 6-8b



UNIVERSAL KEY SHELL  
DUAL KEY PLUG  
(AS VIEWED TOWARDS  
FIXED (RECEPTACLE) RIGHT ANGLE  
BODY MATING INTERFACE)

Figure 6-8c



DUAL KEY SHELL  
UNIVERSAL PLUG  
(AS VIEWED TOWARDS  
FIXED (RECEPTACLE) RIGHT ANGLE  
BODY MATING INTERFACE)

Figure 6-8d (SAS Key - Ref)

FIGURE 6-8 KEYING (OPTIONAL)