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SFF Committee

SFF-8643 Specification

for

MINI MULTILANE SERIES: UNSHIELDED INTEGRATED HIGH DENSITY (HD) CONNECTOR

Rev 1.6 June 1, 2009

Secretariat: SFF Committee

Abstract: This specification defines the physical interface and general performance requirements for the Mini Multilane Unshielded Integrated HD Connector, which is designed for use in high speed serial, interconnect applications at speeds up through 12 Gigabits/second. Usage includes the SAS internal high density 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 specification.

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

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

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EXPRESSION OF SUPPORT BY MANUFACTURERS

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

tbd

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

tbd

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

tbd

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

Foreword

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

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

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

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

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

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

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

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

If you are interested in participating or wish to follow the activities of the SFF Committee, the signup for membership and/or documentation can be found at:

<http://www.sffcommittee.com/ie/join.html>

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

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SFF Committee

Mini Multilane Unshielded Integrated High Density (HD) Connector

1. Scope

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

1.1 Description of Clauses

Clause 1 contains the Scope

Clause 2 contains References, Related Standards and SFF Specifications

Clause 3 contains the Definitions and Conventions

Clause 4 contains the Description

Clause 5 defines the Datums

Clause 6 defines the Dimensions

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 2-1 (Serial Attached SCSI - SAS 2.1
- SFF-8410 High Speed Serial Testing for Copper Links
- SFF-8644 Mini Multilane Series: Shielded Integrated HD 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 Inter-National Committee for Information Technology Standards (<http://tinyurl.com/c4psg>).

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

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

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

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

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

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

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

3.2 Conventions

The dimensioning conventions are described in ANSI-Y14.5M, Geometric 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 clause 6.

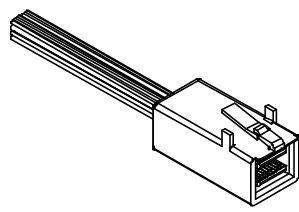
The American convention of numbering is used i.e., a comma separates the thousands and higher multiples, and a period is used as the decimal point. This is equivalent to the ISO/IEC convention of a space and comma.

| | |
|-------------|-------------|
| American: | ISO: |
| 0.6 | 0,6 |
| 1,000 | 1 000 |
| 1,323,462.9 | 1 323 462,9 |

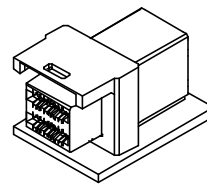
4. Description

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

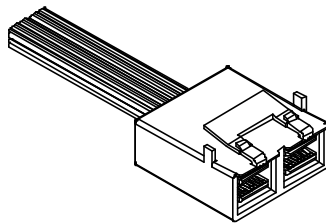
4.1 General View



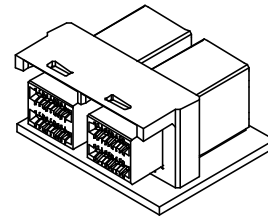
4x Plug



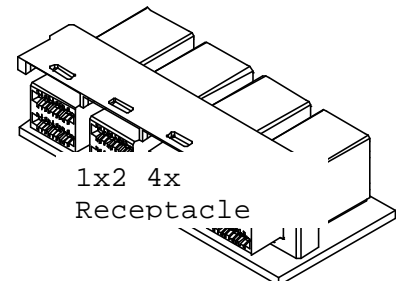
1x1 4x
Receptacle



8x Plug



1x2 4x
Receptacle



1x4 4x
Receptacle

FIGURE 4.1. GENERAL VIEW OF UNSHIELDED INTEGRATED HD CONNECTOR CONFIGURATIONS

TABLE 4.1. UNSHIELDED INTEGRATED HD CONNECTOR CONFIGURATIONS

| Ports | Unshielded Version | Orientation |
|-------|--------------------|-------------|
| | Positions | |
| 1x1 | 36 Position | Right Angle |
| 1x2 | 72 Position | Right Angle |
| 1x4 | 144 Position | Right Angle |

5.0 DATUM DEFINITIONS

5.1 DEFINITION OF DATUMS

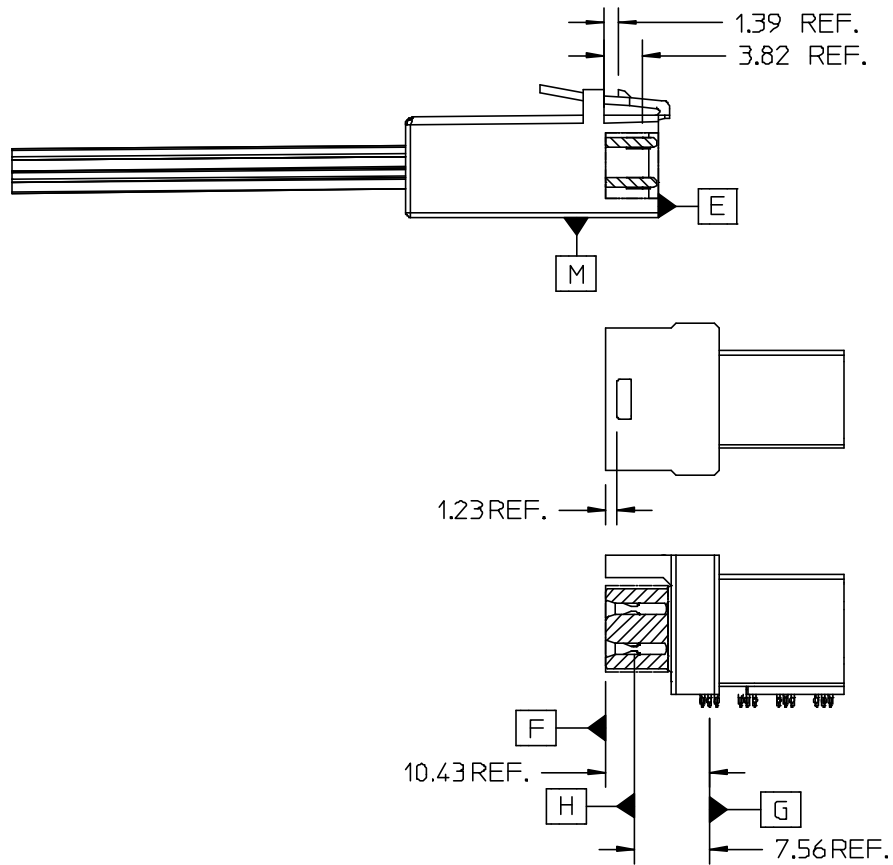


FIGURE 5.1 DEFINITION OF DATUMS

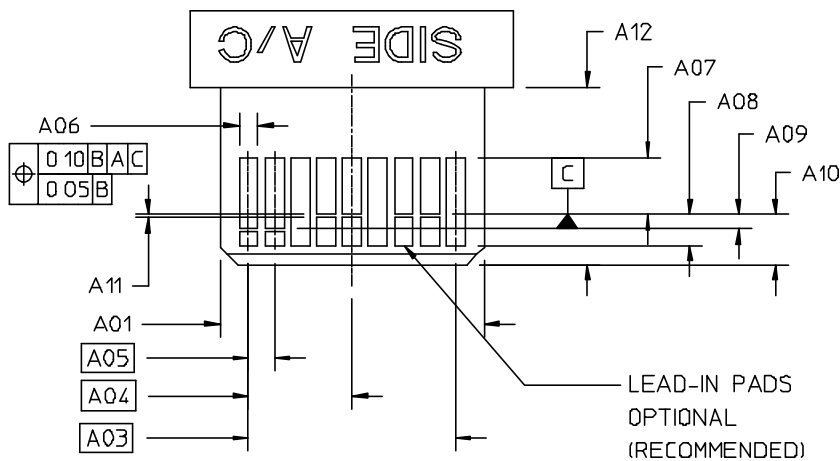
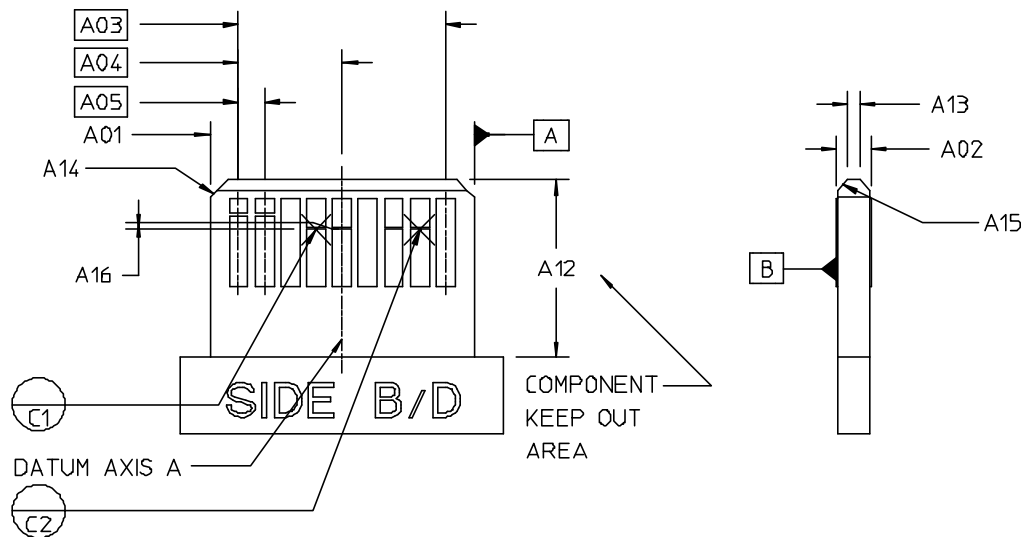
TABLE 5.1 DEFINITION OF DATUMS

| Datum | Description | See Figure |
|-------|---|------------|
| A | Width of Paddle Card | |
| B | Top Surface of Paddle Card | |
| C | Front Edge of Signal Pad on Paddle Card | |
| D | Width of Plug Snout | |
| E | Body of Plug | |

| | | |
|---|--|--|
| F | Front Edge of Receptacle Snout | |
| G | Centerline of First Row of Compliant Tails | |
| H | Centerline of Receptacle Contacts | |
| I | Width of Receptacle Snout | |
| J | Centerline of Outer Holes | |
| K | Centerline of First Row of PCB Holes | |
| L | Surface of PCB | |
| M | Bottom of Plug Body | |
| N | Centerline of Plug Snout Opening | |

6.0 UNSHIELDED INTEGRATED HD CONNECTOR DIMENSIONAL REQUIREMENTS

6.1 UNSHIELDED FREE (PLUG) INTEGRATED HD CONNECTOR PADDLE CARD



DATUM A - CENTERLINE OF PADDLE CARD
 DATUM B - TOP SURFACE OF PADDLE CARD
 DATUM C - LEADING EDGE OF THIRD MATE CONTACTS DEFINED BY OUTER PADS

NO SOLDER MASK WITHIN 0.05 OF DEFINED PAD LOCATIONS

FIGURE 6.1 UNSHIELDED FREE (PLUG) INTEGRATED HD CONNECTOR PADDLE CARD DIMENSIONS

TABLE 6.1 SHIELDED FREE (PLUG) HD CONNECTOR 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 | 0.55 | 0.03 |
| A07 | Pad Length - Third Mate | 1.55 | Min. |
| A08 | Third Mate to First Mate | 0.90 | 0.05 |
| A09 | Third Mate to Second Mate | 0.40 | 0.05 |
| A10 | Card Edge to Third Mate Pad | 1.45 | 0.10 |
| A11 | Pad to Pre-Pad | 0.08 | 0.015 |
| A12 | Component Keep Out Area | 5.40 | Min. |
| A13 | Lead-in Flat | 0.36 | Ref |
| A14 | Lead-in Chamfer x 45° | 0.50 | 0.05 |
| A15 | Lead-in Chamfer x 45° | 0.30 | 0.05 |
| A16 | Third Mate Pad to Datum C | 0.00 | 0.03 |

6.2 UNSHIELDED FREE (PLUG) 4X INTEGRATED HD CABLE CONNECTOR

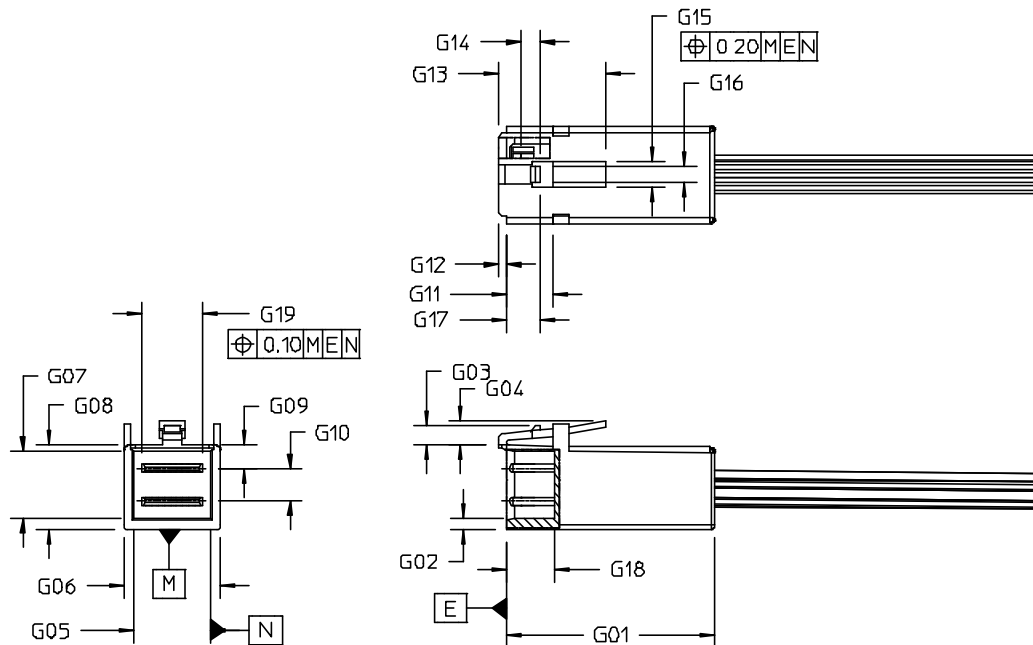


FIGURE 6.2. UNSHIELDED FREE (PLUG) 4X INTEGRATED HD CABLE CONNECTOR

TABLE 6.2 UNSHIELDED FREE (PLUG) 4X INTEGRATED HD CABLE CONNECTOR

| Designator | Description | Dimension | Tolerance |
|------------|--|-----------|-----------|
| G01 | Plug Body Length | 26.75 | Max |
| G02 | Snout - Lower Thickness | 1.43 | 0.05 |
| G03 | Latch Barb Height | 2.49 | 0.10 |
| G04 | Latch Height | 3.00 | 0.75 |
| G05 | Snout Width - Inside | 9.40 | 0.08 |
| G06 | Snout Width - Outside | 11.85 | 0.10 |
| G07 | Snout Height - Inside | 8.05 | 0.08 |
| G08 | Snout Height - Outside | 10.28 | 0.10 |
| G09 | Snout Top to Upper PCB | 2.82 | 0.10 |
| G10 | Upper PCB to Lower PCB | 4.00 | 0.05 |
| G11 | Plug Front to Latch Stop | 5.56 | 0.10 |
| G12 | Plug Lead-In | 1.03 | 0.15 |
| G13 | Plug Front to Latch | 13.00 | 1.50 |
| G14 | Latch Barb to PCB Third Mate Pad Front | 2.43 | 0.08 |
| G15 | Latch Width | 3.20 | Min |
| G16 | Latch Barb Width | 2.00 | 0.15 |
| G17 | Plug Front to Latch Barb | 4.14 | 0.08 |
| G18 | Plug Opening Depth | 5.75 | Min |
| G19 | PCB Width | 7.65 | 0.10 |

6.3 UNSHIELDED FREE (PLUG) 8X INTEGRATED HD CABLE CONNECTOR

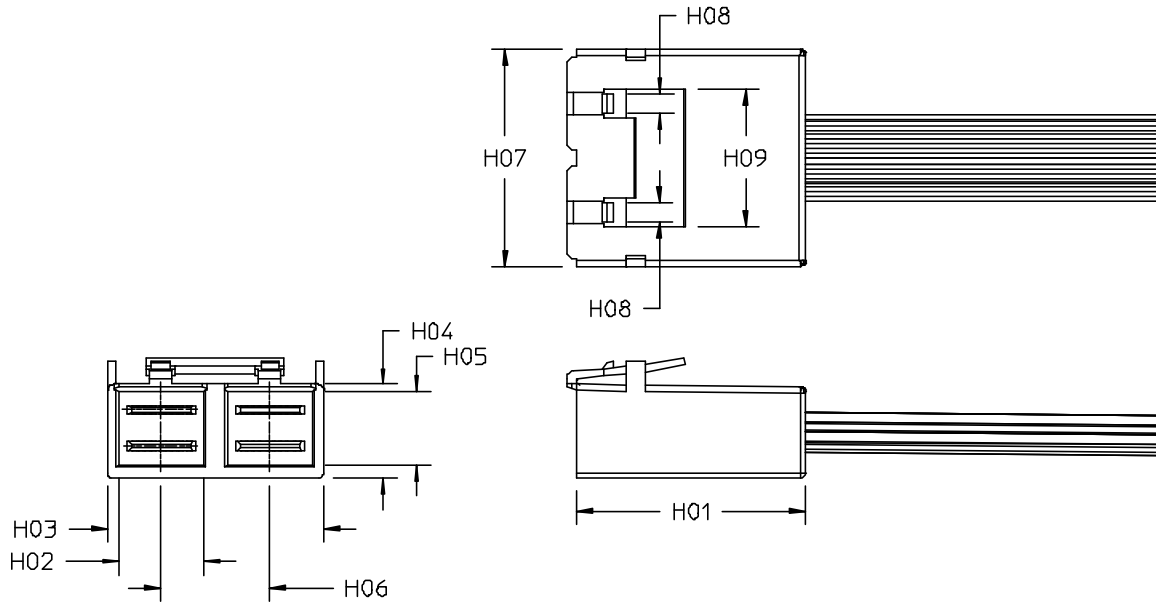


FIGURE 6.3 UNSHIELDED FREE (PLUG) 8X INTEGRATED HD CABLE CONNECTOR

TABLE 6.3 UNSHIELDED FREE (PLUG) INTEGRATED HD CABLE CONECTOR

| Designator | Description | Dimension | Tolerance |
|------------|------------------------|-----------|-----------|
| H01 | Plug Body Length | 26.75 | Max |
| H02 | Snout Width - Inside | 9.40 | 0.08 |
| H03 | Snout Width - Outside | 23.85 | 0.10 |
| H04 | Snout Height - Outside | 10.28 | 0.10 |
| H05 | Snout Height - Inside | 8.05 | 0.08 |
| H06 | Port Spacing | 12.00 | 0.05 |
| H07 | Plug Body Width | 23.85 | 0.15 |
| H08 | Latch Barb Width | 2.00 | 0.15 |
| H09 | Latch Width | 15.20 | Min |

6.4. UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE HD INTEGRATED HD CONNECTOR DIMENSIONS

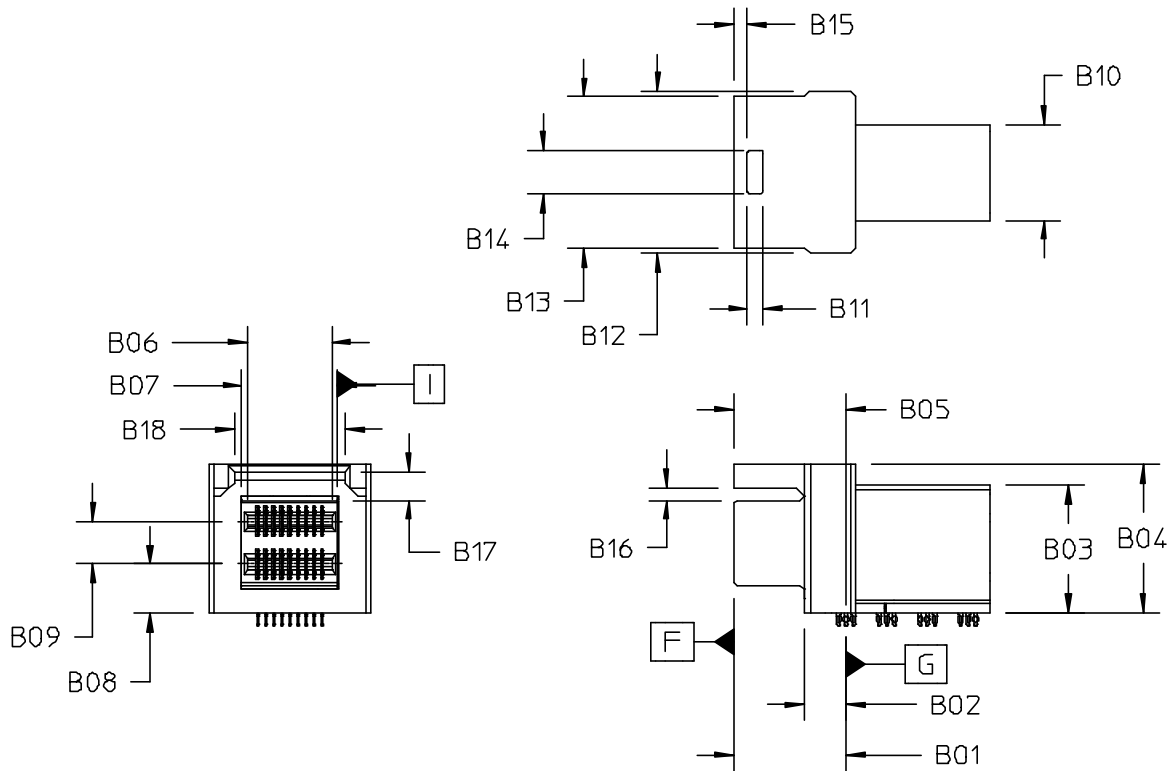


FIGURE 6.4 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR DIMENSIONS

TABLE 6.4 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR DIMENSIONS

| Designator | Description | Dimension | Tolerance |
|------------|------------------------------------|-----------|-----------|
| B01 | Datum G to Front Face | 10.43 | 0.10 |
| B02 | Datum G to End of Snout | 3.85 | 0.05 |
| B03 | Body Height | 11.95 | 0.08 |
| B04 | Overall Height | 13.92 | 0.08 |
| B05 | Datum G to Front of Latch Frame | 10.43 | 0.13 |
| B06 | Receptacle Card Slot Width | 7.85 | 0.08 |
| B07 | Snout Width | 8.95 | 0.08 |
| B08 | Lower Card Slot Location | 4.55 | 0.10 |
| B09 | Lower Card Slot to Upper Card Slot | 4.00 | 0.05 |
| B10 | Body Width | 8.99 | 0.13 |
| B11 | Latch Slot Length | 1.45 | 0.10 |
| B12 | Latch Frame Width | 15.16 | 0.13 |
| B13 | Latch Frame Width | 14.17 | 0.13 |
| B14 | Latch Slot Width | 4.03 | 0.13 |

| | | | |
|-----|------------------------------------|-------|------|
| B15 | Front Face to Latch Slot | 1.23 | 0.05 |
| B16 | Snout to Latch Frame Bottom - Side | 1.15 | 0.13 |
| B17 | Snout to Latch Frame Bottom | 2.70 | 0.10 |
| B18 | Latch Frame Opening | 10.34 | 0.10 |

6.5 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR CONTACT LOCATIONS

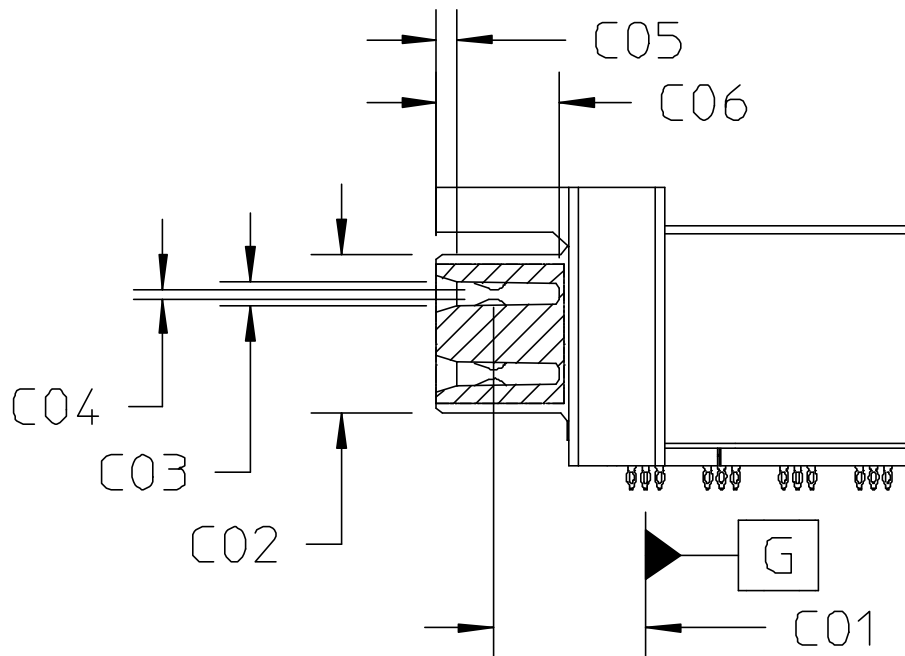


FIGURE 6.5 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR CONTACT LOCATION DIMENSIONS

TABLE 6.5 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR CONTACT DIMENSIONS

| Designator | Description | Dimension | Tolerance |
|------------|------------------------------|-----------|-----------|
| C01 | Datum G to Contact Interface | 7.56 | 0.10 |
| C02 | Receptacle Snout Height | 7.94 | 0.10 |
| C03 | Receptacle Card Slot Height | 1.18 | 0.08 |
| C04 | Contact Gap | 0.45 | 0.15 |
| C05 | Card Slot Lead-In | 1.00 | 0.25 |
| C06 | Card Slot Depth | 6.13 | 0.15 |

6.6 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR HOLD-DOWN & PITCH DIMENSIONS FOR ALL CONFIGURATIONS

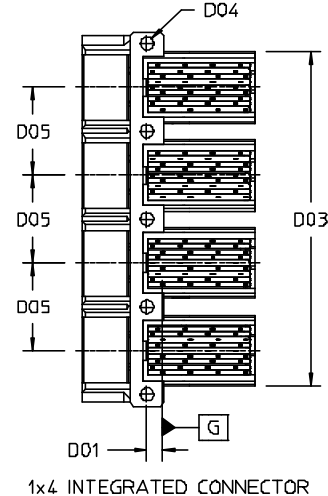
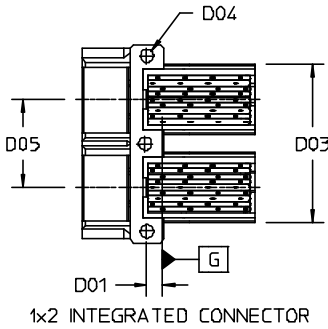
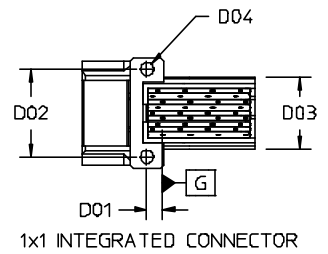


FIGURE 6.6 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR HOLD-DOWN & PITCH DIMENSIONS FOR ALL CONFIGURATIONS

TABLE 6.6 UNSHIELDED FIXED (RECEPTACLE) RIGHT ANGLE INTEGRATED HD CONNECTOR HOLD-DOWN & PITCH DIMENSIONS FOR ALL CONFIGURATIONS

| Designator | Description | Dimension | Tolerance |
|------------|-------------------------------------|-----------|-----------|
| D01 | Datum G to Mounting Hole | 2.15 | 0.15 |
| D02 | Mounting Hole to Mounting Hole | 12.00 | 0.05 |
| D03 | 1x1 Integrated Connector Body Width | 9.75 | 0.10 |
| D03 | 1x2 Integrated Connector Body Width | 21.75 | 0.10 |
| D03 | 1x4 Integrated Connector Body Width | 45.75 | 0.10 |
| D04 | Mounting Hole Diameter | 1.80 | Ref |
| D05 | Port to Port Spacing | 12.00 | 0.05 |

6.7 UNSHIELDED FIXED (RECEPTACLE) 1X1 RIGHT ANGLE INTEGRATED HD CONNECTOR FOOTPRINT

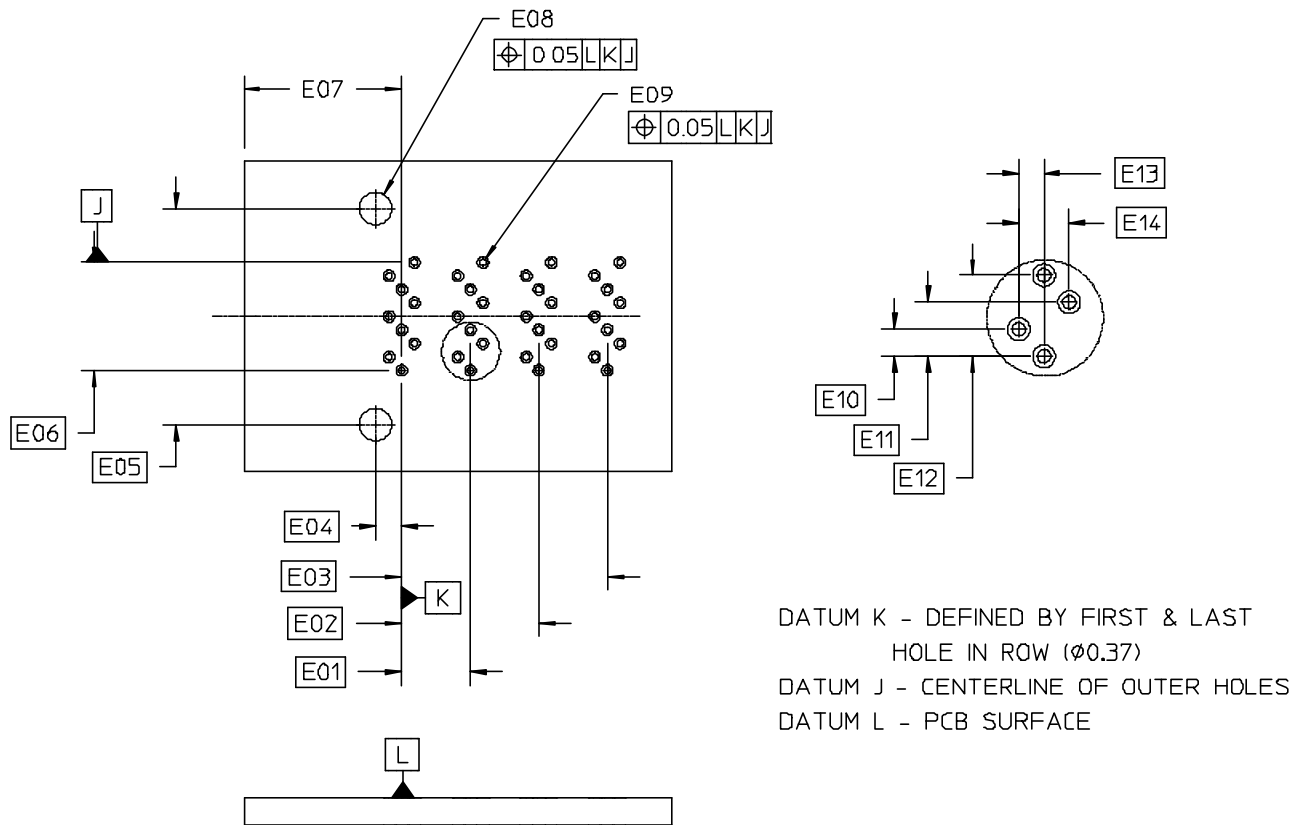


FIGURE 6.7 UNSHIELDED FIXED (RECEPTACLE) 1X1 RIGHT ANGLE INTEGRATED HD CONNECTOR FOOTPRINT

TABLE 6.7 UNSHIELDED FIXED (RECEPTACLE) 1X1 RIGHT ANGLE INTEGRATED HD CONNECTOR FOOTPRINT

| Designator | Description | Dimension | Tolerance |
|------------|----------------------------------|-----------|-----------|
| E01 | Datum K to Second Group | 3.80 | Basic |
| E02 | Datum K to Third Group | 7.60 | Basic |
| E03 | Datum K to Fourth Group | 11.40 | Basic |
| E04 | Datum K to Mounting Hole | 1.45 | Basic |
| E05 | Mounting Hole to Mounting Hole | 12.00 | Basic |
| E06 | Receptacle Pin, Center to Center | 6.00 | Basic |

| | | | |
|-----|----------------------------|------|-------|
| E07 | Datum to Front Edge of PCB | 8.75 | 0.15 |
| E08 | Mounting Hole Diameter | 1.80 | 0.10 |
| E09 | Receptacle Hole Diameter | 0.37 | 0.05 |
| E10 | Receptacle Hole to Hole | 0.75 | Basic |
| E11 | Receptacle Hole to Hole | 1.50 | Basic |
| E12 | Receptacle Hole to Hole | 2.25 | Basic |
| E13 | Receptacle Hole to Hole | 0.70 | Basic |
| E14 | Receptacle Hole to Hole | 1.40 | Basic |

6.8 UNSHIELDED FIXED (RECEPTACLE) 1X2 & 1X4 RIGHT ANGLE INTEGRATED HD CONNECTOR FOOTPRINT

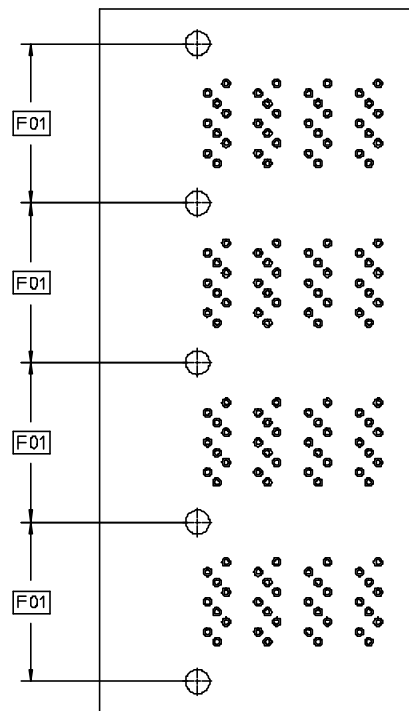
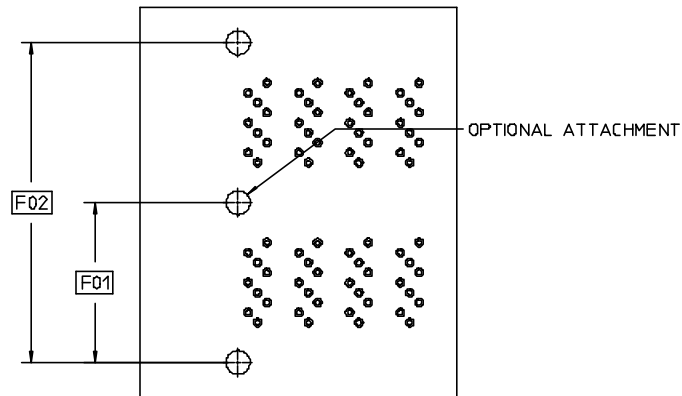


FIGURE 6.8 UNSHIELDED FIXED (RECEPTACLE) 1X2 & 1X4 RIGHT ANGLE INTEGRATED HD CONNECTOR FOOTPRINT

TABLE 6.8 UNSHIELDED FIXED (RECEPTACLE) 1X2 & 1X4 RIGHT ANGLE INTEGRATED HD CONNECTOR FOOTPRINT

| Designator | Description | Dimension | Tolerance |
|------------|---------------------------|-----------|-----------|
| F01 | Port to Port Spacing | 12.00 | Basic |
| F02 | 1x2 Mounting Hole to Hole | 24.00 | Basic |

6.9 UNSHIELDED FIXED (RECEPTACLE) 1X1 RIGHT ANGLE INTEGRATED HD CONNECTOR AND PLUG PIN NUMBERING

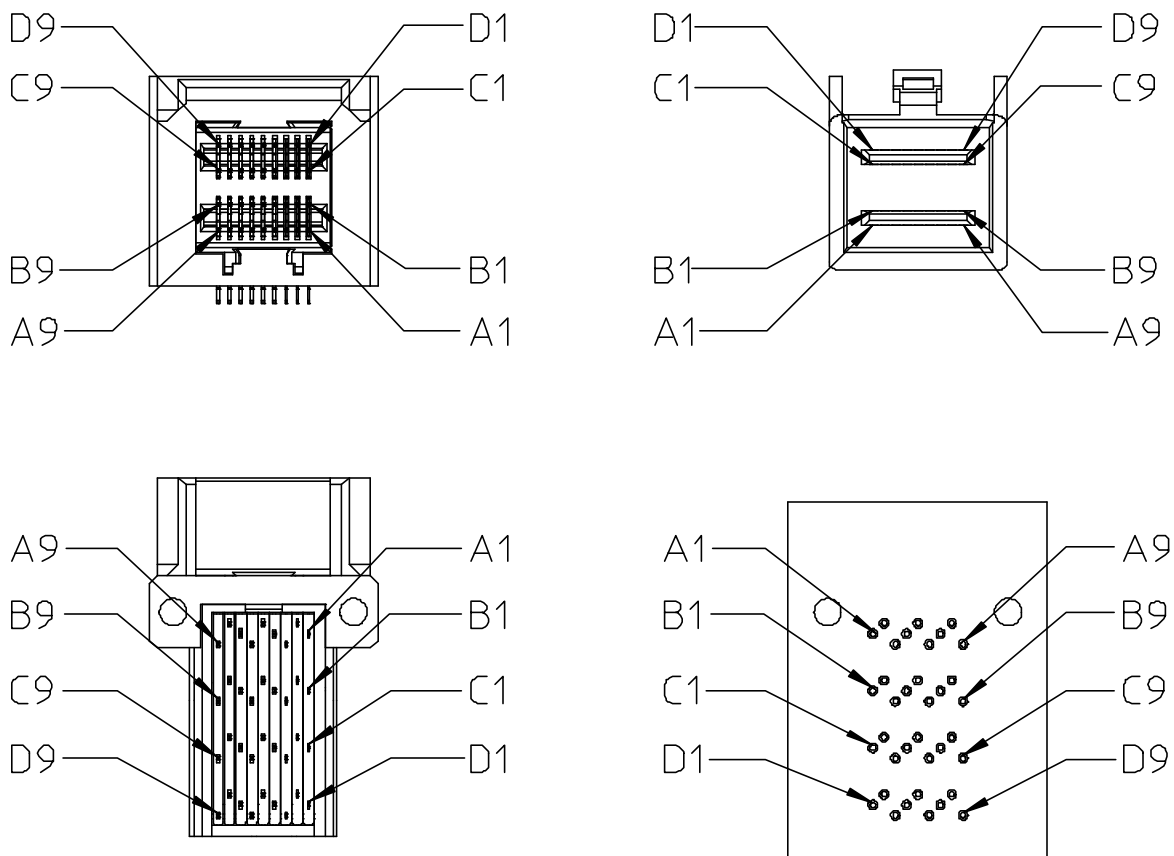


FIGURE 6.9 UNSHIELDED FIXED (RECEPTACLE) 1X1 RIGHT ANGLE INTEGRATED HD CONNECTOR AND PLUG PIN NUMBERING