SFF Committee

**SFF-8086**

Specification for

# Mini Multilane 4X 10 Gb/s Common Elements Connector

**Standardized as EIA-974 at Rev 2.3 dated April 6, 2011**

This specification was submitted as a project to become a standard, and was Expired at that time.

If there were modifications subsequent to the date of submittal, or any were made during the EIA approvals process, they are not reflected in this copy.

EIA standards can be purchased from http://global.ihs.com/

## CONTINUING ACTIVITY

Companion and subsequent specifications have been developed.

| | |
|---|---|
| SFF-8087 | Mini Multilane 4X Unshielded Connector Shell and Plug |
| SFF-8088 | Mini Multilane 4X Shielded Connector Shell and Plug |
| SFF-8642 | Mini Multilane 12X 10 Gb/s Shielded Cage/Connector |
| SFF-8643 | Mini Multilane 8/4X 12 Gb/s Unshielded Connector |
| SFF-8644 | Mini Multilane 8/4X 12 Gb/s Shielded Cage/Connector |
| SFF-8645 | Mini Multilane 8/4X 24 Gb/s Shielded Cage/Connector |
| SFF-8647 | Mini Multilane 12X 14 Gb/s Shielded Cage/Connector |
| SFF-8648 | Mini Multilane 12X 28 Gb/s Shielded Cage/Connector |

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SFF Committee

# SFF-8086

Specification for

## Mini Multilane 4X 10 Gb/s Common Elements Connector

Rev 2.5 April 25, 2015

Secretariat: SFF Committee

Abstract: This specification defines the physical interface and general performance requirements of the mating interface for the Mini Multilane Connector that is designed for use in high speed serial interconnect applications at speeds up to 10 Gb/s. One such use is as the Serial Attached SCSI Mini SAS 4i (wide compact internal connector) and Mini SAS 4X (wide compact external 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 is an internal working document 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.

| | |
|---|---|
| AAmphenol | IBM |
| Applied Micro | Intel |
| Comax | LSI |
| Dell Computer | Molex |
| ENDL | Seagate |
| FCI | Shenzhen |
| Foxconn | Sun Microsystems |
| Fujitsu CPA | TE Connectivity |
| Hewlett Packard | Toshiba |
| HGST | Unisys |
| Hitachi Cable | |

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

| | |
|---|---|
| Arista | JDS Uniphase |
| EMC | Maxtor |
| Emulex | Picolight |
| Finisar | Sumitomo |
| Infineon | Vitesse Semiconductor |

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.

**Change History:**

April 16 2011: Editorial revision to incorporate 2011 titling and review content for consistency prior to being submitted for EIA standardization.

March 14 2013: Letter ballot for EIA-975 distributed for approval, and specification
re-classified as Expired. Minor editing changes made as requested.

April 25, 2015: Revised/Updated Table 6-1 C08 between the contact pads on the Free (Plug) Paddle Card to reflect the larger gap approved and specified by later designs/manufacturing tolerances that maintain the integrity of the design.

**Foreword**

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

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

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

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

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

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

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

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

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

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

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

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

SFF Committee --

**Mini Multilane 4X Common Elements Connector**

## 1. Scope

This specification defines the terminology and physical requirements for the mating interface and physical characteristics of the Mini Multilane Connector. The dimensions specified apply to the various sizes of the family, which covers a variety of circuit sizes, see SFF-8087 Mini Multilane Unshielded Connector and SFF-8088 Mini Multilane Shielded Connector.

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

## 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)
- INCITS 352:2002 FC-PI Fibre Channel Physical Interface
- INCITS 404:200x FC-PI-2 Fibre Channel Physical Interface -2
- T11/1625D FC-PI-3 Fibre Channel Physical Interface -3
- IEEE 802.3z Gigabit Task Force
- InfiniBand IBTA Spec
- SFF-8410 High Speed Serial Testing for Copper Links
- INF-8074i SFP (Small Formfactor Pluggable) Transceiver
- SFF-8075 PCI Card Version of SFP Cage

### 2.2 SFF Specifications

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

### 2.3 Sources

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

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

Copies of SFF, 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).

## CONTENTS



## FIGURES



## TABLES

## 3. General Description

The 0.8 mm connection system of the Mini Multilane Connector is based on industry-proven card edge style contacts, which mate with a single wipe, and are very difficult to damage.

The mating interfaces of paddle card to receptacle body and receptacle body to circuit board are common between SFF-8087 Mini Multilane 4X Unshielded Connector and SFF-8088 Mini Multilane 4X Shielded Connector.

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

This connector system was designed to satisfy the needs for gigabit serial data transmission applications where signals have rise times typically in the range of 100 ps over a nominal 100 ohm differential balanced copper link. Design goals were Minimization of crosstalk and Minimum transmission line impedance discontinuity across the connector interface at speeds of up to 10 Gb/s on both rows of contacts.

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

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

The connector is of a straightforward construction that does not rely on advanced materials or processes, and is physically robust.

## 4. Definitions and Conventions

### 4.1 Definitions

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

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

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

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

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

**Contact mating sequence:** Order of electrical contact during mating/unmating process. Other terms sometimes used to describe this feature are: contact

sequencing, contact positioning, make first/break last, EMLB (early make late break) staggered contacts, and long pin / short pin.

**Fixed:** Used to describe the gender of the mating side of the connector that accepts its mate upon mating. This gender is frequently, but not always, associated with the common terminology "receptacle". Other terms commonly used are "female" and "socket connector". The term "fixed" is adopted from EIA standard terminology as the gender that most commonly exists on the fixed end of a connection, for example, on the board or bulkhead side. In this document "fixed" is specifically used to describe the mating side gender illustrated in Figure 4-1.

**Free:** Used to describe the gender of the mating side of the connector that penetrates its mate upon mating. This gender is frequently, but not always, associated with the common terminology "plug". Other terms commonly used are "male" and "pin connector". The term "free" is adopted from EIA standard terminology as the gender that most commonly exists on the free end of a connection, for example, on the cable side. In this document "free" is specifically used to describe the mating side gender illustrated in Figure 4-1.

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

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

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

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

**MSA: Multiple Source Agreement**

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

**Offset:** An alignment shift from the centerline of the connector.

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

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

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

**SFP: Small Formfactor Pluggable**

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

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

**SMT:** Surface Mount Technology

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

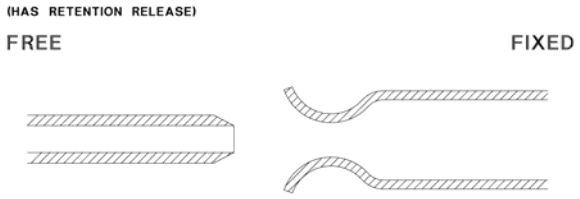


**FIGURE 4-1 MATING SIDE GENDER DEFINITION**

**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.

| 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 |

## 5. Connector Description

### 5.1 Electrical and Mechanical Requirements

The electrical and low frequency performance requirements are defined in Table 5-1, and the mechanical requirements are listed in Table 5-2.

**TABLE 5-1 ELECTRICAL REQUIREMENTS**

| Parameter | Test Conditions | Specifications |
|---|---|---|
| Current | | 0.5 A/contact |
| Voltage | | 30 V AC/contact |
| Temperature | | -20C to +85C |
| Humidity | | 80% RH Maximum |
| Low level Contact resistance with conductor resistance - Initial | EIA 364-6: 320 mV DC, 10 mA | 80 mohm Maximum |
| Insulation Resistance | EIA 364-21: 100 V DC | 10e3 Mohm Minimum between adjacent contacts |
| Dielectric withstanding voltage | 300 V/Minimum DC for 1 minute hold | No defect between adjacent contacts |
| Differential Impedance (Connector area) | EIA 364-108: Rise time: 50 ps (20-80%). Includes connector cable to connector interface and board termination pads and vias | 90~110 ohm (distribution) 100 +/- 5 ohm (distribution of average value) |
| Within pair skew | EIA 364-103 | 5 ps maximum (By design) |
| Near-End Isolation | EIA 364-90: 50 MHz to 6 GHz | -40 dB (Frequencies up to 3 GHz) |
| Insertion Loss | EIA 364-101: 50 MHz to 6 GHZ | 1.0 dB maximum (Frequencies up to 1.6 GHz) |

**TABLE 5-2 MECHANICAL REQUIREMENTS**

| Items | Conditions | Acceptance Limits |
|---|---|---|
| Durability | EIA 364-23 | 250 cycles |
| Mating Force | EIA 364-13: Measurement speed: 10 mm per minute maximum | Maximum of 55.5 N |
| Unmating Force | EIA 364-13: Measurement speed: 10 mm per minute maximum with retention latch disengaged | Maximum of 49.0 N |

### 5.2 High Frequency Performance Requirements

The requirements for the high-speed performance are enabled by reference to SFF-8410 High Speed Serial Testing for Copper Links which defines testing methodology. The high-speed performance test methods of SFF-8410 constitute an essential part of this specification.

### 5.3 Test Criteria

The environmental test criteria are defined in Table 5-3.

**TABLE 5-3 TEST CRITERIA**

| Items | Conditions | Acceptance Limits |
|---|---|---|
| Vibration, random | EIA 364-28, Test Condition VII, Condition D. | Subject mated specimens to 3.10 G's rms between 20-500 Hz for 15 minutes in each of 3 mutually perpendicular planes |
| Physical shock | EIA 364-27, Method H. | Subject mated specimens to 30 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. |
| Thermal shock | EIA 364-32C, condition I | -55C to +85C |
| Temperature life | EIA 364-17, Method A, Test Condition 2, Test Time Condition C | Subject mated specimens to 70C for 500 hours |
| Humidity temperature cycling | EIA 364-31 Method III. | Subject unmated specimens to 10 cycles (10 days) between 25C and 65C at 80-100% RH |
| Mixed flowing gas | EIA 364-65, Class IIA | Subject specimens to environmental Class IIA for 7 days unmated, and 7 days mated. |
| Thermal disturbance | EIA 364-32: Cycle the connector between 15 +/- 3C and 85 +/- 3C, as measured on the part. Ramps should be a Minimum of 2C per minute, and dwell times should ensure that the contacts reach the temperature extremes (a minimum of 5 minutes). Humidity is not controlled. Perform 10 such cycles. | |

### 5.4 Test Results

Table 5-4 summarizes the performance requirements, which need to be achieved in order to pass the test criteria.

**TABLE 5-4 PERFORMANCE REQUIREMENTS**

| Items | Insertion removal force | Contact resistance | Insulation resistance | Dielectric withstanding voltage | Appearance check |
|---|---|---|---|---|---|
| Condition | Satisfy Table 5-2 | Resistance change should be 20 Mohm maximum | 10e3 Mohm Minimum | Same as initial, there should be no defect | There should be no defect |
| Durability | Required | Required | Optional | Optional | Required |
| Vibration | Required | Required | Optional | Optional | Required |
| Physical shock | Required | Required | Optional | Optional | Required |
| Thermal shock | Optional | Optional | Required | Required | Required |
| Thermal disturbance | Required | Required | Optional | Optional | Required |
| Temperature life | Optional | Required | Optional | Optional | Required |
| Humidity-temperature cycling | Optional | Optional | Required | Required | Required |
| Mixed flowing gas | Optional | Required | Optional | Optional | Required |

**5.5 Connector Configurations**

The Mini Multilane Series relies on a receiving body and paddle card, which are the primary elements to construct connectors.

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

Figure 5-1 is an example, which illustrates two styles of receiving bodies and how they become receptacles to receive the plug when encapsulated by the shell that is designed for an unshielded connector application.

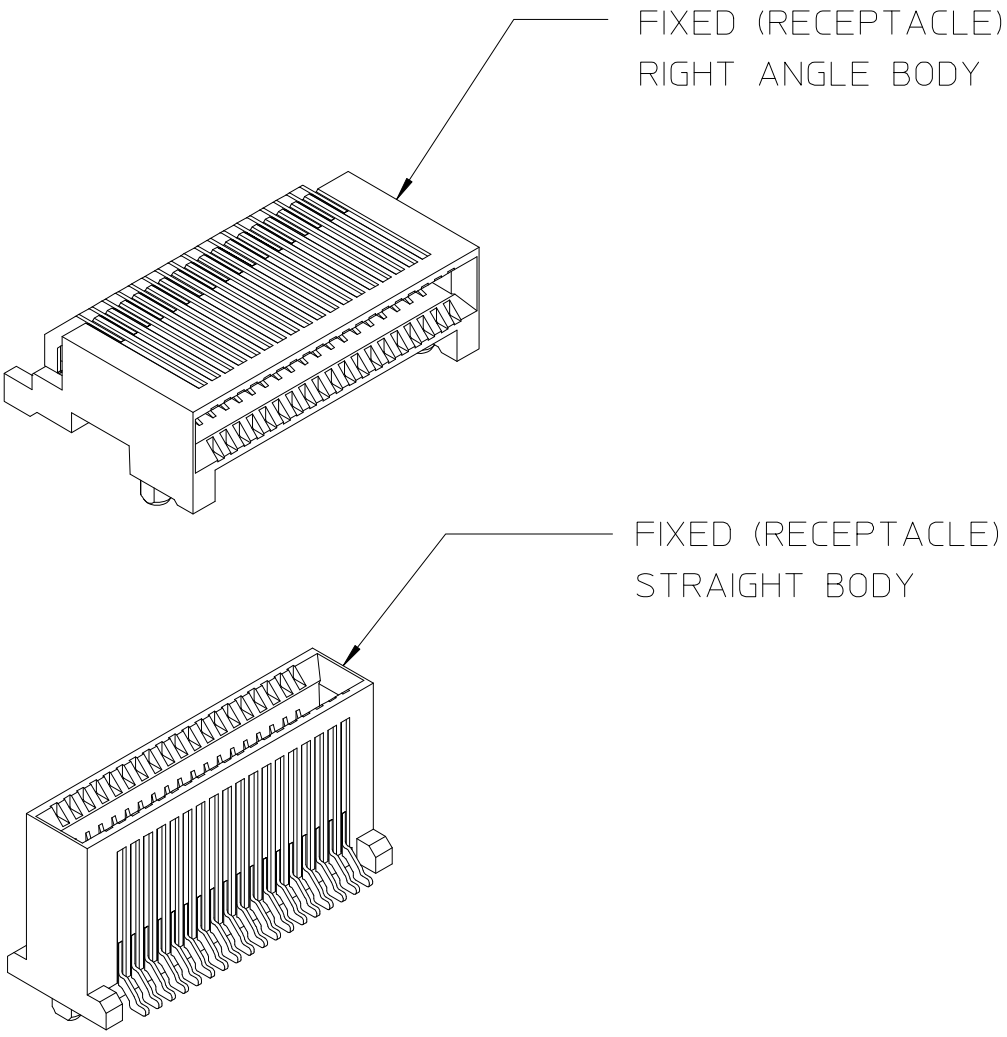


**FIGURE 5-1 GENERAL VIEW OF FIXED (RECEPTACLE) CONFIGURATIONS**

SFF-8087 defines the free (plug) cable connector that incorporates the paddle card and the shell, which is used to encapsulate the receiving body to form a complete receptacle for use in unshielded applications.

SFF-8088 defines the free (plug) cable connector that incorporates the paddle card and the shell, which is used to encapsulate the receiving body to form a complete receptacle for use in shielded applications.

The shell provides guidance and retention for the free (plug) cable connector, and absorbs the stress imposed by insertion and removal of the free (plug) cable connector. This protects the signal quality of the solder joints to the body.

## 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) Paddle Card

**TABLE 6-1 FREE (PLUG) PADDLE CARD**

| Designator | Description | 26 | 36 | 50 | 68 | Tolerance |
|---|---|---|---|---|---|---|
| A02 | CL to First | 4.60 | 6.60 | 9.40 | 13.00 | Basic |
| A03 | CL to Last | 5.00 | 7.00 | 9.80 | 13.40 | Basic |
| A14 | Tail Pitch within Row | 0.80 | = | = | = | Basic |
| C01 | Interface Width | 11.60 | 15.60 | 21.20 | 28.40 | +/- 0.10 |
| C02 | Pad Width | 0.60 | = | = | = | +/- 0.03 |
| C03 | Paddle Card Thickness | 1.00 | = | = | = | +/- 0.10 |
| C04 | End of Pad | 3.05 | = | = | = | +/- 0.10 |
| C05 | Third Mate | 1.45 | = | = | = | +/- 0.10 |
| C06 | Second Mate | 1.05 | = | = | = | +/- 0.10 |
| C07 | First Mate | 0.55 | = | = | = | +/- 0.10 |
| C08 | Gap Between Mating Levels | 0.10 | = | = | = | +/- 0.05 |
| C09 | Card Slot Chamfer x 45° | 0.50 | = | = | = | +/- 0.13 |
| C10 | Mating Chamfer x 45° | 0.30 | = | = | = | +/- 0.10 |
| C11 | Lead-in Flat | 0.36 | = | = | = | Reference |

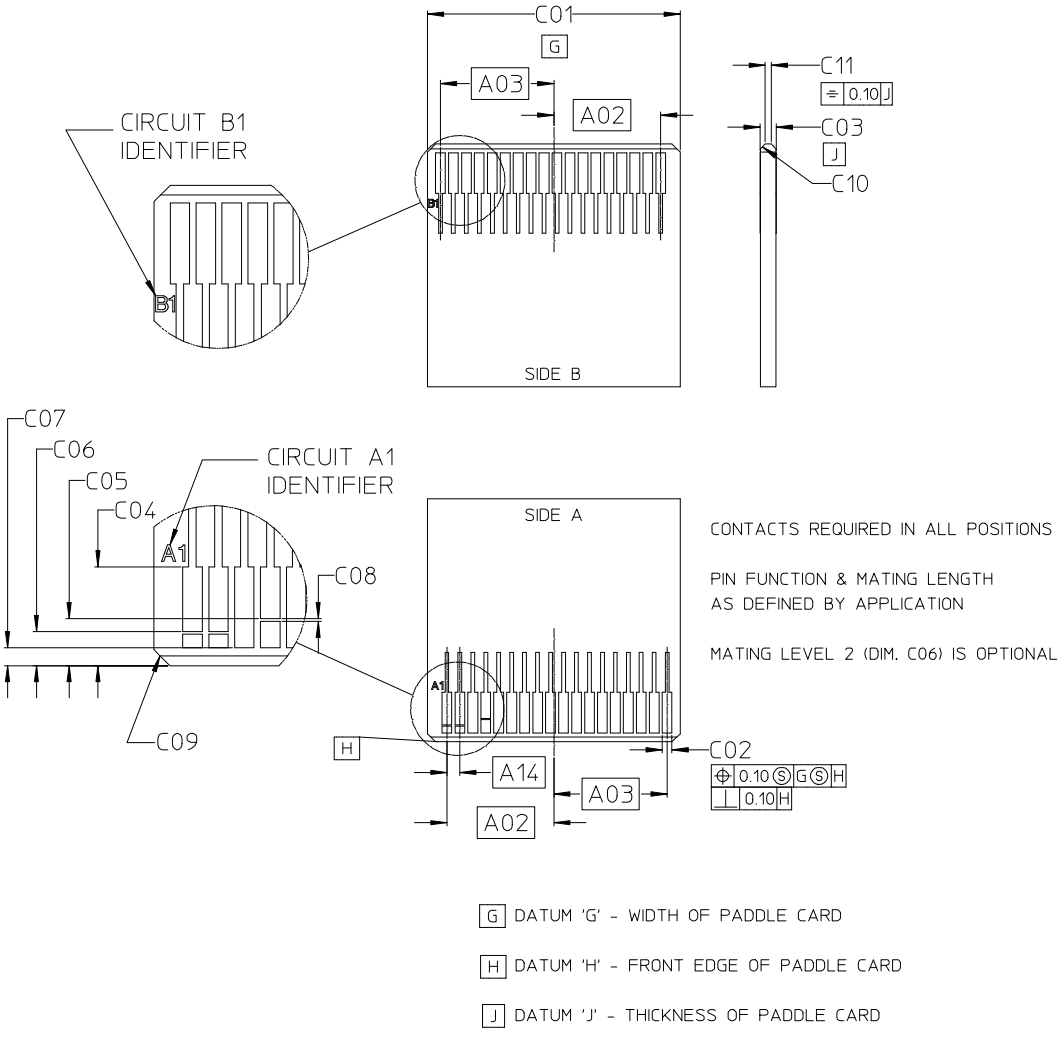


**FIGURE 6-1 FREE (PLUG) PADDLE CARD**

### 6.2 Fixed (Receptacle) Right Angle Connector

**TABLE 6-2 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR**

| Designator | Description | 26 | 36 | 50 | 68 | Tolerance |
|---|---|---|---|---|---|---|
| A01 | First to Last | 10.00 | 14.00 | 19.60 | 26.80 | Basic |
| A02 | CL to First | 4.60 | 6.60 | 9.40 | 13.00 | Basic |
| A03 | CL to Last | 5.00 | 7.00 | 9.80 | 13.40 | Basic |
| A04 | Connector Width | 13.40 | 17.40 | 23.00 | 30.20 | +/- 0.10 |
| A05 | OAL Connector Housing | 11.50 | = | = | = | +/- 0.13 |
| A06 | Card Slot Width | 11.80 | 15.80 | 21.40 | 28.60 | +/- 0.10 |
| A07 | PCB to Card Slot CL | 3.50 | = | = | = | +/- 0.10 |
| A08 | OAH Connector Housing | 5.35 | = | = | = | +/- 0.13 |
| A09 | Card Slot Height | 1.14 | = | = | = | Minimum |
| A10 | Peg to Peg | 12.00 | 16.00 | 21.60 | 28.80 | Basic |
| A11 | Peg Diameter | 1.40 | = | = | = | +/- 0.05 |
| A13 | Maximum Peg Flat | 1.15 | = | = | = | Maximum |
| A14 | Tail Pitch within Row | 0.80 | = | = | = | +/- 0.13 |
| A15 | Tail Pitch Row to Row | 0.40 | = | = | = | +/- 0.13 |
| A16 | Peg CL to Contact CL | 0.00 | = | = | = | +/- 0.10 |
| A17 | Peg CL to Card Slot | 3.22 | = | = | = | +/- 0.13 |
| A18 | Peg CL to Row A | 5.18 | = | = | = | +/- 0.10 |
| A19 | Peg CL to Row B | 7.69 | = | = | = | +/- 0.10 |
| A20 | Peg CL to Front of Housing | 2.90 | = | = | = | +/- 0.08 |
| A21 | Peg Length | 0.95 | = | = | = | +/- 0.13 |
| A22 | Contact Gap | 0.42 | = | = | = | +/- 0.13 |
| A23 | Leg to Leg | 10.73 | 14.73 | 20.33 | 27.53 | +/- 0.10 |
| A24 | Height Under Connector | 1.65 | = | = | = | +/- 0.05 |
| A25 | Paddle Card Seating Location | 1.93 | = | = | = | Reference |
| A26 | Contact Tolerance Zone | 0.30 | = | = | = | Maximum |

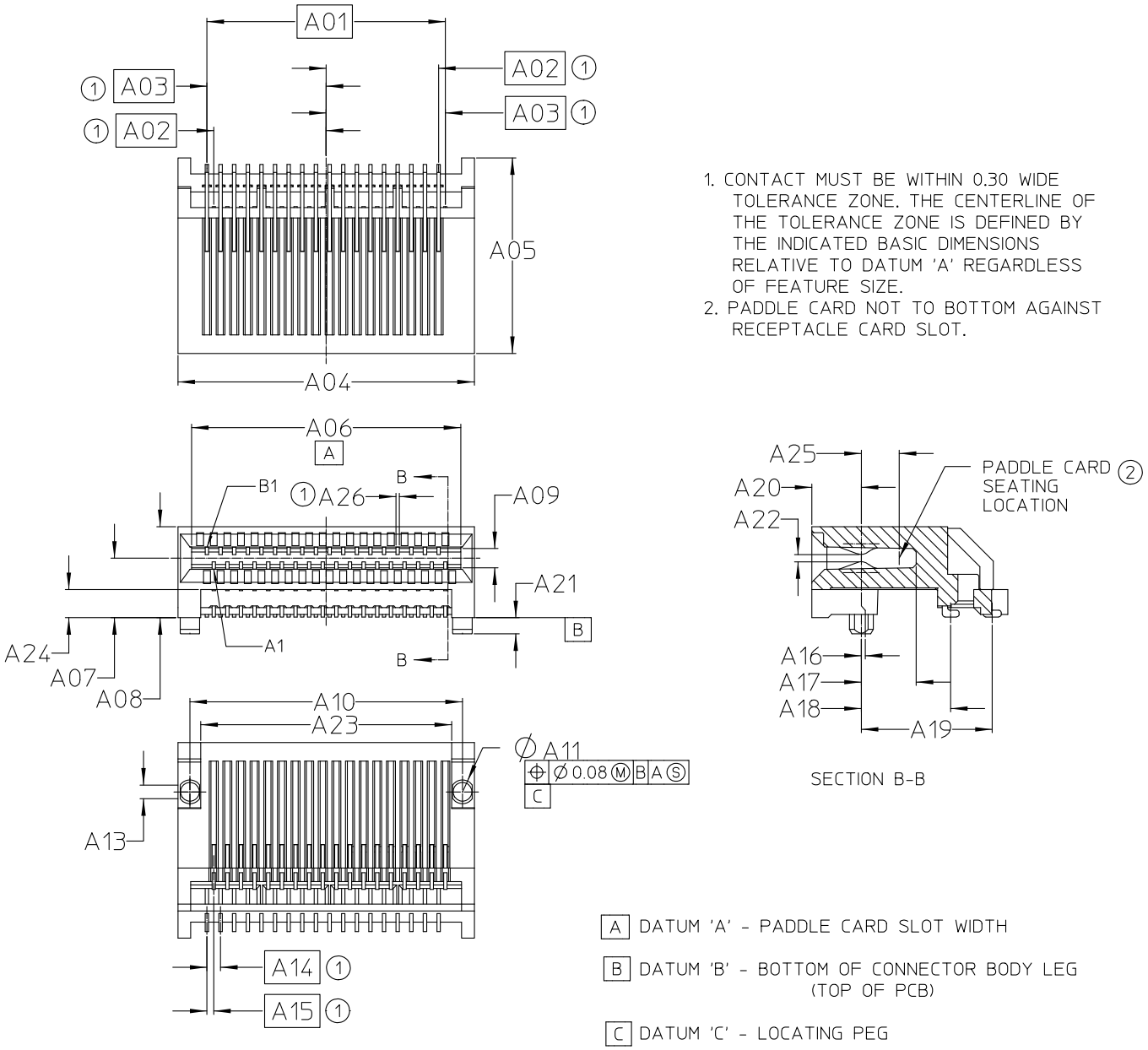


**FIGURE 6-2 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR**

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

| Designator | Description | 26 | 36 | 50 | 68 | Tolerance |
|---|---|---|---|---|---|---|
| A01 | First to Last | 10.00 | 14.00 | 19.60 | 26.80 | Basic |
| A02 | CL to First | 4.60 | 6.60 | 9.40 | 13.00 | Basic |
| A03 | CL to Last | 5.00 | 7.00 | 9.80 | 13.40 | Basic |
| A10 | Peg to Peg | 12.00 | 16.00 | 21.60 | 28.80 | Basic |
| A14 | Tail Pitch within Row | 0.80 | = | = | = | Basic |
| A15 | Tail Pitch Row to Row | 0.40 | = | = | = | Basic |
| B01 | Peg CL to Row A | 5.18 | = | = | = | Basic |
| B02 | Row A to Row B | 2.51 | = | = | = | Basic |
| B03 | Hole Diameter | 1.55 | = | = | = | +/- 0.05 |
| B04 | Peg CL to Edge of PCB | 16.80 | = | = | = | +/- 0.13 |
| B05 | Pad Length | 1.80 | = | = | = | +/- 0.03 |
| B06 | Pad Width | 0.35 | = | = | = | +/- 0.03 |
| B07 | Pad Radius | Full | = | = | = | +/- 0.13 |
| B08 | Connector Keep Out | 13.90 | 17.90 | 23.50 | 30.70 | +/- 0.13 |
| B10 | Plug Keep Out | 8.85 | = | = | = | +/- 0.13 |

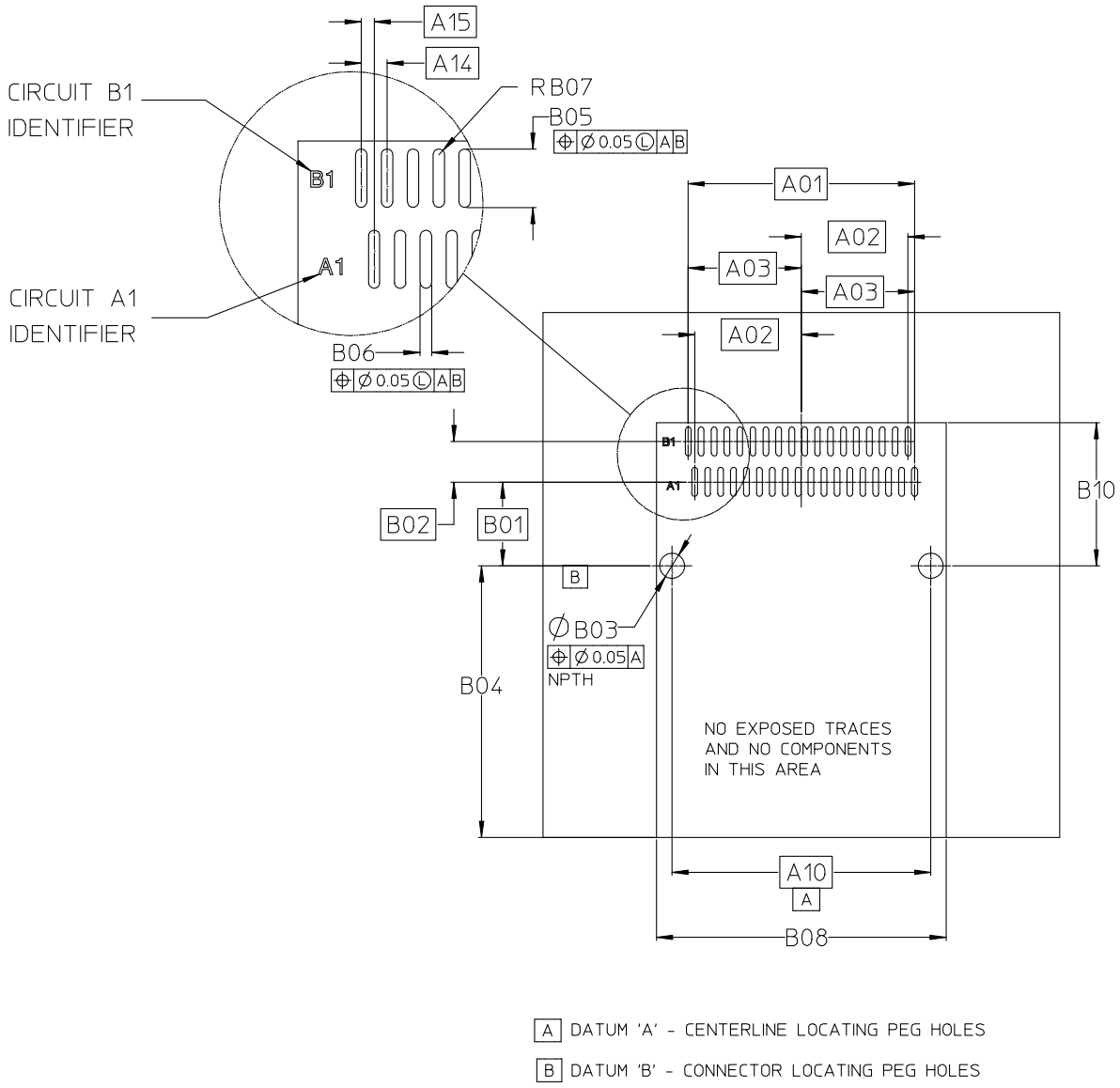


**FIGURE 6-3 FIXED (RECEPTACLE) RIGHT ANGLE CONNECTOR FOOTPRINT**

### 6.3 Fixed (Receptacle) Straight Connector

**TABLE 6-4 FIXED (RECEPTACLE) STRAIGHT CONNECTOR**

| Designator | Description | 26 | 36 | 50 | 68 | Tolerance |
|---|---|---|---|---|---|---|
| A02 | CL to First | 4.60 | 6.60 | 9.40 | 13.00 | Basic |
| A03 | CL to Last | 5.00 | 7.00 | 9.80 | 13.40 | Basic |
| A04 | Connector Width | 13.40 | 17.40 | 23.00 | 30.20 | +/- 0.10 |
| A06 | Card Slot Width | 11.80 | 15.80 | 21.40 | 28.60 | +/- 0.10 |
| A09 | Card Slot Height | 1.14 | = | = | = | Minimum |
| A10 | Peg to Peg | 12.00 | 16.00 | 21.60 | 28.80 | Basic |
| A11 | Peg Diameter | 1.40 | = | = | = | +/- 0.05 |
| A13 | Maximum Peg Flat | 1.15 | = | = | = | Maximum |
| A14 | Tail Pitch within Row | 0.80 | = | = | = | +/- 0.13 |
| A15 | Tail Pitch Row to Row | 0.40 | = | = | = | +/- 0.13 |
| A17 | Peg CL to Card Slot | 3.22 | = | = | = | +/- 0.13 |
| A22 | Contact Gap | 0.42 | = | = | = | +/- 0.13 |
| A25 | Module Seating Location | 1.93 | = | = | = | Reference |
| A26 | Contact Tolerance Zone | 0.30 | = | = | = | Maximum |
| H01 | OAH Connector Housing | 9.08 | = | = | = | +/- 0.13 |
| H02 | Peg Length | 0.83 | = | = | = | +/- 0.13 |
| H03 | OAL Tail to Tail | 9.60 | 13.60 | 19.20 | 26.40 | +/- 0.13 |
| H04 | OAL Toe to Toe | 7.01 | = | = | = | +/- 0.25 |
| H05 | Peg CL to SMT Foot CL | 2.91 | = | = | = | +/- 0.13 |
| H06 | PCB to Bottom of Card Slot | 2.80 | = | = | = | +/- 0.13 |
| H07 | Housing Face to Card Slot | 6.13 | = | = | = | +/- 0.13 |
| H08 | OAW of Connector Housing | 6.00 | = | = | = | +/- 0.13 |
| H09 | Width of Mating Interface | 3.70 | = | = | = | +/- 0.08 |

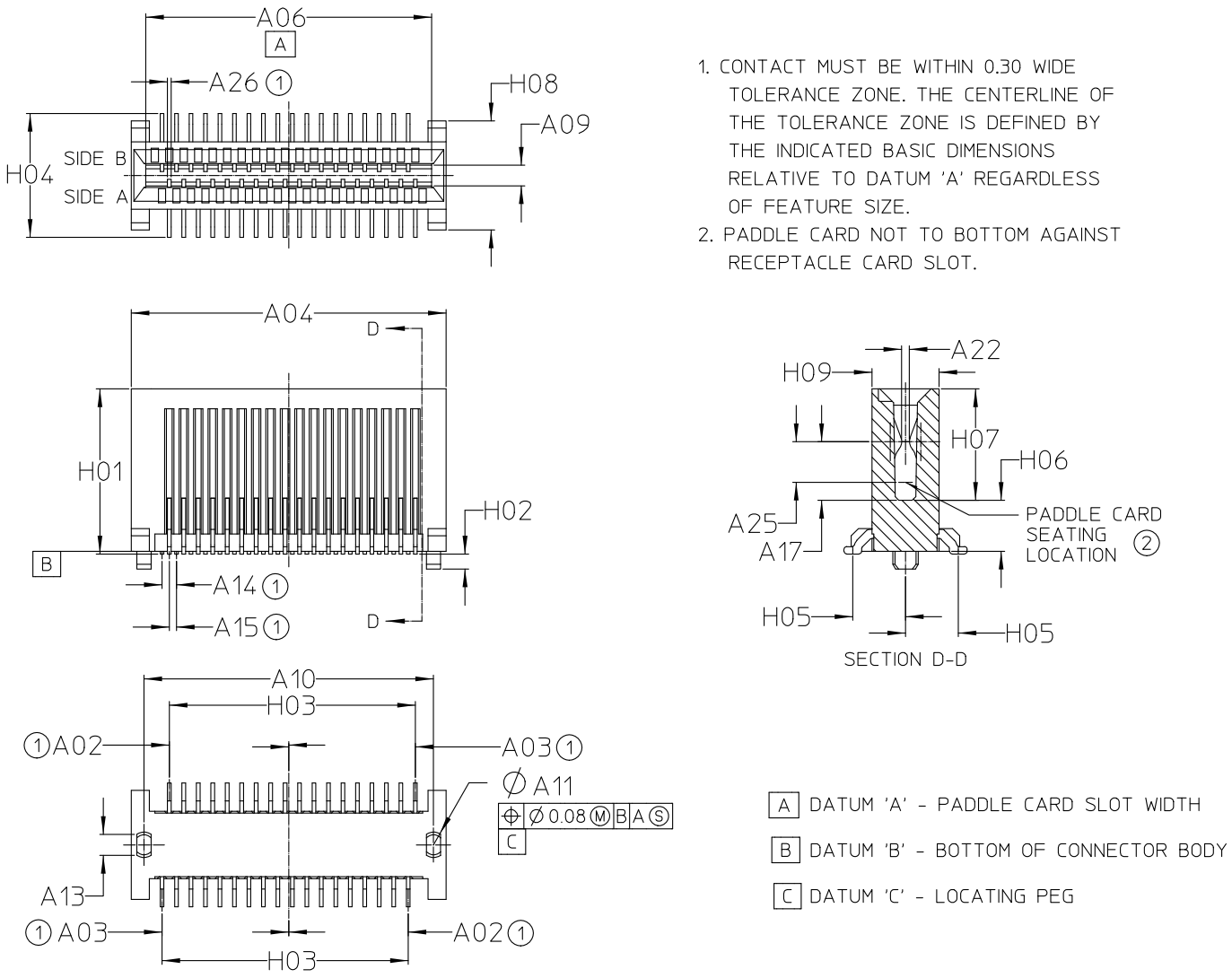


**FIGURE 6-4 FIXED (RECEPTACLE) STRAIGHT CONNECTOR**

**TABLE 6-5 FIXED (RECEPTACLE) STRAIGHT CONNECTOR FOOTPRINT**

| Designator | Description | 26 | 36 | 50 | 68 | Tolerance |
|---|---|---|---|---|---|---|
| A02 | CL to First | 4.60 | 6.60 | 9.40 | 13.00 | Basic |
| A03 | CL to Last | 5.00 | 7.00 | 9.80 | 13.40 | Basic |
| A10 | Peg to Peg | 12.00 | 16.00 | 21.60 | 28.80 | Basic |
| A14 | Tail Pitch within Row | 0.80 | = | = | = | +/- 0.13 |
| B03 | Hole Diameter | 1.55 | = | = | = | +/- 0.05 |
| B05 | Pad Length | 1.80 | = | = | = | +/- 0.03 |
| B06 | Pad Width | 0.35 | = | = | = | +/- 0.03 |
| B07 | Pad Radius | Full | = | = | = | +/- 0.13 |
| H03 | OAL Tail to Tail | 9.60 | 13.60 | 19.20 | 26.40 | +/- 0.13 |
| J02 | Peg CL to Row CL | 2.95 | = | = | = | +/- 0.13 |
| J03 | Peg CL to Connector Keep Out | 6.99 | = | = | = | +/- 0.13 |
| J04 | Peg CL to Connector Keep Out | 4.78 | = | = | = | +/- 0.13 |
| J05 | Connector Keep Out | 15.30 | 19.30 | 24.90 | 32.10 | +/- 0.13 |

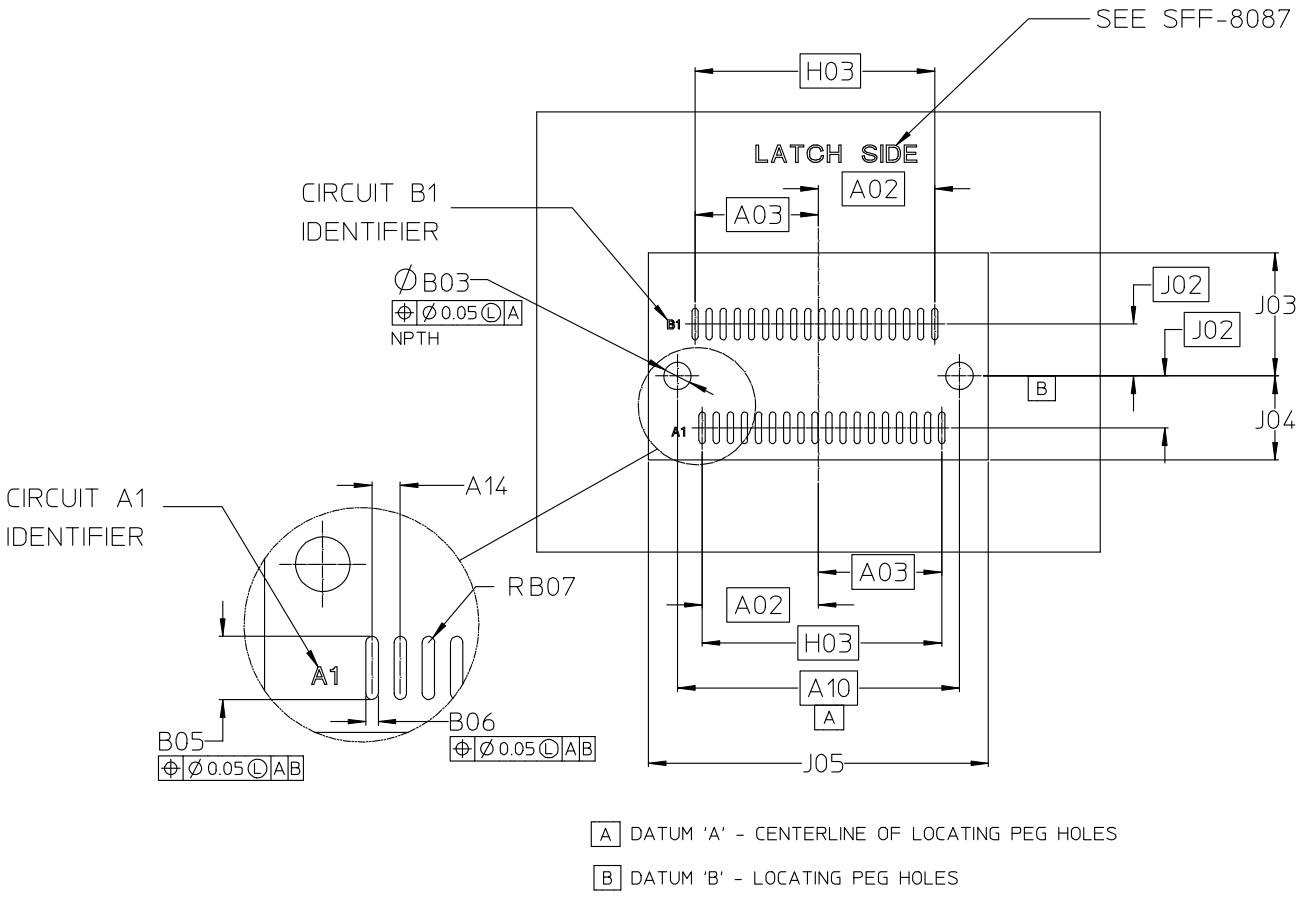


**FIGURE 6-5 FIXED (RECEPTACLE) STRAIGHT CONNECTOR FOOTPRINT**

### 6.4 Contact Numbering

The contact numbering is shown in Table 6-6 for the various sizes of connector. For location of contacts A1 and B1, see the figures above.

**TABLE 6-6 CONTACT NUMBERING**

| 26 Circuit | | 36 Circuit | | 50 Circuit | | 68 Circuit | |
|---|---|---|---|---|---|---|---|
| A1 | B1 | A1 | B1 | A1 | B1 | A1 | B1 |
| A2 | B2 | A2 | B2 | A2 | B2 | A2 | B2 |
| A3 | B3 | A3 | B3 | A3 | B3 | A3 | B3 |
| A4 | B4 | A4 | B4 | A4 | B4 | A4 | B4 |
| A5 | B5 | A5 | B5 | A5 | B5 | A5 | B5 |
| A6 | B6 | A6 | B6 | A6 | B6 | A6 | B6 |
| A7 | B7 | A7 | B7 | A7 | B7 | A7 | B7 |
| A8 | B8 | A8 | B8 | A8 | B8 | A8 | B8 |
| A9 | B9 | A9 | B9 | A9 | B9 | A9 | B9 |
| A10 | B10 | A10 | B10 | A10 | B10 | A10 | B10 |
| A11 | B11 | A11 | B11 | A11 | B11 | A11 | B11 |
| A12 | B12 | A12 | B12 | A12 | B12 | A12 | B12 |
| A13 | B13 | A13 | B13 | A13 | B13 | A13 | B13 |
| | | A14 | B14 | A14 | B14 | A14 | B14 |
| | | A15 | B15 | A15 | B15 | A15 | B15 |
| | | A16 | B16 | A16 | B16 | A16 | B16 |
| | | A17 | B17 | A17 | B17 | A17 | B17 |
| | | A18 | B18 | A18 | B18 | A18 | B18 |
| | | | | A19 | B19 | A19 | B19 |
| | | | | A20 | B20 | A20 | B20 |
| | | | | A21 | B21 | A21 | B21 |
| | | | | A23 | B23 | A23 | B23 |
| | | | | A24 | B24 | A24 | B24 |
| | | | | A25 | B25 | A25 | B25 |
| | | | | | | A26 | B26 |
| | | | | | | A27 | B27 |
| | | | | | | A28 | B28 |
| | | | | | | A29 | B29 |
| | | | | | | A30 | B30 |
| | | | | | | A31 | B31 |
| | | | | | | A32 | B32 |
| | | | | | | A33 | B33 |
| | | | | | | A34 | B34 |