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SFF Committee  
**SFF-8643 Specification**  
for  
**Mini Multilane 4/8X 12 Gb/s Unshielded Connector (HD12un)**

Rev 3.5      September 22, 2014

Secretariat: SFF Committee

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

This is the first generation of this 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.

All Best  
Amphenol  
Avago  
Cinch  
Dell Computer  
Emulex  
FCI  
GLGnet Electronics  
Hewlett Packard  
HGST  
Jess-Link  
LSI  
Luxshare-ICT  
Luxtera  
Molex  
NetApp  
NetLogic uSyst  
Panduit  
Seagate  
Shinning Electronics  
TE Connectivity  
Volex  
Xyratex

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

Foxconn

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

AMI  
Applied Micro  
Broadcom  
EMC  
Finisar  
JDS Uniphase  
Mellanox  
MGE  
Oclaro  
Pioneer  
QLogic  
Sandisk  
Sumitomo  
Toshiba  
Western Digital

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:

Rev 2.1 November 5, 2010:

- Dimension designators changed to alpha order for Figures 6.2 through 6.8.

Rev 2.3 January 11, 2011

- Title changed to "Unshielded 8/4 Channel for 12 Gb/s Applications"
- Changed A11 from 0.105 +/- 0.025 to 0.10 +/- 0.05
- Added note to E01 to clarify contact zone
- Figure 6.8 and Table 6.8 - 1x4 removed

Rev 2.6 August 9, 2012

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

Revision 2.7 April 22, 2013

- Adopt editorial convention of Gb/s

Revision 2.8 June 3, 2013

- Added appropriate figures for the new vertical versions
- Dimensioned the keep-out areas in the connector footprints
- Added rib to top of the right angle latch area

Revision 2.9 July 10, 2013

- Expanded Figure 3-1 to include more configurations
- Redrew figures and clarified dimensioning on vertical configurations

Revision 3.0 July 27, 2013

- Corrected some dimensions in Tables 6-1, 6-2 and 6-4

Revision 3.1 August 22, 2013

- Updated dimensions in Tables 6-1, 6-2 and 6-4
- Added R(right angle) and V(ertical) suffixes to Tables 6-1 and 6-2
- Added optional holes to Figures 6-10 and 6-12

Revision 3.2 February 26, 2014

- Revised description 3.0
- Updated Table 3-1 to list all versions
- Revised designators in Tables 6-1 and 6-2
- Removed revision note below Table 6-4
- Revised Table 6-5 dimensions

Revision 3.3 May 15, 2014

- Title change for commonality in style with QSFP

Revision 3.4 May 25, 2014

- Revised dimensions in Figures 6-1 and 6-2
- Added 6.2 section Title
- Revised Figure 6-7 and Table 6-3 titles
- Revised Titles for Figure 6-8 and Table 6-4
- Revised Table 6-4 to add the 1x2 size
- Revised text with section 6.3 and the section Title
- Revised Table 6-5 descriptions
- Revised Figure 6-12 Title
- Revised Figure 6-14 Title

Revision 3.5 September 22, 2014

- The connector content of this specification was used to create SFF-8613

## 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](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:

<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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## 1 Scope

This specification defines the performance requirements of the Mini Multilane unshielded connector.

### 1.1 Application Specific Criteria

This connector is capable of meeting the interface requirements for the high density internal I/O requirements of T10 SAS-3.

## 2 References

### 2.1 Industry Documents

The following interface standards and specifications are relevant to this Specification.

- INCITS 519 SAS-3 (Serial Attached SCSI 3)
- SFF-8410 High Speed Serial Testing for Copper Links
- SFF-8613 Mini Multilane 8/4X Unshielded Connector
- SFF-8614 Mini Multilane 8/4X Shielded Connector
- SFF-8644 Mini Multilane 12 Gb/s 8/4X Shielded 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/c4psq>).

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

### 2.4 Conventions

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

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

American	French	ISO
0.6	0,6	0.6
1,000	1 000	1 000
1,323,462.9	1 323 462,9	1 323 462.9

### 3 Description

This specification identifies the documentation required to implement a 12 Gb/s unshielded connector suitable to the using applications, as illustrated in the following pictorial representation.

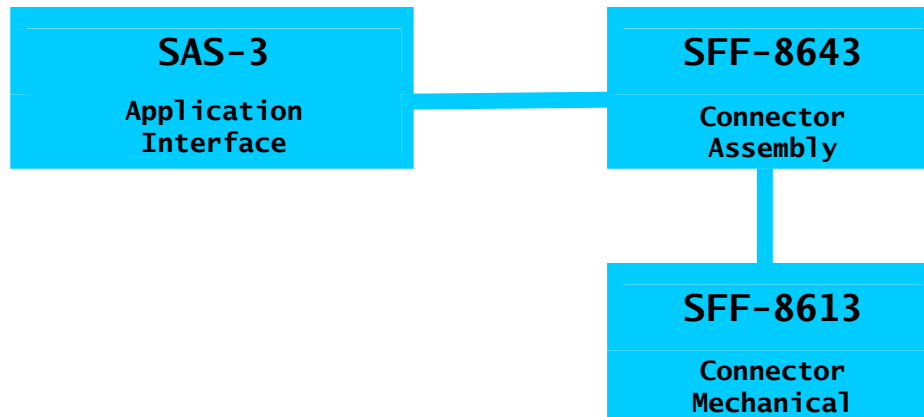


FIGURE 3-1 DOCUMENTATION TO IMPLEMENT A 12 GB/S CONNECTOR

### 4 Overview of Referenced Specifications

#### 4.1 Application Requirements

The electrical and EMI considerations for the use of this connector are specified by the using standards listed in Section 1.1.

This connector system is based upon vertical and right angle receptacle (fixed) connectors and (free) mating plugs. The host board footprint mounting holes contain the critical dimensions for locating the receptacles to the host board. The integral 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.

4.2 SFF-8613

SFF-8613 provides for a 1x1, 1x2 and 1x4 receptacle (fixed side) as well as a 1x1 (4X) and a 1x2 (8X) vertical receptacles and the mating cable plugs (free side).

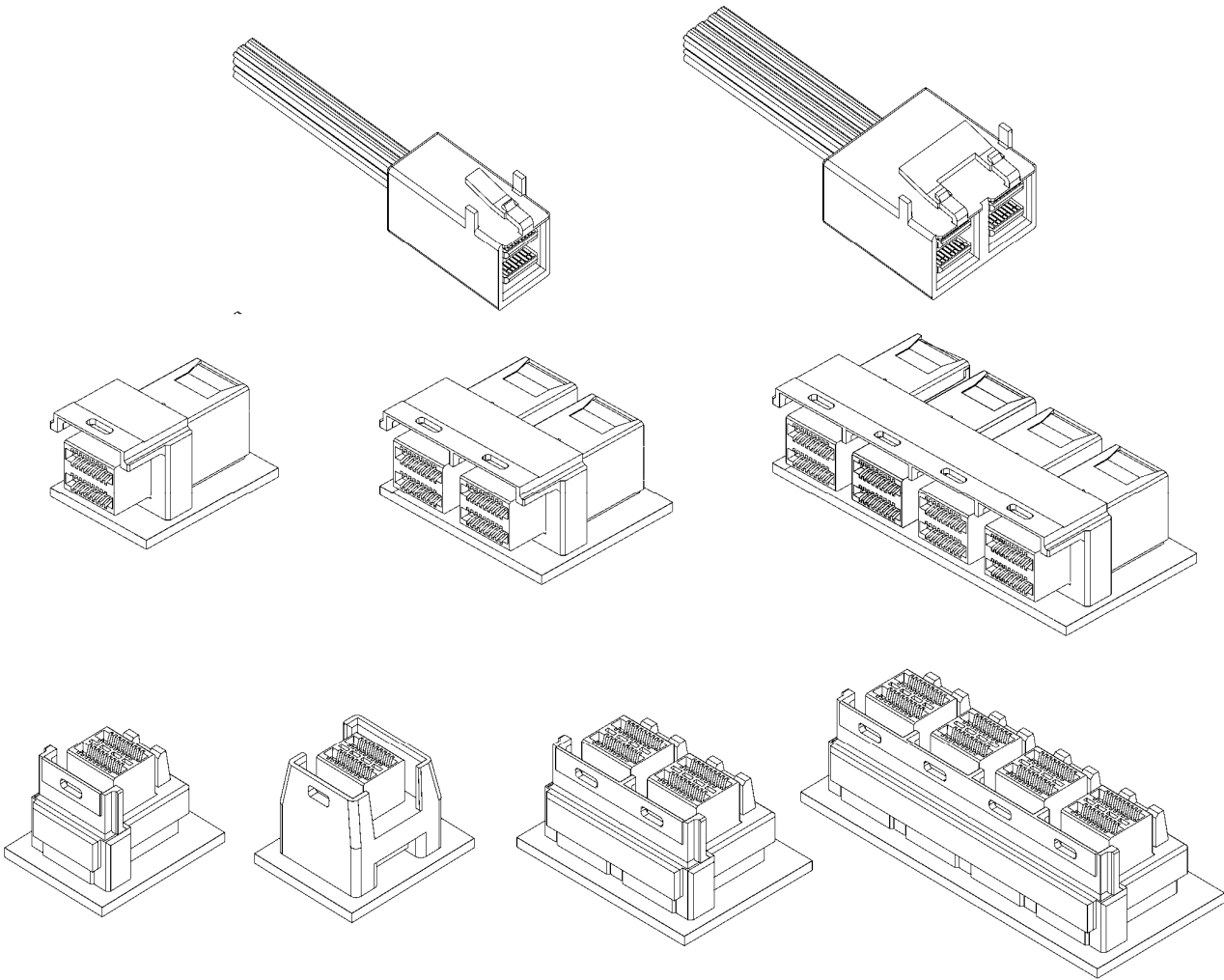


FIGURE 4-1 GENERAL VIEW OF CONFIGURATIONS

TABLE 4-1 CONFIGURATIONS

Port	Positions	Right Angle	Vertical Modular	Vertical Unitary	Plug
1x1	36	X	X	X	X
1x2	72	X	X	Not Shown	X
1x4	144	X	X	NA	NA