

SFF Committee

**SFF-8323**

Specification for

**3.5" Form Factor Drive with Serial Attached Connector**

**The 3.5" specifications were standardized as EIA-740 1999/07**

Subsequent to that date, this specification was developed

**This specification has been submitted to the EIA**

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-8323**  
Specification for  
**3.5" Form Factor Drive with Serial Attached Connector**

Rev 1.6      August 30 2014

Secretariat: SFF Committee

**Abstract:** This specification defines the requirements for the location of the serial connector on the 3.5" Drive Form Factors for Serial Attached SCSI (SAS) applications. The location is similar to that of the Serial ATA (SATA) connector location such that a backplane with a SAS receptacle connector may accept either a SAS or SATA drive. Dimensions are referenced either from the form factor bottom mounting hole or the form factor side mounting hole, depending on the application. Additional information concerning Serial ATA may be found at [www.serialata.org](http://www.serialata.org).

The connector location is nominally flush to the drive form factor.

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.

**Support:** This document 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  
Dell  
ENDL  
FCI/Berg  
Foxconn Int'l  
Fujitsu CPA  
Hewlett Packard  
Hitachi America  
Hitachi GST  
Honda Connector  
IBM  
Intel  
Madison Cable  
Maxtor  
Molex  
Nexans  
Seagate  
Sun Microsystems  
Toshiba America  
Tyco AMP  
Unisys  
Xyratex

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

Amphenol  
Fujitsu Compnts  
Infineon  
Vitesse Semi

**Update History**

Rev 1.5 (December 21, 2013)

- Rev 1.4 September 2004 contents incorporated in current template.

Rev 1.6 (August 30, 2014)

- Editorial changes for consistency between specifications in revised EIA-740.

## 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.

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SFF Committee --

### **3.5" Form Factor Drive with Serial Attached Connector**

#### **1. Scope**

This specification defines the location of the serial interface connector on the 3.5" Drive Form Factor for Serial Attached SCSI (SAS) applications.

##### **1.1 Application Environment**

The environment for the 35" Drive Form Factor is any computer, cabinet, or enclosure connecting to one or more drives in a restricted packaging environment.

The purpose of this Specification is to provide information that will assist vendors to design products that can fit the same packaging envelope.

#### **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 standards are relevant to many SFF Specifications.

- ASME Y14.5M      Dimensioning and Tolerancing
- INCITS.376      Serial Attached SCSI (SAS)
- T10 1601-D      Serial Attached SCSI - 1.1 (SAS-1.1)
- SFF-8301      3.5" Form Factor Drive Dimensions
- SFF-8482      Serial Attachment 2X Unshielded Connector
- SFF-8630      Serial Attachment 12 Gb/s 4X Unshielded Connector
- SFF-8639      Multifunction 12 Gb/s 6X Unshielded Connector
- SFF-8680      Serial Attachment 12 Gb/s 2X Unshielded 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://www.techstreet.com/incitsgate.tmpl>).

##### **2.4 Conventions**

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

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. General Description

The application environment for the 3.5" Drive Form Factor is any computer, cabinet, or enclosure connecting to one or more drives in a restricted packaging environment.

This specification defines the location of the serial connector on the 3.5" Drive Form Factor for Serial Attached SCSI (SAS) applications. The connector location is nominally flush to the drive form factor.

This specification defines requirements for a drive that can be directly inserted into the backplane of a cabinet, without the need for a cable, and provides information necessary to assist manufacturers in the systems integration of small form factor disk drives. Alternately, a cable may be used to supply power and to connect to the primary data port of the drive. This specification allows only one location for the interface connector on the drive for any specific application.

The location is similar to that of the Serial ATA (SATA) connector location such that a backplane with a SAS receptacle connector may accept either a SAS or SATA drive. Additional information concerning Serial ATA may be found at [www.serialata.org](http://www.serialata.org).

In application option A where bottom mounting is used, the bottom mounting hole provides the reference for dimensions. In application option B where side mounting is used, the side mounting hole provides the reference for dimensions. A drive may comply with both options but the systems application must choose either Option A or Option B.

This specification methodology prevents excessive tolerance stack-up between the two mounting screw locations when the connector is referenced to only one mounting screw location and the form factor drawing is used to determine the location of the connector to the other mounting screw location.

Provision exists in the serial connector for improved mating via guides. Staggered pin lengths incorporate provision for mating ground prior to mating any other signals.

Care must be taken in the application of this drive so that excessive stress is not exerted on the connector. Backplane configurations must pay particular attention so that the connector is not damaged due to excessive side loading, compressive forces, or from supporting the weight of the device.



Table 3-1 defines the dimensions associated with the positioning of the serial connector on the drive as illustrated in the figures.

**TABLE 3-1 SERIAL CONNECTOR LOCATION**

<b>Dimension</b>	<b>Millimeters</b>	<b>Inches</b>
A 1	101.60	4.000
A 2	42.73	1.682
A 3	33.39	1.315
A 4	0.40	0.016
A 5	4.00	0.157
A 6	0.76	0.030
A 7	3.50	0.138
A 8	36.38	1.432
A 9	0.25	0.010
A10	1.00	0.039
A11	20.68	0.814
A12	0.38	0.015
A13	13.43	0.529
A14	37.20	1.465
A15	1.50	0.059
A16	1.00	0.039
A17	1.00	0.039
A18	23.60	0.929
A19	1.00	0.039
A20	2.85	0.112

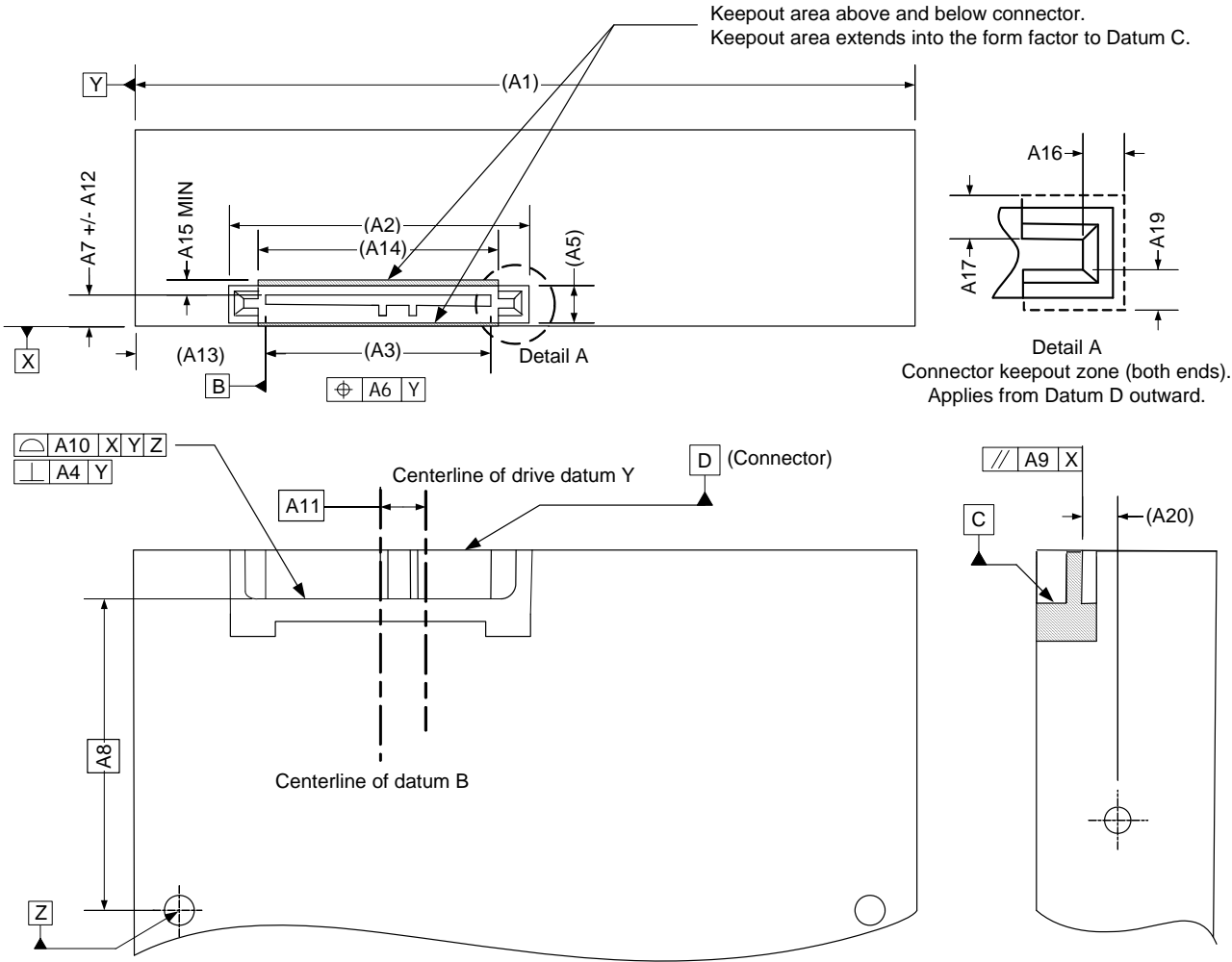


FIGURE 3-1 OPTION A: SERIAL CONNECTOR REFERENCED TO BOTTOM MOUNTING SCREW

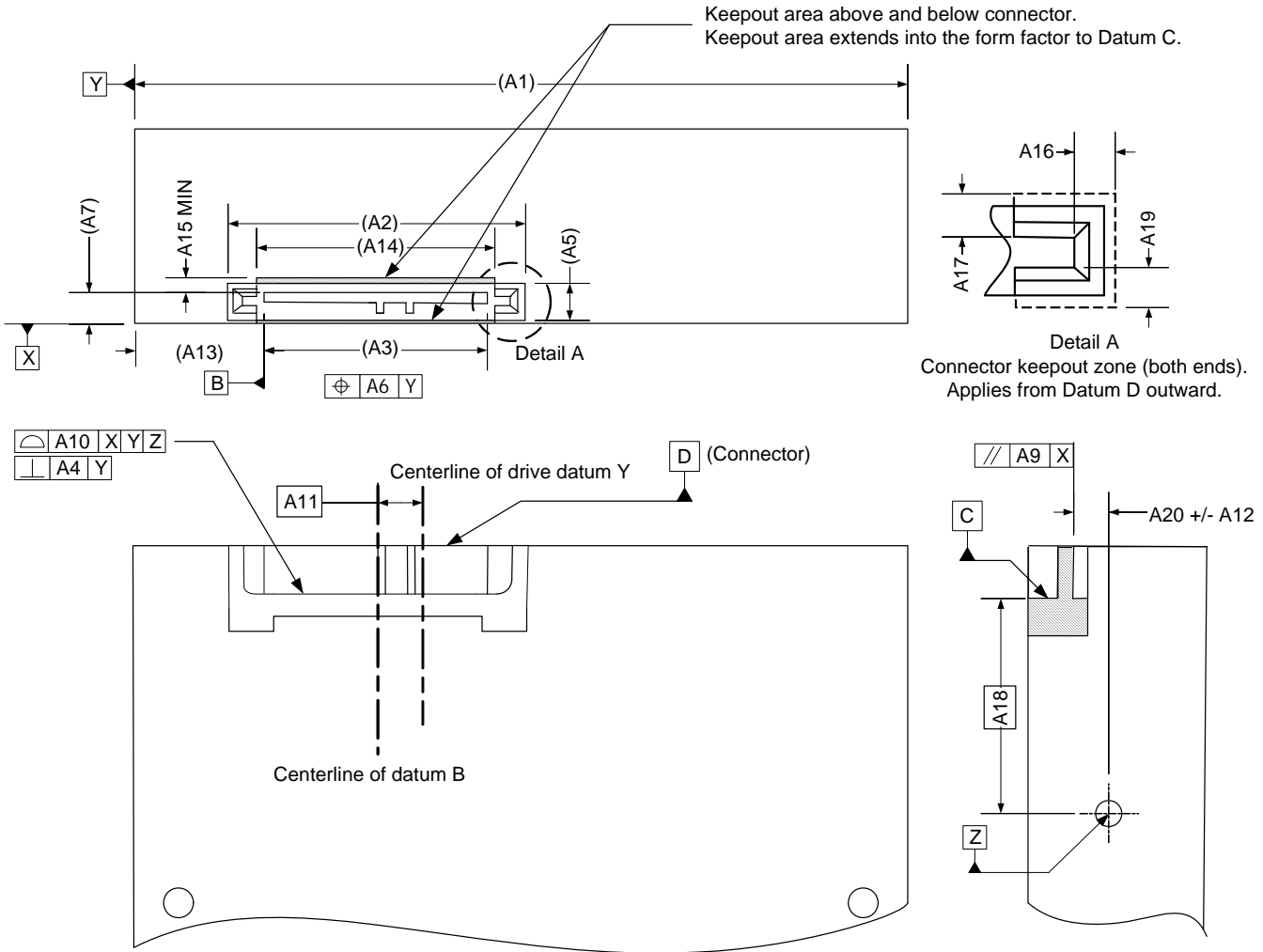


FIGURE 3-2 OPTION B: SERIAL CONNECTOR REFERENCED TO SIDE MOUNTING SCREW