

SFF Committee

SFF-8300

Specification for

Suite of 3.5" Form Factor Drives

Rev 2.4

January 16, 2016

Standardized as EIA-740 1999/07

This specification was Expired after being submitted as a project to the Electronic Industries Alliance as a consolidation of several specifications.

| | | |
|----------|-----|--|
| SFF-8301 | 1.4 | 3.5 inch Form Factor Drive Dimensions |
| SFF-8302 | 1.1 | 3.5 inch Form Factor Cabled Connector Locations |
| SFF-8332 | 1.2 | 3.5 inch Form Factor Drive w/80-pin SFF-8015 SCA Connector |
| SFF-8337 | 1.2 | 3.5 inch Form Factor Drive w/SCA-2 Connector |
| SFF-8342 | 1.3 | 3.5 inch Form Factor Drive w/Serial Unitized Connector |

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

Standardized as EIA-740-A 2016/01

Some individual specifications Expired, some were new, and the editor had cause to generate revisions of others, the details of which are reflected in the Update History on the 'Expression of Support by Manufacturers' page. .

| | | |
|----------|-----|---|
| SFF-8301 | 1.8 | 3.5 inch Form Factor Drive Dimensions |
| SFF-8302 | 1.3 | 3.5 inch Form Factor Cabled Connector Locations |
| SFF-8323 | 1.6 | 3.5 inch Form Factor Drive w/Serial Attached Connector |
| SFF-8337 | 1.5 | 3.5 inch Form Factor Drive w/SCA-2 Connector |
| SFF-8348 | 1.0 | 3.5 inch Form Factor w/Combo Connector inc USB Micro-B Receptacle |

EXPRESSION OF SUPPORT BY MANUFACTURERS

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

All Best
Foxconn
HGST
Luxshare-ICT
Molex
Sandisk
Seagate
Shenzhen
TE Connectivity
Toshiba
Volex

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

Amphenol
Applied Micro
Broadcom
FCI
Finisar
JDS Uniphase
QLogic
Sumitomo

Update History

Rev 2.3 (October 31, 2015)

- Corrected errors found in SFF-8337 during EIA ballot review

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.

TABLE OF CONTENTS

| | |
|-----------------------------------|----|
| 1. Scope | 8 |
| 1.1 Application Environment | 8 |
| 2. References | 8 |
| 2.1 Industry Documents | 8 |
| 2.2 SFF Specifications | 8 |
| 2.3 Sources | 8 |
| 2.4 Conventions | 8 |
| 2.5 Definitions | 8 |
| 3. General Description | 10 |
| 3.1 Mounting Holes | 10 |
| 3.2 Dimensions | 10 |
| 4. Scope | 14 |
| 4.1 Application Environment | 14 |
| 5. References | 14 |
| 5.1 Industry Documents | 14 |
| 5.2 SFF Specifications | 14 |
| 5.3 Sources | 14 |
| 5.4 Conventions | 14 |
| 6. General Description | 15 |
| 6.1 Discrete Connectors | 15 |
| 6.2 Unitized Connectors | 15 |
| 6.3 Upgradable Unitized Connector | 16 |
| 7. Scope of SFF-8323 | 19 |
| 7.1 Application Environment | 19 |
| 8. References | 19 |
| 8.1 Industry Documents | 19 |
| 8.2 SFF Specifications | 19 |
| 9. Sources | 19 |
| 9.1 Conventions | 19 |
| 10. General Description | 21 |
| 11. Scope | 27 |
| 11.1 Application Environment | 27 |
| 12. References | 27 |
| 12.1 Industry Documents | 27 |
| 12.2 SFF Specifications | 27 |
| 12.3 Sources | 27 |
| 12.4 Conventions | 27 |
| 13. General Description | 28 |
| 14. Scope | 33 |
| 14.1 Application Environment | 33 |
| 15. References | 33 |
| 15.1 Industry Documents | 33 |
| 15.2 SFF Specifications | 33 |
| 15.3 Sources | 33 |
| 15.4 Conventions | 33 |

| | |
|-------------------------|----|
| 16. General Description | 34 |
|-------------------------|----|

FIGURES

| | |
|---|----|
| Figure 3-1 Form Factor of 3.5" Disk Drive | 11 |
| Figure 6-1 Discrete Connector Orientation | 15 |
| Figure 6-2 Unitized Connector Orientation | 15 |
| Figure 6-3 Upgradable Unitized Connector Orientation | 16 |
| Figure 10-1 Option A: Serial Connector Referenced to Bottom Mounting Screw | 23 |
| Figure 10-2 Option B: Serial Connector Referenced to Side Mounting Screw | 24 |
| Figure 13-1 SCA-2 Connector Location | 29 |
| Figure 13-2 Connector Clearance Zones | 30 |
| Figure 16-1 Option 1: Connector Referenced to Bottom Mounting Screws (1 of 2) | 36 |
| Figure 16-2 Option 1: Connector Referenced to Bottom Mounting Screws (2 of 2) | 37 |
| Figure 16-3 Connector Referenced To Side Mounting Screws (1 of 2) | 38 |
| Figure 16-4 Connector Referenced To Side Mounting Screws (2 of 2) | 39 |

TABLES

| | |
|---|----|
| Table 3-1 3.5" Disk Drive Dimensions | 10 |
| Table 10-1 Serial Connector Location | 22 |
| Table 13-1 SCA-2 Connector Location | 28 |
| Table 16-1 USB 3.0 Combination Connector Location | 35 |

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

SFF Committee

SFF-8301

Specification for

3.5" Form Factor Drive Dimensions

Rev 1.8

August 30 2014

Secretariat: SFF Committee

A prior generation of this specification has been incorporated as a standard of the Electronic Industries Association, and can be purchased through Global Engineering (303-792-2181) in hard copy form as EIA-740.

Since the EIA standard was published, there have been changes introduced by industry.

EIA standards and draft standards are not available electronically, so the SFF provides electronic copies of this specification.

Abstract: This document defines the dimensions for 3.5" magnetic disk drives.

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

POINTS OF CONTACT:

Alvin Cox
Seagate Technology, LLC
10321 West Reno Avenue
Oklahoma City OK 73157

Ph: 405-206-4809
alvin dot cox at seagate dot com

I. Dal Allan
Chairman SFF Committee
14426 Black Walnut Court
Saratoga CA 95070

Ph: 408-867-6630
endlcom at acm dot org

EXPRESSION OF SUPPORT BY MANUFACTURERS

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

3M
Adaptec
Cirrus Logic
EMC
ENDL
Foxconn
Hewlett Packard
HGST
Honda Connector
IBM
Intel
Luxshare-ICT
Madison Cable
Maxtor
Methode
Seagate
Sigmax
TE Connectivity
Unisys

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

Amphenol
Avago
DEC
Dell Computer
ETRI
FCI
Finisar
Micrel
Molex
NetApp
Oclaro
QLogic
Sandisk
Sumitomo
Toshiba
Volex

Change History:

Rev 1.5 (January 27, 2010)

- Added new bottom fastener position A13 dimension (3.000 in) to Figure 4-1.
- Added new bottom fastener position choice description to Section 4.1

Rev 1.6 (March 16, 2010)

- Updated new bottom fastener position choice description in Section 4.1 as per advice of the committee at the March 2010 meeting.

Rev 1.7 (February 8, 2013)

- Note on thread size omitted from redrawn Figure 4-1 included in Table 4-1.

Rev 1.8 (August 30, 2014)

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

SFF Committee --

3.5" Form Factor Drive Dimensions

1. Scope

This specification defines the dimensions of 3.5" disk drives.

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
- X3.131R-1994 SCSI-2 Small Computer System Interface
- X3.253-1995 SPI (SCSI-3 Parallel Interface)
- X3.302-xxxx SPI-2 (SCSI-3 Parallel Interface -2)
- X3.277-1996 SCSI-3 Fast 20
- X3.221-1995 ATA (AT Attachment) and subsequent extensions

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 (www.techstreet.com/incitsgate.html).

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 |

2.5 Definitions

For the purpose of SFF Specifications, the following definitions apply:

Height: Distance from board surface to farthest overall connector feature

Optional: This term describes features which 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.

3. General Description

3.1 Mounting Holes

There are four to six mounting holes on the bottom and two on each side.

Although a disk vendor may provide for three positions per side, systems manufacturers may find that the hole located between the two specified holes is not in the same location relative to the other holes for a wide selection of drives. For this reason, the middle hole has not been specified and is considered optional.

The pair of bottom mounting holes located by dimension A7 is required. One additional pair of bottom mounting holes are required, either the pair of mounting holes located by dimension A6 or the pair of mounting holes located by dimension A13. Providing all three pairs of mounting holes (located by dimensions A7, A6 and A13) is allowed.

3.2 Dimensions

TABLE 3-1 3.5" DISK DRIVE DIMENSIONS

| Dimension | Millimeters | | Inches | |
|----------------|-------------|-----|-------------|-----|
| | | Max | | Max |
| A 1 | 17.80 | Max | 0.700 | Max |
| A 1 | 26.10 | Max | 1.028 | Max |
| A 1 | 42.00 | Max | 1.654 | Max |
| A 2 | 147.00 | Max | 5.787 | Max |
| A 3 | 101.60 | | 4.000 | |
| A 4 | 95.25 | | 3.750 | |
| A 5 | 3.18 | | 0.125 | |
| A 6 | 44.45 | | 1.750 | |
| A 7 | 41.28 | | 1.625 | |
| A 8 | 28.50 | | 1.122 | |
| A 9 | 101.60 | | 4.000 | |
| A10 | 6.35 | | 0.250 | |
| A11 | 0.25 | | 0.010 | |
| A12 | 0.50 | | 0.020 | |
| A13 | 76.20 | | 3.000 | |
| Threads | | | | |
| Size | | | 6-32 UNC-28 | |
| Penetration | 3.0 | Min | 3.8 | Max |

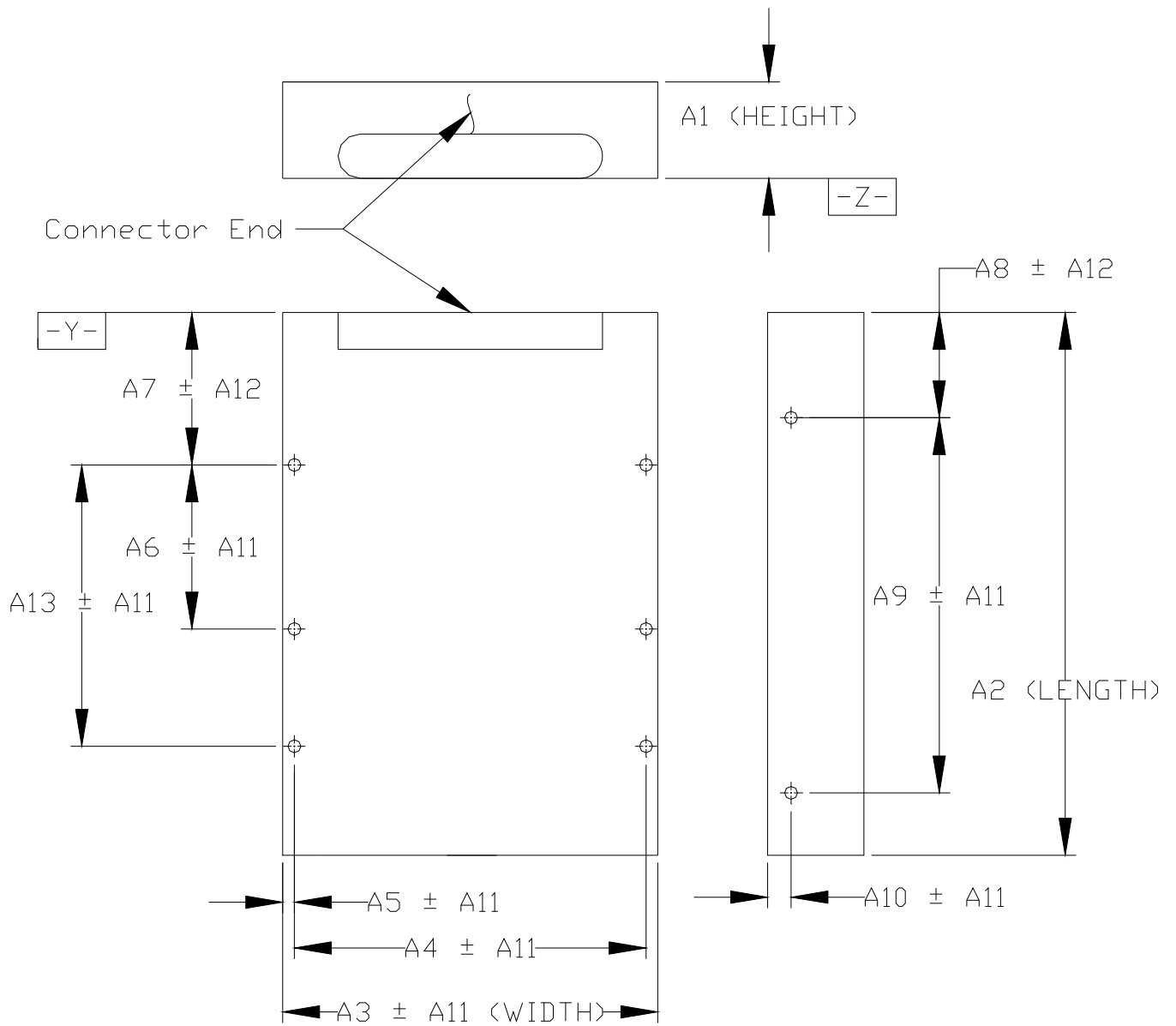


FIGURE 3-1 FORM FACTOR OF 3.5" DISK DRIVE

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-8302

Specification for

3.5" Form Factor Cabled Connector Locations

Rev 1.3

August 30 2014

Secretariat: SFF Committee

Abstract: This specification defines the cabled connector locations on 3.5" magnetic disk drives.

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.

POINTS OF CONTACT:

Alvin Cox
Seagate Technology, LLC
10321 West Reno Avenue
Oklahoma City OK 73157

Ph: 405-206-4809
alvin dot cox at seagate dot com

I. Dal Allan
Chairman SFF Committee
14426 Black Walnut Court
Saratoga CA 95070

Ph: 408-867-6630
endlcom at acm dot org

EXPRESSION OF SUPPORT BY MANUFACTURERS

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

3M
Adaptec
AMP
Cirrus Logic
Conner Peripherals
ENDL
Hewlett Packard
Honda Connector
IBM
Madison Cable
Maxtor
Methode
Quantum
Robinson Nugent
Seagate
Sigmax

Update History

Rev 1.2 (December 21, 2013)

- Rev 1.1 June 1995 contents incorporated in current template.

Rev 1.3 (August 30, 2014)

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

SFF Committee --

3.5" Form Factor Cabled Connector Locations

4. Scope

This specification defines the connector locations on 3.5" magnetic disk drives for the attachment of cables.

4.1 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.

5. References

The SFF Committee activities support the requirements of the storage industry, and it is involved with several standards.

5.1 Industry Documents

The following standards are relevant to many SFF Specifications.

- ASME Y14.5M Dimensioning and Tolerancing

5.2 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>

5.3 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.tmp1>).

5.4 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 |

6. General Description

6.1 Discrete Connectors

The connectors may be located anywhere at the rear of the drive, as per the orientation illustrated in Figure 5-1 which is established to simplify cabling for the integrator.

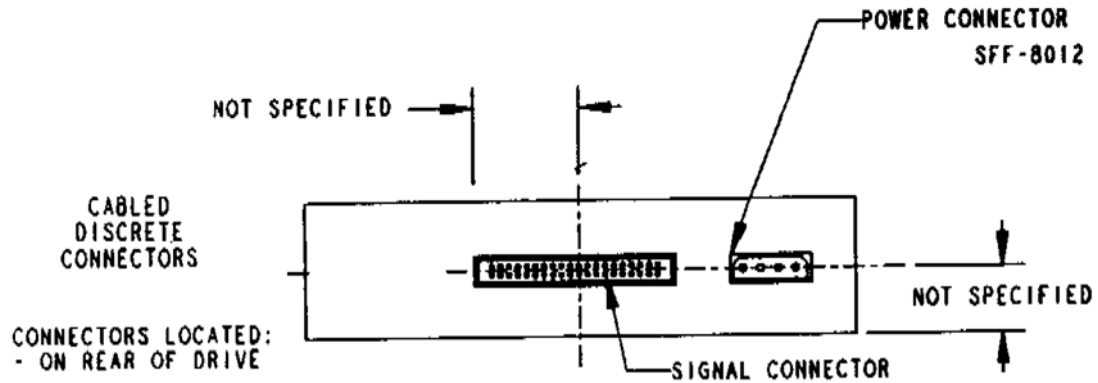


FIGURE 6-1 DISCRETE CONNECTOR ORIENTATION

6.2 Unitized Connectors

The packaging of two or more different types of connectors in a single shell can assist in reducing the manufacturing cost of disk drives, and may be mounted as illustrated in Figure 5-2. Unitized connectors may or may not have similar pitch or contact styles e.g. see SFF-8009 Unitized Connector for Cabled Drives.

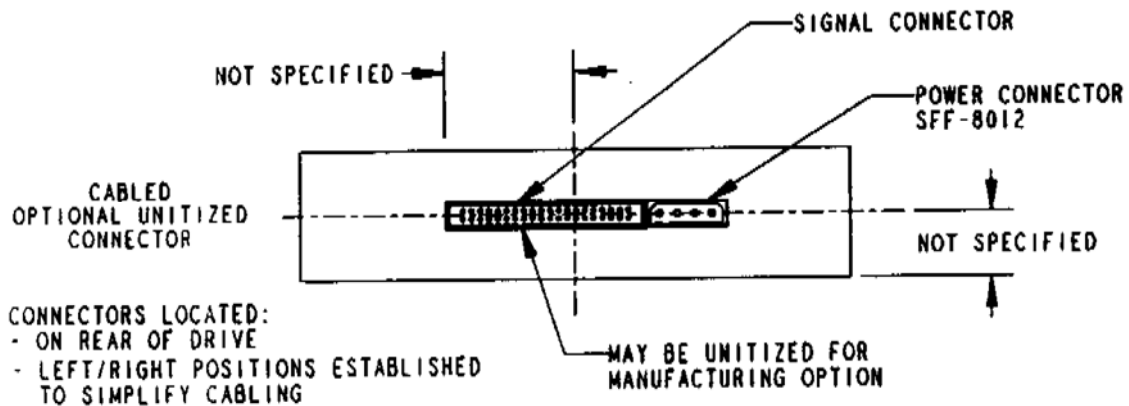


FIGURE 6-2 UNITIZED CONNECTOR ORIENTATION

6.3 Upgradable Unitized Connector

If an OEM wishes to use multiple drive types in a cabinet, there may be tight restrictions placed on the vendor as to where the connector can be located at the rear of the drive. Unitized Connectors of the type illustrated in Figure 5-3 may vary in spacing between the connector sections. SFF Specifications for the Single Connector Attach and Serial Unitized Connectors are designed to be superior alternatives to achieve the same objective.

The Unitized Connector has to be manufactured in a fixed position relative to the form factor to assure user upgradability. Support for interchangeable drives using a Unitized Connector as illustrated in Figure 5-3 is a Vendor Unique option.

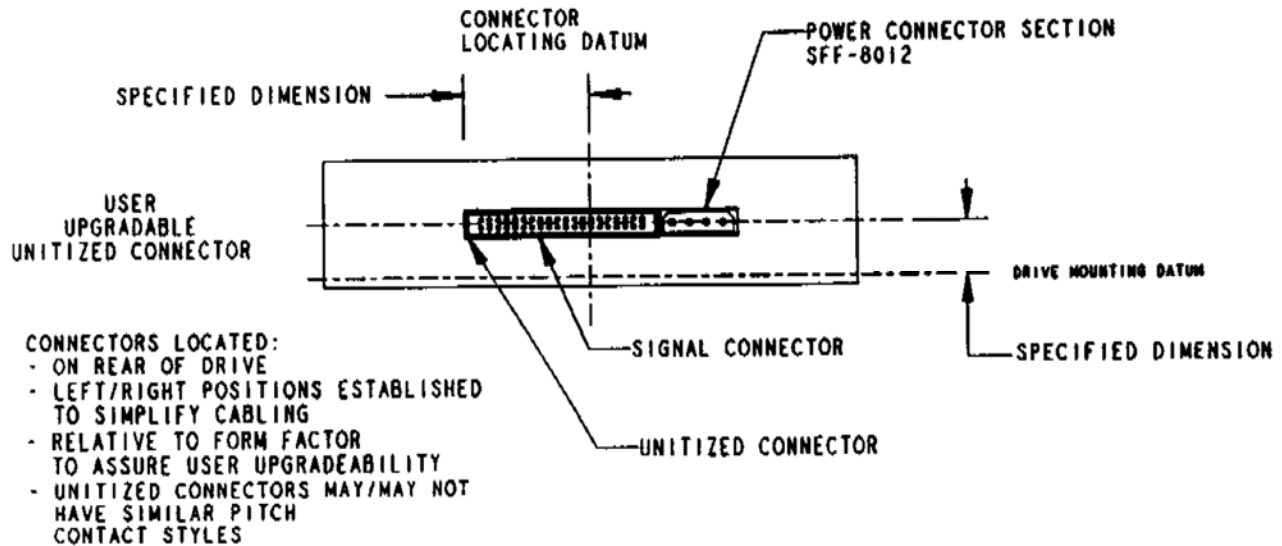


FIGURE 6-3 UPGRADABLE UNITIZED CONNECTOR ORIENTATION

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 1.5 December 21, 2013

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.

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.

POINTS OF CONTACT:

Alvin Cox
Seagate Technology, LLC
10321 West Reno Avenue
Oklahoma City OK 73157

Ph: 405-206-4809
alvin dot cox at seagate dot com

I. Dal Allan
Chairman SFF Committee
14426 Black Walnut Court
Saratoga CA 95070

Ph: 408-867-6630
endlcom at acm dot org

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 - Rev 1.4 September 2004 contents incorporated in current template.

SFF Committee --

3.5" Form Factor Drive with Serial Attached Connector

7. Scope of SFF-8323

The 83xx suite of specifications describes the configuration characteristics associated with 3.5" disk drives. This suite defines the characteristics of drives such that products from different vendors may be used in the same mounting configurations. External dimensions, connector placement, and mounting holes assist manufacturers in the systems integration of small form factor disk drives.

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

7.1 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.

8. References

The SFF Committee activities support the requirements of the storage industry, and it is involved with several standards.

8.1 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

8.2 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>

9. 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.tmp1>).

9.1 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 |

10. 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.

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 10-1 defines the dimensions associated with the positioning of the serial connector on the drive as illustrated in the figures.

TABLE 10-1 SERIAL CONNECTOR LOCATION

| Dimension | Millimeters | Inches |
|------------------|--------------------|---------------|
| 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 |

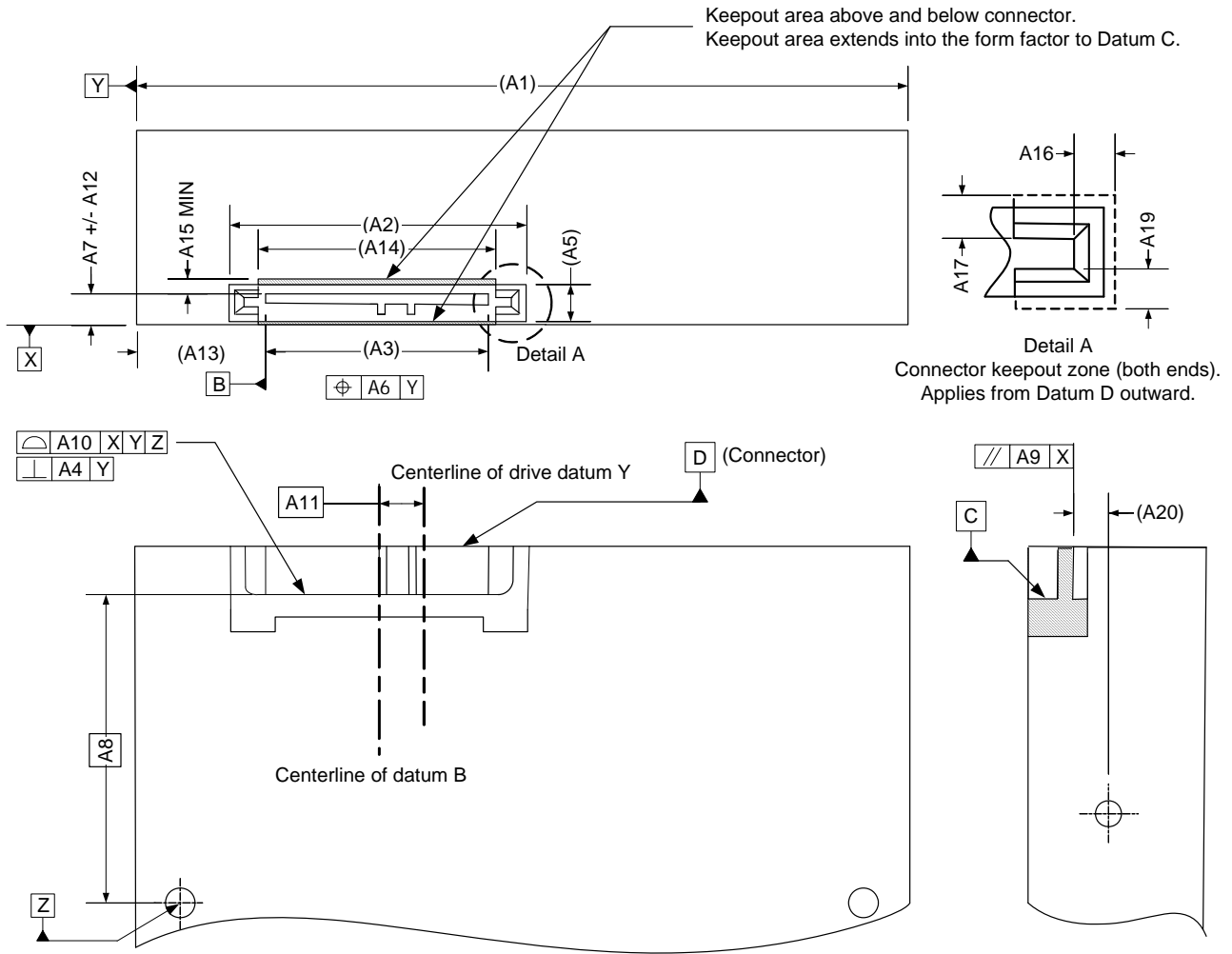


FIGURE 10-1 OPTION A: SERIAL CONNECTOR REFERENCED TO BOTTOM MOUNTING SCREW

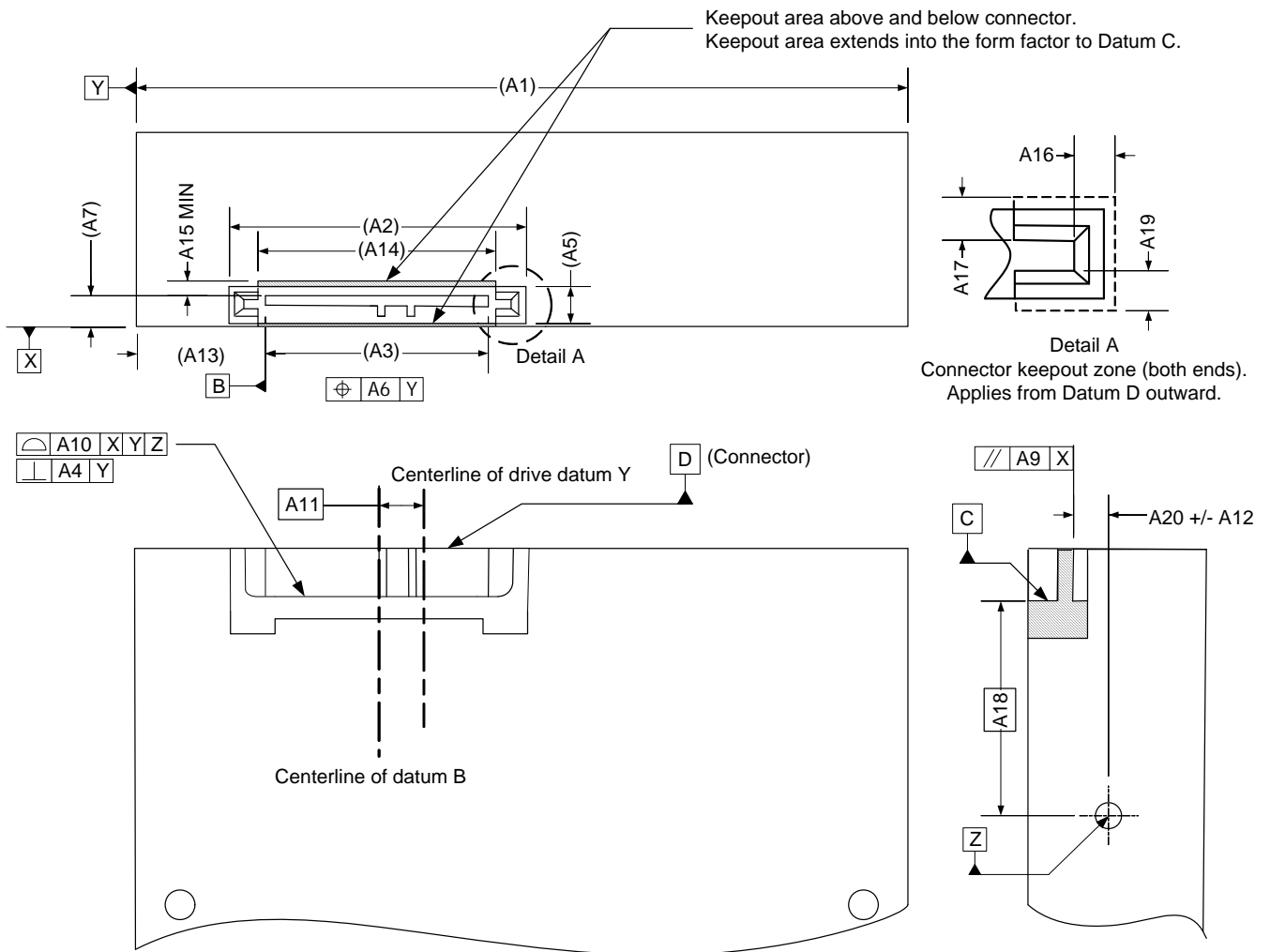


FIGURE 10-2 OPTION B: SERIAL CONNECTOR REFERENCED TO SIDE MOUNTING SCREW

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-8337

Specification for

3.5" Form Factor Drive w/SCA-2 Connector

Rev 1.5 October 31, 2015

Secretariat: SFF Committee

Abstract: This specification defines the location of Fibre Channel SCA-2 connectors on 3.5" magnetic disk drives.

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.

POINTS OF CONTACT:

Alvin Cox
Seagate Technology, LLC
10321 West Reno Avenue
Oklahoma City OK 73157

Ph: 405-206-4809
alvin dot cox at seagate dot com

I. Dal Allan
Chairman SFF Committee
14426 Black Walnut Court
Saratoga CA 95070

Ph: 408-867-6630
endlcom at acm dot org

EXPRESSION OF SUPPORT BY MANUFACTURERS

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

3M
Adaptec
AMP
Cirrus Logic
Conner Peripherals
ENDL
Hewlett Packard
Honda Connector
IBM
Madison Cable
Maxtor
Methode
Robinson Nugent
Seagate
Sigmax
Unisys

Update History

Rev 1.3 (December 21 2013)

- Rev 1.2 July 1995 contents incorporated in current template.
- References to SCSI were removed because SFF-8046 80-pin SCA-2 Connector for SCSI Disk Drives has Expired since SFF-8337 was first Published.

Rev 1.4 (August 30, 2014)

- Editorial changes to clarify that inches is the controlling dimension.
- Editorial changes for consistency between specs in revised EIA-740.

Rev 1.5 (October 31, 2015): errors found during EIA ballot review

- Corrected pin count of Fibre Channel connector in 3
- Deleted first A2 dimension in Table 3-1

SFF Committee --

3.5" Form Factor Drive w/SCA-2 Connector

11. Scope

This specification defines the connector locations for Fibre Channel 3.5" magnetic disk drives.

11.1 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.

12. References

The SFF Committee activities support the requirements of the storage industry, and it is involved with several standards.

12.1 Industry Documents

The following standards are relevant to many SFF Specifications.

- ASME Y14.5M Dimensioning and Tolerancing
- SFF-8451 SCA-2 2 Gb/s 2X Unshielded Connector
- SFF-8454 SCA-2 8 Gb/s 2X Unshielded Connector

12.2 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>

12.3 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.tmp1>).

12.4 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, unless specifically stated otherwise.

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 |

13. General Description

This specification defines the location of the interface connectors of 40-pin SCA-2 (Single Connector Attach) for Fibre Channel 3.5" disk drives.

This specification defines a drive which 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. This specification allows only one location for the interface connector on the drive.

Provision exists in the SCA-2 connector for improved mating via guides which incorporate provision for mating ground prior to mating any other signals.

Table 13-1 defines the dimensions associated with the positioning of the connector on the drive as illustrated in Figure 13-1.

TABLE 13-1 SCA-2 CONNECTOR LOCATION

| Dimension | Inches | Millimeter s |
|------------------|---------------|-------------------------|
| A 1 | 4.000 | 101.60 |
| A 2 | 1.618 | 41.10 |
| A 3 | 0.040 | 1.02 |
| A 4 | 0.015 | 0.38 |
| A 5 | 0.276 | 7.00 |
| A 6 | 0.040 | 1.02 |
| A 7 | 0.181 | 4.60 |
| A 8 | 1.625 | 41.28 |
| A 9 | 0.015 | 0.38 |
| A10 | 0.020 | 0.50 |

1. Inch is the controlling dimensional unit.
2. No feature shall protrude more than 0.020" (0.50mm) beyond the face of the connector

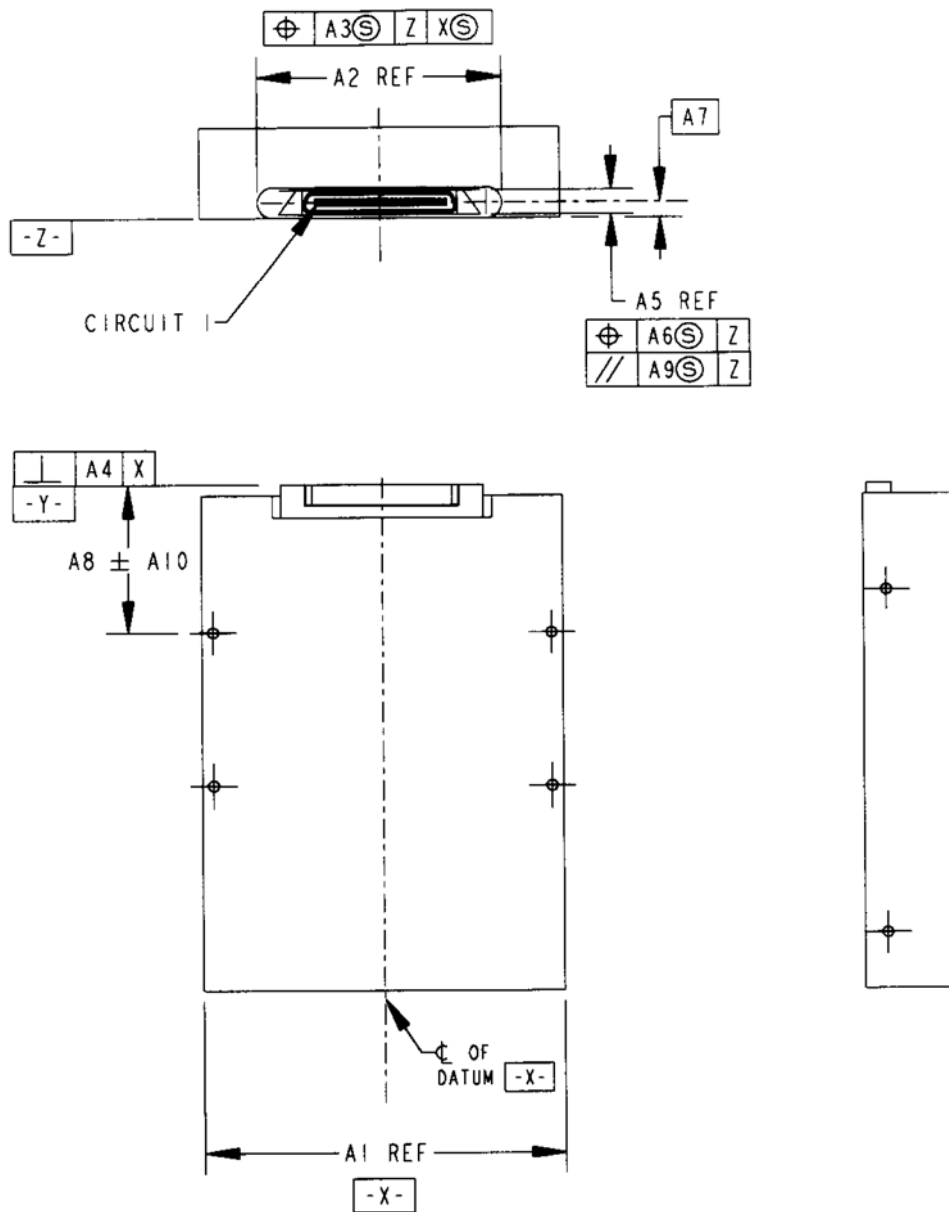
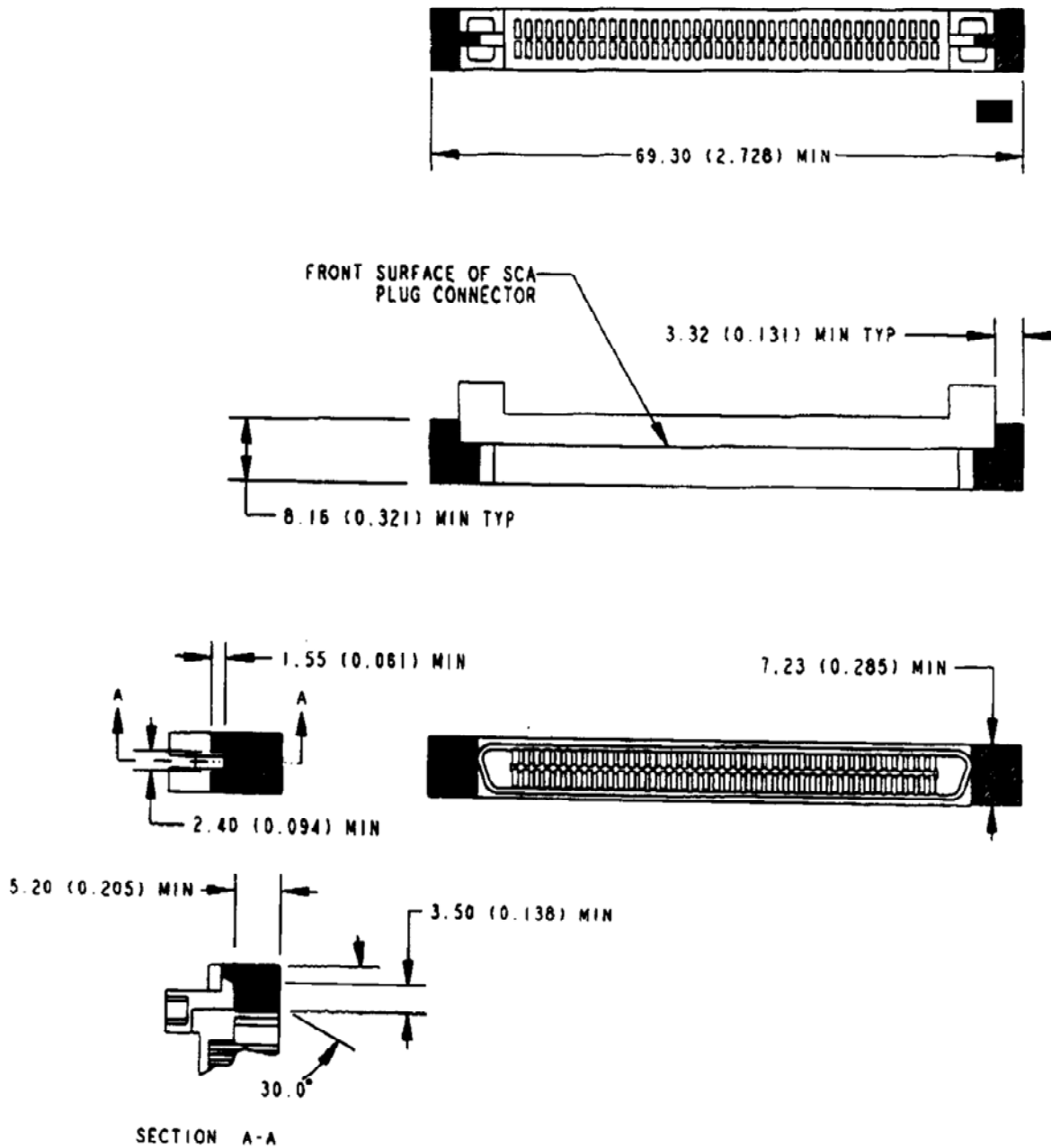


FIGURE 13-1 SCA-2 CONNECTOR LOCATION



1. CROSS HATCH DEPICTS CLEARANCE ZONE

The clearance zones defined are independent of the connector size.

FIGURE 13-2 CONNECTOR CLEARANCE ZONES

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-8348

Specification for

3.5" Form Factor w/Combo Connector inc USB Micro-B Receptacle

Rev 1.0

August 30 2014

Secretariat: SFF Committee

Abstract: This specification defines the dimensions for location of the combination connector including a USB 3.0 Micro-B receptacle on the 3.5" Drive Form Factor.

This document provides a common specification for systems manufacturers, system integrators, and suppliers of drives. This is an internal working document of the SFF Committee, an industry ad hoc group.

This document 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 document 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 document is supported by the identified member companies of the SFF Committee.

POINTS OF CONTACT:

Alvin Cox
Seagate Technology, LLC
10321 West Reno Avenue
Oklahoma City OK 73157

Ph: 405-206-4809
alvin dot cox at seagate dot com

I. Dal Allan
Chairman SFF Committee
14426 Black Walnut Court
Saratoga CA 95070

Ph: 408-867-6630
endlcom at acm dot org

EXPRESSION OF SUPPORT BY MANUFACTURERS

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

Cinch
EMC
FCI
Foxconn
Hitachi GST
Seagate
Volex

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

Finisar
LSI
Molex
NetApp
NetLogic uSyst
Sandisk
Toshiba
Tyco

Update History

Rev 0.5 (September 15, 2010)

- Updated the table entries as indicated in red text (A3, A11, A21, and A22) and replaced all figures.
- The reference to the mounting hole and the USB connector moved to the top of the tongue to the bottom.
- The dimensioning of the power section to USB section was revised.

Revision 0.6 (October 12, 2010)

- Updated figures to remove USB 3.0 connector protrusion.
- Deleted A22 dimension, changed A15 and corrected the inch values of A13.

Revision 0.8 (January 6, 2011)

- Changed connector name to "combination connector including a USB 3.0 Micro-B receptacle" and made minor editorial changes to text.

Revision 0.9 (December 21, 2013)

- Rev 0.8 contents incorporated in current template.

Rev 1.0 August 30, 2014

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

SFF Committee --

3.5" Form Factor w/Combo Connector inc USB Micro-B Receptacle

14. Scope

This specification defines location of the combination connector including a USB 3.0 Micro-B receptacle on the 3.5" Drive Form Factor. The connector includes blind mate features plus extra power and feature pins provided on an additional connector section that is similar to the SATA connector power section. The drive may be used with a special backplane connector that allows support of an enhanced feature set. Alternately, it may be used with a USB cable having a Micro-B plug (and a standard SATA power cable, if required), although this configuration does not provide connections for the enhanced feature set.

14.1 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.

15. References

The SFF Committee activities support the requirements of the storage industry, and it is involved with several standards.

15.1 Industry Documents

The following interface and industry standards are relevant to this specification:

- ASME Y14.5M Dimensioning and Tolerancing
- Universal Serial Bus 3.0 Specification
- Serial ATA Revision 3.0 (SATA), 2 June 2009
- SFF-8301 3.5" Form Factor Drive Dimensions
- SFF-8458 3.5" Form Factor w/Combo Connector inc USB Micro-B Receptacle

15.2 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>

15.3 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.tmp>).

15.4 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 |

16. General Description

This specification defines the location of the combination connector including a USB 3.0 Micro-B receptacle on the 3.5" Drive Form Factor. The drive 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 drives. Alternately, cables may be used to supply power and to connect to the data port(s) of the drive.

This specification allows only one location for the interface connector on the drive. The location is similar to that of the Serial ATA (SATA) connector location such that migration to USB 3.0 may be done with minimal mechanical changes to the system.

Additional contacts are added on the power connector on the opposite side of the standard SATA power pins so that a standard power cable may be used or an enhanced feature set may be incorporated with the use of a backplane connector. See SFF-8458 for enhanced feature set details.

Provisions exist in the combination 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.

For a drive that can be directly inserted into the backplane of a cabinet this specification references dimensions for Option 1, the form factor bottom mounting hole or Option 2, the form factor side mounting hole. The optional approach prevents excessive tolerance stack-up between the two mounting screw locations when the connector is referenced to only one of the mounting screw locations.

A drive may comply with both options but the systems application must choose either Option 1 or Option 2.

TABLE 16-1 USB 3.0 COMBINATION CONNECTOR LOCATION

| Dimension | Millimeters | Inches |
|-----------|-------------|--------|
| A 1 | 101.60 | 4.000 |
| A 2 | 47.30 | 1.862 |
| A 3 | 36.52 | 1.438 |
| 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 | 19.11 | 0.752 |
| A12 | 0.38 | 0.015 |
| A13 | 13.43 | 0.529 |
| A14 | 41.34 | 1.628 |
| A15 | 2.50 | 0.098 |
| 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 |
| A21 | 3.67 | 0.144 |

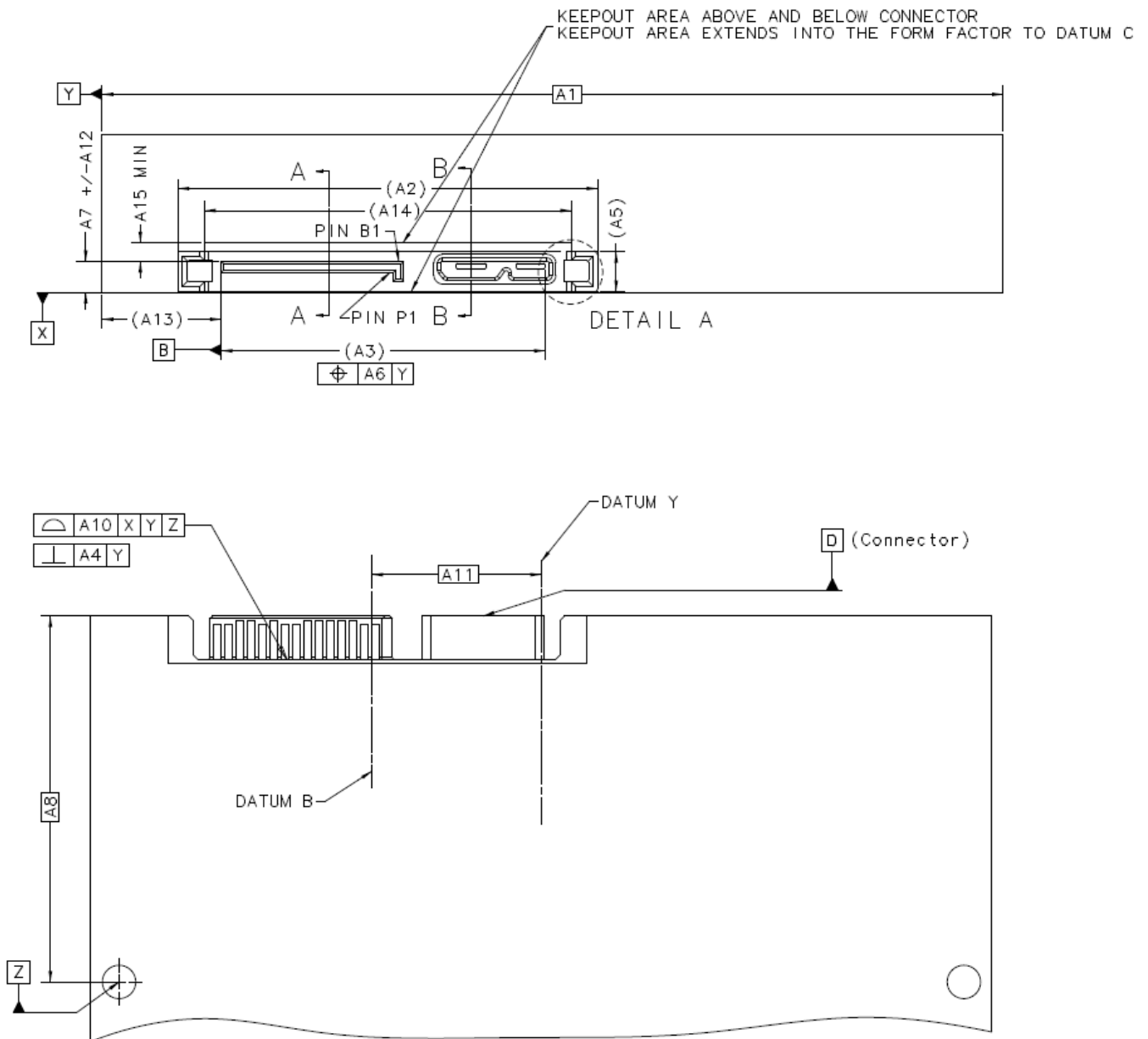
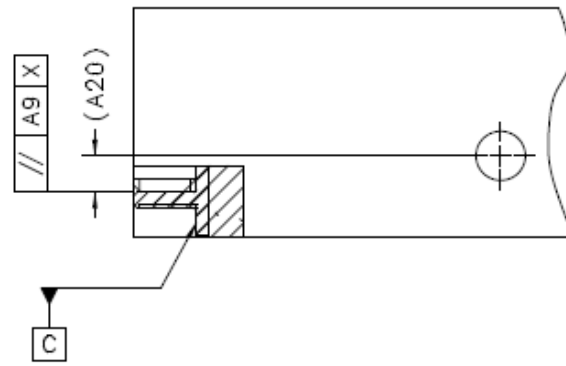
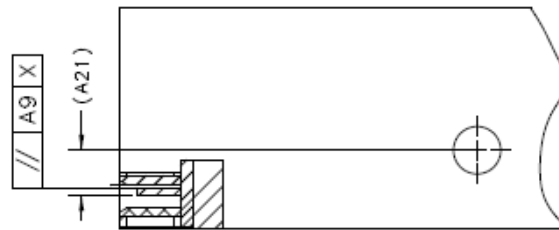


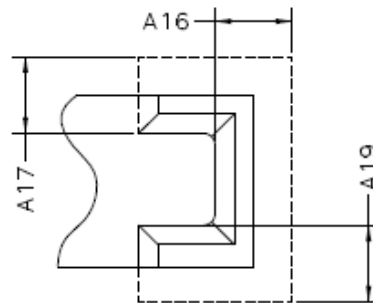
FIGURE 16-1 OPTION 1: CONNECTOR REFERENCED TO BOTTOM MOUNTING SCREWS (1 OF 2)



SECTION A-A



SECTION B-B



DETAIL A

CONNECTOR KEEP-OUT ZONE (BOTH ENDS)
 APPLIES FROM DATUM D OUTWARD

FIGURE 16-2 OPTION 1: CONNECTOR REFERENCED TO BOTTOM MOUNTING SCREWS (2 OF 2)

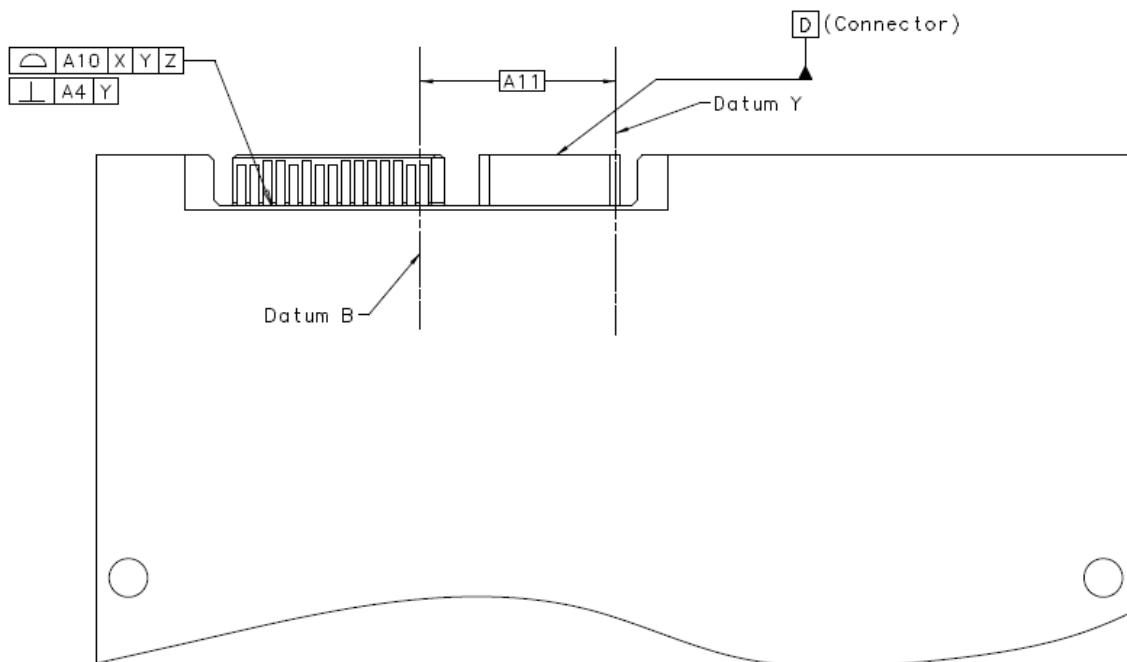
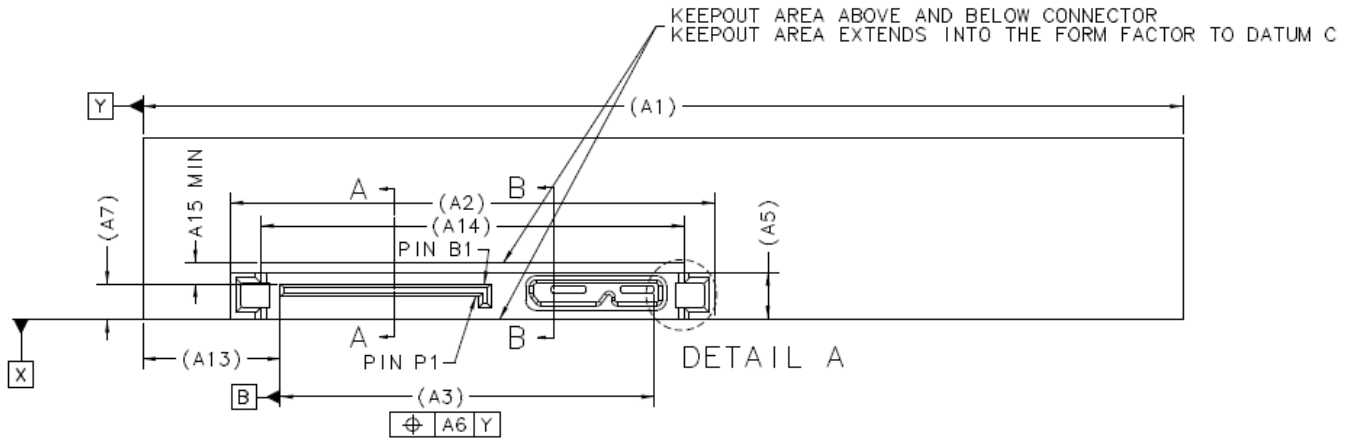
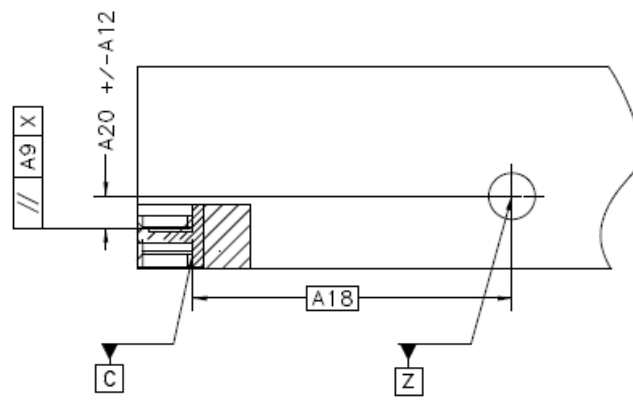
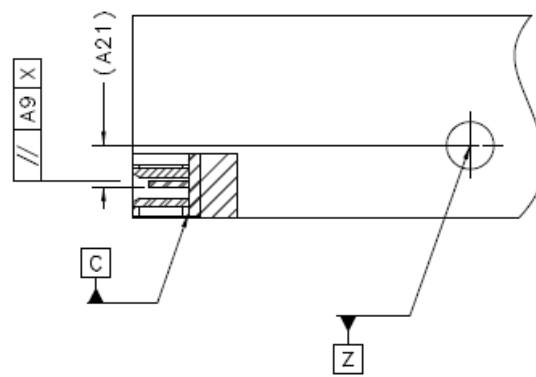


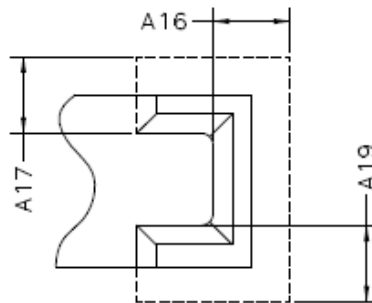
FIGURE 16-3 CONNECTOR REFERENCED TO SIDE MOUNTING SCREWS (1 OF 2)



SECTION A-A



SECTION B-B



DETAIL A

CONNECTOR KEEP-OUT ZONE (BOTH ENDS)
 APPLIES FROM DATUM D OUTWARD

FIGURE 16-4 CONNECTOR REFERENCED TO SIDE MOUNTING SCREWS (2 OF 2)