This document was developed by the SFF Committee prior to it becoming the SFF TA (Technology Affiliate) TWG (Technical Working Group) of the SNIA (Storage Networking Industry Association) in 2016.

The information below should be used instead of the equivalent herein.

POINTS OF CONTACT: SFF TA TWG Chair Email: sff-chair@snia.org.
LOCATION OF SFF DOCUMENTS: http://www.snia.org/sff/specifications.

Suggestions for improvement of this specification are welcome and should be submitted to http://www.snia.org/feedback.

If you are interested in participating in the activities of the SFF TA TWG, additional information and the membership application can be found at: http://www.snia.org/sff.

SFF Committee documentation may be purchased (see 2.3).
SFF Committee documents are available at fission.dt.wdc.com/pub/standards/SFF/spec

SFF Committee

SFF-8009 Specification for

Unitized Connector for Cabled Applications

Rev 4.2 October 10, 2000

Secretariat: SFF Committee

Abstract: This document defines the Unitized Connector used in cabled applications for disk drives. Rev 2.1 of this Specification was approved as a Published Specification. Additional information requested by connector vendors
has been provided in this revision.

This document provides a common specification for systems manufacturers, system integrators, and suppliers of magnetic disk 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.

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

Documentation: This document has been prepared in a similar style to that of the ISO (International Organization of Standards).

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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	Integral Peripherals
All Best Technique	Madison Cable
AMP	MiniStor Per'ls
Berg	Molex
Cirrus Logic	Montrose/CDT
Compaq	Oak Technology
ENDL	Quantum
FCI/Berg	Seagate
Fujitsu CPA	Toshiba America
Hewlett Packard	Unisys
Hitachi Cable	Yamagata Fujitsu
IBM	

The following SFF member companies voted no on the technical content of this industry specification.

Robinson Nugent

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

Amphenol	Pioneer NewMedia
DDK Electronics	Ricoh
DEC	Silicon Systems
Matsushita	Specialty Electronics
Maxtor	Winchester Elect
Methode	

The following member companies of the SFF Committee voted to forward this industry specification to an accredited standards body.

Integral Peripherals	Seagate
Oak Technology	

If you are not a member of the SFF Committee, but you are interested in participating, the following principles have been reprinted here for your information.

PRINCIPLES OF THE SFF COMMITTEE

The SFF Committee is an ad hoc group formed to address storage industry needs in a prompt manner. When formed in 1990, the original goals were limited to defining de facto mechanical envelopes within which disk drives can be developed to fit compact computer and other small products.

Adopting a common industry size simplifies the integration of small drives (2 1/2" or less) into such systems. Board-board connectors carrying power and signals, and their position relative to the envelope are critical parameters in a product that has no cables to provide packaging leeway for the integrator.

In November 1992, the SFF Committee objectives were broadened to encompass other areas which needed similar attention, such as pinouts for interface applications, and form factor issues on larger disk drives. SFF is a forum for resolving industry issues that are either not addressed by the standards process or need an immediate solution.

Documents created by the SFF Committee are expected to be submitted to bodies such as EIA (Electronic Industries Association) or an ASC (Accredited Standards Committee). They may be accepted for separate standards, or incorporated into other standards activities.

The principles of operation for the SFF Committee are not unlike those of an accredited standards committee. There are 3 levels of participation:

- Attending the meetings is open to all, but taking part in discussions is limited to member companies, or those invited by member companies
- The minutes and copies of material which are discussed during meetings are distributed only to those who sign up to receive documentation.
- The individuals who represent member companies of the SFF Committee receive documentation and vote on issues that arise. Votes are not taken during meetings, only guidance on directions. All voting is by letter ballot, which ensures all members an equal opportunity to be heard.

Material presented at SFF Committee meetings becomes public domain. There are no restrictions on the open mailing of material presented at committee meetings. In order to reduce disagreements and misunderstandings, copies must be provided for all agenda items that are discussed. Copies of the material presented, or revisions if completed in time, are included in the documentation mailings.

The sites for SFF Committee meetings rotate based on which member companies volunteer to host the meetings. Meetings have typically been held during the ASC T10 weeks.

The funds received from the annual membership fees are placed in escrow, and are used to reimburse ENDL for the services to manage the SFF Committee.

Foreword

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 in which space was at a premium and time to market with the latest machine was an important factor. System integrators worked individually with vendors to develop the packaging. The result was wide diversity, and with space being such a major consideration in packaging, it was not possible to replace one vendor's drive with a competitive product.

The desire to reduce disk drive sizes to even smaller dimensions such as 1.8" and 1.3" made it likely that devices would become even more constrained in dimensions because of a possibility that such small devices could be inserted into a socket, not unlike the method of retaining semiconductor devices.

The problems faced by integrators, device suppliers, and component suppliers led to the formation of an industry ad hoc group to address the marketing and engineering considerations of the emerging new technology in disk drives. After two informal gatherings on the subject in the summer of 1990, the SFF Committee held its first meeting in August.

During the development of the form factor definitions, other activities were suggested because participants in the SFF Committee faced problems other than the physical form factors of disk drives. In November 1992, the members approved an expansion in charter 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.

At the same time, the principle was adopted of restricting the scope of an SFF project to a narrow area, so that the majority of documents would be small and the projects could be completed in a rapid timeframe. If proposals are made by a number of contributors, the participating members select the best concepts and uses them to develop specifications which address specific issues in emerging storage markets.

Those companies which have agreed to support a documented 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.

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

The development work on this specification was done by the SFF Committee, an industry group. The membership of the committee since its formation in 1990 through July 1998 has included the following organizations:

3M
Adaptec
All Best Technique
Alps Tohoku
AMP
Amphenol Interconnect
Apple Computer
Areal Technology
Aztech Systems
Berg Electronics
Burndy
Circuit Assembly
Cirrus Logic
Compaq Computer
Conner Peripherals
Dell Computer
Digital Equipment
Elastomeric Technologies
Elco
ENDL
Foxconn International
Framatome Connectors
Fujitsu Takamisawa America
Harting Electronik
Harting North America
Hewlett Packard
Hitachi America
Hitachi Cable Manchester
Honda Connectors
IBM
Integral Peripherals
Intel
Intellistor
Iomega
JPM
JTS
JVC
LG Electronics
Madison Cable
Matsushita Electric
Maxtor
Methode Electronics
Microsoft
MiniStor Peripherals
Mitsumi
Molex
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National Semiconductor
NEC Deutschland
NYPLA Industrial
O R Technology
Oak Technology
Philips Laser Optics Systems
PrairieTek
Promise Technology
Quantum
Ricoh
Robinson Nugent
Rodime
Rohm LSI Systems
Samsung Electronics
Sanyo
Seagate Technology
Silicon Integrated Systems
Silicon Systems
Sony
Specialty Electronics
Stocko Connectors
Sun Microsystems
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Toshiba America
Unisys
Wearnes Hollingsworth
Wearnes Peripherals
Wearnes Technology
Western Digital
Winchester Electronics
YC Cable USA
Zenith Data Systems

If you are not receiving the documentation of SFF Committee activities or are interested in becoming a member, the following signup information is reprinted here for your information.

Annual SFF Committee Membership Fee	$ 1,800.00
Annual SFF Committee Paper Documentation Fee	$ 300.00
Annual Surcharge for AIR MAIL to Overseas	$ 100.00
Annual Surcharge for Electronic Documentation	$ 360.00

Name: _____

Title: _____

Company: _____

Address: _____

_____

_____

Phone: _____

Fax: _____

Email: _____

Please register me as a Member of the SFF Committee for one year.

Paper documentation	$ 1,800
Electronic documentation	$ 2,160

Check Payable to SFF Committee for $_____ is Enclosed

Please invoice me $_____ on PO #: _____

MC/Visa/AmX_____ Expires_____

Please register me as an Observer on the SFF Committee for one year.

Paper documentation	$ 300 U.S. $ 400 Overseas
Electronic documentation	$ 660 U.S. $ 760 Overseas

Check Payable to SFF Committee for $_____ (POs Not Accepted)

MC/Visa/AmX_____ Expires_____

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FIGURES

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SFF Committee --

Unitized Connector for Cabled Applications

1. Scope

This SFF Specification defines the unitized connector which provides a single body with three connectors in the same relative plane. The purpose of providing this assembly is to simplify cabinet harnessing of large numbers of disk drives.

The purpose of this SFF Specification is to define the pinouts so that products from different vendors may be used in the same configurations.

In an effort to broaden the applications for small form factor disk drives, an ad hoc industry group of companies representing system integrators, peripheral suppliers, and component suppliers decided to address the issues involved.

The SFF Committee was formed in August, 1990 and the first working document was introduced in January, 1991.

1.1 Description of Clauses

Clause 1 contains the Scope and Purpose.

Clause 2 contains Referenced and Related Standards and SFF Specifications.

Clause 3 contains the General Description.

Clause 4 contains the Glossary.

Clause 5 contains the connector and signal requirements.

Annex A is informative.

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 are relevant to many SFF Specifications.

- 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)
- X3T10/1071 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. At the date of printing document numbers had been assigned to the following projects. The status of Specifications is dependent on committee activities.

F = Forwarded The document has been approved by the members for forwarding to a formal standards body.
P = Published The document has been balloted by members and is available as a published SFF Specification.
A = Approved The document has been approved by ballot of the members and is in preparation as an SFF Specification.
C = Canceled The project was canceled, and no Specification was Published.
D = Development The document is under development at SFF.
E = Expired The document has been published as an SFF Specification, and the members voted against re-publishing it when it came up for annual review.
e = electronic Used as a suffix to indicate an SFF Specification which has Expired but is still available in electronic form from SFF e.g. a specification has been incorporated into a draft or published standard which is only available in hard copy.
i = Information The document has no SFF project activity in progress, but it defines features in developing industry standards. The document was provided by a company, editor of an accredited standard in development, or an individual. It is provided for broad review (comments to the author are encouraged).
s = submitted The document is a proposal to the members for consideration to become an SFF Specification.

Spec #	Rev	List of Specifications as of May 14, 1998
SFF-8000		SFF Committee Information
SFF-8001i	E	44-pin ATA (AT Attachment) Pinouts for SFF Drives
SFF-8002i	E	68-pin ATA (AT Attachment) for SFF Drives
SFF-8003	1.1	SCSI Pinouts for SFF Drives
SFF-8004	E	Small Form Factor 2.5" Drives
SFF-8005	E	Small Form Factor 1.8" Drives
SFF-8006	E	Small Form Factor 1.3" Drives
SFF-8007	E	2mm Connector Alternatives
SFF-8008	E	68-pin Embedded Interface for SFF Drives
SFF-8009	3.1	Unitized Connector for Cabled Drives
SFF-8010	E	Small Form Factor 15mm 1.8" Drives
SFF-8011i	E	ATA Timing Extensions for Local Bus
SFF-8012	2.0	4-Pin Power Connector Dimensions
SFF-8013	E	ATA Download Microcode Command
SFF-8014	C	Unitized Connector for Rack Mounted Drives
SFF-8015	E	SCA Connector for Rack Mounted SFF SCSI Drives
SFF-8016	C	Small Form Factor 10mm 2.5" Drives
SFF-8017	1.7	SCSI Wiring Rules for Mixed Cable Plants
SFF-8018	E	ATA Low Power Modes
SFF-8019	E	Identify Drive Data for ATA Disks up to 8 GB
SFF-8020i	2.6	ATA Packet Interface for CD-ROMs
SFF-8028i	E	- Errata to SFF-8020 Rev 2.5
SFF-8029	E	- Errata to SFF-8020 Rev 1.2
SFF-8030	1.7	SFF Committee Charter
SFF-8031		Named Representatives of SFF Committee Members
SFF-8032	1.2	SFF Committee Principles of Operation
SFF-8033i	E	Improved ATA Timing Extensions to 16.6 MBs
SFF-8034i	E	High Speed Local Bus ATA Line Termination Issues
SFF-8035i	E	Self-Monitoring, Analysis and Reporting Technology
SFF-8036i	E	ATA Signal Integrity Issues
INF-8037i	1.0	Intel Small PCI SIG

INF-8038i	1.0	Intel Bus Master IDE ATA Specification
SFF-8039i	E	Phoenix EDD (Enhanced Disk Drive) Specification
SFF-8040	1.2	25-pin Asynchronous SCSI Pinout
SFF-8041	C	SCA-2 Connector Backend Configurations
SFF-8042	C	VHDCI Connector Backend Configurations
SFF-8043	1.0	40-pin MicroSCSI Pinout
SFF-8045	3.7	40-pin SCA-2 Connector w/Parallel Selection
SFF-8046	2.7	80-pin SCA-2 Connector for SCSI Disk Drives
SFF-8047	C	40-pin SCA-2 Connector w/Serial Selection
SFF-8048	C	80-pin SCA-2 Connector w/Parallel ESI
SFF-8049	2.5	80-conductor ATA Cable Assembly
INF-8050i	1.0	Bootable CD-ROM
INF-8051i	0.2	Small Form Factor 3" Drives
INF-8052i	0.91	ATA Interface for 3" Removable Devices
INF-8053i	4.3	GBIC (Gigabit Interface Converter)
INF-8055i	2.0	SMART Application Guide for ATA Interface
SFF-8056	1.1	50-pin 2mm Connector
SFF-8057	1.2	Unitized ATA 2-plus Connector
SFF-8058	1.2	Unitized ATA 3-in-1 Connector
SFF-8059	2.3	40-pin ATA Connector
SFF-8060	1.1	SFF Committee Patent Policy
SFF-8061	1.1	Emailing drawings over the SFF Reflector
SFF-8065	C	40-pin SCA-2 Connector w/High Voltage
SFF-8066	C	80-pin SCA-2 Connector w/High Voltage
SFF-8067	1.8	40-pin SCA-2 Connector w/Bidirectional ESI
SFF-8068	1.0	Guidelines to Import Drawings into SFF Specs
SFF-8069	1.0	Fax-Access Instructions
INF-8070i	1.1	ATAPI for Rewritable Removable Media - Part 1
INF-8071i		ATAPI for Rewritable Removable Media - Part 2
INF-8072i		ATAPI for Rewritable Removable Media - Part 3
SFF-8080	1.2	ATAPI for CD-Recordable Media - Part 1
SFF-8081		ATAPI for CD-Recordable Media - Part 2
SFF-8082		ATAPI for CD-Recordable Media - Part 3
SFF-8090	1.0	ATAPI for DVD (Digital Video Data)
SFF-8200e	1.1	2 1/2" drive form factors (all of 82xx family)
SFF-8201e	1.3	2 1/2" drive form factor dimensions
SFF-8212e	1.2	2 1/2" drive w/SFF-8001 44-pin ATA Connector
SFF-8300e	1.1	3 1/2" drive form factors (all of 83xx family)
SFF-8301e	1.2	3 1/2" drive form factor dimensions
SFF-8302e	1.1	3 1/2" Cabled Connector locations
SFF-8332e	1.2	3 1/2" drive w/80-pin SFF-8015 SCA Connector
SFF-8337e	1.2	3 1/2" drive w/SCA-2 Connector
SFF-8342e	1.3	3 1/2" drive w/Serial Unitized Connector
SFF-8400	C	Very High Density Cable Interconnect
SFF-8420	4.0	HSSDC-1 Shielded Connections
SFF-8430	1.0	Mini-MT Duplex Optical Connections
SFF-8441	11.0	VHDCI Shielded Configurations
SFF-8451	9.0	SCA-2 Unshielded Connections
SFF-8480	0.0	HSS (High Speed Serial) DB9

SFF-8500e 1.1 5 1/4" drive form factors (all of 85xx family)
SFF-8501e 1.1 5 1/4" drive form factor dimensions
SFF-8508e 1.1 5 1/4" ATAPI CD-ROM w/audio connectors
SFF-8551e 1.2 5 1/4" CD-ROM 1" High form factor

SFF-8610 C SDX (Storage Device Architecture)

2.3 Sources

Copies of ANSI standards or proposed ANSI standards may be purchased from Global Engineering.

15 Inverness Way East	800-854-7179 or 303-792-2181
Englewood	303-792-2192Fx
CO 80112-5704	

Copies of SFF Specifications are available by FaxAccess or by joining the SFF Committee as an Observer or Member.

14426 Black Walnut Ct	408-867-6630x303
Saratoga	408-867-2115Fx
CA 95070	FaxAccess: 408-741-1600

FaxAccess is a computer-operated service capable of faxing copies of documents selected from a menu. Anyone ordering documents over FaxAccess must be using the handset of a fax machine, as the documents are transmitted over the same line as the caller dialed in on to make the selection(s).

The increasing size of SFF Specifications has made FaxAccess less practical as a way to obtain large documents.

Although SFF does not maintain a Web site, electronic copies of documents are made available via CD_Access, a service which provides copies of all the specifications plus SFF reflector traffic. CDs are mailed every 2 months as part of the document service, and provide the letter ballot and paper copies of what was distributed at the meeting as well as the meeting minutes.

If this is the last page of an SFF Specification, it means that the latest copy of this specification is not available via FaxAccess. To obtain a copy, you may join the SFF Committee as a Member or an Observer, and sign up for either paper or electronic copies.

3. General Description

The environment for this SFF Specification is any disk drive which wants to provide a common connector structure to assist OEMs in cabling of configurations.

4. Definitions and Conventions

4.1 Definitions

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

4.1.1 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.

4.1.2 Reserved: 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.

4.1.3 VU (Vendor Unique): This term is used to describe bits, bytes, fields, pins, signals, code values and features which are not described in this SFF Specification, and may be used in a way that varies between vendors.

4.1.4 VU Mode: A mode of execution by the drive in which its use is not defined by this SFF Specification. The means by which a vendor invokes vendor unique operations within a drive is defined by this SFF Specification.

4.2 Conventions

Certain terms used herein are the proper names of signals. These are printed in uppercase to avoid possible confusion with other uses of the same words; e.g., ATTENTION. Any lower-case uses of these words have the normal American- English meaning.

A number of conditions, commands, sequence parameters, events, English text, states or similar terms are printed with the first letter of each word in uppercase and the rest lower-case; e.g., In, Out, Request Status. Any lower- case uses of these words have the normal American-English meaning.

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

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

5. Signals

This Specification relies upon the electrical and mechanical characteristics of SCSI-2. There are three connectors in the Unitized Connector.

- 68-pin SCSI-3 P-Cable Connector
- 4-pin Power Connector
- 12-pin 2mm Auxiliary Connector

5.1 Signal Conventions

Signal names are shown in all upper case letters. Signals can be asserted (active, true) in either a high (more positive voltage) or low (less positive voltage) state. A dash character (-) at the end of a signal name indicates it is asserted at the low level (active low). No dash at the end of a signal name indicates it is asserted high (active high). An asserted signal may be driven high or low by an active circuit, or it may be allowed to be pulled to the correct state by the bias circuitry.

Control signals that are asserted for one function when high and asserted for another function when low are named with the asserted high function name followed by a slash character (/), and the asserted low function name followed with a dash (-) e.g. a signal named BITENA/BITCLR- would enable a bit when high and clear a bit when low. All signals are TTL compatible unless otherwise noted. Negated means that the signal is driven by an active circuit to the state opposite to the asserted state (inactive, or false) or may be simply released (in which case the bias circuitry pulls it inactive, or false), at the option of the implementor.

5.2 Pinouts

The pinouts for the P-Cable connector are specified by the SCSI-3 SPI standard (see 2). Table 5-1 shows the signals and relationships such as direction for the Power connector.

TABLE 5-1 POWER CONNECTOR

Pin	Description	Hst	Dir	Dev
1	+12V	x	--->	x
2	+12V Return	x	--->	x
3	+5V Return	x	--->	x
4	+5V	x	--->	x

Table 5-2 shows the signals and relationships such as direction for the Auxiliary Connector.

NOTE: Ambiguities in the original proposal for this connector resulted in some manufacturers implementing different pin assignments prior to the finalization of this Specification.

TABLE 5-2 SIGNAL ASSIGNMENTS FOR AUXILIARY CONNECTOR

Pin	Signal	Description	Hst	Dir	Dev
1	SEL0-	SCSI ID Sel 0	x	--->	x
2	XTFALT-	External fault	x	<---	x
3	SEL1-	SCSI ID Sel 1	x	--->	x
4	VUNIQ-	Vendor Unique	x	<---	x
5	SEL2-	SCSI ID Sel 2	x	--->	x
6	SPSYNC-	Spindle Synch	x	<---	x
7	SEL3-	SCSI ID Sel 3	o	--->	x
8	XTACTV-	External activity	x	<---	x
9	ENTERM-	Enable termination	o	--->	x
10	GROUND	Ground	o	<---	x
11	+5V	+5V	o	<---	x
12	FAULT-	Drive fault	x	--->	x

The Dir column indicates the direction of the signal between host and device.
An x in the Hst column means this signal shall be supported by the Host.
An x in the Dev column means this signal shall be supported by the device.
An o means this signal is Optional.
If there is nothing in the Dev column for a pin location, then no connection should be made to that pin.

5.2.1 SCSI ID Sel 0

When negated, this signal shall have a value of 0 and when asserted shall have a value of 1 for the purposes of selection and arbitration.

This signal shall be latched within 250 msec of the application of power or optionally of the negation of RST within the device. This input shall source no more than 4.8mA when the input signal is asserted.

If SCSI ID Sel 0 is intended to be asserted, the host shall provide a low impedance connection from SEL0- to XTFALT- or GROUND through an appropriate means.

5.2.2 External fault

This signal is an open-collector output capable of sinking, intended to drive an LED to indicate an external fault condition has occurred.

This signal shall be held asserted for 250 msec following the application of power or optionally, the negation of RST during initialization while the SCSI ID pin is read (if this signal is connected to an LED, this action can cause the LED to light briefly). When asserted, this signal shall present a DC impedance of 150 ohms +/-20% to ground.

Provision of this signal is optional. However, if it is not provided, the pin shall meet the above requirements during initialization and have a high impedance after initialization.

5.2.3 SCSI ID Sel 1

When negated, this signal shall have a value of 0 and when asserted shall have a value of 2 for the purposes of selection and arbitration.

This signal shall be latched within 250 msec of the application of power or optionally of the negation of RST within the device. This input shall source no more than 4.8mA when the input signal is asserted.

If SCSI ID Sel 1 is intended to be asserted, the host shall provide a low impedance connection from SEL1- to VUNIQ- or GROUND through an appropriate means.

5.2.4 Vendor Unique

This signal is an open-collector output available for Vendor Unique usage. This signal shall be held asserted for 250 msec following the application of power or optionally, the negation of RST during initialization while the SCSI ID pin is read (if this signal is connected to an LED, this action can cause the LED to light briefly). When asserted, this signal shall present a DC impedance of 150 ohms +/-20% to ground.

Provision of this signal is optional. However, if it is not provided, the pin shall meet the above requirements during initialization and have a high impedance after initialization.

5.2.5 SCSI ID Sel 2

When negated, this signal shall have a value of 0 and when asserted shall have a value of 4 for the purposes of selection and arbitration. This signal shall be latched within 250 msec of the application of power or optionally of the negation of RST within the device. This input shall source no more than 4.8mA when the input signal is asserted.

If SCSI ID Sel 2 is intended to be asserted, the host shall provide a low impedance connection from SEL2- to SPSYNC- or GROUND through an appropriate means.

5.2.6 Spindle Synch

This signal is an open-collector output which is used as a spindle synchronization reference. This signal shall be held asserted for 250 msec following the application of power or optionally, the negation of RST during initialization while the SCSI ID pin is read (if this signal is connected to the Spindle Synch of other drives, this action can cause the synch function to be interrupted briefly). When asserted, this signal shall present a DC impedance of 150 ohms +/-20% to ground.

Provision of this signal is optional. However, if it is not provided, the pin shall meet the above requirements during initialization and have a high impedance after initialization. Typically, spindle synchronization is only effective if all drives connected through this pin are identical in make and model.

5.2.7 SCSI ID Sel 3

When negated, this signal shall have a value of 0 and when asserted shall have a value of 8 for the purposes of selection and arbitration. This signal shall be latched within 250 msec of the application of power or optionally of the negation of RST within the device. This input shall source no more than 4.8mA when the input signal is asserted. If SCSI ID Sel 3 is intended to be asserted, the host shall provide a low impedance connection from SEL3- to XTACTV- or GROUND through an appropriate means.

5.2.8 External activity

This signal is an open-collector output intended to drive an LED to indicate the device is active. This signal shall be held asserted for 250 msec following the application of power or optionally, the negation of RST during initialization while the SCSI ID pin is read (if this signal is connected to an LED, this action can cause the LED to light briefly). When asserted, this signal shall present a DC impedance of 150 ohms +/-20% to ground. Provision of this signal is optional. However, if it is not provided, the pin shall meet the above requirements during initialization and have a high impedance after initialization.

5.2.9 Enable termination

When connected to ground, this optional signal shall cause the drive to enable its terminators. If this signal is not connected, the drive shall disable its terminators.

5.2.10 Ground

This signal shall be connected to logic ground.

5.2.11 +5V

This signal provides 5V of DC power to drive LEDs, and should be limited to a maximum value of 1A.

5.2.12 Drive fault

This signal is normally held negated. Assertion of this signal shall cause the drive to stop any media-altering activity, which may result in the drive asserting XTFALT- or VUNIQ- signals, or both. This input shall source no more than 4.8mA when the input signal is asserted.

This signal is intended to be used as a power failure warning and/or as a write protect input. Provision of this signal is optional. If this signal is not provided, the pin shall be open.

NOTE: This signal can be used as a write-fault input in addition to a fault input.

The assertion of this input signal, when write commands are active, may cause data loss. However, judicial use of this input signal under failure conditions can mimimize the degree of data loss.

6. Physical Configuration

6.1 Disk Drive Parameters

Figure 6-1 shows the orientation of the Unitized Connector relative to the form factor of the drive. No dimensions are shown as the connector can fit on more than one form factor. Although the connector is shown at the bottom of the drive, this is only illustrative. If the connector were at the top of the drive it shall lie in the same plane i.e. it shall not be reversed.

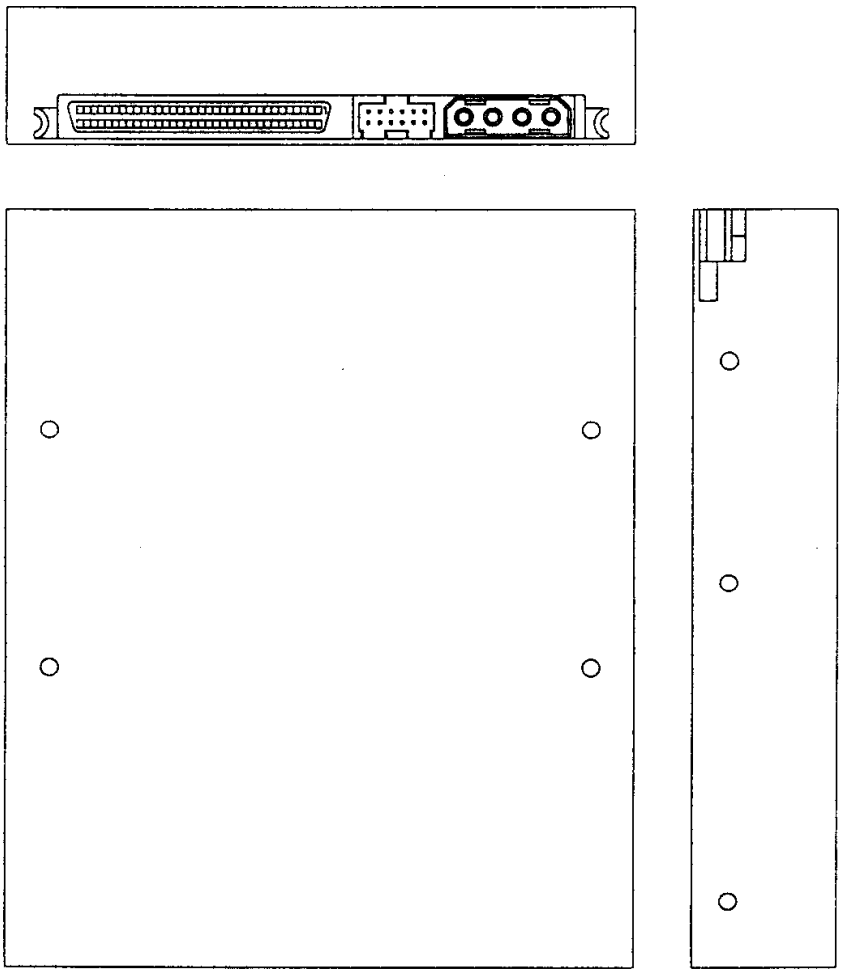
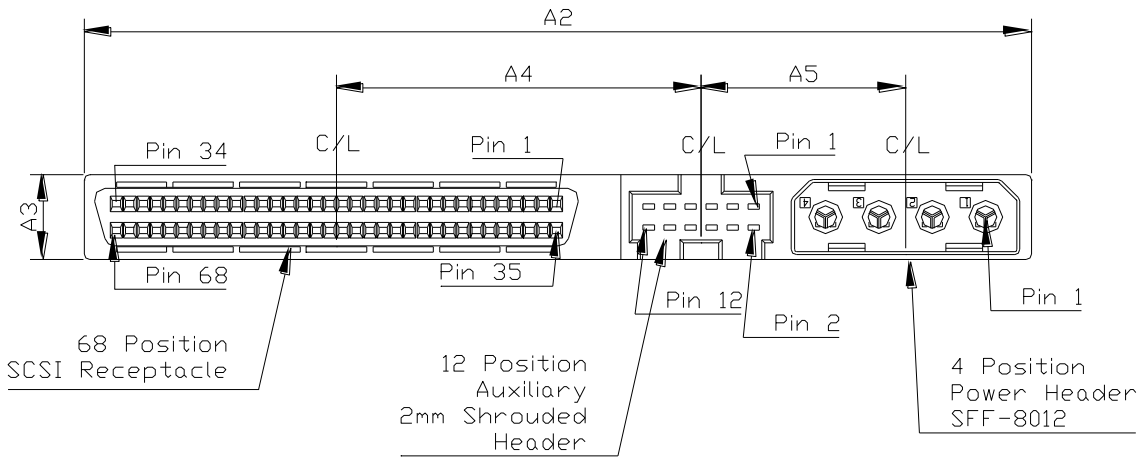


FIGURE 6-1 ORIENTATION OF UNITIZED CONNECTOR

6.2 Connector Specifications

The nominal dimensions for the mating interface are shown in Figure 6-2. These dimensions are the most common in use, but may be different in some implementations.



A2	90.22	+/- 0.3
A3	8.01	+/- 0.1
A4	34.74	+/- 0.1
A5	19.52	+/-0.1

FIGURE 6-2 UNITIZED CONNECTOR

Figure 6-3 includes features that provide alignment guidance, and Table 6-3 contains the dimensions.

TABLE 6-1 ALTERNATIVE CONNECTOR

Dimension	Millimeters	Inches
A 1	101.45	3.994
A 2	95.92	3.776
A 3	2.73	0.107
A 4	7.71	0.303
A 5	54.93	2.163
A 6	8.35	0.328
A 7	16.5	0.65
A 8	76.15	2.998
A 9	59.29	2.334
A10	52.61	2.071
A11	3.25	0.128
A12	8.59	0.338
A13	8.75	0.344
A14	5.90	0.23
A15	R4.00	R0.157
A16	R3.25	R0.128
A17	3.2	0.126
A18	19.48	0.767
A19	34.74	1.368
T 1	+/- .15	.006
T 2	+/- .10	.004
T 3	+0.0/-0.1	+0.0/-.004

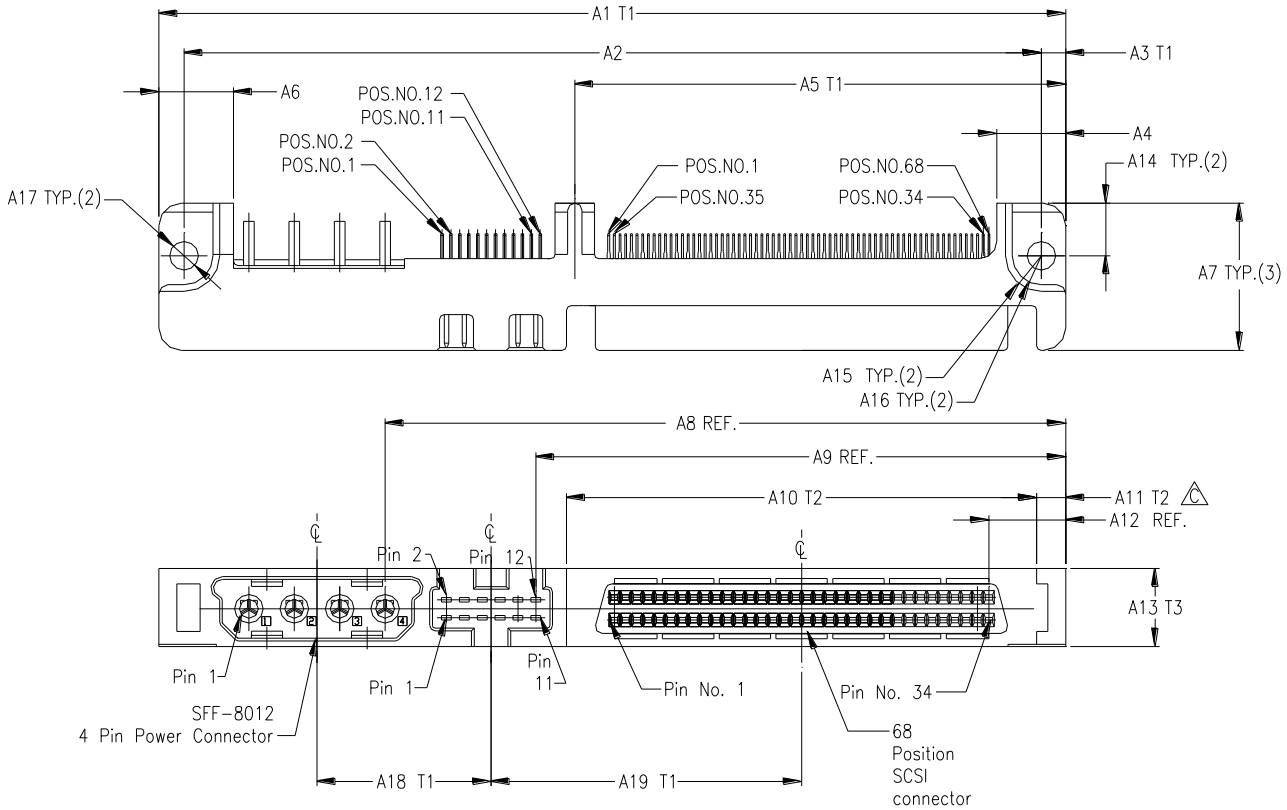


FIGURE 6-3 ALTERNATIVE UNITIZED CONNECTOR

Annex A. Application Considerations (informative).

The unitized connector may be utilized in a number of environments, such as those described.

A.1 Stand-Alone

The drive is connected to the Power and SCSI-3 P-Cable connectors, and 2mm jumpers in the Auxiliary connector are used for drive configuration:

- Set SCSI ID
- Select termination
- Power the LEDs (if any)

A.2 Remote

The drive is connected to all three connectors, with the Auxiliary cable connecting the drive to a configuration control board.

The control board may choose to:

- Set SCSI ID by using the supplied Ground signal to assert the desired SELx signal(s) (the remaining SELx signal(s) will be floating).
- Use the 5V output to power LEDs.
- Tie all the SPSYNC- signals together if spindle synchronization is wanted.
- Activate the terminator by using the supplied Ground signal to assert ENTERM- on the last cabled device
- Create a write-protect function by using the supplied Ground signal to assert XTFALT-.

A.3 Racked

Although no provision has been made for guide pins and other assistance for blind mating applications, a common backplane may be used to terminate all three connectors. The SCSI ID would depend on the position of the device within the backplane, and the integrator may choose to:

- Set SCSI ID by using the supplied Ground signal to assert the desired SELx signal(s) (the remaining SELx signal(s) will be floating).
- Use the 5V output to power LEDs located on a panel somewhere in the cabinet.
- Tie all the SPSYNC- signals together if spindle synchronization is wanted.
- Activate the terminator by using the supplied Ground signal to assert ENTERM- on the device located last on the backplane.
- Create a write-protect function by using the supplied Ground signal to assert XTFALT-.