SFF specifications are available at http://www.snia.org/sff/specifications
or ftp://ftp.seagate.com/sff

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

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

POINTS OF CONTACT:

Chairman SFF TA TWG
Email: SFF-Chair@snia.org

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

The complete list of SFF Specifications which have been completed or are currently being worked on can be found at:
http://www.snia.org/sff/specifications/SFF-8000.TXT

The operations which complement the SNIA's TWG Policies & Procedures to guide the SFF TWG can be found at:
http://www.snia.org/sff/specifications/SFF-8032.PDF

Suggestions for improvement of this specification will be welcome, they should be submitted to:
http://www.snia.org/feedback

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

SFF Committee

SFF-8441 Specification for

VHDCI Shielded Configurations

Rev 14.1 November 21, 1999

Secretariat: SFF Committee

Abstract: This document defines the physical interface and performance requirements for VHDCI (Very High Density Cable Interconnect) connectors and retention schemes to be used for 68-position SCSI shielded connections. Other uses of this general-purpose connection system are also possible. These VHDCI connectors are based on 0.8mm ribbon-style technology.

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 specification has been forwarded to the EIA where it is being processed as SP-3652A.

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.

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

POINTS OF CONTACT:

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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
AMP
Amphenol
Berg
Compaq
DDK Electronics
ENDL
FCI/Berg
Hitachi Cable
Honda Connector
Madison Cable
Molex
TI Japan
Unisys

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

Foxconn Int'l
Fujitsu CPA
IBM
Matsushita
Maxtor
Methode
Montrose/CDT
Pioneer NewMedia
Quantum
Ricoh
Seagate
Sun Microsystems
Toshiba America
Winchester Elect
Yamagata Fujitsu

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.

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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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 has included a mix of companies which are leaders across the industry.

SFF Committee --

VHDCI Shielded Configurations

1. Scope

This specification defines the terminology and physical requirements for shielded VHDCI (Very High Density Cable Interconnect) connections and complete connectors.

Such connectors are desirable in SCSI systems where space is constrained and where a simplified shielded interconnect is needed to address a wide variety of retention and cable routing needs. The VHDCI SCSI connections offer any of three retention schemes; jack screws, squeeze-to-release clips, or detent with the same bulkhead or device side. VHDCI connections are small enough to eliminate the need for right angle backshells in the cable assembly. These features significantly reduce the number of parts required to enable a wide variety of SCSI shielded interconnects and allow at least four wide SCSI buses to pass through a single PC option slot with each bus having independent separability at the bulkhead.

The mating sides (including retention) are the same for all connector versions of the same gender. The termination side of the connectors vary to accommodate the requirements of different popular assembly techniques such as cable backshell and printed circuit board mounting. The termination side must be associated with the gender of its mating side as different mating side genders have different pin numbering (mirror images).

The controlling document for the dimensional values is EIA-700A0AF (SP-3652), a pending EIA (Electronic Industries Association) standard. The relevant parts of the EIA document are included in this specification for easy reference. The specific versions of complete connectors that are standardized for use with SCSI are controlled by this specification as not all possible combinations of mating side and termination side are supported.

This document specifies the requirements on the mating and termination sides of the connectors to enable functional multiple sourcing of the complete connectors. The construction of the connectors between the mating and the termination sides are not controlled by this document except for schemes using backshells where the cable assembly backshell-to-connector frontshell interface is specified.

Extensive non-linear conversions have been executed on the original electronic files used for the figures and any dimensions extracted from features of the figures that are not specifically dimensioned or toleranced are not representative of actual dimensions in any products.

In an effort to broaden the applications for storage devices, 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 defines the connectors.

Clause 6 defines physical dimensions.

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)
- X3.277-1996 SCSI-3 Fast 20
- X3.221-1995 ATA (AT Attachment) and subsequent extensions
- EIA PN-3652 Detail Specification for Trapezoidal Connector 0.8mm Pitch used with Very High Density Cable Interconnect.

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 November 21, 1999
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	E	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	4.1	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	2.3	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	E	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
INF-8020i	E	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	1.8	SFF Committee Charter
SFF-8031		Named Representatives of SFF Committee Members
SFF-8032	1.4	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	E	Intel Small PCI SIG
INF-8038i	E	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	E	40-pin MicroSCSI Pinout
SFF-8045	4.2	40-pin SCA-2 Connector w/Parallel Selection
SFF-8046	E	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	E	80-conductor ATA Cable Assembly
INF-8050i	1.0	Bootable CD-ROM
INF-8051i	E	Small Form Factor 3" Drives
INF-8052i	E	ATA Interface for 3" Removable Devices
SFF-8053	5.4	GBIC (Gigabit Interface Converter)
INF-8055i	E	SMART Application Guide for ATA Interface
SFF-8056	C	50-pin 2mm Connector
SFF-8057	E	Unitized ATA 2-plus Connector
SFF-8058	E	Unitized ATA 3-in-1 Connector
SFF-8059	E	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	2.6	40-pin SCA-2 Connector w/Bidirectional ESI
INF-8068i	1.0	Guidelines to Import Drawings into SFF Specs
SFF-8069	E	Fax-Access Instructions
INF-8070i	1.2	ATAPI for Rewritable Removable Media
SFF-8072	1.2	80-pin SCA-2 for Fibre Channel Tape Applications
SFF-8073	-	20-pin SCA-2 for GBIC Applications
SFF-8080	E	ATAPI for CD-Recordable Media
SFF-8090	3.6	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-8410	12.1	High Speed Serial Testing for Copper Links
SFF-8411	-	High Speed Serial Testing for Backplanes
SFF-8412	-	HSS Requirements for Duplex Optical Links D
SFF-8420	10.1	HSSDC-1 Shielded Connections
SFF-8430	4.1	MT-RJ Duplex Optical Connections
SFF-8441	14.1	VHDCI Shielded Configurations
SFF-8451	10.1	HSS (High Speed Serial) SCA-2 Connections
SFF-8480	2.1	HSS (High Speed Serial) DB9 Connections
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-8551	2.0	5 1/4" CD-ROM 1" High form factor
SFF-8572	-	5 1/4" Tape 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 joining the SFF Committee as an Observer or Member or at ftp://fission.dt.wdc.com/pub/standards/sff/spec.

14426 Black Walnut Ct 408-867-6630x303
Saratoga 408-867-2115Fx
CA 95070

The increasing size of SFF Specifications has made FaxAccess impractical to obtain large documents. Document subscribers and members are automatically updated every two months with the latest specifications. Specifications are available by FTP at fission.dt.wdc.com/pub/standards/sff/spec

Electronic copies of documents are also 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.

TABLE OF CONTENTS

TABLE OF FIGURES

1. General Description

The presently standardized connection systems available for use with SCSI (Small Computer System Interface) cabling alternatives require that the system integrator or designer choose between alternatives that are incompatible and much larger physically than required for the SCSI signals. The new VHDCI connection system is based on 0.8mm x 1.24mm contacts instead of 1.25mm x 2.5mm or 2.5mm x 2.5mm contacts. This allows at least a 3x reduction in the space required for the cable connections while maintaining adequate electrical performance for all forms of parallel SCSI (including the newest emerging low voltage differential version.)

This 0.8mm connector family is based on proven connector technology using the mechanically robust ribbon or leaf contact style. Despite its much smaller size the overall SCSI connection formed using these connectors is tough and capable of withstanding normal service stress. It is very difficult to damage the 0.8mm contacts (in contrast to the present high density SCSI family where fragile pins are used on the free side) (see glossary below for definition).

The 0.8mm contacts are capable of carrying adequate current and are electrically suitable for SCSI applications.

These smaller connectors are natural partners for the smaller SCSI cables that are possible when using the latest cable wire technology. Without deviating from the mainstream of cable manufacturing technology it is now possible to create cable wire for wide (16 bit) SCSI that has half the cross section compared to the previous generation. This halving of the cable cross section coupled with the dramatically smaller VHDCI connectors results in nothing short of a revolution in the shielded SCSI cable options. With half the cross section the flexibility of the cable is increased several fold.

These 0.8mm connectors also find important application in printed circuit designs where space is at a premium. This is especially important for multichannel SCSI controllers and host adapter products but applies generally to all SCSI board products.

The small size of the VHDCI family allow a single wide SCSI connection for type II and type III PCMCIA cards (PC cards). This is the only connector among any of the high performance storage interconnects (SSA, Fibre Channel, P1394) that can be used with a type II PCMCIA PC card. Due to the height of the cable backshell it is not possible to have more than one type II SCSI adapter PC card in the same type III slot. It is possible to have two type II cards in the same type III slot as long as the SCSI card is inserted after the other type II PC card or is in the top slot.

At present there are no plans to use 0.8mm connectors for single port SCA applications (direct disk drive attachment to backplanes) and this will continue as long as the form factor of disk drives remains much larger than the connectors. Future applications of 0.8mm connectors for multiport SCSI device connections are possible.

Since the 68 position connector will support both wide and narrow SCSI only the 68 position version is standardized. This allow for a single SCSI connector for all forms of SCSI.

When used with PC option cards it is possible to have up to 4 connectors in the same slot without interfering with adjacent slots. See Figure 23 (stacked termination side not required) and Figure 46. Dimensions (88.9mm) must be used to achieve 4 connectors. The minimum dimensions in the PCI standard will not accommodate long dimensions for two adjacent VHDCI connectors. Most enclosures are built to accommodate the EISA/ISA dimensions even when used with PCI option cards so this limitation has little practical significance. For enclosures that use only Microchannel option cards or are designed only for minimum dimension PCI option cards this opening could be too small to accommodate 4 connectors on one card. For this limited case two VHDCI connectors may be used in a “half-stacked” configuration.

The use of the VHDCI technology has no effect on the SCSI wiring rules, the SCSI protocol or firmware, or the system configuration rules.

2. Definitions and Conventions

2.1. Definitions

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

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.

PCMCIA: This is the acronym for the Personal Computer Memory Card International Association, a trade association responsible for the promotion of removable device interfaces for a variety of products including memory, modems, disks, etc.

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.

Position: The name for the connector contact for a specific line. Other terms sometimes used are: pin, contact, slot, and mating point.

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

Termination side: The side of the connector opposite the mating side that is used for permanently attaching conductors to the connector. . Due to pin numbering differences between mating side genders the termination side shall always be specified in conjunction with a mating side of a specific gender. Other terms

commonly used in the industry are: back end, non-mating side, footprint, printed circuit board side, and post side.

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

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

Double sided termination: A cable termination assembly style and connector design style where both sides of the connector are accessible when attaching wires. This style frequently has IDC termination points that point in opposite directions and is frequently a symmetrical design. Refer to Figure 15.

Single sided termination: A cable termination assembly style and a connector design style where only one side of the connector is accessible when attaching wires. This style frequently has IDC termination points that point in the same direction and is frequently an asymmetrical or "offset" design. Refer to Figure 16.

Straight: A connector design for use with printed circuit board assembly technology where the mating direction is perpendicular to the plane of the printed circuit board

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

Dual Row: A connector design for use with printed circuit board assembly technology where the termination side points are arranged in two parallel rows. In this document the termination points happen to be staggered with respect to corresponding points in the other row

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

Through hole: A connector design and a printed circuit board design style where the connector termination points penetrates the printed circuit board and are subsequently soldered to the printed circuit board

Surface mount: A connector design and a printed circuit board design style where the connector termination points do not penetrate the printed circuit board and are subsequently soldered to the printed circuit board

Hybrid: A connector design and a printed circuit board design style where two rows of staggered through hole and one row of in line surface mount termination points are used

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

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

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

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

Board Termination Technologies: surface mount single row, surface mount dual row, through hole, hybrid, straddle mount

Frontshell: That part of the connector body that interfaces with the shield circuit and mechanical parts of the cable assembly. This shield circuit interface may be achieved by soldered foil, stamped metal clamshells, diecast backshells, or other means. The frontshell also provides the mechanical interface between the connector and the rest of the cable assembly. Other terms sometimes used for the frontshell are: housing, nosepiece, cowling, and metal shroud.

Backshell: That part of the cable assembly that interfaces with the frontshell of the connector on one side and the cable media on the other side. Backshells provide the mechanical structural continuity between the cable media and the connector body as well as connecting the cable shield to the connector shield.

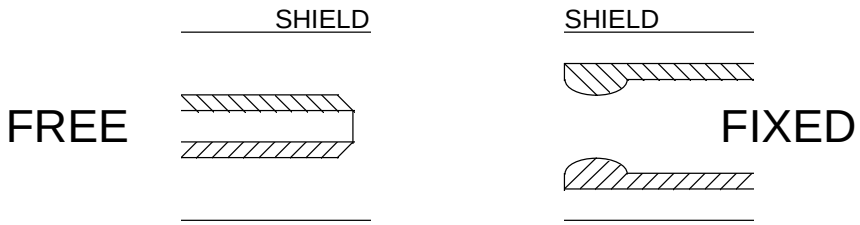


Figure 1 - Mating side gender definition

Annex A contains some explanation and rationalization for the terminology used by EIA for the description of connectors. Since these terms apply largely to the use of the connectors and not directly to the properties of the connectors themselves there is some confusion possible when the connectors are used in certain ways. For

example it is perfectly acceptable to use the fixed gender on a cable (thereby making it "free" in the application). This use does not change the name of the gender to "free". Even though the use may not map to the terminology in all cases these terms are adopted in this document for convenience of reference to the EIA documents. Readers are encouraged to consider the most common applications for the gender when mentally mapping the terminology to the connector properties.

2.2. 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 AmericanEnglish 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 lowercase 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

3. Connector descriptions:

3.1. Complete connector options

The complete connectors listed in this section are supported in this document:

The overall view of the mating sides are shown in Figure 2.

FREE MATING SIDE CONNECTORS (refer to Figure 26 for mating side specifications:

CONNECTOR NAME	OVERVIEW	OUTLINE	TERMINATION SIDE
FREE CABLE DOUBLE SIDED	Figure 15	Figure 18	NA
FREE CABLE SINGLE SIDED	Figure 16	Figure 21	NA
FREE CABLE DOUBLE SIDED FRONTSHELL / CONNECTOR INTERFACE	NA	Figure 19	NA
FREE CABLE SINGLE SIDED FRONTSHELL / CONNECTOR INTERFACE	NA	Figure 21	NA
FREE BOARD STRAIGHT THROUGH HOLE	Figure 8	Figure 12	Figure 35
FREE BOARD STRAIGHT SURFACE MOUNT DUAL ROW	Figure 8	Figure 12	Figure 36
FREE BOARD RIGHT ANGLE 5MM HYBRID	Figure 10	Figure 13	Figure 40
FREE BOARD RIGHT ANGLE 6MM HYBRID	Figure 10	Figure 13	Figure 40
FREE BOARD STRADDLE MOUNT	Figure 11	Figure 14	Figure 41
FREE BOARD RIGHT ANGLE 5MM THROUGH HOLE	Figure 10	Figure 13	Figure 39
FREE BOARD RIGHT ANGLE 6MM THROUGH HOLE	Figure 10	Figure 13	Figure 39
FREE BOARD RIGHT ANGLE 5MM SURFACE MOUNT SINGLE ROW	Figure 10	Figure 13	Figure 38
FREE BOARD RIGHT ANGLE 6MM SURFACE MOUNT SINGLE ROW	Figure 10	Figure 13	Figure 38
FREE BOARD RIGHT ANGLE 5MM SURFACE MOUNT DUAL ROW	Figure 10	Figure 13	Figure 37
FREE BOARD RIGHT ANGLE 6MM SURFACE MOUNT DUAL ROW	Figure 10	Figure 13	Figure 37

FIXED MATING SIDE CONNECTORS (used on the device side except when used with cable terminations) (Refer to Figure 25 for mating side specifications):

CONNECTOR NAME	OVERVIEW	OUTLINE	TERMINATION SIDE
FIXED CABLE DOUBLE SIDED	Figure 17	Figure 22	NA
FIXED CABLE FRONTSHELL / CONNECTOR INTERFACE	NA	Figure 20	NA
FIXED BOARD RIGHT ANGLE 5MM THROUGH HOLE	Figure 5	Figure 7	Figure 32
FIXED BOARD RIGHT ANGLE 6MM THROUGH HOLE	Figure 5	Figure 7	Figure 32
FIXED BOARD RIGHT ANGLE 5MM SURFACE MOUNT SINGLE ROW	Figure 5	Figure 7	Figure 31
FIXED BOARD RIGHT ANGLE 6MM SURFACE MOUNT SINGLE ROW	Figure 5	Figure 7	Figure 31
FIXED BOARD RIGHT ANGLE 5MM SURFACE MOUNT DUAL ROW	Figure 5	Figure 7	Figure 30
FIXED BOARD RIGHT ANGLE 6MM SURFACE MOUNT DUAL ROW	Figure 5	Figure 7	Figure 30
FIXED BOARD RIGHT ANGLE 5MM HYBRID	Figure 5	Figure 7	Figure 33
FIXED BOARD RIGHT ANGLE 6MM HYBRID	Figure 5	Figure 7	Figure 33
FIXED BOARD STRAIGHT THROUGH HOLE	Figure 3	Figure 4	Figure 29
FIXED BOARD STRAIGHT SURFACE MOUNT DUAL ROW	Figure 3	Figure 4	Figure 28
FIXED BOARD STRADDLE MOUNT	Figure 6	Figure 9	Figure 34
FIXED BOARD STRADDLE MOUNT LOW PROFILE (FOR PC CARDS)	Figure 6	Figure 9	Figure 34
FIXED BOARD STACKED (OVER/UNDER) Version 1	Figure 23	Figure 24	Figure 42
FIXED BOARD STACKED (OVER/UNDER) Version 2	Figure 23	Figure 24	Figure 43

The dimensional requirements for mating interface displacements are shown in Figure 27. The bulkhead cutout requirements are shown in Figure 44 for SBUS, Figure 45 for CMC, and Figure 46 for EISA, ISA, PCI.

The relevant figures from EIA PN–700A0AF (SP-3652) are duplicated for reference below:

Only the physical dimensions and a table of the most important performance requirements are included.

3.2. Performance and compatibility requirements

VHDCI shielded connectors shall meet the performance requirements specified in EIA-700A0AF (SP-3652). Some of these are summarized in Table 1.

Table 1 - Some performance requirements for VHDCI connectors

PARAMETER			
RATED VOLTAGE	30 V rms		
CURRENT RATINGS	1.5A single contact (~ normal SCSI condition)	0.5A/contact with 34 contacts energized @ 0.5A	0.3 A/contact with 68 contacts energized @ 0.3A
INSULATION RESISTANCE	500 megohms min		
AMBIENT TEMPERATURE	-55°C to 85°C		
MATING CYCLES	up to 2000		
CONTACT RESISTANCE	< 60 milliohm		

The physical compatibility requirements for use with printed circuit boards are given in Table 2. Note that other board thicknesses require different tail lengths and are not included in this document.

Table 2 - Printed circuit board compatibility requirements

TERMINATION SIDE STYLE	PRINTED CIRCUIT BOARD THICKNESS	
	MIN (MM / INCHES)	MAX (MM /INCHES)
SURFACE MOUNT *	1.0 / 0.039	1.75 / 0.069
THROUGH HOLE	1.45 / 0.057	1.75 / 0.069
HYBRID (THROUGH HOLE)	1.45 / 0.057	1.75 / 0.069
STRADDLE MOUNT	0.87 / 0.034	1.13 / 0.044
* This dimension is required to accommodate the board retention feature that penetrates the board		

3.3. Dimensional requirements

The drawings in this section use the dimensioning conventions described in ANSI-Y14.5M, Dimensioning and tolerancing. All dimensions are in millimeters.

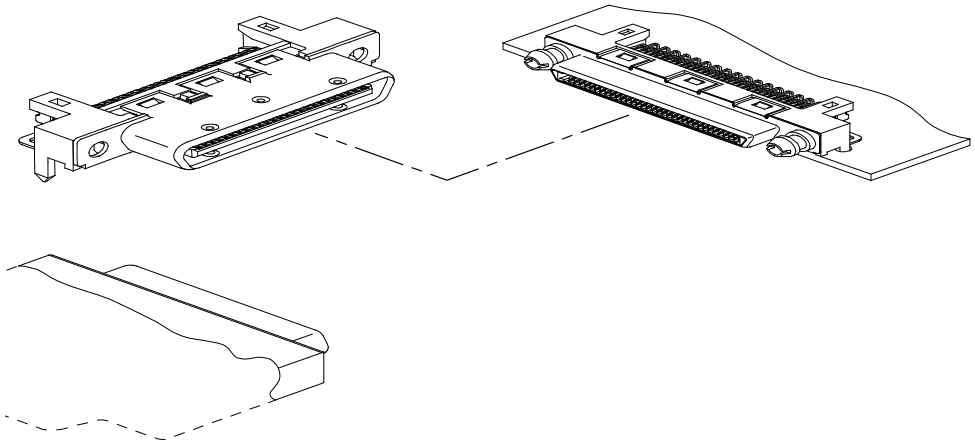


Figure 2 - General view of mating sides

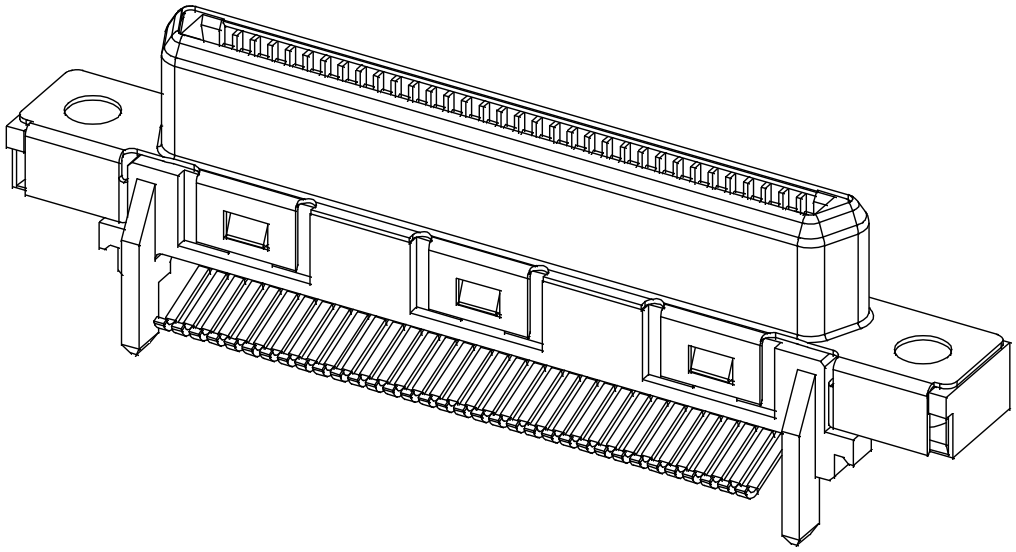


Figure 3 - Fixed board straight overview

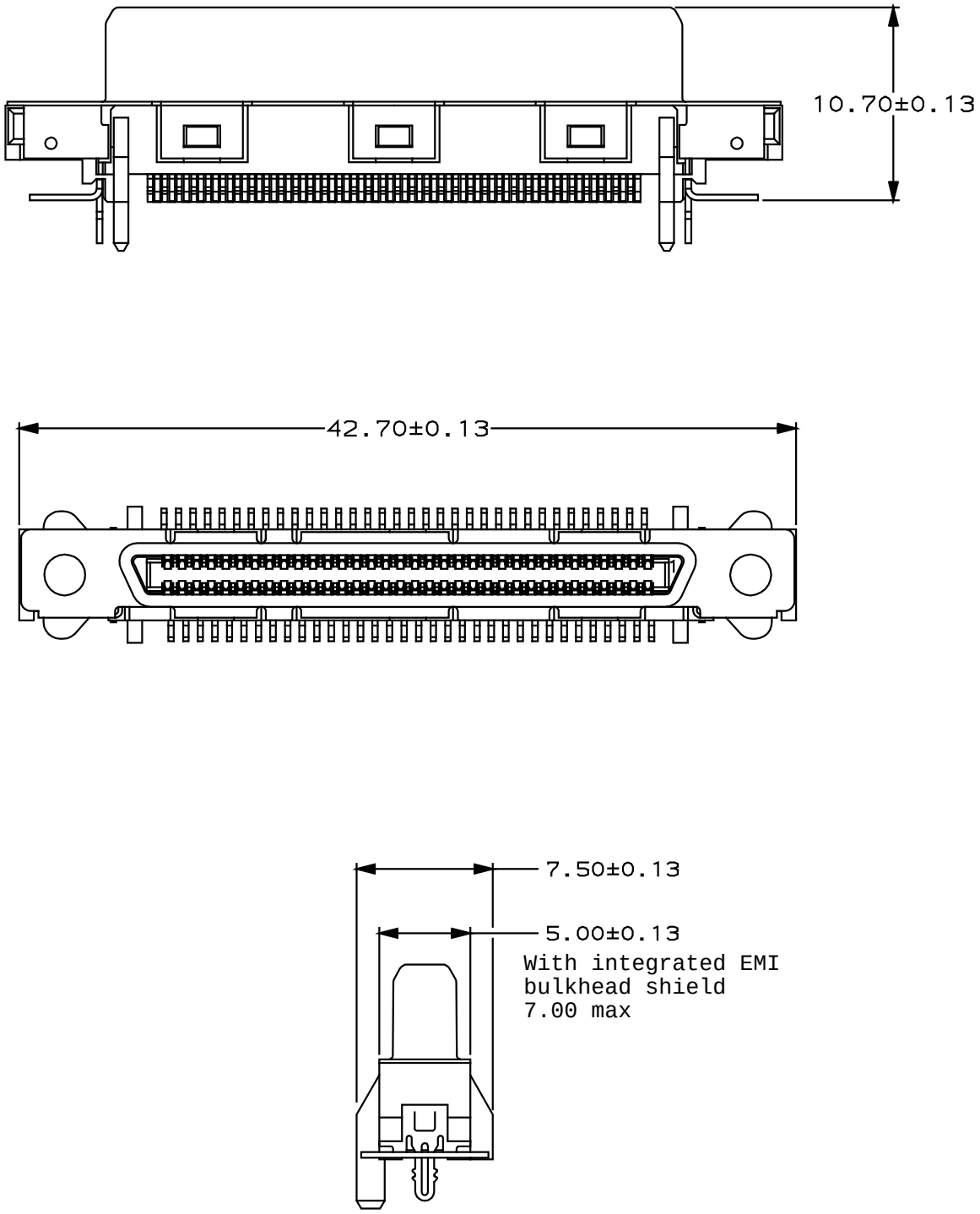


Figure 4 - Fixed board straight outline dimensions

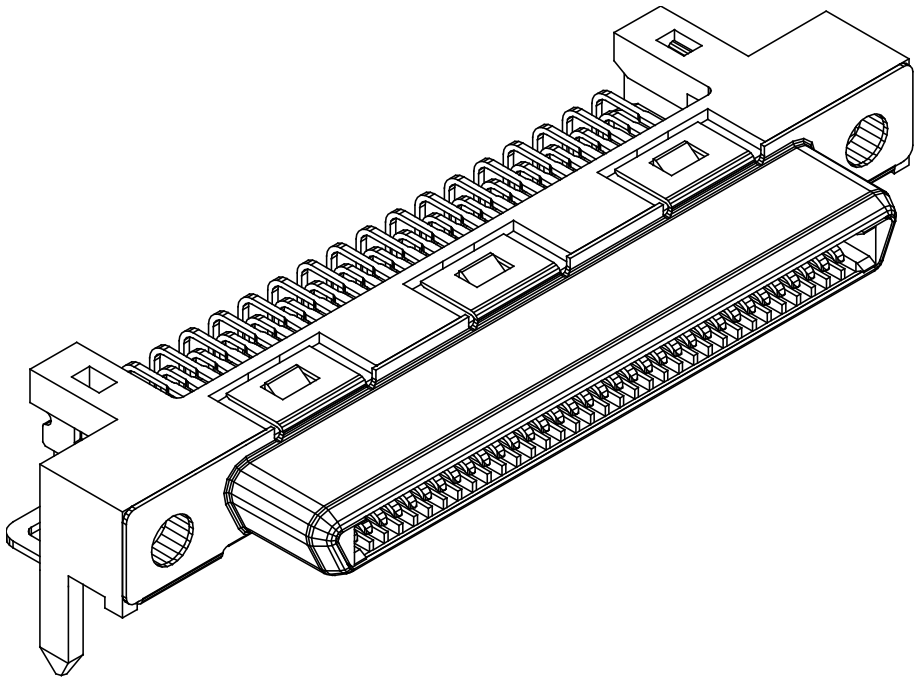


Figure 5 - Fixed board right angle overview

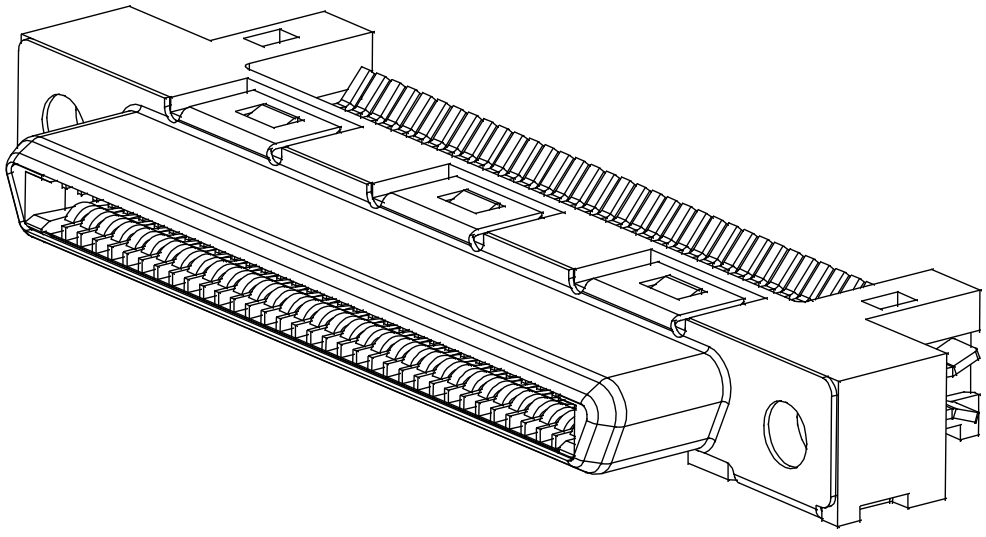
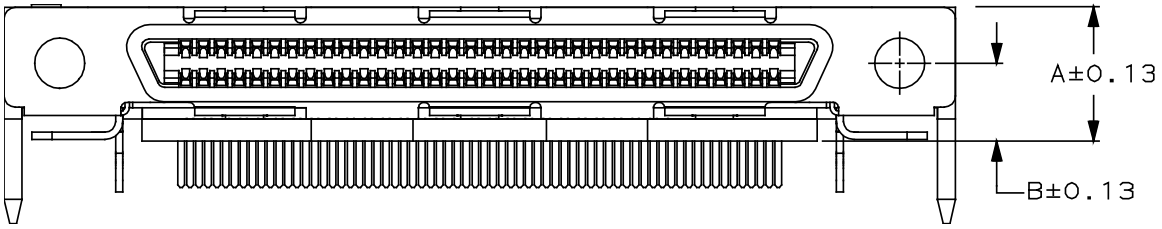
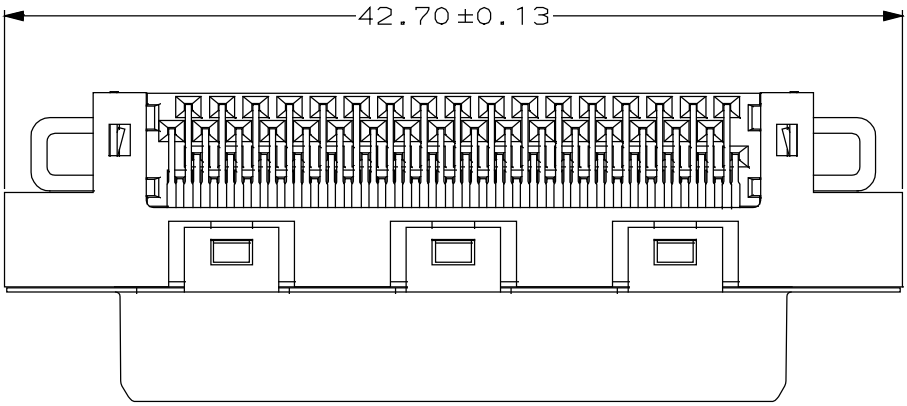


Figure 6 - Fixed board straddle mount overview



	A (mm)	B (mm)
RIGHT ANGLE 5mm	5.00	2.50
RIGHT ANGLE 6mm	6.00	3.50



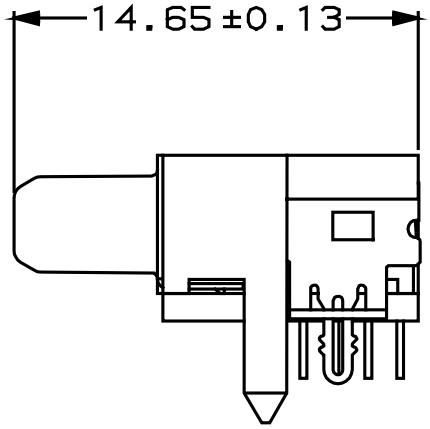


Figure 7 - Fixed board right angle outline dimensions

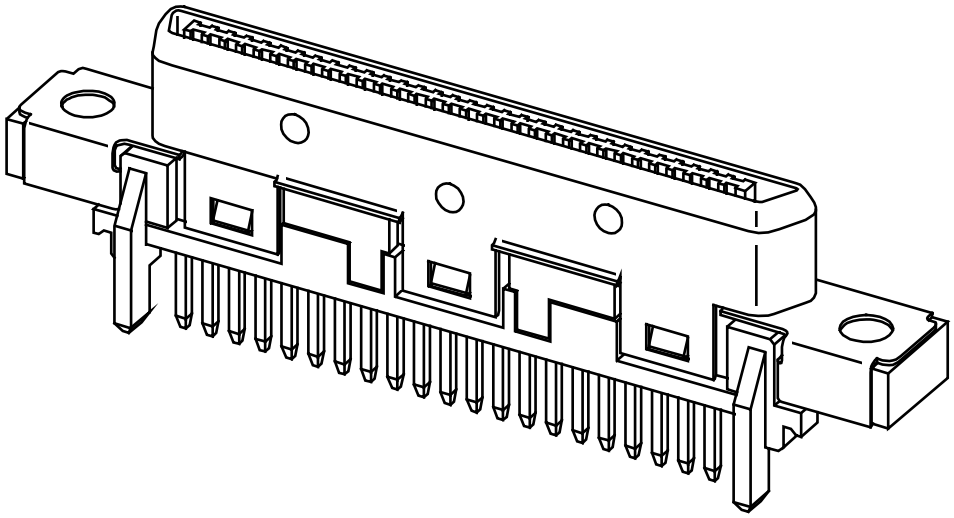
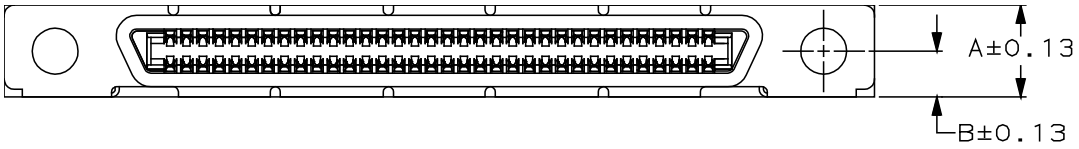
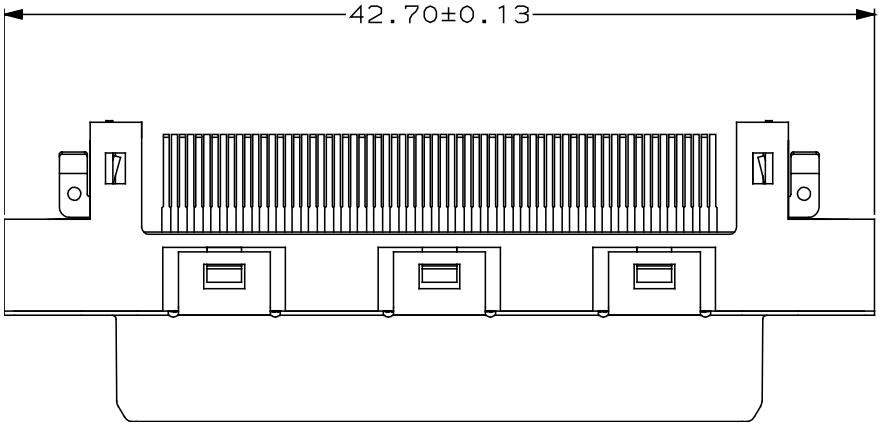
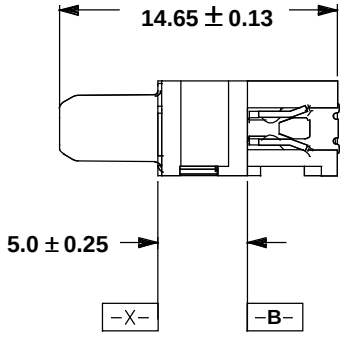


Figure 8 - Free board straight overview







	A (mm)	B (mm)
STRADDLE MOUNT	5.00	2.50
STRADDLE MOUNT LOW PROFILE	4.75	2.375

Figure 9 - Fixed board straddle mount outline dimensions

In Figure 9 see Figure 25 for the definition of “X” and Figure 34 for the definition of “B”.

Due to the height of the cable backshell it is not possible to have more than one type II SCSI adapter PC card in the same type III slot. It is possible to have two type II cards in the same type III slot as long as the SCSI card is inserted after the other type II PC card or is in the top slot.

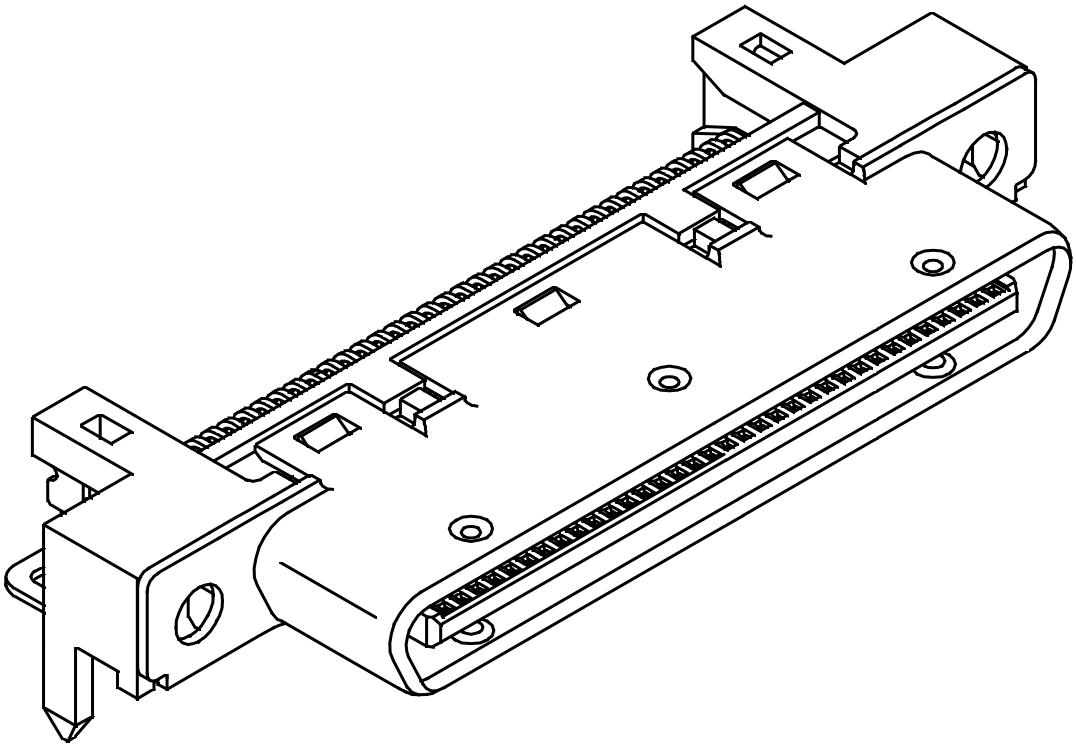


Figure 10 - Free board right angle overview

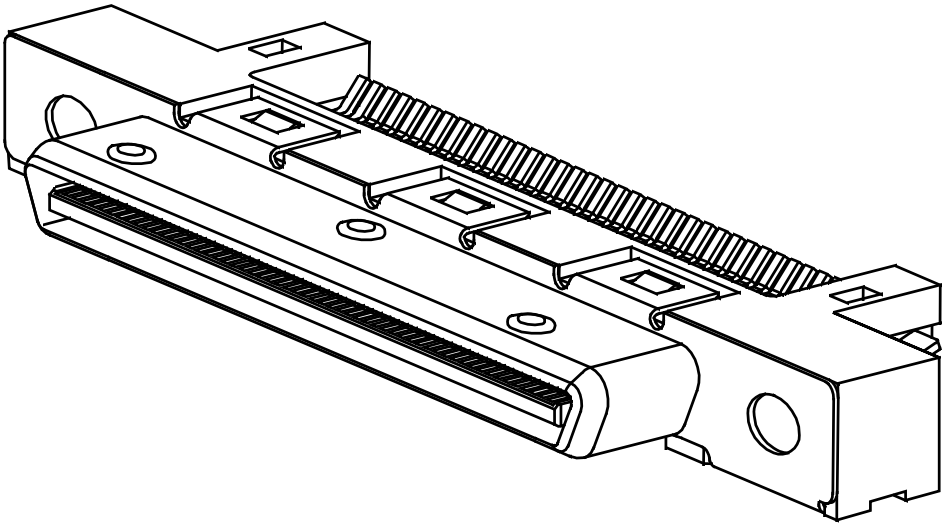


Figure 11 - Free board straddle mount overview

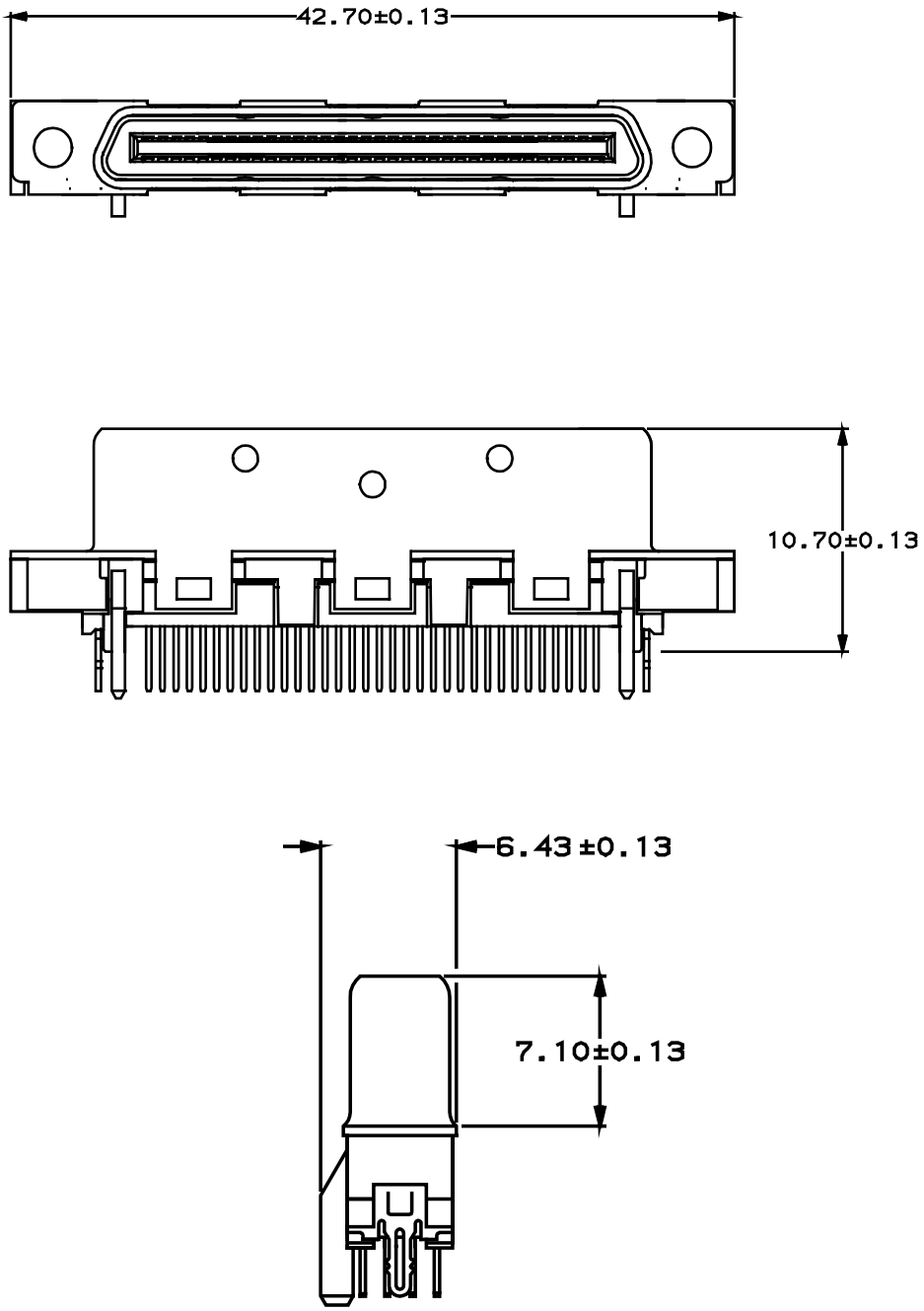
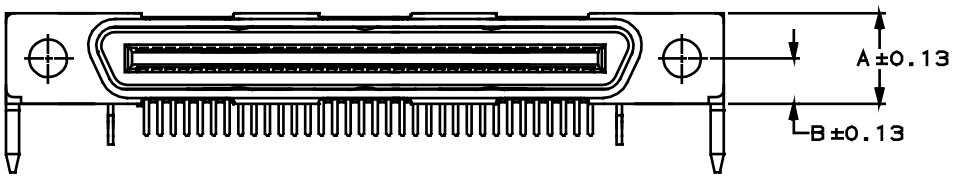
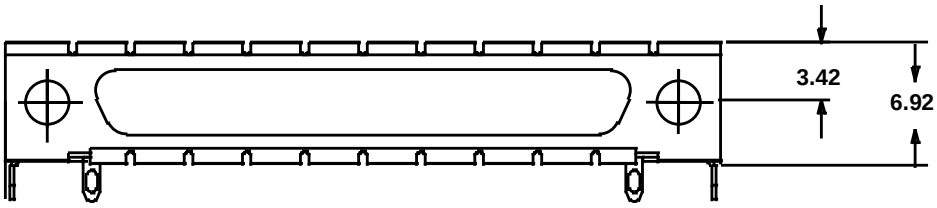


Figure 12 - Free board straight outline dimensions



		A (mm)	B (mm)
Option 1	RIGHT ANGLE 5mm	5.00	2.50
Option 2	RIGHT ANGLE 6mm	6.00	3.50

Without integrated EMI bulkhead shield



Option 3 with integrated EMI bulkhead shield

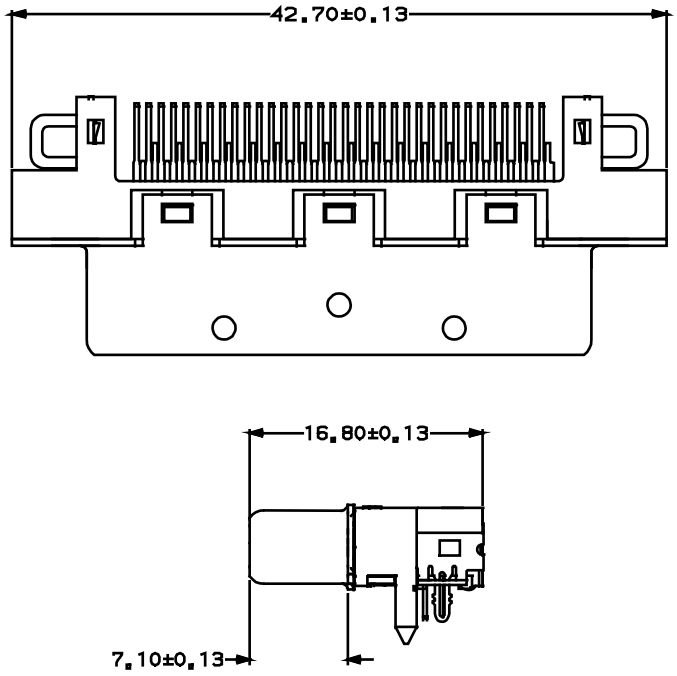


Figure 13 - Free board right angle outline dimensions

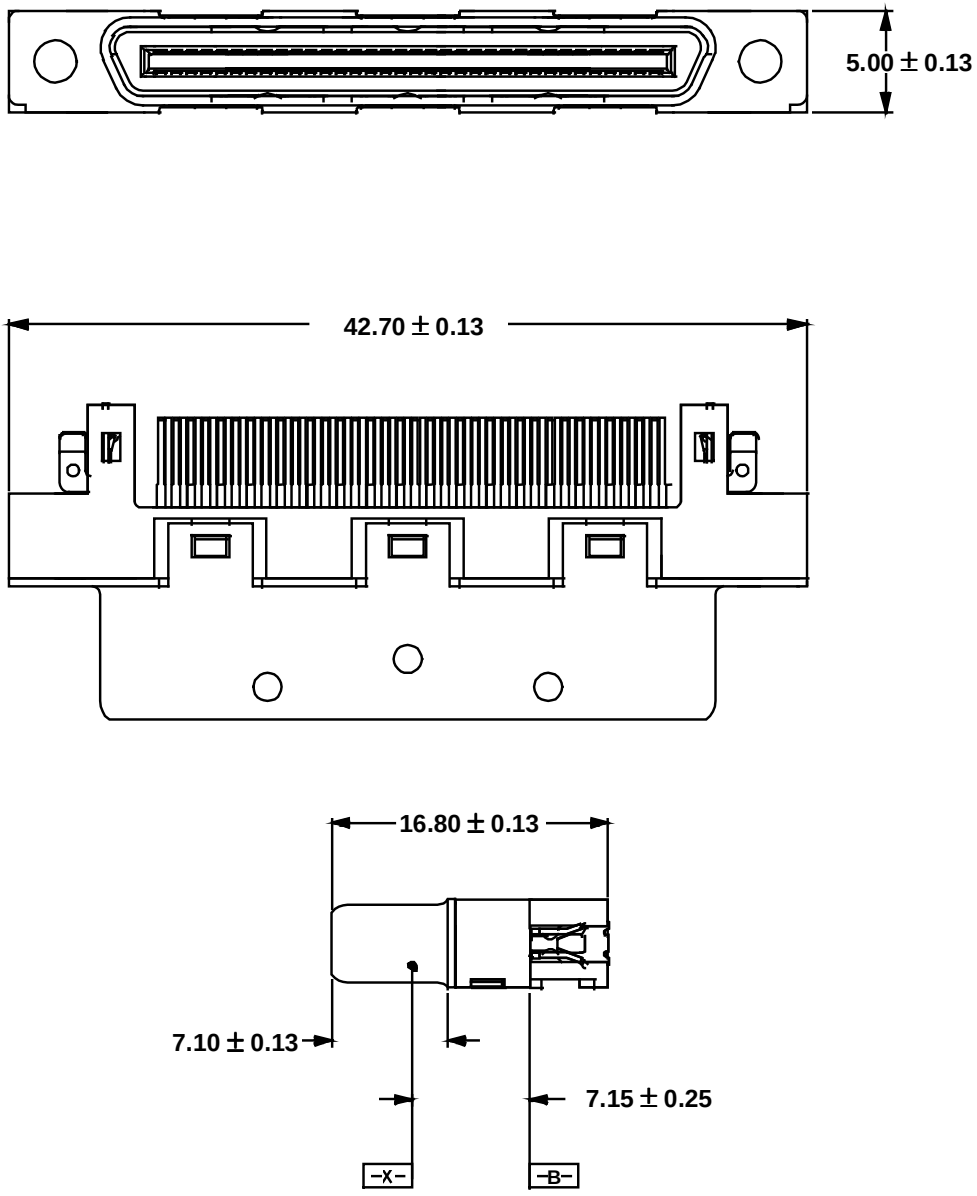


Figure 14 - Free board straddle mount outline dimensions

In Figure 14 see Figure 26 for definition of “X” and Figure 41 for the definition of “B”.

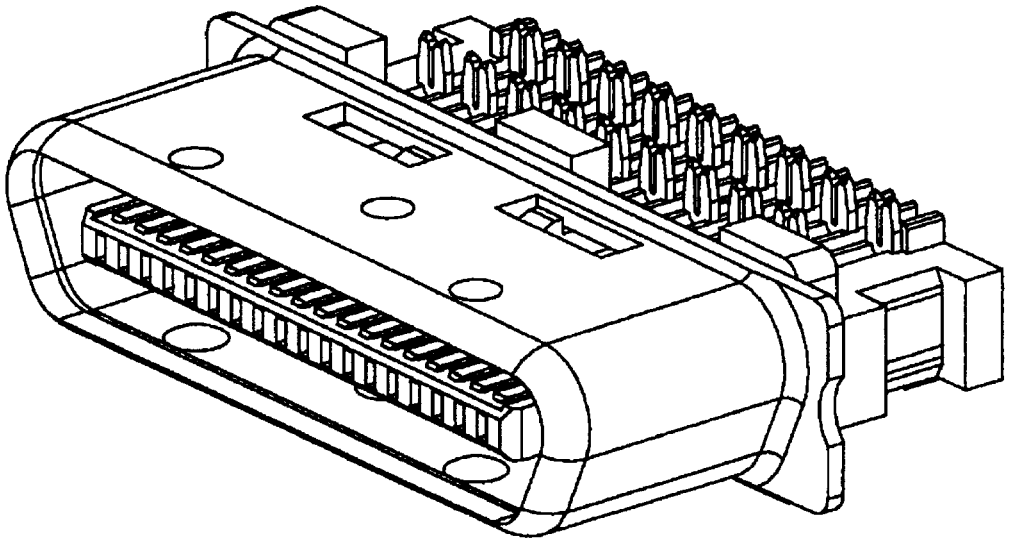


Figure 15 - Free cable double sided overview

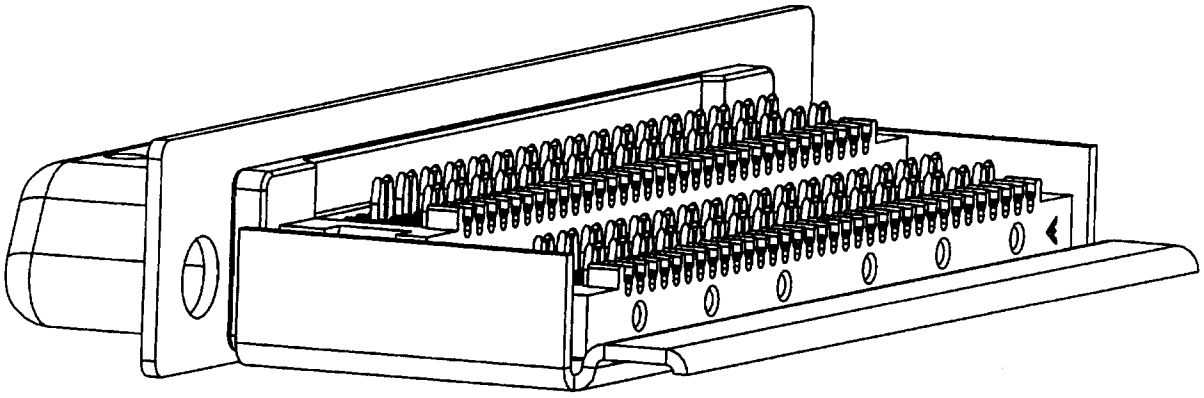


Figure 16 - Free cable single sided overview

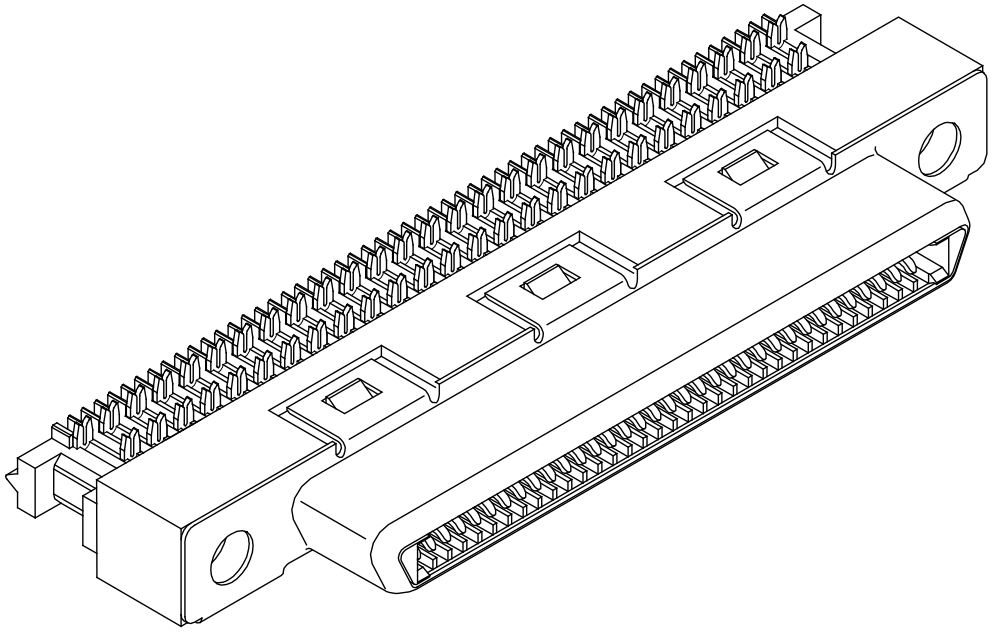


Figure 17 - Fixed cable double sided overview

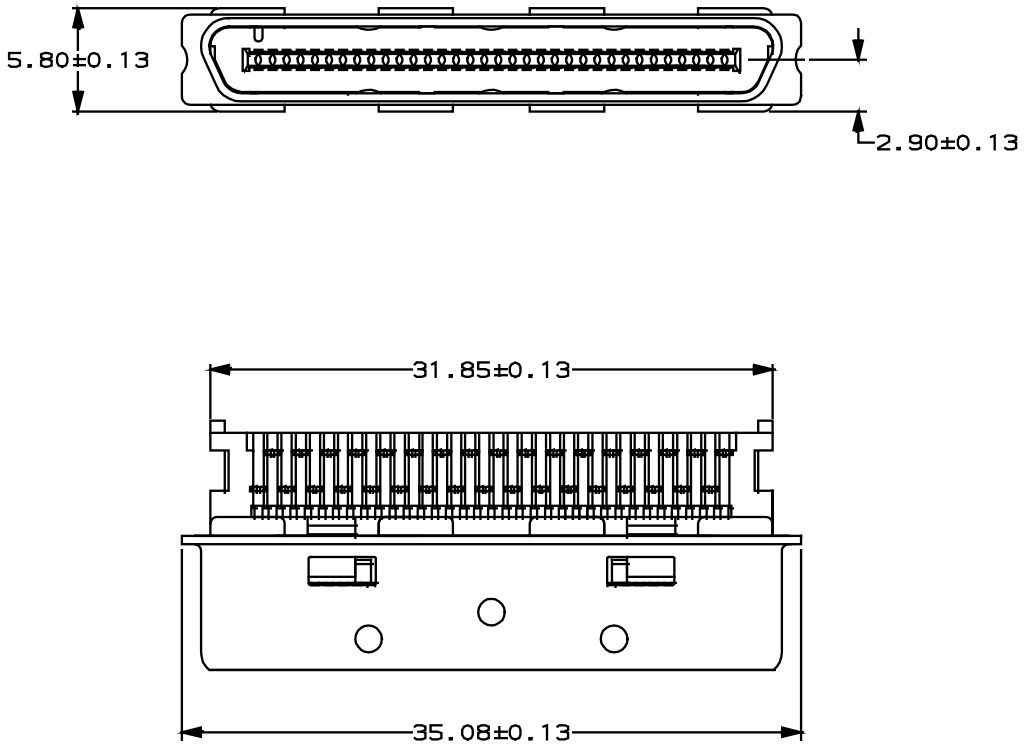


Figure 18 - Free cable double sided outline dimensions

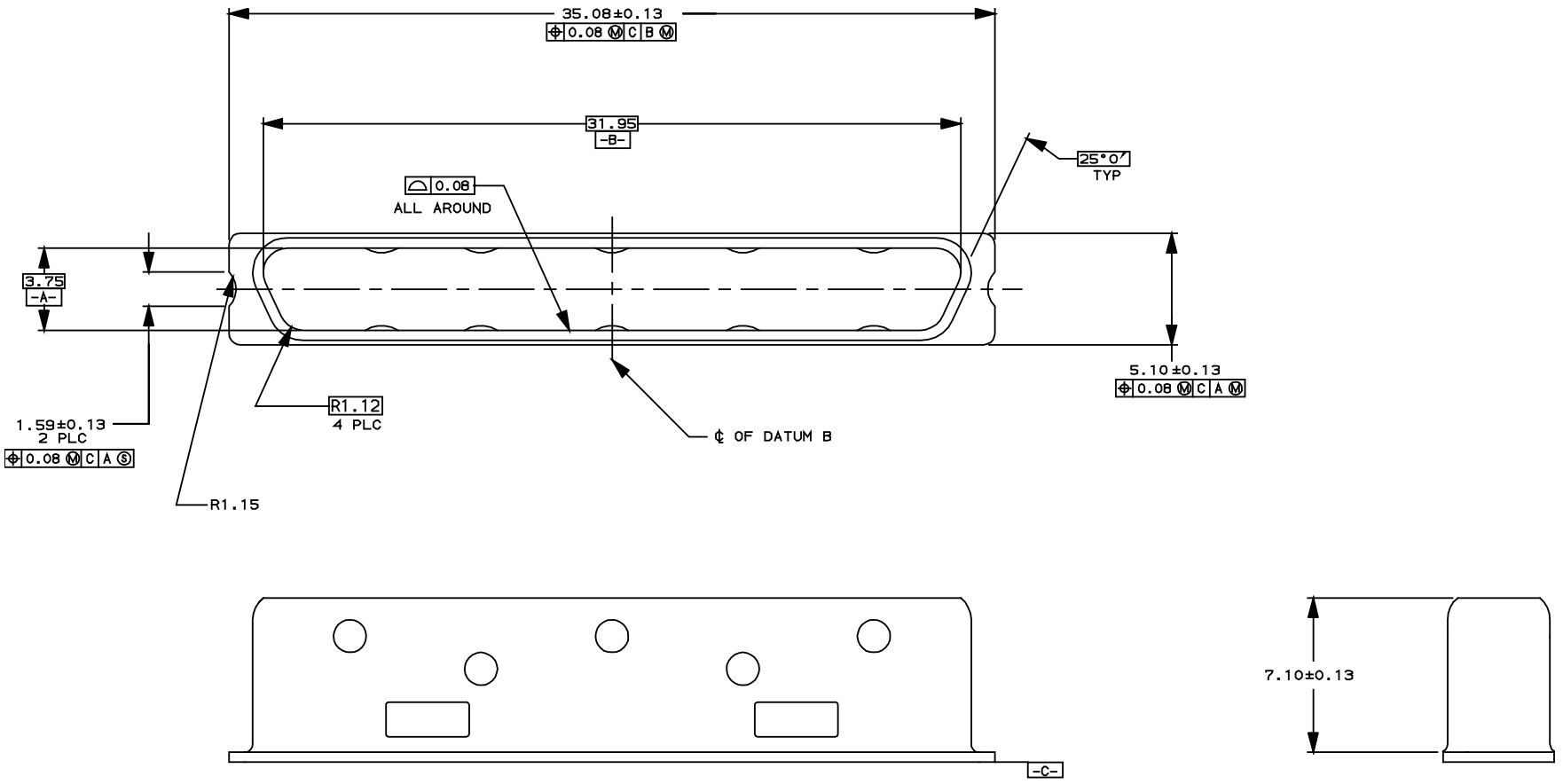


Figure 19 - Free cable double sided frontshell interface dimensions

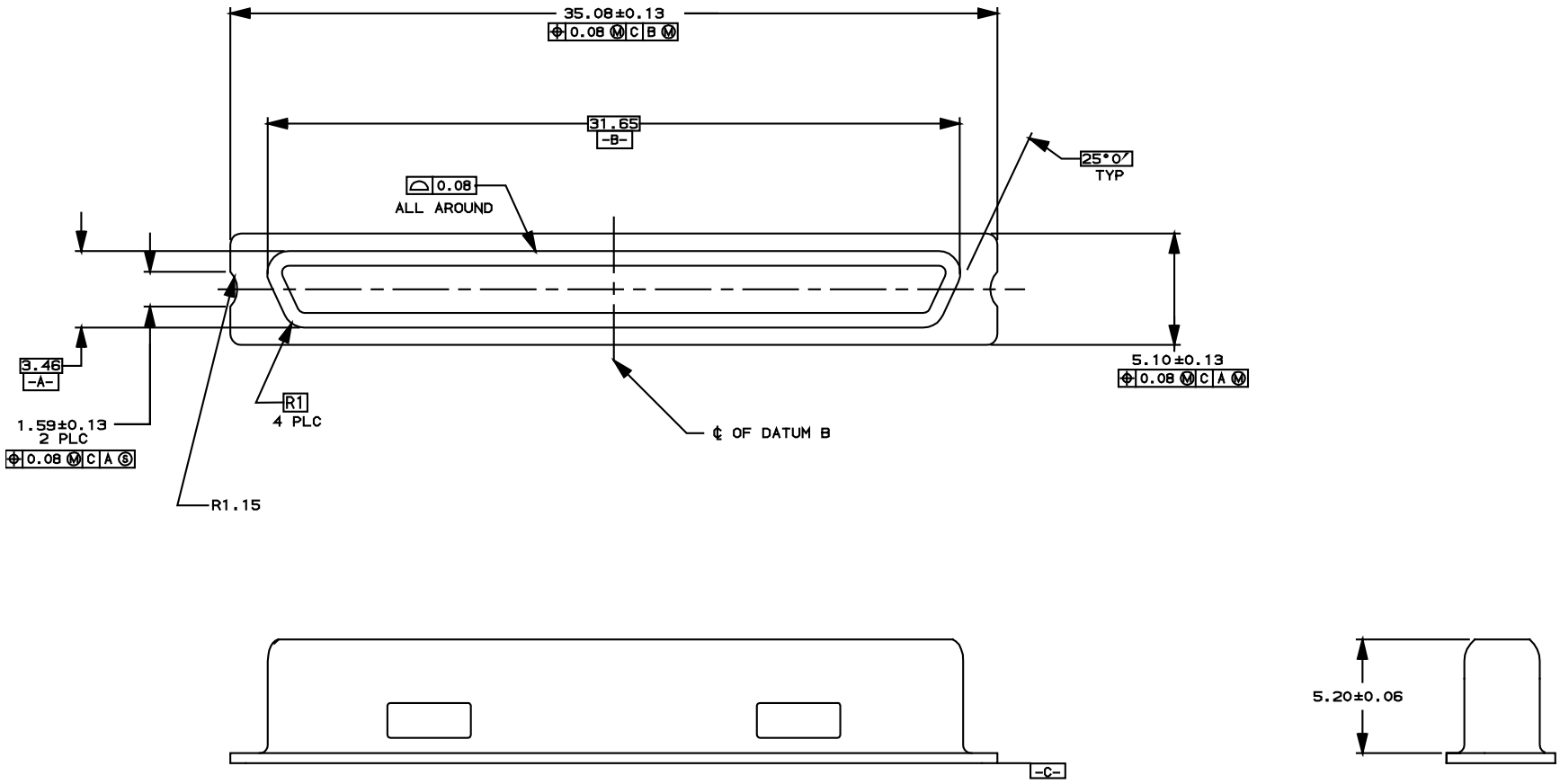


Figure 20 - Fixed cable double sided frontshell interface dimensions

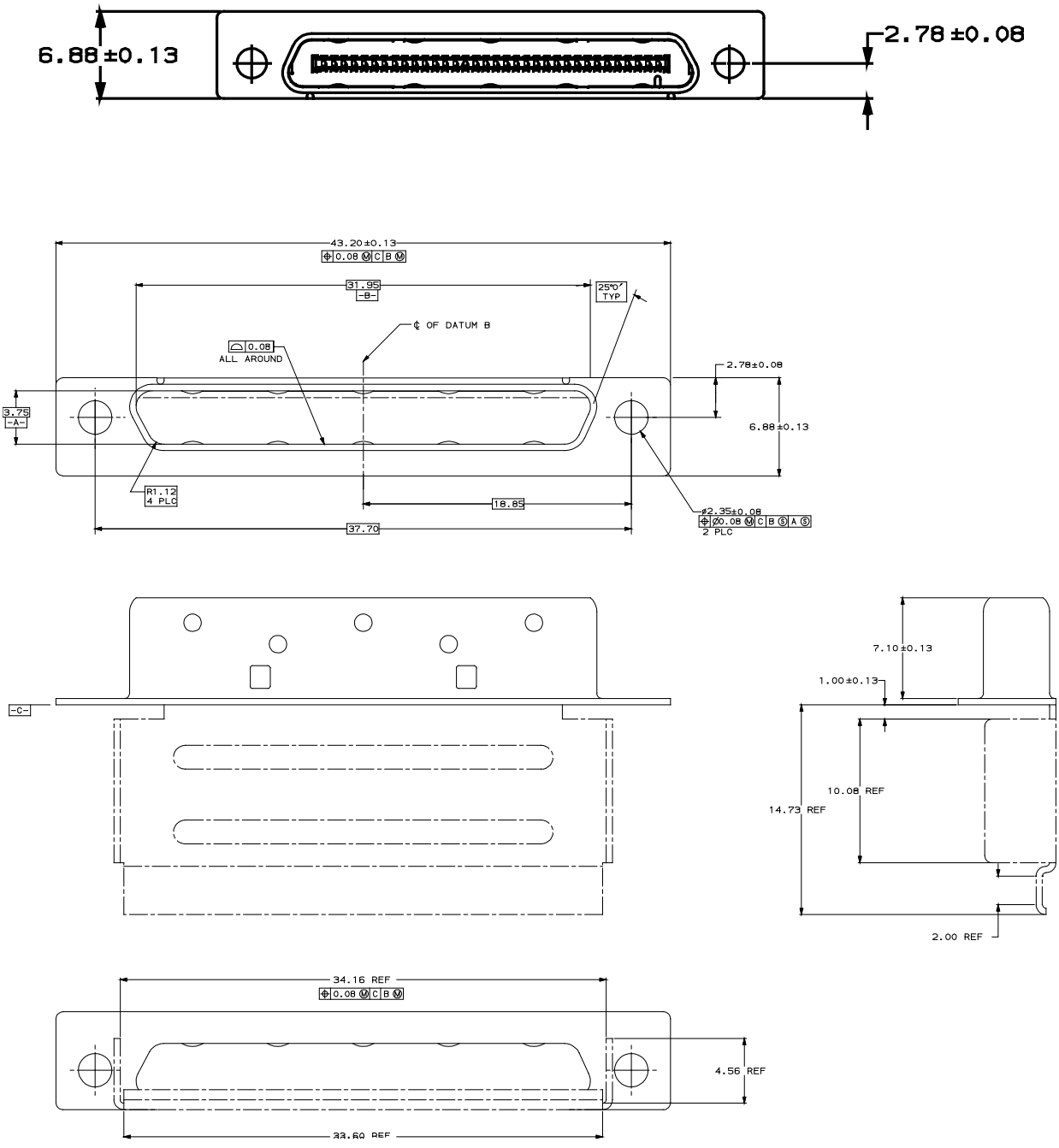
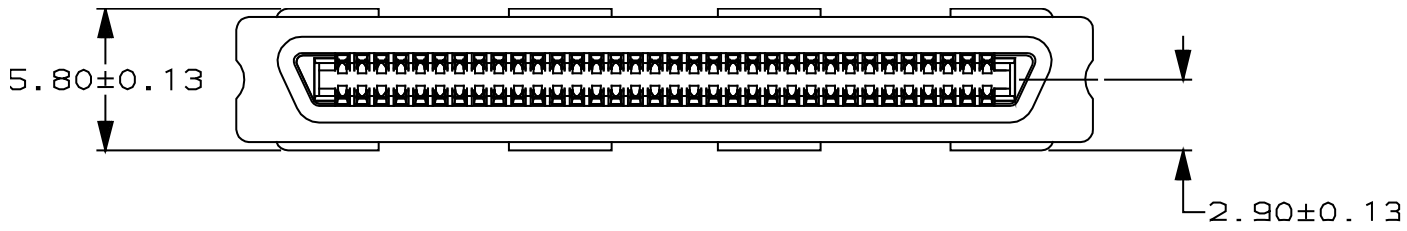
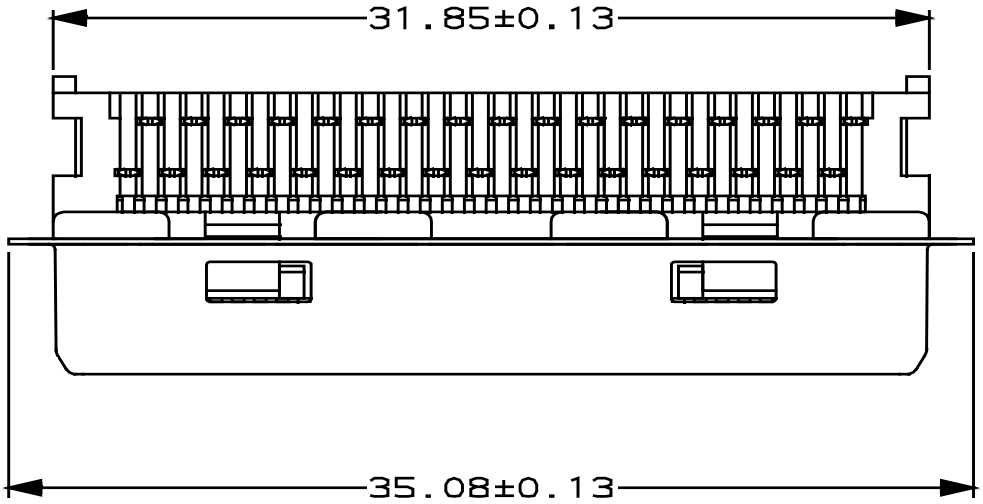


Figure 21 - Free cable single sided outline / frontshell dimensions





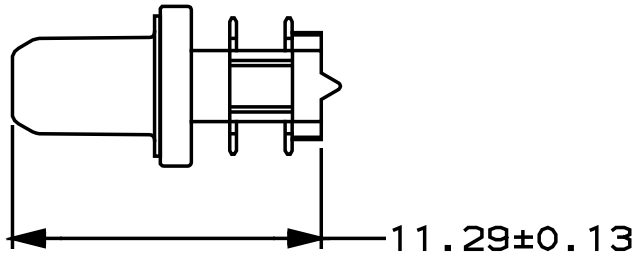


Figure 22 - Fixed cable outline dimensions

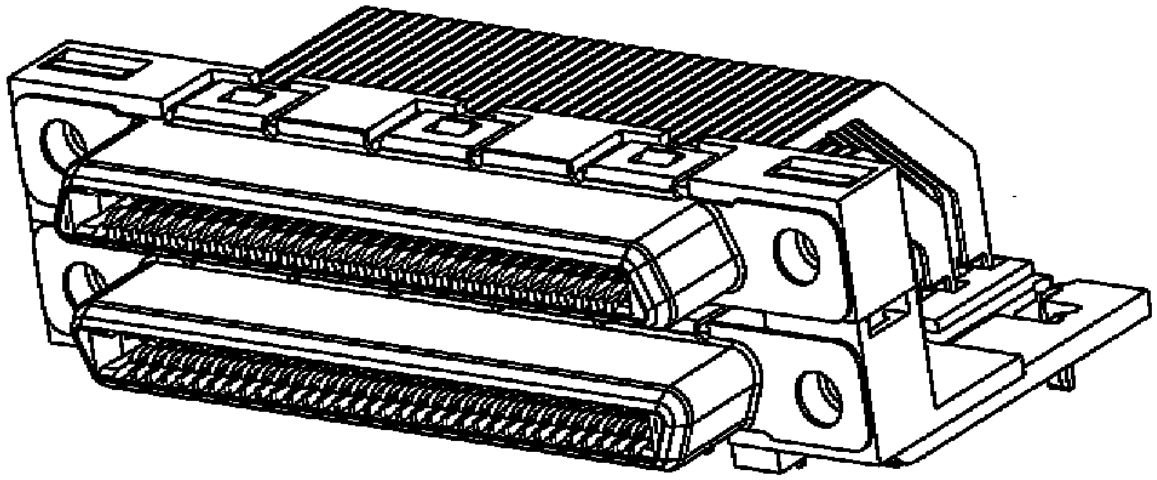
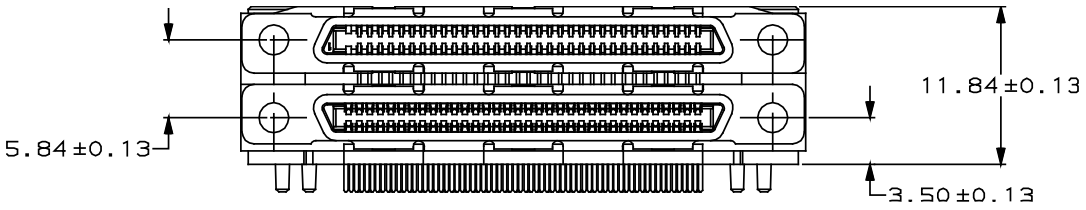
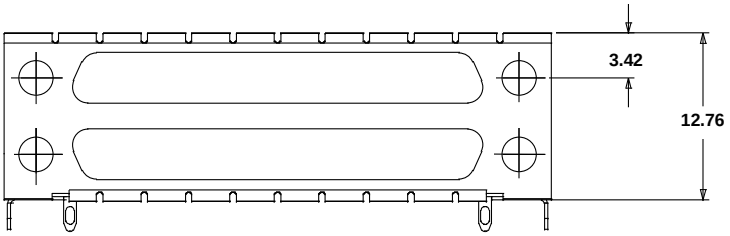


Figure 23 - Stacked overview



Without integrated EMI bulkhead shield



With integrated EMI bulkhead shield

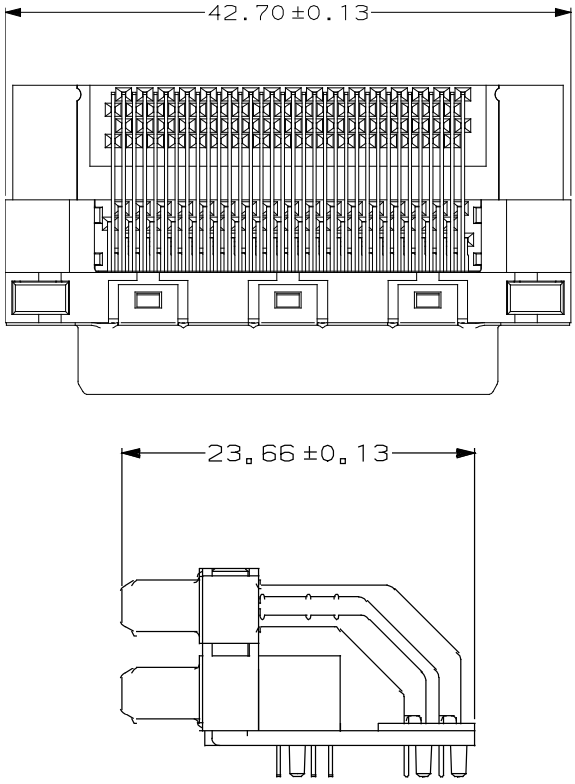


Figure 24 - Stacked outline dimensions

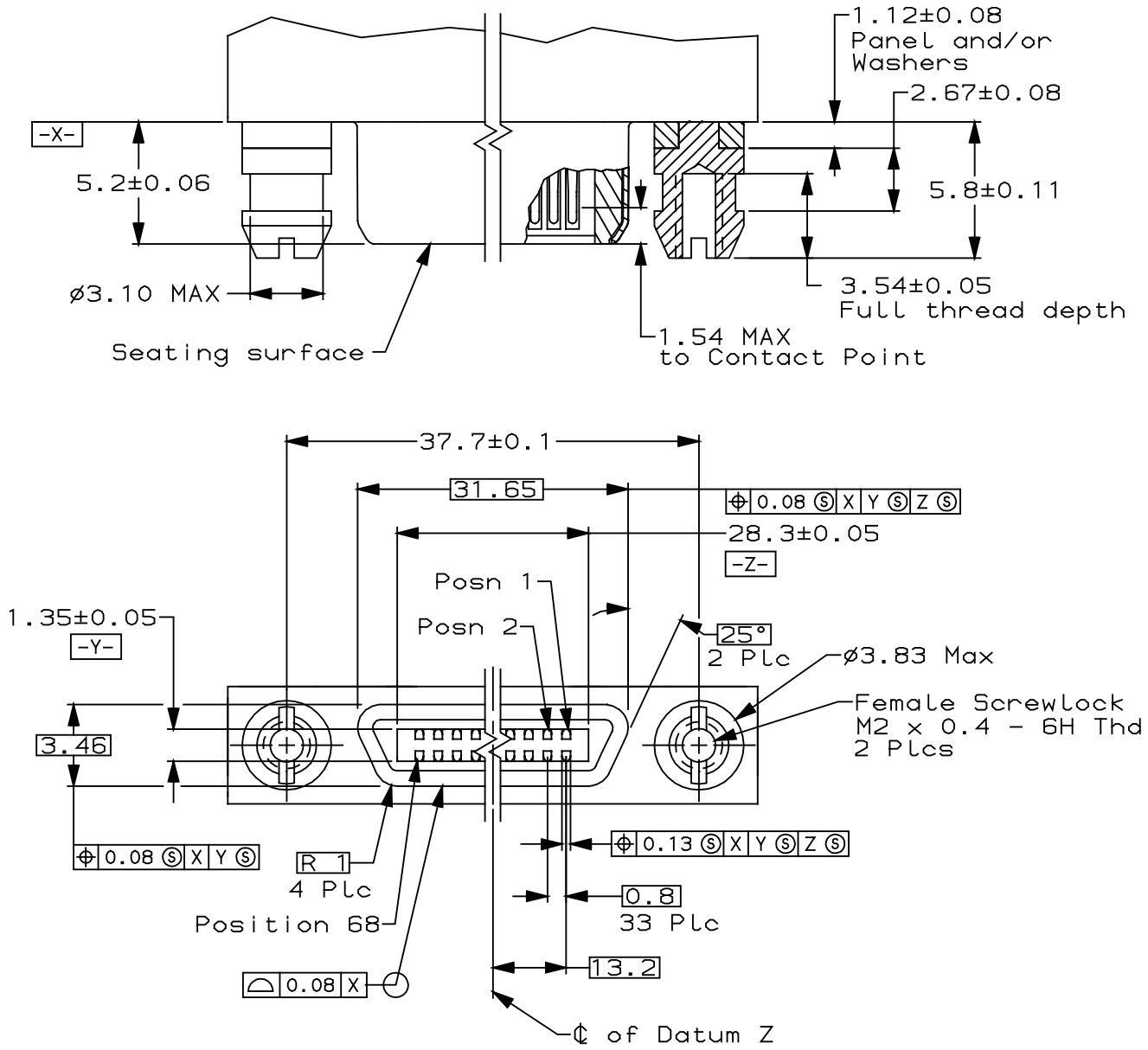


Figure 25 - Fixed mating side dimensions

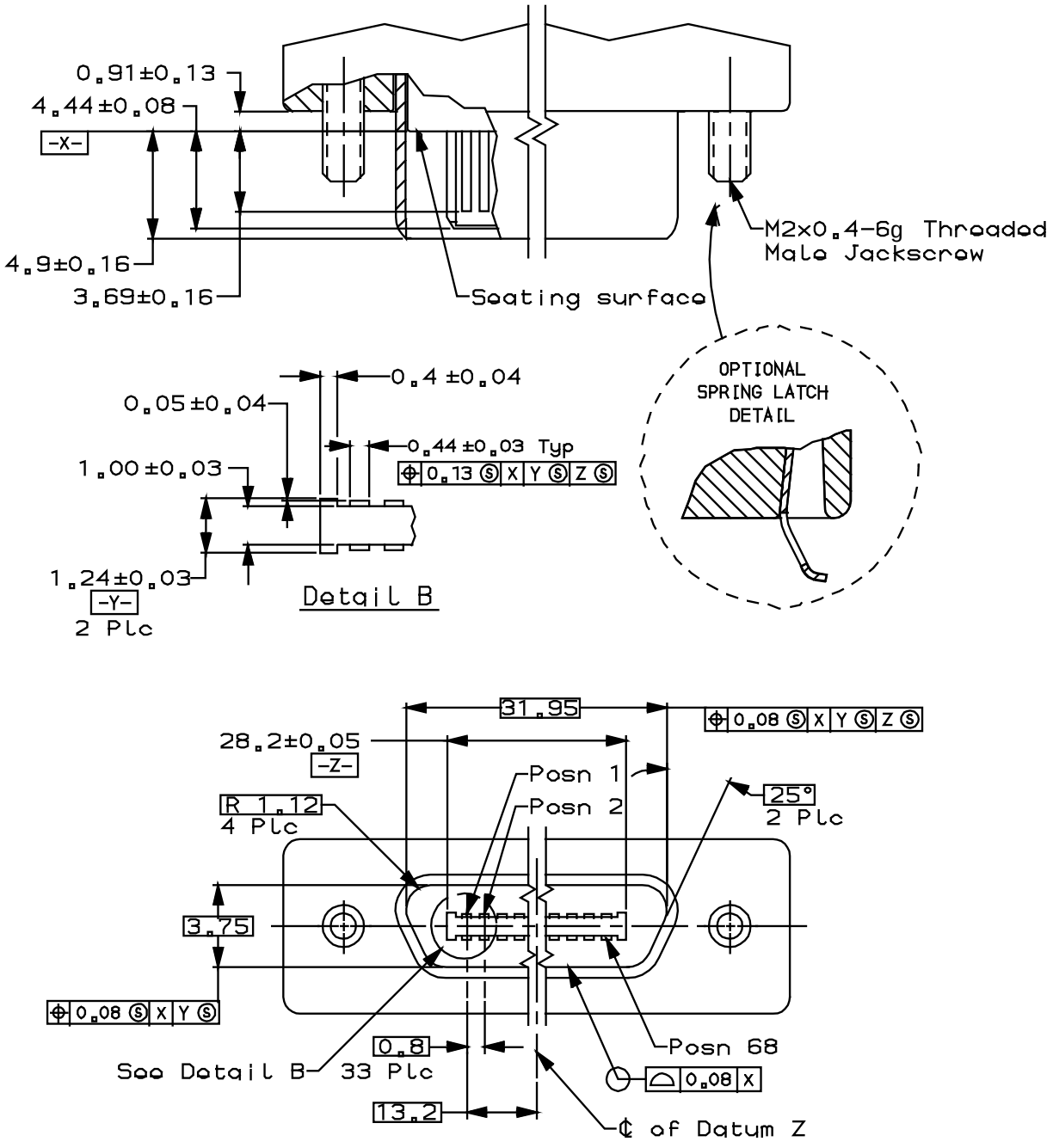


Figure 26 - Free mating side dimensions

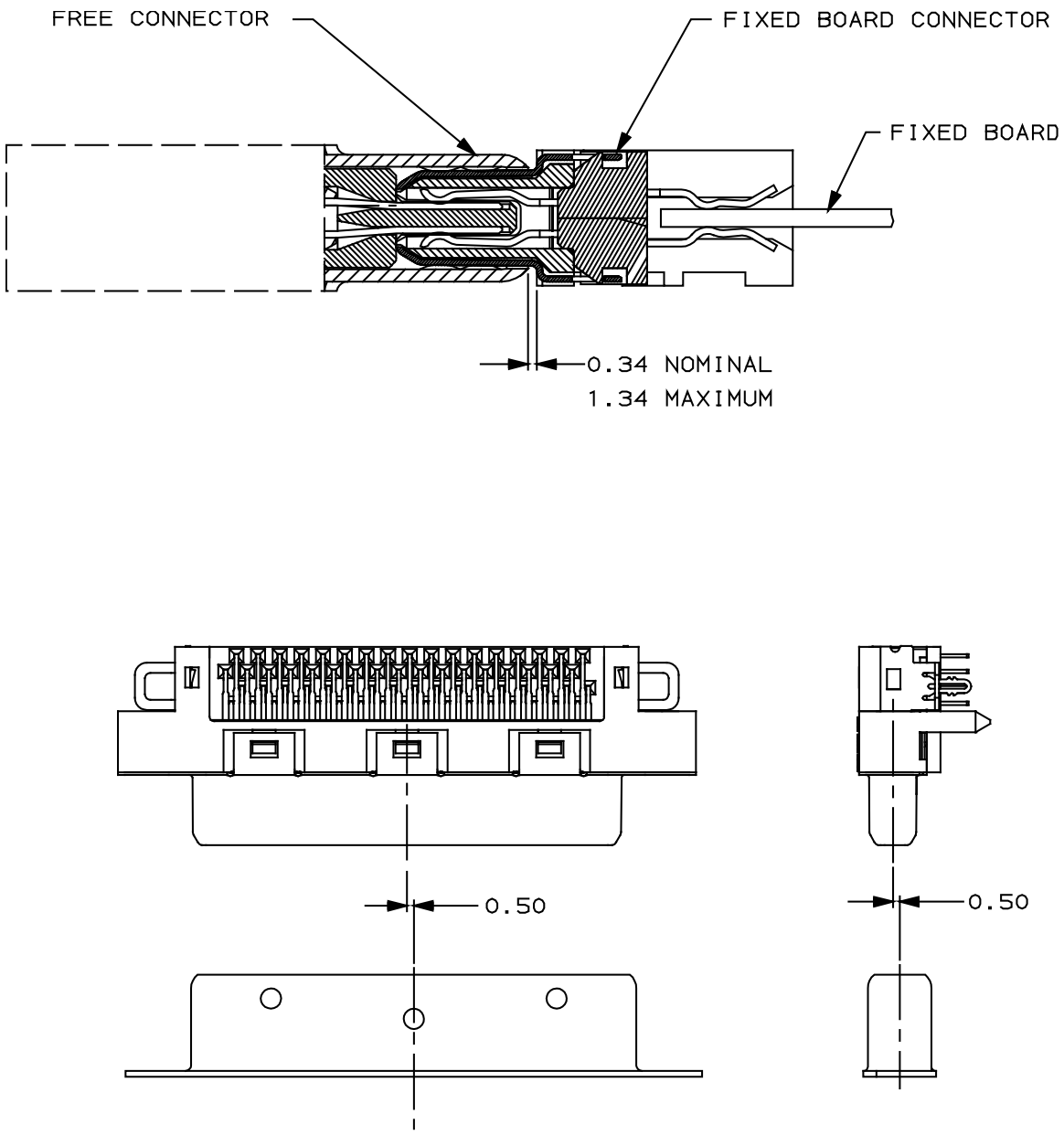


Figure 27 - Mating interface displacement dimensions

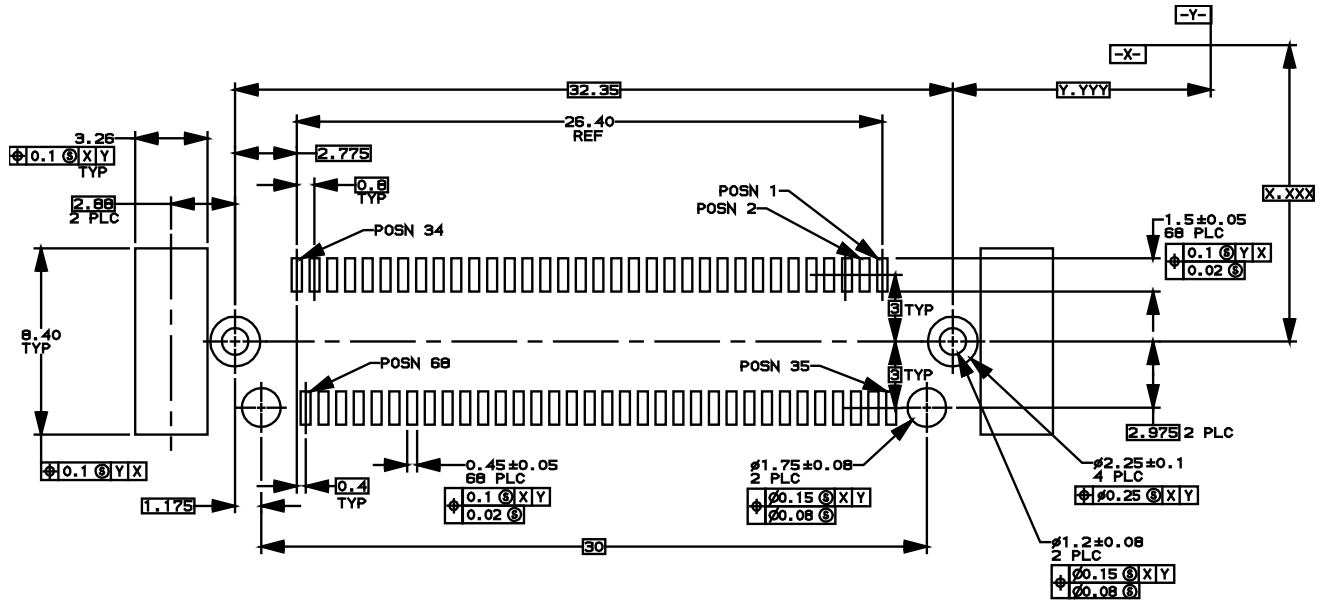


Figure 28 - Fixed board straight surface mount dual row

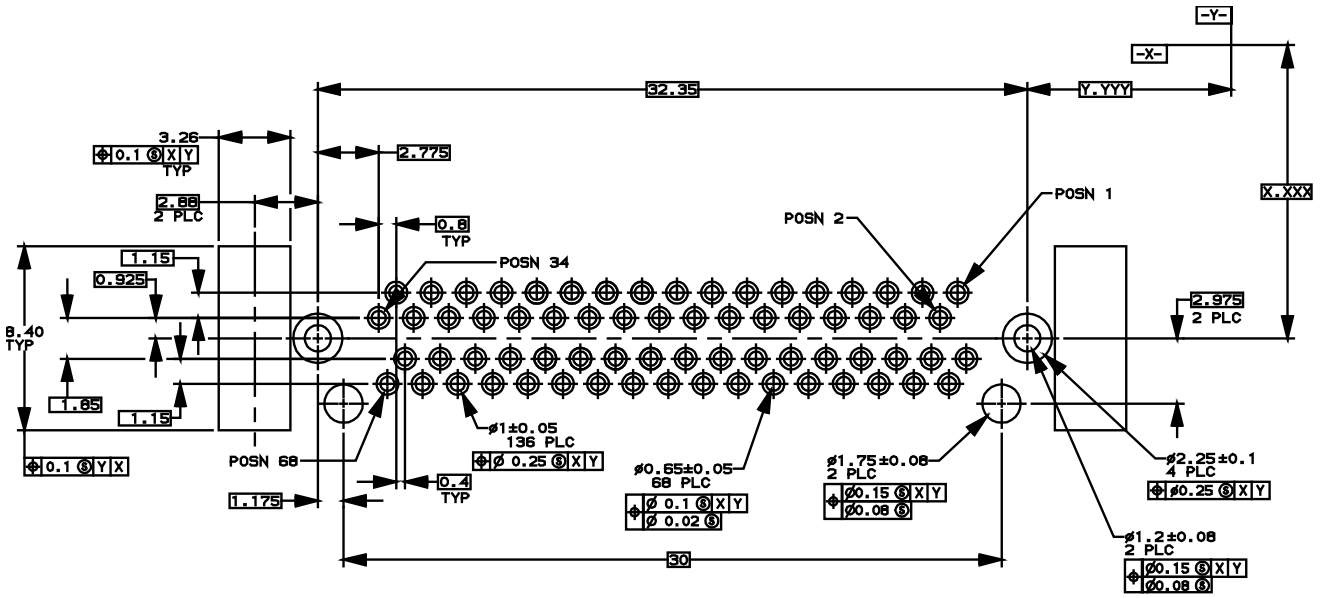


Figure 29 - Fixed board straight thru hole

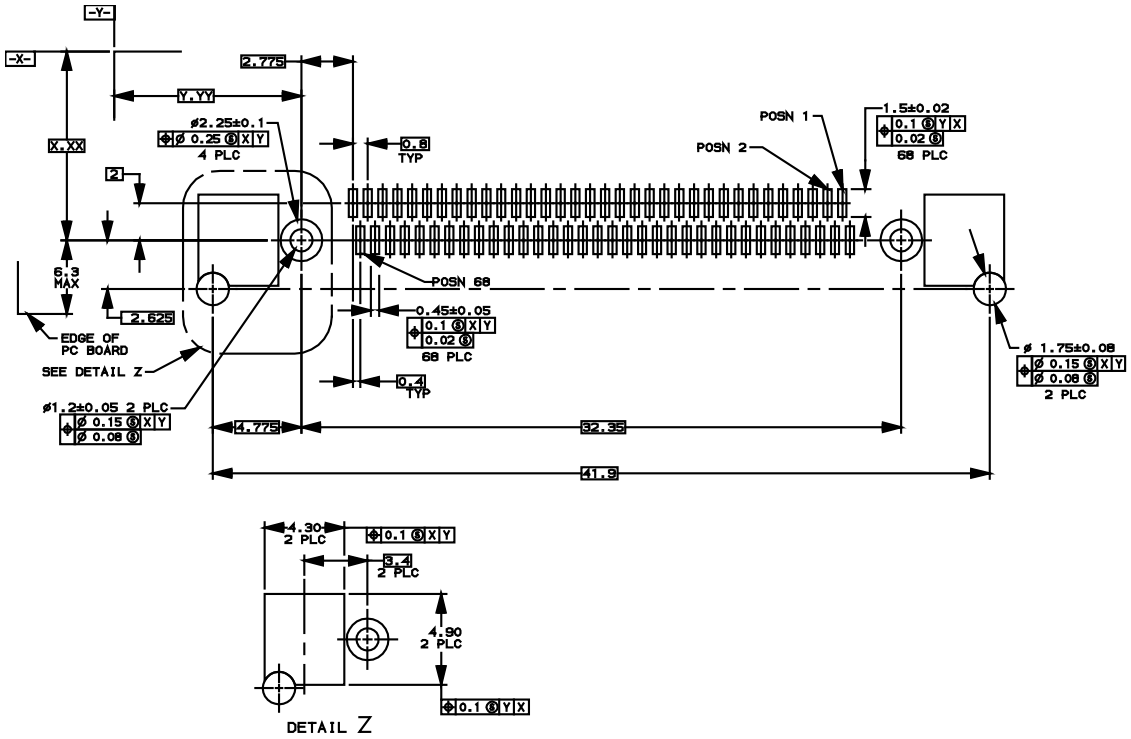


Figure 30 - Fixed board right angle surface mount dual row

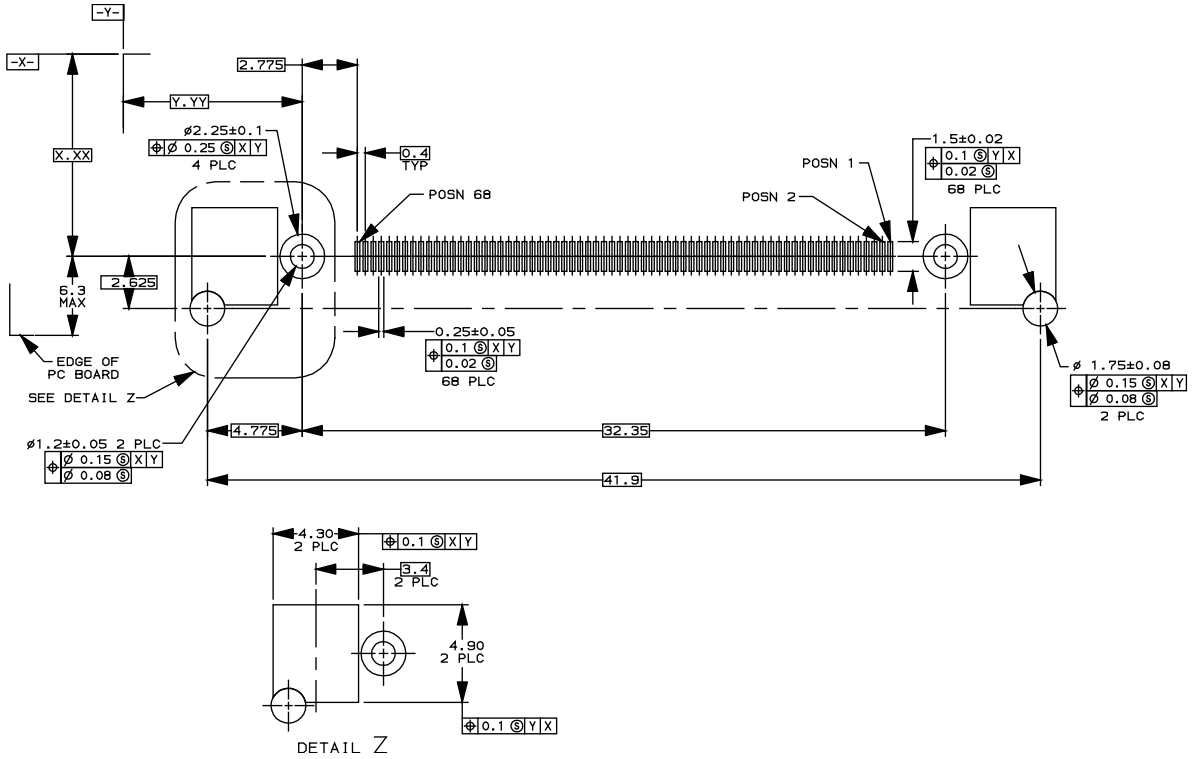


Figure 31 - Fixed board right angle surface mount single row

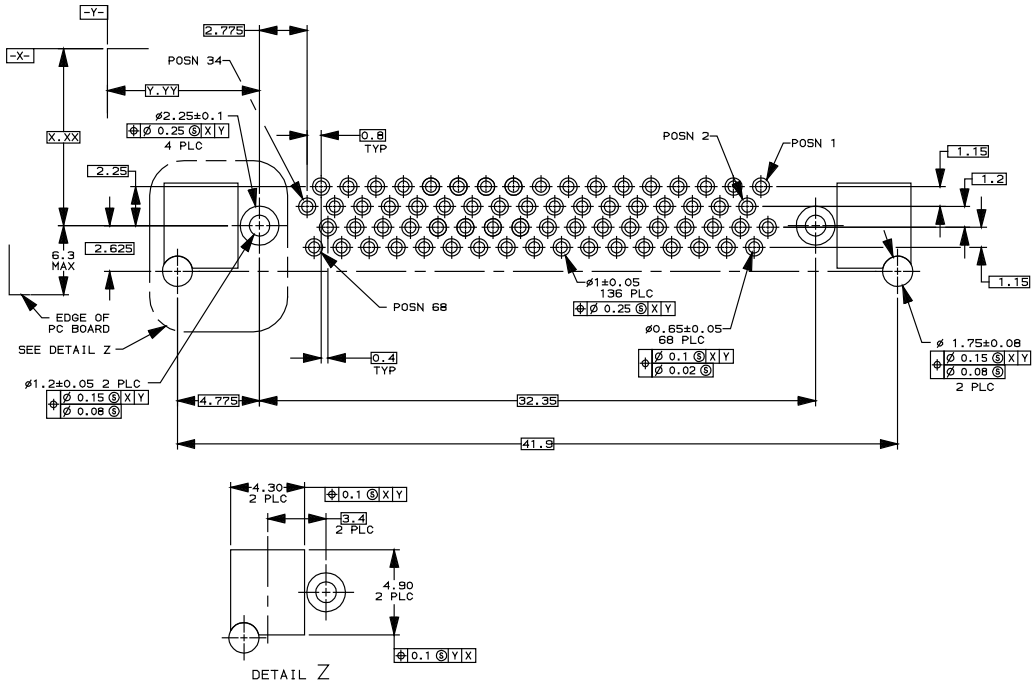


Figure 32 - Fixed board right angle thru hole

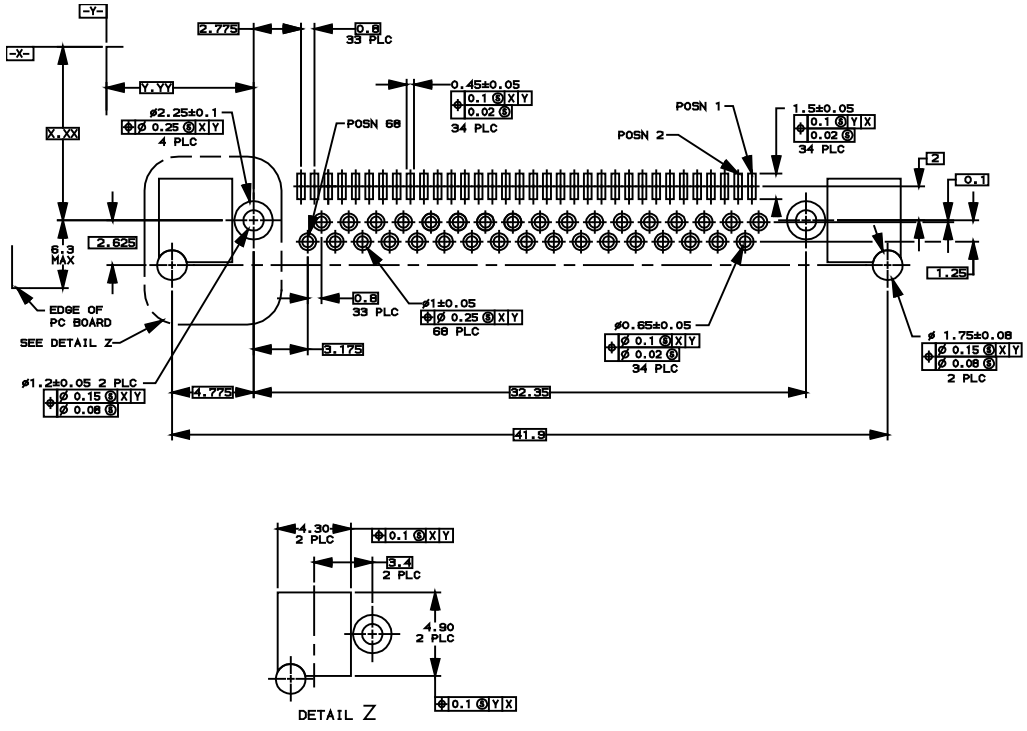


Figure 33 - Fixed board right angle hybrid

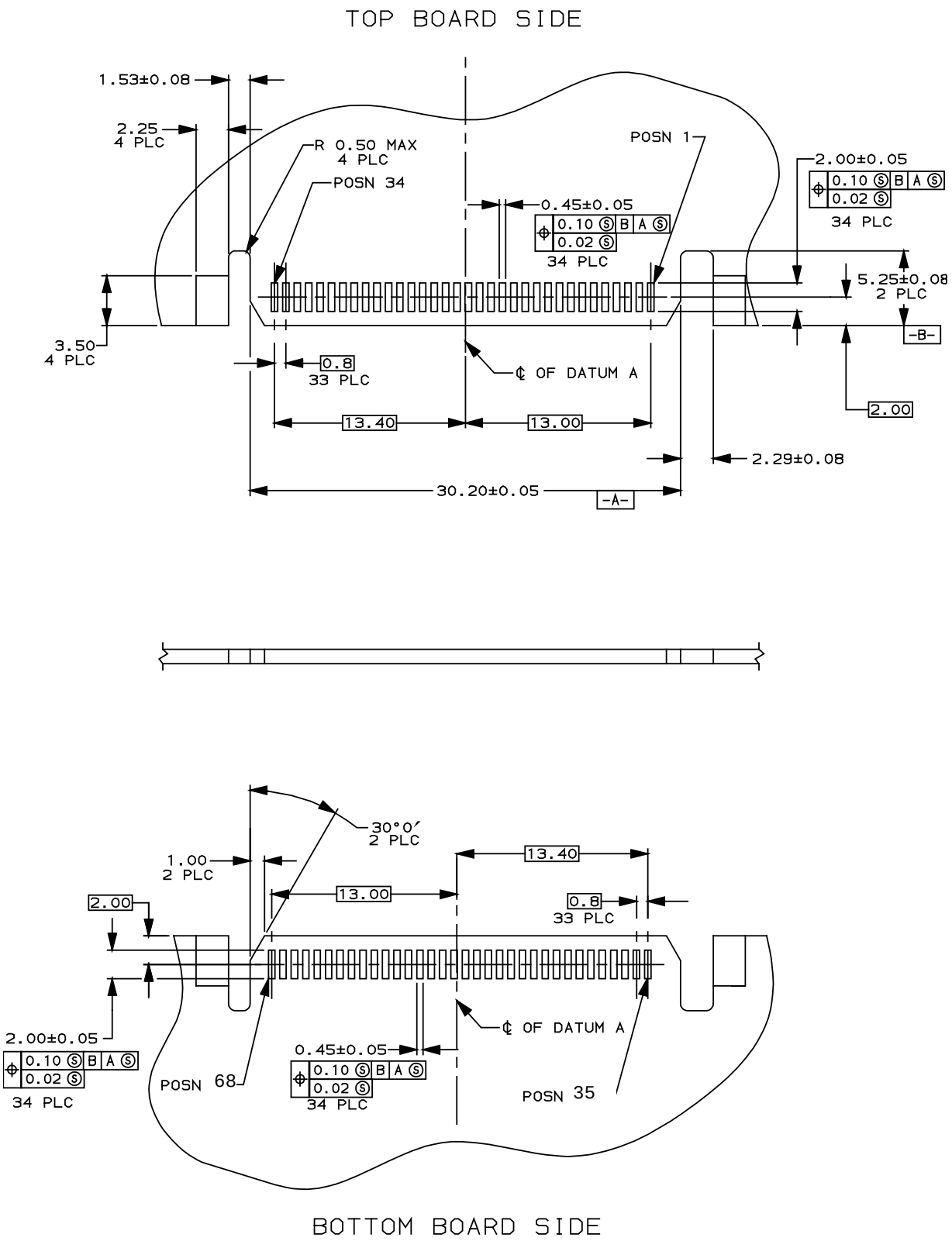


Figure 34 - Fixed board straddle mount

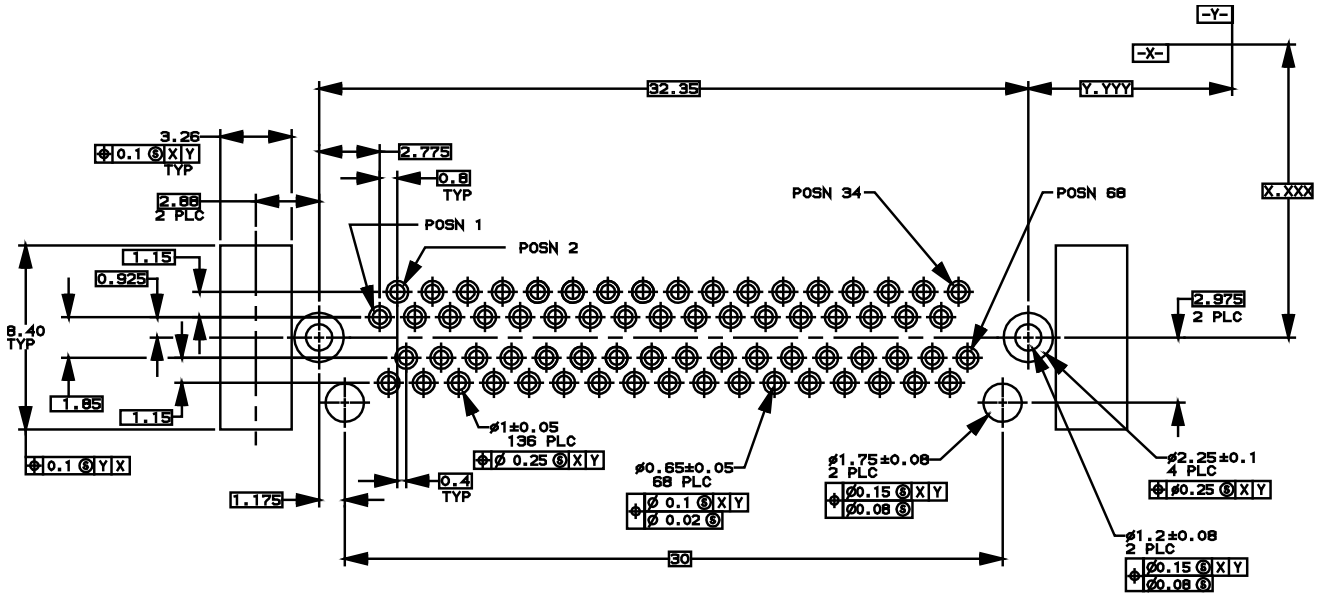


Figure 35 - Free board straight thru hole

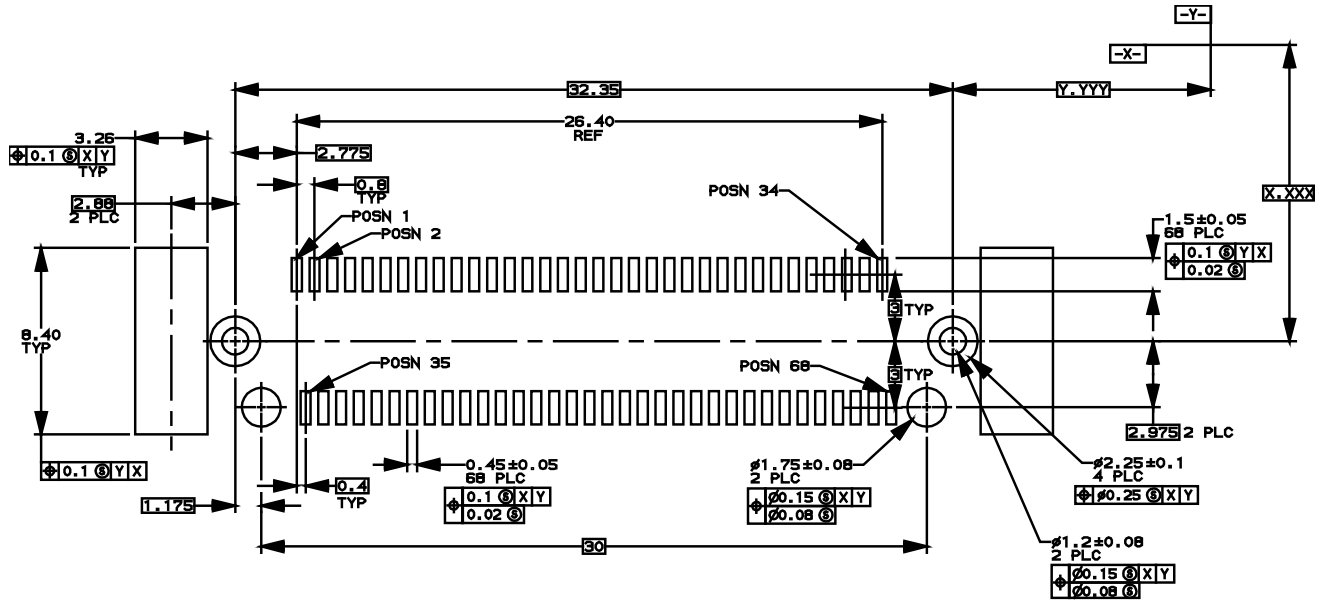


Figure 36 - Free board straight surface mount dual row

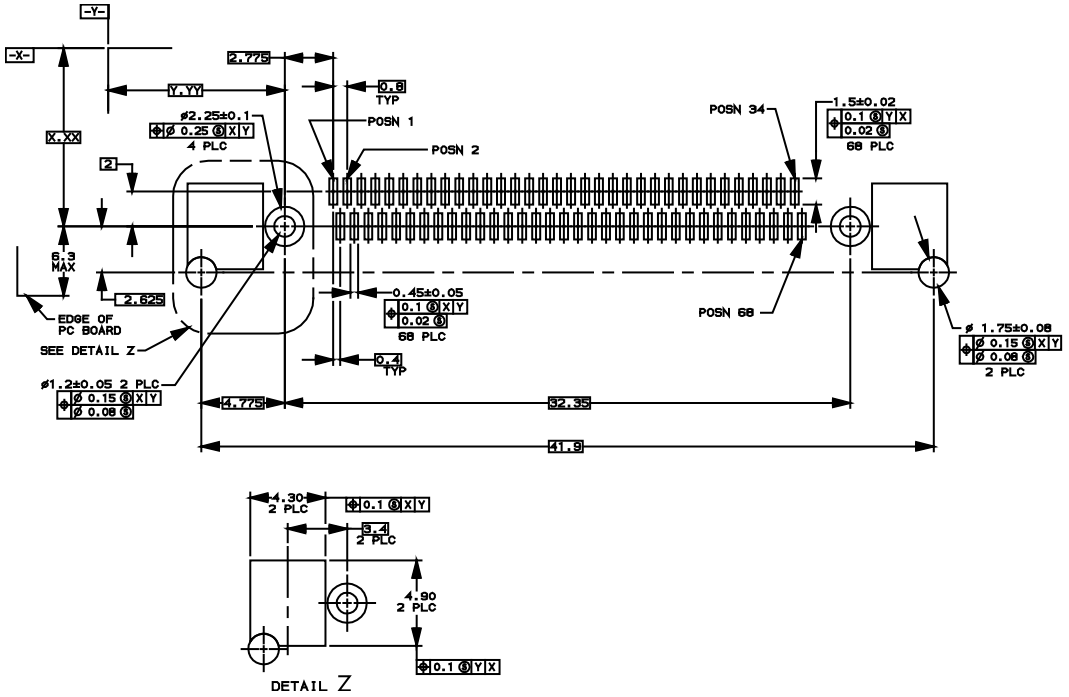


Figure 37 - Free board right angle surface mount dual row

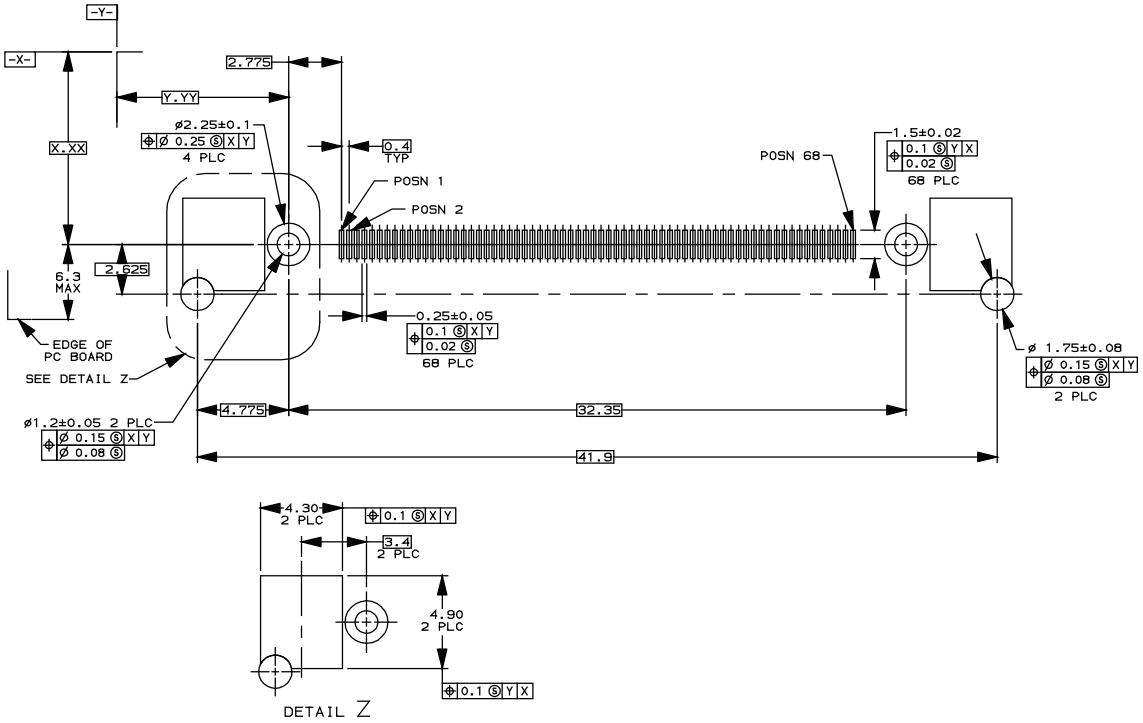


Figure 38 - Free board right angle surface mount single row

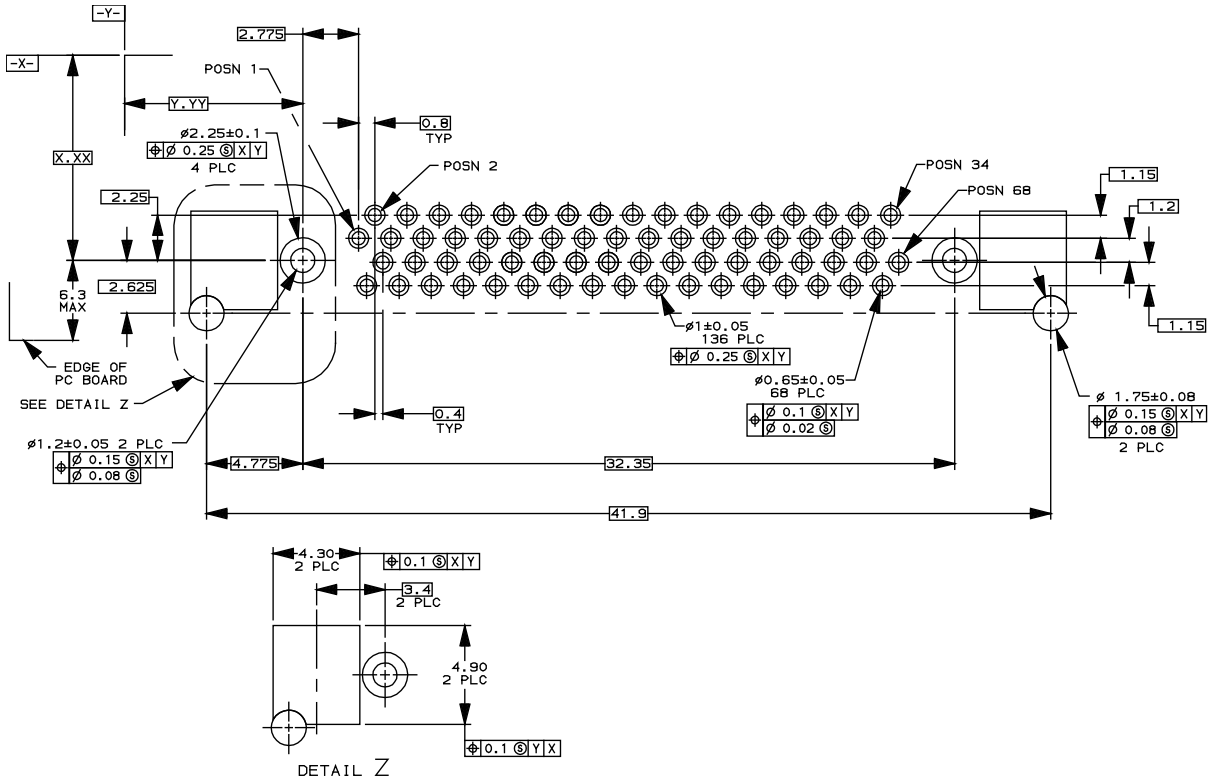


Figure 39 - Free board right angle thru hole

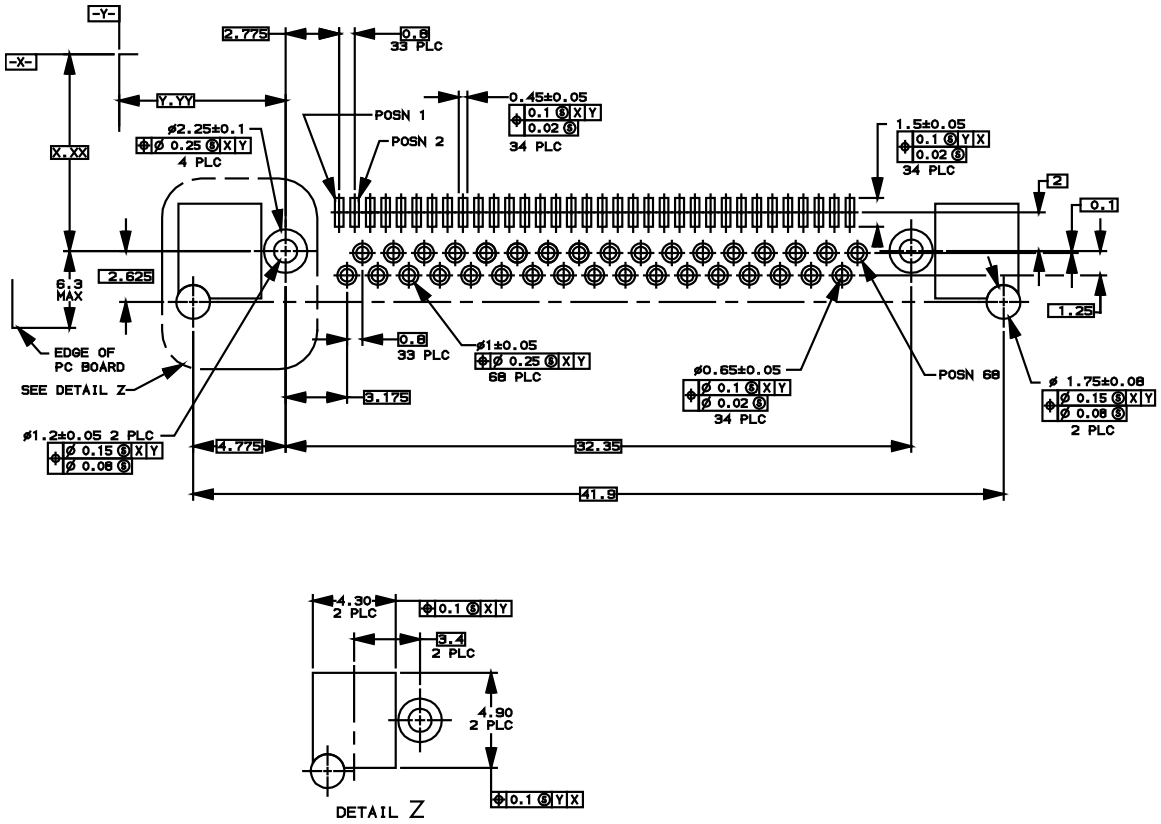


Figure 40 - Free board right angle hybrid

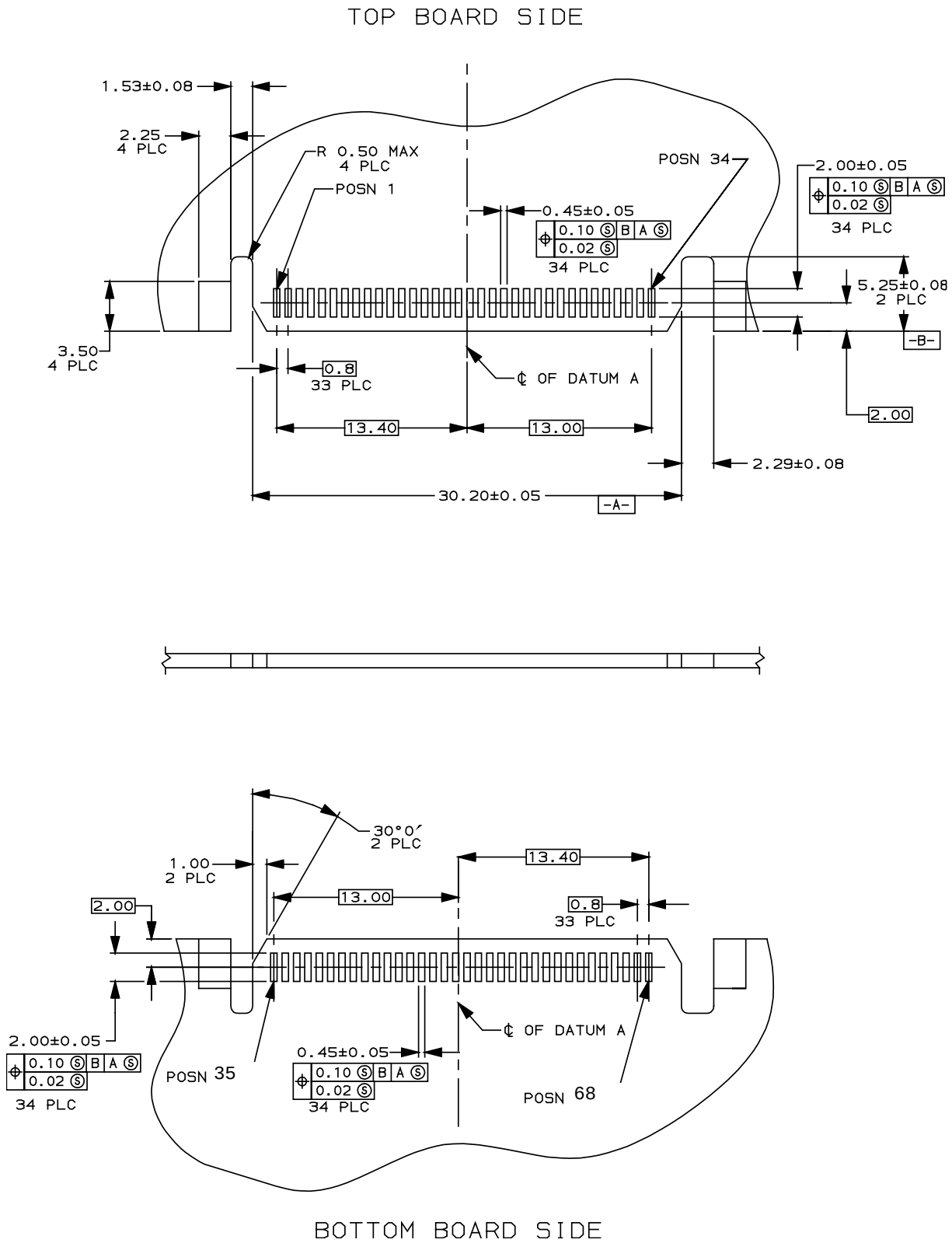


Figure 41 - Free board straddle mount

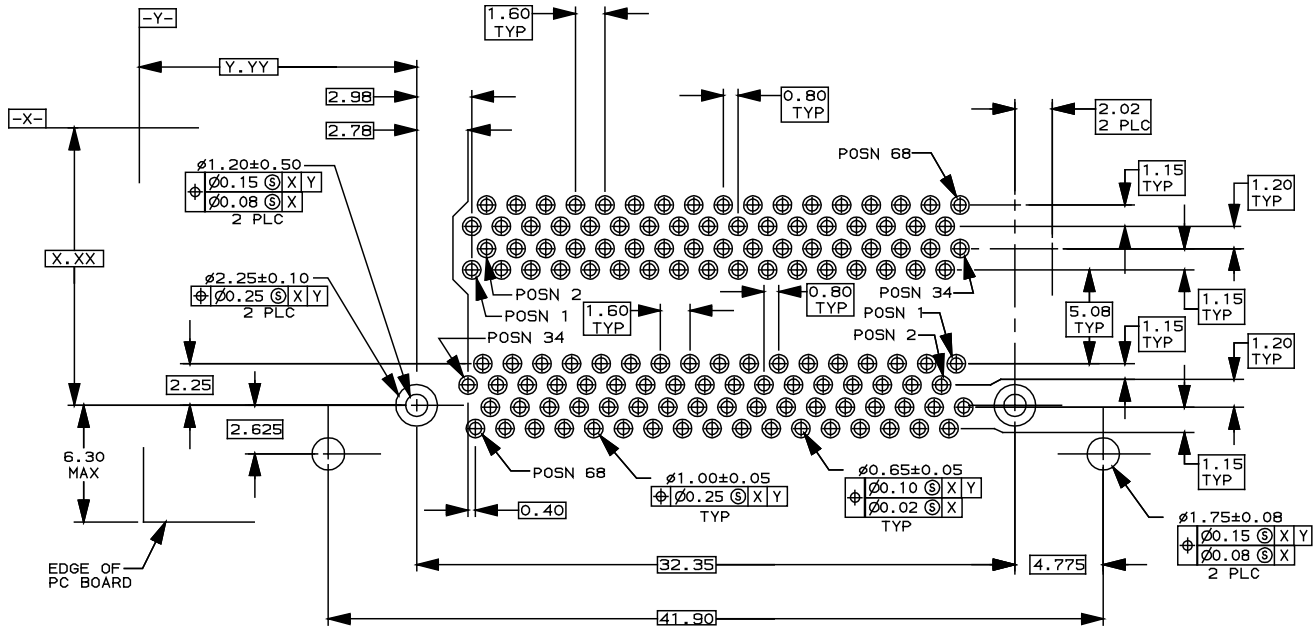


Figure 42 - Fixed board stacked thru hole (version 1)

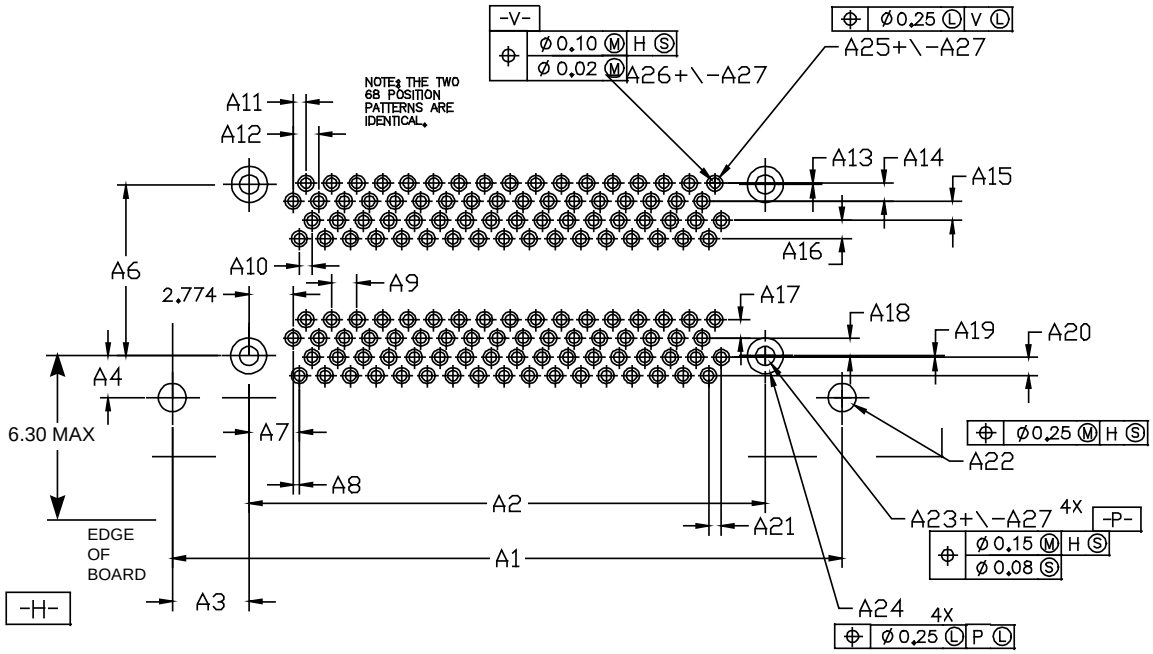


Figure 43 - Fixed board stacked thru hole (version 2)

Table 3 - Dimensions for fixed board stacked thru hole version 2

Dimension	Millimeters	Inches
A1	41.90	1.649
A2	32.35	1.274
A3	4.775	0.188
A4	2.625	0.103
A5	2.774	0.109
A6	10.71	0.422
A7	3.17	0.125
A8	0.40	0.016
A9	1.60	0.063
A10	0.80	0.031
A11	0.800	0.031
A12	1.600	0.063
A13	0.100	0.004
A14	1.150	0.045
A15	1.200	0.047
A16	1.150	0.045
A17	1.150	0.045
A18	1.200	0.047
A19	0.100	0.004
A20	1.150	0.045
A21	0.800	0.031
A22	1.750	0.069
A23	1.200	0.047
A24	2.250	0.088
A25	1.000	0.039
A26	0.650	0.025
A27	0.50	0.020

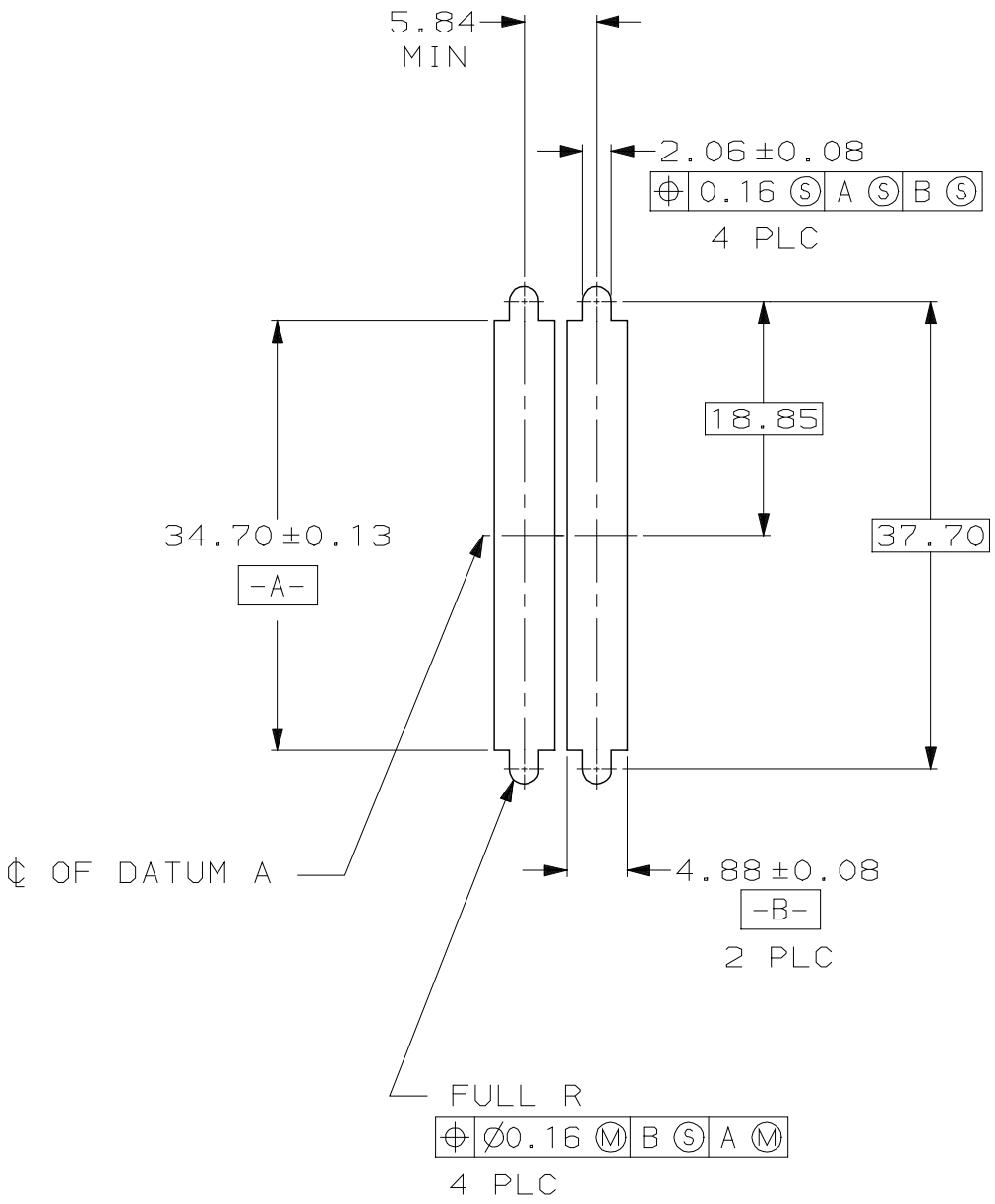


Figure 44 - Bulkhead cutouts for SBUS

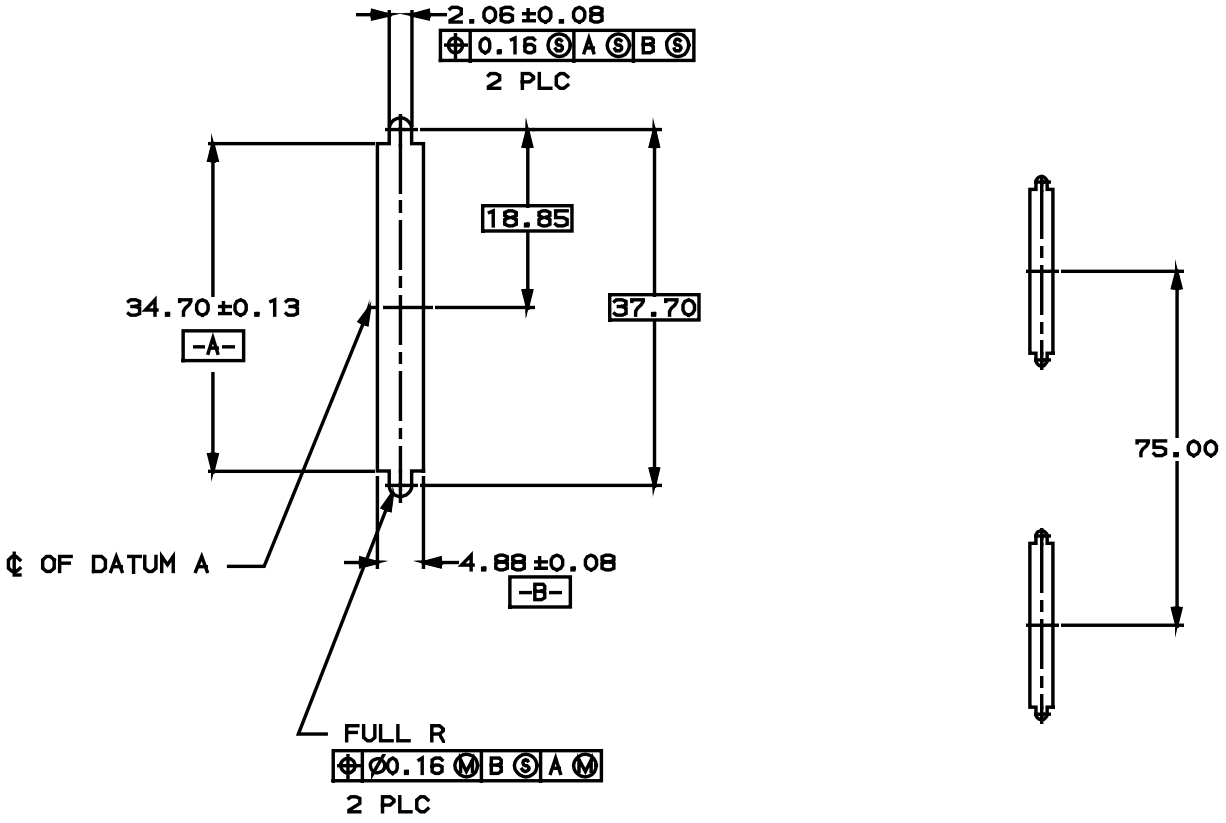


Figure 45 - Bulkhead cutouts for CMC

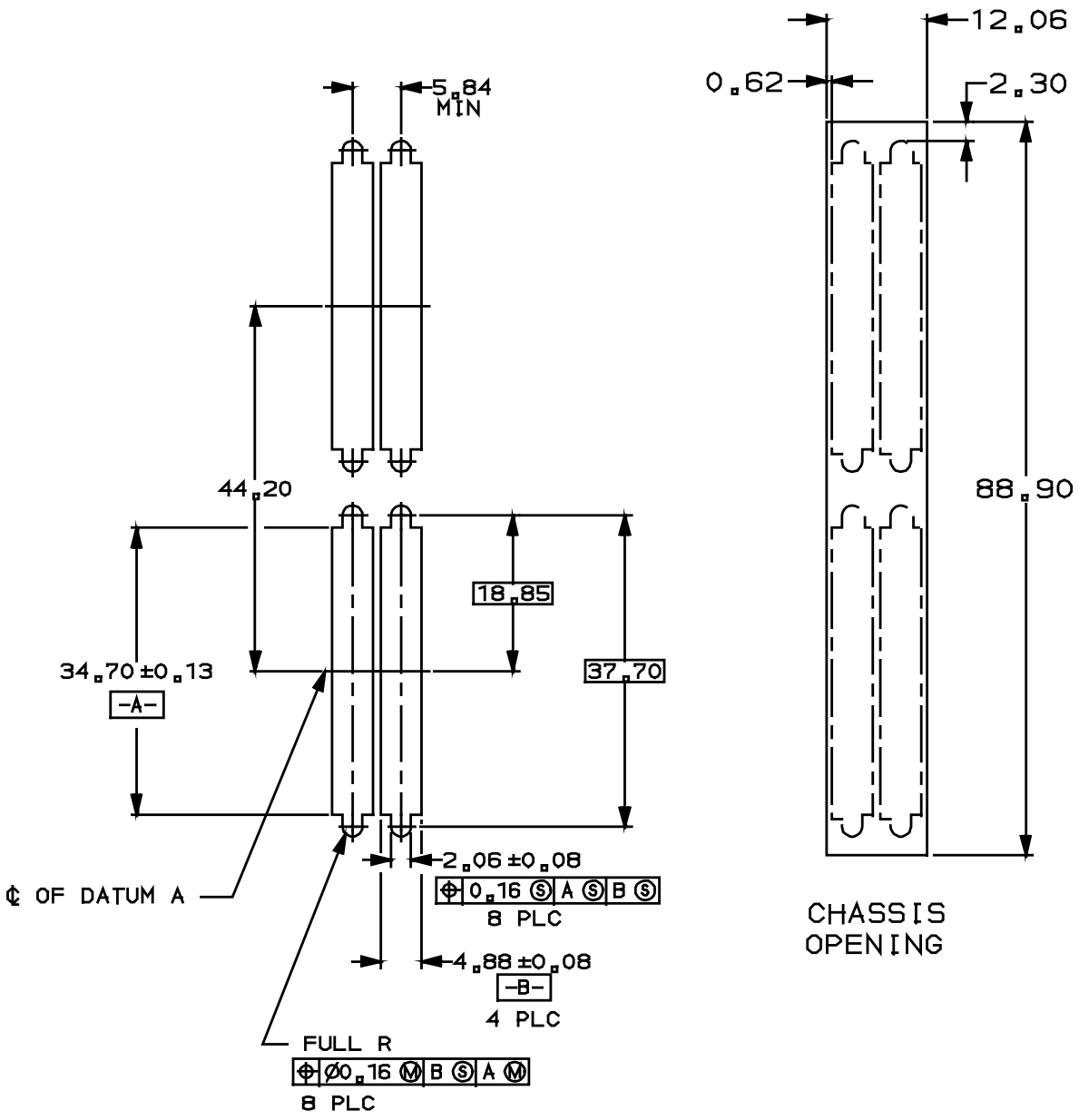


Figure 46 - Bulkhead cutouts for EISA/ISA/PCI

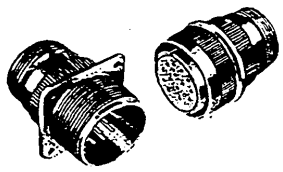
Special note: The dimensions for this cutout will not work for the long dimension if using the minimum dimension specified in the PCI standard for the cutout opening. This cutout requires the 88.9 mm opening allowed by the EISA/ISA standard. See section 1 for more discussion.

ANNEX A
EIA TERMINOLOGY FOR CONNECTOR GENDER

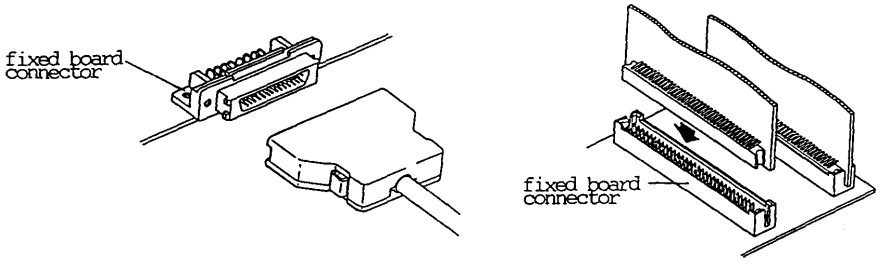
Figure 47 and Figure 48 describe the rationale for the EIA connector gender terminology.

(Expansion Connector)
A connector that provides a flexible connection between a rigid conductor and electrical apparatus.

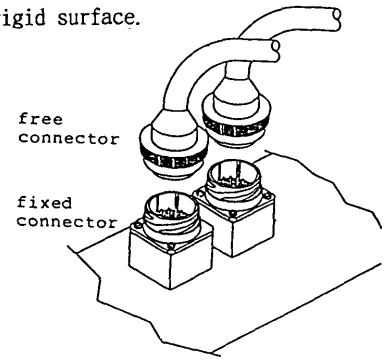
(Fireproof Connector) 581-06-09
A connector capable of withstanding flame of a specified temperature for a specified time.



(Fixed board Connector) 581-06-39
A connector mounted on removal printed board, for engagement with a Free Cable Connector or a Free Board Connector.



(Fixed Connector) 581-06-10
A connector for attachment to a rigid surface.



(Flat Cable Connector)
Connector designed specifically to terminate flat cable. May be designed for flat conductor, flat cable or round conductor flat cable.

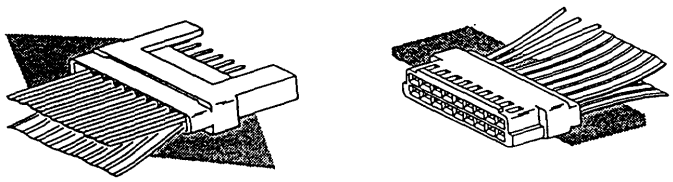
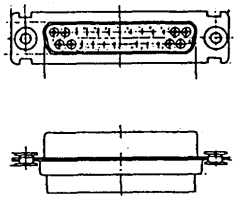
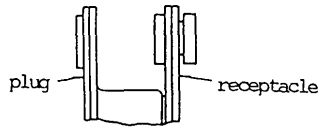


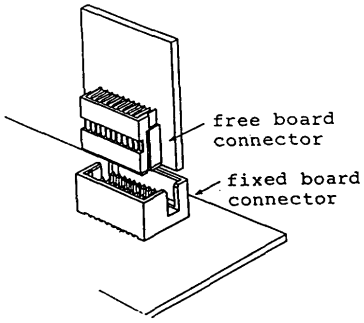
Figure 47 - EIA definitions for connector terminology

(Float Mounting Connector) 581-06-11
A fixed connector with mounting means permitting movement to facilitate align -ment with the mating connector.

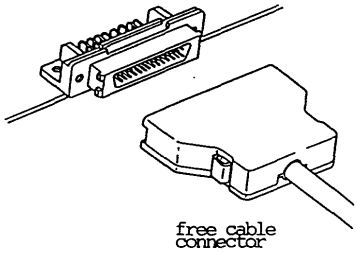




(Free Board Connector) 581-06-40
A connector mounted on a printed board which can be separated from Mother Board or Back Plane.

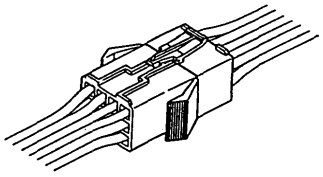


(Free Cable Connector) 581-06-12
A connector for attachment to the free end of a wire or cable.



(Free Coupler Connector) 581-06-13
A connector that mates with a Free Connector in a cable-to-cable appli -cation.

(Free Hanging Connector)
A connector that is movable and not fixed to a board, panel, or frame. It will mate another free-hanging connector or with a panel-mount connector.



(Hermaphroditic Connector) 581-06-14
A connector which mates with an identical connector.

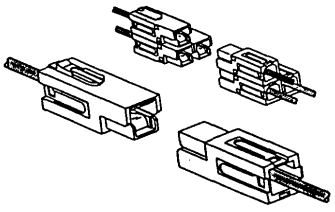


Figure 48 - EIA definitions for connector terminology