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SFF-TA-1032

Specification for

Multi-Lane External High Speed Cable System

Rev 0.0.22 January 23, 2025

SECRETARIAT: SFF TA TWG
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This document has been released by SNIA. The SFF TWG believes that the ideas, methodologies, and technologies described in this document are technically accurate and are appropriate for widespread distribution.

The description of the connector in this specification does not assure that the specific component is available from connector suppliers. If such a connector is supplied, it should comply with this specification to achieve interoperability between suppliers.

ABSTRACT: This specification defines the mechanical and electrical requirements of a pluggable high speed connector and cable system. This document provides a common specification for systems manufacturers, system integrators, and suppliers of modules.

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FOREWORD

The development work on this specification was done by the PCISIG, an industry group and given to the SFF TA TWG, a SNIA Technical Affiliate Technical Working Group. Since its formation as the SFF Committee in August 1990, as well as since SFF's transition to SNIA in 2016, the membership has included a mix of companies which are leaders across the industry.

For those who wish to participate in the activities of the SFF TWG, the signup for membership can be found at https://www.snia.org/join.

REVISION HISTORY

Rev 0.0.14	Initial Release
Rev 0.0.15	Comment review additions
Rev 0.0.16	Additional comment review drawings removing the posts from the SMT cages and adding the glue keepout zone on the boards.
Rev 0.0.17	Added drawing 7-12 back in which was inadvertently deleted
Rev 0.0.18	New Figures 4-4, A-1, and A-3 Updated Datum Table list Added missing paddle card edge views Updated most of the enhanced (SMT) drawings
Rev 0.0.19	Added reference to INF-TA-1003 and CopprLink Removed reference to REF-TA-1011 Removed AOC from Acronym list Added FF and JJ datums to datum list Added reference to Pick and Place equipment in Section 5-3 Replaced Figures 4-5. 4-6, 4-7, 6-7, 6-8, 7-2, 7-3, 7-5, 7-6, 7-8, 7-9, 7-10 Changed Surface Treatment requirement in Table 8-1 Changed Current rating from 1.5A to 3.0A in Table 8-1 Changed to single contact being energized for current rating in Table 8-3
Rev 0.0.20	Added optional peg to the SMT connector, and optional peg hole to the PCB Updated some figures and made other editorial fixes
Rev 0.0.22	Remove reference to SFF-TA-1039 Changed voltage rating from 30V to 29.9V Replaced the SMT bezel cutout side view drawings Replaced Figs 5-11, 5-12, 5-13, 5-14, 5-15, 5-17, 5-18

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FIGURES

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1. Scope

This specification defines a multi-lane count high speed external cable host connector/cage as well as the mating cable plug for X16, X8, and X4 link widths.

2. References and Conventions

2.1 Industry Documents

The following documents are relevant to this specification:

- ASME Y14.5 Dimensioning and Tolerancing
- EIA-364-1000 Environmental Test Methodology for Assessing the Performance of Electrical Connectors and Sockets Used in Controlled Environment Applications
- INF-TA-1003 400 Gb/s (16 x 25 Gb/s) Pluggable Transceiver
- CopprLink External Cable Specification for PCI Express 5.0 and 6.0

2.2 Sources

The complete list of SFF documents which have been published, are currently being worked on, or that have been expired by the SFF Committee can be found at https://www.snia.org/sff/specifications. Suggestions for improvement of this specification are welcome and should be submitted to https://www.snia.org/feedback.

Other standards may be obtained from the organizations listed below:

Standard	Organization	Website
ASME	American Society of Mechanical Engineers (ASME)	https://www.asme.org
Electronic Industries Alliance (EIA)	Electronic Components Industry Association (ECIA)	https://www.ecianow.org/eia-technical-standards
IEEE	Institute of Electrical and Electronics Engineers (IEEE)	https://ieeexplore.ieee.org/browse/standards/get-program/page/series?id=68
InfiniBand	InfiniBand Trade Association (IBTA)	https://www.infinibandta.org
JEDEC	Joint Electron Deice Engineering Council (JEDEC)	https://www.jedec.org
OIF	Optical Internetworking Forum (OIF)	https://www.oiforum.com/technical-work/implementation-agreements-ias/
PCIe	PCI-SIG	https://www.pcisig.com/specifications
SAS and other ANSI standards	International Committee for Information Technology Standards (INCITS)	https://www.incits.org

2.3 Conventions

The following conventions are used throughout this document:

DEFINITIONS: Certain words and terms used in this standard have a specific meaning beyond the normal English meaning. These words and terms are defined either in the definitions or in the text where they first appear.

ORDER OF PRECEDENCE: If a conflict arises between text, tables, or figures, the order of precedence to resolve the conflicts is text; then tables; and finally figures. Not all tables or figures are fully described in the text. Tables show data format and values.

LISTS: Lists sequenced by lowercase or uppercase letters show no ordering relationship between the listed items.

EXAMPLE 1 - The following list shows no relationship between the named items:

a. red (i.e., one of the following colors):
    A. crimson; or
    B. pink;
b. blue; or
c. green.

Lists sequenced by numbers show an ordering relationship between the listed items.

EXAMPLE 2 -The following list shows an ordered relationship between the named items:

1. top;
2. middle; and
3. bottom.

Lists are associated with an introductory paragraph or phrase and are numbered relative to that paragraph or phrase (i.e., all lists begin with an a. or 1. entry).

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

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

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

3. Keywords, Acronyms, and Definitions

For the purposes of this document, the following keywords, acronyms, and definitions apply.

3.1 Keywords

May: Indicates flexibility of choice with no implied preference.

May or may not: Indicates flexibility of choice with no implied preference.

Obsolete: Indicates that an item was defined in prior specifications but has been removed from this specification.

Optional: 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.

Prohibited: Describes a feature, function, or coded value that is defined in a referenced specification to which this SFF specification makes a reference, where the use of said feature, function, or coded value is not allowed for implementations of this specification.

Reserved: Defines the signal on a connector contact. 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.

Restricted: Refers to features, bits, bytes, words, and fields that are set aside for other standardization purposes (e.g., entities). If the context of the specification applies the restricted designation, then the restricted bit, byte, word, or field shall be treated as a value whose definition is not in scope of this document, and is not interpreted by this specification.

Shall: Indicates a mandatory requirement. Designers are required to implement all such mandatory requirements to ensure interoperability with other products that conform to this specification.

Should: Indicates flexibility of choice with a strongly preferred alternative.

Vendor specific: Indicates something (e.g., a bit, field, code value) that is not defined by this specification. Specification of the referenced item is determined by the manufacturer and may be used differently in various implementations.

3.2 Acronyms and Abbreviations

EMLB: Early Mate Late Break
IDC: Insulation Displacement Contact
IDT: Insulation Displacement Termination
PCB: Printed Circuit Board
PF: Press Fit
PTH: Plated Through Hole
RA: Right Angle
RAND: Reasonable and Non-Discriminatory
SMT: Surface Mount Technology

3.3 Definitions

Alignment guides: A term used to describe features that pre-align the two halves of a connector interface before electrical contact is established. Other common terms include: guide pins, guideposts, blind mating features, mating features, alignment features, and mating guides.

Basic (dimension): The theoretical exact size, profile, orientation, or location of a feature. It is used as the basis from which permissible variations are established by tolerances in notes or in feature control frames (GD&T).

Connector: Each half of an interface that, when joined together, establish electrical contact and mechanical retention between two components. In this specification, the term connector does not apply to any specific gender; it is used to describe the receptacle, the plug or the card edge, or the union of receptacle to plug or card edge. Other common terms include: connector interface, mating interface, and separable interface.

Contact mating sequence: A term used to describe the order of electrical contact established/ terminated during mating/un-mating. Other terms include: contact sequencing, contact positioning, mate first/break last, EMLB (early mate late break) staggered contacts, and long pin/short pin.

Contacts: A term used to describe connector terminals that make electrical connections across a separable interface.

Datum: A point, line, plane, etc. assumed to be exact for the purposes of computation or reference, as established from actual features, and from which the location or geometric relationship of either feature is established.

Frontshell / Backshell: A term used to describe the metallic part of a module that provides mechanical and shielding continuity between the plug and receptacle. Other terms commonly used are: housing, snout, and metal shroud.

Module: In this specification, module may refer to a plug assembly at the end of a copper (electrical) cable (passive or active), an active optical cable assembly, an optical transceiver, or a loopback.

Plug: A term used to describe the connector that contains the penetrating contacts of the connector interface as shown in Figure 3-1. Plugs typically contain stationary contacts. Other common terms include male, pin connector, and card edge.

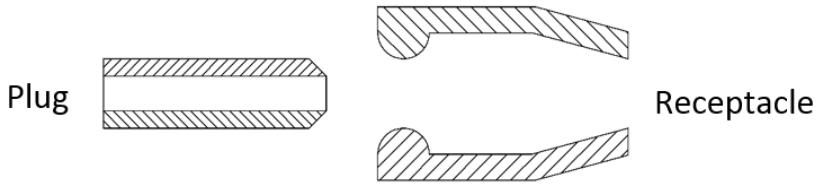


Figure 3-1 Plug and Receptacle Definition

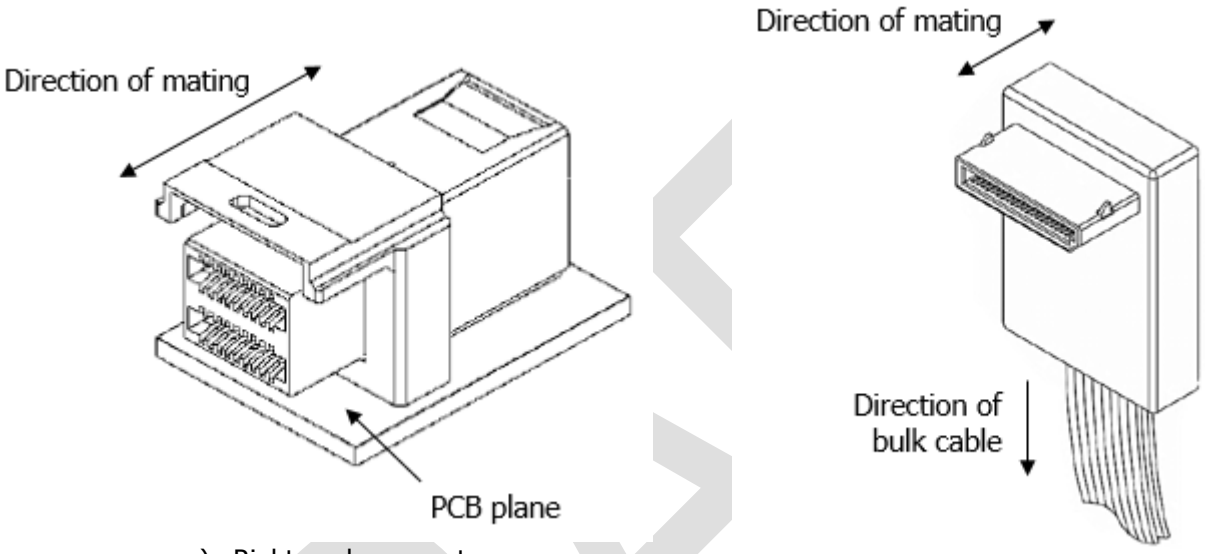
Plated through hole termination: A term used to describe a termination style in which rigid pins extend into or through the PCB. Pins are soldered to keep the connector or cage in place. Other common terms are through hole or PTH.

Press fit: A term used to describe a termination style in which collapsible pins penetrate the surface of a PCB. Upon insertion, the pins collapse to fit inside the PCB's plated through holes. The connector or cage is held in place by the interference fit between the collapsed pins and the PCB.

Receptacle: A term used to describe the connector that contains the contacts that accept the plug contacts as shown in Figure 3-1. Receptacles typically contain spring contacts. Other common terms include female and socket connector.

Reference (dimension): A dimension provided for information or convenience. It has no tolerance and is not to be used for inspection or conformance. It can be calculated from other tolerance dimensions or can be found elsewhere on the drawing with a tolerance. If removed, it would have no impact on the defined object or the ability or reproduce it.

Right Angle: A term used to describe either a connector design where the mating direction is parallel to the plane of the printed circuit board upon which the connector is mounted or a cable assembly design where the mating direction is perpendicular to the bulk cable.



a) Right angle connector

b) Right angle cable assembly

Figure 3-2 Right Angle Connector and Cable Assembly

Straddle mount: A term used to describe a termination style that uses surface mount termination points on both sides of a PCB.

Straight: A term used to describe a connector design where the mating direction is parallel to the bulk cable.

Surface mount: A term used to describe a termination style in which solder tails sit on pads on the surface of a PCB and are then soldered to keep the connector or cage in place. Other common terms are surface mount technology or SMT.

Termination: A term used to describe a connector's non-separable attachment point such as [a connector contact to a bulk cable/ a cage to a PCB or flex circuit/ bulk cable to a PCB or flex circuit/ solder tail to PCB]. Common PCB terminations include: surface mount (SMT), plated through hole termination (PTH), and press fit (PF). Common cable terminations include insulation displacement contact (IDC), insulation displacement termination (IDT), wire slots, solder, welds, crimps, and brazes.

Vertical: A term used to describe a connector design where the mating direction is perpendicular to the printed circuit board upon which the connector is mounted.

Wipe: The distance a contact travels on the surface of its mating contact during the mating cycle as shown in Figure 3-3.

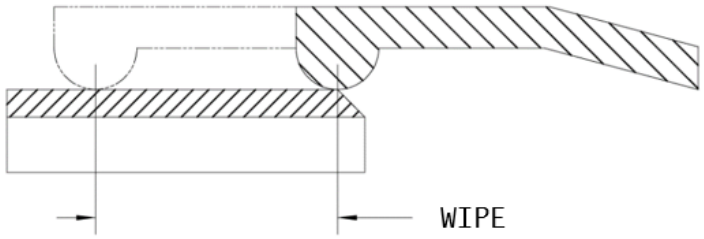


Figure 3-3 Wipe for a Continuous Contact

4. General Description

4.1 Configuration Overview/Descriptions

This connector system consists of a cable mounted module mating with a host connector enclosed in a metal cage mounted on a Printed Circuit Board. Three versions are described: a 120 position (X16), a 68 position (X8), and a 44 position (X4).

4.1.1 Connector Configuration

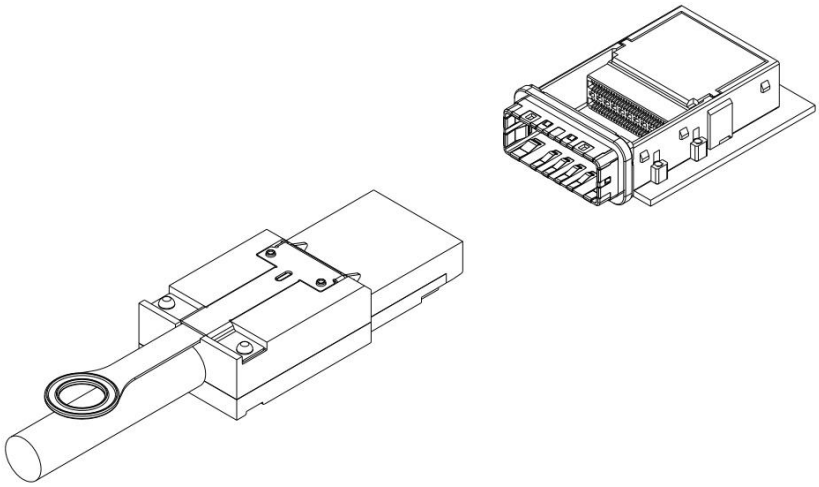


Figure 4-1 Standard Connector Overview

4.2 Contact Numbering

The pins or electrical contacts in this connector can be found in the drawings in Section 5, The Connector Mechanical Specification.

4.3 Cage, Connector, Module Alignment

The alignment of the cage, connector, and module are shown in the following figures.

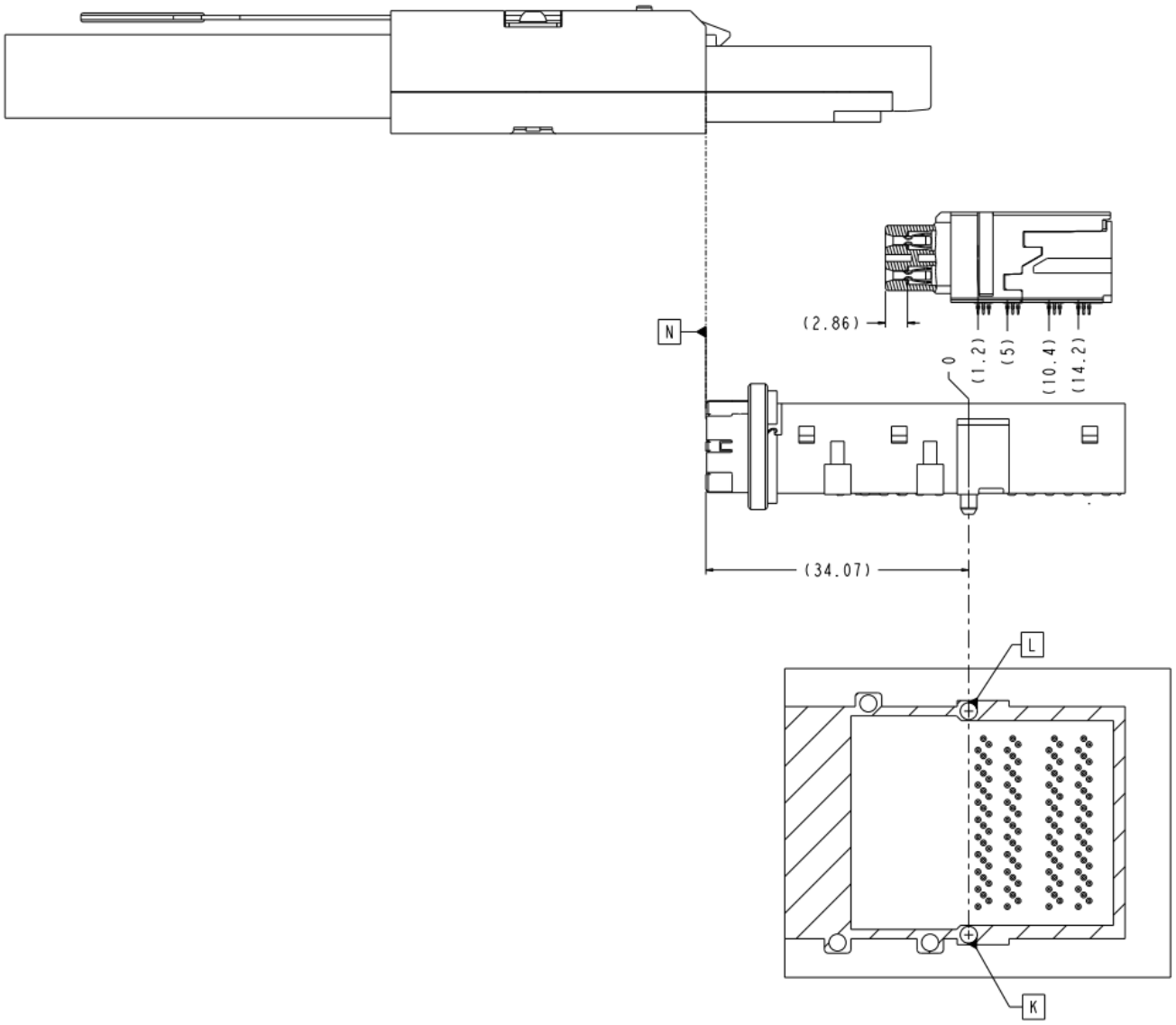


Figure 4-2 Cage, X16 Through-Hole Connector, Module Alignment

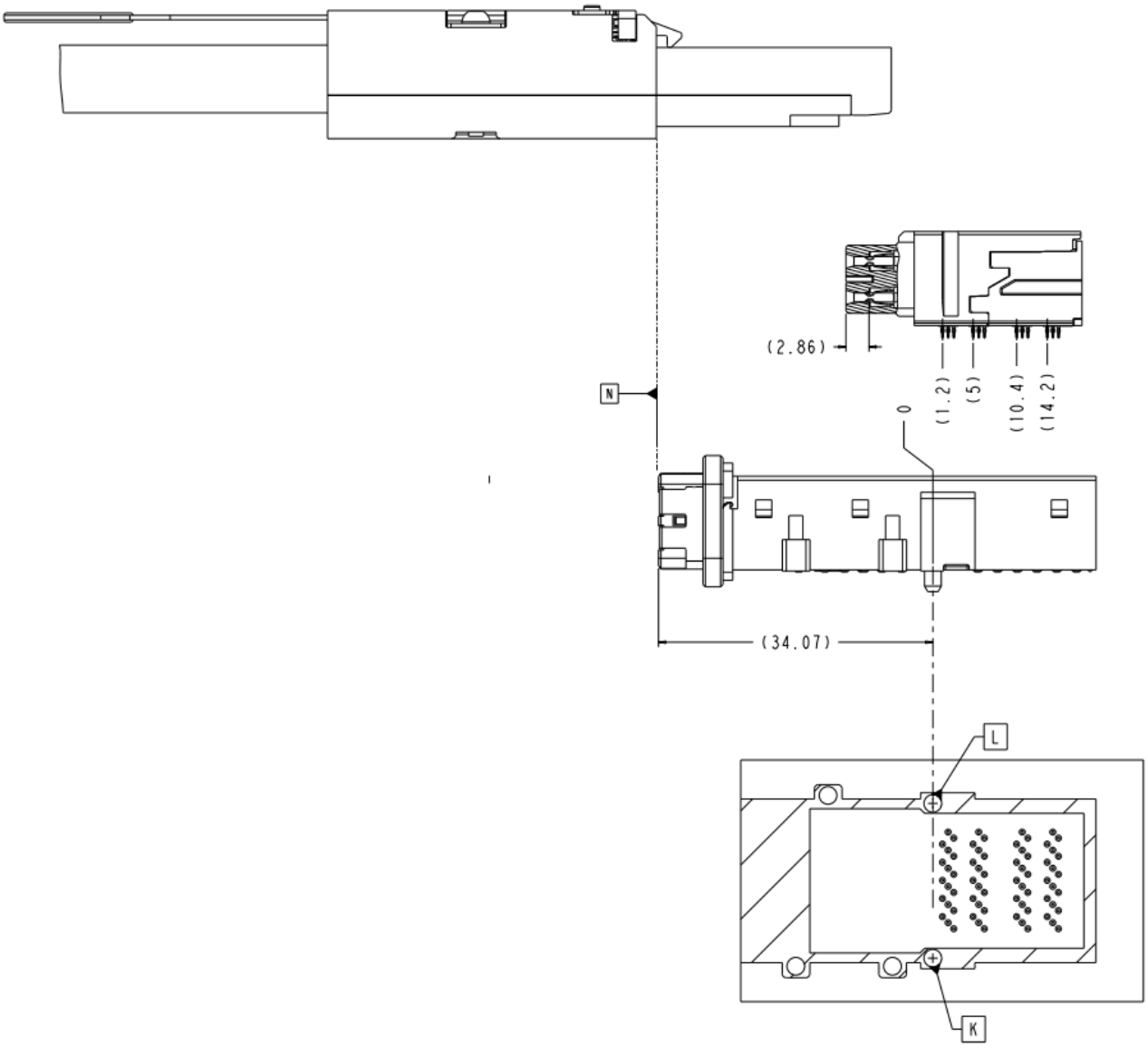


Figure 4-3 Cage, X8 Through-Hole Connector, Module Alignment

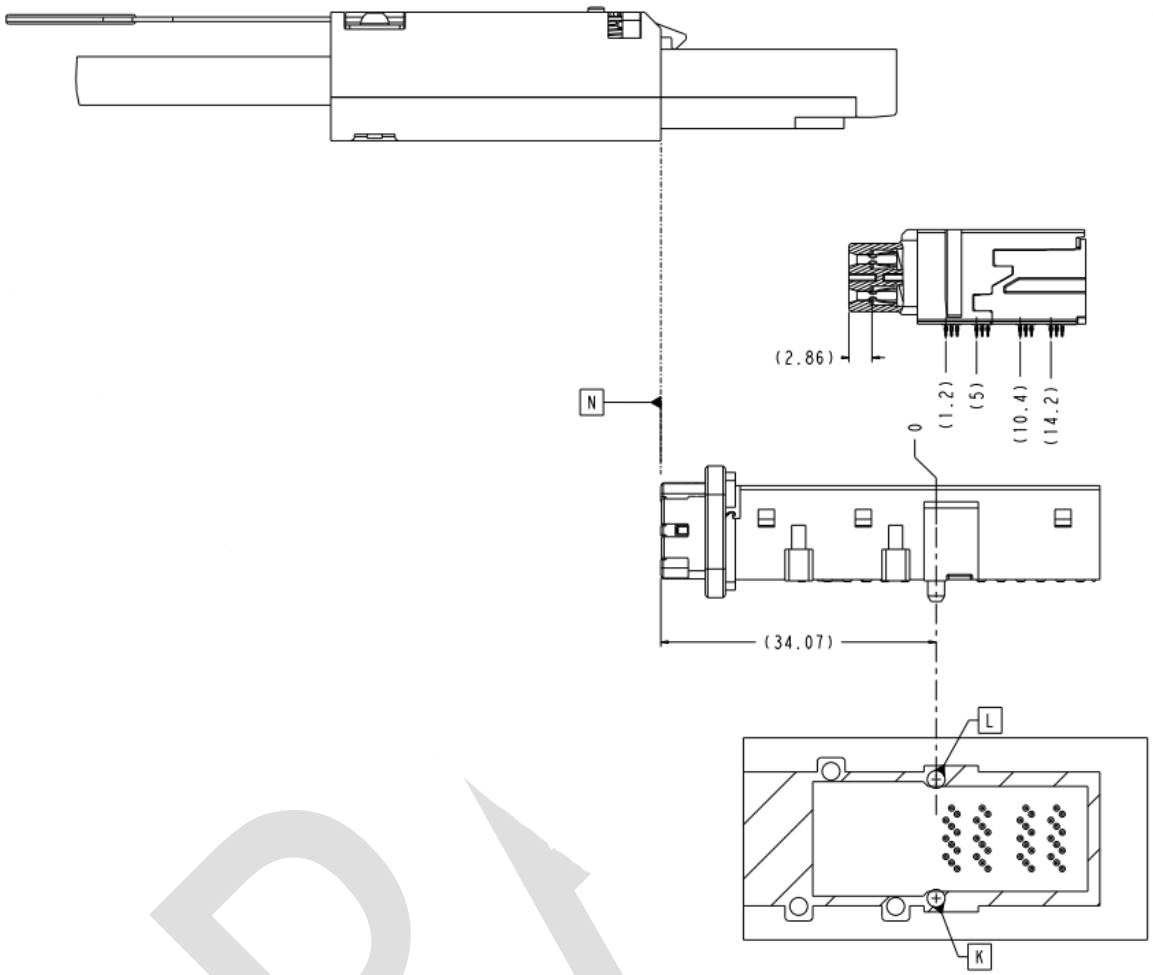


Figure 4-4 Cage, X4 Through-Hole Connector, Module Alignment

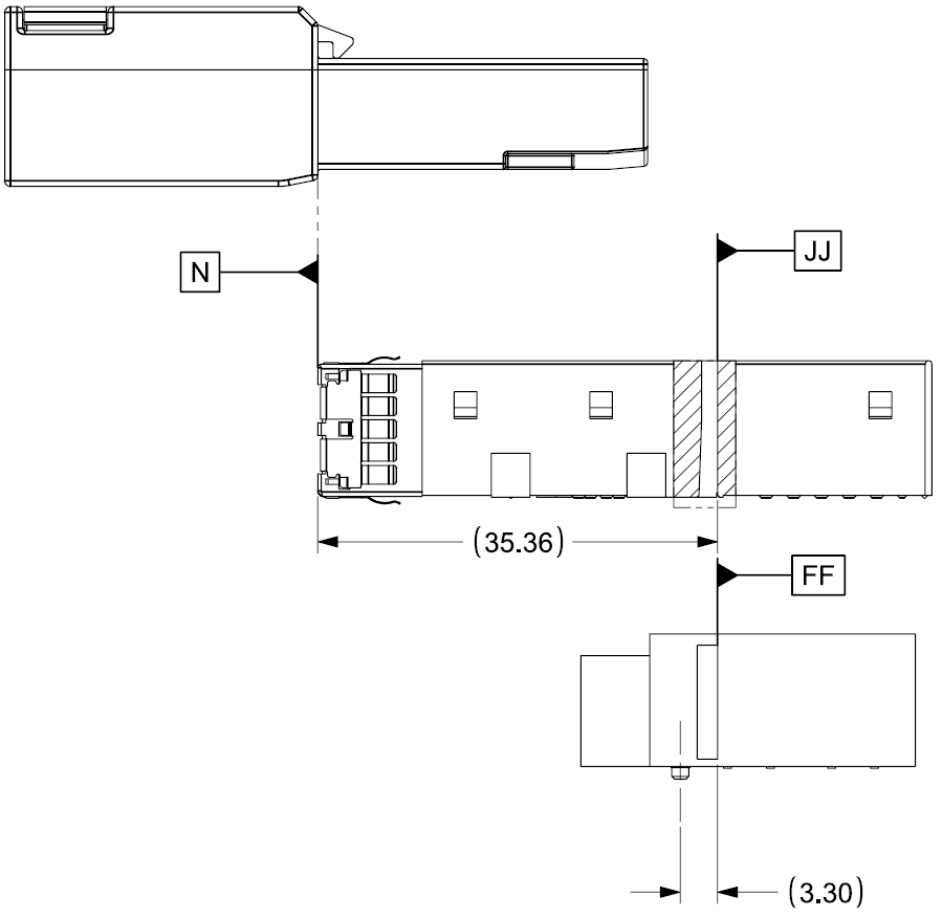


Figure 4-5 Cage, X16 SMT Connector, Module Alignment

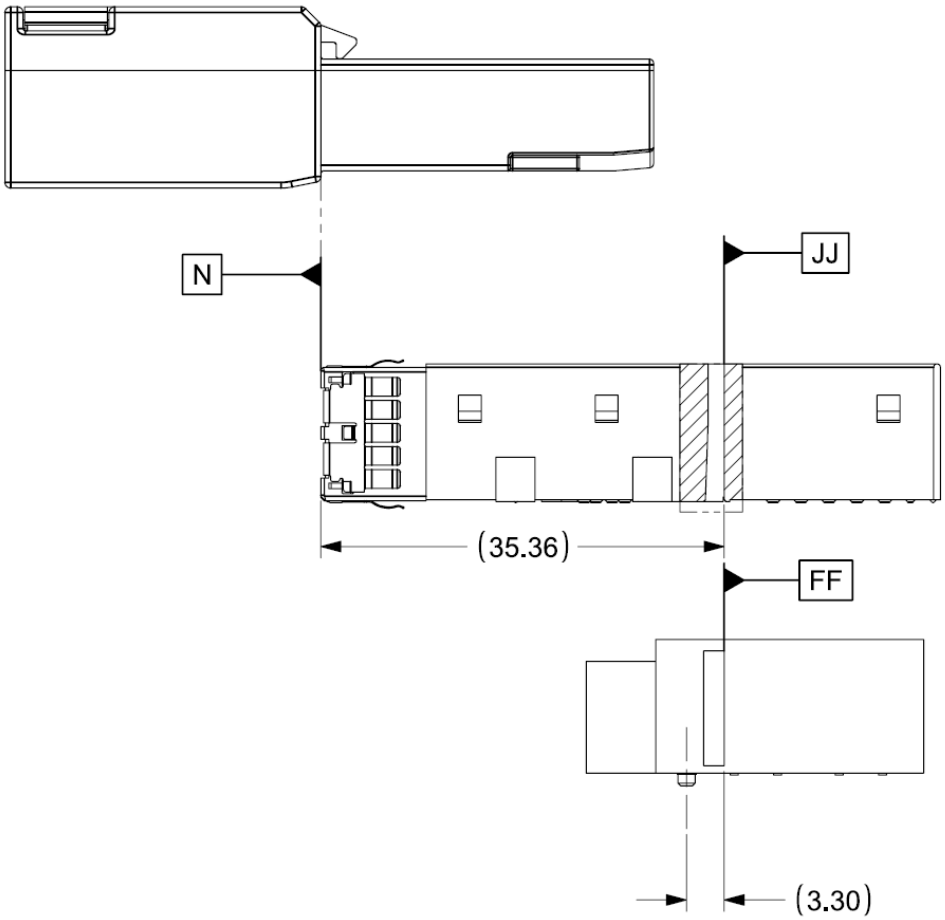


Figure 4-6 Cage, X8 SMT Connector, Module Alignment

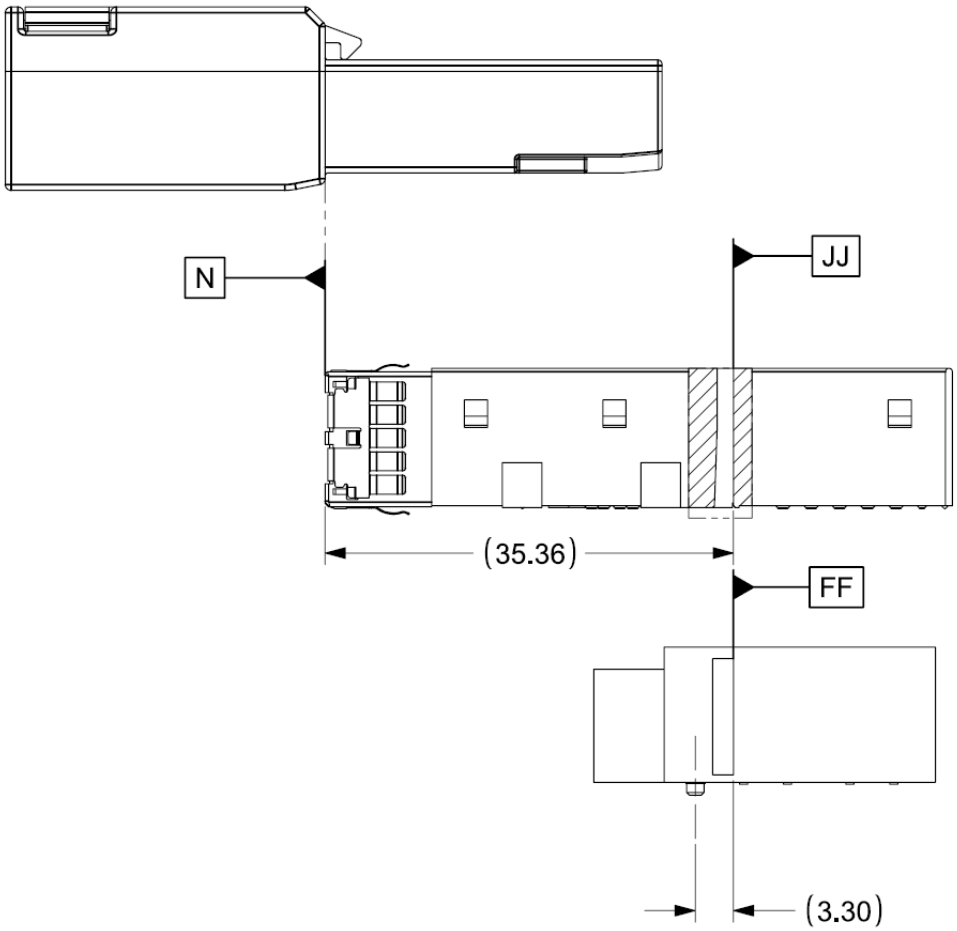


Figure 4-7 Cage, X4 SMT Connector, Module Alignment

5. Connector Mechanical Specification

5.1 Overview

This section describes the three connectors defined in this specification: X16, X8, X4.

5.1.1 Datums

The datums defined in Table 5-1 are used throughout the rest of the document to describe the dimensional requirements of this connector.

Table 5-1 Datum Descriptions

A	Top of Connector
B	Bottom of connector
C	Connector mating face length
D	Connector card slot width
E	Connector card slot length
F	Connector front face
G	Module top surface
H	Module mating stop
J	Module mating width
K	Cage locating post/hole
L	Cage locating post/hole
M	Cage bottom
N	Cage front face surface
P	Cage front face width
R	SMT host board SMT connector locating hole
S	Surface mount connector locating post
T	Host board top surface
V	SMT host board SMT connector locating hole
X	Paddle card width
Y	Signal pad leading edge
Z	Paddle card surface
DD	Inside bezel surface
EE	Board surface
FF	Connector locating boss
JJ	Cage locating slot

5.2 Host Connector, Through-Hole

This section defines three host connectors that are placed inside the cages as defined in Section 6. It also defines the host boards onto which they are mounted. There are 3 sizes: X16, X8, and X4. These connectors, when in their respective cages, receive the modules with the module paddle cards mating with the connector's contacts.

Notes for Figures in Section 5.2

1. Grounds are all common
2. Cross-hatched areas to be conductive on PCB
3. Recommended drill for 0.31 mm diameter finished PTH is 0.39 mm diameter
4. Recommended annular ring around 0.31 mm diameter finished PTH is 0.66 mm diameter
5. Keep-out area exception: When adjacent connector is present it will interleave shown keep-out area.
6. Datum T is the top surface of the host board.

5.2.1 X16 Through-Hole Host Connector

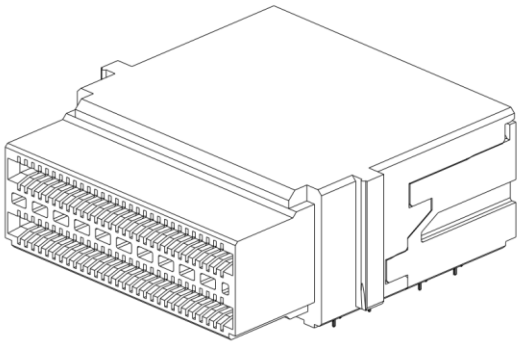


Figure 5-1 X16 Through-Hole Connector Overview

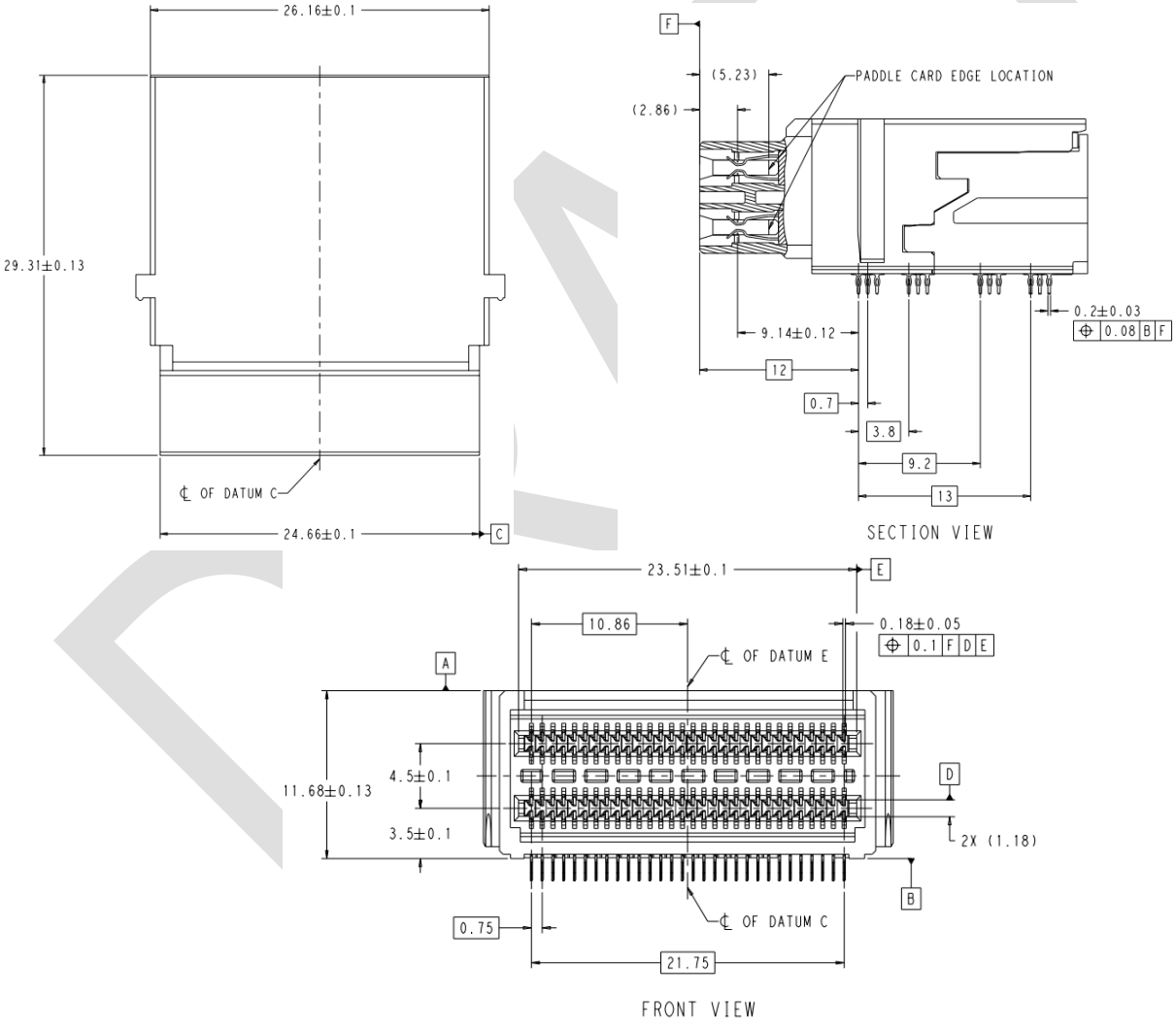


Figure 5-2 X16 Through-Hole Host Connector

5.2.2 X16 Through-Hole Host Board

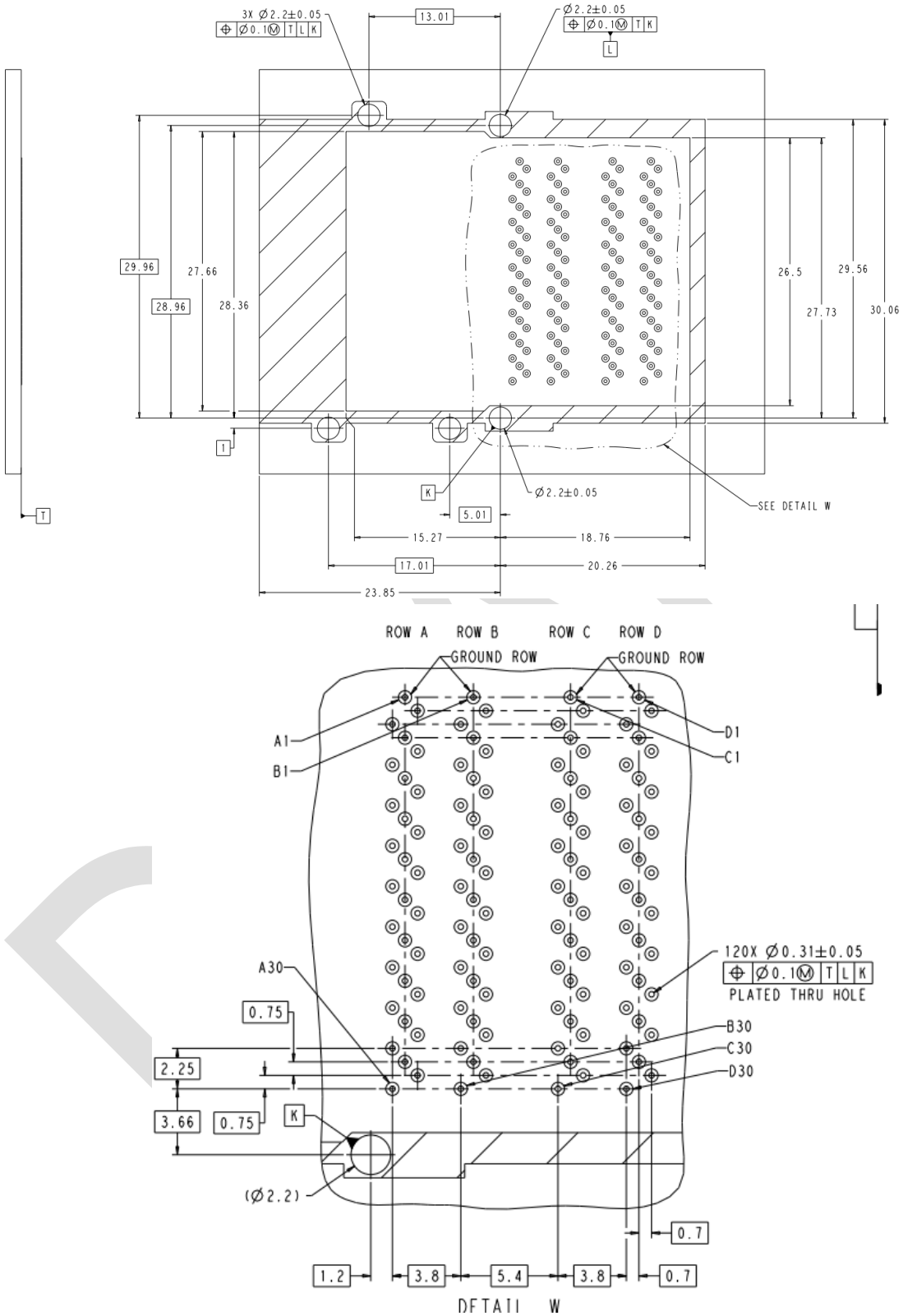


Figure 5-3 X16 Through-Hole Host Board Layout

5.2.3 X8 Through-Hole Host Connector

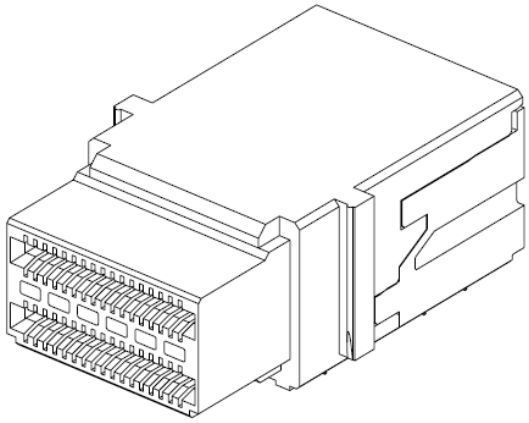
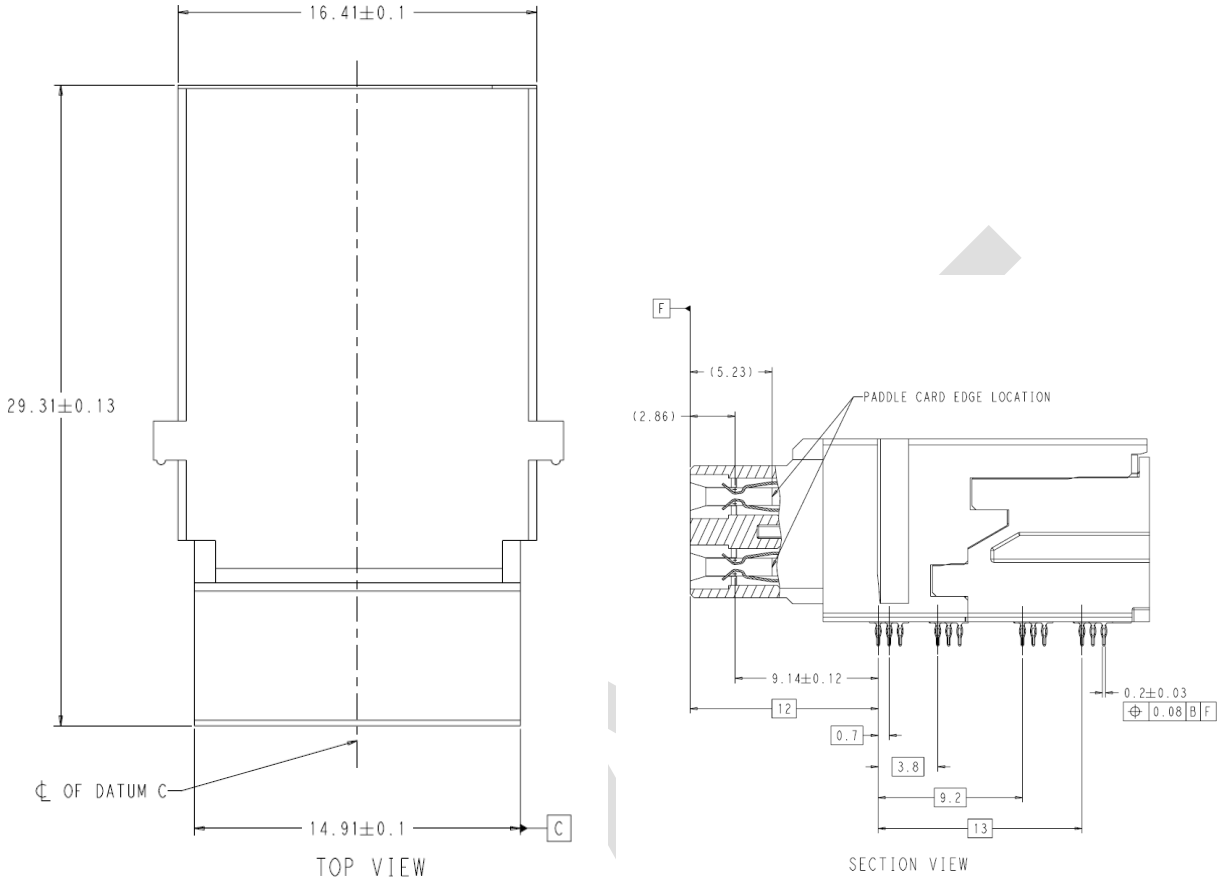


Figure 5-4 X8 Through-Hole Connector Overview



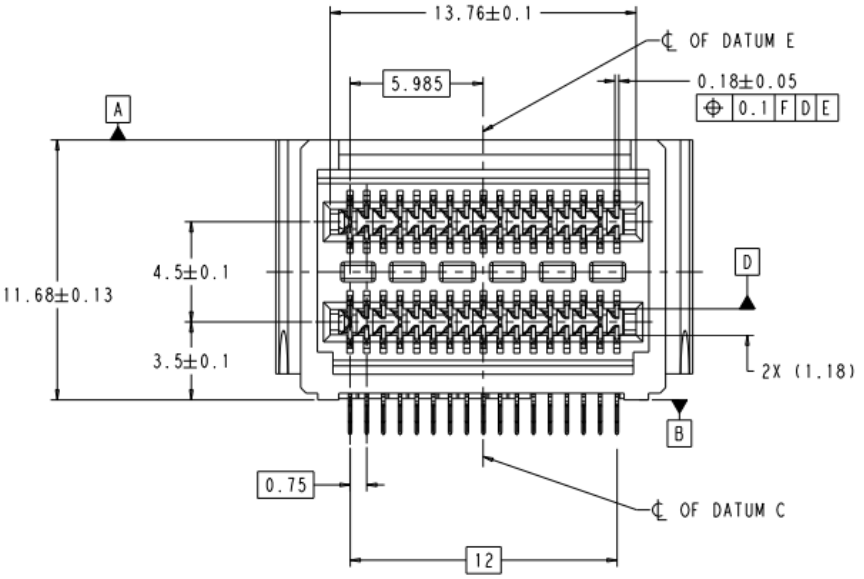
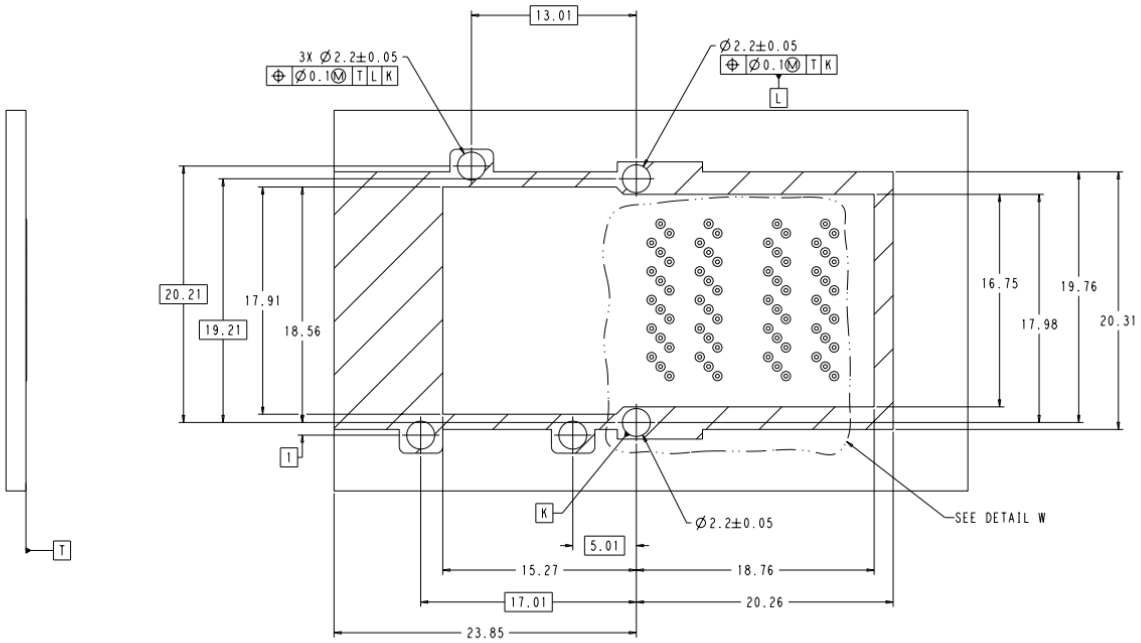


Figure 5-5 X8 Through-Hole Host Connector

5.2.4 X8 Through-Hole Host Board Layout



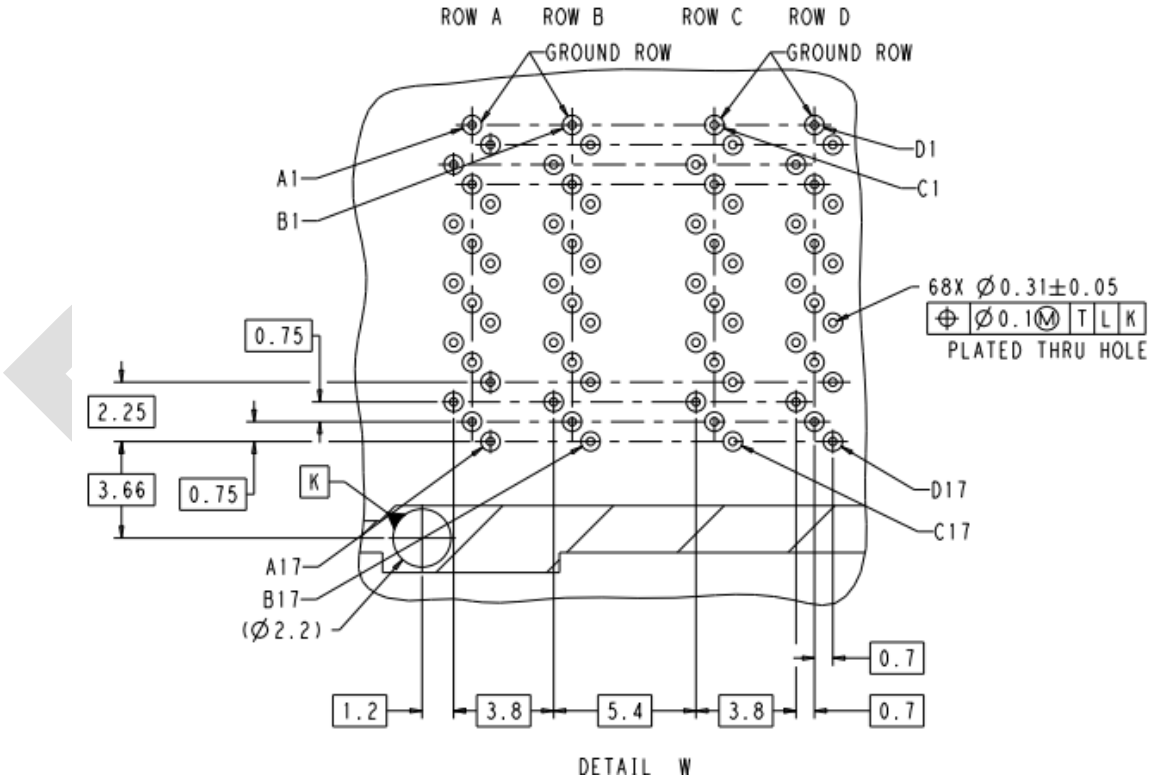


Figure 5-6 X8 Through-Hole Host Board Layout

5.2.5 X4 Through-Hole Host Connector

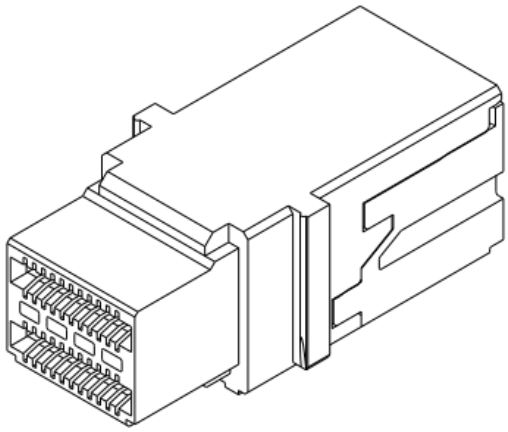
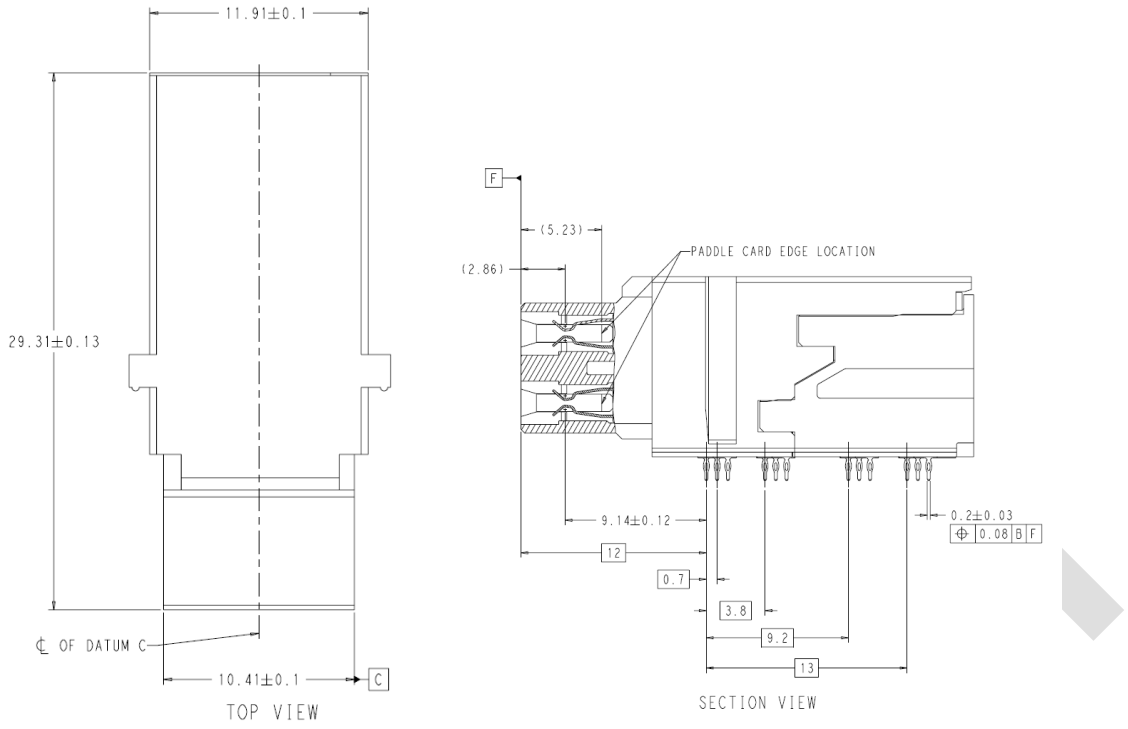


Figure 5-7 X4 Through-Hole Host Connector Overview



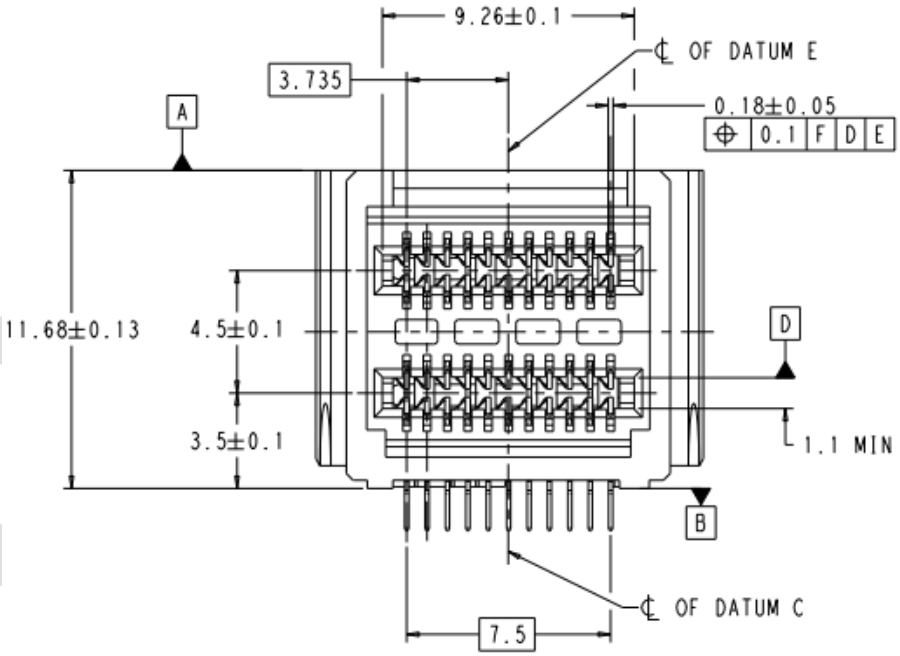


Figure 5-8 X4 Through-Hole Host Connector

5.2.6 X4 Through-Hole Host Board Layout

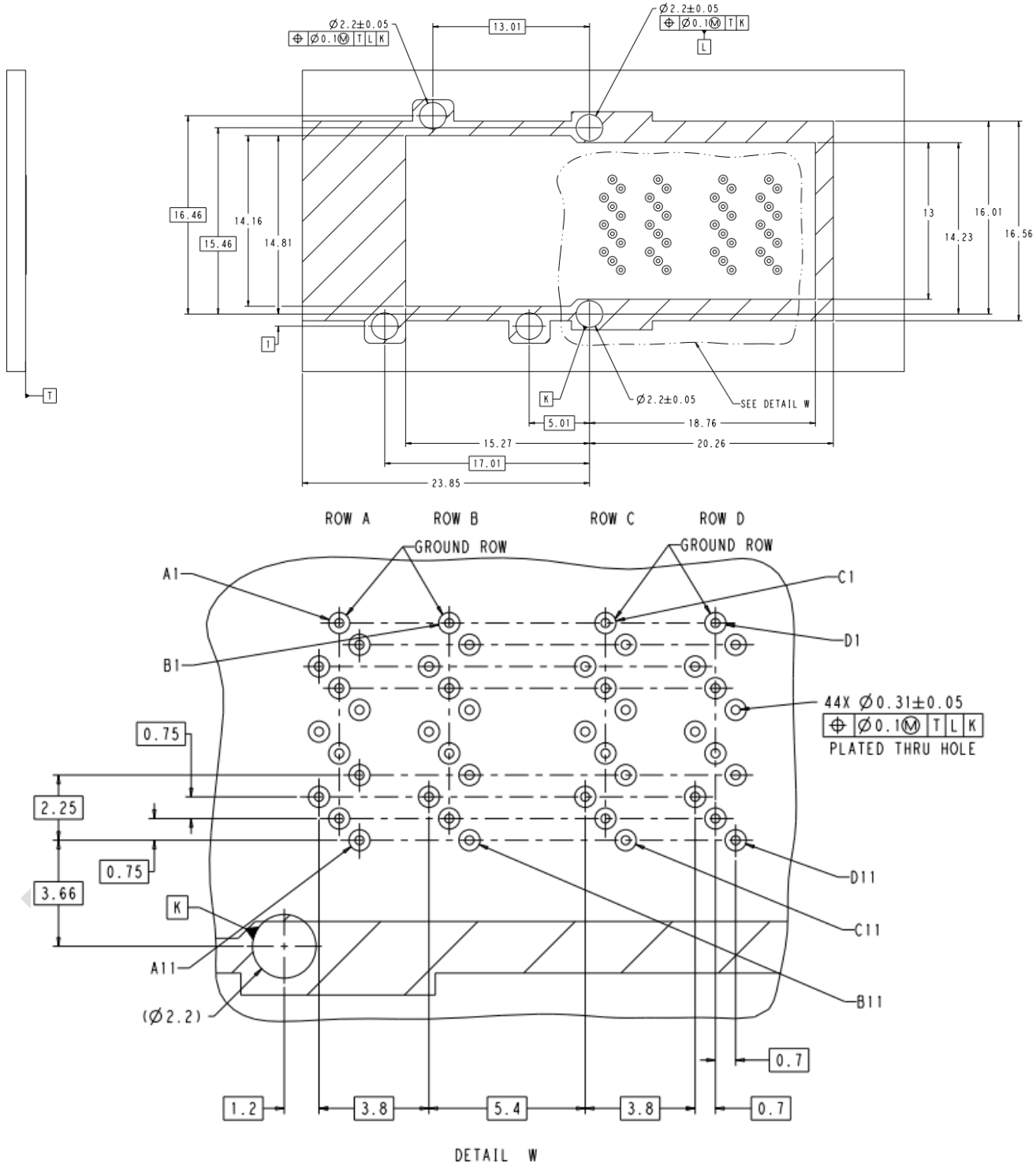


Figure 5-9 X4 Through-Hole Host Board Layout

5.3 Host Connector, Surface Mount

This section defines three surface mount host connectors that are placed inside the cages as defined in Section 6. These connectors are designed to be placed with pick and place equipment. It also defines the host boards onto which they are mounted. There are 3 sizes: X16, X8, and X4. These connectors, when in their respective cages, receive the modules with the module paddle cards mating with the connector's contacts

5.3.1 X16 Surface Mount Host Connector

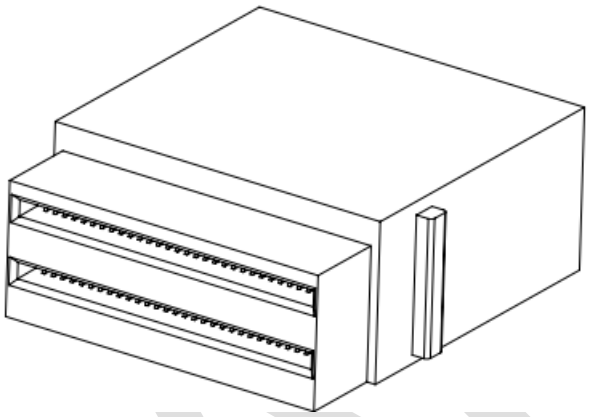


Figure 5-10 X16 Surface Mount Host Connector Overview

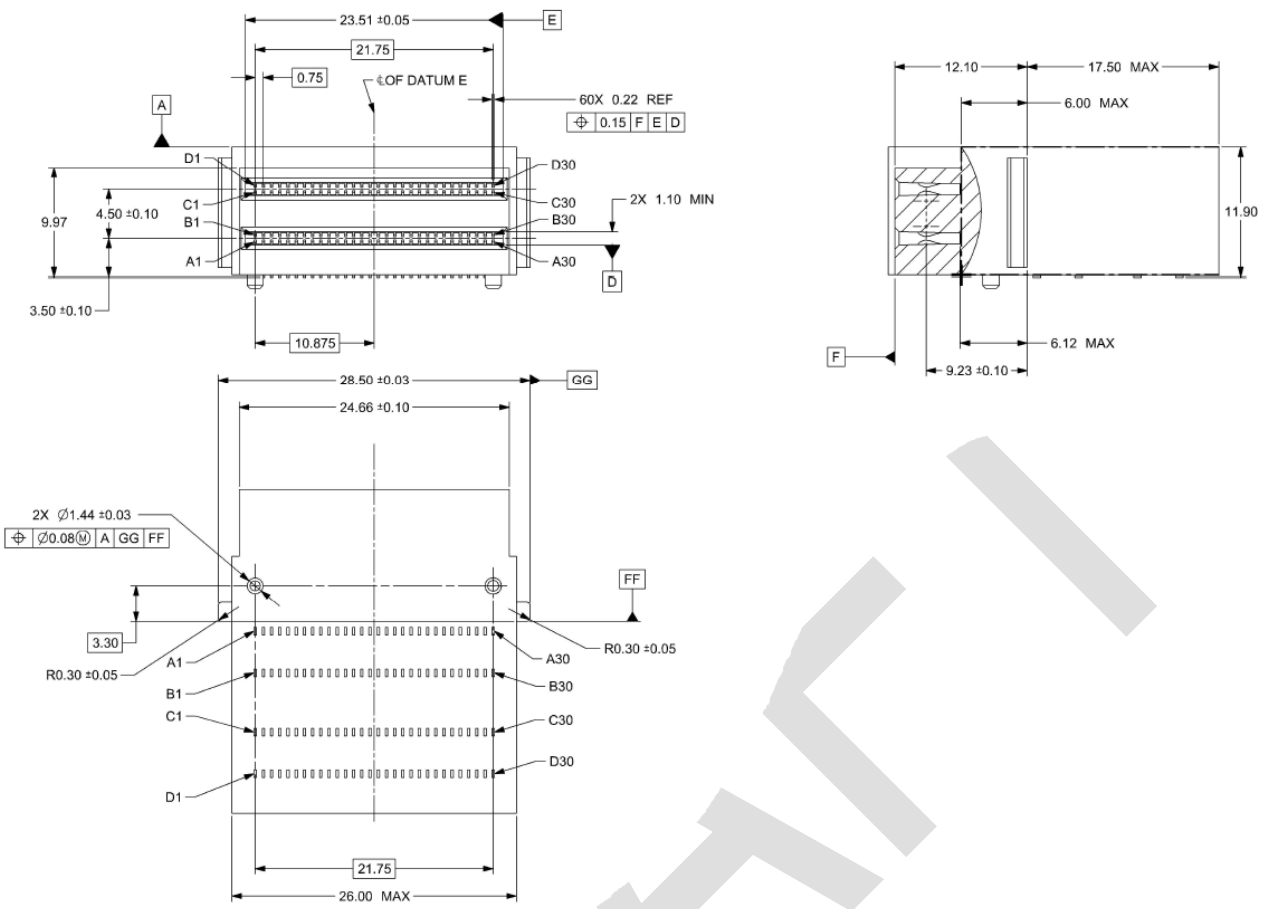
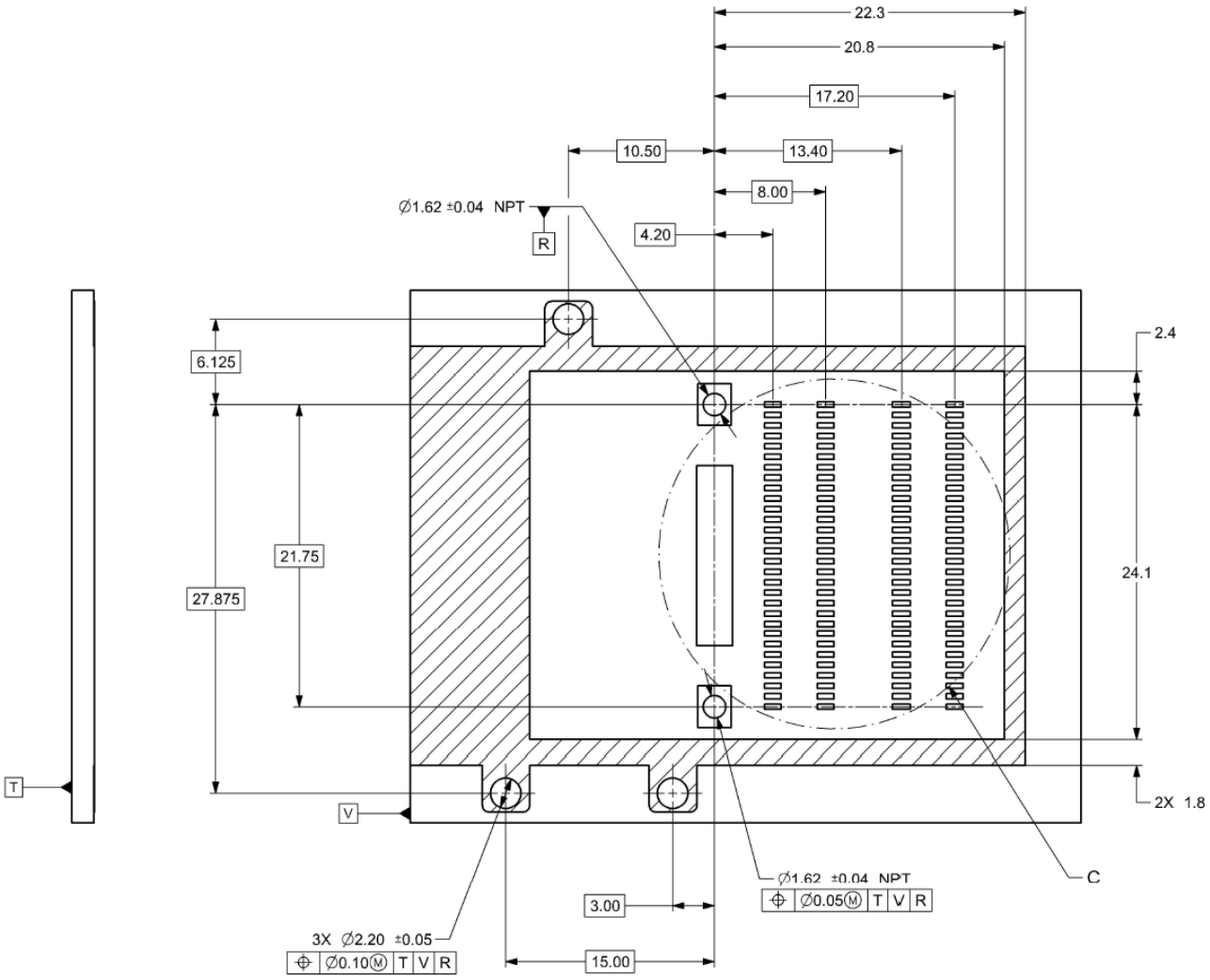


Figure 5-11 X16 Surface Mount Host Connector

5.3.2 X16 Surface Mount Host Board Layout



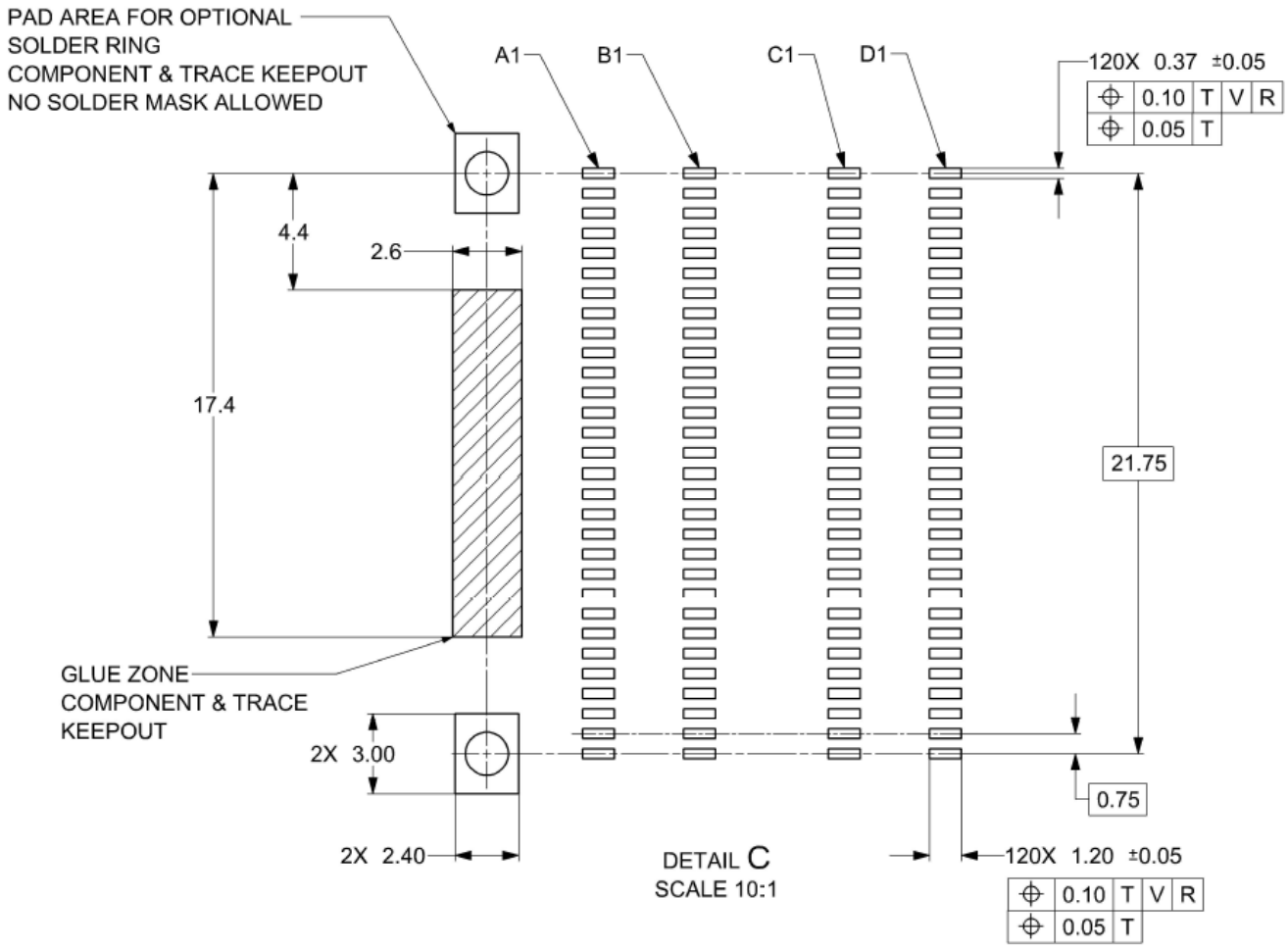


Figure 5-12 X16 Surface Mount Host Board Layout

5.3.3 X8 Surface Mount Host Connector

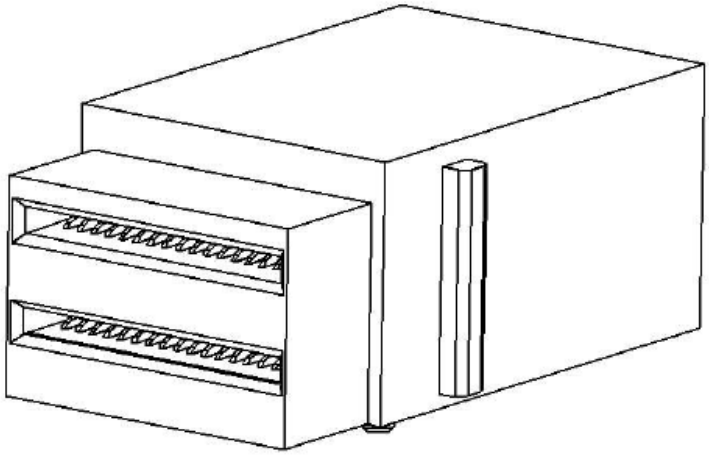


Figure 5-13 X8 Surface Mount Host Connector Overview

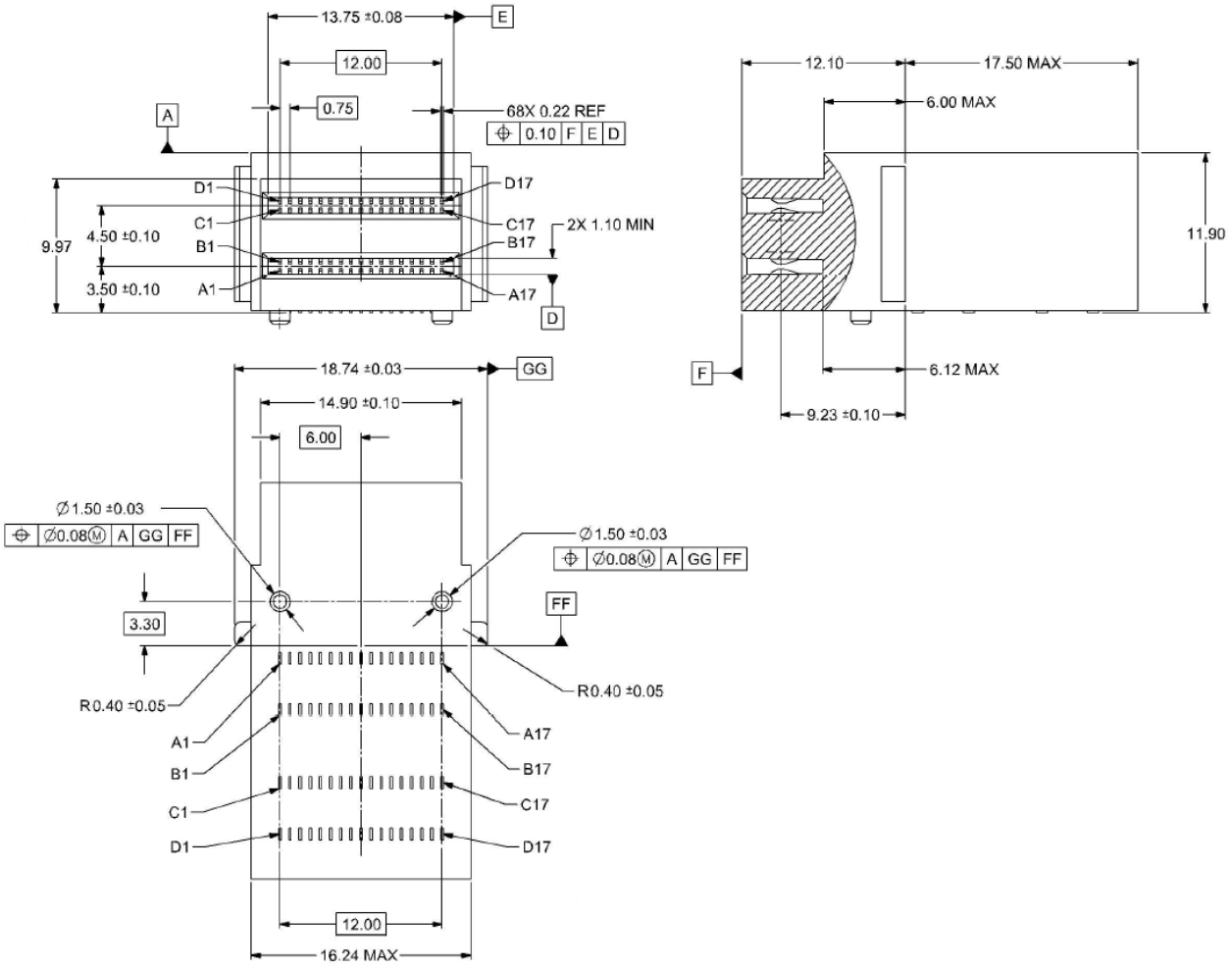
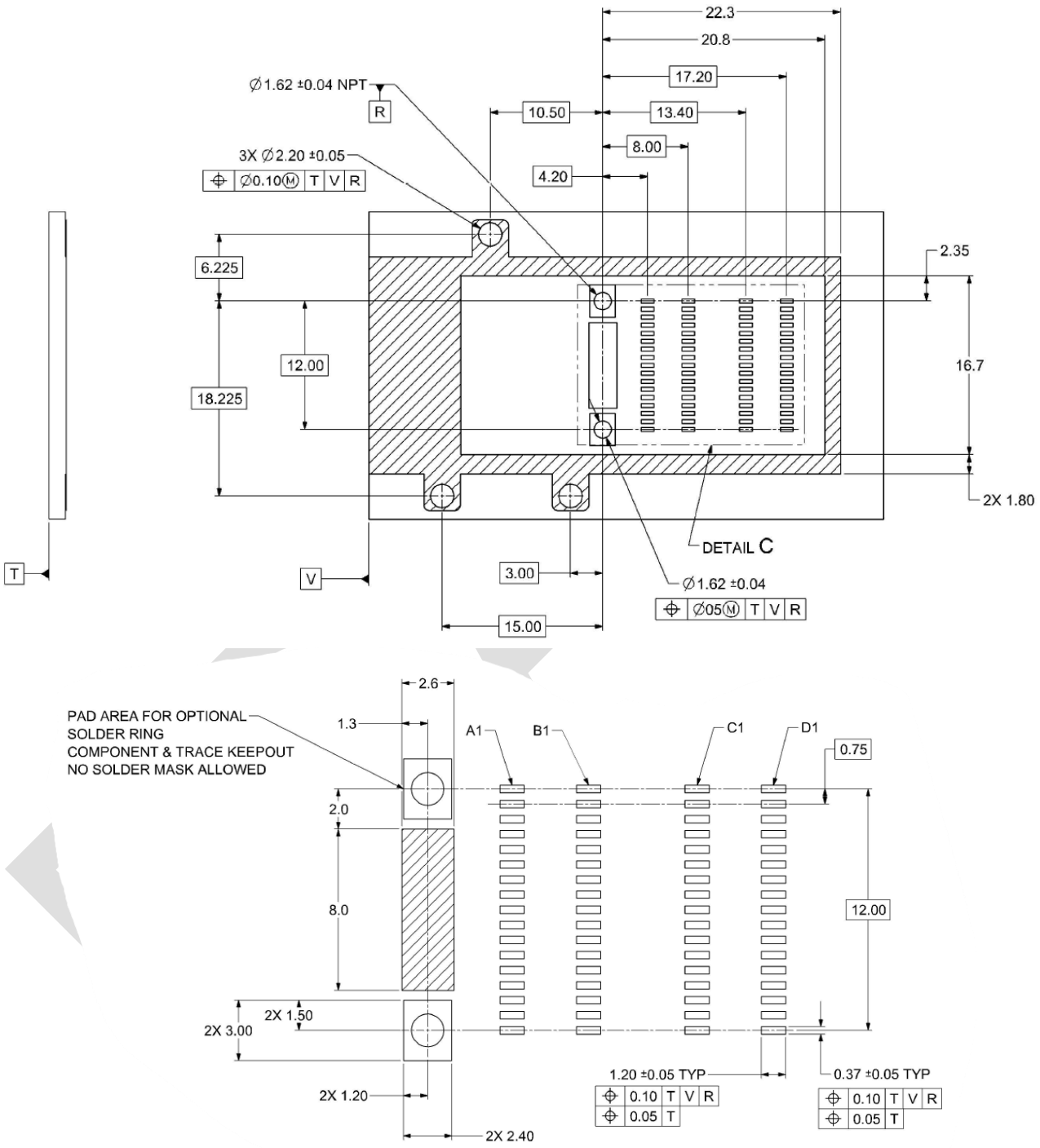


Figure 5-14 X8 Surface Mount Host Connector

5.3.4 X8 Surface Mount Host Board Layout



DETAIL C

Figure 5-15 X8 Surface Mount Host Board Layout

5.3.5 X4 Surface Mount Host Connector

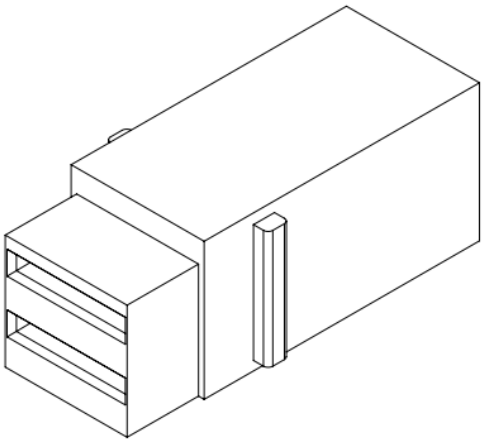


Figure 5-16 X4 Surface Mount Host Connector Overview

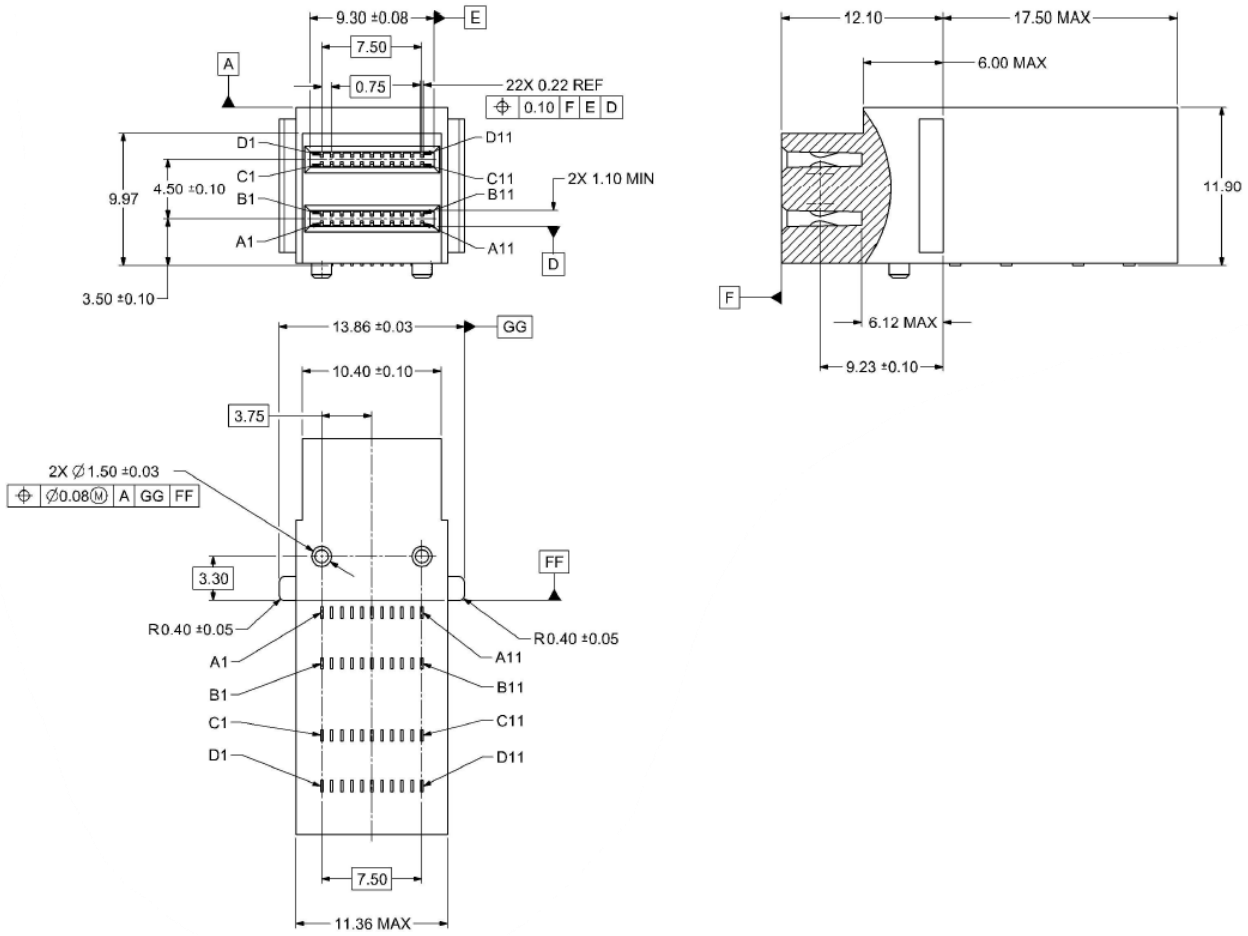
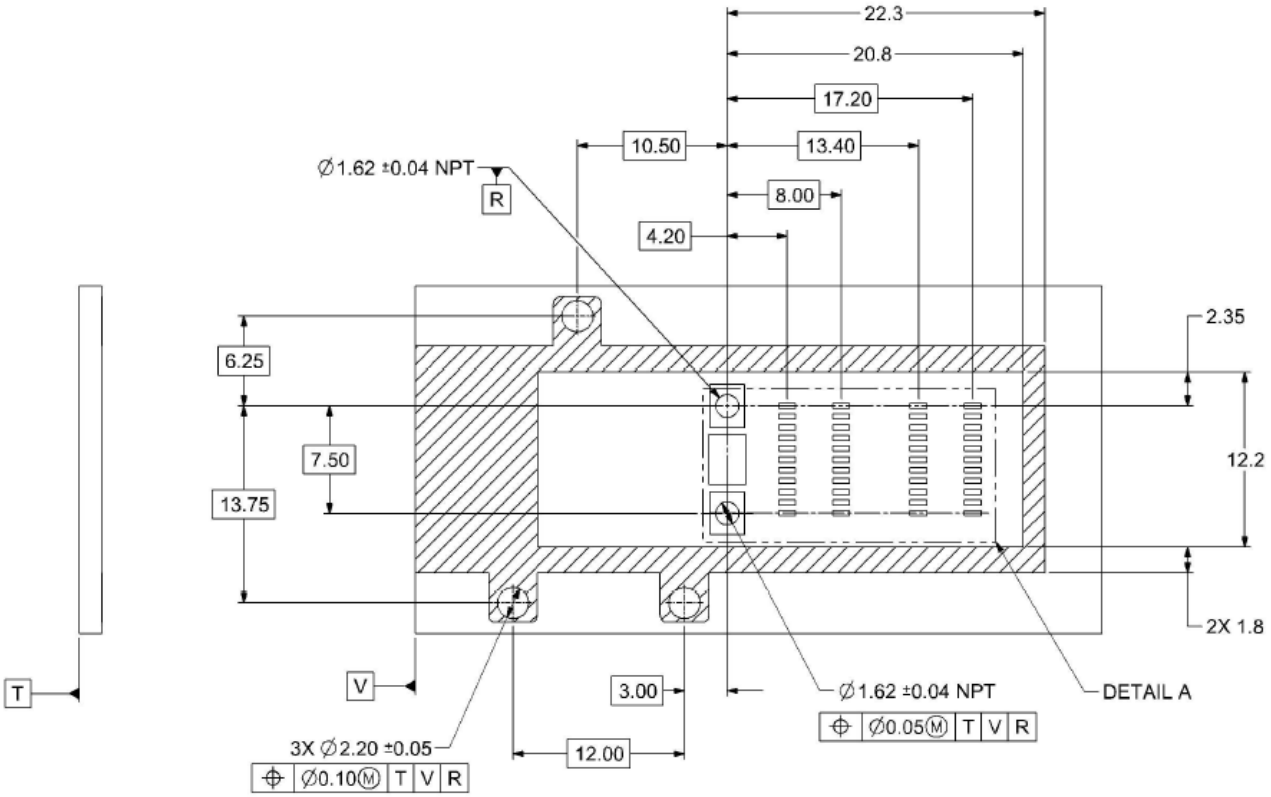
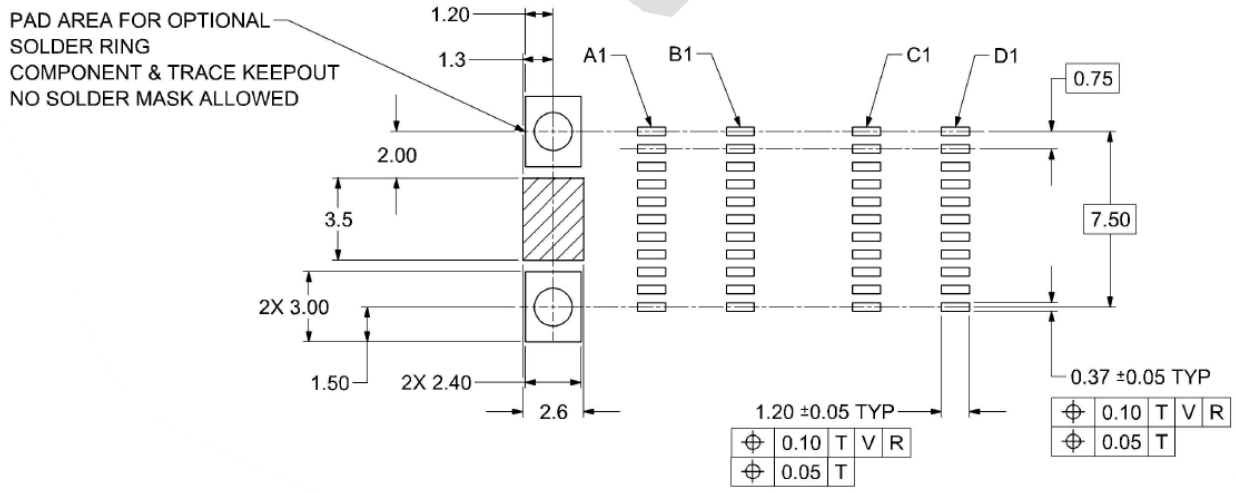


Figure 5-17 X4 Surface Mount Host Connector

5.3.6 X4 Surface Mount Board Layout





DETAIL A

Figure 5-18 x4 Surface Mount Host Board Layout

6. Cage Mechanical Specification

6.1 Overview

This section defines the three sizes of cages, X16, X8, and X4, into which the host connectors are mounted and accept the appropriate module assembly.

6.2 Cage/Connector Assembly

The through-hole connector and cage are intended to be supplied as a single, assembled unit.
The surface mount connector and cage are supplied separately for ease of assembly. The insertion force of the cage on the connector after soldering is 40N max.

6.2.1 X16 Through-Hole Cage/Connector Assembly

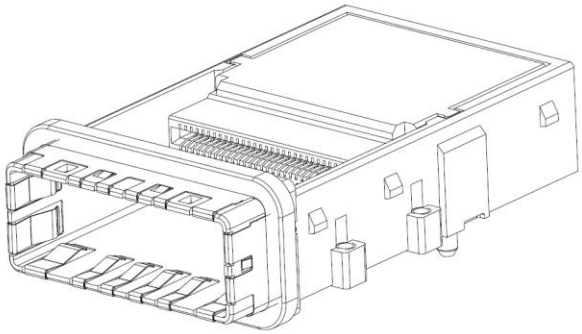
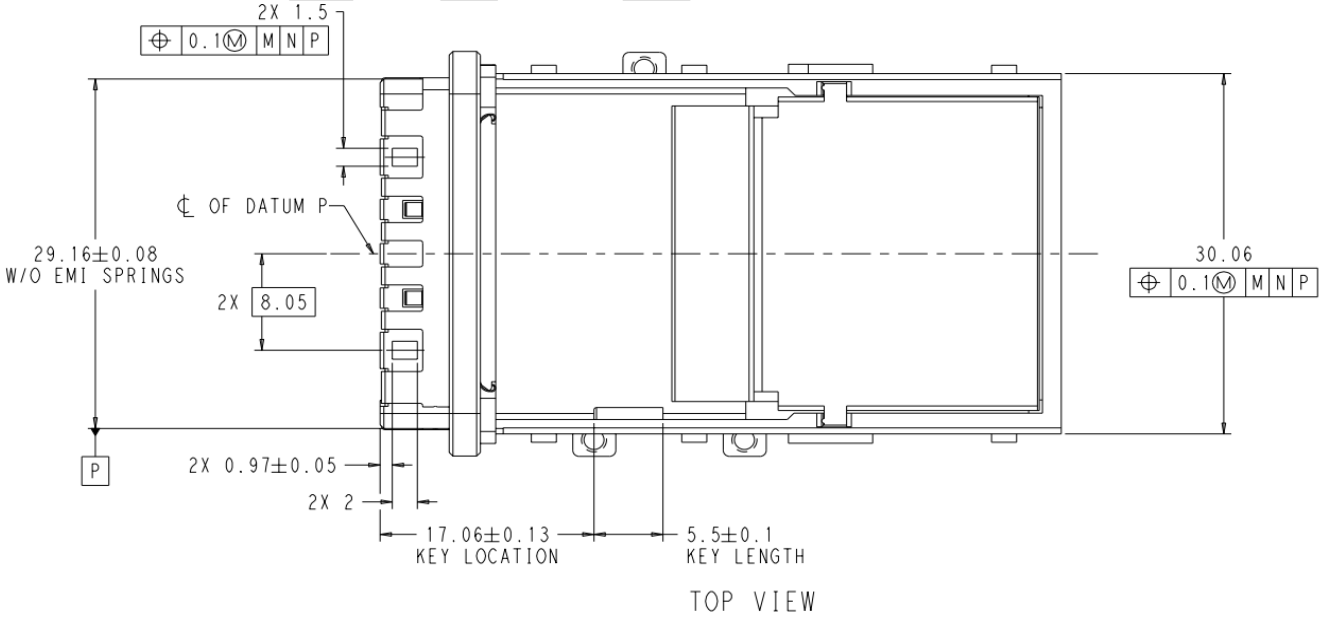
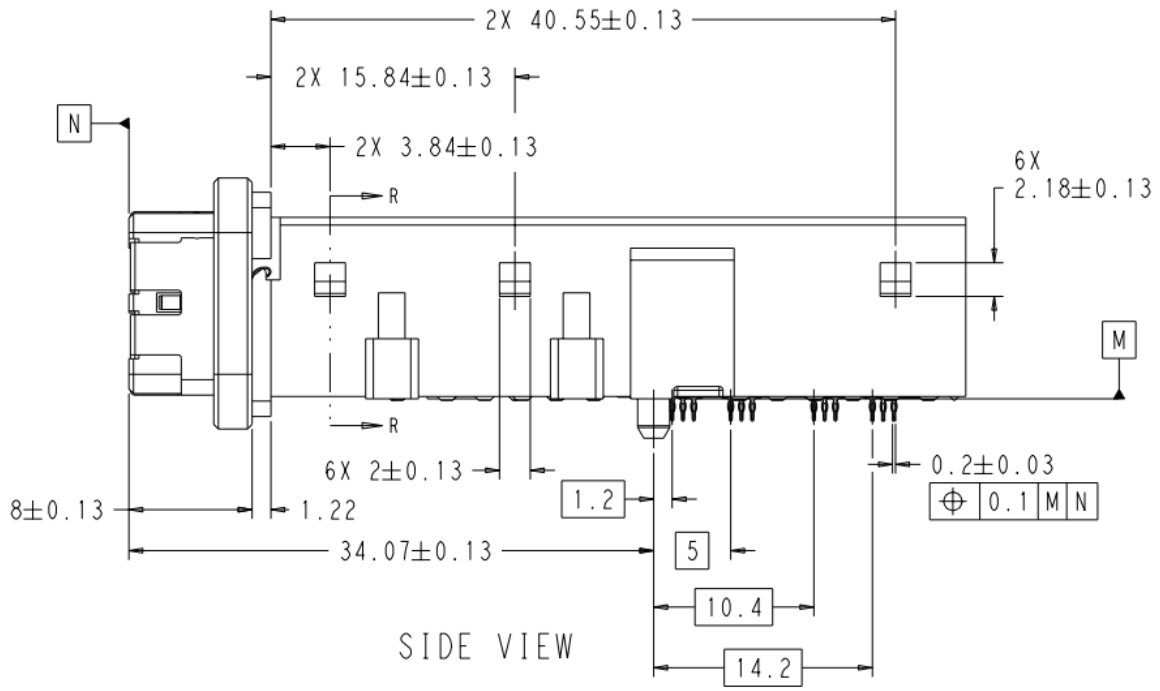
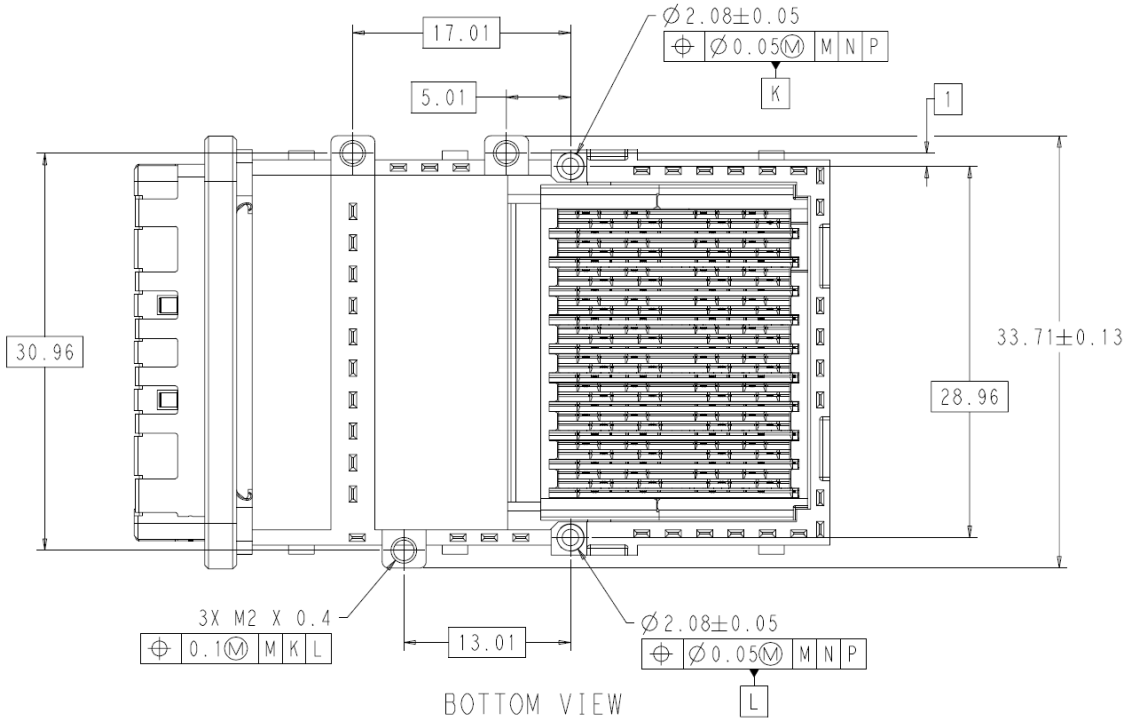


Figure 6-1 X16 Through-Hole Cage/Connector Overview





1



2

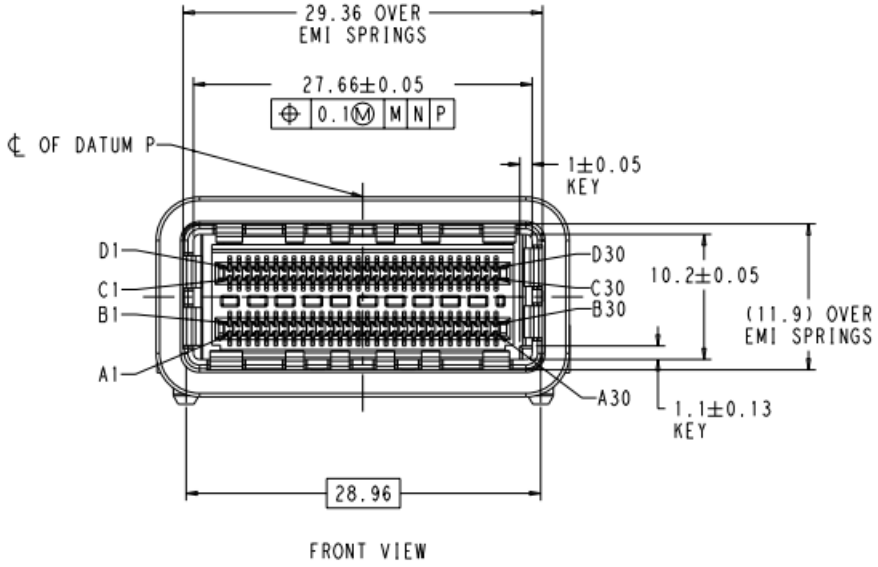


Figure 6-2 X16 Through-Hole Cage/Connector Assembly

6.2.2 X8 Through-Hole Cage/Connector Assembly

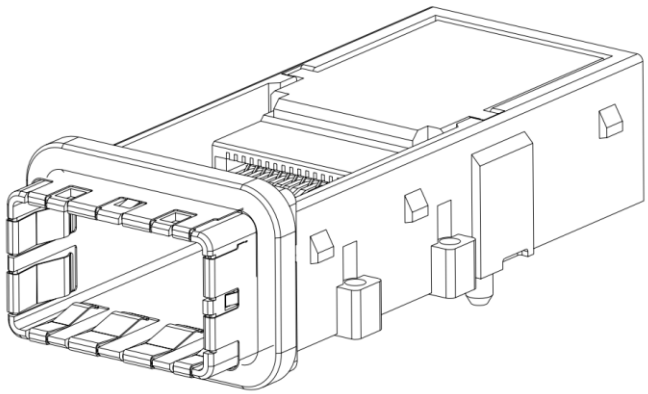
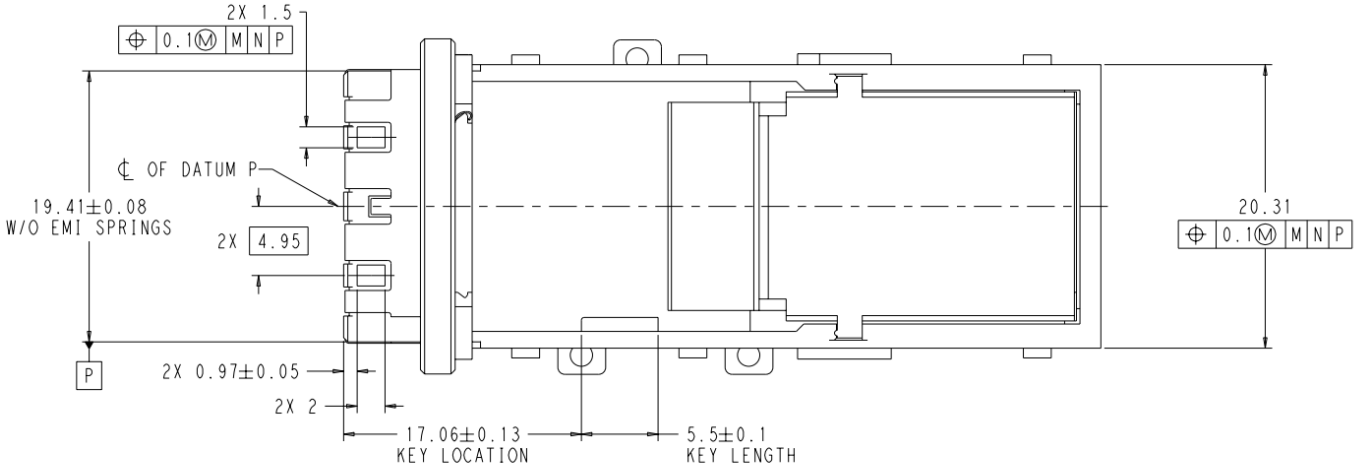
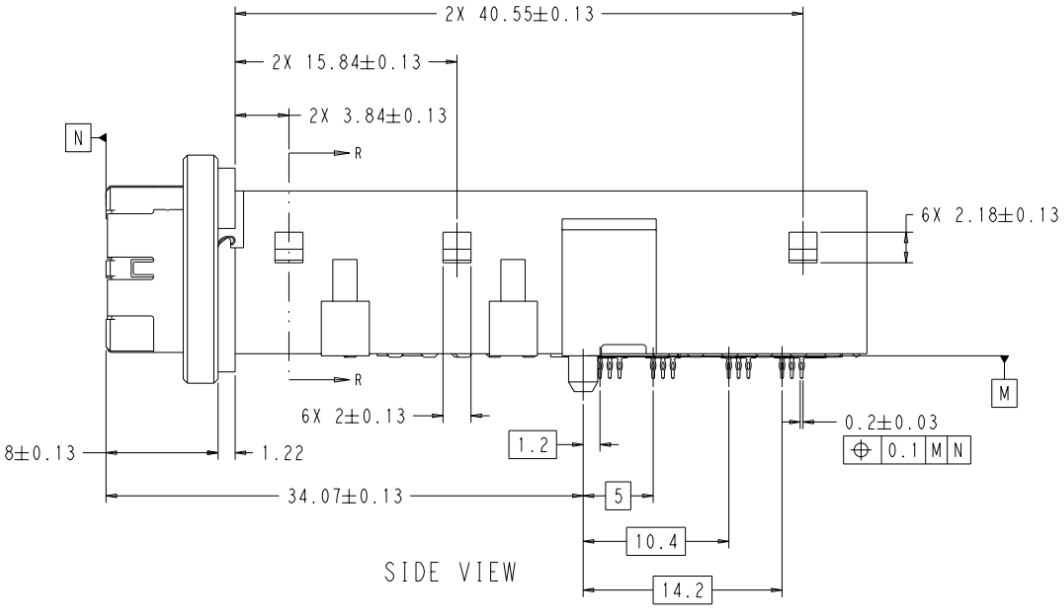


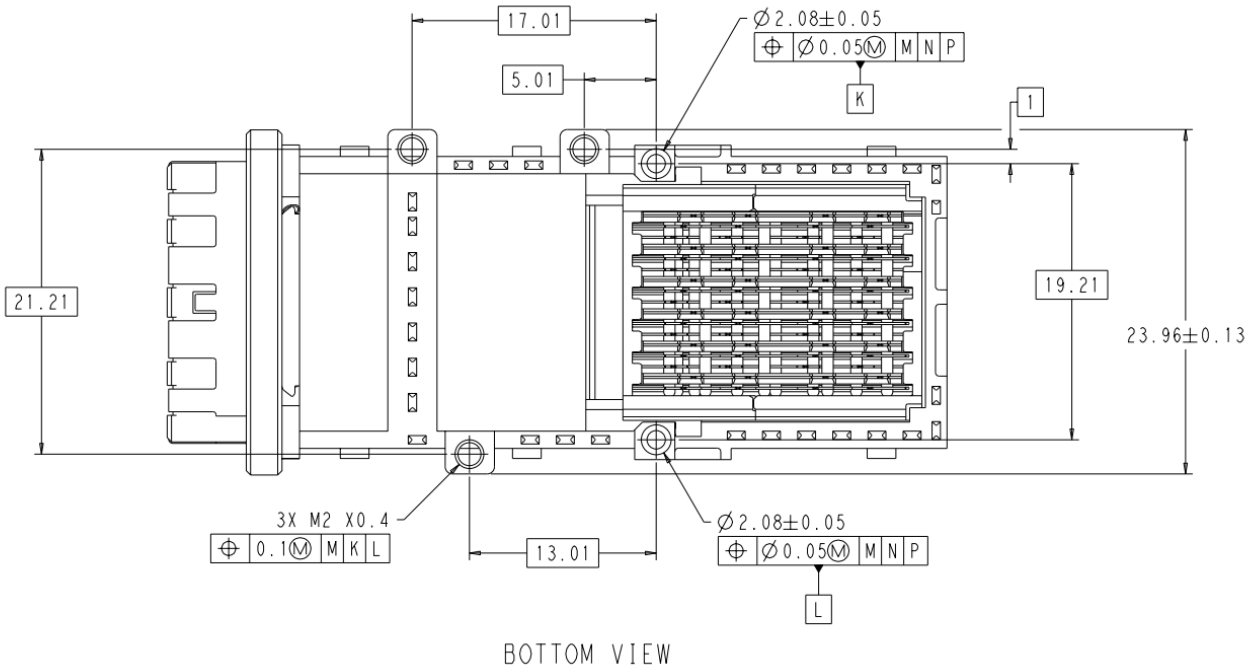
Figure 6-3 X8 Through-Hole Cage/Connector Overview



1



2
3



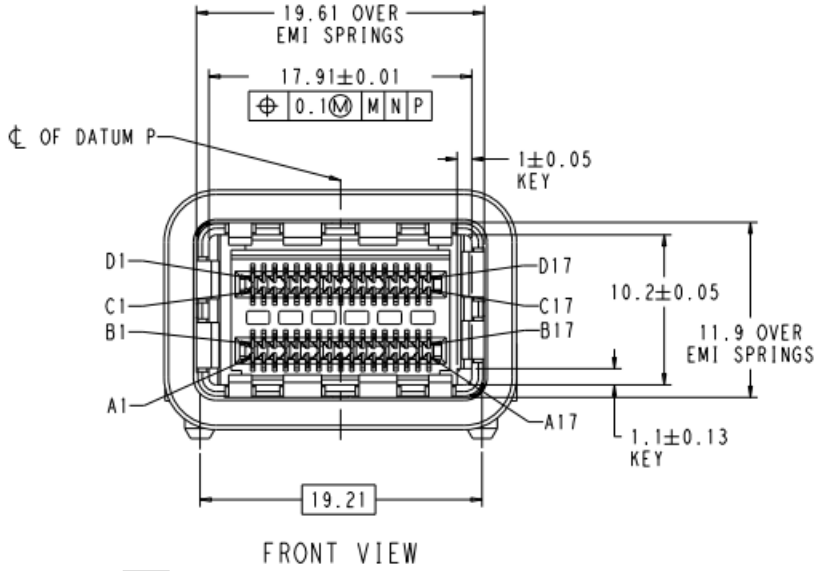


Figure 6-4 X8 Through-Hole Cage/Connector

6.2.3 X4 Through-Hole Cage/Connector Assembly

Note: Cage shown as used – with connector installed.

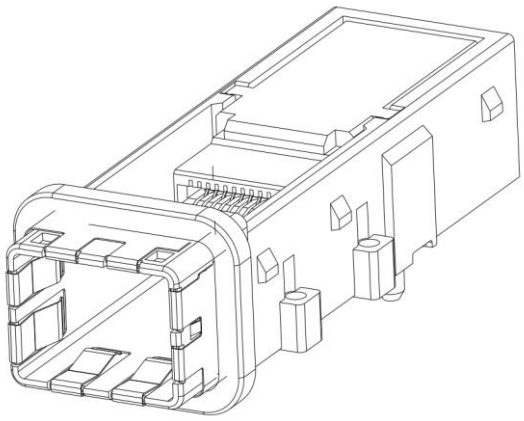
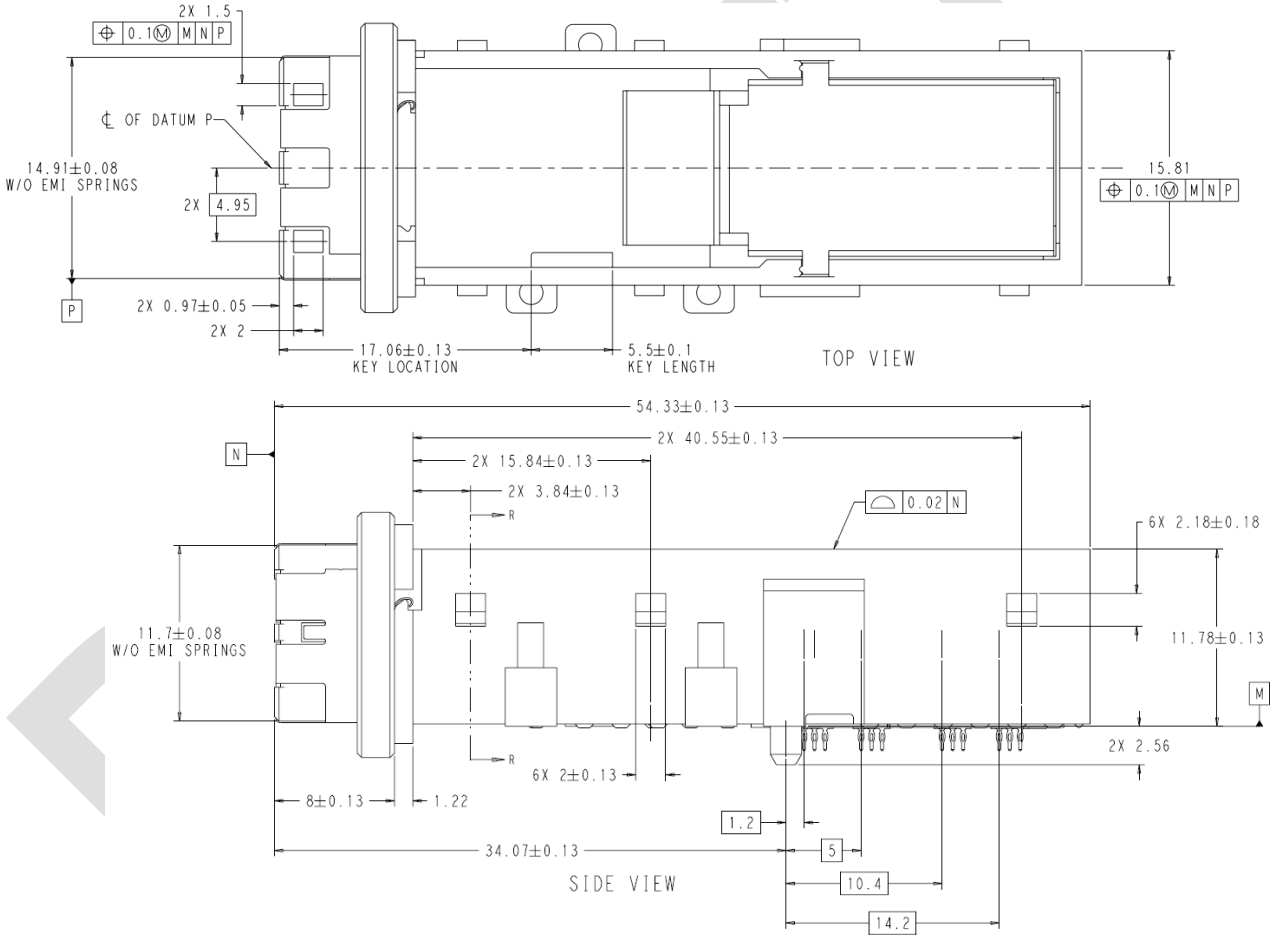


Figure 6-5 X4 Through Hole Cage/Connector Assembly



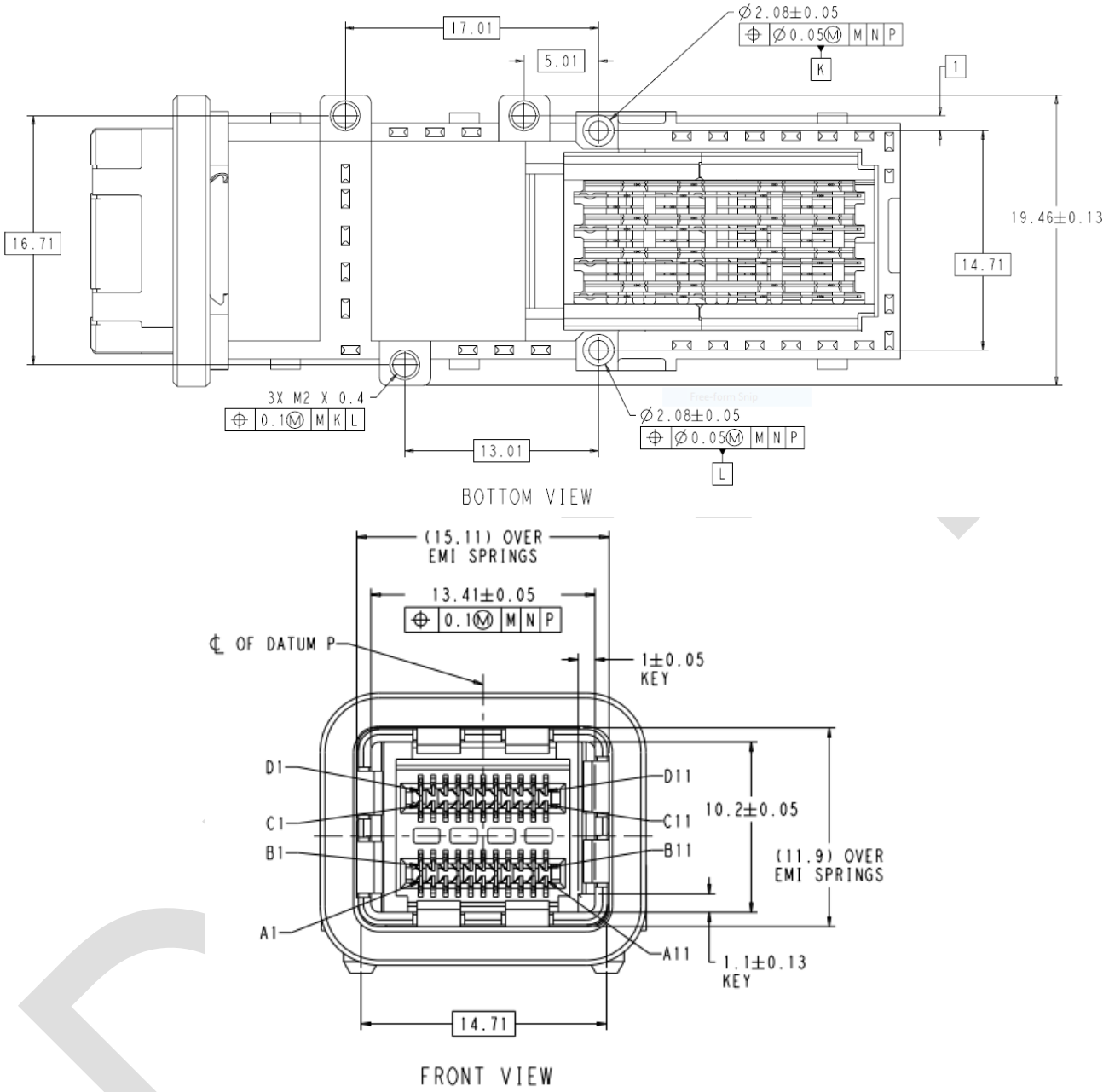


Figure 6-6 X4 Through-Hole Cage

6.2.4 X16 Surface Mount Cage

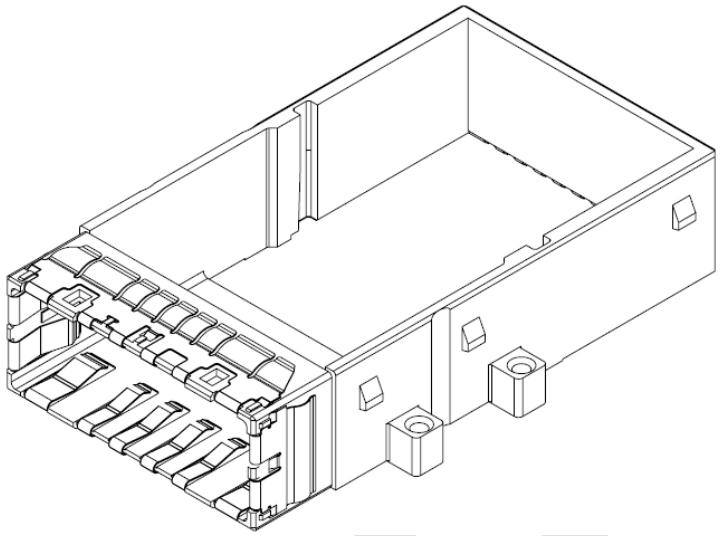


Figure 6-7 X16 Surface Mount Cage

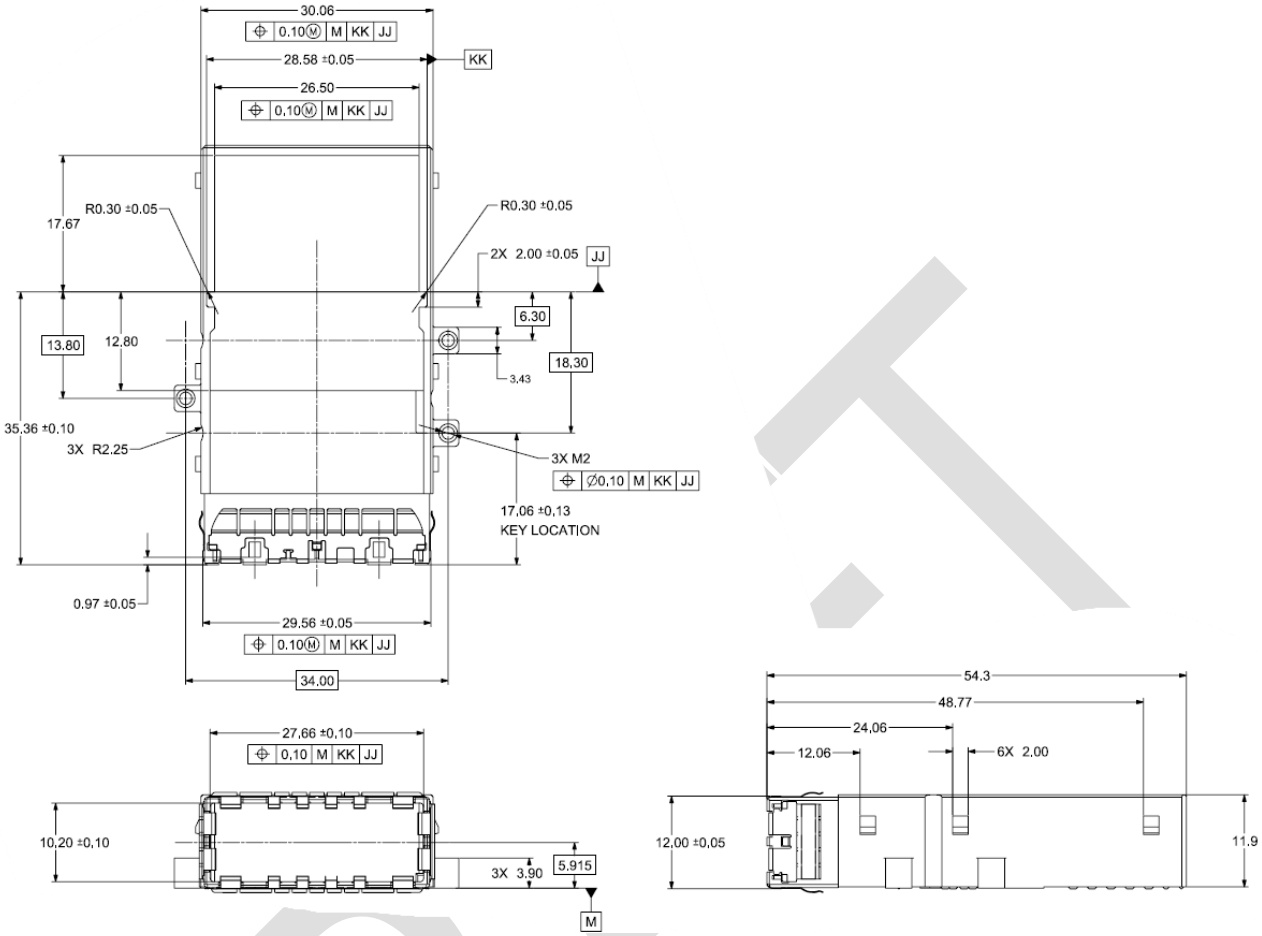


Figure 6-8 X16 Surface Mount Cage

6.2.5 X8 Surface Mount Cage

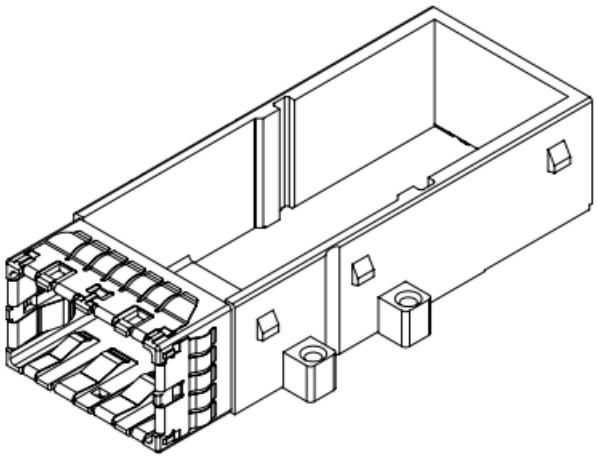


Figure 6-9 X8 Surface Mount Cage

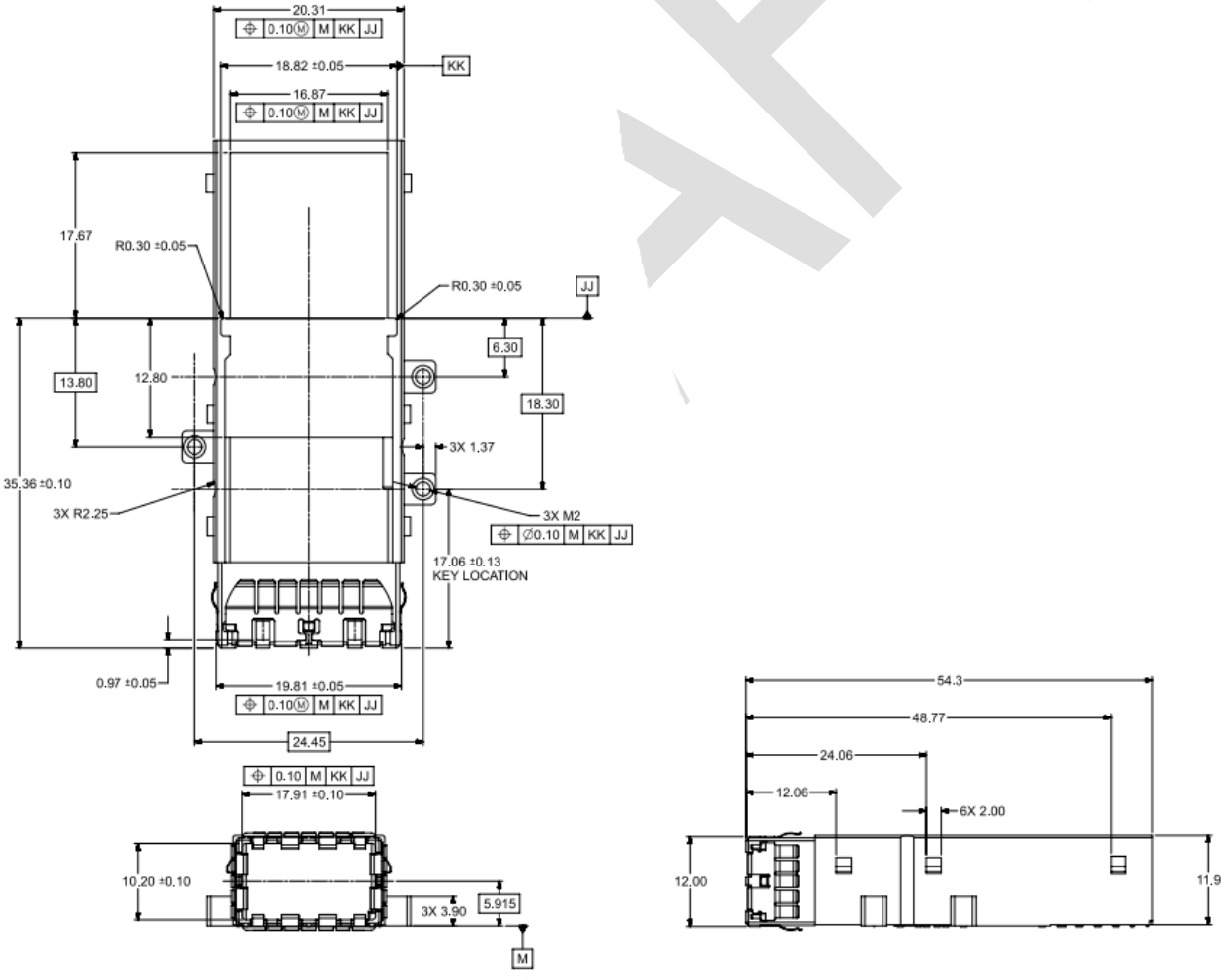


Figure 6-10 X8 Surface Mount Cage

6.2.6 X4 Surface Mount Cage

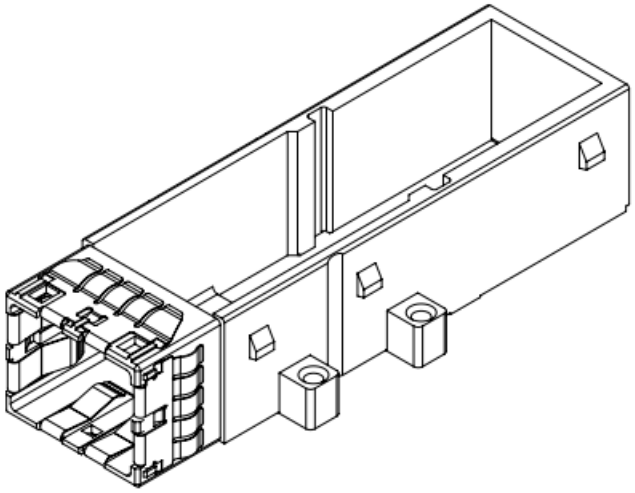


Figure 6-11 X4 Surface Mount Cage Overview

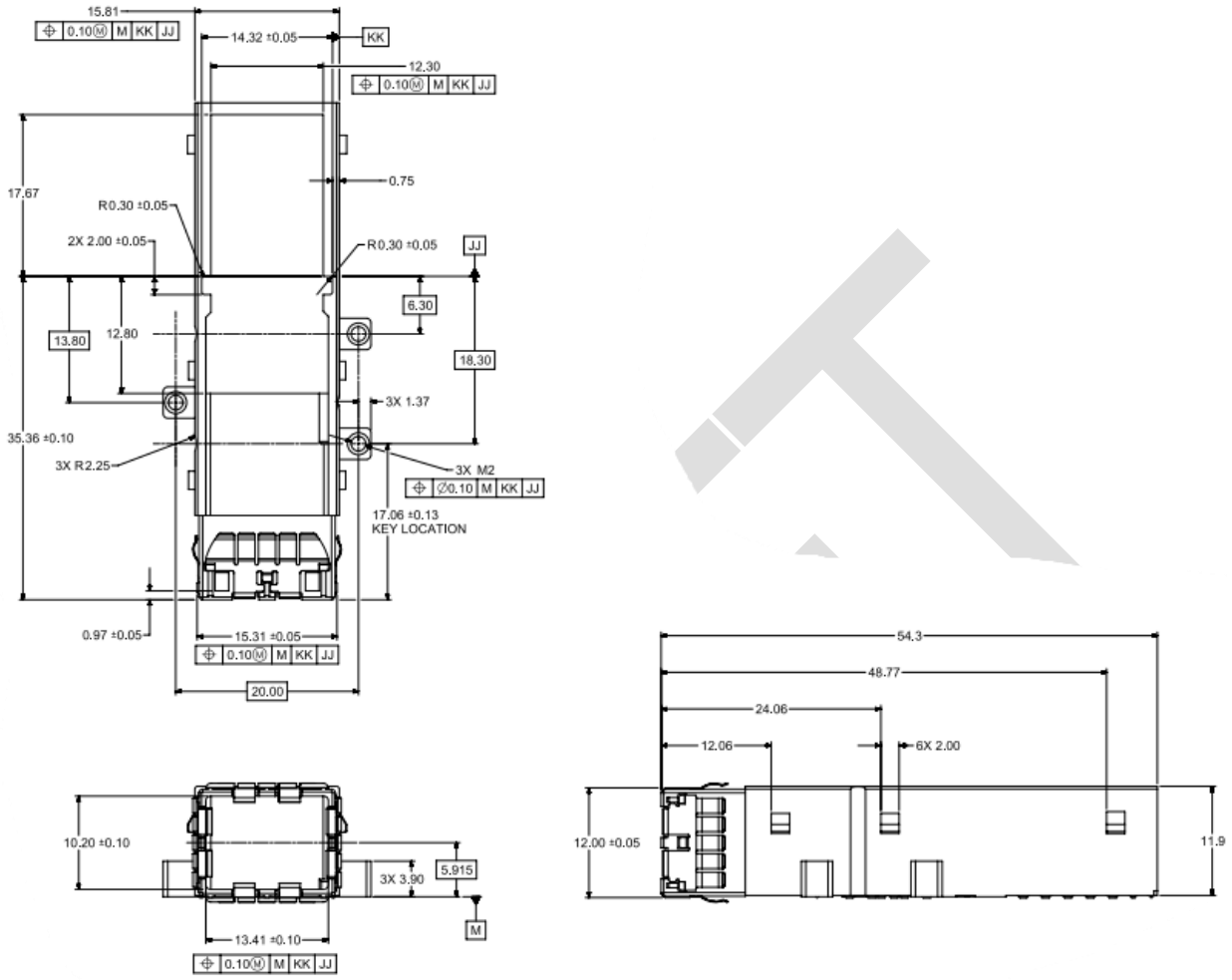


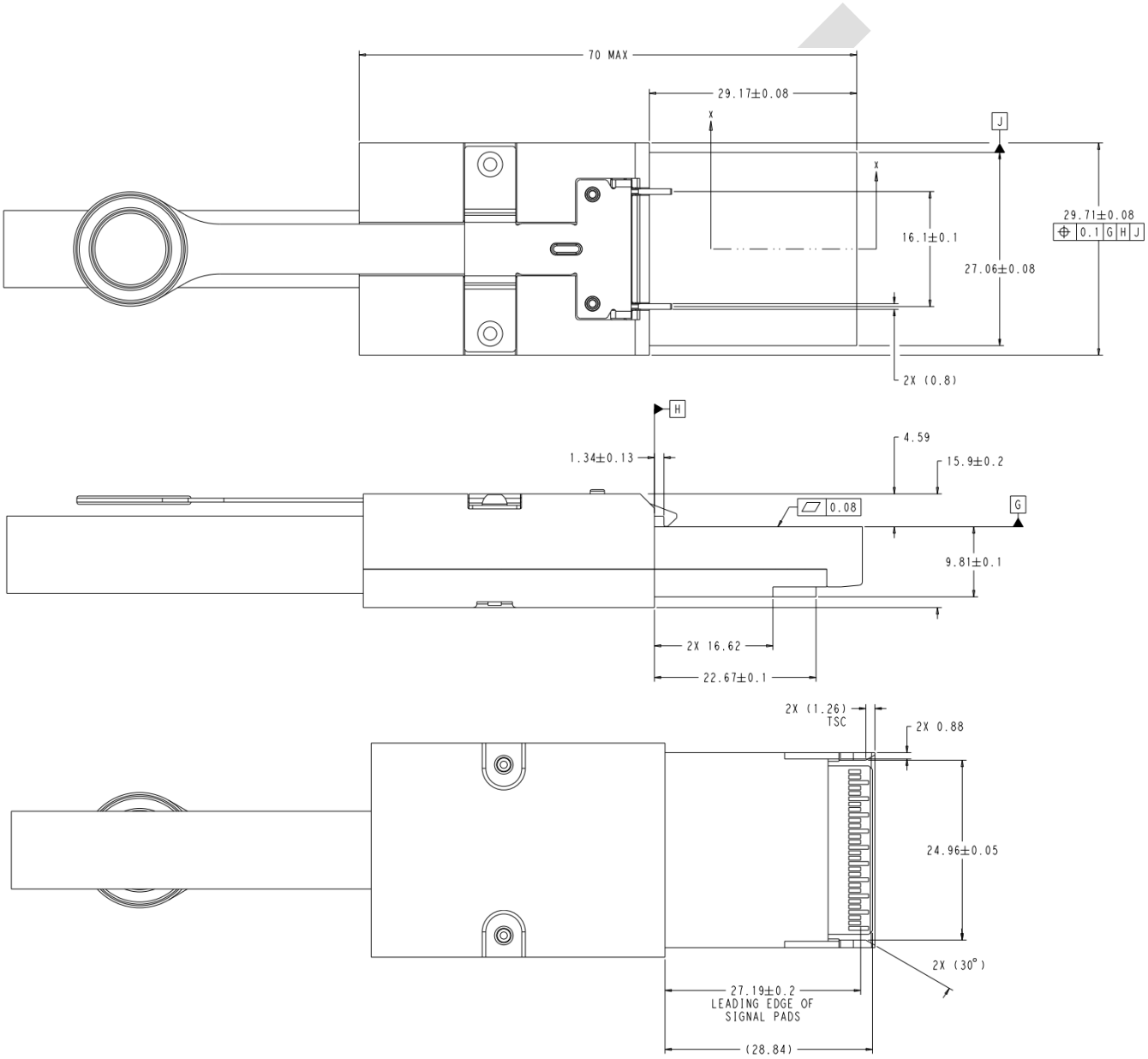
Figure 6-12 X4 Surface Mount Cage

7. Module Mechanical Specification

7.1 Overview

This section describes 3 versions of the standard module: X16, X8, and X4 sizes. The modules are removed from the cage/connector assembly by means of a pull tab. They provide a means to self-lock to the cage upon insertion.

7.1.1 X16 Standard Module



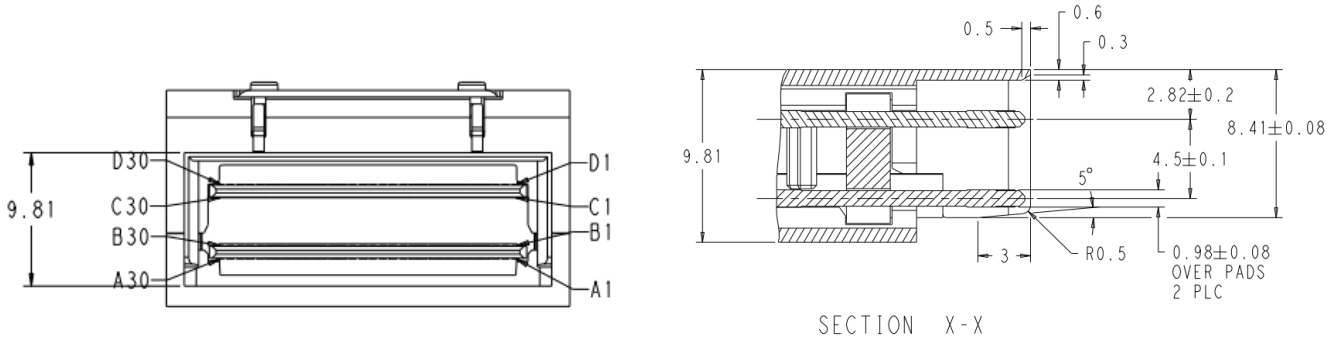


Figure 7-1 X16 Standard Module

7.1.2 X16 Standard Paddle Card Edge

There are two module paddle cards as defined below. The pads are designed for a sequenced mating: first mate – ground pads, second mate – power pads, third mate – signal pads.

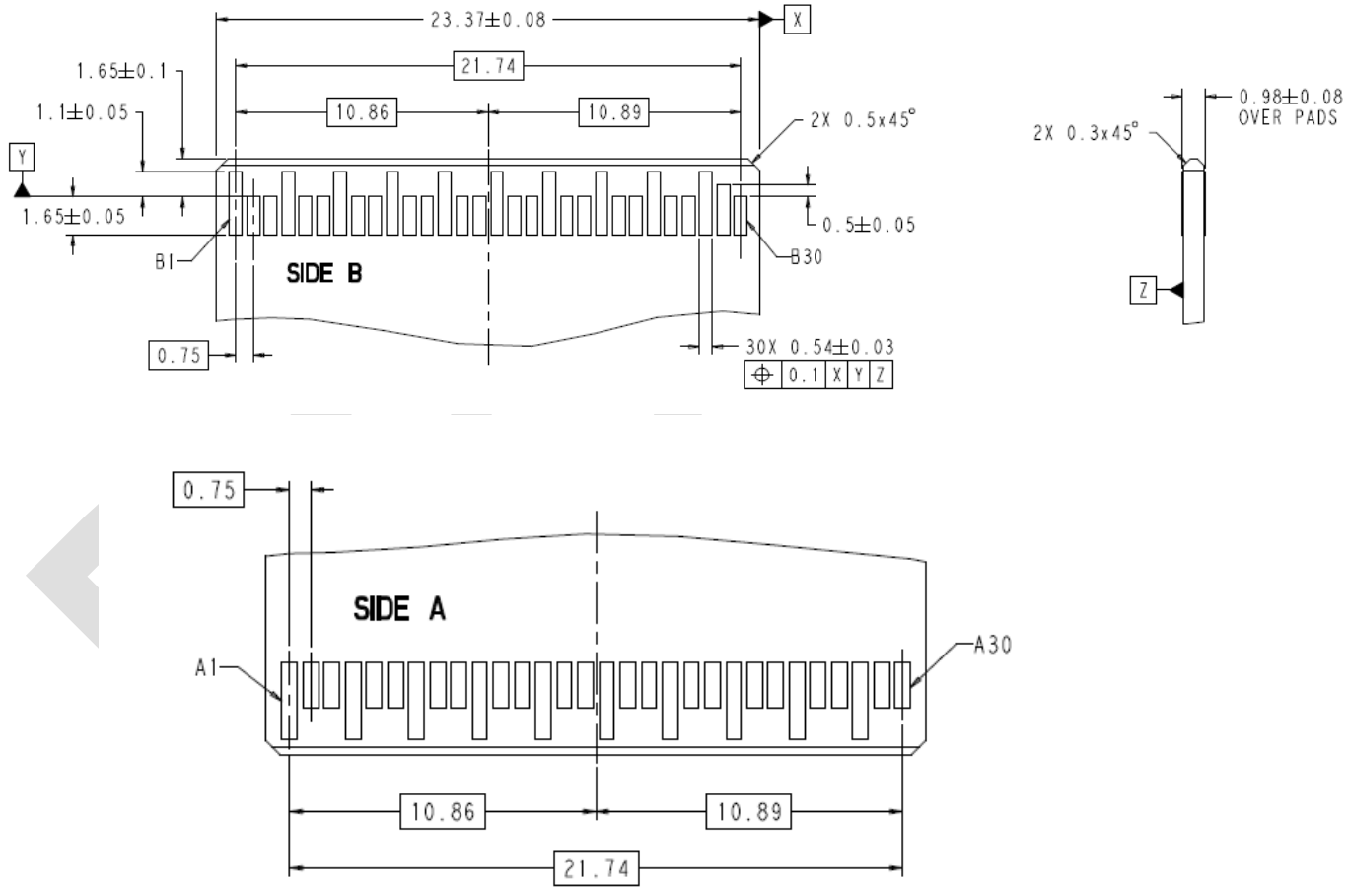


Figure 7-2 X16 Standard Lower Paddle Card

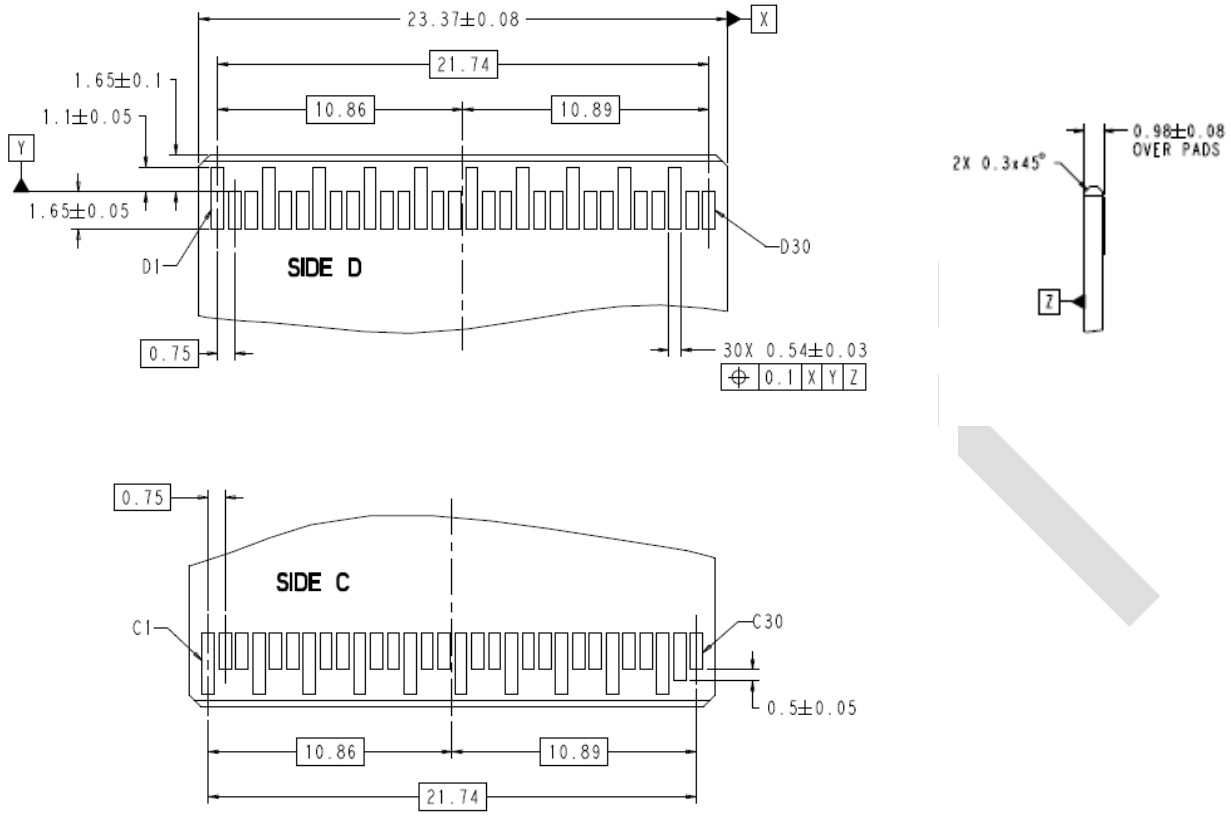


Figure 7-3 X16 Standard Upper Paddle Card

7.1.3 X8 Standard Module

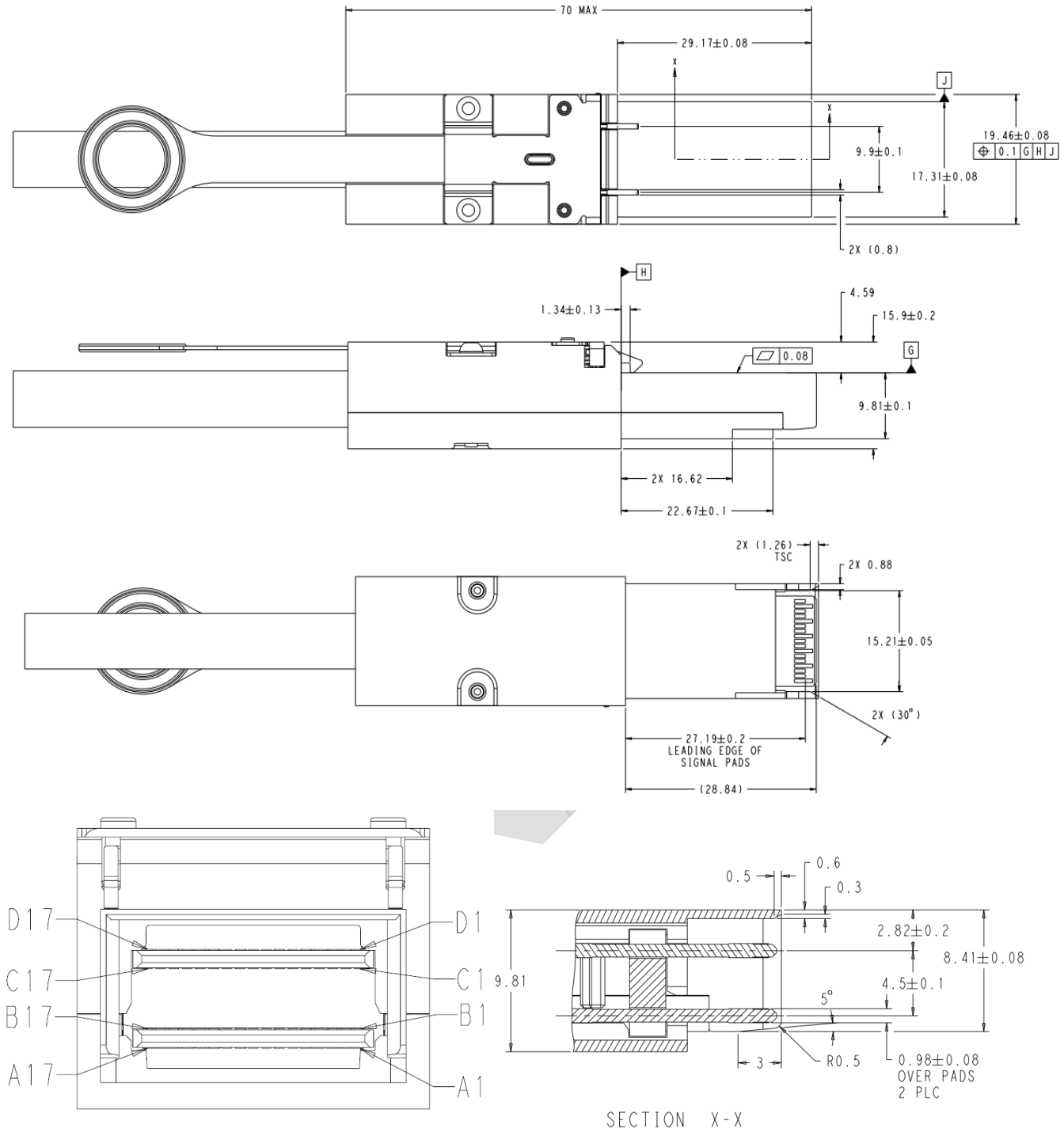


Figure 7-4 X8 Standard Module

7.1.4 X8 Standard Paddle Card Edge

There are two module paddle cards as defined below. The pads are designed for a sequenced mating: first mate – ground pads, second mate – power pads, third mate – signal pads.

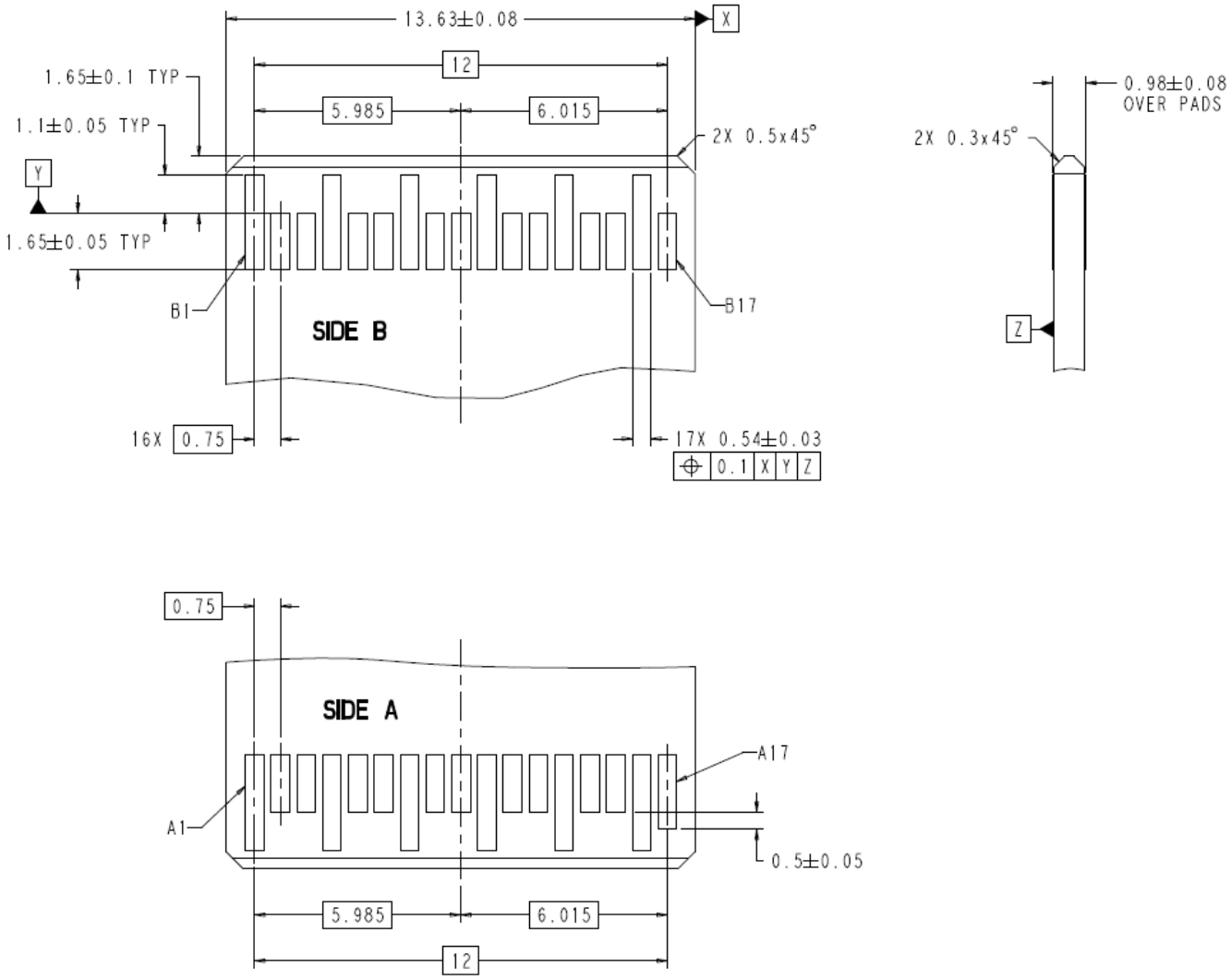


Figure 7-5 X8 Standard Lower Paddle Card

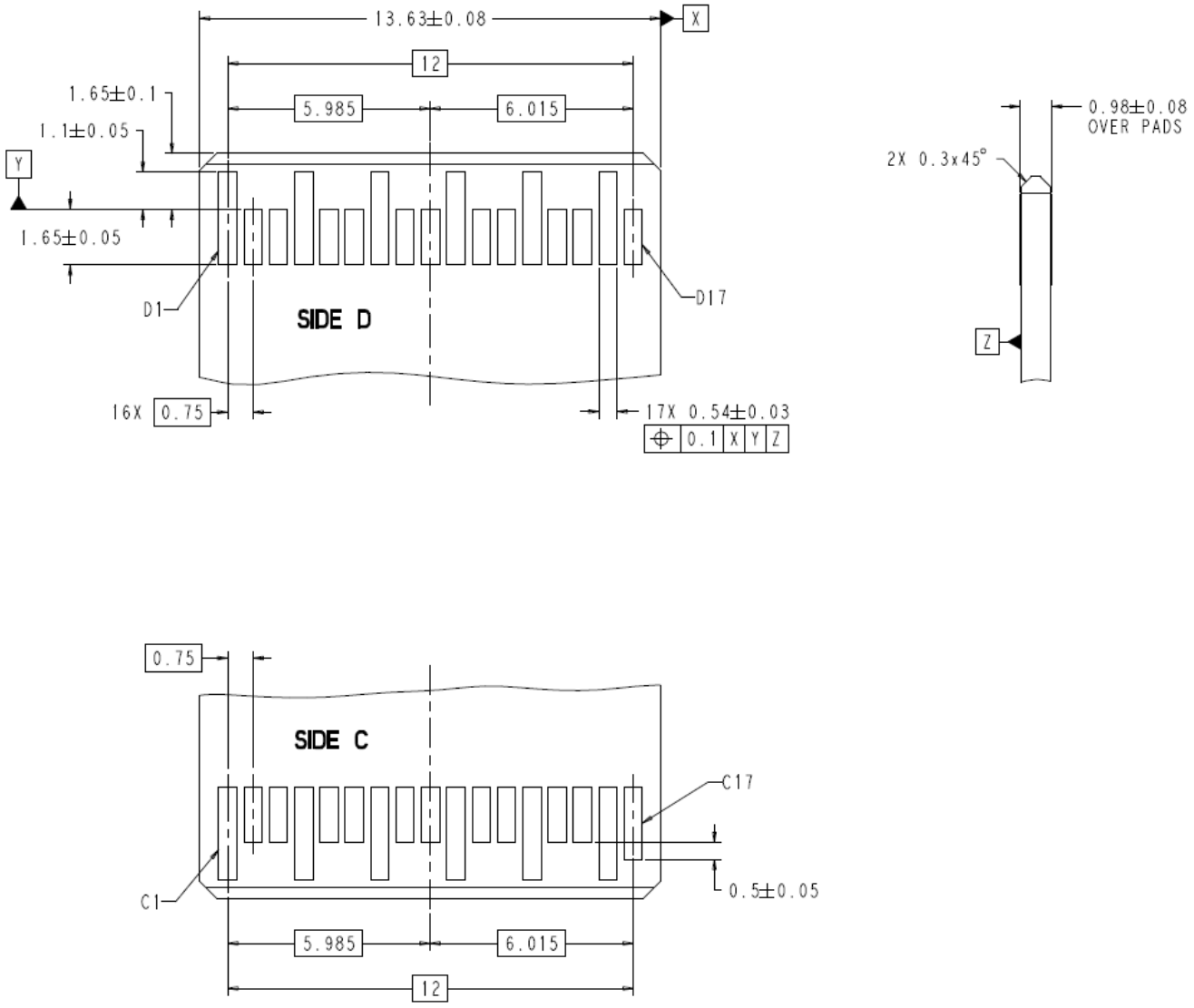


Figure 7-6 X8 Standard Upper Paddle Card

7.1.5 X4 Standard Module

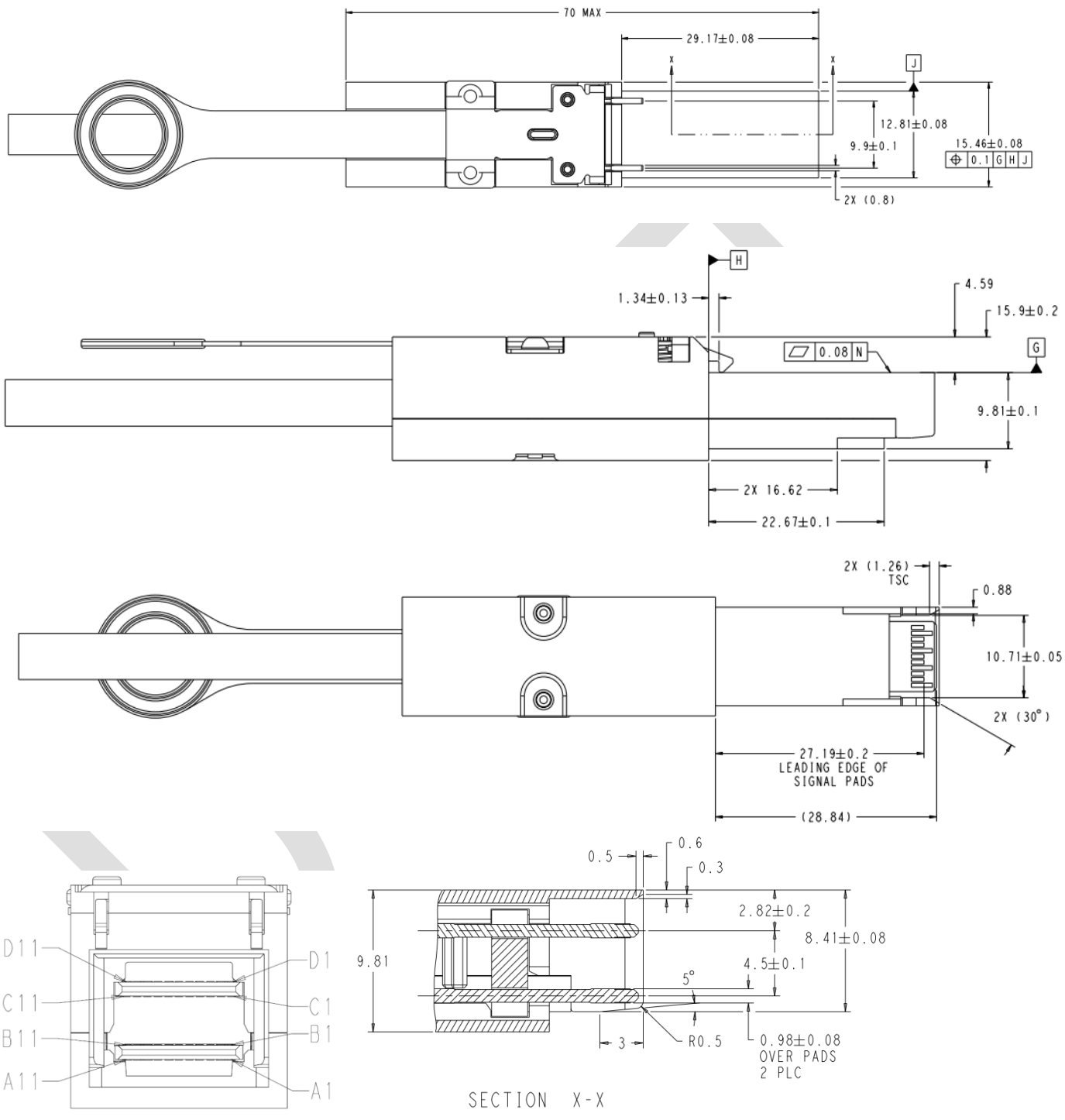


Figure 7-7 X4 Standard Module

7.1.6 X4 Standard Paddle Card Edge

There are two module paddle cards as defined below. The pads are designed for a sequenced mating: first mate – ground pads, second mate – power pads, third mate – signal pads.

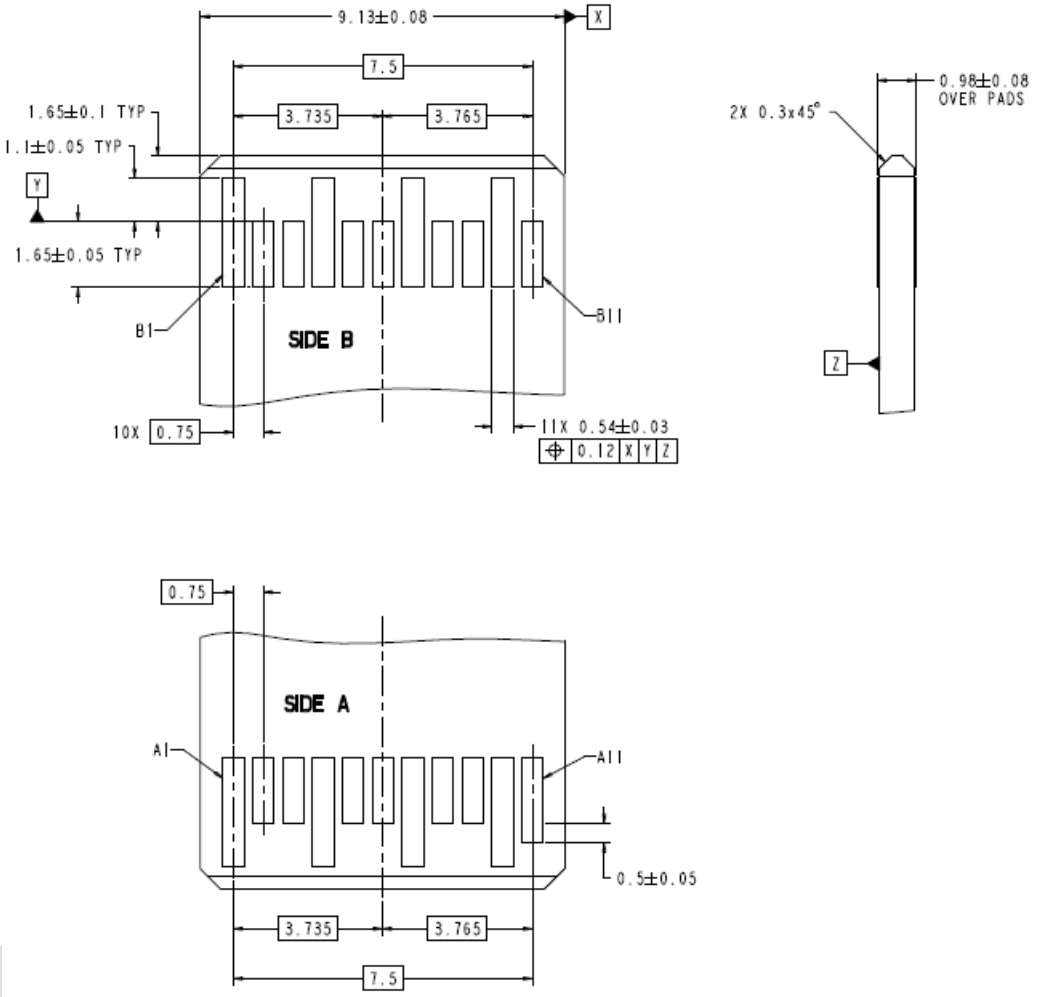


Figure 7-8 X4 Standard Lower Paddle Card

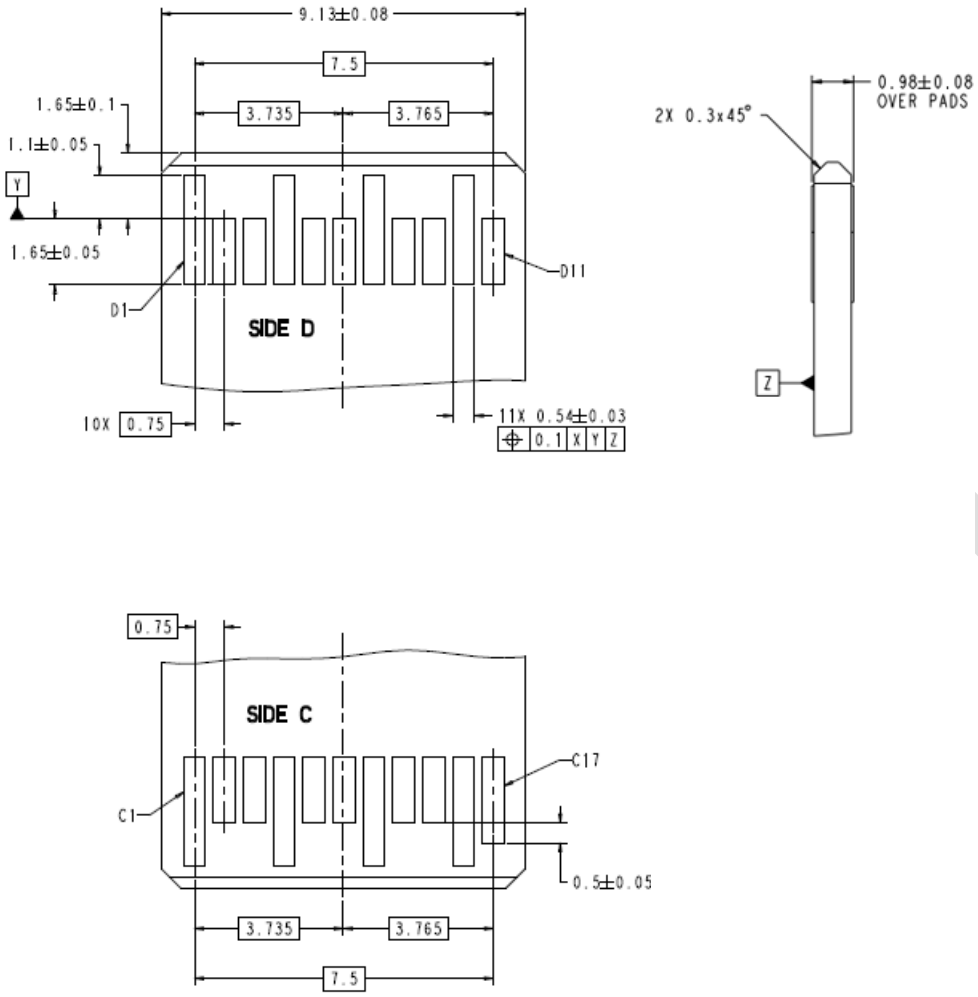
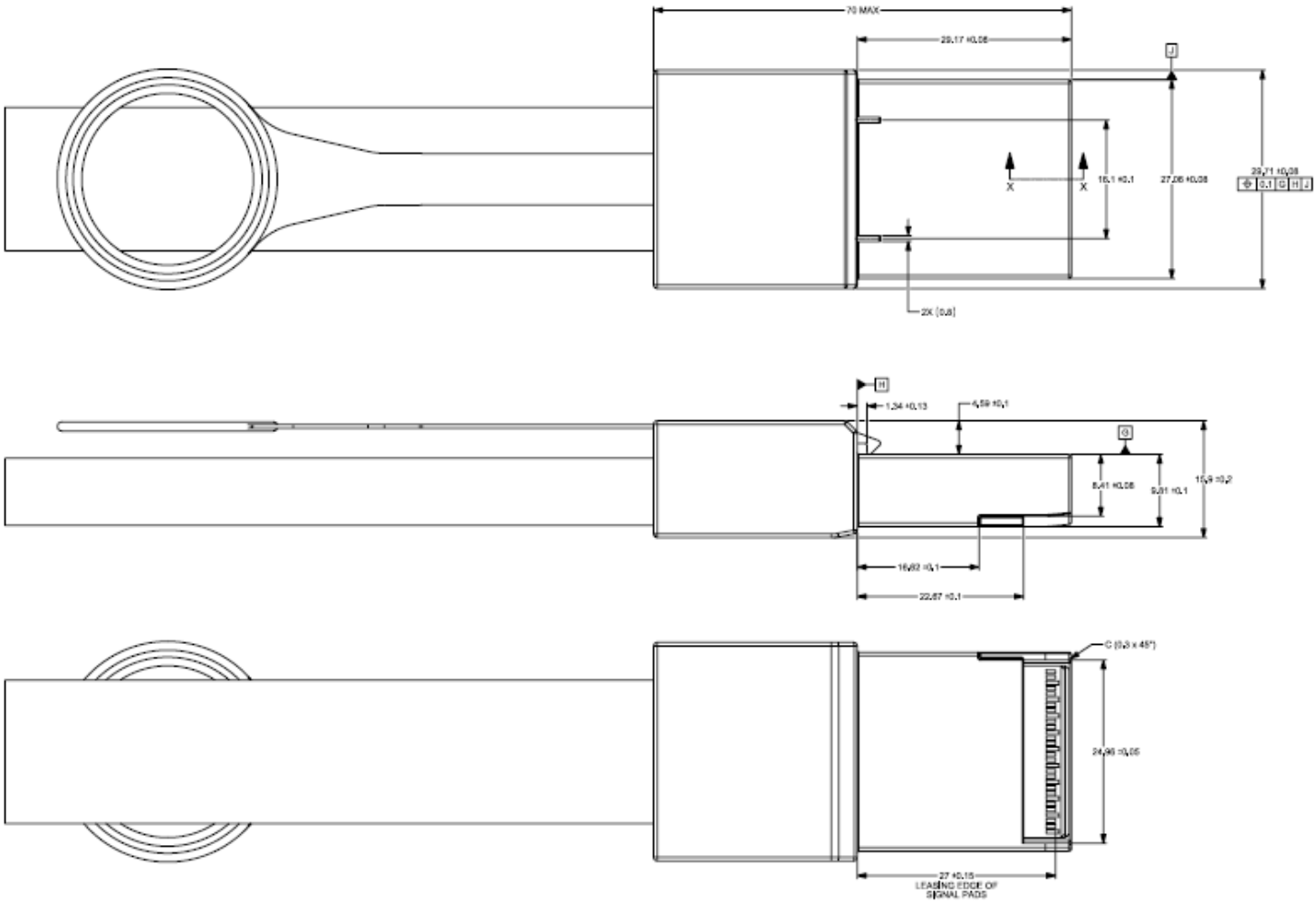


Figure 7-9 X4 Standard Upper Paddle Card

7.2 Overview, Enhanced Performance Version

This section describes 3 versions of the module: X16, X8, and X4 sizes with a configuration that provides for enhanced performance. The modules are removed from the cage/connector assembly by means of a pull tab. They provide a means to self-lock to the cage upon insertion.

7.2.1 X16 Enhanced Module



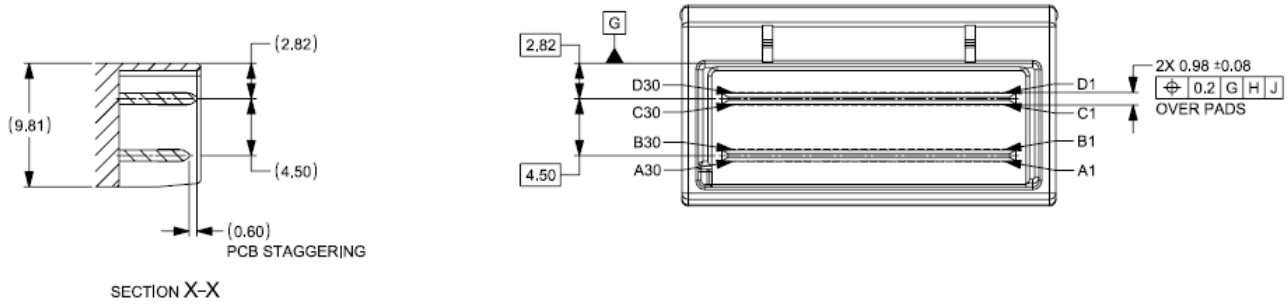


Figure 7-10 X16 Enhanced Module

7.2.2 X16 Enhanced Paddle Card Edge

There are two module paddle cards as defined below. The pads are designed for a sequenced mating: first mate – ground pads, second mate – power pads, third mate – signal pads.

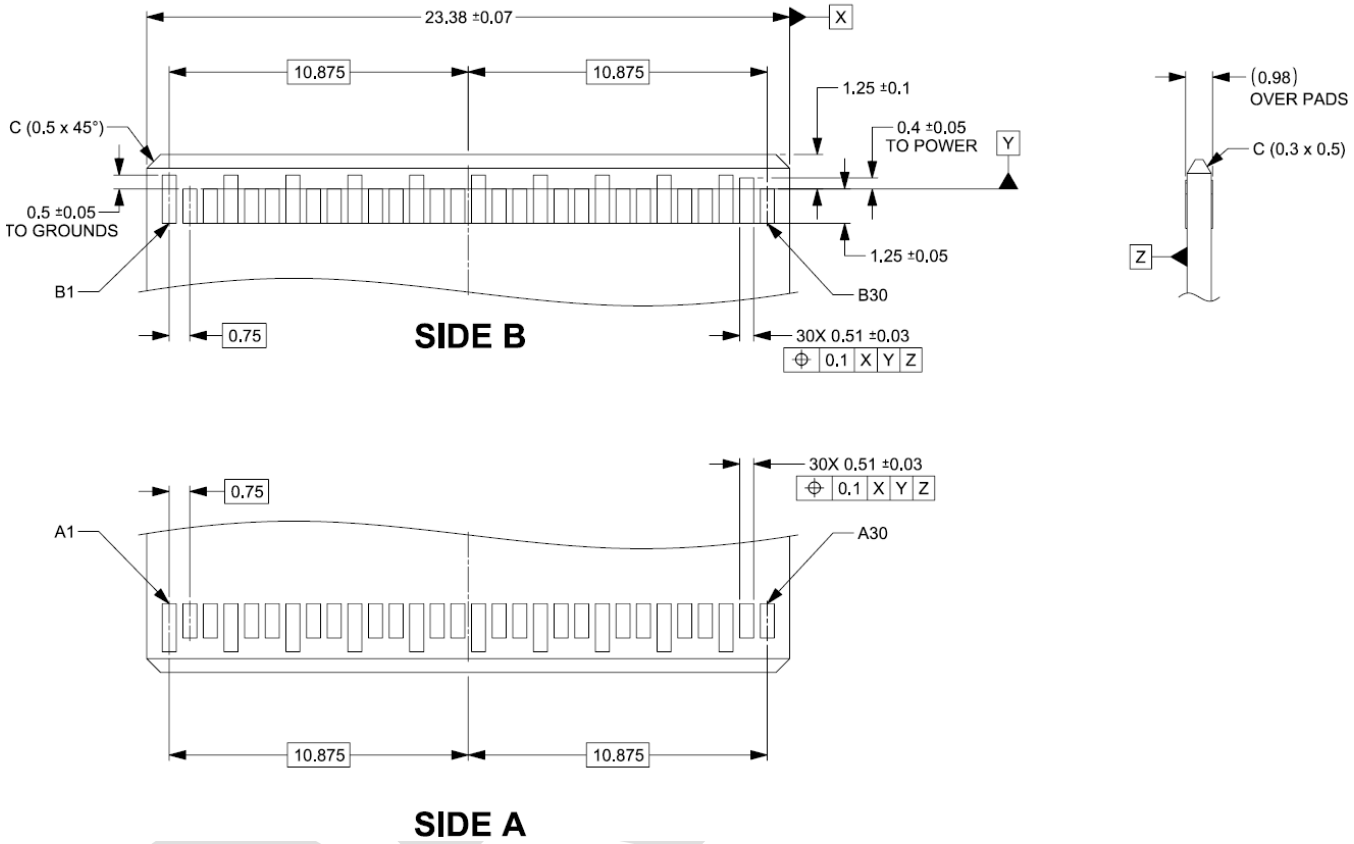


Figure 7-11 X16 Enhanced Lower Paddle Card

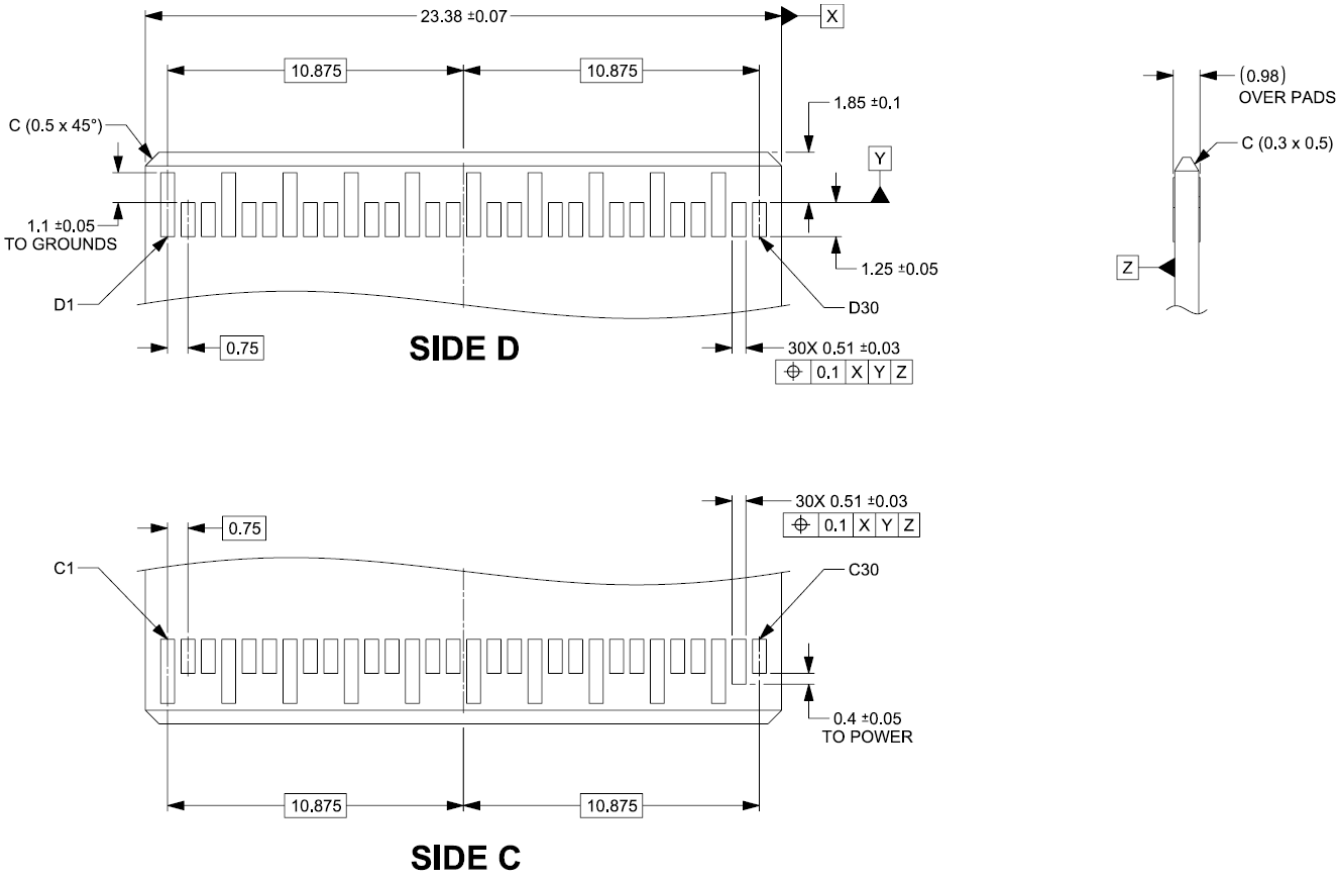


Figure 7-12 X16 Enhanced Upper Paddle Card

7.2.3 X8 Enhanced Module

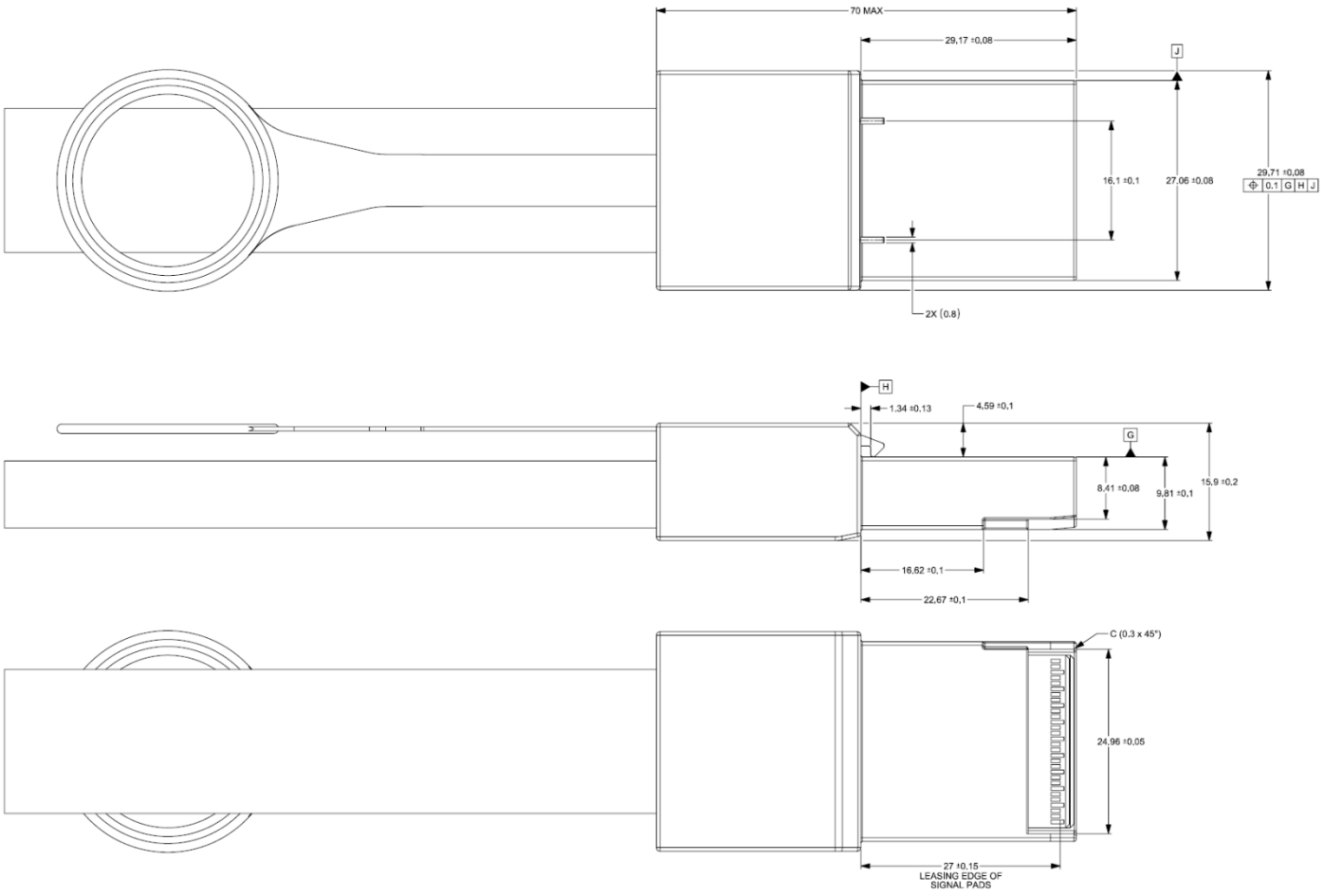


Figure 7-13 X8 Enhanced Module

7.2.4 X8 Enhanced Paddle Card Edge

There are two module paddle cards as defined below. The pads are designed for a sequenced mating: first mate – ground pads, second mate – power pads, third mate – signal pads.

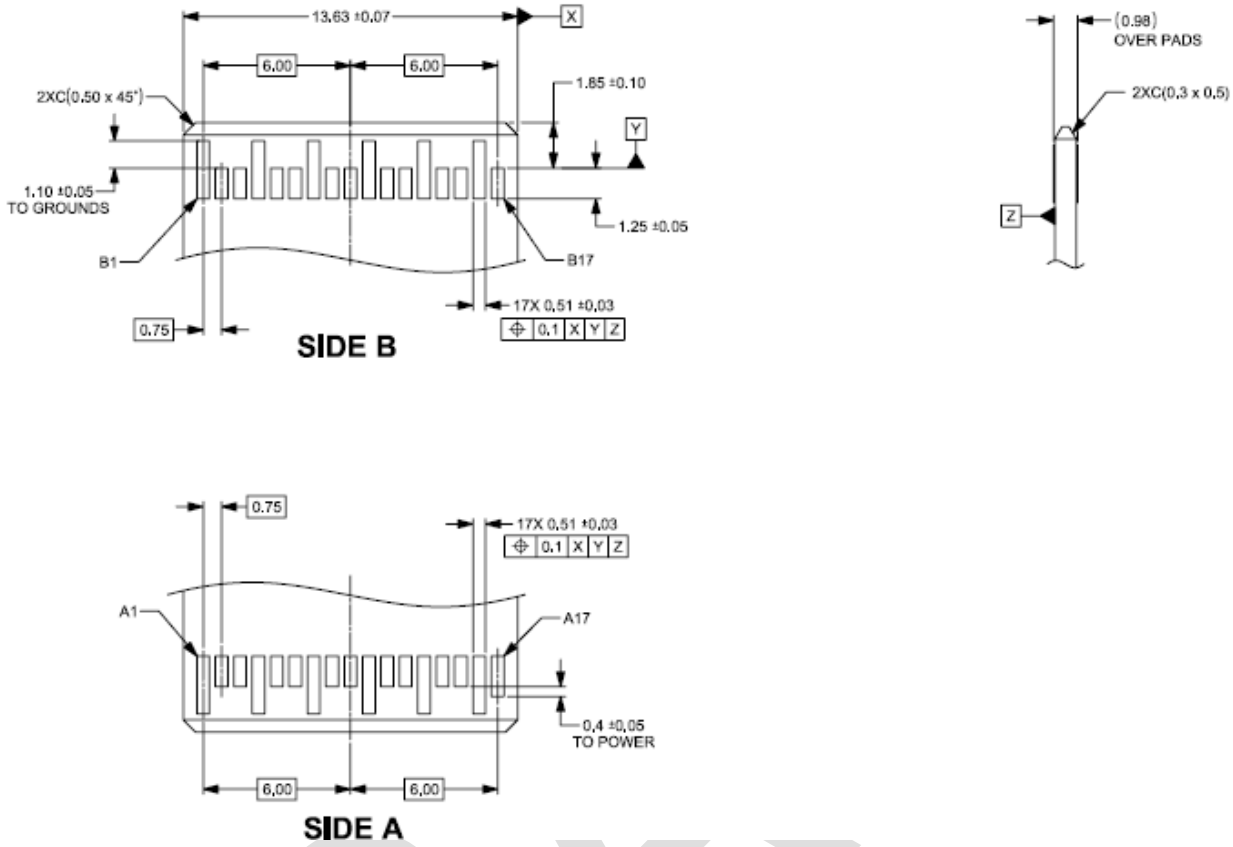


Figure 7-14 X8 Enhanced Lower Paddle Card

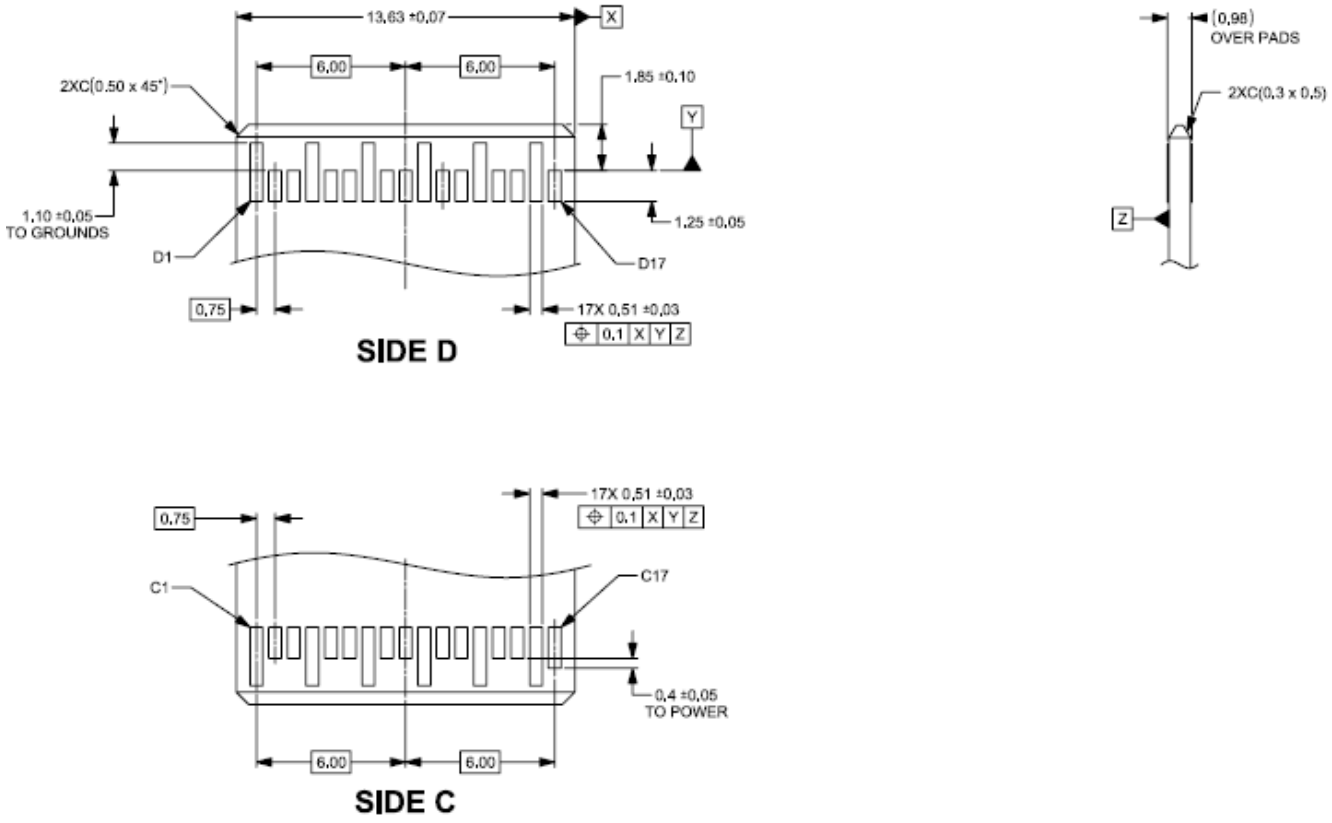
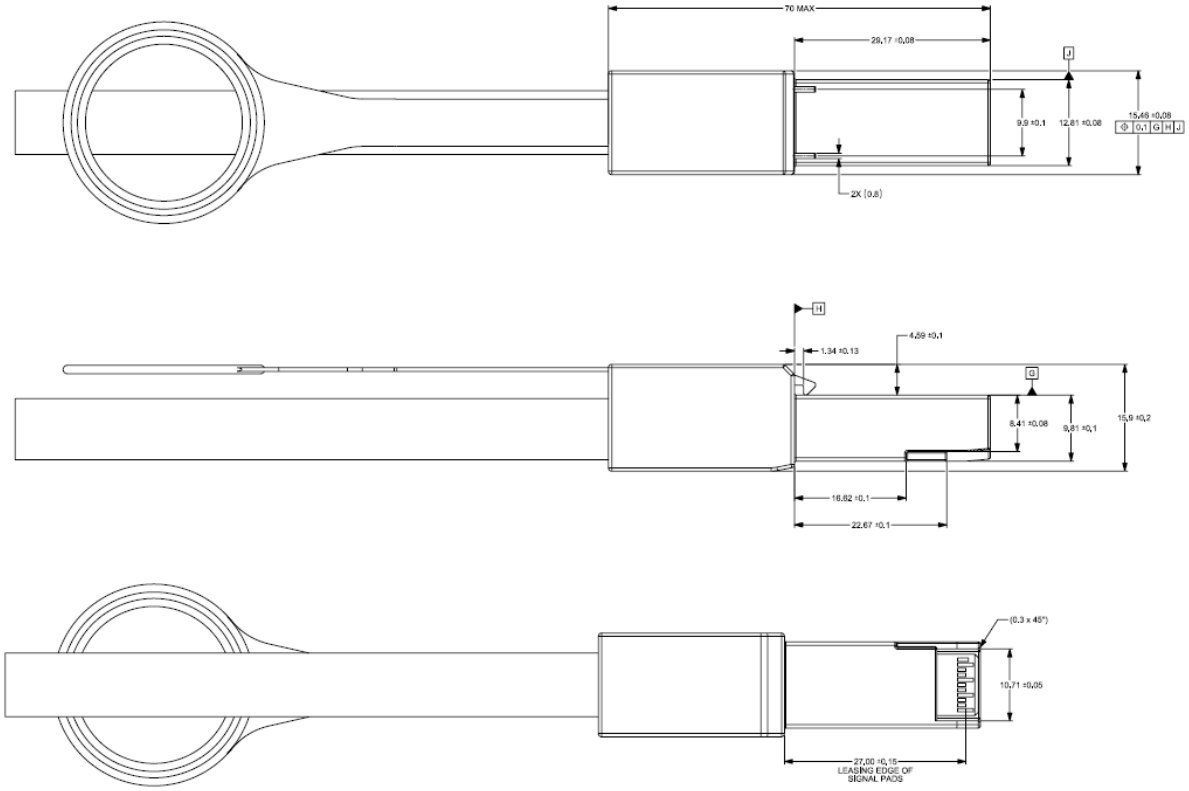


Figure 7-15 X8 Enhanced Upper Paddle card

7.2.5 X4 Enhanced Module



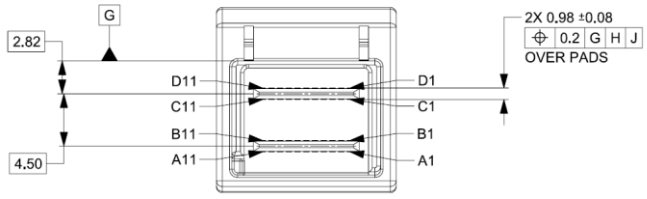


Figure 7-16 X4 Enhanced Module

7.2.6 X4 Enhanced Paddle Card Edge

There are two module paddle cards as defined below. The pads are designed for a sequenced mating: first mate – ground pads, second mate – power pads, third mate – signal pads.

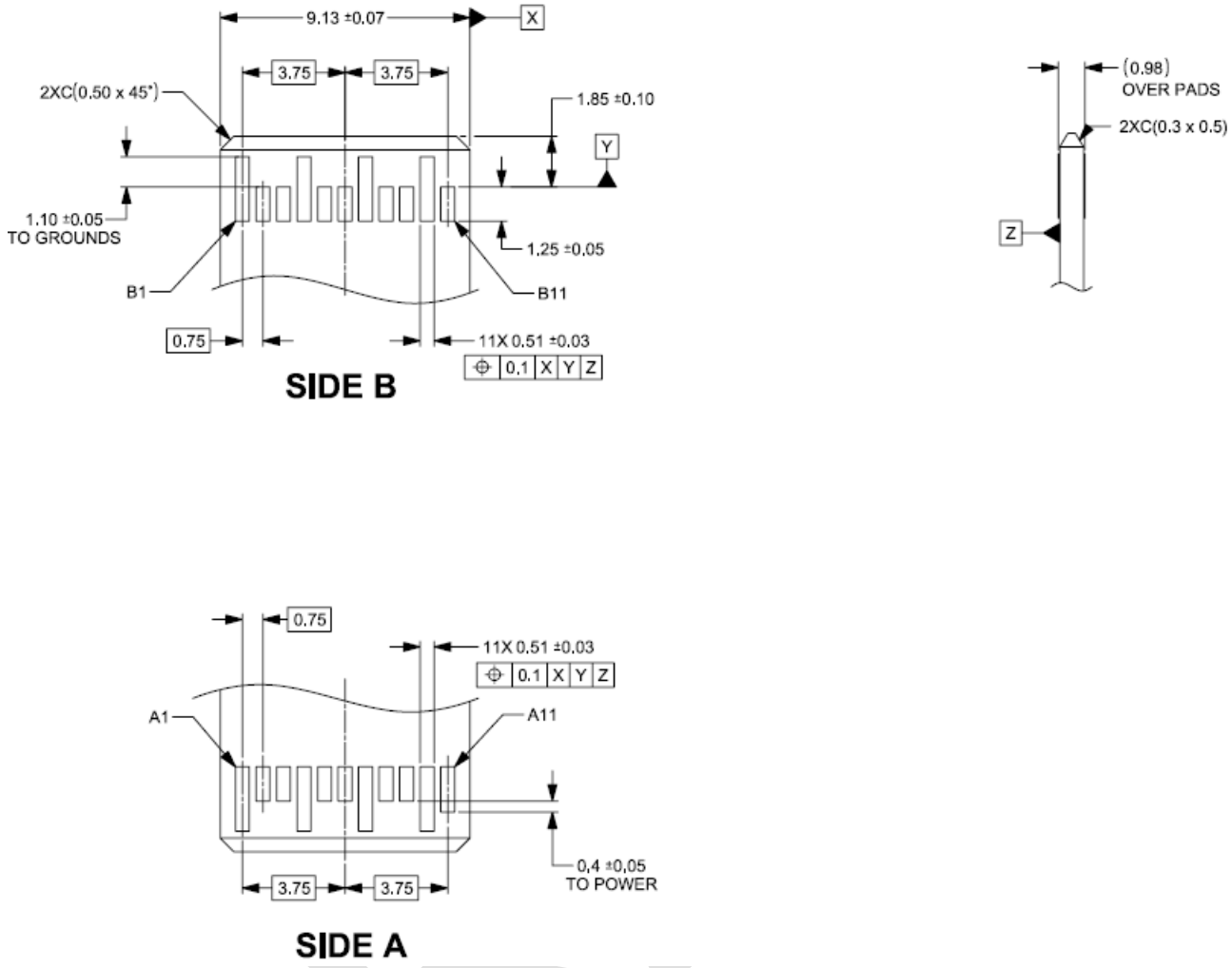


Figure 7-17 X4 Enhanced Lower Paddle Card

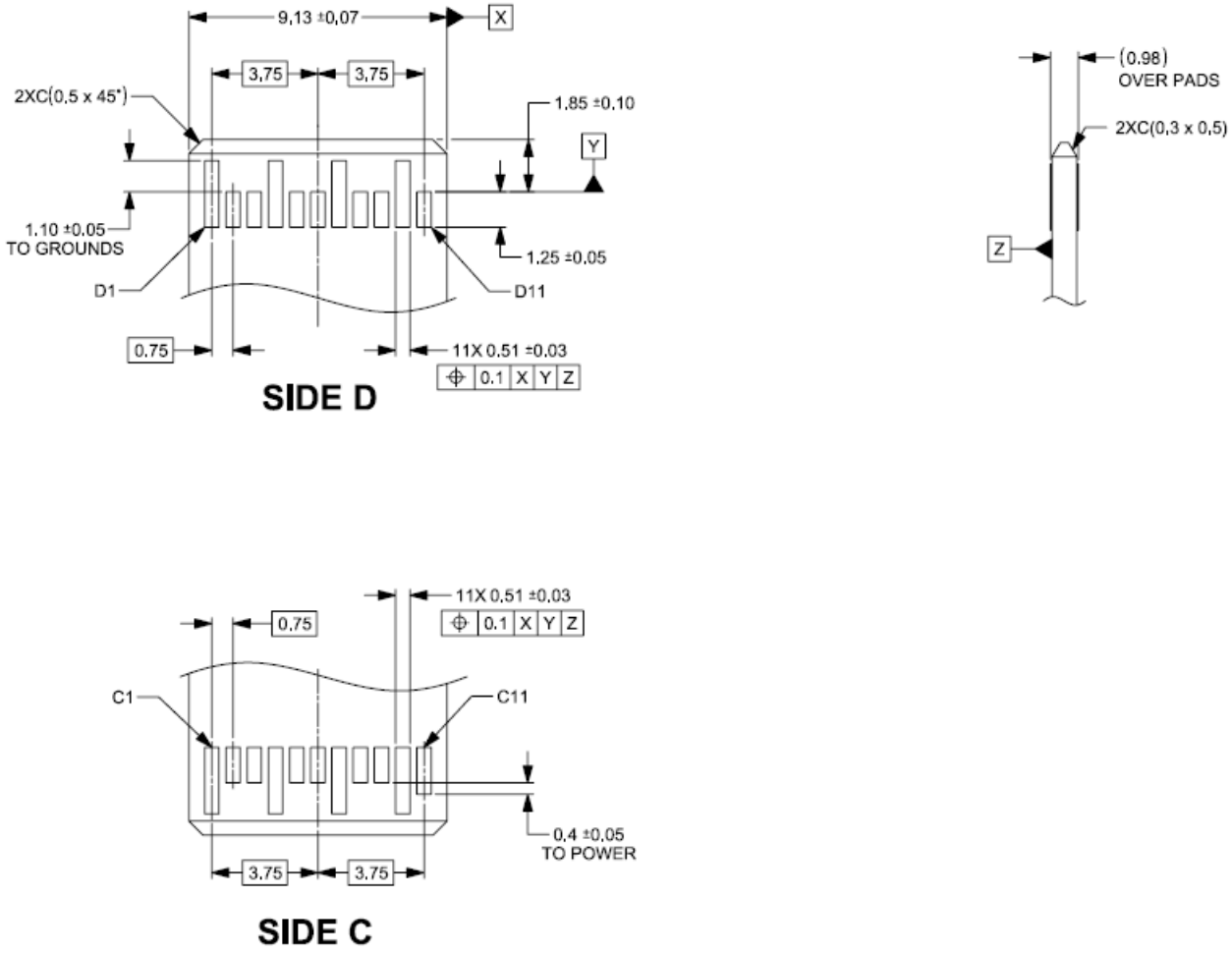


Figure 7-18 X4 Enhanced Upper Paddle Card

8. Test Requirements and Methodologies (TS-1000, etc.)

8.1 Performance Tables

EIA-364-1000 (TS-1000) shall be used to define the test sequences and procedures for evaluating the connector system described in this document. Where multiple test options are available, the manufacturer shall select the appropriate option where not previously specified. The selected procedure should be noted when reporting data. If there are conflicting requirements or test procedures between EIA-364 procedures and those contained within this document, this document shall be considered the prevailing authority.

Unless otherwise specified, procedures for sample size, data, and collection to be followed as specified in EIA-364-1000. See EIA-364-1000 Annex B for objectives of tests and test groups.

Table 8-1 summarizes the performance criteria that are to be satisfied by the connector described in this document. Most performance criteria are validated by EIA-364-1000 testing, but this test suite leaves some test details to be determined. To ensure that testing is repeatable, these details are identified in Table 8-2. Finally, testing procedures used to validate any performance criteria not included in EIA-364-1000 are provided in Table 8-3.

Table 8-1 Form Factor Performance Requirements

Performance Parameters	Description/ Details	Requirement
Mechanical/ Physical Requirements		
Plating Type	Plating type on connector contacts	Precious
Surface Treatment	Surface treatment on connector contacts	Manufacturer to specify
Wipe length	Designed distance a contact traverses over a mating contact surface during mating and resting at a final position	Manufacturer to specify
Rated Durability Cycles	The expected number of durability cycles a component is expected to encounter over the course of its life	Connector/ cage: 100 cycles Module: 25 cycles
Mating Force*	Amount of force needed to mate a module with a connector when latches are activated	40 N MAX
Unlatched Unmating Force*	Amount of forced needed to separate a module from a connector when latches are deactivated	30 N
Latch Retention*	Amount of force the latching mechanism can withstand	100 N MIN
Environmental Requirements		
Field Life	The expected service life for a component	10 years
Field Temperature	The expected service temperature for a component	65°C
Environmental Requirements		
Current	Maximum current to which a single power pin is exposed in use	3.0A MAX**
Operating Rating Voltage	Maximum voltage to which a contact is exposed in use	29.9V DC per contact MAX
NOTE: Performance criteria denoted with stars (*) are not validated by EIA-364-1000 testing. Refer to **Table 8-3** for test procedures and pass/fail criteria. ** **Contact locations carrying power to be defined in specific application document (PCIe CopprLink for example).**		

Table 8-2 describes the details necessary to perform the tests described in the EIA-364-1000 test sequences. Testing shall be done in accordance with EIA-364-1000 and the test procedures it identifies in such a way that the parameters/ requirements defined in
Table 8-1 are met. Any information in this table supersedes EIA-364-1000.

Table 8-2 EIA-364-1000 Test Details

Test	Test Descriptions and Details	Pass/ Fail Criteria
Mechanical/ Physical Tests		
Durability (preconditioning)	EIA-364-09 To be tested with connector, cage, and module (Latches should be locked)	No evidence of physical damage
Durability (see Note 1)	EIA-364-09 To be tested with connector, cage, and module (Latches should be locked out per EIA-364-1000)	No visual damage to mating interface or latching mechanism
Environmental Tests		
Mixed Flowing Gas (see Note 2)	EIA-364-65 Class IIA See Table 4.1 in EIA-364-1000 for exposure times Test option Per EIA-364-1000: 1A, 1B, 2, 3 or 4	No intermediate test criteria
Electrical Tests		
Low Level Contact Resistance (see Note 3)	EIA-364-23 20 mV DC MAX, 100 mA MAX To include wire termination or connector-to-board termination	20 mΩ MAX change from baseline
Dielectric Withstanding Voltage	EIA-364-20 Condition I 300 VAC minimum for 1 minute Applied voltage may be product / application specific	No defect or breakdown between adjacent contacts -AND- 1 mA Max Leakage Current
NOTES: 1. If the durability requirement on the connector is greater than that of the module, modules may be replaced after their specified durability rating. 2. Test option, temperature, duration must be reported. 3. The first low level contact resistance reading in each test sequence is used to determine a baseline measurement. Subsequent measurements in each sequence are measured against this baseline.		

Table 8-3 describes the testing procedures necessary to validate performance criteria not validated by EIA-364-1000 testing. The tests are to be performed in such a way that the parameters/ requirements defined in Table 8-1 are met.

Table 8-3 Additional Test Procedures

Test	Test Descriptions and Details	Pass/ Fail Criteria
Mechanical/ Physical Tests		
Mating Force	EIA-364-13 To be tested with cage, connector, and module without heat sinks	Refer to Table 8-1 -AND- No physical damage to any components
Unlatched Unmating Force	EIA-364-13 To be tested with cage, connector, and module without heat sinks Latching mechanism deactivated (locked out)	
Latch Retention	EIA-364-13 To be tested with cage, connector, and module without heat sinks Latching mechanism engaged (not locked out)	
Environmental Tests		
Storage Temperature	EIA-364-32 Method A, Test Condition 1, Duration 4 Use min and max Field Temperatures listed in Table 8-1 for temperature range	Refer to Table 8-1
Storage Humidity	EIA-364-31	Refer to Table 8-1
Electrical Tests		
Current	EIA-364-70 Method 3, 30C temperature rise Single contact energized.	Refer to Table 8-1 for current magnitude

Appendix A. Bezel Panel Cut-out Recommendations (Informative)

A.1. X16 Bezel Panel Cut-Out

The recommended Bezel Panel Cut-out for the X16 connector is shown in Figure A- 1.

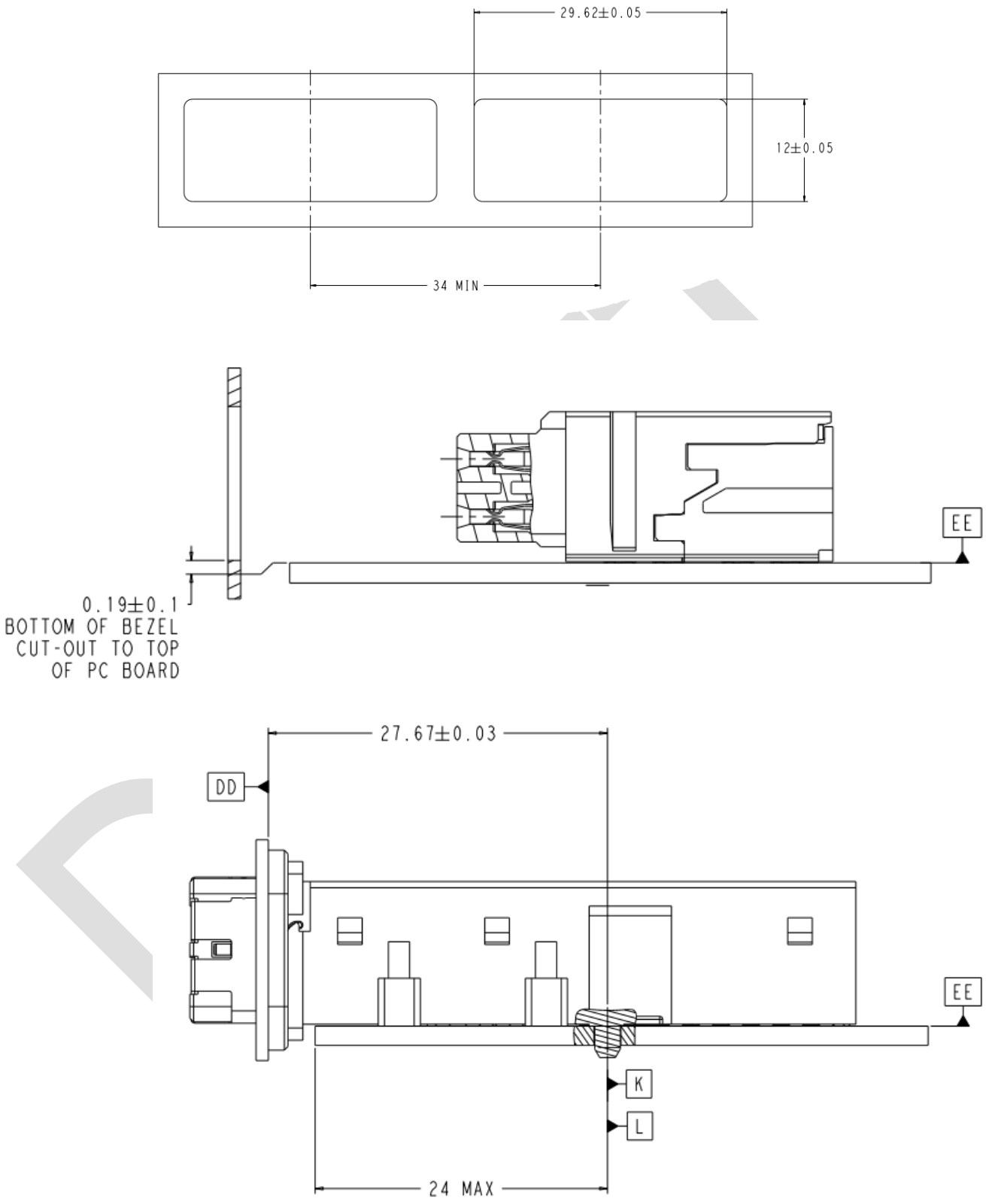


Figure A- 1 Through-Hole Bezel Cut-out, X16

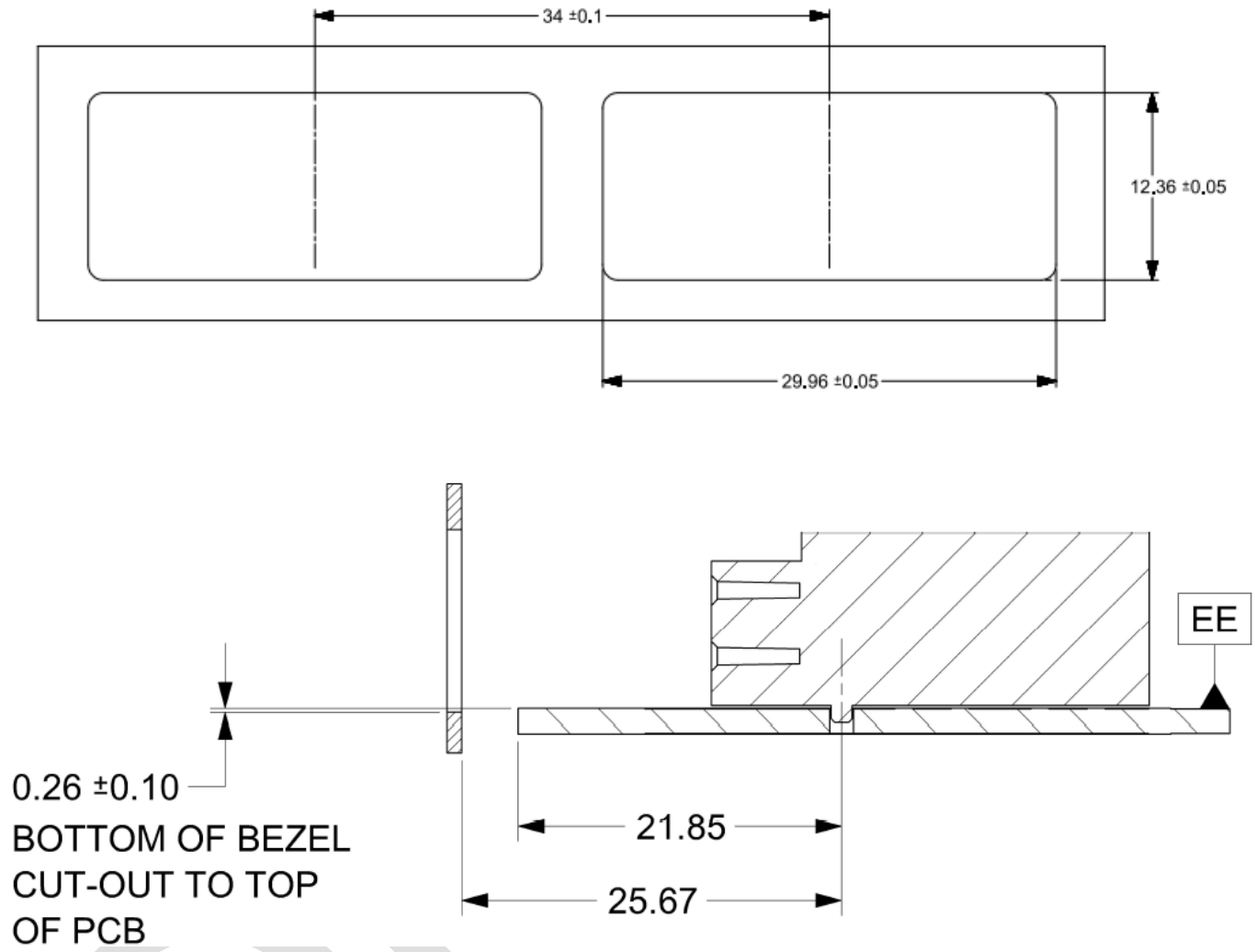


Figure A- 2 Surface Mount Bezel Cut-out, X16

A.2. X8 Bezel Panel Cut-out

The recommended Bezel Panel Cut-out for the X8 connector is shown in Figure A- 3.

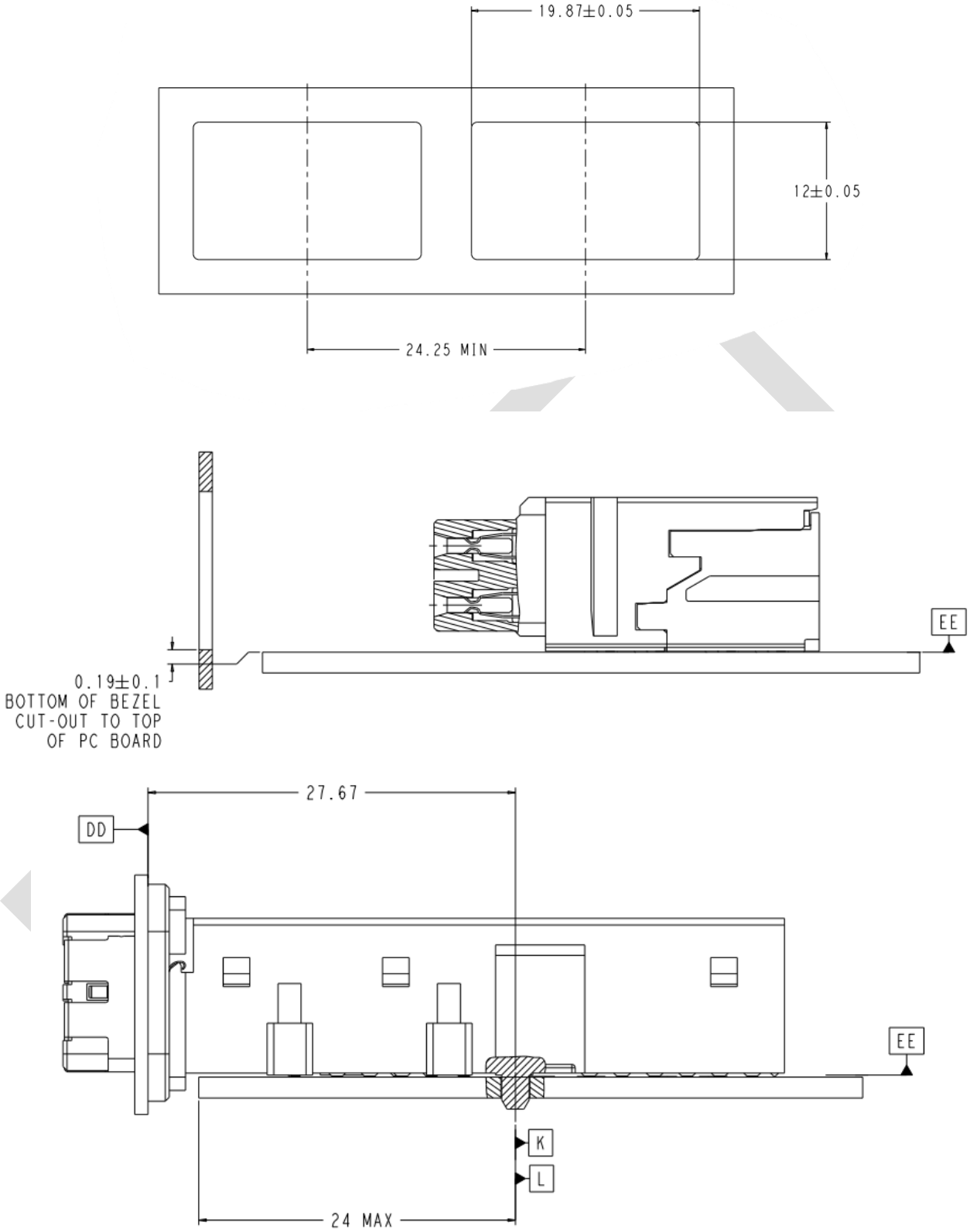


Figure A- 3 Through-Hole Bezel Cutout X8

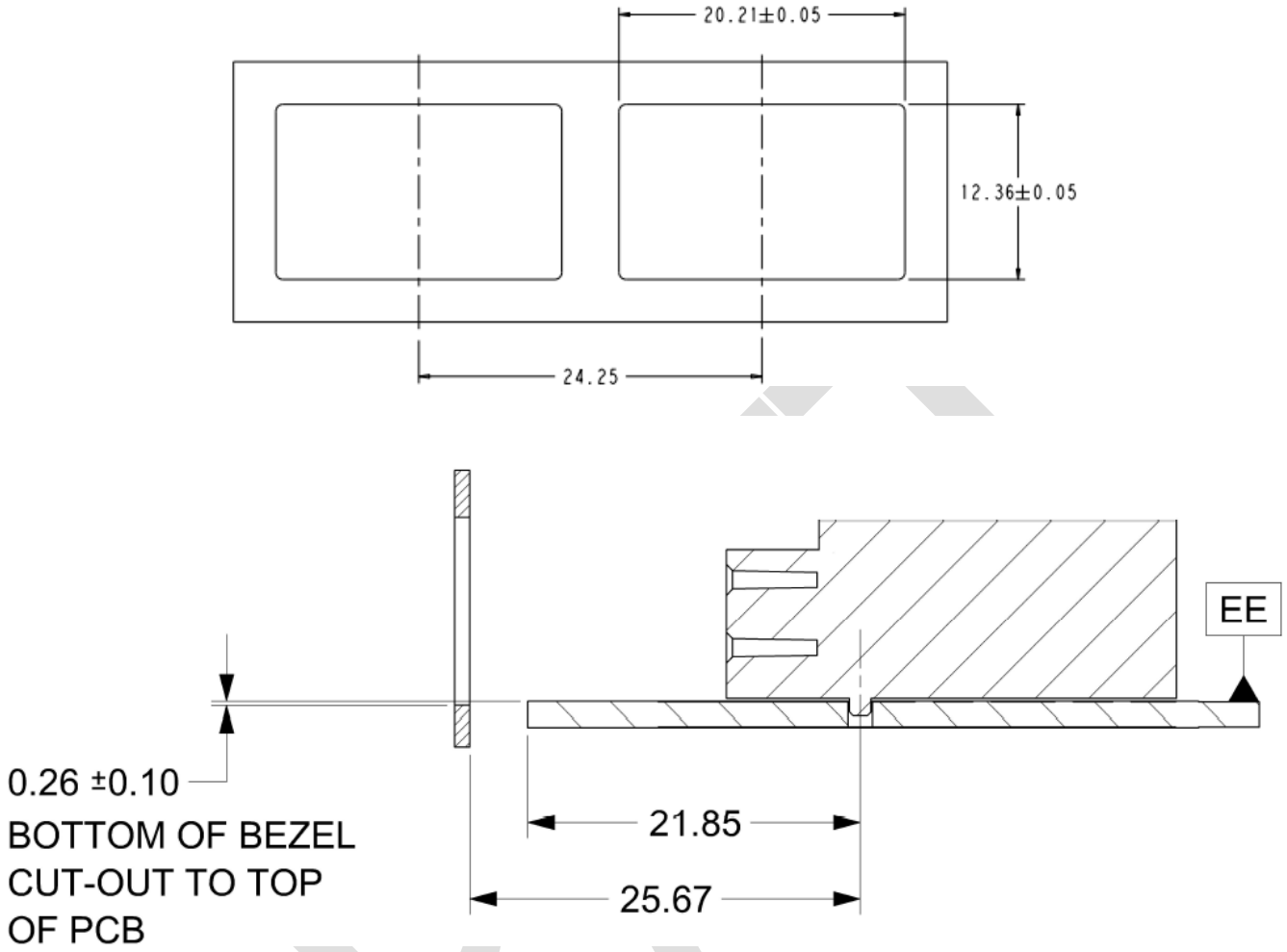


Figure A- 4 Surface Mount Bezel Cutout, X8

A.3. X4 Bezel Panel Cut-out

The recommended Bezel Panel Cut-out for the X8 connector is shown in Figure A- 5.

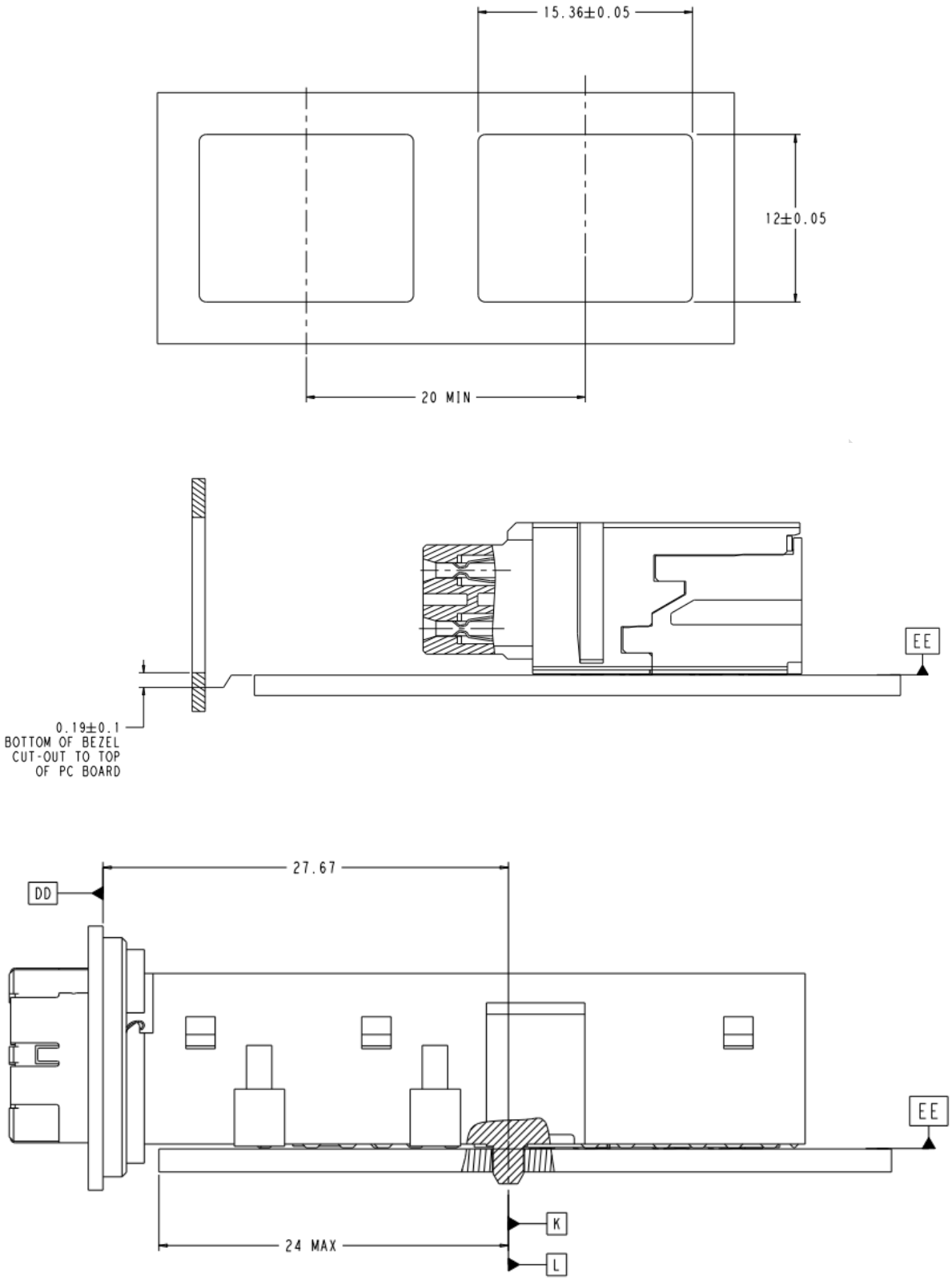


Figure A- 5 Through-Hole Bezel Panel Cut-out, X4

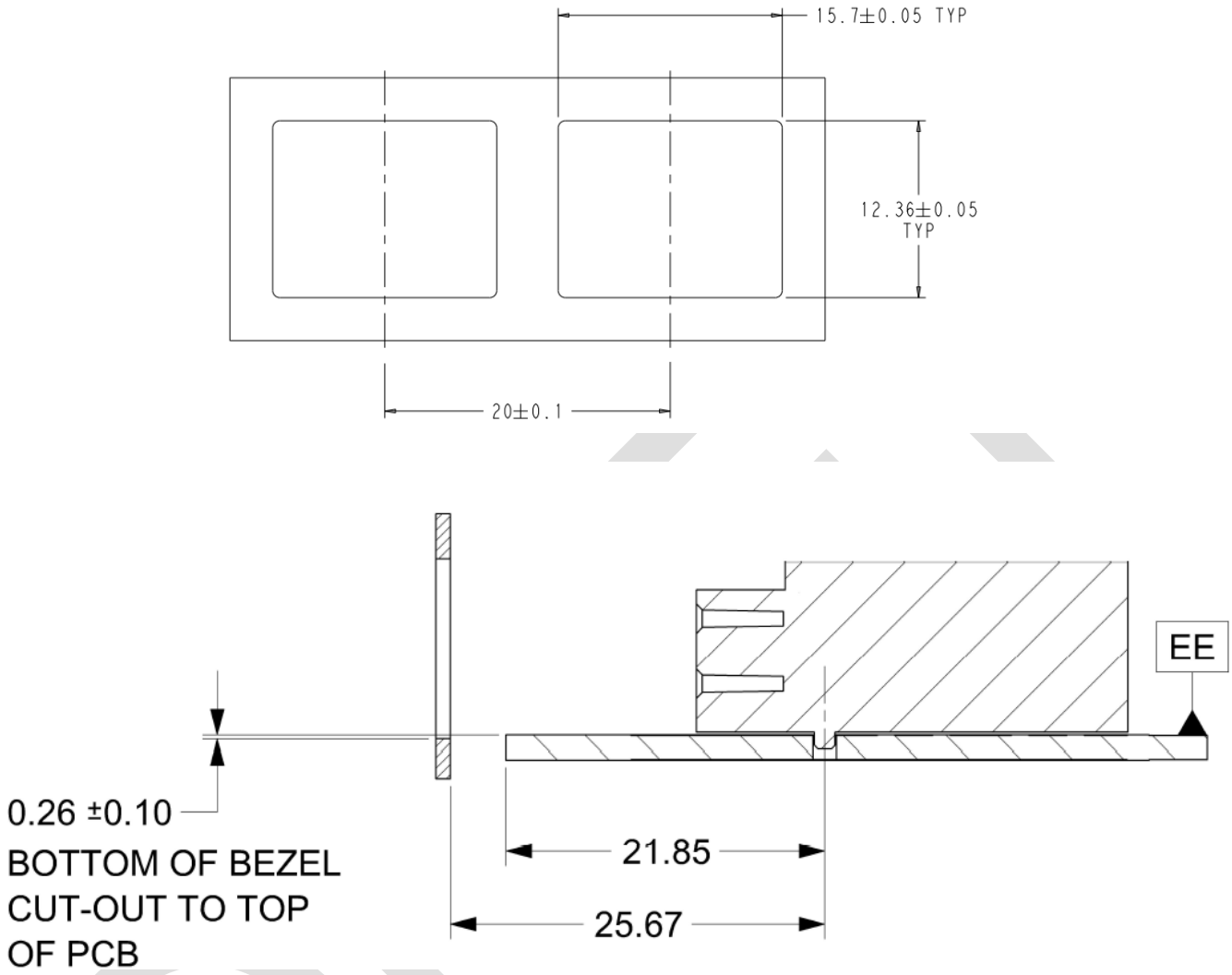


Figure A- 6 Surface Mount Bezel Panel Cutout, X4