

**NOTE**



All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance of  $\pm 0.13$  and angles have a tolerance of  $\pm 2^\circ$ . Figures and illustrations are for identification only and are not drawn to scale.

**1. INTRODUCTION**

This specification covers the requirements for application of the Fortis Zd pc board connector system used in the aerospace and defense industry. The connector system provides an electrical connection between two perpendicular pc boards using a modular concept.

When corresponding with personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of this product are provided in Figure 1.

**Vertical Receptacle**

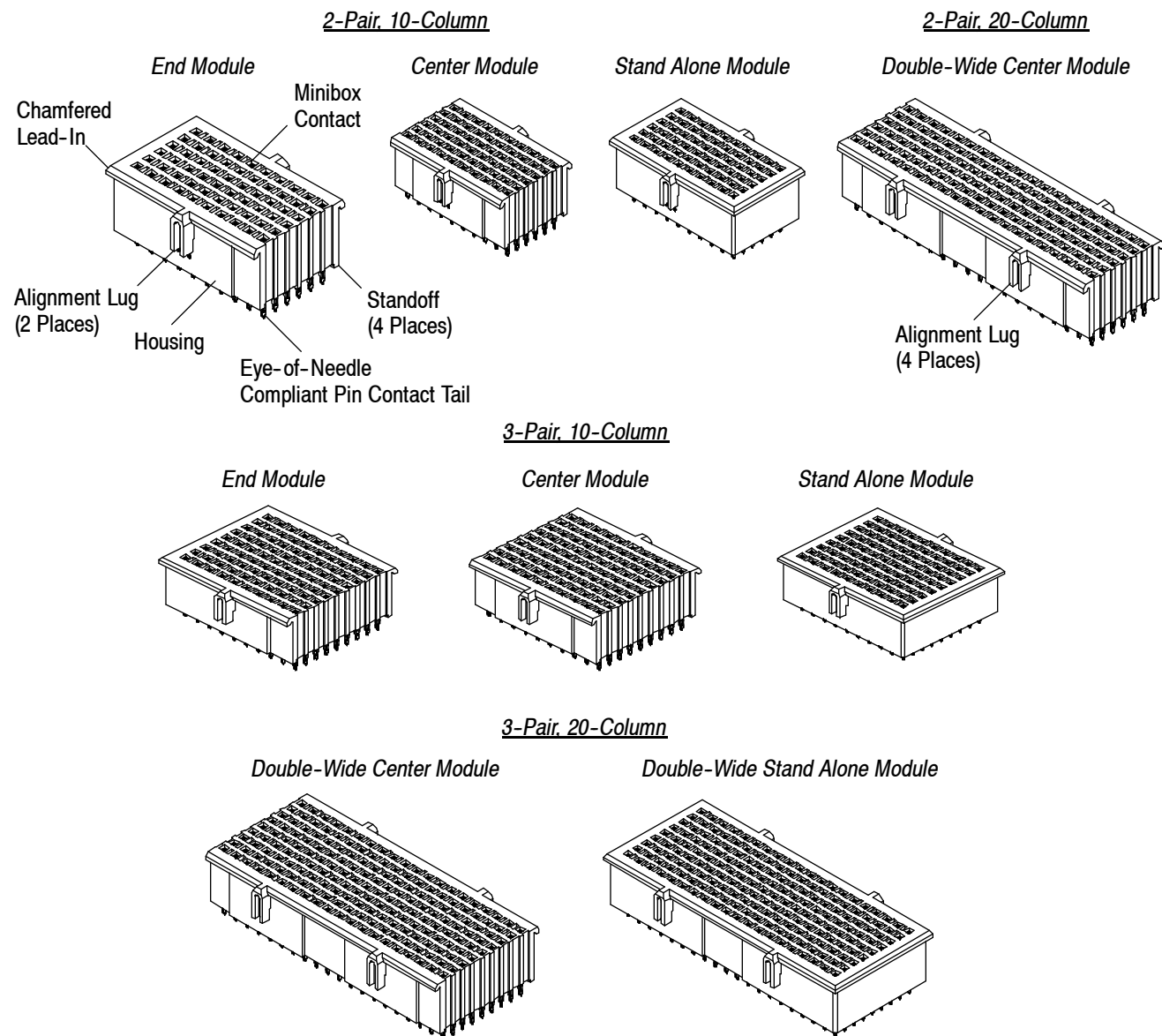
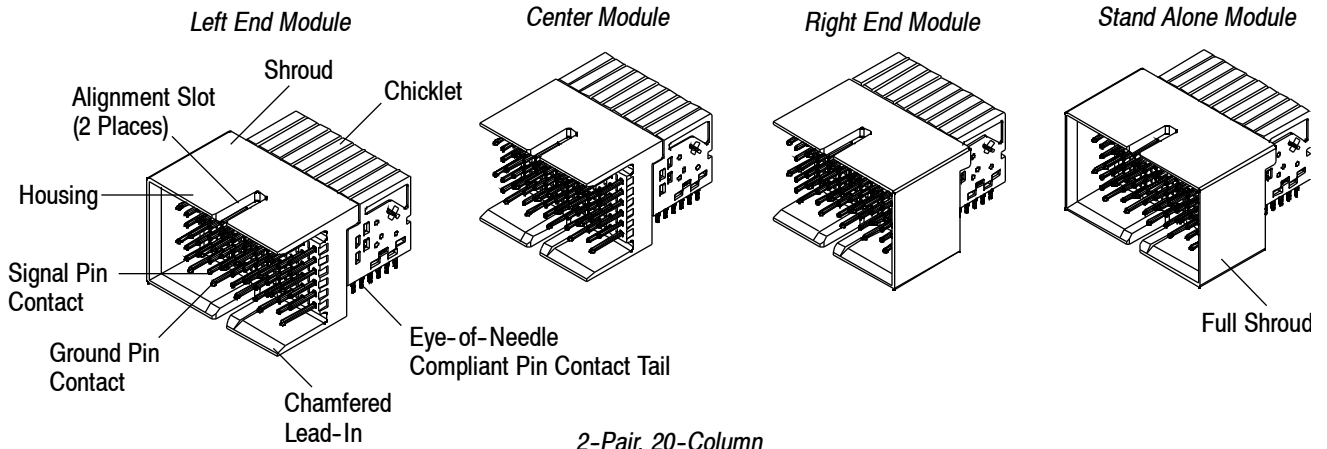


Figure 1 (Cont'd)

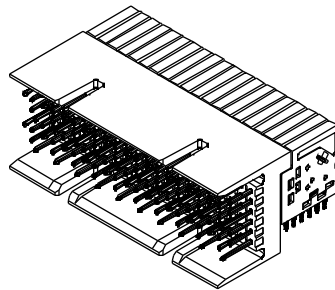
**Right-Angle Header**

2-Pair, 10-Column

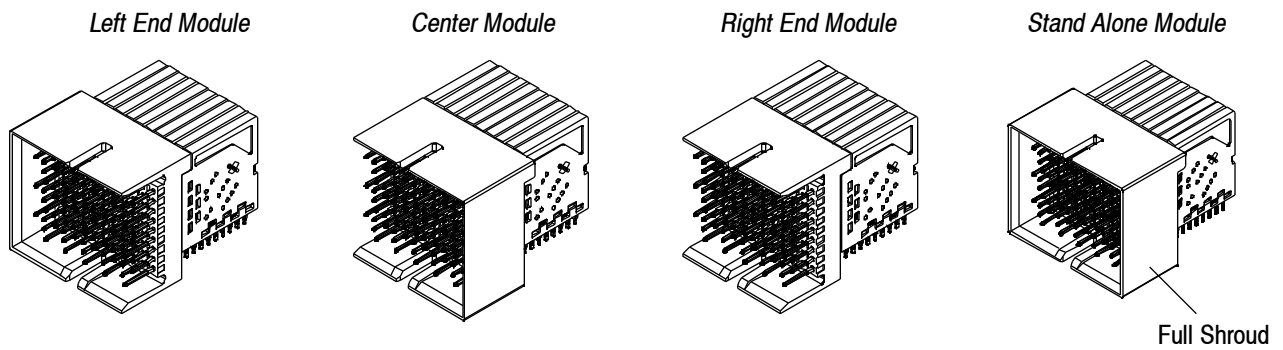


2-Pair, 20-Column

*Double-Wide Center Module*



3-Pair, 10-Column



3-Pair, 20-Column

*Double-Wide Center Module*

*Double-Wide Stand Alone Module*

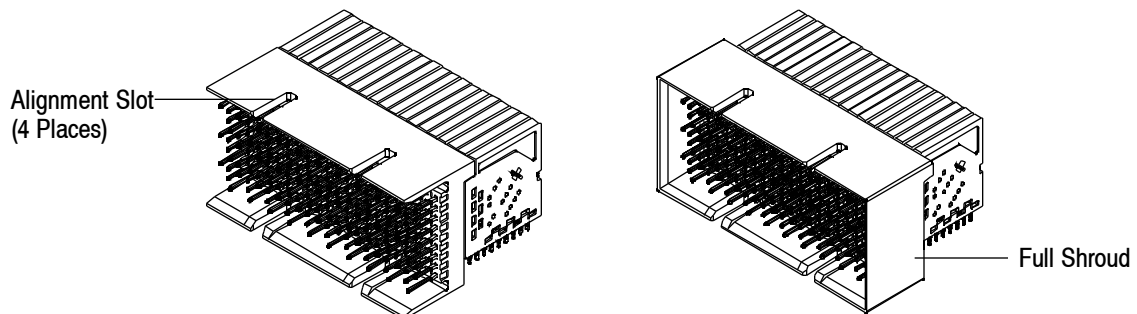


Figure 1 (End)

The connector system consists of a vertical receptacle (motherboard) and a right-angle header (daughter card) consisting of a configuration of end modules, center modules, stand alone modules, double-wide center modules, and double-wide stand alone modules. The stand alone modules have full shrouds. Each module contains signal and ground eye-of-needle compliant pin (press-fit) contacts.

The receptacle module has 10 (end and center) or 20 (double-wide center) columns and 9 rows of contacts. The header modules have 10 (left, right, and center) or 20 (double-wide center) chicklets with each containing 9 contacts. Both are available in 2 or 3 pairs.

For initial alignment during mating, the chamfered lead-in around the edges of the mating side of the header modules captures and guides the mating side of the receptacle module. Alignment lugs and alignment slots are molded onto the ends of the modules to provide blind mating. Universal and keyed guide hardware are available for proper mating and allow up to  $\pm 3.0$  offset for blind mating. The guide hardware consists of a guide pin and guide module. The connectors require 2 guide pins (for the receptacle) and 2 guide modules (for the header) and must be attached to the pc board. Refer to Figure 2.

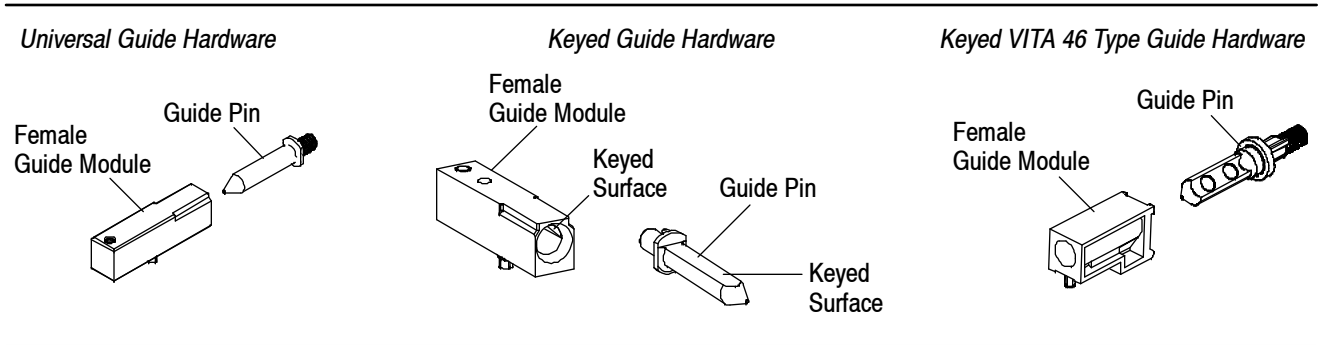


Figure 2

The modules can be seated on the pc board using manual application tooling.

The module profile size (pitch) is 25.4. The density, defined as a combination of the amount of columns and contacts per module, is provided in Figure 3.

MODULE TYPE	DENSITY				
	COLUMNS	2-PAIR MODULE		3-PAIR MODULE	
		Contacts	Differential Pairs	Contacts	Differential Pairs
End, Center, Stand Alone	10	60	20	90	30
Double-Wide Center, Double-Wide Stand Alone	20	120	40	180	60

Figure 3

### 1.1. Contact Length

Length of the contacts is given in Figure 4.

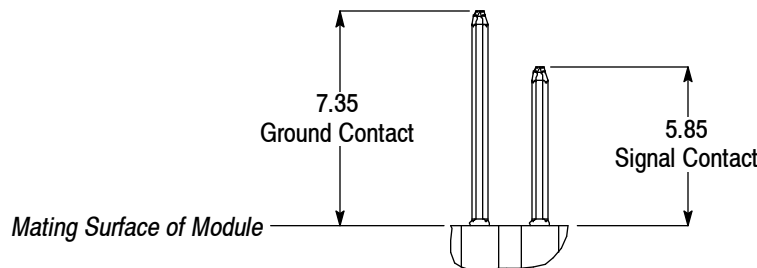


Figure 4

## 1.2. Connector Configuration

The minimum and maximum amount of modules used in a configuration and possible connector configurations are shown in Figure 5. The configurations shown include guide hardware.

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

Revisions to this application specification include:

- Changed company logo
- Modified purpose of connector mating features and changed mating offset dimension in Section 1
- Added Paragraph 2.6
- Changed pressure to force and corrected unit of measure in Paragraph 3.6,B

### 2.2. Customer Assistance

Reference Product Base Part Number 200896 and Product Code L059 are representative of the Fortis Zd pc board connector system. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local Representative or, after purchase, by calling PRODUCT INFORMATION at the number at the bottom of page 1.

### 2.3. Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, the information contained in the Customer Drawings takes priority.

### 2.4. Specifications

Design Objective 108-2409 provides expected product performance and test information.

### 2.5. Instructional Material

Instruction Sheets (408-series) provide product assembly instructions or tooling setup and operation procedures and Customer Manuals (409-series) provide machine setup and operating procedures. There are no documents available that pertain to this product.

### 2.6. Standards and Publications

Standards and publications developed by the Institute of Electrical and Electronics Engineers (IEEE) provide industry test and performance requirements. Documents available which pertain to this product are:

IEC 60352-5, "Solderless Connections Part 5: Press-In Connections — General Requirements, Test Methods and Practical Guidance

## 3. REQUIREMENTS

### 3.1. Safety

Do not stack product shipping containers so high that the containers buckle or deform.

### 3.2. Storage

#### A. Shelf Life

The modules should remain in the shipping containers until ready for use to prevent deformation to the contacts. The modules should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

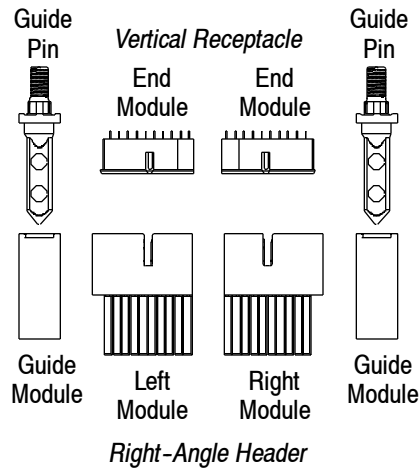
#### B. Chemical Exposure

Do not store modules near any chemical listed below as they may cause stress corrosion cracking in the contacts.

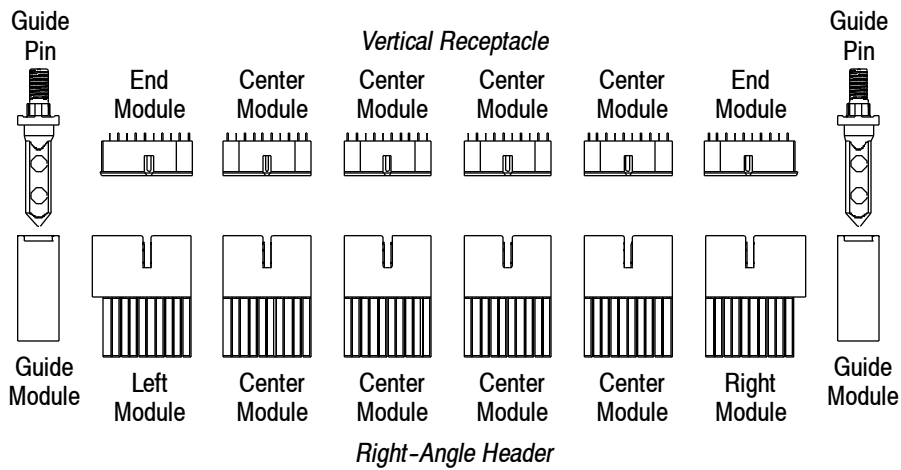
Alkalies	Ammonia	Citrates	Phosphates	Citrates	Sulfur Compounds
Amines	Carbonates	Nitrites	Sulfur	Nitrites	Tartrates

**Connector Configurations**

Minimum Amount of Modules



Recommended Maximum Amount of Modules  
(60 Columns)



Possible Amount of Modules

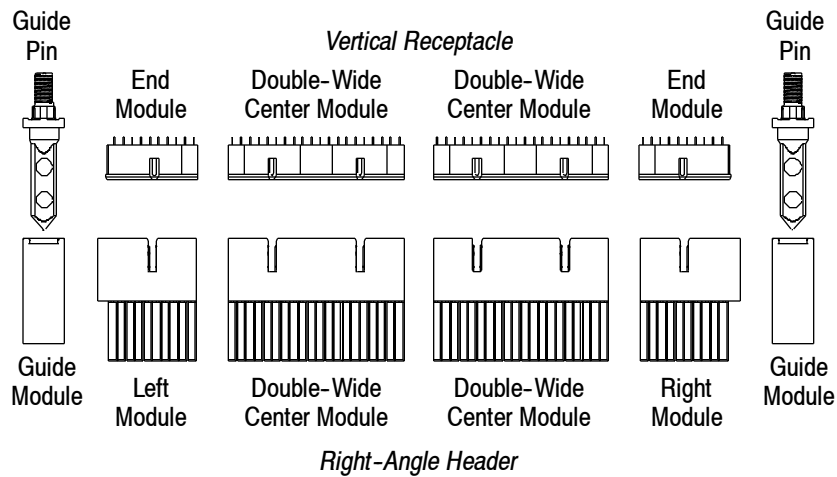


Figure 5 (Cont'd)

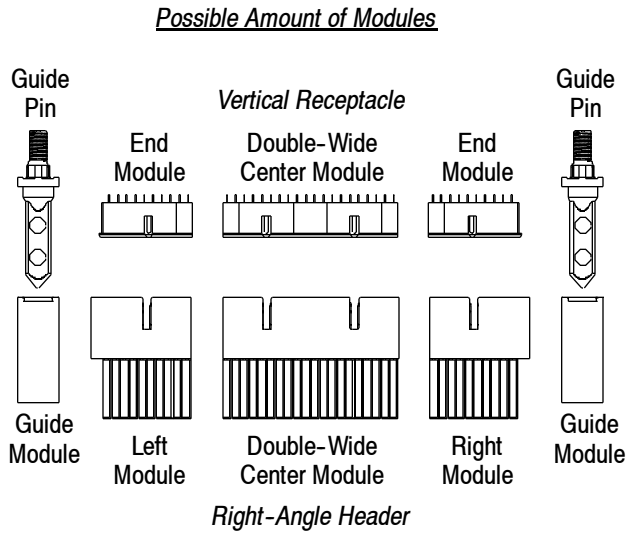
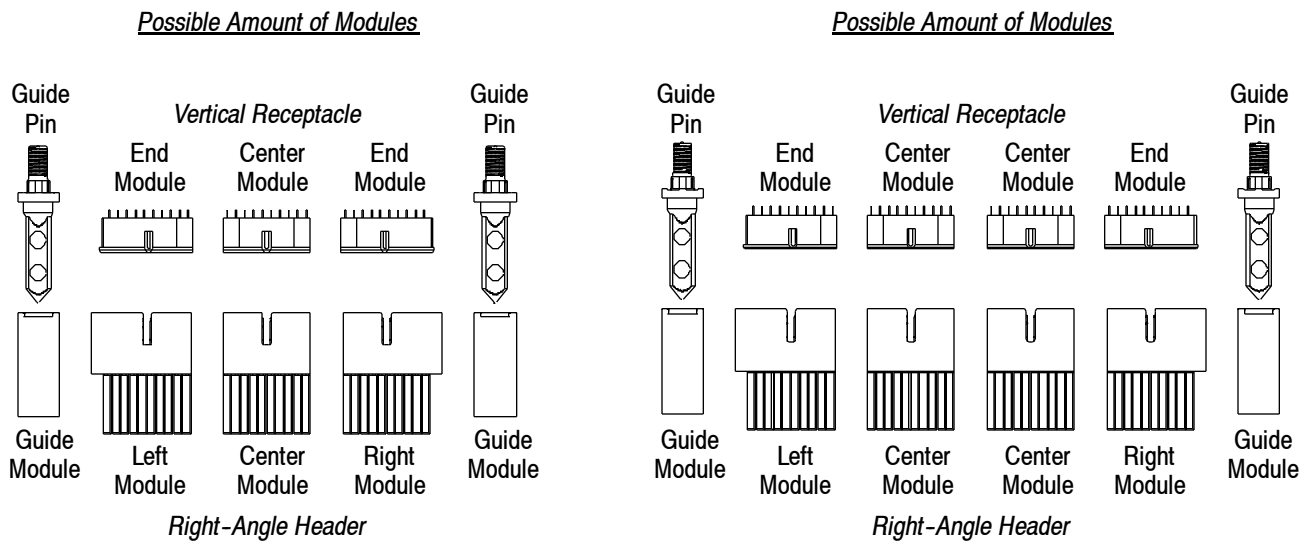


Figure 5 (End)

**3.3. Limitations**

The connector system is designed to operate in a temperature range of -65° to 125°C [-85° to 257°F].

**3.4. Material**

The module housing and chicklets are made of molded high temperature polyesters, rated UL 94V0. The header contacts are made of phosphor bronze, and the receptacle contacts are made of beryllium copper; both underplated with nickel and tin, tin-lead, or gold at the contact tails and plated with gold at the contact interface.

### 3.5. PC Board

#### A. Material and Thickness

The pc board material shall be glass epoxy (FR-4 or G-10). For single plane application, the pc board thickness shall be a minimum of 1.40. For mid plane application, the backplane thickness shall be a minimum of 3.8.

#### B. Tolerance

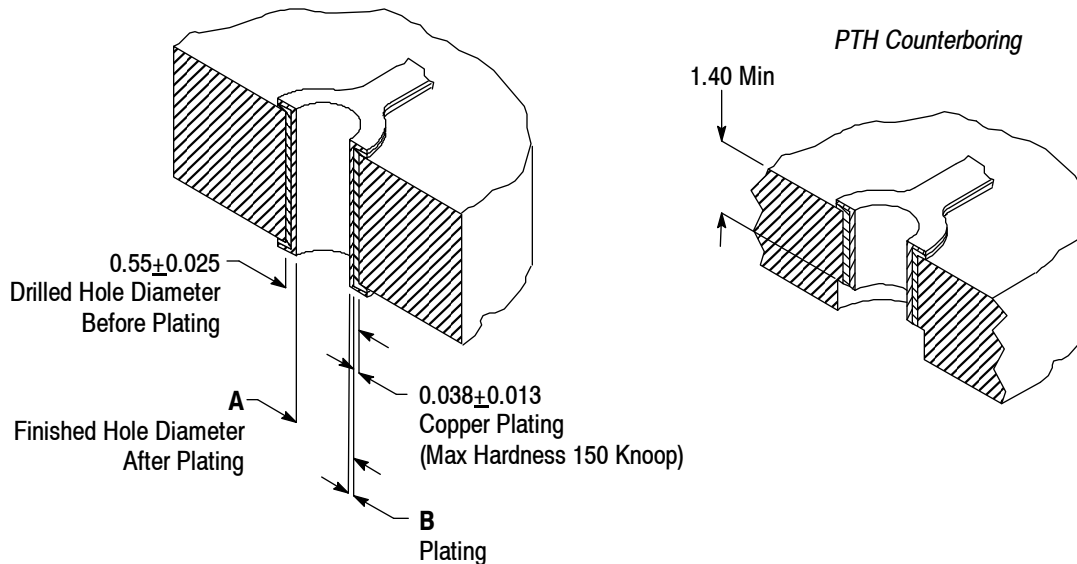
Maximum allowable bow of the pc board shall be 0.03 over the length of the connector.

#### C. Holes

The contact holes must be drilled and plated through to specific dimensions. The plating type and thickness and finished hole size must be as stated to provide unrestricted insertion of the contacts. See Figure 6.

Pc boards can be back-drilled (counterbored) for signal integrity performance using no more than the overall plating thickness dimension provided in Figure 6.

**PC Board Contact Hole Dimensions**



DIMENSION		
A	B	
	Surface Finish	Thickness Range
0.46	Tin-Lead (SnPb)	0.008±0.004
	Immersion Tin (Sn)	0.0005-0.004
0.47	Organic Solderability Preservative (OSP)	0.0002-0.0005
	Immersion Silver (Ag)	0.0003±0.0002
	Immersion Gold (Au) Over Nickel (Ni) (ENIG)	0.0001-0.0005 Au 0.00127-0.0026 Ni

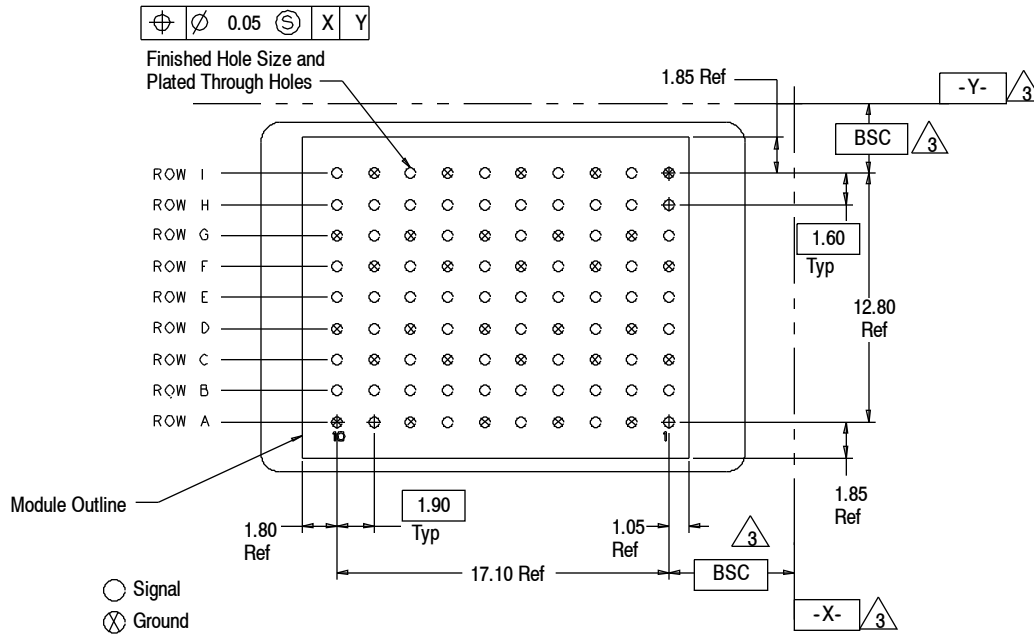
Figure 6

#### D. Layout

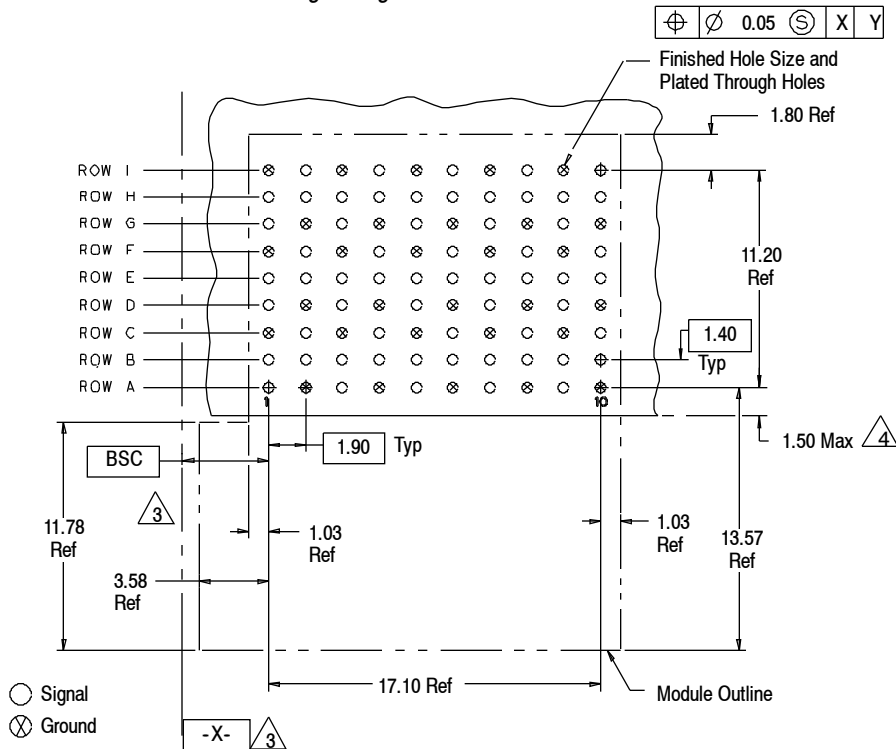
The holes in the pc board must be precisely located to ensure proper placement and optimum performance of the module. The pc board layout must be designed using the dimensions provided on the customer drawing for the specific module. Reference *sample* of the recommended pc board layouts are shown in Figure 7.

**Sample Recommended PC Board Layouts  
(Component Side Shown)**

*Vertical Receptacle End Module*



*Right-Angle Header End Module*



△3 Datums and Basic Dimensions Established by Customer

△4 Dimension Applies to Centerline of Through Hole

Figure 7



### 3.6. Placement

#### A. Modules

The module number one position must be aligned with the number one position board hole. When placing modules on the pc board, make sure that the contacts are aligned and started into the matching holes before seating the module onto the pc board.



*Modules should be handled only by the housing to avoid deformation, contamination, or damage to the contacts.*

The entire “eye” of each contact must be within the pc board hole. Depending on the thickness of the pc board, the contact tails may or may not protrude from the pc board.

#### B. Guide Hardware

The interaction of the guide pin and guide module provide error-free mating and prevents damage to the housings and contacts. The guide hardware is recommended for multi-connector, large and heavy daughter card applications, and conditions where misalignment tolerances given in Paragraph 3.10 cannot be met. See Figure 8.

Placement of the guide hardware onto the pc boards must be applied with tooling capable of supplying a downward force between 222 and 667 N [50 and 150 lb-force]. The guide hardware must be fully seated on the pc board. A customer-supplied screw must be used with the guide module.

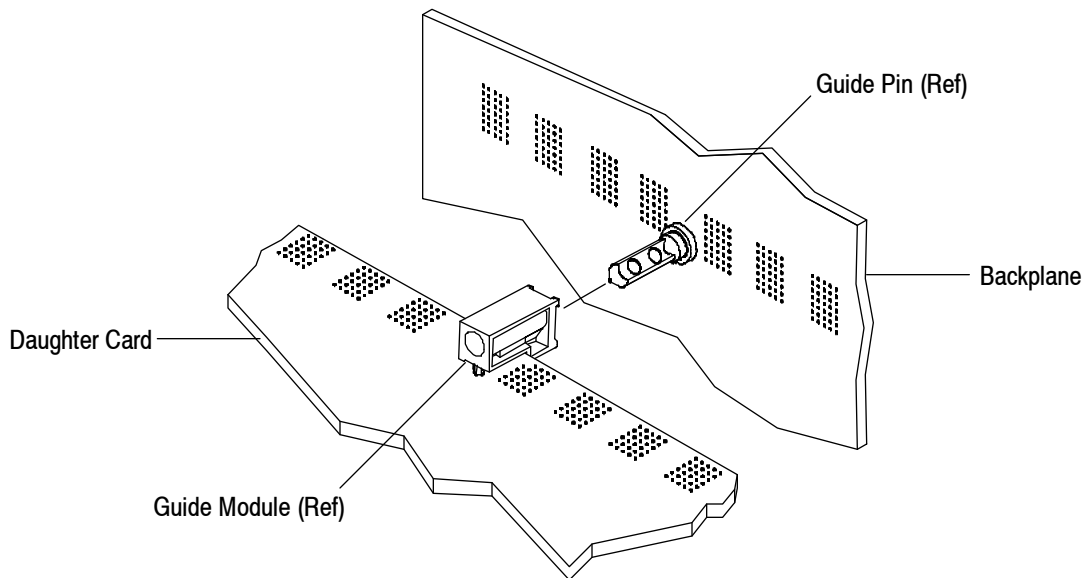
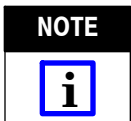


Figure 8

### 3.7. Spacing

#### A. Modules End-to-End

Care must be used to avoid interference between adjacent modules. The recommended minimum distance between modules to ensure proper mating is provided in Figure 9.



*The information provided is for manual placement of modules. If robotic equipment is used, other space allowances will be required for the grippers.*

When using these modules with other connectors or components, call PRODUCT INFORMATION at the number at the bottom of page 1 for recommended spacing.

**Recommended Module End-to-End Spacing  
(Component Side Shown)**

**Note:** Dimensions are for Reference Only

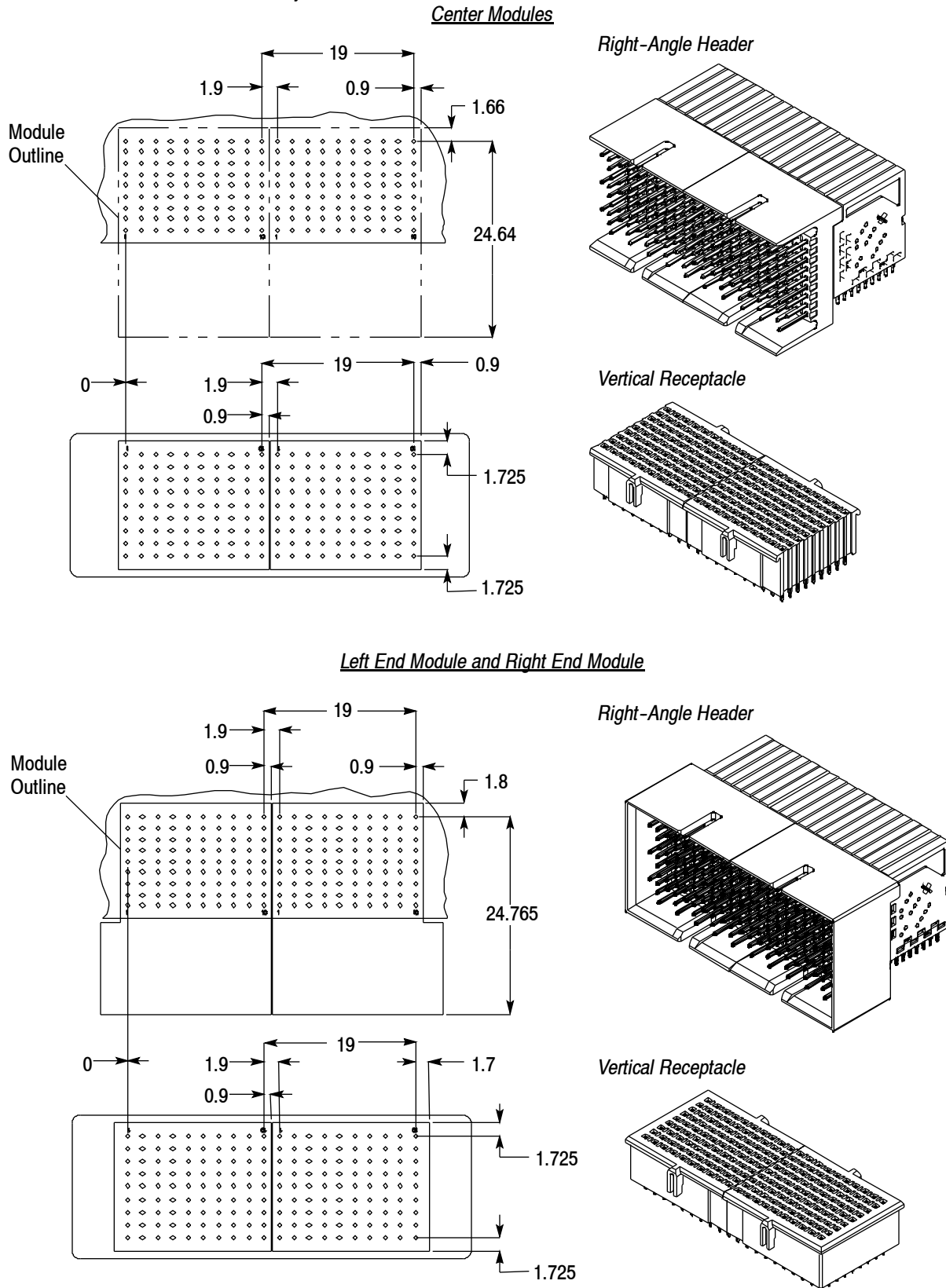
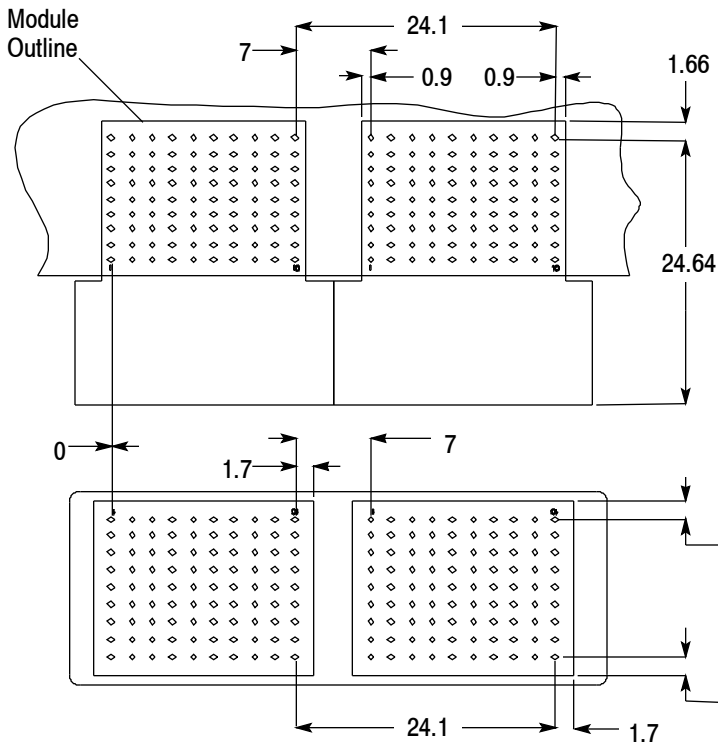


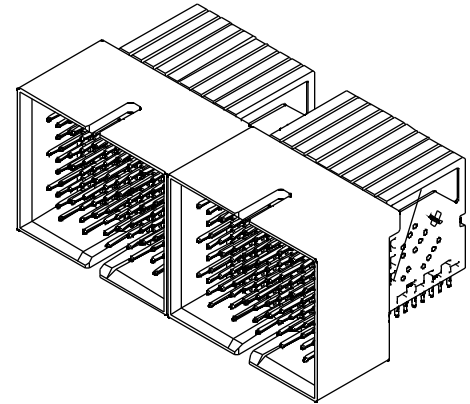
Figure 9 (Cont'd)

**Note:** Dimensions are for Reference Only

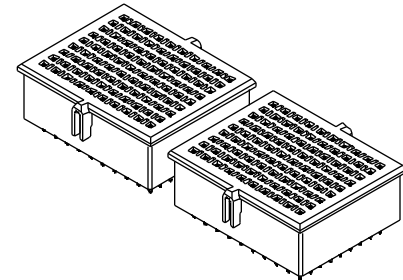
Full Shroud End Modules



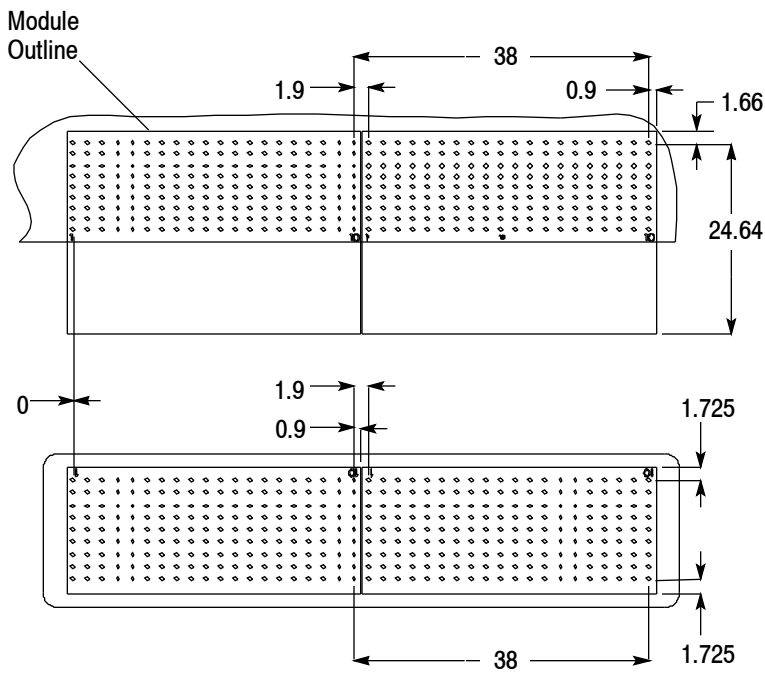
*Right-Angle Header*



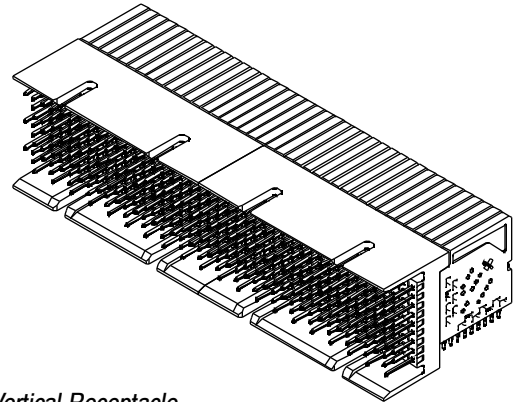
*Vertical Receptacle*



Double-Wide Center Modules



*Right-Angle Header*



*Vertical Receptacle*

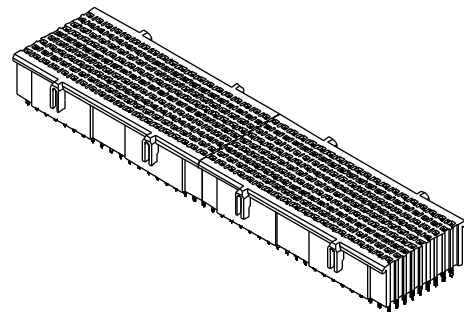
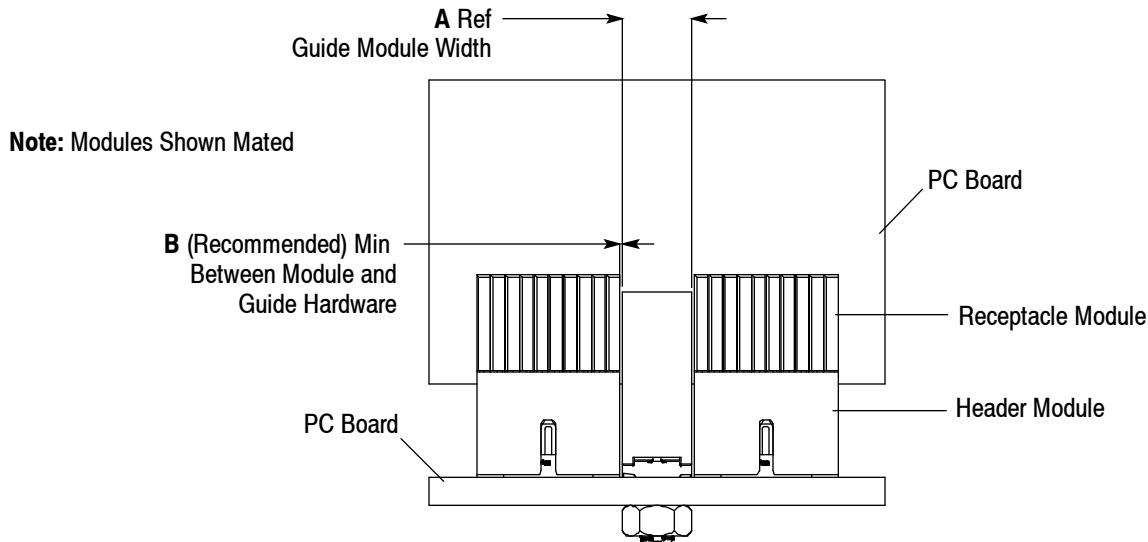


Figure 9 (End)

## B. Modules and Guide Hardware

The recommended minimum distance between the module and guide hardware is given in Figure 10.

### Recommended Module and Guide Hardware Spacing



GUIDE HARDWARE	DIMENSION	
	A	B
Universal and Keyed	7.9	0.5
Keyed VITA 46 Type	9.0	

Figure 10

### 3.8. Seating Modules

The module must be seated onto the pc board using the tooling described in Section 5. The maximum gap between the pc board and the module after seating is given in Figure 11.

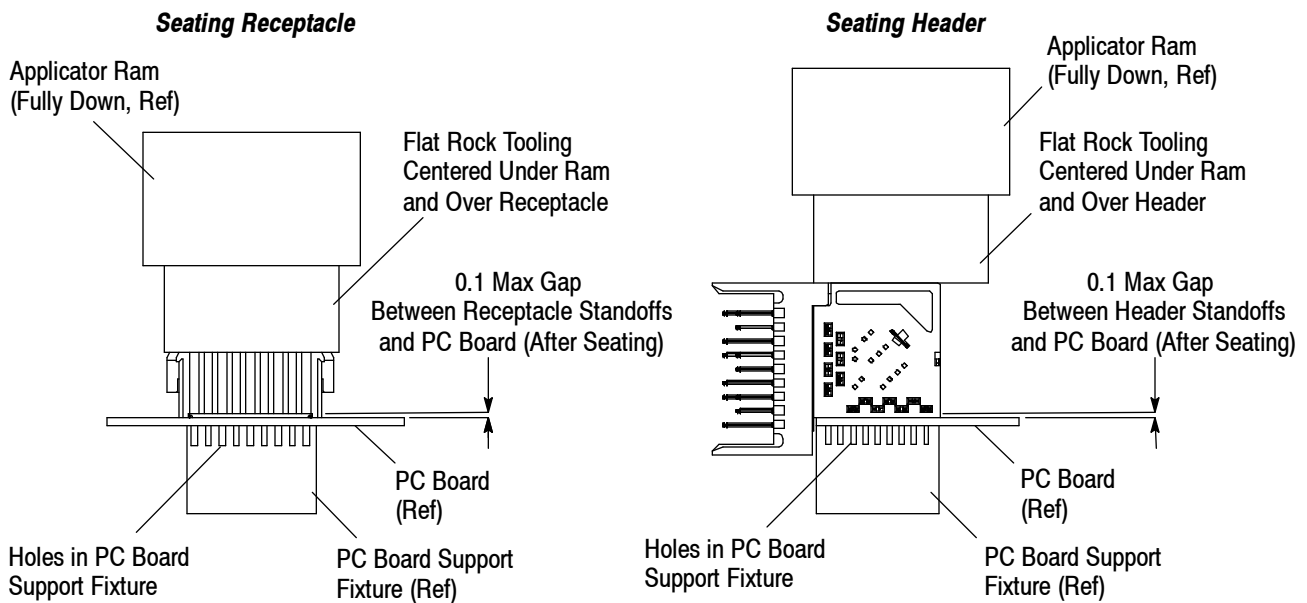


Figure 11

### 3.9. Mating Modules

#### A. Alignment

Proper alignment is essential to ensure full engagement of mating modules and that contacts are not bent or otherwise damaged during mating.

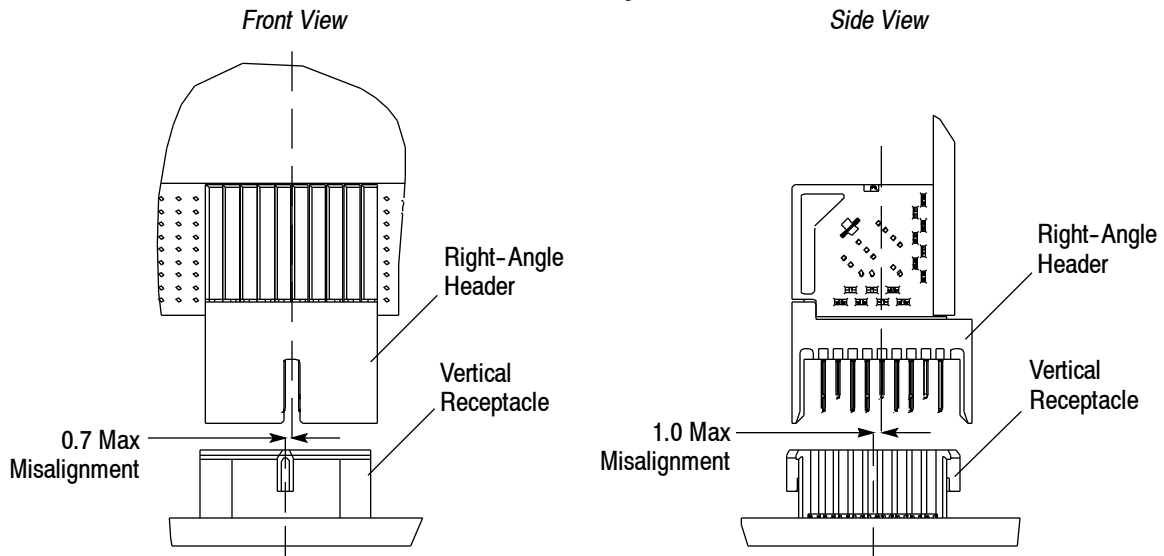
Tolerance limitations for single plane application are given Figure 12.

Tolerance limitations for mid plane application are given Figure 14.

#### Mating Module Alignment

Note: Guide Hardware Not Shown

##### Horizontal Misalignment



##### Vertical Misalignment

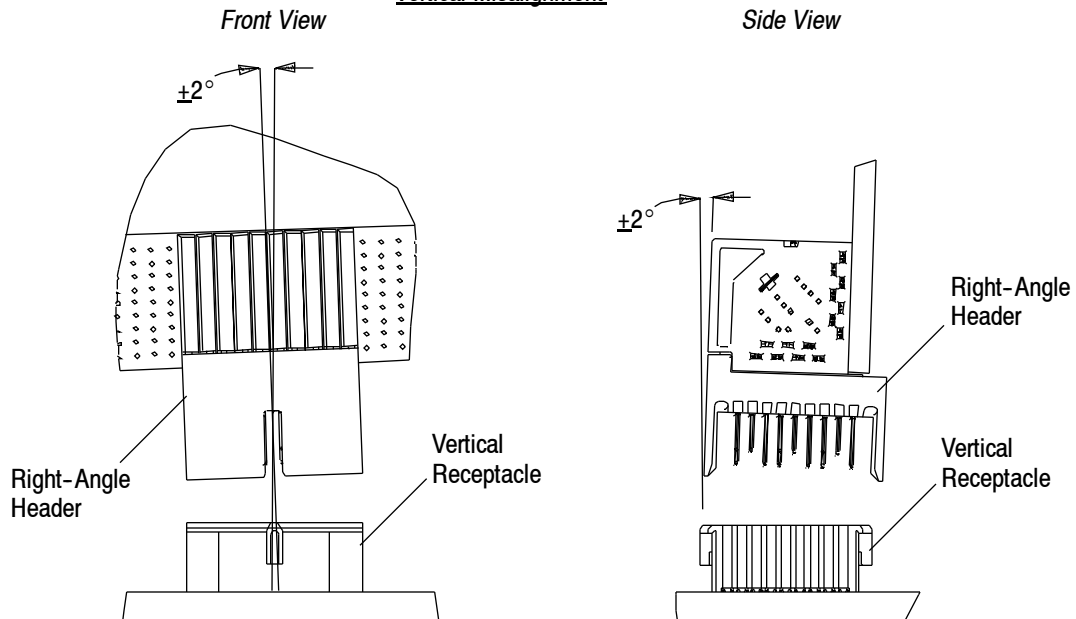


Figure 12

## B. Mating Force

A maximum of 0.834 N [3 oz-force] per contact is required for full mating of the modules.

## C. Mating Sequence and Wipe Length

These connectors have three levels of sequencing during mating: first mate, last break (FMLB), reliable mate, and fully mated. The relative distances between sequencing levels as a function of the distance between the top of the backplane and the centerline of Row A of the daughtercard module is given in Figure 13.

To ensure full mating of modules, the recommended minimum distance between the top of the backplane and the centerline of Row A of the header (daughtercard module) and related dimensions are given in Figure 13.

Wipe length is calculated by subtracting the reliable mating point dimension and the fully mated condition dimension. Refer to Figure 13.

### NOTE



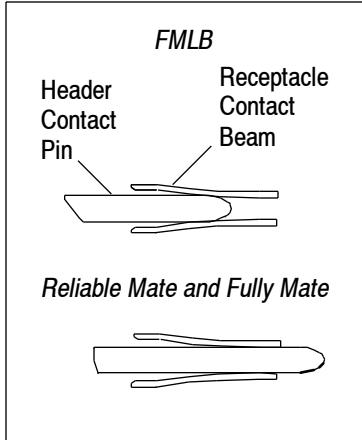
*FMLB is the first and last instance in a mating cycle where the pin comes in contact with the beam, but has not deflected the beam. Reliable mate is the first and last instance in a mating cycle where the pin has completely deflected the beam and the beam is supplying full normal force to the pin. Refer to Figure 13.*

## D. Durability

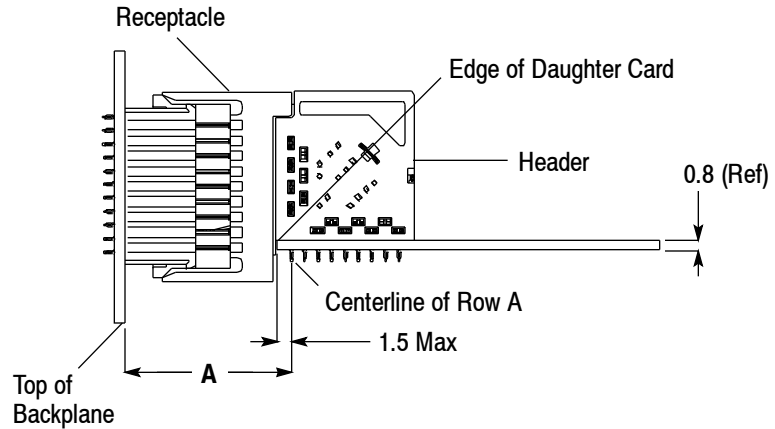
A total of 500 mating cycles are allowed for durability.

### Mating Sequence

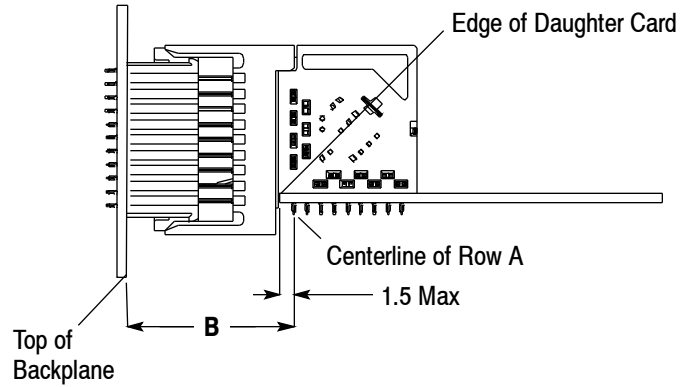
**Note:** Dimensions are based on modules being fully seated on the pc board.



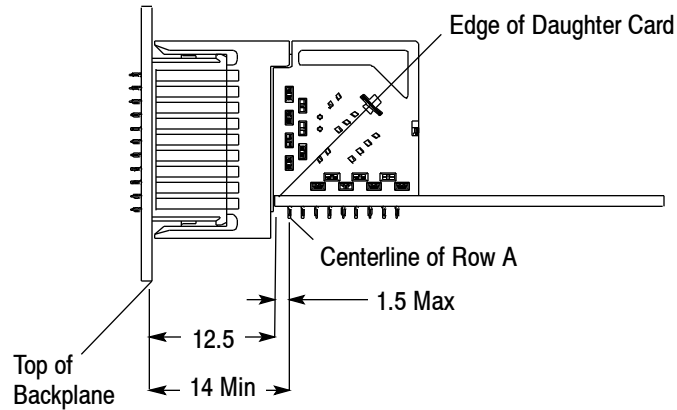
#### First Mate Last Break (FMLB)



#### Reliable Mate



#### Fully Mated



COMPONENT	DIMENSION		WIPE LENGTH (Max)
	A (FMLB)	B (Reliable Mate)	
Plastic Housing (Alignment)	20.00	—	—
Ground Contact	17.27	17.12	3.35
Signal Contact	15.92	15.77	2.00

Figure 13

### 3.10. Mid Plane Application

Alignment for mid plane applications are shown in Figure 14.

**Note:** Guide Hardware Not Shown

**Note:** Modules are Shown Not Mated

#### Mid Plane Application

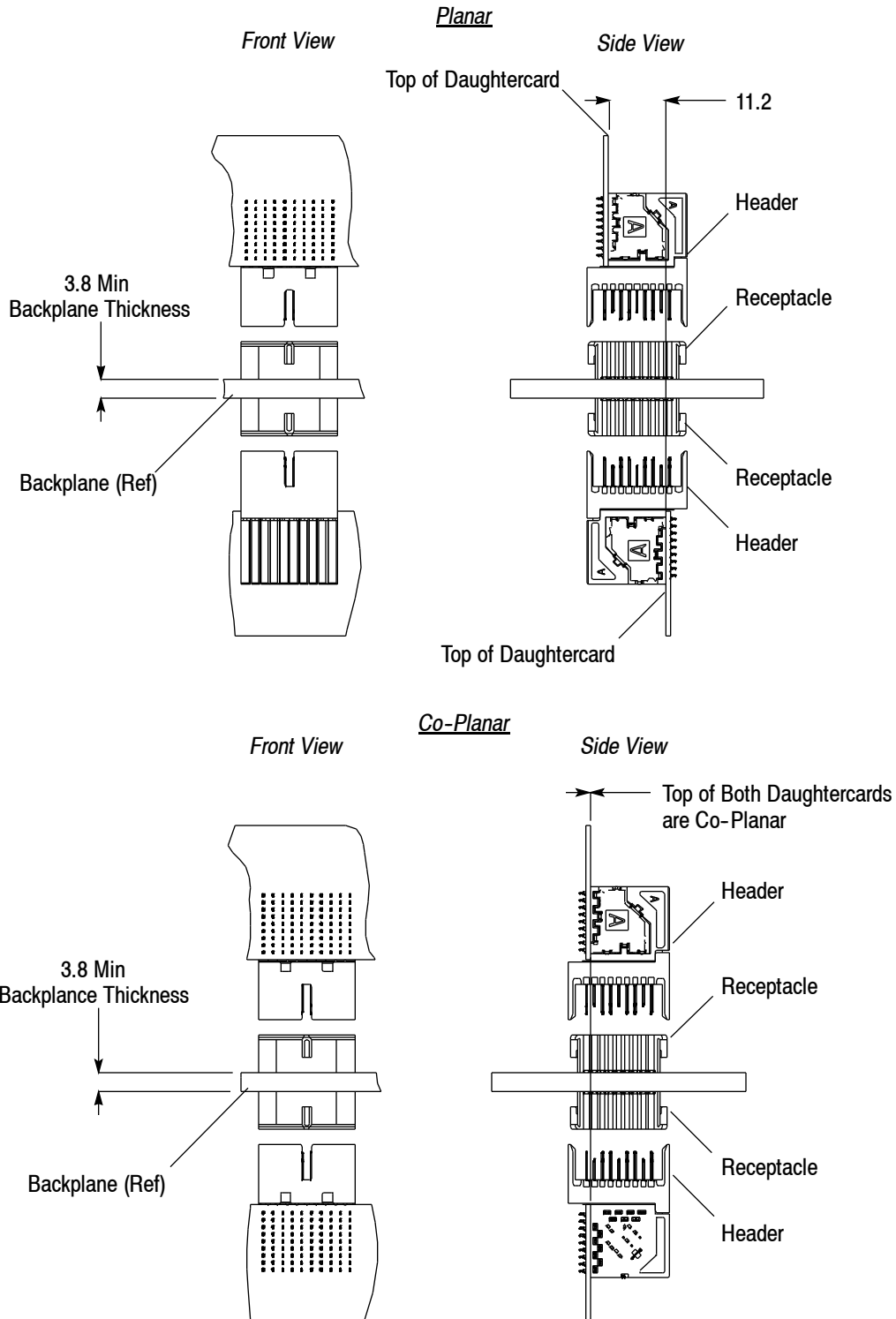


Figure 14



### 3.11. Module Removal

The minimum amount of extraction force per contact is 0.028 N [.10 oz-force].

### 3.12. Replacement and Repair

Damaged or defective modules **MUST NOT** be used. The modules can be replaced a maximum of two times.

## 4. QUALIFICATION

No qualifying support for the Fortis Zd pc board connector system was defined at the time of publication of this document.

## 5. TOOLING

Tooling needed to seat the modules are shown in Figure 15.

### 5.1. Application Tooling

The application tooling (such as a manual arbor press) used to seat these modules must provide sufficient amount of downward force to insert the contacts into the pc board holes.

### 5.2. PC Board Support Fixture

A pc board support fixture must be used to prevent bowing of the pc board during the placement of the modules on the board. The support fixture must have a flat surface with holes or a channel large enough and deep enough to receive any protruding components. The pc board must be secured to the support fixture to prevent movement of the pc board during seating.

The pc board support fixture must also be used when removing the modules from the pc board.

### 5.3. Flat Rock Tooling

Commercially available bar stock (flat rock tooling) with a flat surface large enough to cover all contacts must be used with the application tooling to seat and remove these modules.

For removing the modules from the pc board, it is suggested that the pc board be supported from the connector side.

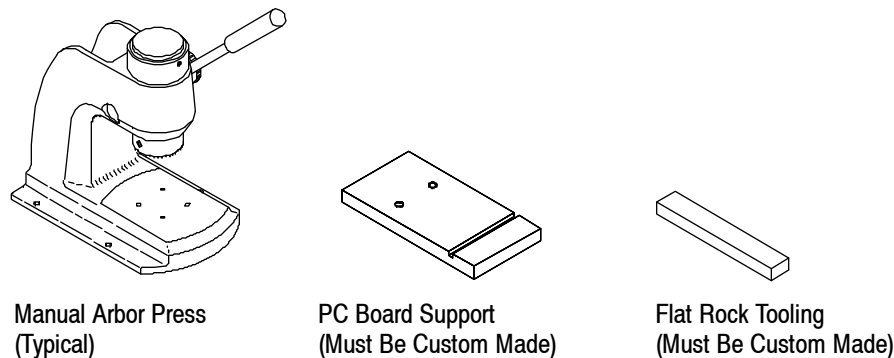
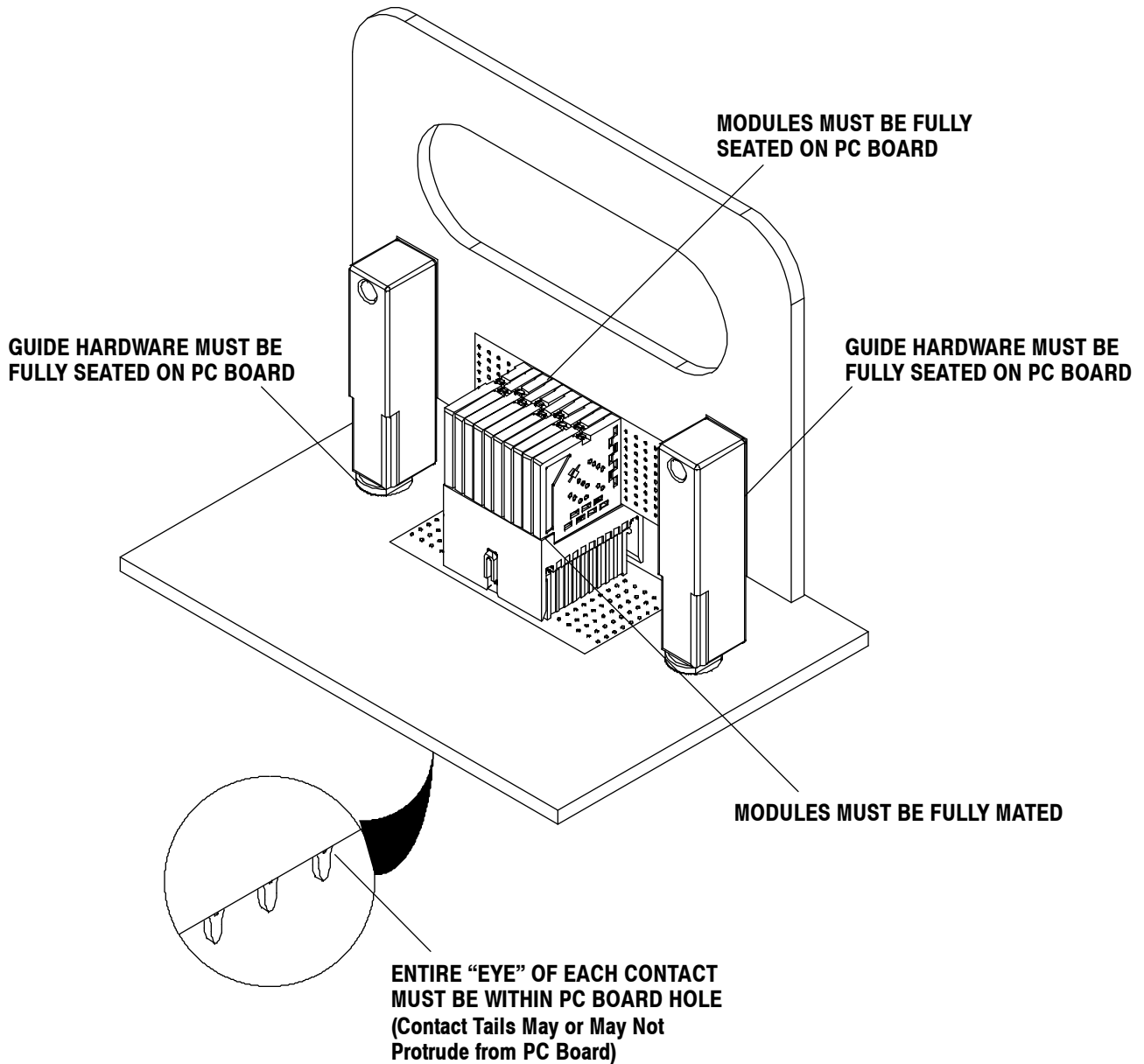


Figure 15

**6. VISUAL AID**

The illustration below shows a typical application of Fortis Zd pc board connector system. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.



**FIGURE 16. VISUAL AID**