

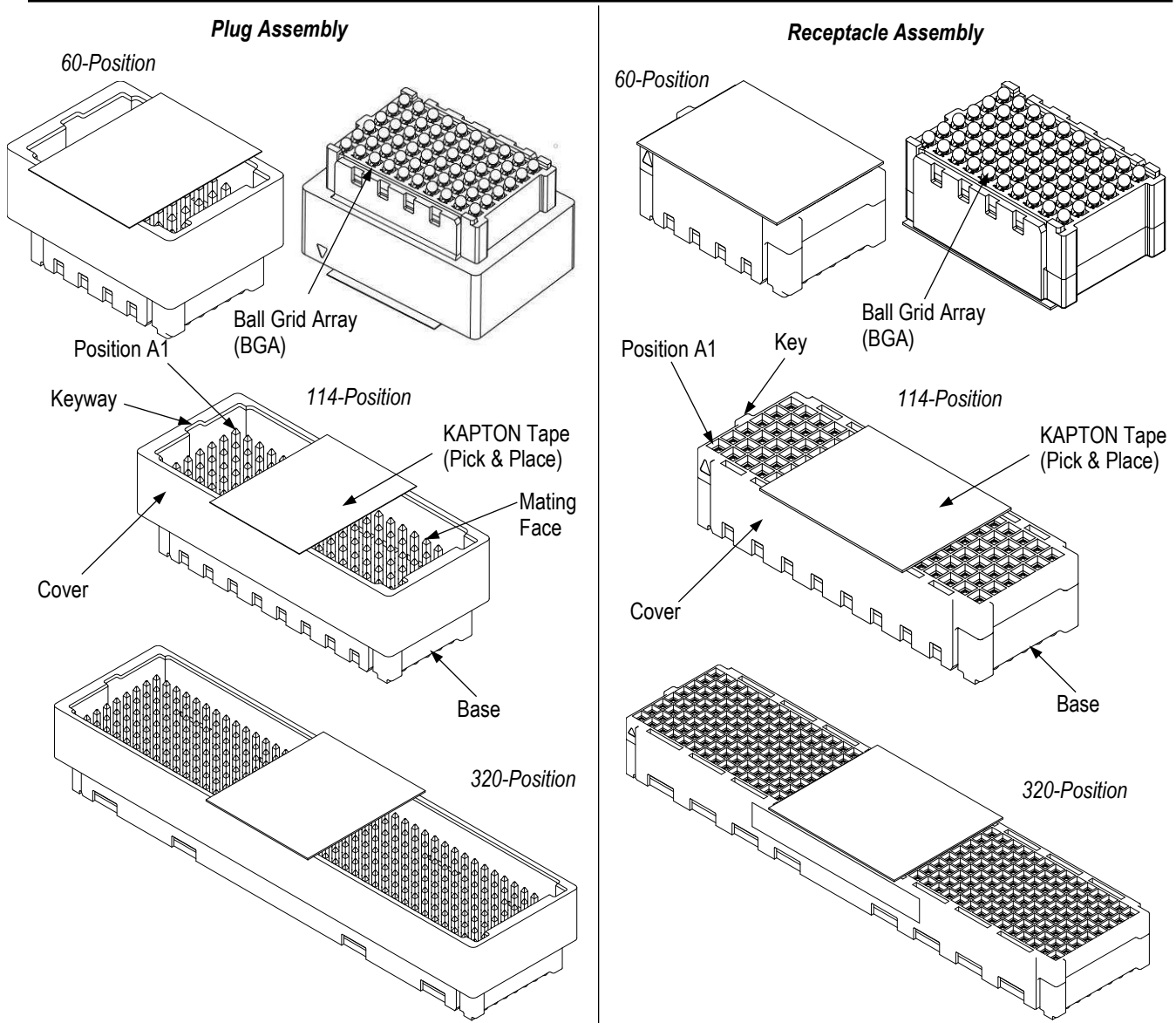


**NOTE**

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 Mezallok Stacking Connectors used to meet or exceed the requirements of XMC 2.0 per the VITA 61 standard. The VITA 61 standard defines performance requirements for a rugged, high-speed stacking connector system. These requirements include mating durability of 500 cycles minimum and signal transmission speeds of 16+GHz. The connectors are available in a plug assembly and receptacle assembly that provide a connection between two parallel printed circuit (pc) boards. The connectors are available in 60, 114, and 320 positions (size - see Figure 2). The plug is a constant nominal height of 4 mm, and the receptacles are available with nominal heights of between 6 and 14 mm. The mated height is a combination of the plug and receptacle heights.



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Figure 1



**NOTE**

Not all connector configurations are tooled. Call Product Information at the number at the bottom of Page 1 for availability.

Each connector consists of a cover and base (some taller receptacle assemblies also include a spacer). The cover is on the mating face of the connector and contains contacts; and the base is on the pc board side of the connector and contains solder balls. The connectors use a Ball Grid Array (BGA) for solder attachment to the pc board, as shown in Fig. 1, 60-position plug and receptacle assemblies. Both SnPb and SAC 405 solder alloys are available.

The connectors are supplied in anti-static pocket tape packaging. KAPTON tape is attached to the connector for pickup and placement by automated equipment with vacuum pick-up; however, the tape is not used for placement by hand or when using mechanical grippers that grip the outside of the connector.

Position A1 is laser-marked on the connector covers. To assure proper mating orientation, the connectors are keyed at both ends. For initial alignment during mating, the chamfered lead-in around the perimeter of the pin assembly captures and guides the cover of the receptacle assembly. This lead-in also allows for blind mating.

When corresponding with TE Connectivity 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.

**1.1. Specifics**

CONNECTOR SPECIFIC	CONNECTOR SIZE (mm)		
	60-POSITION	114-POSITION	320-POSITION
Connector Length	15.67	27.10	53.77
Connector Width	11.0	11.0	13.54

Figure 2

**1.2. Electrical Performance**

These connectors are designed with close edge coupling to dedicated ground contacts on each side of the signal contacts, matching the impedance between contact pairs. Typical electrical performance is given in Figure 3.

TEST	1:1 DIFFERENTIAL PAIR	1:1 SINGLE-ENDED CONNECTION
Impedance at 50 ps (10% to 90%)	85-110 Ohms	50-60 Ohms
Frequency of Operation	16+ GHz	5 GHz
Multi-Active NEXT at 50 ps (10% to 90%)	< 2%	< 2%

Figure 3

**2. REFERENCE MATERIAL**

**2.1. Revision Summary**

- Updated document to corporate requirements
- Added new NOTE to Paragraph 3.3.G

**2.2. Customer Assistance**

Reference Product Base Part Numbers 2102060, 2102061, and Product Code L724 are representative of Mezalok Stacking Connectors. Use of these numbers will identify the product line and help you to obtain product information when visiting [www.te.com](http://www.te.com) or calling the number at the bottom of page 1.

**2.3. Drawings**

Customer drawings for product part numbers are available from [www.te.com](http://www.te.com). Information contained in the customer drawing takes priority.

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## 2.4. Specifications

Product Specification [108-2411](#) (60 and 114-position) and [108-2411-1](#) (320-position) provides product performance and test results.

## 3. REQUIREMENTS

### 3.1. Safety

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

### 3.2. PC Board

**i** **NOTE**  
The design of the pc board affects connector reliability and performance.

#### A. Solder Pads

The pc board solder pads must be solderable in accordance with Electronic Industries Alliance (EIA) 364-52. The pad diameter shall be  $0.64+0.05$  mm with a true position of diameter of 0.10 mm Regardless of Feature Size (RFS). The pad shall be copper defined with Organic Solderability Preservative (OSP) or Hot Air Solder Leveling (HASL).

#### B. Layout

Per VITA 42 or VITA 61 XMC mezzanine card and carrier board footprints. See Figure 4.

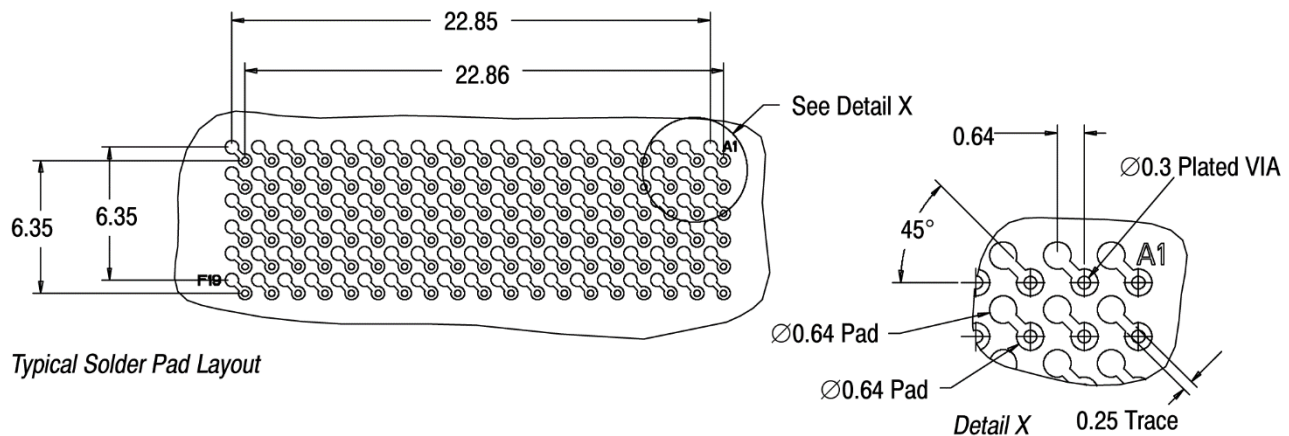


Figure 4

**i** **NOTE**  
Refer to the Customer Drawings for the 60- and 320-position pc board layouts.

### 3.3. Solder Process

#### A. Solder Paste

A no-clean solder paste is recommended.

#### B. Solder Volume

Solder volume must be approximately  $0.049 \text{ mm}^3$  per pad.

#### C. Solder Mask

The solder mask opening diameter must be greater than the pc board pad diameter and is recommended to be  $\text{Ø}0.89$  mm nominally. The pc board vias should not be directly under the solder pads of the ball grid array. The component side of the pc board shall be fully covered with solder mask. The mask may be truncated along the interconnect trace.

### D. Stencil

A stencil thickness of 0.157 mm is recommended. A round aperture diameter of 0.64 mm is recommended.

### E. Reflow

1. To obtain temperature equalization at all ball grid array locations, the assembly should be soaked at a temperature above 145°C [293°F] between 60 and 80 seconds prior to reflow.
2. The reflow time at temperatures above 183°C [361°F] for tin-lead solder application and above 218°C [424°F] for lead-free solder application should be from 60 to 90 seconds for the perimeter of the solder ball grid array and at least 30 seconds for the center of the solder ball grid array.
3. Peak temperature should be between 210°C and 220°C [410°F and 428°F] for tin-lead solder application and between 230°C and 240°C [446°F and 464°F] for lead-free solder application for no more than 10 seconds.
4. The total cumulative time to ramp up, soak, and reflow shall be limited to 280 seconds.
5. A nitrogen environment of 4,000 ppm O<sub>2</sub> or lower can improve solderability; however, is not required.
6. The ramp rate should be less than 2.0°C [35.6°F] per second.



#### NOTE

Recommended temperatures are for the top surface of the pc board within or near the connector solder ball grid array.

### F. Solder Profile

A sample reflow temperature profile is shown in Figure 5.

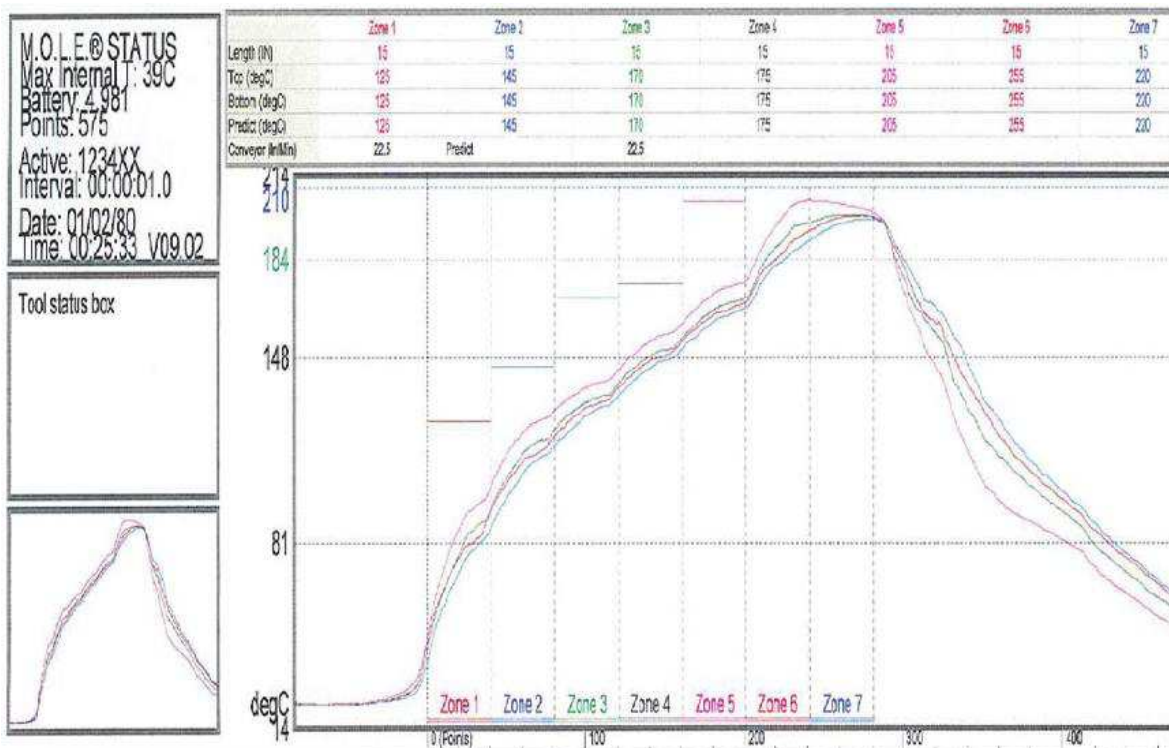


Figure 5

### G. Cleaning

After reflow, the assembly can be washed with an appropriate cleaner to remove any residue or contaminants. In order to leave connector surface treatment and its' benefits intact, boards must be washed with a non-direct, gentle cascade of DI water. If your cleaning process does not conform, contact TE Product Engineering to discuss commercially available surface treatments to reapply to connector modules to recover separable interface enhancements.



**NOTE**

For connector under-fill applications, contact TE Product Engineering for recommended procedures.

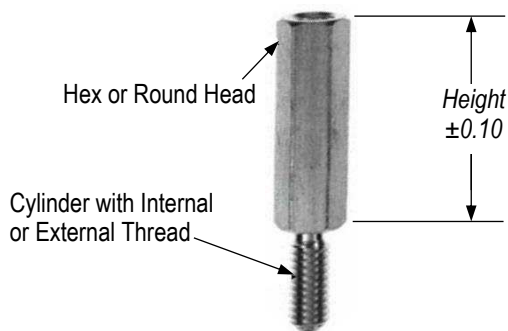
**3.4. Assembly Inspection**

The connectors must be inspected visually for damage and cleanliness. Visual inspection of the solder joint of the ball grid array is not feasible. Solder joints can be inspected using X-ray techniques. A solder pad that is shaped different than the solder ball might assist in viewing the solder plane. Electrical testing may be performed; however, caution must be taken to avoid damage to the connector contacts during the electrical testing.

**3.5. Ancillary Items (Standoffs)**

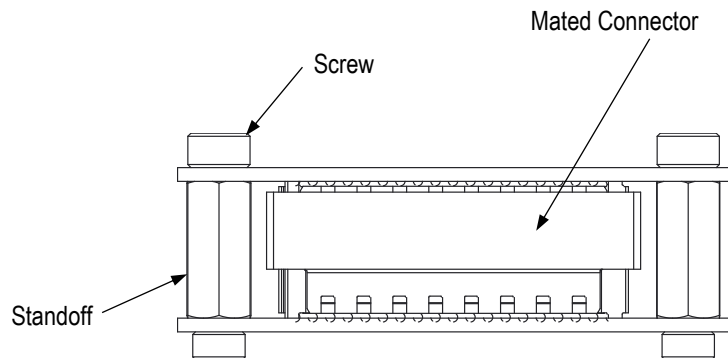
The connectors require the use of commercially-available standoffs (standoffs are not included with the connectors). Standoffs provide load support and intermate retention for the connectors. Requirements for the standoff are provided in Figure 6.

Detail A



**NOTE:** Standoff height should be nominally equal to board-to-board mated height. (Refer to Figure 8.)

Detail B



**NOTE:** Recommended pc board mounting hole diameter is  $2.70 \pm 0.10$  mm to accept either a 2.5 x 0.45 metric or 2-56 UNC threaded screw.

Figure 6

**3.6. Mating and Unmating**

**A. Mating**

The KAPTON tape must be removed from both connectors before mating. These connectors should be mated straight.

Align the connectors and when the keys start to enter the keyways, push at the approximate center of the connector into the mating connector until the face of the receptacle cover bottoms on the face of the plug.

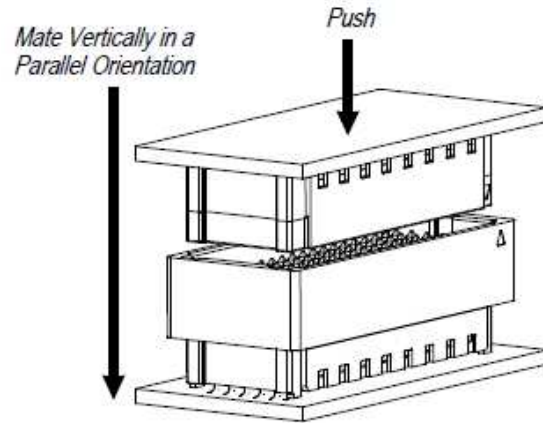
Because of the asymmetric keying, reverse mating is impossible (the key end of the receptacle cannot be inserted into the non-keyway end of the plug). Both connectors have a lead-in around the perimeter that will allow blind mating.

**B. Unmating**

These connectors can be unmated by pulling them straight apart or by “rocking” the connectors from side-to-side while pulling them apart. Refer to Figure 7.

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**Mating**



Socket/Receptacle Assembly is on Carrier

Pin Header/Plug Assembly is on Mezzanine

**UnMating**

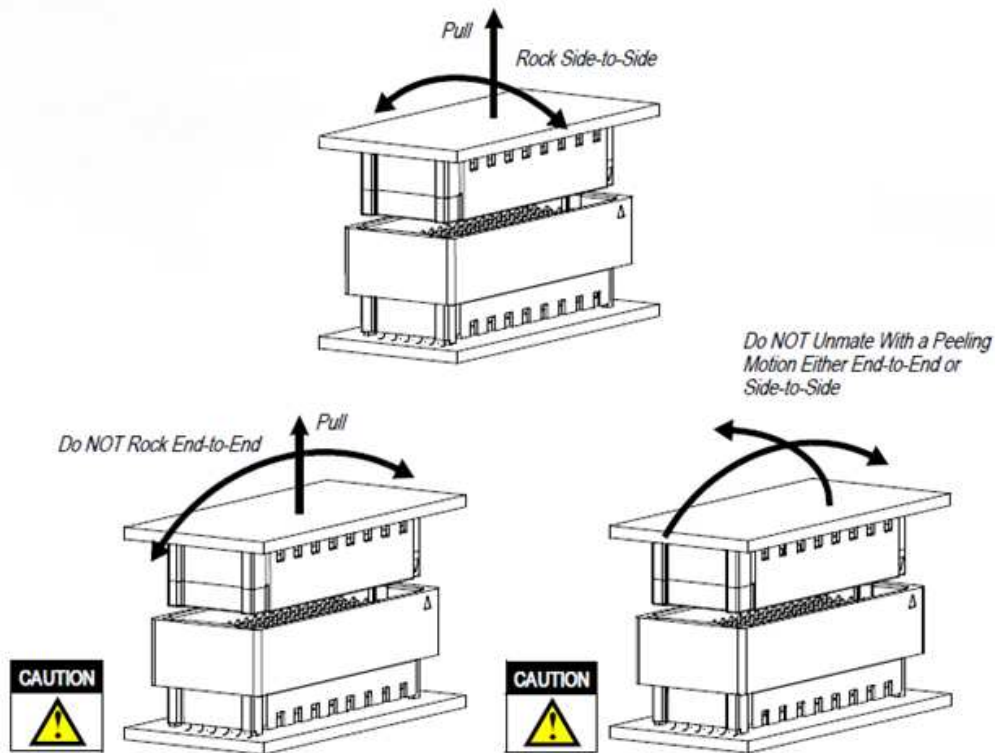
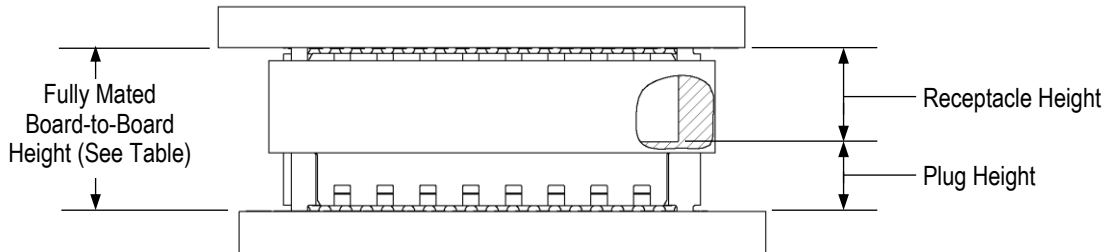


Figure 7



### 3.7. Fully Mated Connector Board-to-Board Height

The mated connector board-to-board height is affected by the pc board pad size, pad plating, solder paste, and solder profile. The fully mated connector board-to-board height is given in Figure 8.

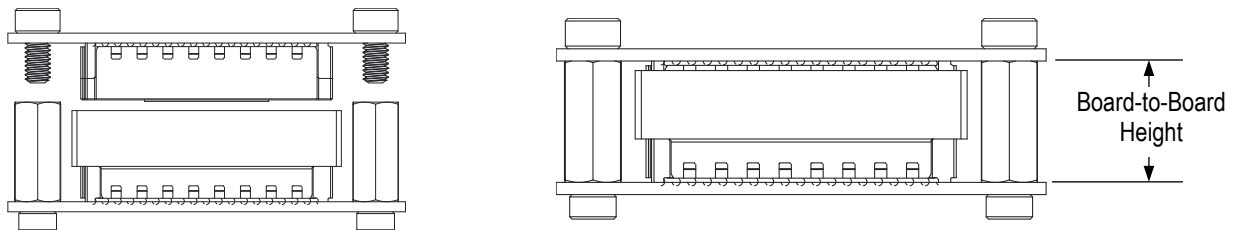


PLUG HEIGHT	RECEPTACLE HEIGHT (mm)	FULLY MATED BOARD-TO-BOARD STACK HEIGHT (mm)
4.0	6.0	10.0
	8.0	12.0
	11.0	15.0
	13.0	17.0
	14.0	18.0

Figure 8

### 3.8. Mating Sequence

The mating sequence as related to the distance between the surfaces of pc boards for the available connector to-board nominal stack heights is shown in Figure 9.

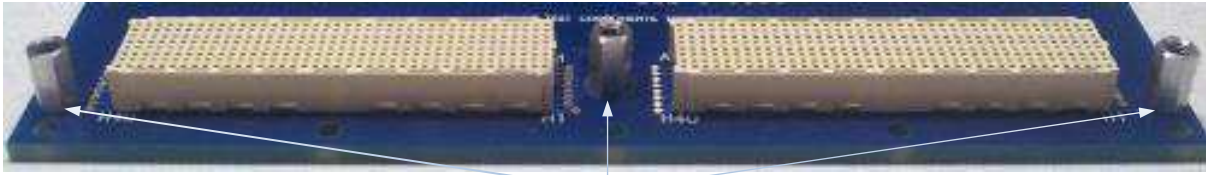


		MATING SEQUENCE					WIPE LENGTH
CONDITION	DESCRIPTION	BOARD-TO-BOARD HEIGHT (mm)					
		10	12	15	17	18	
Contacts Engaged	Plug and Receptacle Contacts Make Contact	12.11	14.11	17.11	19.11	20.11	0
Fully Mated	Plug Cover Bottoms on Receptacle	10	12	15	17	18	2.11

Figure 9

### 3.9. Optional Jack Screw Hardware

To facilitate connector mating and unmating, jack screws can be placed in line with the connector module centerline, or can replace nearby standoffs, and unscrewed to separate boards with no damage. It is recommended that there be at least three jack screws around modules to allow for straight, level mating and unmating.



Three Jack Screw Standoffs Fastened to Host Board

Figure 10

In order to install the jack screw hardware onto the pc boards, the following should be done for each:

**A. Materials to Procure**

Use a jack screw assembly consisting of the following (see Figure 11):

- (1) M3x.5 x 5 mm long flat head screw (McMaster Carr p/n: 92125A125)
- (1) Steel standoff - M3 internal thread (see table in Figure 11 for McMaster Carr part number)
- (1) M3 e-clip (McMaster Carr p/n: 98317A207)
- (1) TE custom M3 jack screw (TE p/n: 2226666-[ ])



MODULAR STACK HEIGHT (mm [in.])	STANDOFF HEIGHT (mm [in.])	STANDOFF McMASTER CARR P/N
10 [.394]	8 [.315]	94868A164
12 [.472]	10 [.394]	94868A166
15 [.591]	13 [.512]	N/A
17 [.669]	15 [.591]	N/A
18 [.709]	16 [.630]	94868A172

**NOTE:** McMaster Carr part numbers are provided as reference to parts used in TE's jack screw assembly. Components that conform to these parts may be sourced from a supplier of customer's choice.

Figure 11

**B. PC Board Preparation**

1. Drill a Ø3.2 mm [Ø.125 in.] thru hole on the mezzanine and host boards where the jack screws will be located (these holes should be concentric when the modules are mated).
2. Add a countersink for an M3 flat head screw to the jack screw holes on the **non-component side** of both pc boards. See Figure 12.

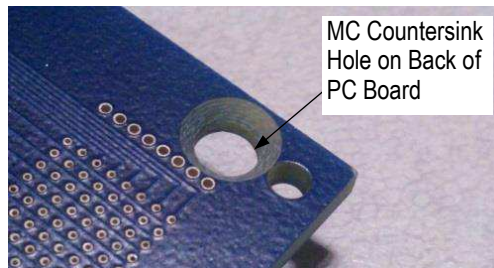


Figure 12

**C. Jack Screw Assembly Procedure (Installing Standoffs)**

Install standoffs onto 5 mm long M3 screws on socket module pc board in jack screw locations as shown in Figure 13.



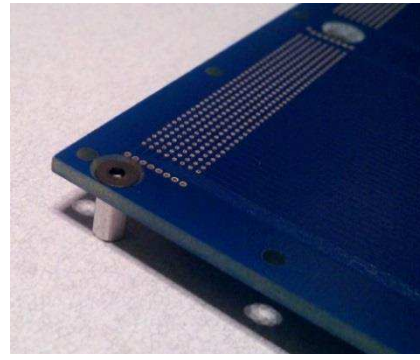
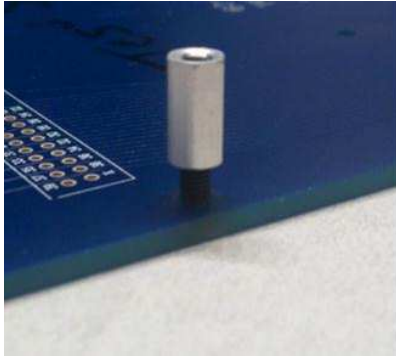


Figure 13

**D. Jack Screw Assembly Procedure (Installing Jack Screw)**

1. TE's solution makes use of custom M3 jack screws (2226666-[ ]) and e-clips. See Figure 14.



Figure 14

2. Install e-clip in groove on jack screw as shown in Figure 15.

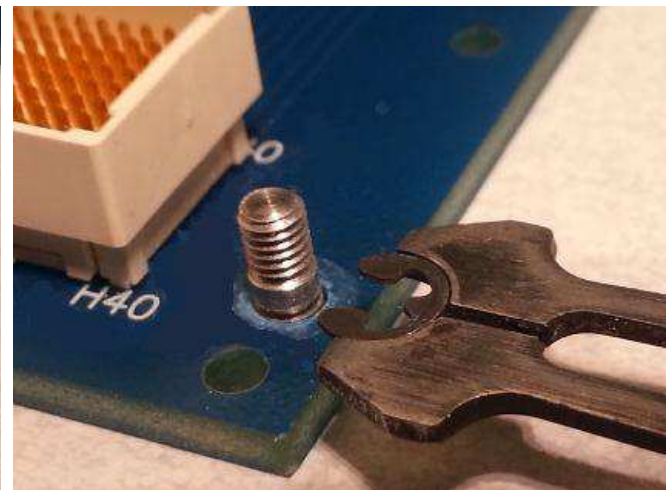
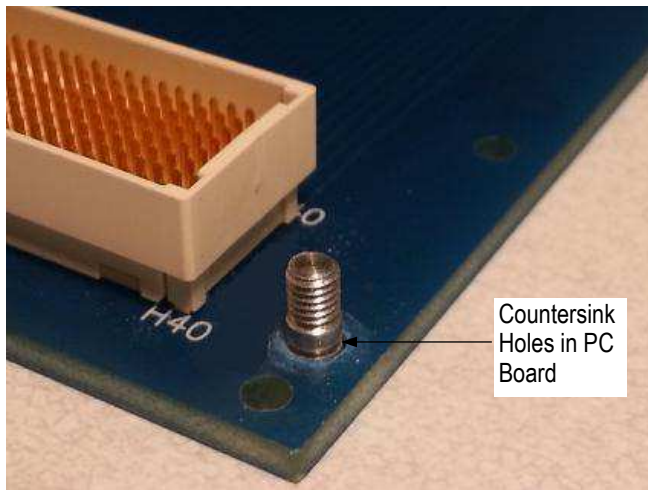


Figure 15

3. Jack screw is now installed on pc board. See Figure 16.

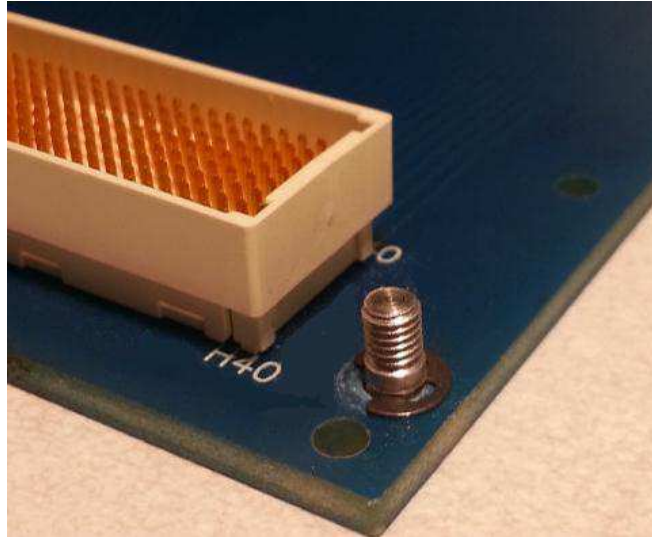


Figure 16

### 3.10. PC Board Assembly Procedure (Figure 17)

1. Align modules and jack screws in mating orientation.
2. TO MATE: starting with center jack screw, turn each screw 1-2 revolutions at a time (to prevent excessive board bow) until proper spacing between pc boards is achieved.
3. TO UNMATE: Reverse mating procedure in previous step.



Figure 17

### 3.11. Tape Packaging

Per EIA-481-D. See Figure 18.

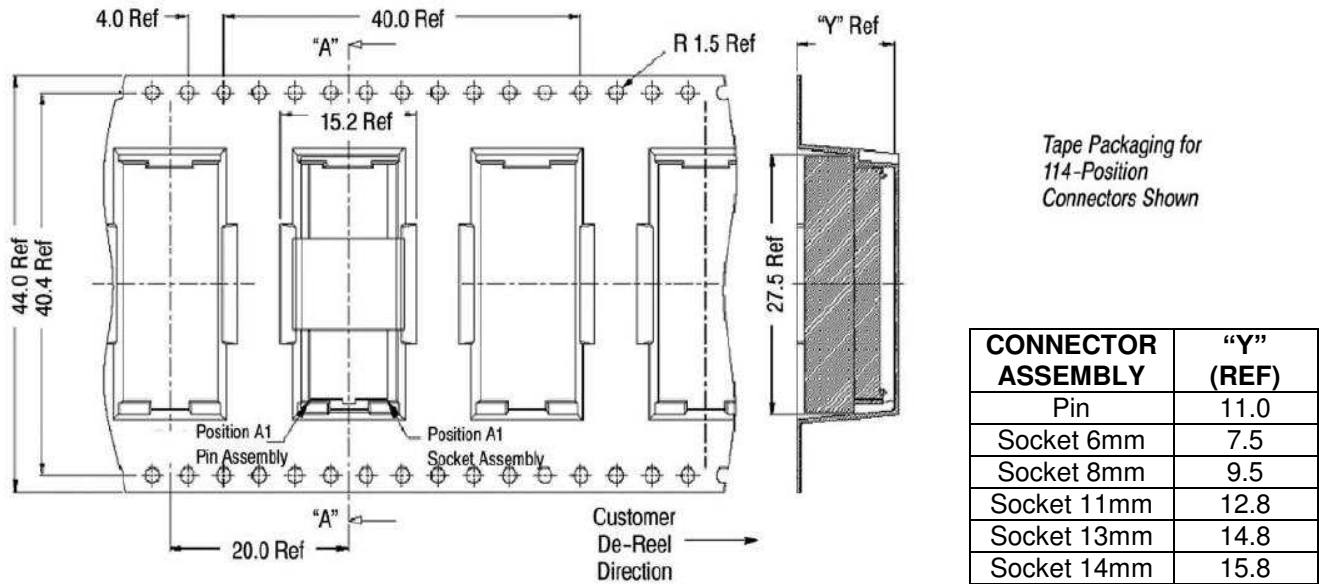


Figure 18

#### 4. QUALIFICATION

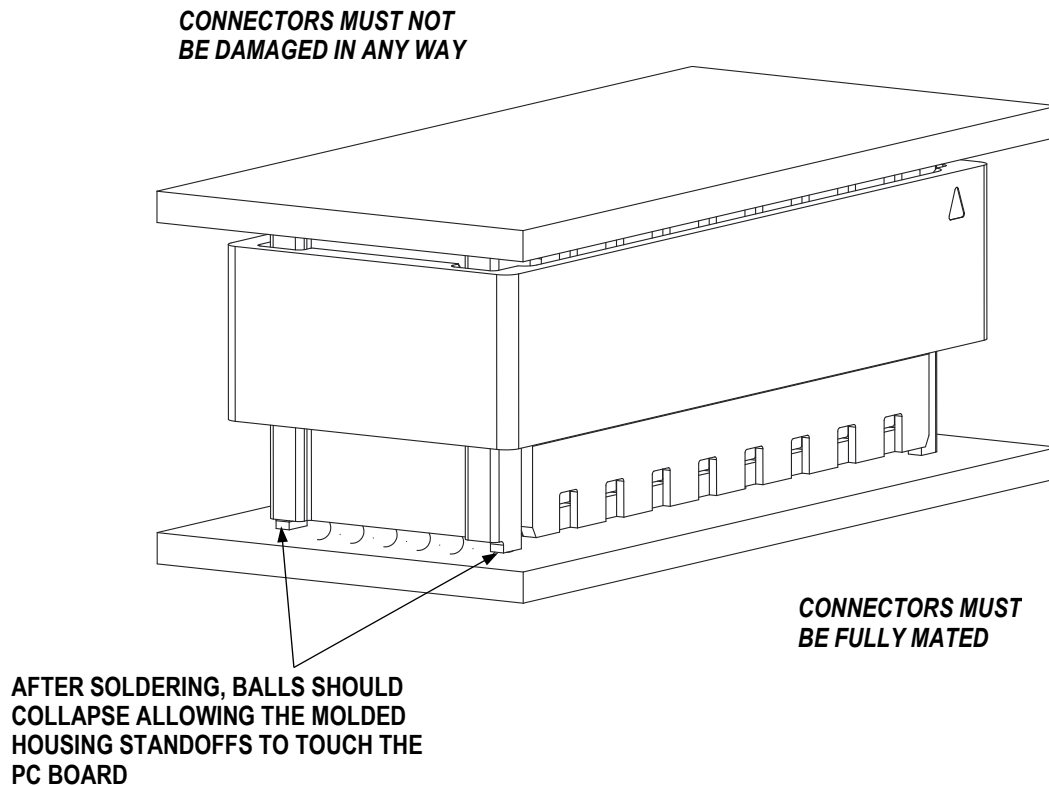
Mezlok Stacking Connectors are qualified to Product Specification 108-2411 per Test Report 501-736.

#### 5. TOOLING

The connectors can be placed on the pc board manually; however, it is recommended that the connectors be placed on the pc board using automated equipment. Fixturing may be used to assure true position accuracy to properly locate the connectors-the fixturing must reference the datum surfaces detailed on the customer drawing to ensure reliable placement

## 6. VISUAL AID

The illustration below shows a typical application of this product. 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 19. VISUAL AID**