



**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 are not drawn to scale.

**1. INTRODUCTION**

This specification covers the requirements for application of Mini-SAS HD external receptacle connector and cage assembly. The receptacle is a pre-assembled unit available in 1x1, 1x2, and 1x4 configurations. The receptacle is designed to be inserted into a panel after application to the printed circuit (pc) board.

The connector consists of a housing with 36-position receptacle ports and compliant pin contacts on 0.75-mm centerline spacing. Each receptacle port has two card slots that accept a 1.0  $\pm 0.10$ -mm thick integrated circuit card housed in the mating module. The cage assembly has compliant pin contacts and fasteners for mechanical retention into the pc board. The cage assembly features a cover assembly and panel ground springs to provide electromagnetic interference (EMI) suppression and electrical grounding to the pc board and panel.

Basic terms and features of this product are provided in Figure 1.

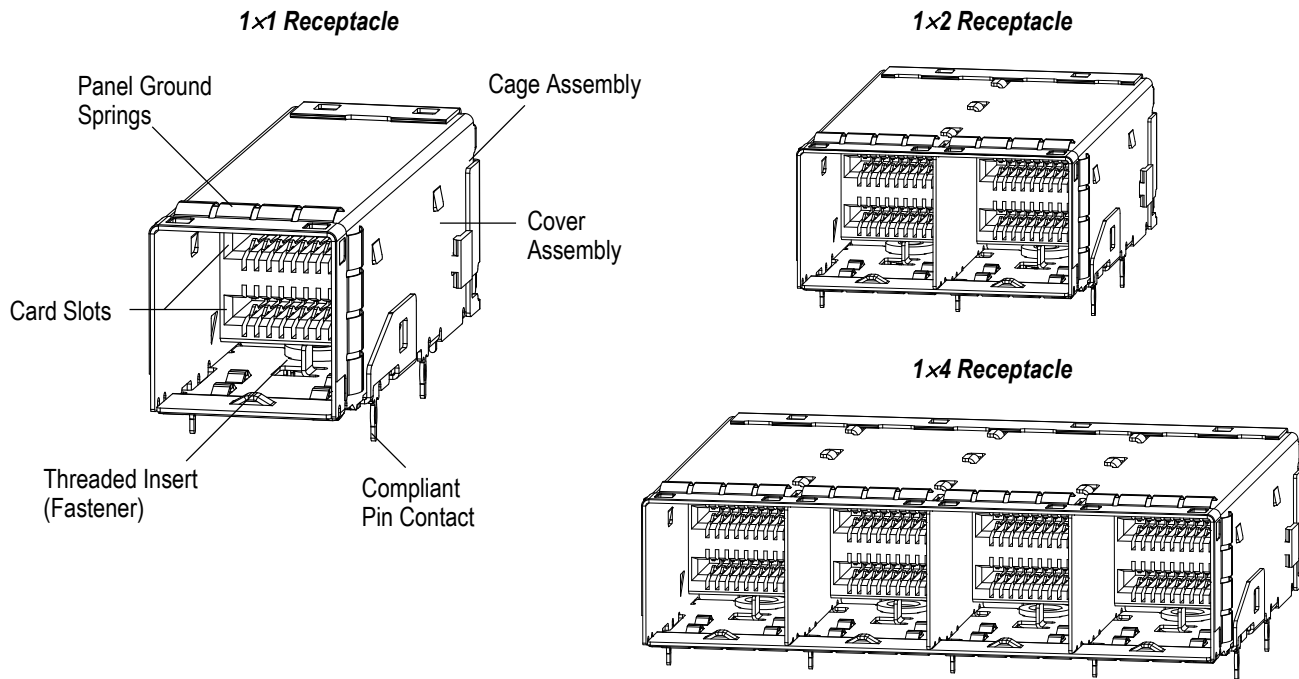


Figure 1

**2. REFERENCE MATERIAL**

**2.1. Revision Summary**

Revisions to this application specification include:

- Corrected arrows for plating in Figure 2 and arrows for bezel placement in Figure 7

**2.2. Customer Assistance**

Reference Product Base Part Number 2149027, 2149966, and 2149375 and Product Code L817 are representative of Mini-SAS HD external receptacle connector and cage assembly. Use of these numbers will identify the product line and help you to obtain product and tooling information when visiting [www.te.com](http://www.te.com) or calling the number at the bottom of this page.

## 2.3. Drawings

Customer drawings for product part numbers are available from [www.te.com](http://www.te.com).

## 2.4. Specifications

Product Specification [108-2462](#) provides product performance and test results.

## 2.5. Instructional Material

Instruction sheets (408-series) provide product assembly instructions or tooling setup and operation procedures. Instructional material that pertain to this product are:

[408-10466](#) Mini-SAS HD Removal Tools 2161646-1, 2161647-1, and 2161648-1

[408-127007](#) Mini-SAS HD Seating Tool Kits 2018875-1, 2018875-2, and 2018875-3

## 3. REQUIREMENTS

### 3.1. Safety

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

### 3.2. Material

The housing and chicklets (which hold the compliant pin contacts) are made of molded thermoplastic, UL 94-V-0. All compliant pin contacts of the receptacle are made of copper alloy underplated with nickel plated with tin or tin-lead at the leads and plated with gold or gold equivalent at the interface area. The cage assembly is made of nickel silver copper alloy.

### 3.3. Storage

#### A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the product material.

#### B. Shelf Life

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

#### C. Chemical Exposure

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

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

### 3.4. Operating Temperature

The receptacles are designed to operate in a temperature range of -40° to 85°C [-40° to 185°F].

### 3.5. Host PC Board

#### A. Material and Thickness

The host pc board material shall be glass epoxy (FR-4 or G-10). The pc board thickness shall be a minimum of 1.57 mm.



#### NOTE

Call the number at the bottom of page 1 for suitability of other pc board materials.

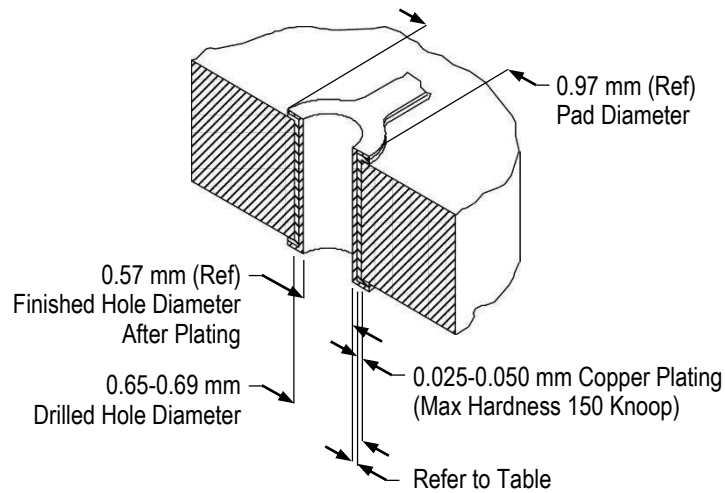
**B. Tolerance**

Maximum allowable bow of the pc board shall be 0.08 mm over the length of the cage assembly. The coplanarity of the pc board circuit pads must be 0.03 mm.

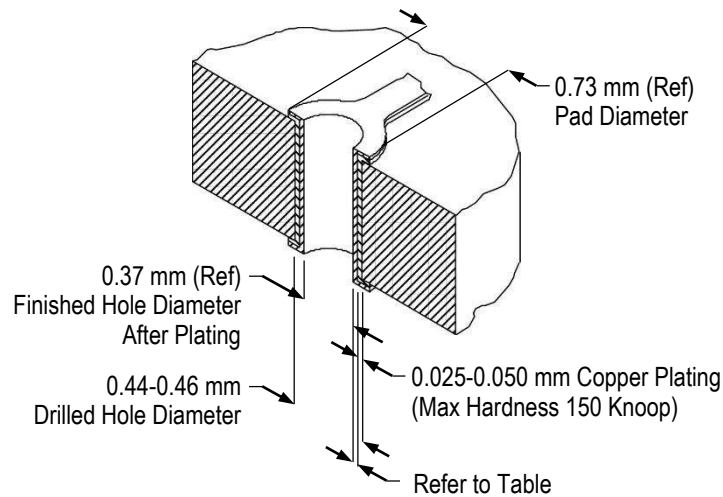
**C. Hole Dimensions**

The holes for the signal contacts must be drilled and plated through to dimensions specified in Figure 2.

**Recommended Hole Dimensions for Cage Assembly**



**Recommended Hole Dimensions for Connector**



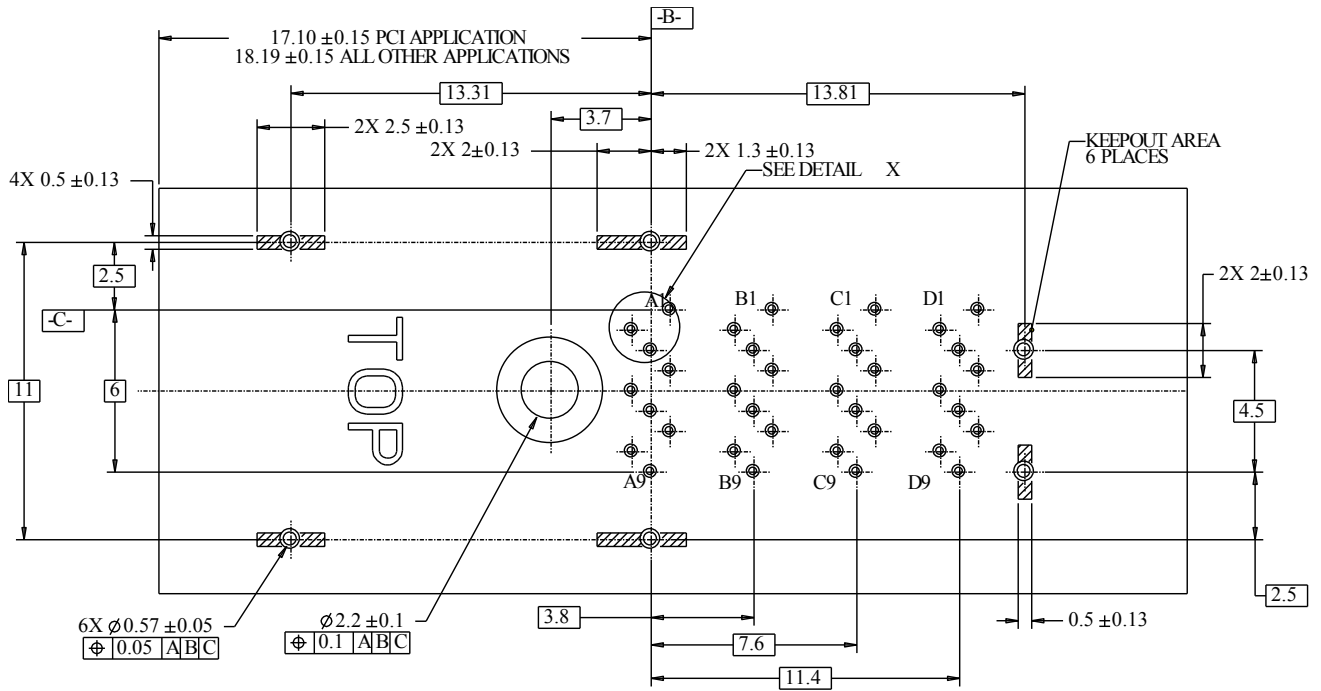
THICKNESS (mm)	PLATING
0.004-0.010	Hot Air Solder Leveling (HASL) Tin-Lead (SnPb)
0.0005-0.002	Immersion Tin (Sn)
0.0002-0.0005	Organic Solderability Preservative (OSP)
0.0001-0.0005 0.004-0.0076	Immersion Gold (Au) Over Nickel (Ni) (ENIG)
0.0001-0.0005	Immersion Silver (Ag)

Figure 2

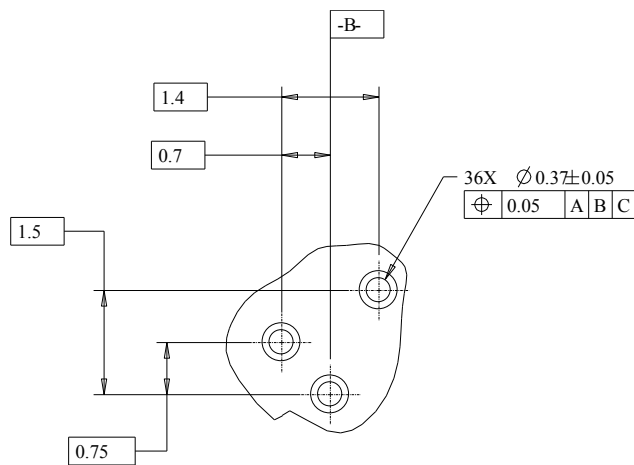
### D. Layout

All holes and circuit pads must be precisely located on the pc board to ensure proper placement and optimum performance of the receptacle. Recommended circuit pad pattern, keep out zones, dimensions, and tolerances for a single receptacle are provided in Figure 3.

**Recommended Host PC Board Layout**



**Detail X**



**Figure 3**

### 3.6. Transceiver Modules

The mating transceiver module packing size cannot exceed the width of each cage port opening. This includes the part of the transceiver extending outside of the cage. Since the port-to-port spacing has an 11-mm centerline, the widest transceiver width extending outside of the cage should be less than 10.75 mm. This will prevent any possible interference when transceivers are inserted in adjacent ports.



**CAUTION**

*If the mating transceiver module packing size exceeds the width of each cage port opening, there may be interference when transceivers are inserted in adjacent ports.*

### 3.7. Bezel

The bezel must provide a cutout that allows proper mounting of the receptacle. The EMI gasket grounding feature must be compressed by the bezel in order to provide an electrical ground between the receptacle and bezel for EMI suppression. Care must be used to avoid interference between adjacent receptacles and other components. The minimum allowable distance between receptacles must be considered to ensure proper assembly. Bezel thickness, dimensions for bezel cutout, and minimum allowable distance between cutouts are given in Figure 4.

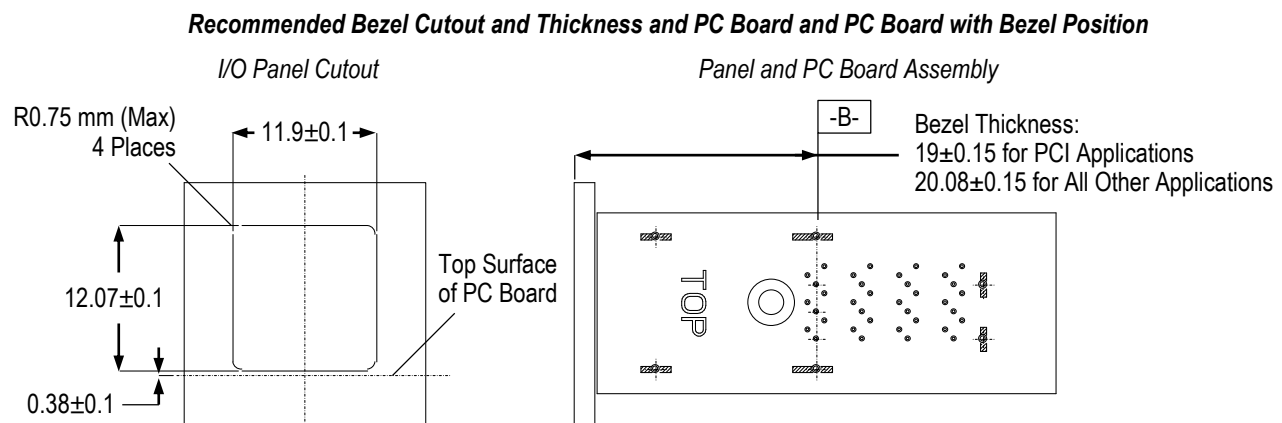


Figure 4

### 3.8. PC Board and Bezel Position

The bezel and pc board must be positioned in relation to each other to avoid interference with the function of the connector module locking latch and to ensure proper function of the panel springs. This relationship must conform to the dimensions given in Figure 4.

### 3.9. Placement and Seating

The following requirements apply to placement of receptacles and receptacles used for rework purposes.



**CAUTION**

*Receptacles should be handled only by the cage assembly to avoid deformation, contamination, or damage to the compliant pin contacts.*

The cage assembly compliant pin contacts must be aligned with matching holes in the pc board, then inserted into the pc board simultaneously to prevent twisting or bending of the compliant pin contacts.

Using proper seating force and seating height is essential to interconnection performance. The force used to seat the receptacle must be applied evenly to prevent deformation or other damage to the compliant pin contacts. The force required to seat the receptacle onto the pc board can be calculated by:

$$\text{Amount of Compliant Pin Contacts} \times 44.5 \text{ N [10 lbs]} \text{ (Force per Compliant Pin Contact)} = \text{Seating Force}$$



**CAUTION**

*Over-driving of the receptacle will deform parts critical to the quality of the connection. Maximum force occurs prior to the receptacle bottoming on the pc board.*

The shut height of the application tool must be specifically set for proper seating of the receptacle. The shut height can be calculated by:

$$\text{Seating Height (Receptacle Seated)} + \text{Height of Seating Tool} + \text{Combined Thickness of PC Board and PC Board Support Fixture} = \text{Shut Height (Ram Down)}$$

The seating height, measured from the top of the cage assembly (not including the panel ground springs) to the top of the pc board, is given in Figure 5.

The receptacle must be seated on the pc board not exceeding the dimensions given in Figure 5.



**NOTE**

The shut height may need to be adjusted to obtain the 0.10-mm maximum gap between the standoffs of the cage assembly and the pc board.

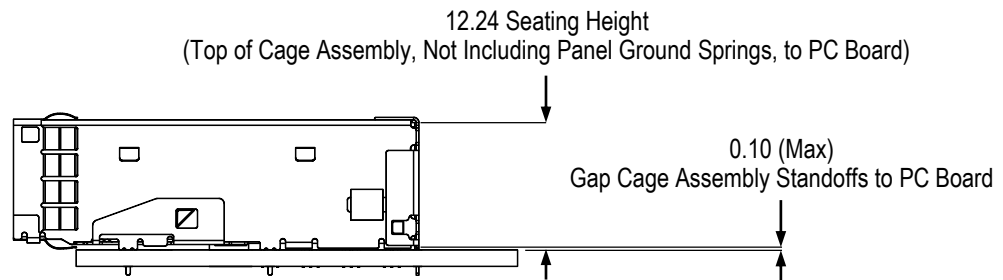


Figure 5

**3.10. Assembly Fasteners**

After seating, the cage assembly must be fastened with an M2×0.4 screw from the bottom of the pc board.

The screw (customer supplied) is application specific. The threaded length of the fastener must not exceed the maximum pc board thickness plus 1.45 mm. The torque applied to the screw should not exceed 0.29 Nm [2.6 in.-lb]; otherwise, damage may occur. See Figure 6.

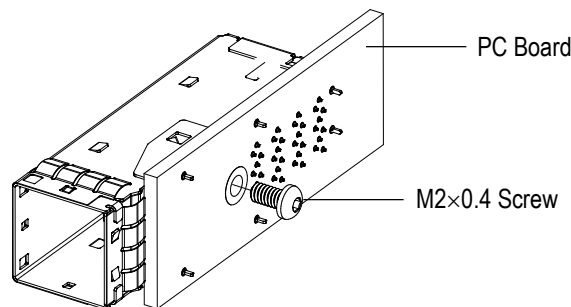


Figure 6

**3.11. Assembly Inspection**

After assembly, the cage assembly panel ground springs must be compressed by the bezel. A slight bow in the cage assembly is permitted. The bezel and pc board must be positioned according to the dimensions given in Figure 7.

**Assembly Inspection**

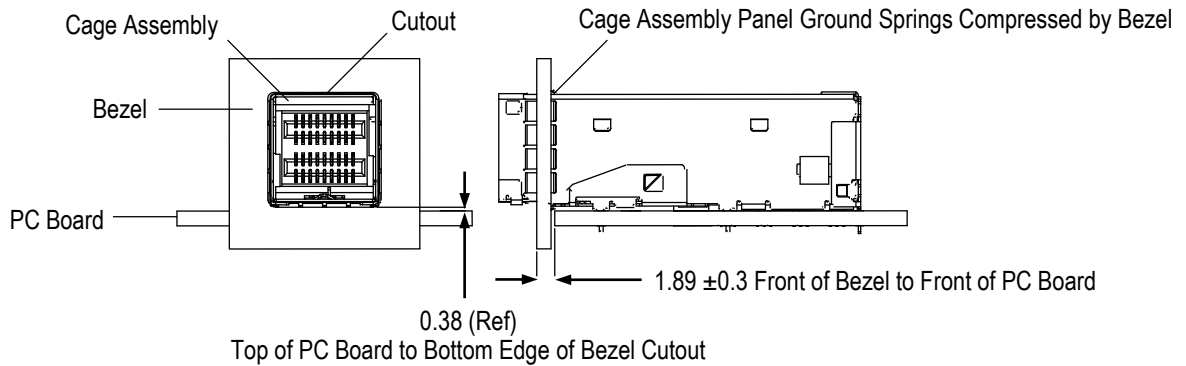


Figure 7

**4. QUALIFICATION**

Agency evaluation for Mini-SAS HD external receptacle connector and cage assembly was not defined at the time of publication of this application specification.

**5. TOOLING**

Tooling part numbers and instructional material packaged with the tooling are given in Figure 8.

**5.1. Seating Tool**

The seating tool is used to seat the receptacle onto the pc board.

**5.2. Removal Tool**

The removal tool is used to remove the receptacle from the pc board by pushing the pc board off of the receptacle. The receptacle should not be re-used.

**5.3. Power Unit**

Power for the seating tools and removal tools must be provided by a power unit (with a ram) capable of supplying a downward force of 44.5 N [10 lbs] per contact. For available power units, call the number at the bottom of page 1.

**5.4. PC Board Support Fixture**

A pc board support (customer designed) must be used with the seating tool and the removal tool. The support fixture provides support for the pc board and protects the pc board and the receptacle from damage. It is recommended that the support fixture be at least 25.4 mm longer and wider than the pc board and have flat surfaces with holes or a channel large enough and deep enough to receive any protruding components.

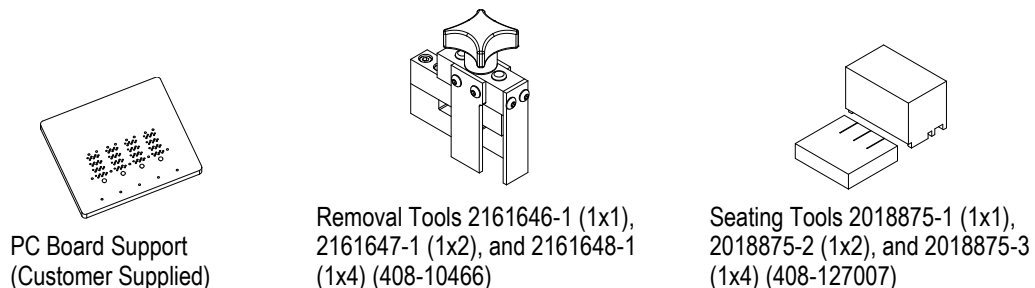
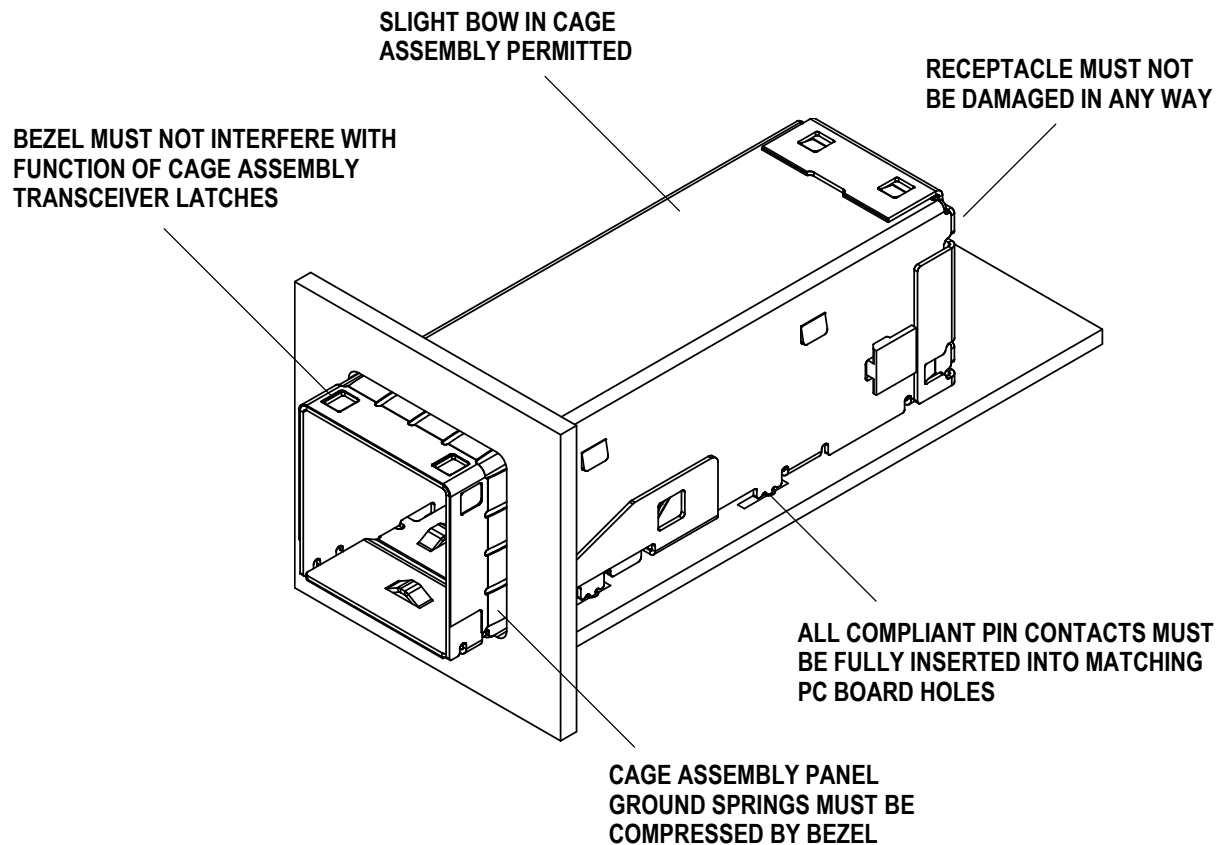


Figure 8

## 6. VISUAL AID

The illustration below shows a typical application of Mini-SAS HD external receptacle connector and cage assembly. 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 9. VISUAL AID**