

**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.

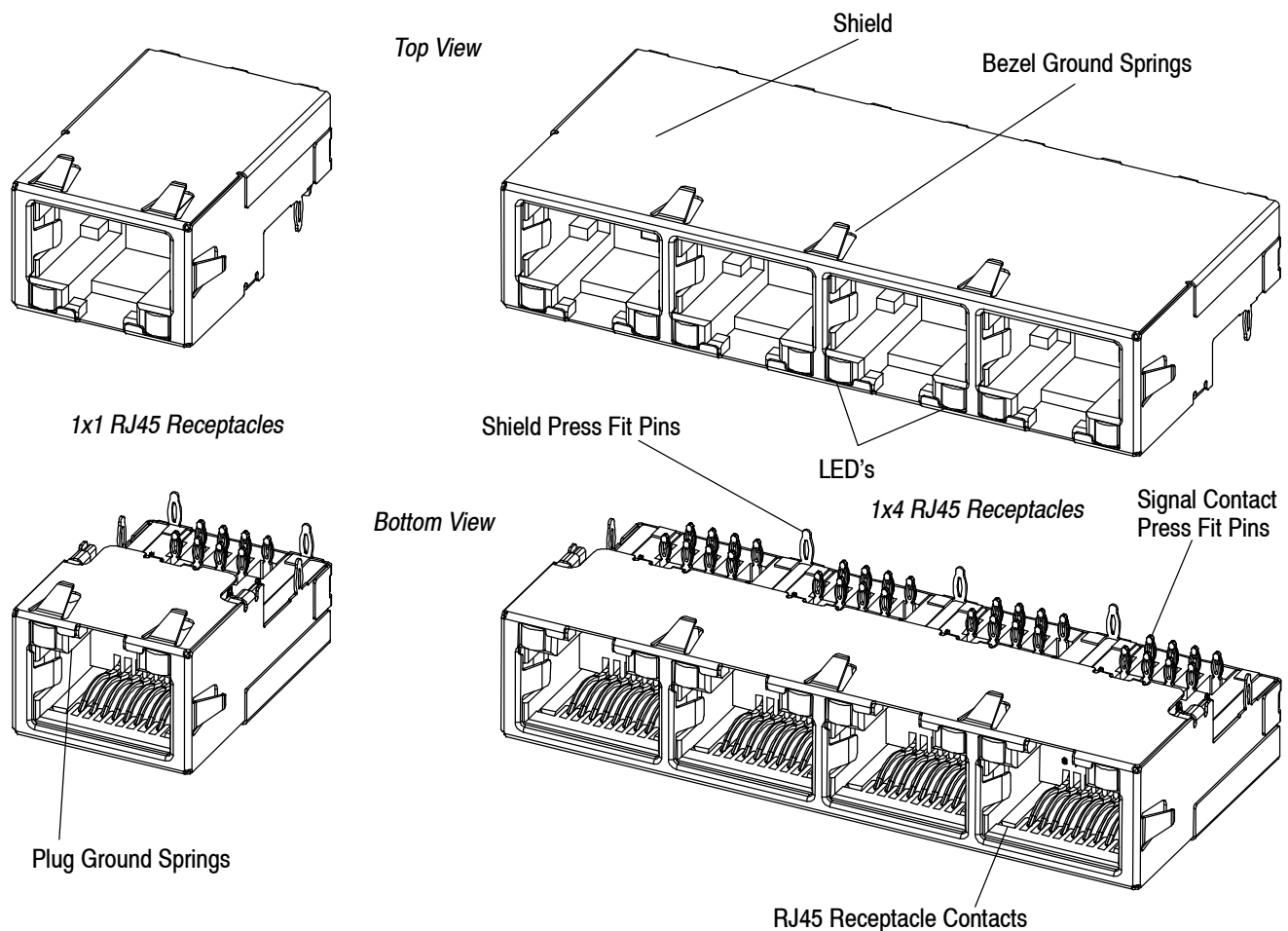
## 1. INTRODUCTION

This specification covers the requirements for application of Category 5, Shielded, Offset, Press Fit Modular Jacks with Integrated Light Emitting Diodes (LED) for printed circuit (pc) board and panel mount applications. These modular jacks are available in 1x1 and 1x4 configurations. When the modular jacks are mounted onto a pc board, a portion of the bottom row extends below the pc board, thereby reducing the overall profile height of the modular jack. The modular jack accepts 8-position Category 5 modular plug assemblies.

The modular jacks consist of a housing and a shield. The housing features standoffs to ensure proper seating on the pc board. The connector assembly features compliant pin contacts for mechanical retention to the pc board, and to provide Electromagnetic Interference (EMI) suppression and panel ground springs. The modular jack is available with or without integrated LED's. The modular jacks must be pressed onto the pc board by press tooling. The connector is designed to be inserted into a panel after being seated onto the pc board.

When corresponding with Tyco Electronics 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.

**1x1 and 1x4 RJ45 Receptacles**



**Figure 1**

## 2. REFERENCE MATERIAL

### 2.1. Revision Summary

- Updated document to corporate requirements and new format
- Changed “Design Objective” to “Product Specification” in Paragraph 2.4
- Added new information to table in Figure 3 and corrected leader arrows in Figure 4

### 2.2. Customer Assistance

Reference Product Base Part Numbers 1888250, 1888251, and Product Code 2239 are representative numbers of the Category 5, Shielded, Offset, Press Fit, Modular Jacks with Integrated Light Emitting Diodes (LED). 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 Tyco Electronics Representative or, after purchase, by calling the Tooling Assistance Center or the Product Information numbers at the bottom of page 1.

### 2.3. Drawings

Customer Drawings for specific products are available from the responsible Tyco Electronics Engineering Department via the service network. The information contained in the Customer Drawings takes priority if there is a conflict with this specification or with any other technical documentation supplied by Tyco Electronics.

### 2.4. Specifications

Product Specification 108-2274 provides product performance and test information.

## 3. REQUIREMENTS

### 3.1. Safety

Do not stack component packages so high that the shipping containers can buckle or deform.

### 3.2. Limitations

The connectors are designed to operate in a temperature range of  $-40^{\circ}$  to  $85^{\circ}\text{C}$  [ $-40$  to  $185^{\circ}\text{F}$ ].

#### NOTE



*The panel requirements given in this document are specifically configured for products used in the communications industry. It is strongly recommended that this panel configuration NOT be used for peripheral component interconnect (PCI) applications.*

### 3.3. Materials

The front housing is molded from thermoplastic, UL 94-V-0. All jack interface and compliant pin contacts are made from Phosphor Bronze under plated with nickel, plated with gold or tin at the plug/pc board interface area. The shells are made from brass plated with nickel.

### 3.4. Storage

#### A. Ultraviolet Light

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

#### B. Shelf Life

The connectors should remain in the shipping container until ready for use to prevent deformation to the compliant pin contacts and mounting posts. The connector should be used on a first in, first out basis to avoid storage contamination that could adversely affect signal transmission and performance.

#### C. Chemical Exposure

Do not store connectors or cage assemblies near any chemicals listed below as they may cause stress corrosion cracking in the compliant pin contacts or mounting posts.

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

### 3.5. LED Operation

The LED operation requirements for these modular jacks are provided in Figures 2 and 3.

LIGHT PIPE MODULAR JACK				
DESCRIPTION (Test Condition)	ABSOLUTE MAXIMUM RATING			
	GREEN	YELLOW	BI-COLOR	UNIT
Luminance Intensity, $I_v$ @ 20mA	7 Typ (1.8 min)	5 Typ (1.8 min)	8 Typ (2.6 min) 4 Typ (1.6 min)	[ $I_v$ (mcd)]
Viewing Angle	100	100	100	°
Lens	Green	Yellow	White Diffused	-
With Resistor (250 Ohm)	No	No	No	-
Forward Voltage, $V_f$ = 20mA	2.5	2.5	2.5	V
Reverse Voltage	5	5	5	V
Peak Forward Current	140	140	140	mA
DC Forward Current	25	25	25	mA
Reverse Current, $V_R$ = 5V	10	10	10	μA
Operating/Storage Temperature	-40° TO 85°C [-40° to 185°F]	-40° TO 85°C [-40° to 185°F]	-40° TO 85°C [-40° to 185°F]	°C [°F]

Figure 2

### 3.6. PC Board

#### A. Material and Thickness

The pc board material shall be glass epoxy (FR-4 or G-10). The minimum pc board thickness shall be 1.60 ±0.16 mm.

#### NOTE

Contact **PRODUCT INFORMATION** at 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 connector.

#### C. Hole Dimensions

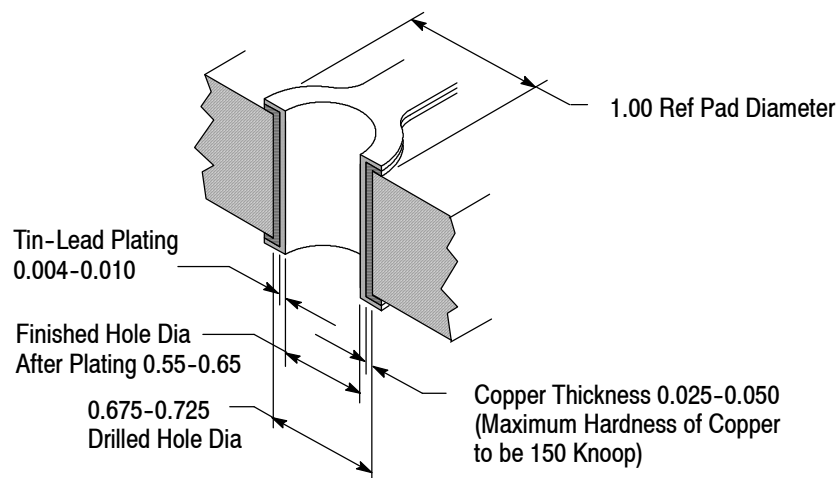
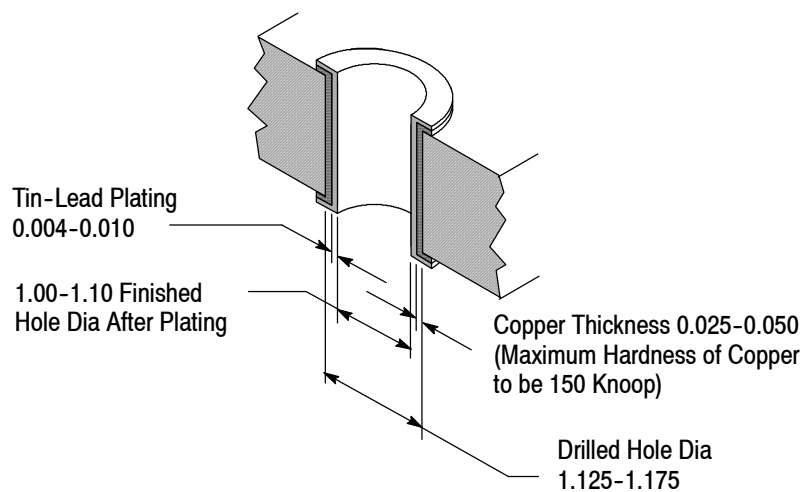
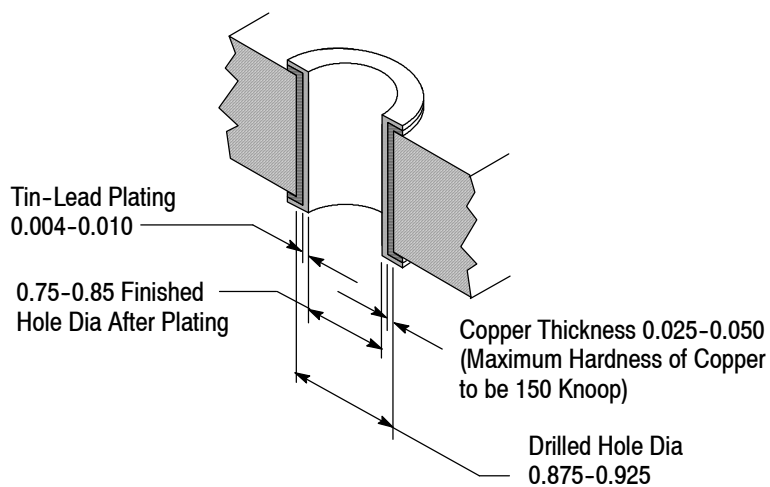
The holes for the connector must be drilled and plated through to dimensions specified in Figure 3. The pc board holes can withstand modular jack removal up to three times without damage to the plated through hole.

#### D. Layout

The holes for the connector must be precisely located to ensure proper placement and optimum performance of the connector. Recommended hole pattern, dimensions, and tolerances are provided in Figure 4.

SURFACE FINISH	
THICKNESS	PLATING
0.004-0.010	Hot Air Solder Leveling (HASL) Tin-Lead (Sn-Pb)
0.0005-0.004	Immersion Tin (Sn)
0.0002-0.0005	Organic Solderability Preservative (OSP)
0.0001-0.0005 Au; 0.00127-0.0076 Ni	Immersion Gold (Au) Over Nickel (Ni) (ENIG)
0.0001-0.0005	Immersion Silver (Ag)

Figure 3 (cont'd)

*Recommended Hole Dimensions: LED Contact**Recommended Hole Dimensions: Shield Pins**Recommended Hole Dimensions: Signal Contacts**Figure 3 (end)*

Recommended PC Board Layout. See Drawing for "Side A" Reference  
(AMC PC Board Width Shown)

PC BOARD CUTOUT	"D"
Standard Face Plate	11.34
AMC Module Face Plate	11.50

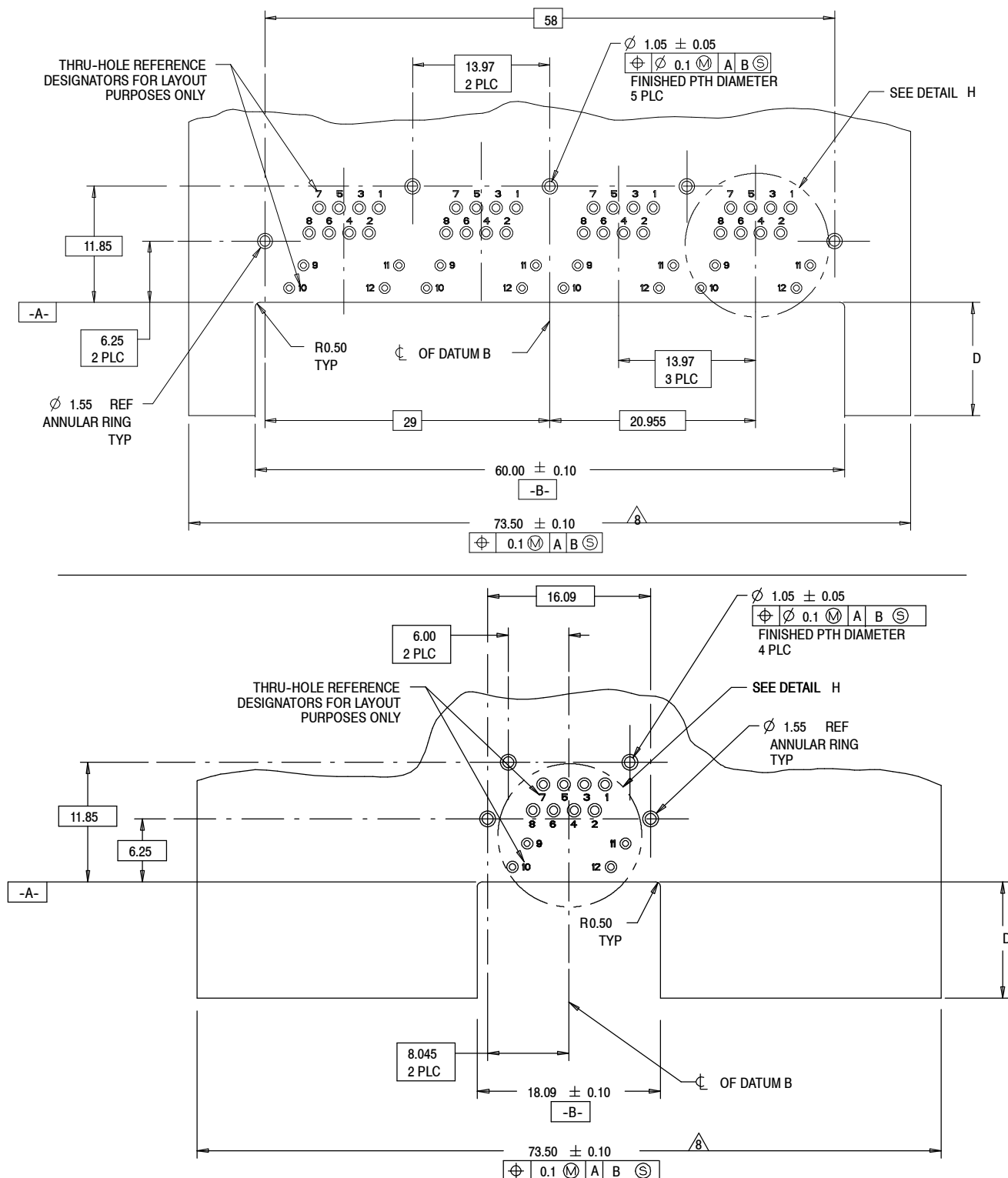


Figure 4 (cont'd)

DETAIL H

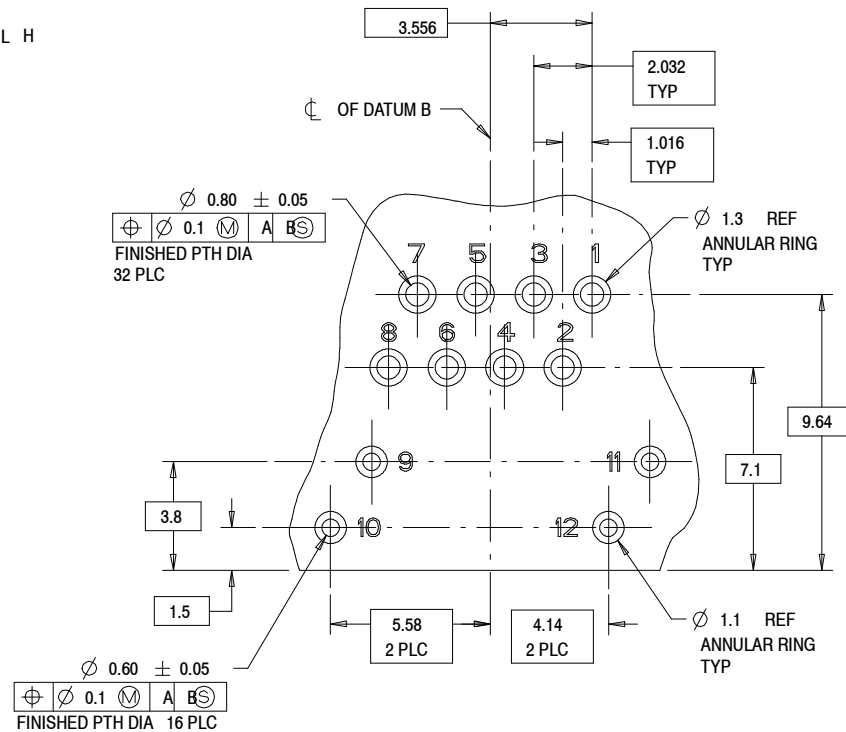


Figure 4 (end)

### 3.7. Insertion Force

To properly seat the modular jack and avoid damage to any components during seating, the appropriate insertion force must be used. The minimum force necessary to seat modular jacks with LED's onto a pc board with nominal size holes is provided in Figure 5. Insertion force for all other variations must be determined by using the data stated.

#### NOTE



For example, modular jacks without LED's would require slightly less insertion force, and modular jacks seated onto pc boards with minimum size holes would require significantly more insertion force than stated in Figure 5.

MODULAR JACK	MINIMUM INSERTION FORCE (N [lbs-Force])
	(Modular Jacks with LED's onto PC Board with Nominal Size Holes)
1X1	234 [48]
1X4	707 [159]

Figure 5

### 3.8. Checking Installed Connector

All contacts, pc board ground pins, and pc board side ground pins (if applicable) must be fully inserted into the pc board holes. All standoffs must be seated on the pc board not exceeding the dimensions shown in Figure 6. See customer drawing for additional details.

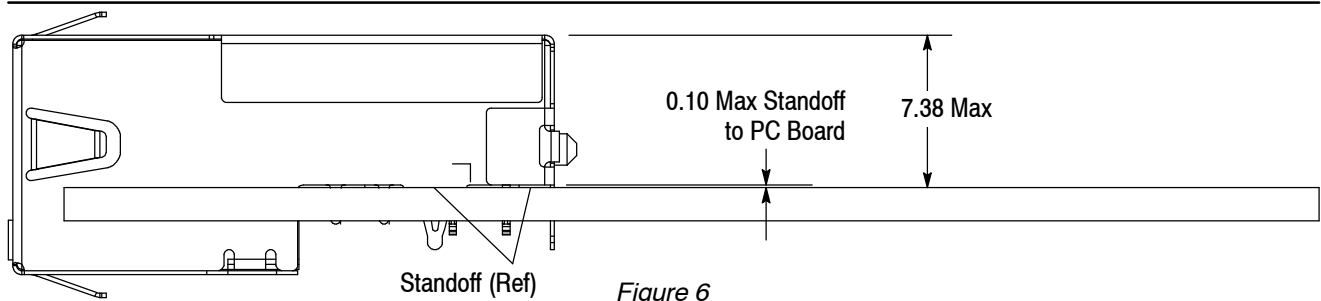


Figure 6

### 3.9. Panel Mounting

The panel must be cut using the dimensions provided on the customer drawing for the specific modular jack. The panel thickness shall be approximately 0.60 mm. A reference sample of a recommended panel cutout for the modular jack is shown in Figures 7 and 8.

The panel must provide a cutout that allows proper mounting of the connector. The connector panel ground springs must be compressed by the panel in order to provide an electrical ground between the connector and the panel for EMI suppression. Care must be used to avoid interference between adjacent connectors and other components. Dimensions for panel cutout and minimum allowable distance between cutouts are shown in Figure 8. See the customer drawings for additional details.

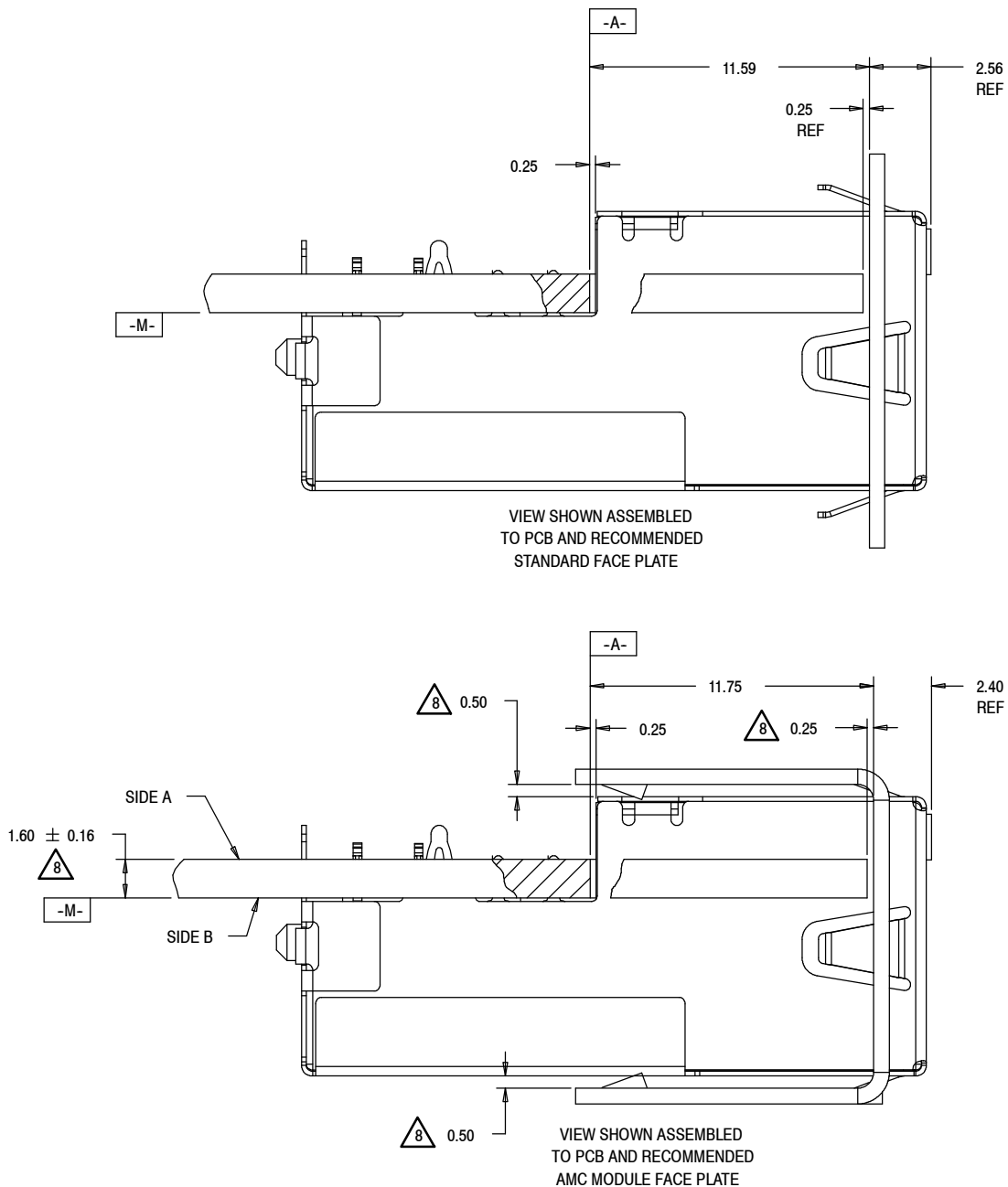


Figure 7

### 3.10. PC Board and Panel Position

The panel and pc board must be positioned in relation to each other in order to avoid interference with the function of the connector panel ground springs. This relationship must conform to the dimensions shown in Figure 8.

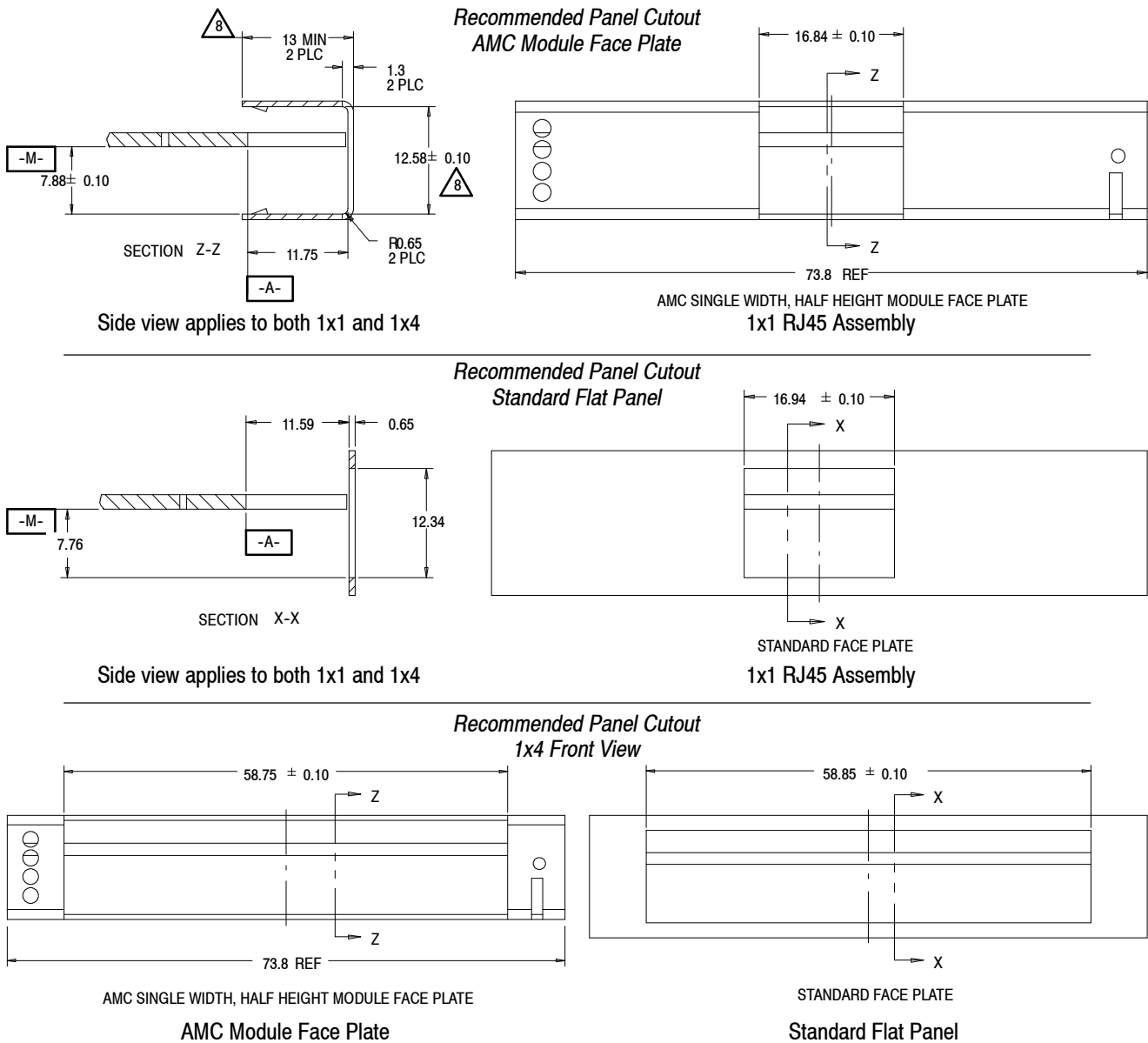


Figure 8

### 3.11. Placement

The following requirements also apply to connectors used for rework purposes.



Connectors should be handled only by the shield and to avoid deformation, contamination, or damage to the compliant pin contacts.

#### A. Registration

The 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. The shield pins will need to be located first, followed by the signal contacts and then the LED contacts.

## B. Seating

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

Number of compliant pins X 22.25 N [5 lbs] (Force per Compliant Pin) = Seating Force



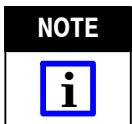
*Over-driving of the connector will deform parts critical to the quality of the connection to the pc board. Maximum force occurs prior to the connector assembly bottoming on the pc board.*

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

Seating Height (Connector Seated) + Height of Tool + PC Board Thickness + PC Board Support Base  
= Shut Height of Ram

The seating height, measured from the top of the connector assembly (not including panel ground springs or fold over tabs) to the top of the pc board, is given in Figure 6.

The connector assembly must be seated on the pc board not to exceed the dimensions shown in Figure 6.



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

## 3.12. Checking Assembly

After assembly, the panel must compress the connector panel ground springs. A slight bow in the shield is permitted. The panel and pc board must be positioned according to the dimensions shown in Figure 8.

## 3.13. Repair/Replacement

These modular jacks are not repairable. Damaged or defective modular jacks **MUST NOT** be used. Damaged or defective modular jacks must be removed and replaced. Modular jacks may be removed by standard desoldering methods. The modular jacks **MUST NOT** be re-used after being removed from the pc board.

## 4. QUALIFICATIONS

No qualification documentation is available at the time of publication of this document.

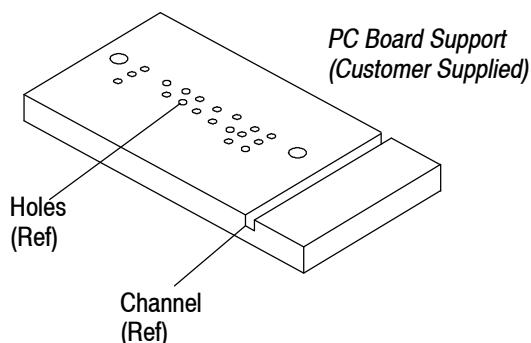
## 5. TOOLING

### 5.1. PC Board Support

A pc board support must be used with the seating tool. The support fixture provides proper support for the pc board and protects the pc board and the connector assembly from damage. The support fixture must be customer designed. 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 channels long enough and deep enough to receive any protruding components of the connector assembly or customer pc board. See Figure 9.

### 5.2. Arbor Frame Assembly

Manual arbor frame assemblies are used to exert a downward force used to apply connectors to a pc board using seating tools. These frame assemblies are commercially available or you may contact Tyco Electronics Tooling Center at the bottom of page 1. See Figure 9.



Arbor Frame Assembly  
(Commercially Available or  
Contact Tyco Electronics)

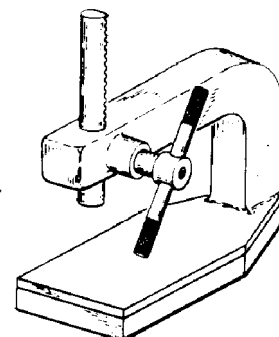
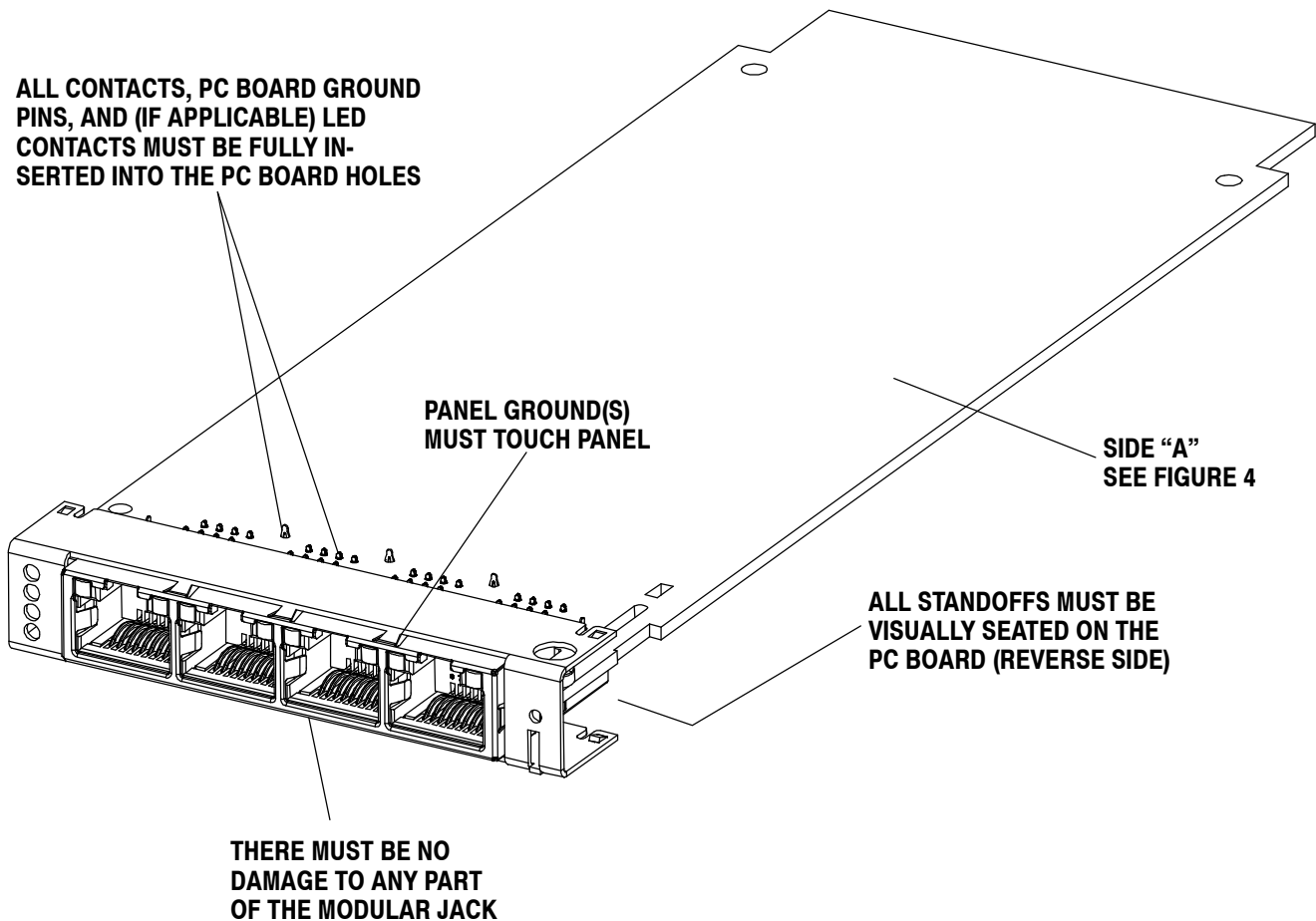


Figure 9

## 6. VISUAL AID

Figure 10 shows a typical application of a Category 5, Shielded, Offset, Press Fit, Modular Jack with Integrated Light Emitting Diodes (LED). 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.

**NOTE: 1X4 AMC MODULE FACE PLATE AND CARD SHOWN, 1X1 WOULD HAVE THE SAME REQUIREMENTS (ASSEMBLY SHOWN IN TAB UP ORIENTATION)**



**FIGURE 10. VISUAL AID**