



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 ± 0.13 mm 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 TE Connectivity Economy Power (EP) High-Temp PCB Headers using Pin-in-Paste re-flow technology. These products are designed for secondary power circuit applications. These are available at a contact centerline spacing of 3.96mm. During mating, the positive locking lever on the outside of the plug housing engages the mating header housing to provide for greater retention. This helps maintain reliable connections, when other non-locking type connectors could vibrate apart. This same locking lever must be depressed to un-mate the connectors. The locking mechanism is also located high enough to help avoid interference with printed circuit (pc) board clear plastic coating (potting), which is a common treatment for many home appliances.

Headers with a 3.96 mm [.156 in.] centerline are offered in single-row 2 through 8 positions. These are provided tubes for automatic machines. The slim, vertical, post headers are stackable end-to-end for greater flexibility when designing pc board configurations. The mating height of a low-profile plug and vertical header is 16.3 mm [.642 in.] above the pc board. Compact dimensions like these are well suited for most applications in confined spaces.

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

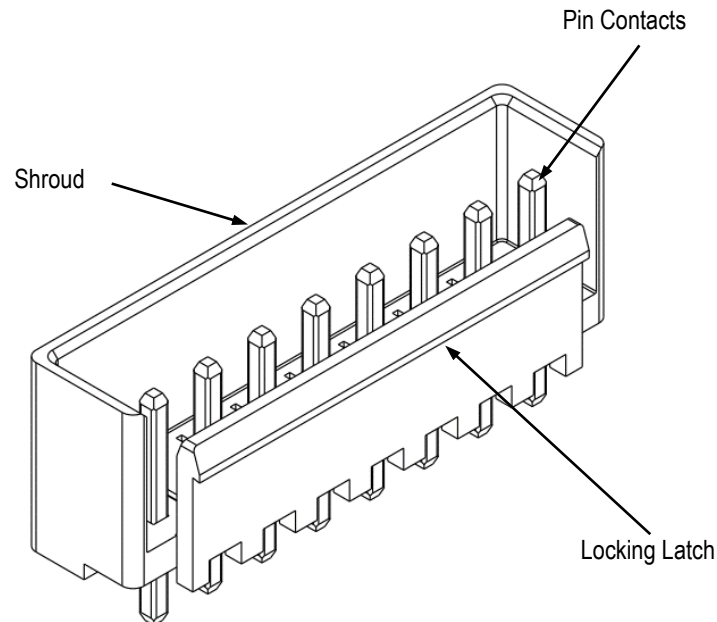


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Initial release of application specification

2.2. Customer Assistance

Reference Product Base Part Number 2213738 and Product Codes L837 is representative of the EP Connectors. Use of these numbers will identify the product line and help you to obtain product and tooling information. Such information can be obtained through a local TE Representative, by visiting our website at www.te.com, or by calling PRODUCT INFORMATION or the TOOLING ASSISTANCE CENTER at the numbers 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. Manuals

Manual [402-40](#) can be used as a guide to soldering. This manual provides information on various flux types and characteristics with the commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

2.5. Specifications

Product Specification [108-5609](#) 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. 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. Reeled Products

Store coil wound reels horizontally and traverse wound reels vertical.

D. 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

3.3. Header Assemblies

The pc board vertical header assemblies are supplied with pre-installed contacts that have vertical solder tines. They are designed to mate with connectors that have precision formed, crimp-type contacts inserted into 2 through 8 position housings. The header assemblies are soldered to the pc board.

3.4. PC Board

A. Material and Thickness

1. Board material will be glass epoxy (FR-4, G-10).
2. Board thickness shall be 1.78 mm max.



NOTE

Contact the Product Information Center or the Tooling Assistance Center numbers listed at the bottom of page 1 for suitability of other pc board materials or thicknesses.

B. Tolerance

Maximum allowable bow of the pc board shall be 0.03 mm over the length of the header assembly.

C. PC Board Layout

The contact holes in the pc board must be precisely located to ensure proper placement and optimum performance of the header assembly. Design of the pc board using the dimensions provided in Figure 2. The layout shows the top (component) side of the pc board.

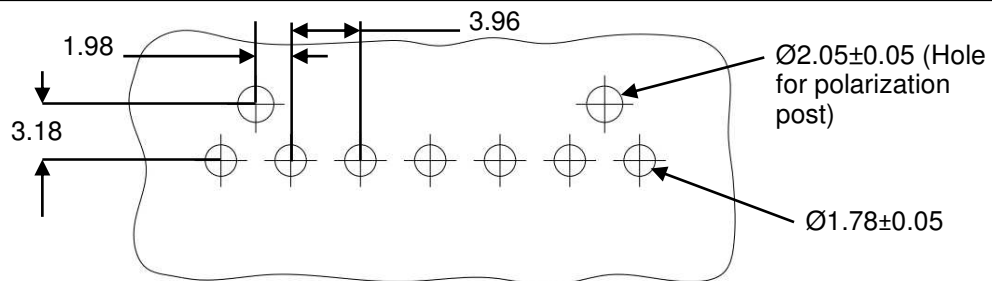


Figure 2

3.5. PC Board Solder Tine Holes

The holes in the pc board for the solder tines must be drilled and plated through to specific dimensions. See Figure 3.

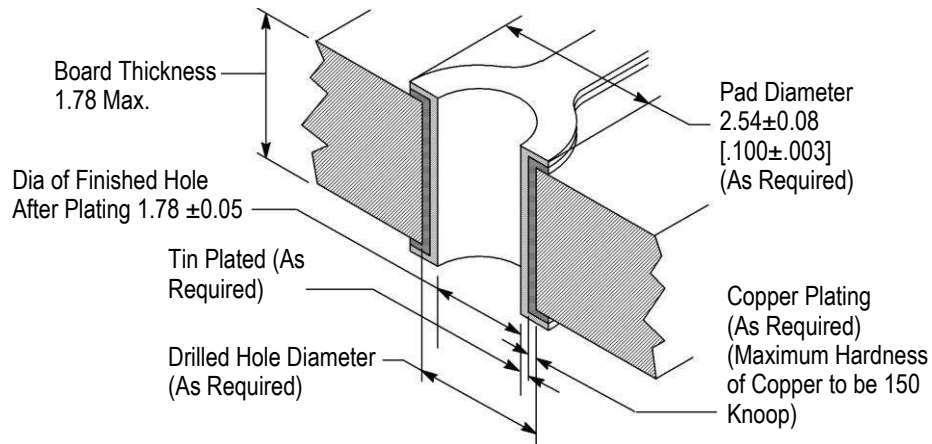


Figure 3

3.6. PC Board Header Assembly Placement



CAUTION

The header assemblies should only be handled by the housing to prevent deformation or other damage to the solder tines.

A. Manual Placement

Align the header assembly solder tines with the appropriate holes in the pc board. Start all solder tines into the pc board, then press on the header until it seats on the pc board.

B. Robotic Placement

The robotic equipment must be adjusted to feed, pick up, and place the headers on the pc board with an accuracy of 0.25 mm. For information on robotic equipment, see Section 5, TOOLING.

3.7. Soldering

Observe guidelines and procedures when soldering contacts. Solder, clean, and dry all leads to contacts according to the following. The connectors should be soldered using vapor phase reflow (VPR), double-sided, non-focused infrared (IR), forced air convection, or equivalent soldering techniques. All solder joints should conform to the Workmanship Specification IPC-A-610 and IPC J-STD-001.

A. Flux Selection

Contacts must be fluxed prior to soldering with a mildly active, rosin base flux. Selection of the flux will depend on the type of pc board and other components mounted on the board. Additionally, the flux must be compatible with the wave solder line, manufacturing, health, and safety requirements. Flux that is compatible with the connectors is provided in Figure 4.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER	ALPHA
Type RMA (Mildly Activated)	Mild	Noncorrosive	185/197	611

Figure 4

KESTER and ALPHA are trademarks of their respective owners.

A. Solder Mask

Solder mask is recommended between all pads when soldering pc boards with surface mount contacts to minimize solder bridging between pads. The mask must not exceed the height of the pad by more than 0.05 mm. If a trace is run between adjacent pads of the pc board, a solder mask must

be applied over the trace to prevent bridging and wicking of solder away from the contact solder tines. Those most suitable are Liquid Photo Imageable and Dry Film.

B. Process

PC Boards with EP Header Pin-In-Paste contacts should be soldered using vapor phase (VPR), double-sided, non-focused infrared reflow (IR) or equivalent soldering techniques. Due to many variables involved with the reflow process (i.e., component density, orientation, etc.), it is recommended that trial runs be conducted under actual manufacturing conditions to ensure product and process compatibility. The EP Header contacts will withstand the temperature and exposure time specified in Figure 5.

SOLDERING PROCESS	TEMPERATURE (Max)	TIME (At Max Temperature)
IR	220°C [428°F]	3 Minutes

Figure 5

The lead-free reflow is shown in Figure 6.

Kester Lead-Free Reflow Profile
Alloys: Sn96.5/Ag3.0/Cu0.5 and Sn96.5/Ag3.5

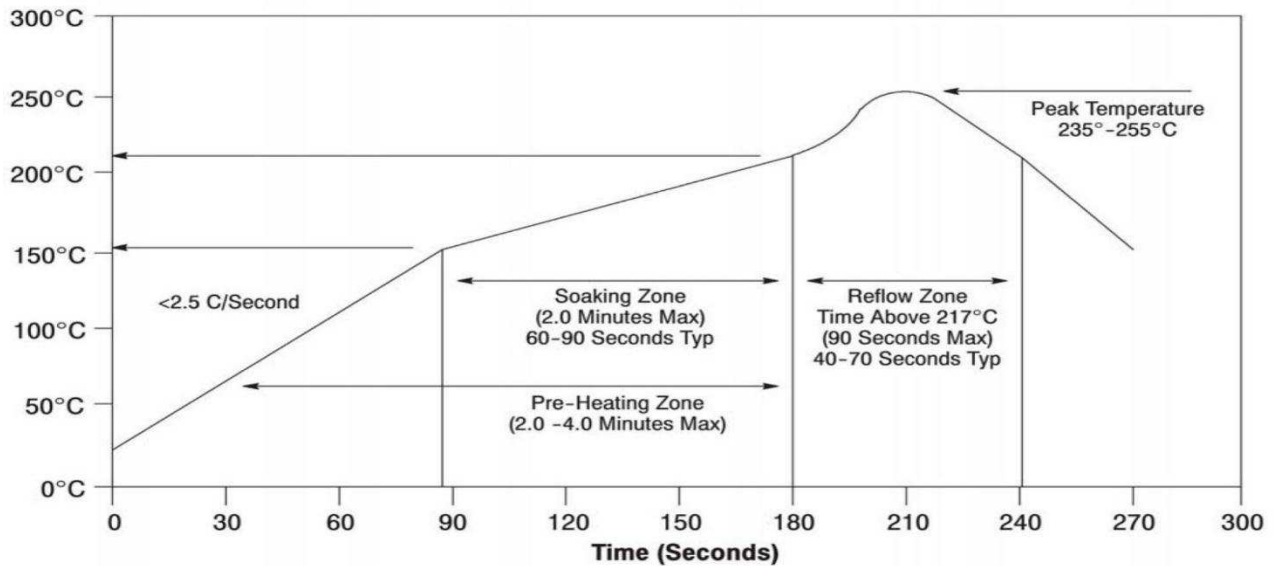


Figure 6

C. Solderability

The pc board pads must be solderable in accordance with IPC/EIA J-STD-003 and all other requirements for surface mount and through-hole contacts specified in this document.

D. Solder Paste Characteristics

- a. Alloy type shall be SAC 305; Sn 96.5/Ag 3.0/Cu 0.5.
- b. Flux incorporated in the paste shall be rosin, mildly active (RMA) type.
- c. Paste will be at least 80% solids by volume.
- d. Mesh designation -200 to +325 (74 to 44 square micron openings, respectively).
- e. Minimum viscosity of screen print shall be 5x10% cp (centipoise).
- f. Minimum viscosity of stencil print shall be 7.5x10% cp (centipoise).

E. Solder Volume

Recommended Deposited Solder Paste Volume: **2.29mm³** minimum (based upon 90% solids content in solder paste. If using a solder paste with different solids content this number will need to be adjusted to achieve roughly the same amount of reflowed solder volume)

i **NOTE**
Solder paste volumes are required as follows (calculated per 90% solids content).
Paste volume may vary depending on the composition.

F. Stencil Requirements

Solder paste stencil thickness is 0.007". The shape and location of solder paste stencil apertures are shown in Figure 7.

i **NOTE**
All traces must be covered by solder mask in the solder deposit area. Exposed traces could cause bridging and create a short, or wick solder away from the solder tines, producing a weak solder joint.

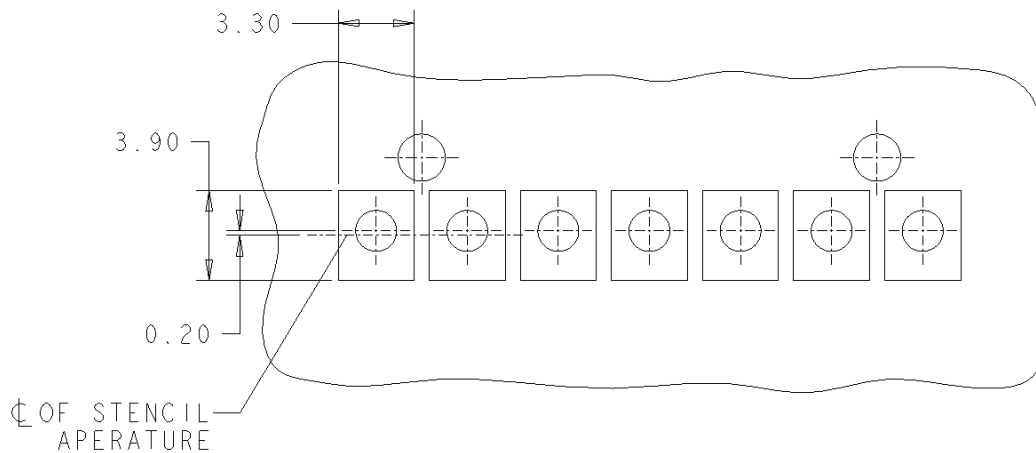


Figure 7

G. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Common cleaning solvents that will not affect the connectors or assemblies for the times and temperatures provided without any adverse effects on the connector assembly are listed in Figure 8.

! DANGER
Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Trichloroethylene and Methylene Chloride can be used with no harmful effect to the connectors; however, TE does not recommend them because of the harmful occupational and environmental effects. Both are carcinogenic (cancer-causing) and Trichloroethylene is harmful to the earth's ozone layer.

! CAUTION
If you have a particular solvent that is not listed, contact TE Tooling Assistance Center or Product Information at the number on the bottom of page 1.

CLEANER		TIME (Minutes)	TEMPERATURE (Max)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
BIOACT EC-7	Solvent	5	100°C [212°F]
Butyl CARBITOL	Solvent	1	Ambient Room
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous		
KESTER 5779	Aqueous		
LONCOTERGE 520	Aqueous		
LONCOTERGE 530	Aqueous		
Terpene	Solvent		

Figure 8

ALPHA, BIOACT, CARBITOL, LONCOTERGE, and KESTER are trademarks of their respective owners.

H. Drying



CAUTION

Excessive temperatures may cause contact plating degradation.

When drying cleaned assemblies and pc boards, temperatures to which the contacts are subject should not exceed 220°C [492°F] for more than 3 minutes.

I. Checking Installed Header Assemblies



NOTE

All solder joints should conform to the requirements specified in this document and those specified in Test Specification 109-11 for through hole mount connectors. The maximum post-solder bow is ±0.25 mm.

The header assembly must be seated on the pc board to the dimensions shown in Figure 9. Solder must be evenly distributed and not cracked. All solder joints should comply with Specification IPC-A-610.



Fully formed solder fillets

Figure 9

3.8. Polarization

The configuration of the contact cavity assures polarization for the mating connectors.

3.9. Mating Connectors

To ensure a proper circuit connection, the receptacle connector latch must fully engage the header assembly locking ramp.

The receptacle has an integral locking latch that should be fully seated and latched to the header assembly locking tab after mating. The locking latch ensures positive mating of connectors. The distance between mating connectors must be considered when determining location of connectors to ensure full mating. The mated dimension of the receptacle housing to the pin header is provided in Figure 10.

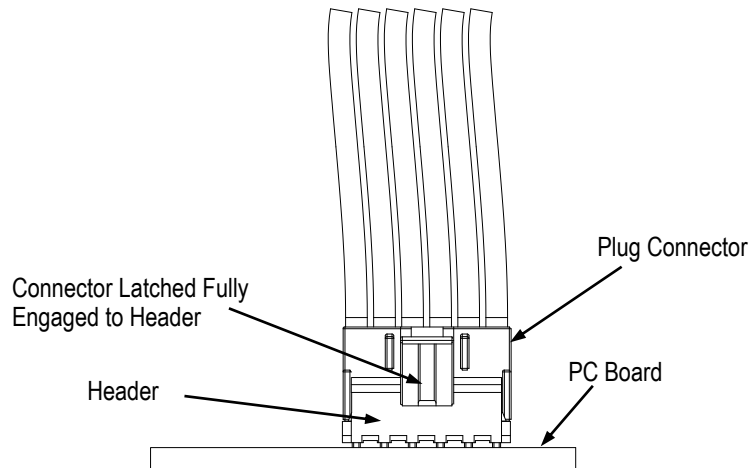


Figure 10



CAUTION

Receptacles will mate only with the appropriate pin headers; the receptacle and pin header must have the identical number of circuit positions and rows.

3.10. Unmating of Connectors

To unmate the plug connector from the header assembly, push on the locking latch with your thumb and pull straight up from the header assembly. See Figure 11.

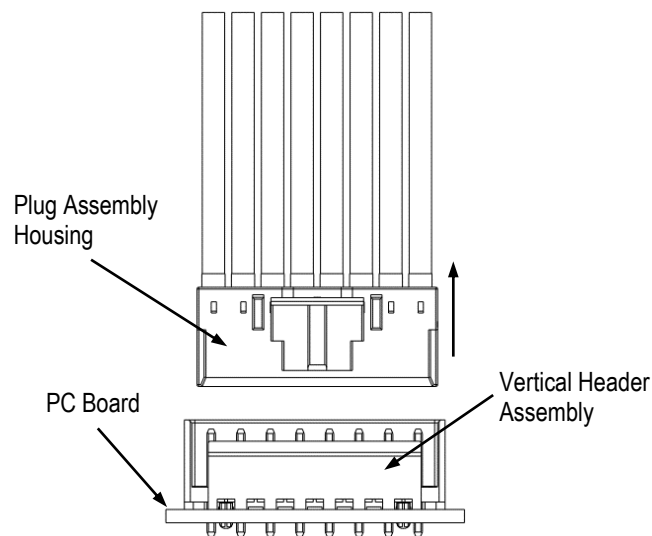


Figure 11

3.11. Repair/Removal

A. Header Assembly

Damaged header assemblies will require standard de-soldering of all contact solder tines and removal of the header from the pc board. Individual solder type contacts cannot be replaced.

4. QUALIFICATION

Economy Power (EP) Headers, Housings, and Receptacles are Component Recognized in UL-1977 and Certified in CSA International C22.2 No. 182.3 by Underwriters Laboratories Inc. (UL) in file E28476.

5. TOOLING

5.1. PC Board Supports

A customer supplied pc board support must be used to prevent bowing of the pc board during insertion of the headers. It should have a flat surface with holes or a channel large enough to receive the solder tines during installation.

5.2. Robotic Equipment

For automatic machine placement, a pc board support must be used to prevent bowing of the pc board during the placement of header assemblies on the pc board. It should have flat surfaces with holes or a channel large enough and deep enough to receive the solder tines. The robotic equipment must have a true position accuracy tolerance to properly locate the solder tines. This includes gripper and fixture tolerances as well as equipment repeatability.

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.

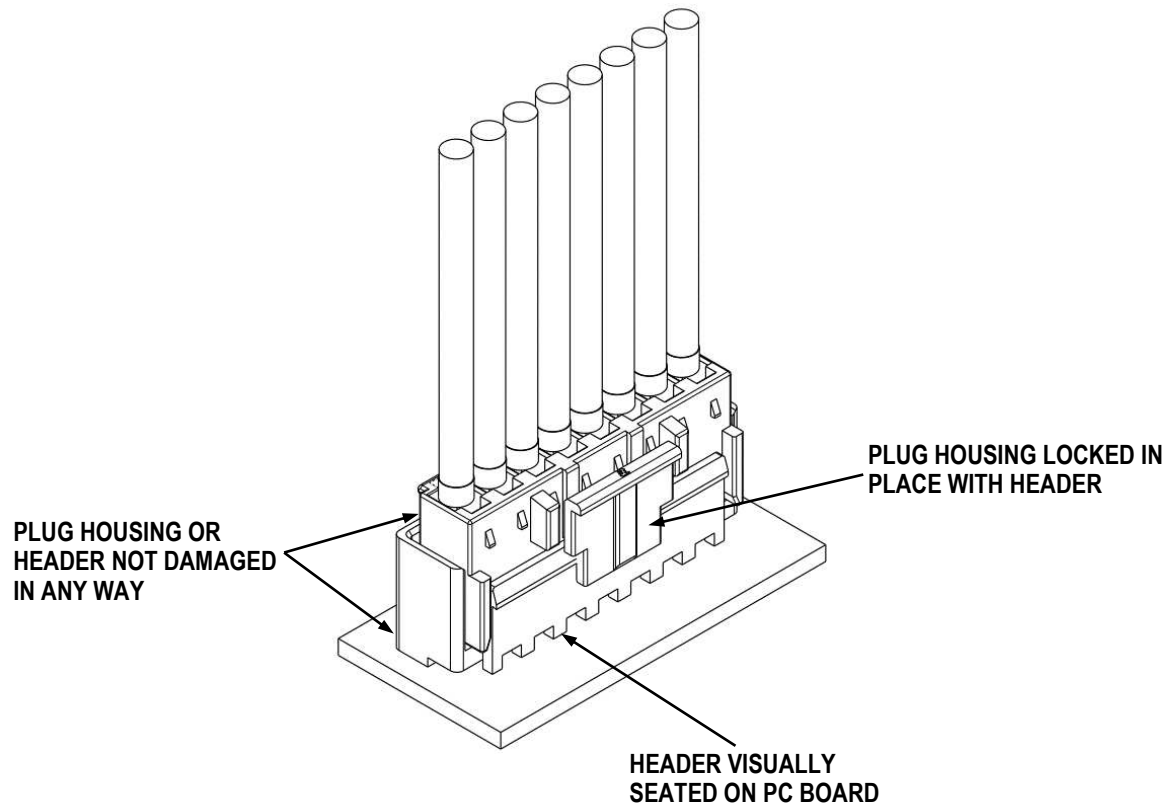


FIGURE 12. VISUAL AID