



NOTE

All numerical values are in metric units [with U.S. customary units in brackets]. Dimensions are in millimeters [and inches]. Unless otherwise specified, dimensions have a tolerance of ± 0.13 [± 0.005] 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 High-Temperature Universal MATE-N-LOK Printed Circuit (PC) Board Headers using Pin-in-Paste solder re-flow technology. The vertical pin and socket headers are available in 2- through 6-circuit single-row versions and 6 through 15 circuit three row versions and are intended for board-to- wire applications.

When corresponding with TE Connectivity 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.

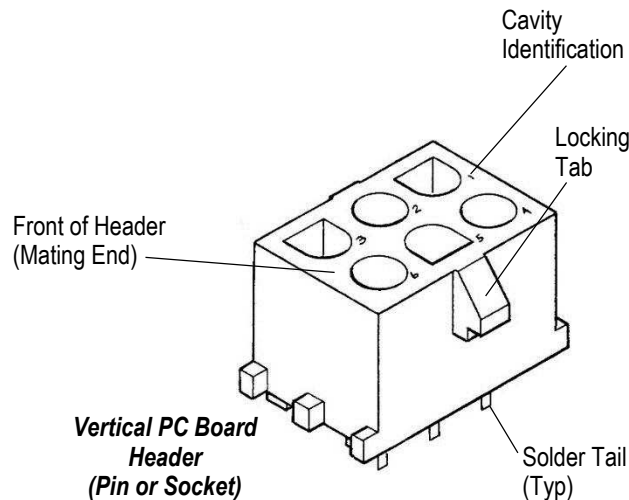


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- ◆ Rev A: New Release.
- ◆ Rev B: Updated typographical errors.
- ◆ Rev C: Updated stencil details and pcb layout.

2.2. Customer Assistance

Reference Product Base Part Number 2213752, 2213753, 2213755, 2213756 and Product Code L837 are representative numbers of the High-Temp Universal MATE-N-LOK product line. 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 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

Product Specifications [108-1053](#) (for headers) provides product performance requirements and test result information.

2.5. Manuals

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

3. REQUIREMENTS

3.1. Storage

A. Ultraviolet Light

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

B. Reel Storage

When using reeled contacts, store coil wound reels horizontally and traverse wound reels vertically.

C. Shelf Life

Each connector is packaged and shipped in an individual antistatic tube container or tape and reel. To prevent damage to the housings and contact solder tines, the connectors should remain in the container until ready for installation. Also, to prevent possible storage contamination and ensure maximum solderability, the connectors should be used on a first in, first out basis.

D. Chemical Exposure

Do not store contacts near any of the following chemicals as they may cause stress corrosion.

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



NOTE

Where the above environmental conditions exist, phosphor-bronze contacts are recommended instead of brass if available.

3.2. PC Board

A. Material and Thickness

1. Board material will be glass epoxy (FR-4, G-10).
2. The connector headers can be installed on pc boards up to 1.57 mm [.062 in.] thick for standard tails, and 3.18 mm [.125 in.] for long tails. Board thickness may vary depending upon the application. Contact the Product Information Center or the Tooling Assistance Center number listed at the bottom of page 1 for suitability of other board materials or thicknesses.

B. Tolerance

Maximum allowable bow of the pc board shall be 0.25 mm [.010 in.] over the length of the socket.

C. PC Board Layout

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



NOTE

Figure 2 represents a typical pc board layout for this product. For dimensions and hole pattern layout for specific product, obtain the appropriate customer drawing through your Tyco Electronics Representative or refer to the telephone numbers at the bottom of page 1.

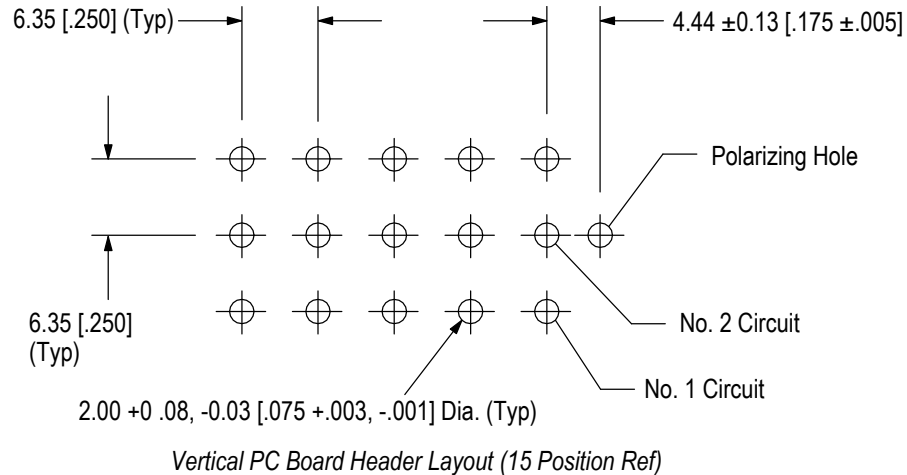


Figure 2

3.3. Contact Hole Configuration

The contact holes in the pc board must be prepared as specified in Figure 3.

NOTE: The drilled hole diameter must be sized so that the diameter of the finished hole after plating meets the dimensions as shown.

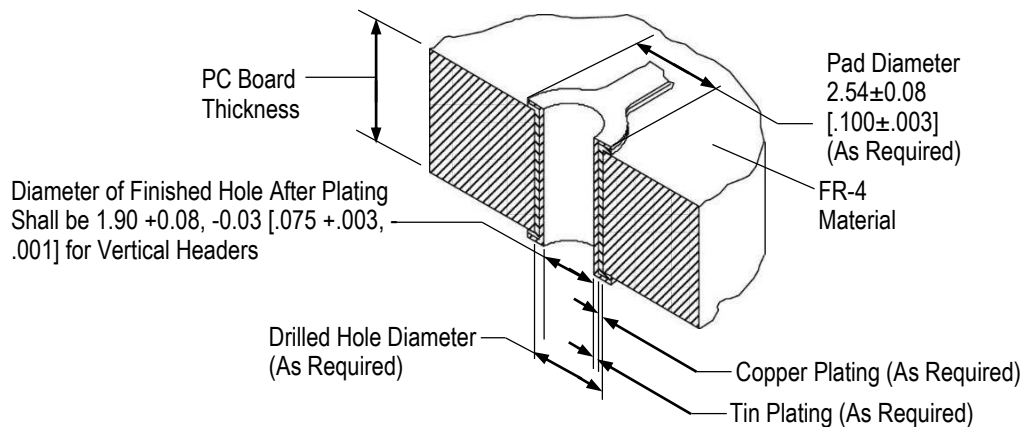


Figure 3

3.4. 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 Universal MATE-N-LOK 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 Universal MATE-N-LOK 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

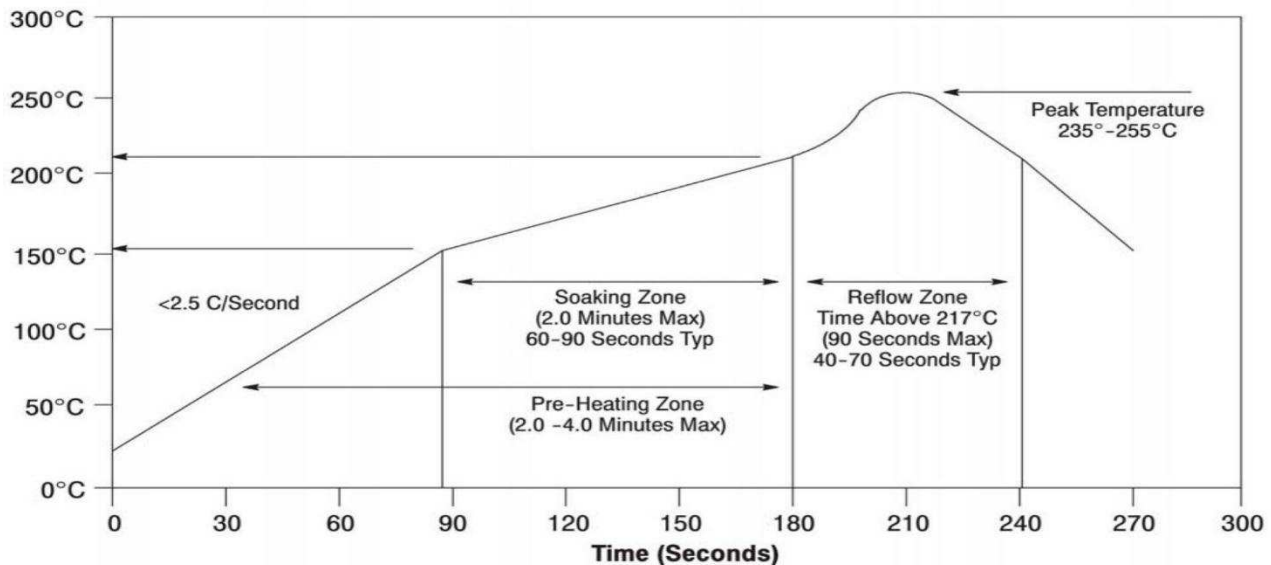


Figure 6

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

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

E. Solder Volume

**NOTE**

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

Recommended Deposited Solder Paste Volume: **3.04mm³** 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)

G. Stencil Requirements

Solder paste stencil thickness is 0.006". The stencil shape is 4.50mm x 4.50mm. The shape and location of solder paste stencil apertures are also shown in Figure 7.

**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.

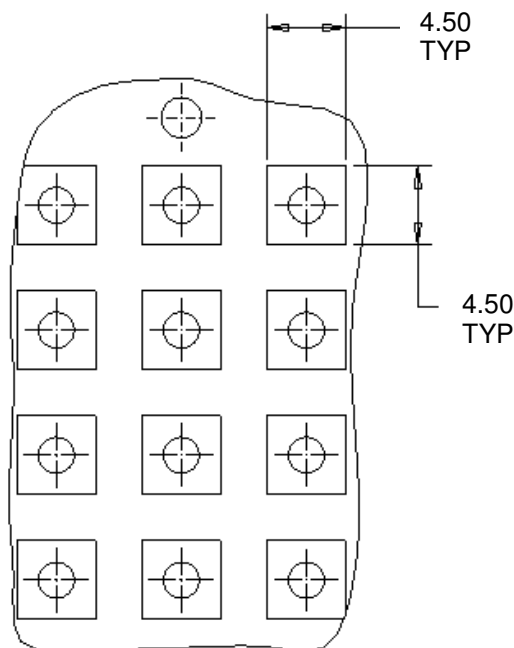


Figure 7

H. 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.

I. 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.

J. 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.

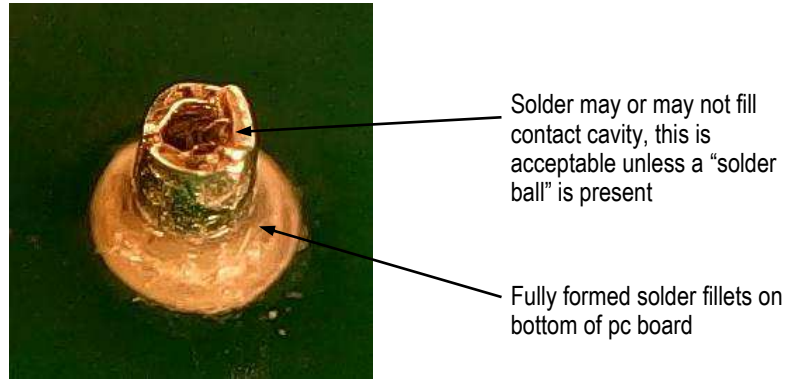


Figure 9

3.5. Repair/Replacement

The contacts and housings are not repairable.



CAUTION

DO NOT use damaged or defective contacts or housings. DO Not remove the wire and re-terminate contacts.

4. QUALIFICATION

The Universal MATE-N-LOK Connectors are Recognized by Underwriters Laboratories Inc. (UL) in File Number E28476.

5. TOOLING

This section provides a selection of tools for various application requirements. Modified designs and additional tooling concepts may be available to meet other application requirements. A list of tooling recommendations and instructional material packaged with the tooling covering the full wire size range is provided in Figure 19.



NOTE

Tool Engineers have designed machines for a variety of application requirements. For assistance in setting up prototype and production line equipment, contact Tool Engineering through your local TE Representative or call the Tooling Assistance Center number at the bottom of page 1.

◆ **Robotic Equipment**

The robotic equipment must have a true position accuracy tolerance of 0.25 mm [.010 in.] to properly locate the connectors for insertion. This includes gripper and fixture tolerances as well as equipment repeatability.

◆ **Board Supports**

A pc board support must be used to prevent bowing of the pc board during the placement of a connector on the board. It should have flat surfaces with holes or a channel wide enough and deep enough to receive the contact solder tails and boardlocks or other attaching hardware during installation of the connector on the board.

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.

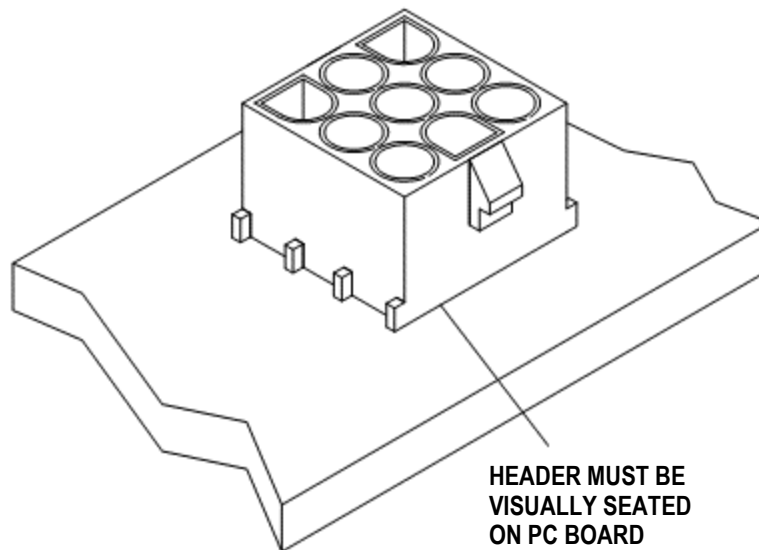


FIGURE 10. VISUAL AID