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 ±2°. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of thru-hole solder tine FASTON contacts onto printed circuit (pc) boards using Pin-In-Paste solder re-flow technology. The products covered by this application specification include TAB, and RECEPTACLE versions of 187 and 250 series printed circuit (pc) board FASTON contacts, as specified in figure 1.

Applying the specified contacts with Pin-In-Paste solder re-flow technology allows the contacts to be placed onto a pc board that has been prepared with solder paste, and then re-flow the solder paste to complete the installation. This eliminates intermediate clinching/deforming of the contact solder tines prior to soldering.

The contacts are available in loose-piece form, for manual application, and continuous strip, packaged on a reel, for automatic machine application.

NOTE
Only those FASTON pc board mount products specified in Figure 1 have been tested to confirm Pin-In-Paste solderability performance. Other FASTON pc board mount products have not been tested, or, are not suitable for Pin-In-Paste solder re-flow processing.

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.

PC Board FASTON Contacts
187 Series Tab
63860-1
1742361-1
250 Series Tab
63824-1
63862-1
1742188-1
63849-1
250 Series Receptacle
63968-1
63969-1 63994

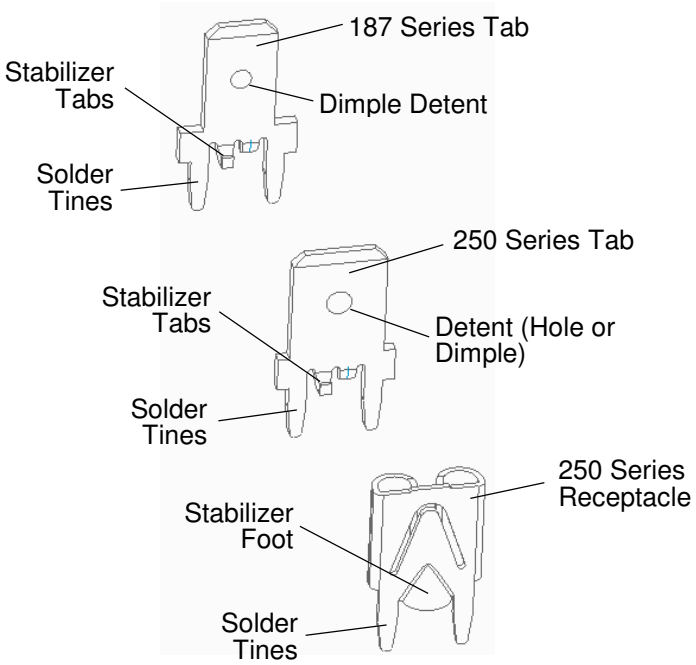

Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- None

2.2. Customer Assistance

Reference Product Base Part Numbers 63824-1 and Product Code A457 are representative of the FASTON Tab contacts. 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 this page.

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 is available from the service network. This manual provides information on various flux types and characteristics along with the commercial designation and flux removal procedures. A checklist is included in the manual as required for information on soldering problems.

2.5. Specifications

Workmanship Specification IPC-A-610 provides solderability requirements and evaluation methods.

2.6. Reference Materials

A. Application Specification
114-2115: FASTON Series Tab Contacts for Printed Circuit (PC) Board Applications
114-2156: FASTON .250/.205 Series Printed Circuit (PC) Board Receptacles

3. REQUIREMENTS

3.1. Safety

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

3.2. Limitations

The contacts are designed to operate in a maximum temperature of 110°C [230°F].

3.3. Material

The contacts are made of copper alloy, under-plated with copper or nickel, and plated overall with tin.

3.4. 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

3.5. PC Board

Common pc board materials may be used, such as glass epoxy (FR-4 or G-10). The pc board must be solderable in accordance with IPC J-STD-003.

A. Pads

The pc board circuit pads must be solderable in accordance with IPC J-STD-003. Plated-Thru-Hole (PTH) must connect the top/bottom pads on pc board.

B. Layout

The recommended pad layout is shown in Figure 2.

NOTE
FASTON pc board mount Receptacle contacts require component-side solder pad with "offset stabilizer" as shown in Figure 2. The offset stabilizer feature is required in order to provide the specified product performance.

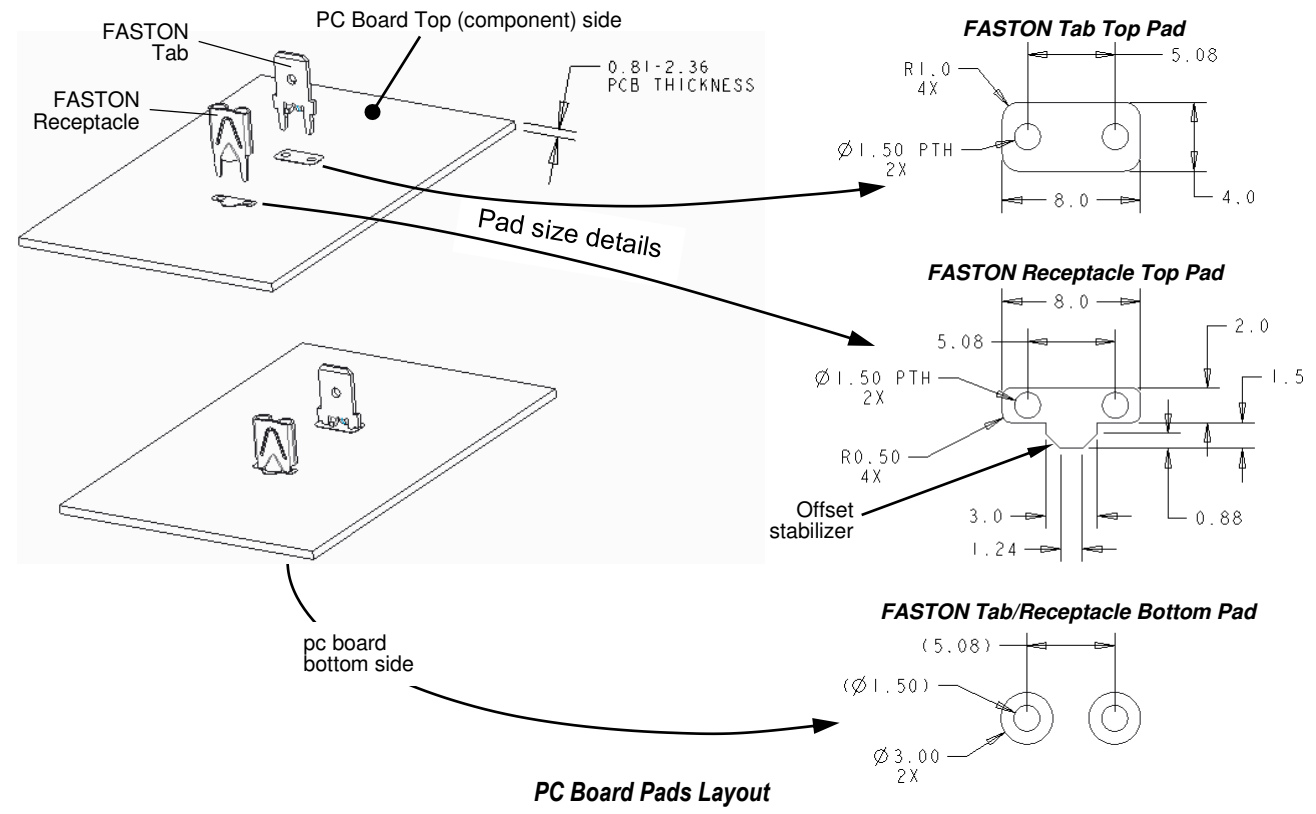

Figure 2

3.6. FASTON Contact Installation

The contact installation is similar for both Tab and Receptacle contacts. However, the Receptacle contact has an orientation with respect to the pc board pad that must be observed. Contacts provided loose-piece can be placed on the pc board manually. Alternatively, contacts can be provided on a reel and placed with an automatic machine having a cut-off and gripper tool. The installation procedure for each contact is described below and is shown in Figure 3.

1. Prepare the pc board by applying solder paste to contact locations using stencil (ref. para. 3.7G, Figure 7).
2. Orient FASTON contact perpendicular to the pc board and align the contact solder tines with the plated-thru-holes (PTH) of the component (top) side solder pad where the contact is to be placed.
    a. Tab contacts do not have a preferred orientation with respect to the component side solder pads. Either solder tine of the Tab contacts may be placed into either of the 2 PTHs of the component solder pads.
    b. Receptacle contacts have a preferred orientation with respect to the component-side solder pads that must be observed. The Receptacle Stabilizer Foot must align with the pc board pad "offset stabilizer" feature as shown in Figure 3.

CAUTION
Receptacle Contact Stabilizer Foot must align with pc board Offset Stabilizer pad as specified in para. 3.7,2,b and shown in Figure 3. Failure to maintain the specified alignment results in contact damage during solder paste re-flow.

3. Insert the FASTON contact solder tines into the PTHs of the solder pad and place the FASTON component onto the pc board. The FASTON contact solder tines must go through the solder paste covering the PTHs of the solder pad. The contact must be placed so the Stabilizer Tab/Foot is fully in contact with the solder paste and resting on the pc board.
4. With contacts placed on the pc board, carefully handle the pc board assembly to avoid disturbing the placement of contacts prior to solder re-flow.

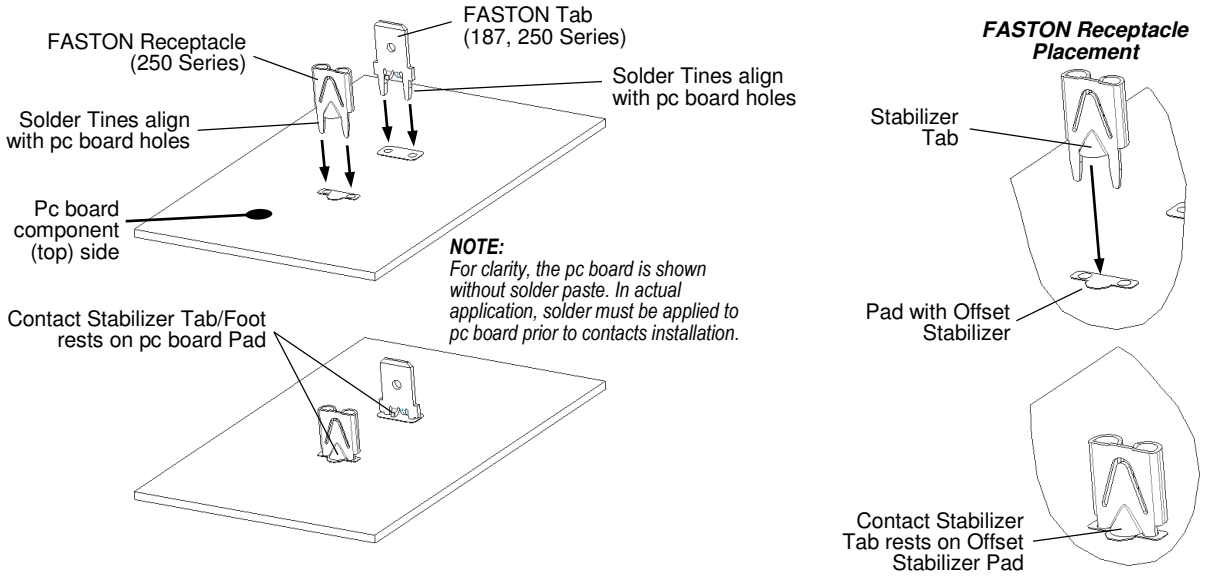

Figure 3

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.

B. 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.

C. Process

PC Boards with FASTON 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 FASTON 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.

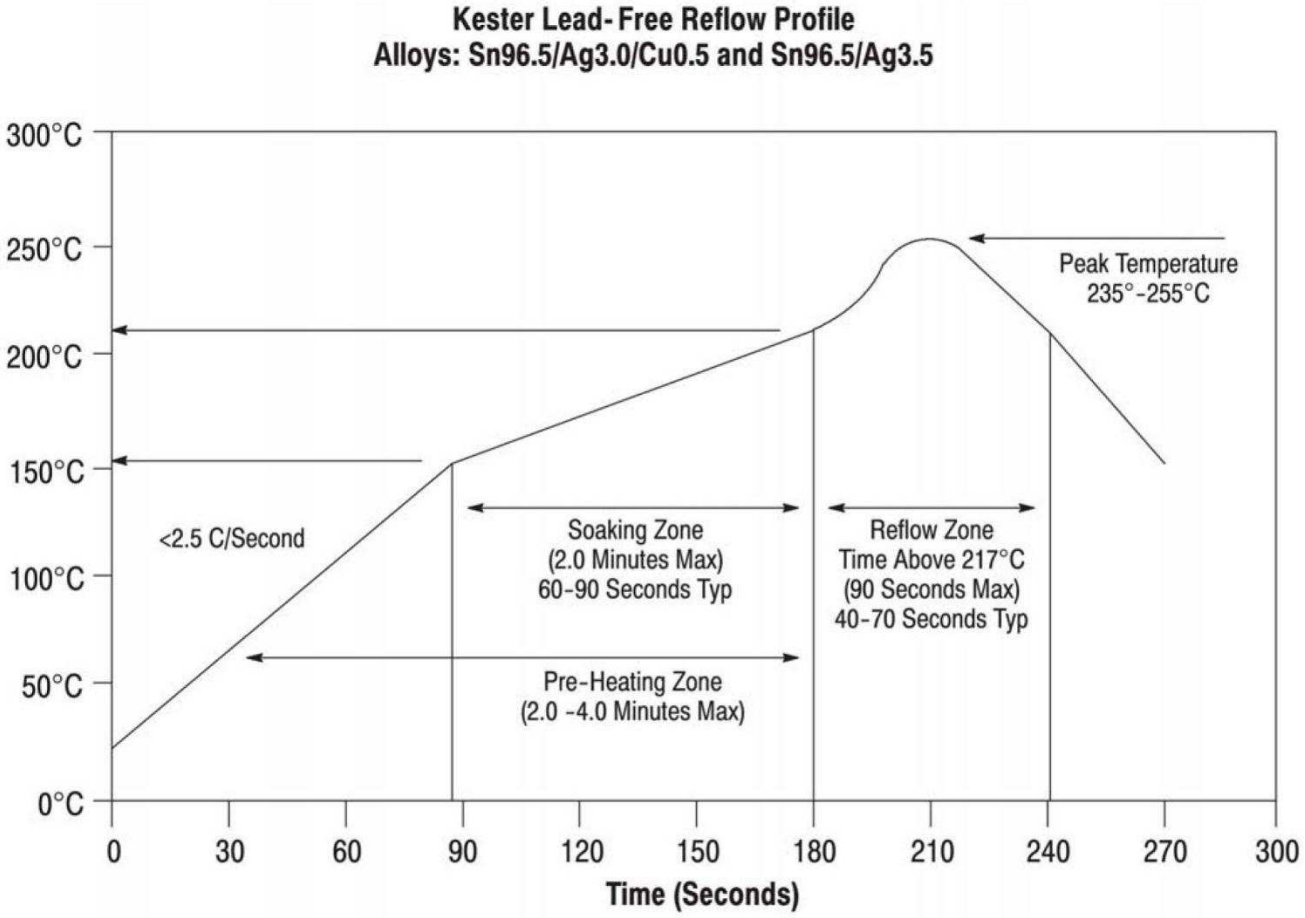

Figure 6

A. 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.

B. 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).

C. Solder Volume

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

Solder paste volume for each FASTON Printed Circuit Board Contact must be according to the following: 7.8 mm^3 per FASTON contact.

G. Stencil Requirements

Solder paste stencil thickness is 0.13mm. The shape and location of solder paste stencil apertures are 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.

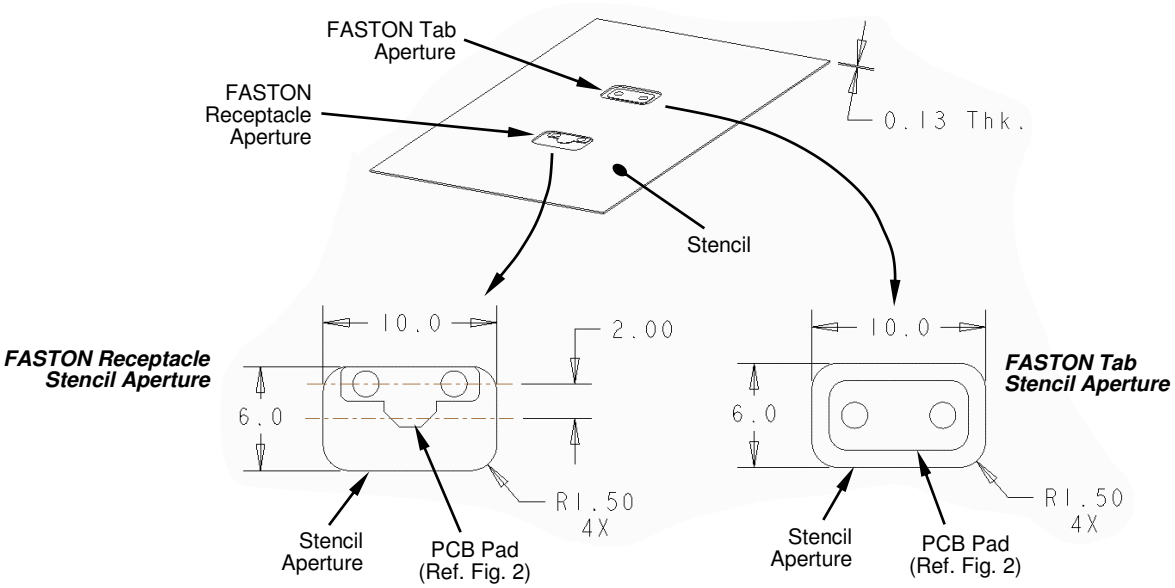

Figure 7

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.

3.8. Checking Installed Contacts

All solder joints should comply with Specification IPC-A-610. For typical fillets for surface mount and through-hole tine requirements, refer to Figure 9.

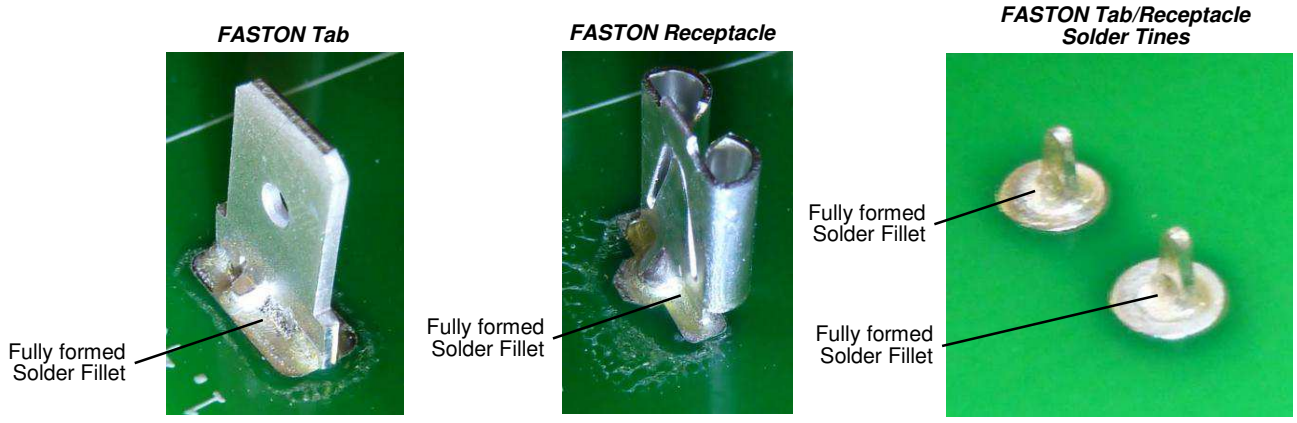

Figure 9

3.9. Replacement and Repair

The contacts are not repairable.

CAUTION
DO NOT use damaged or defective contacts.

4. QUALIFICATIONS

All contacts are Recognized by Underwriters Laboratories Inc. (UL) in File Number E66717 and have been certified by CSA International in File Number LR7189.

5. QUALIFICATIONS

5.1. Robotic Equipment

Robotic installation equipment must have a true position accuracy tolerance of 0.25 mm to properly locate the FASTON contacts. This includes gripper and fixture tolerances as well as equipment repeatability.

5.2. PC Board Support

For automatic machine placement, a pc board support must be used to prevent bowing of the pc board during the placement of FASTON contacts. It should have flat surfaces with holes or a channel large enough and deep enough to receive protruding solder tines. The pc board support must be customer made.

6. VISUAL AID

The illustration below (Figure 10) shows a typical application of FASTON Pin-In-Paste contacts. 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.

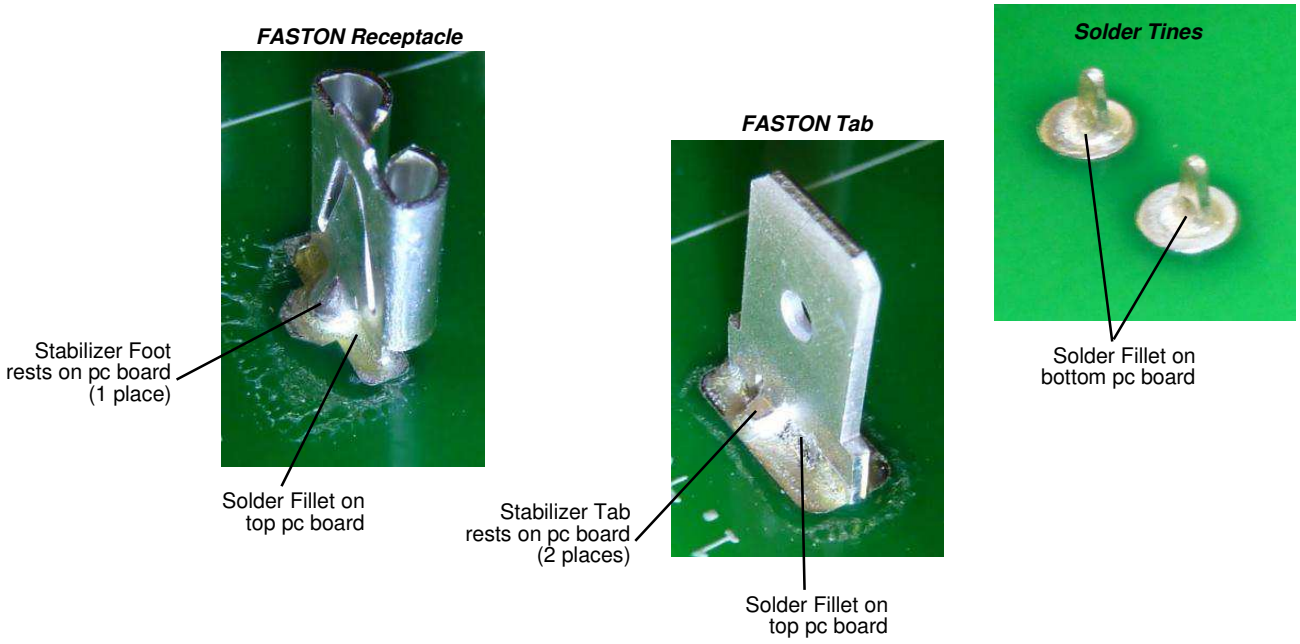

FIGURE 10. VISUAL AID