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 [±.005] 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 the SLIVER 2.0 4C Vertical Card Edge Connector with High Power, a power/signal hybrid connector that contains 140 signal contacts and 4 high power contacts. The connector consists of a housing with solderable metal hold downs, vertical surface-mount contacts having a 0.6mm pitch between centerlines and 4 through hole power contacts. The connector features a paddle card entry slot that accepts 1.57±0.13 [0.62±0.005] thick integrated circuit card, overmold to hold the contacts in place, and alignment posts and hold downs for stability and placement of the connector on the pc board.

The connector is supplied in trays for manual or robotic machine placement.

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

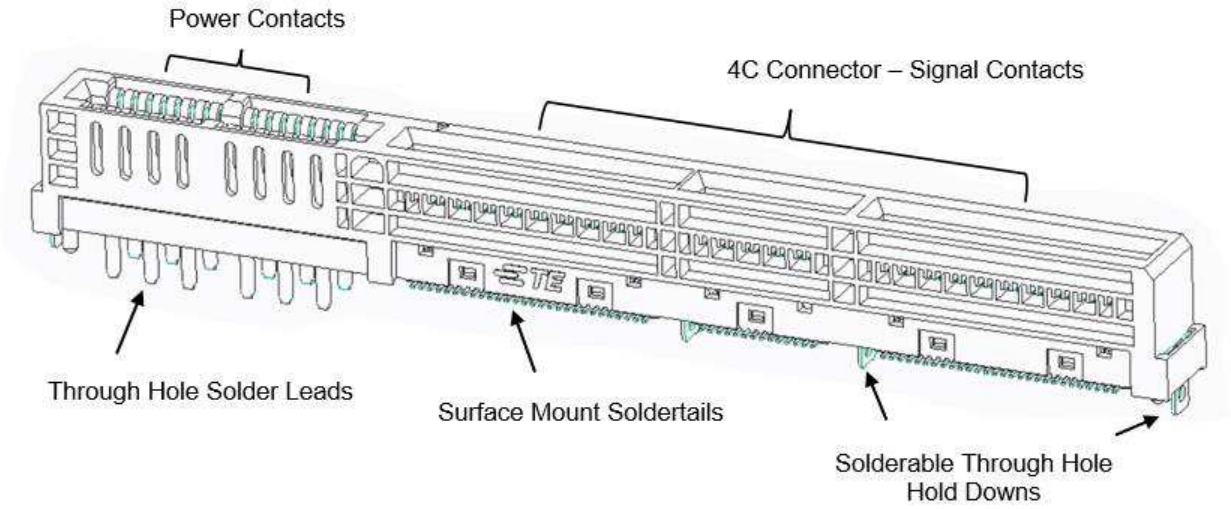


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Initial release of application specification.

2.2. Customer Assistance

Reference Product Base Part Number 2338718 and Product Code L370 are representative of the SLIVER 2.0 4C Connector with HP. Use of these numbers will identify the product line and help you to obtain product and tooling information when visiting www.te.com or calling the number at the bottom of page 1.

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. If there is a conflict between the information contained in the customer drawing and this specification, the customer drawing 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, flux removal procedures, and a checklist for information on soldering problems.

2.5. Specifications

Product Specification 108-130032 provides expected product performance and test results.

Product Specification 108-130008 provides additional product performance and test results for the signal contact portion of the SLIVER 2.0 4C Connector with HP.

Product Specification 108-130028 provides additional product performance and test results for the power contact portion of the SLIVER 2.0 4C Connector with HP.

Application Specification 114-130013, Sliver Power Module provides additional information on the power contact portion of the SLIVER 2.0 4C Connector with HP.

2.6. Standards

The standard that pertains to this product is:

EIA-364-52, “Solderability of Contact Terminations Test Procedure for Electrical Connectors and Sockets”

3. REQUIREMENTS

3.1. Safety

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

3.2. Operating Temperature

The connector is designed to operate in a temperature range of -55° to 105°C [-67° to 221°F]. See paragraph 3.5.F.

3.3. Material

The housing is made of liquid crystal polymer thermoplastic, UL 94-V-0. The contacts are made of copper alloy underplated with nickel, plated with tin on the solder tails, and plated with gold or gold equivalent at the interface area.

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

A. Material and Thickness

The pc board material shall be glass epoxy (FR-4 or G-10). The pc board thickness shall be a minimum of 1.50.

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

B. Tolerance

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

C. Circuit Pads

The circuit pads must be solderable in accordance with EIA-364-52.

D. Hole Dimensions

Finished Hole Dimensions can be noted from Connector Customer Drawing and Section E (Layout). Recommended plating for through hole: 0.008 [0.0003] minimum tin over 0.05±0.025 [0.002±0.001] copper. Maximum copper hardness 150 Knoop.

E. Layout

The pc board layout must be designed using the dimensions provided on the customer drawing for the specific connector. All holes and circuit pads must be precisely located on the pc board. A reference sample of the recommended pc board layout is given in *Figure 2*.

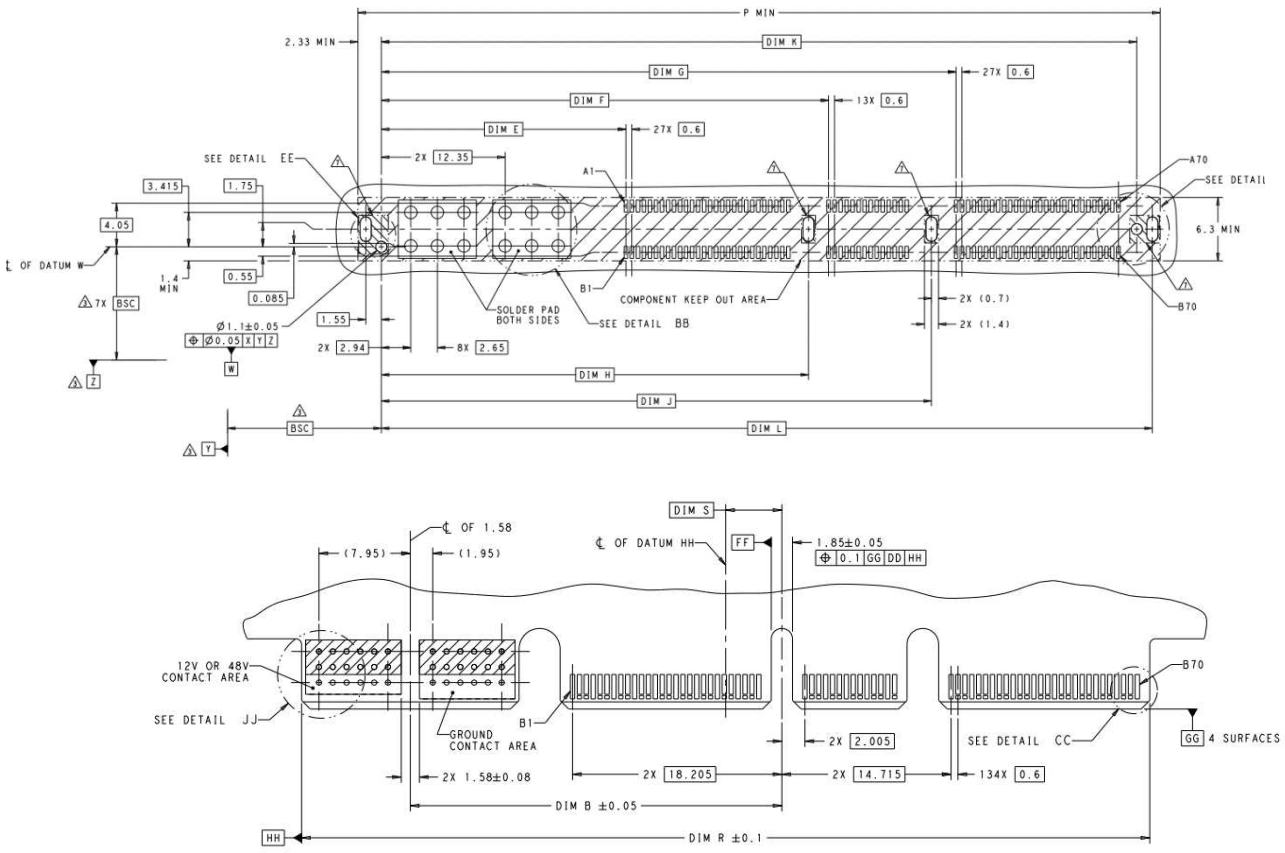
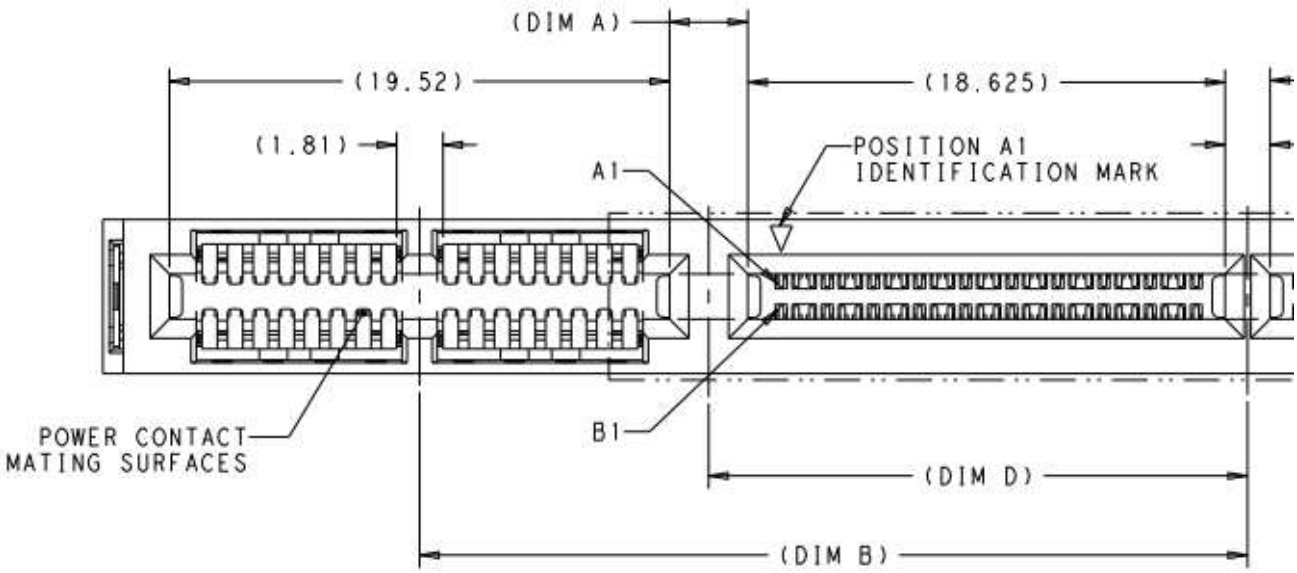


Figure 2 (continued)

48V vs. 12V Power Contacts

The barrier wall of Dimension A acts as a keying feature to prevent the mating of a 12V Add In Card into a connector at 48 Volts.



21.53	78.89	33.31	4.05	48V
21.03	77.89	32.31	3.05	12V
D	C	B	A	VOLTAGE RATING

Figure 2 (end)

F. Board Temperature

To maintain the connector within its operating temperature range, the mounting board temperature at the connector interface shall not exceed a temperature equal to 90°C. At no time during operation is the mating card permitted to exceed 80°C within a distance of 2.54mm [0.100 in] from the top of the connector (8.54mm [0.336 in] from the mating card edge). In order not to exceed 90° it is recommended that the board and mating card be constructed from minimum of 2-layer, 2-ounce copper cladding. Traces from the lands to the power plane should be a minimum of 9mm [0.35 in] wide and minimal length. Power trace sum of all widths should be greater than 20mm [0.75 in] wide.

G. Guidance

The connector solution must have guidance hardware for the card edge PCB to be within the X, Y, and Z direction constraints. It is recommended that the connector housing is not used as a hard stop for the card edge PCB. The hardware provides a rough alignment to the housing's mating interface, and Z direction position, as well as support in the X, and Y directions. *Please reference SFF-TA-1002 document for guidance dimensions.* Connector mounting board should contain at least two layers of 2 oz. copper or equivalent to ensure connector current carrying capacities are not affected.

3.6. Soldering

A. Process

The connector must be soldered using non-focused infrared (IR) reflow or equivalent soldering technique. Reflow temperature and time may vary depending on the size of the pc board and placement of other components. This connector can be subjected to the reflow temperature and approximate time specified in *Figure 3*.

B. Solder Paste Characteristics

1. Alloy type for tin-lead solder shall be 63 Sn/37 Pb, 60 Sn/40 Pb, or 62 Sn/36 Pb/2 Ag.
2. Alloy type for lead-free solder shall be compatible with pure tin or gold, for example, SAC305 (96.6 Sn/3 Ag/0.5 Cu) or SAC405 (95.5 Sn/4 Ag/0.5 Cu)
3. Flux incorporated in the paste shall be rosin, mildly active (RMA) type.
4. Paste will be at least 80% solids by volume.
5. Mesh designation shall be -200 to +325 (74 to 44 square micron openings, respectively).
6. Minimum viscosity of screen print shall be 5×10% cp (centipoise).
7. Minimum viscosity of stencil print shall be 7.5×10% cp (centipoise).

C. Solder Volume

Minimum solder volume (V) (before curing) for each circuit pad is calculated as follows:
1.5 (pad length) × 0.26 (pad width) × 0.15 (stencil thickness) = 0.0585 mm^3

Minimum solder volume (V) (min. board thickness) for each hold-down is 2.92 mm^3

Minimum solder volume (V) (min. board thickness) for each power contact tail through hole is 1.45 mm^3

NOTE
Solder volume may vary depending on solder paste composition.

D. Solder Paste Thickness

Solder paste thickness for the connector contact solder tines must be at least **0.15mm [0.006in].**

E. Stencil

The stencil aperture is determined by the circuit pad size and stencil thickness. It may be any shape as long as it prevents solder bridging from one pad to another. The stencil should be 0.15mm [0.006in] thick.

The stencil should include circuit pads for the contacts and holes for the stabilizers and hold-downs. The stencil layout must be designed using the dimensions provided on the customer drawing for the specific connector.

F. Solder Mask

When soldering, solder mask is recommended between all circuit pads to minimize solder bridging between pads. The mask must not exceed the height of the pad. If a trace is run between adjacent pads on the pc board, a solder mask must be applied over the trace to prevent bridging and wicking of solder away from the connector contact solder tines. Mask most suitable is Liquid Photo Imageable.

It is recommended that component temperatures not exceed the temperatures and times given in *Figure 3.*

CAUTION
Excessive temperatures may cause connector housing degradation or plating deterioration.

Reflow Soldering Process Cycle
Lead-Free Solder (Maximum 260°C [500°F])

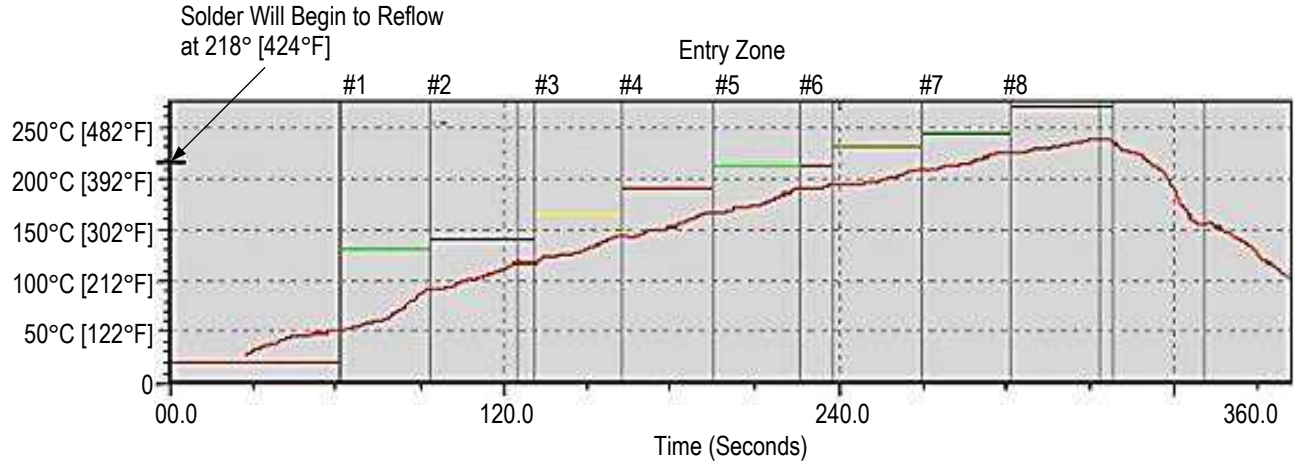


Figure 3 (continued)

Reflow Soldering Process Cycle
Tin-Lead Solder (Maximum 230°C [446°F] for 20 Seconds)

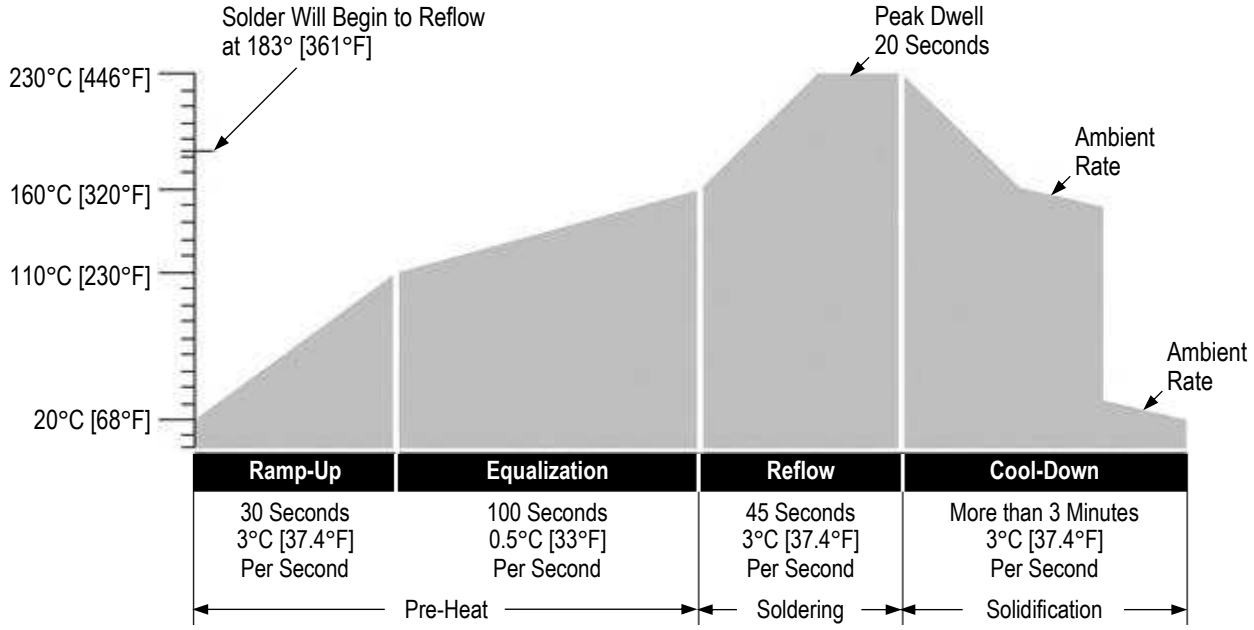


Figure 3 (end)

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. Cleaners must be free of dissolved flux and other contaminants. It is recommended cleaning the pc board on its edge. If using aqueous cleaner, standard equipment such as a soak-tank or an automatic in-line machine should be used. Common cleaning solvents that will not affect this connector are listed in *Figure 4.*

DANGER
Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the manufacturer's material safety data sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and methylene chloride are not recommended because of harmful occupational and environmental effects.

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 4

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

NOTE
If a cleaning solvent is not listed, call the number at the bottom of page 1 for advice.

H. Drying

When drying cleaned assemblies and pc boards, temperature limitations must not be exceeded: 105°C [221°F]. Excessive temperatures may cause connector housing degradation.

3.7. Connector Placement

CAUTION
Connectors should be handled only by the housing to avoid deformation, contamination, or damage to the contact solder tines.

Each contact solder tine must be seated on its pc board circuit pad. Optimally, the tines should be centered on the pc board circuit pads; however, slight misalignment is permissible.

Because the connector alignment posts are for clearance and fit only, the force required to seat the connector is minimal. The alignment posts and hold-downs must be inserted into the pc board holes. Refer to *Figure 5*.

3.8. Checking Installed Connector

All solder joints must conform to the requirements specified in Workmanship Specification 101-21 and all other requirements specified in this document. The solder fillets must be evenly formed around each contact solder tine. Solder must have 95% minimum coverage over the circuit pad. Solder should attach each hold-down to the pc board.

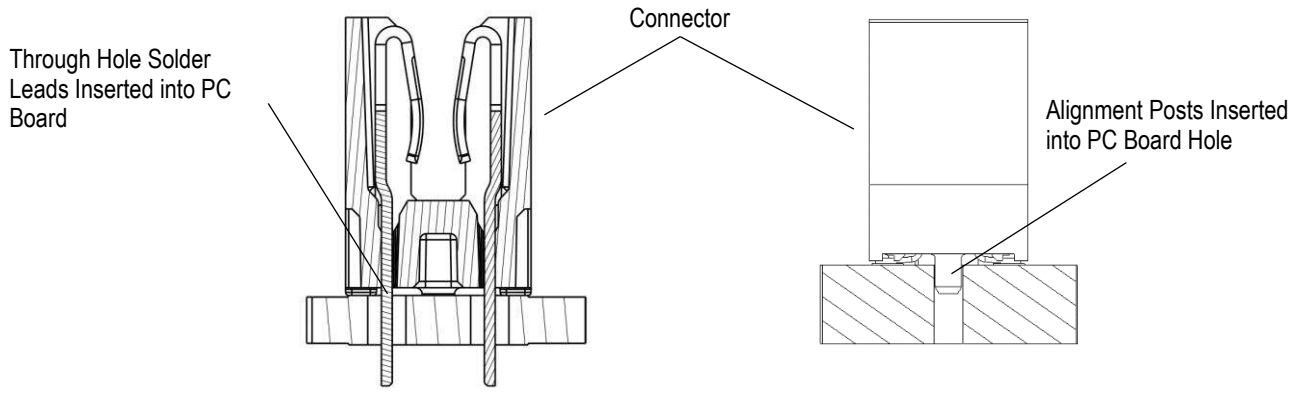


Figure 5

3.9. Removal and Repair

Standard de-soldering methods must be used to remove the connector from the pc board. The connector must not be re-used after removal. The connector is not repairable. Defective or damaged product must not be used.

4. QUALIFICATION

The SLIVER 2.0 connector is Recognized by Underwriters Laboratories Inc. (UL) in File E_____. (TBD)

5. TOOLING

No tooling is required for manual placement of the connectors onto the pc board.

For automatic machine placement, the robotic equipment must have a true position accuracy tolerance sufficient to properly locate the connector. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the connector datum surfaces given on the customer drawing to ensure reliable placement. The connector is available with polyester cover tape for vacuum pick and place.

6. VISUAL AID

The illustration below shows a typical application of SLIVER 2.0 4C Connector with HP. 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.

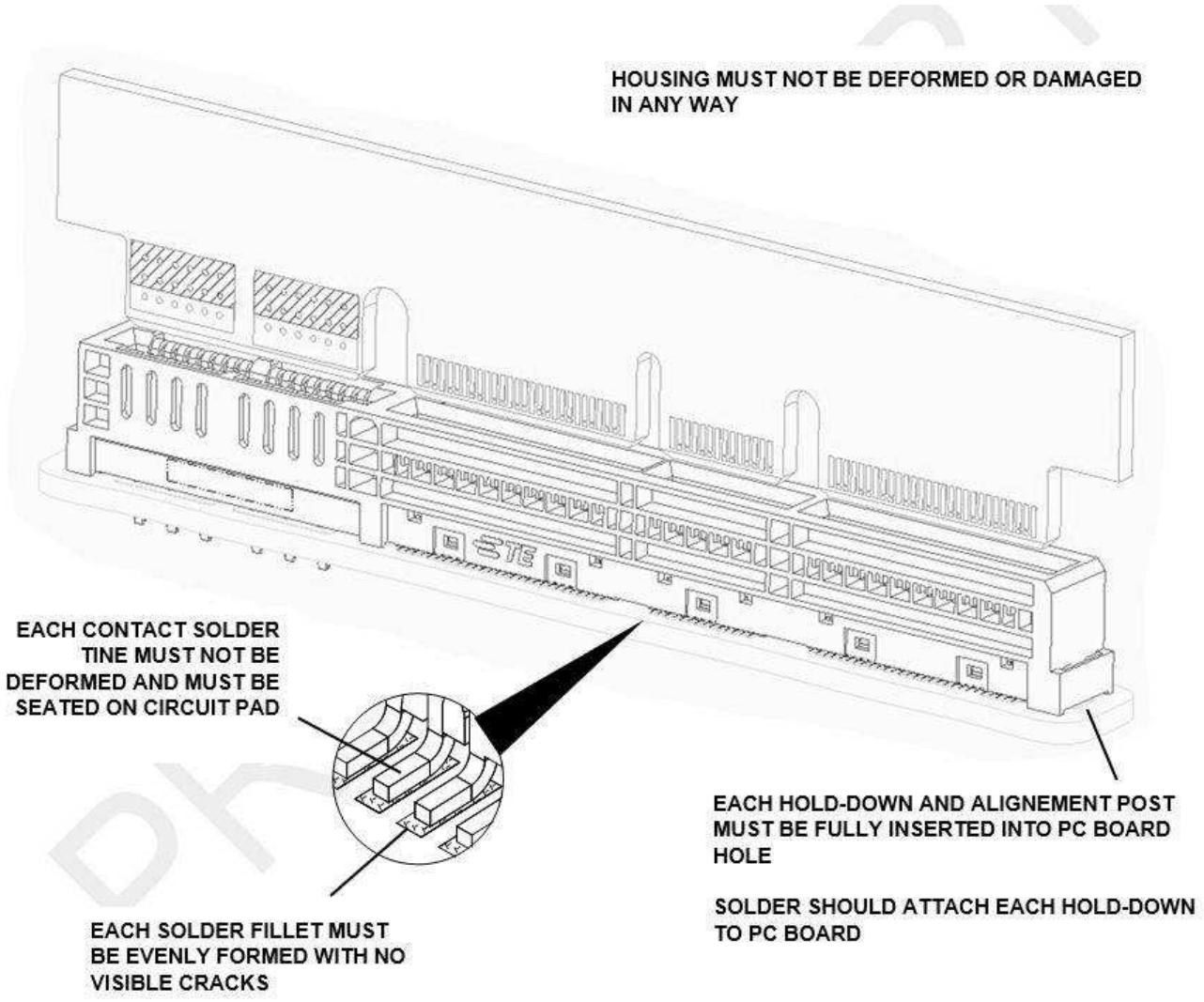


Figure 6 Visual Aid