



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 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 miniature hermaphroditic board-to-board and wire-to-board connectors for printed circuit (pc) board applications. The board-to-board connectors are available with 2, 4, and 6 positions. The wire-to-board connectors have 2 positions. Each connector has a housing that contains mating pin contact(s) and socket contact(s).

The board-to-board connector has surface-mount technology (SMT) contact tines for placement on the pc board. The housing features standoffs to allow cleaning after soldering. The wire-to-board connector has color-coded wires each with detached wire insulation to protect the conductors during shipment.

The board-to-board connectors are packaged on tape and reel for automatic machine or robotic equipment placement. These connectors can mate and unmate horizontally or vertically from each other.

When corresponding with 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.

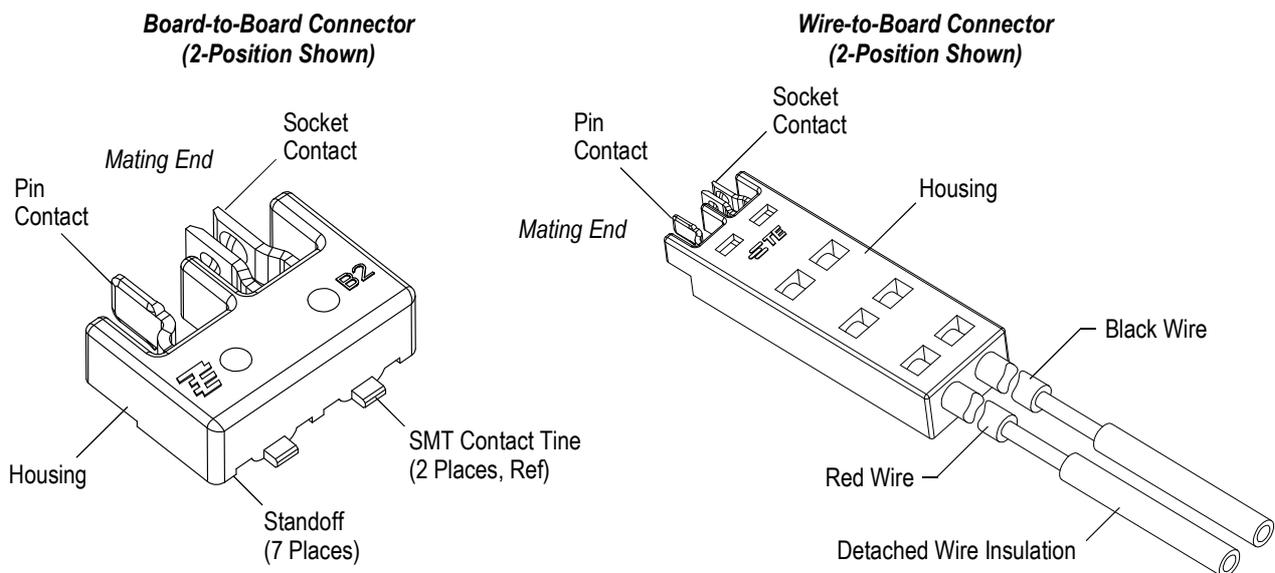


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this application specification include:

- Added wire-to-board connectors

2.2. Customer Assistance

Reference Product Base Part Numbers 1971567 (board-to-board) and 2213203-1 (wire-to-board) and Product Code L833 are representative of miniature hermaphroditic 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 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](#) 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 [108-106050](#) provides product performance and test results.

2.6. Instructional Material

Instruction sheets (408-series) provide product assembly instructions or tool setup and operation procedures. Instruction sheets available that pertain to this product are:

[411-106013](#) Miniature Hermaphroditic Board-to-Board Connectors

3. REQUIREMENTS

3.1. Safety

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

3.2. Limitations

The connectors are designed to operate in a temperature range of 40° to 105°C [104° to 221°F]. Connectors having TÜV certification, the operating temperature range is -30° to 65°C [86° to 149°F].

3.3. Material

The contacts are made of tin-plated brass and copper alloy. The housing is made of high-temperature rated (UL 94V-0) thermoplastic. The wire is made of copper and synthetic fluoropolymer.

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). Aluminum-clad pc boards and flex circuits may be used. There is no required thickness for the pc board.

TÜV is a trademark.

B. Tolerance

Maximum allowable bow of the pc board shall be 0.10 over the length of the connector.

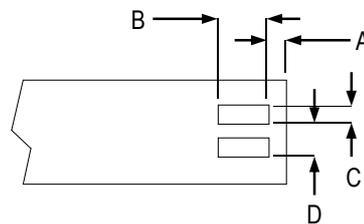
C. Pads

The pc board circuit pads must be solderable in accordance with J-STD-003, "Solderability Tests for Printed Boards".

D. Layout

The pc board layout must be designed using the dimensions provided on the customer drawing for the specific connector. As an example, the recommended pc board layout for the 2-position connector is shown in Figure 2.

Recommended PC Board Layout (2-Position Shown)



APPLICATION	DIMENSION ±0.05			
	A	B	C	D
Horizontal Mating with 0.2 Gap Between PC Boards	1.90	3.80	1.50	3.00
Horizontal or Vertical Mating with 2.4 Gap Between PC Boards	0.08			

Figure 2

3.6. Connector Placement

Optimally, the contact solder tines should be centered on the pads; however, slight misalignment is permissible as long as the entire solder tine is on the pad and placement meets the requirements given in J-STD-001, "General Requirements for Soldering Electronic Interconnection."

3.7. Soldering

Guidelines and procedures must be observed when soldering contacts. All solder joints should conform to those specified in IPC-A-610, "Acceptability of Electronic Assemblies," J-STD-001, and all other requirements specified in this document. All wire leads to contacts should be soldered, cleaned, and dried according to the following:

A. Process

The connectors should be soldered using double-sided non-focused infrared reflow (IR) or equivalent soldering technique. The connectors will withstand the temperature and exposure time specified in Figure 3. The IR profile is given in Figure 4.



NOTE

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.

SOLDERING PROCESS	TEMPERATURE	TIME (At Max Temperature)
IR	260°C [468°F]	10 Seconds

Figure 3

KESTER Lead-Free Reflow Profile
Alloys: Sn 96.5/Ag 3.0/Cu 0.5 and Sn 96.5/Ag 3.5

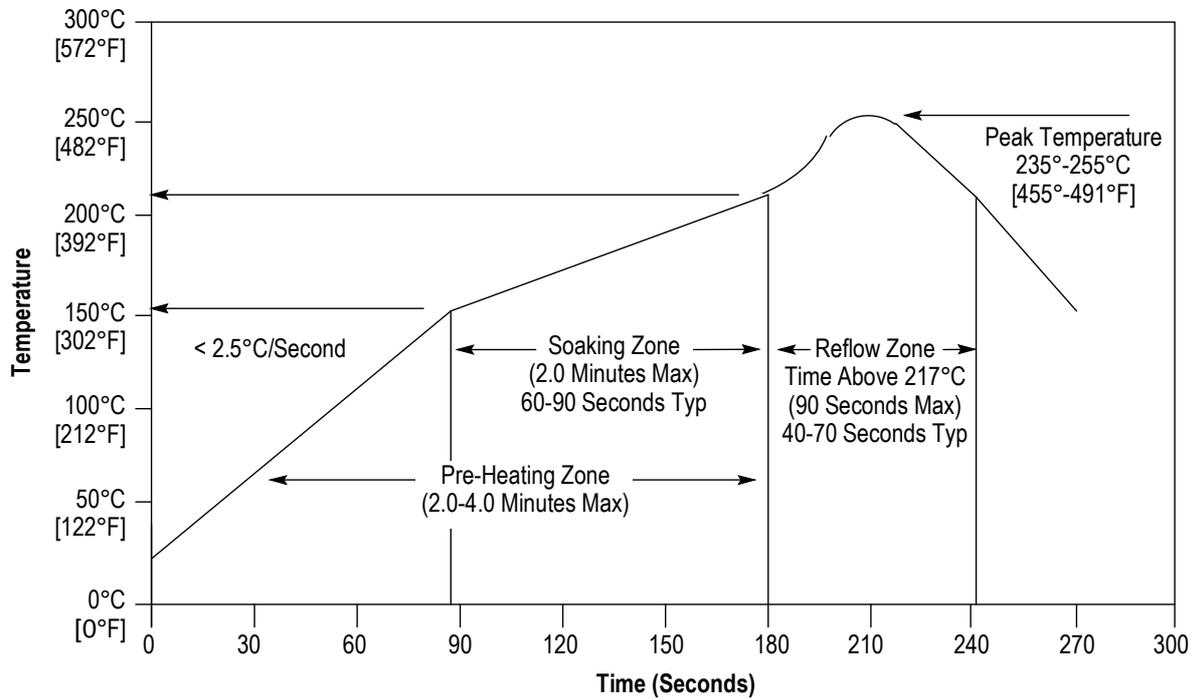


Figure 4

B. Solder Paste Characteristics

1. Alloy type shall be SAC 305, Sn 96.5/Ag 3.0/Cu 0.5.
2. Flux incorporated in the paste shall be rosin, mildly active (RMA) type.
3. Paste will be at least 80% solids by volume.
4. Mesh designation shall be -200 to +325 (74 to 44 square micron openings, respectively).
5. Minimum viscosity of screen print shall be 5×10% cp (centipoise).
6. Minimum viscosity of stencil print shall be 7.5×10% cp.

C. Solder Mask

Solder mask is recommended between all pads to minimize solder bridging. The mask must not exceed the height of the pad by more than 0.05. If a trace is run between adjacent pads on the solder side 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. Liquid photo imageable or dry film solder masks are recommended.

D. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder and flux for recommended cleaning solvents. Using common cleaning solvents with the times and temperatures specified in Figure 5 will not affect these connectors.



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 is not recommended because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).

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 5

E. Drying

When drying cleaned connectors and pc boards, temperature should not exceed 220°C [492°F] for more than 3 minutes.

3.8. Checking Installed Connector

All solder joints should conform to those specified in J-STD-001, “General Requirements for Soldering Electronic Interconnection” and all other requirements specified in this application specification. All solder fillets must be formed evenly around the contact solder tine. The housing standoffs must be seated on the pc board.

3.9. Mating

These connectors can be mated horizontally or vertically. Proper alignment is essential to ensure full engagement of mating connectors and to prevent contacts from being bent or otherwise damaged. Mating connector alignment tolerances are given in Figure 6.

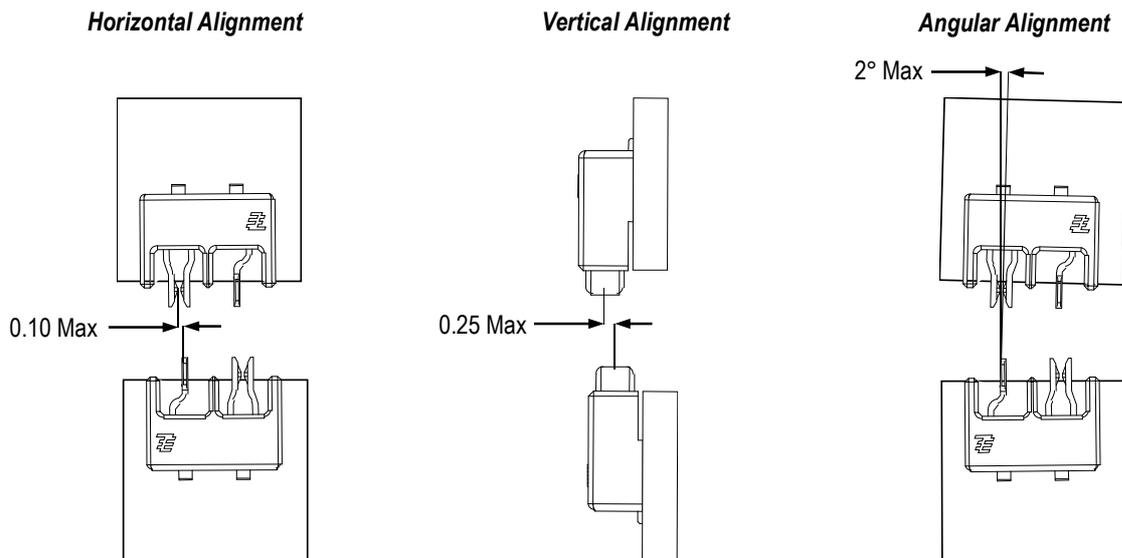


Figure 6

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

3.10. Heat Sink

It is highly recommended that the pc boards for board-to-board mated connectors and the connector for wire-to-board mated connectors be immobilized mechanically or by securing them to a heat sink or rigid substrate that will not allow them to move independently. Screws or high performance adhesive transfer tape can be used to secure the pc boards, and high performance adhesive transfer tape must be used to secure the wire connector.

**CAUTION**

TE Connectivity recommends that wire connectors and pc boards using the Miniature Hermaphroditic connectors should be securely mounted to a rigid substrate as defined in Figure 7 to minimize the potential for micro motion that is known to be a key contributor to fretting corrosion in separable contact interfaces especially in harsh environments. Products are available with gold plated contacts for applications in harsh environments.

3.11. Connector Removal

Connectors must be removed from the pc board using standard de-soldering methods, then discarded.

3.12. Replacement and Repair

Damaged or defective connectors must not be used. The connectors are not repairable.

4. QUALIFICATION

Miniature hermaphroditic board-to-board and wire-to-board connectors are Component Recognized by Underwriter Laboratories, Inc. (UL) in File E28476.

5. TOOLING

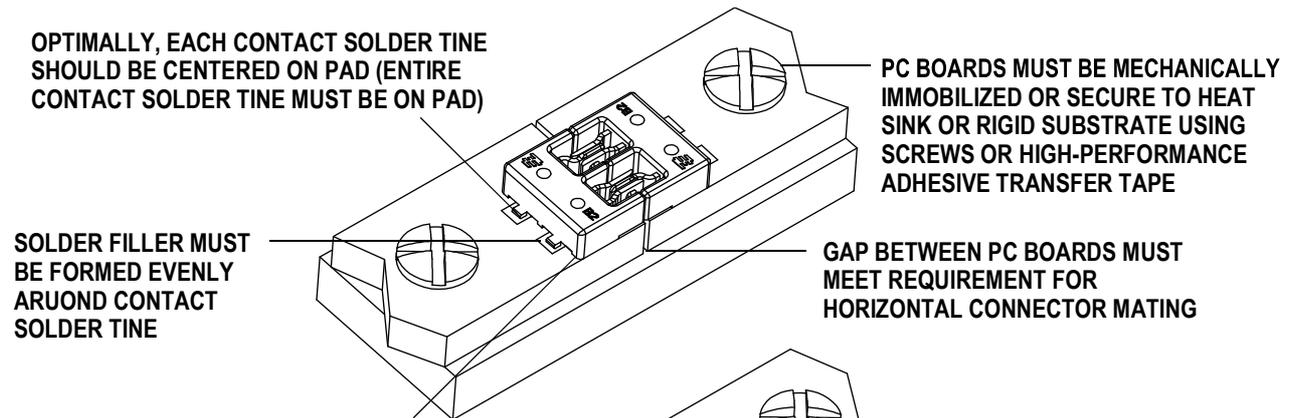
For automatic machine placement, a pc board support must be used to prevent bowing of the pc board during the placement of connectors on the board. It should have flat surfaces with holes or a channel large enough and deep enough to receive any protruding components. The pc board support must be customer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

Robotic equipment must have a true position accuracy tolerance of 0.10 to properly locate the connectors. This includes gripper and fixture tolerances as well as equipment repeatability.

6. VISUAL AID

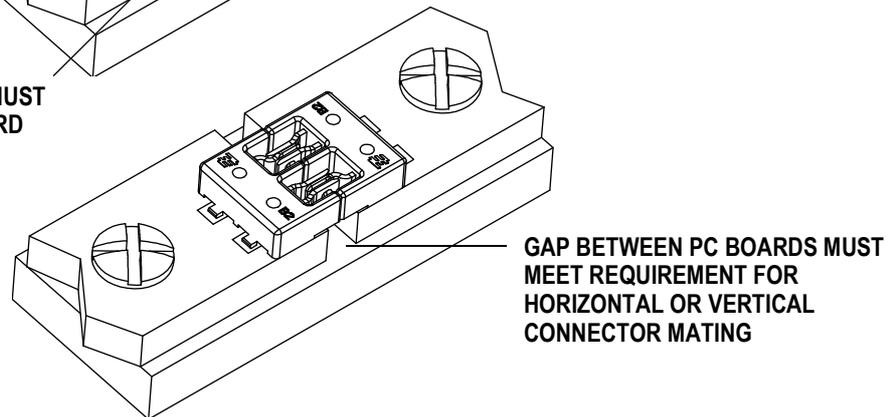
The illustration below shows a typical application of miniature hermaphroditic board-to-board and wire-to-board connectors. This illustration should be used by production personnel to ensure a correctly applied product. Applications which DO NOT appear correct should be inspected using the information in the preceding pages of this specification and in the instructional material shipped with the product or tooling.

**BOARD-TO-BOARD
HORIZONTAL CONNECTOR MATING**



HOUSING STANDOFFS MUST BE SEATED ON PC BOARD

**BOARD-TO-BOARD
HORIZONTAL OR VERTICAL
CONNECTOR MATING**



BOARD CONNECTOR MATED TO WIRE CONNECTOR



WIRE CONNECTOR MUST BE MECHANICALLY IMMOBILIZED OR SECURE TO HEAT SINK OR RIGID SUBSTRATE USING HIGH-PERFORMANCE ADHESIVE TRANSFER TAPE

FIGURE 7. VISUAL AID