

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 LED Bulb Connector for use on LED modular printed circuit (pc) board Surface Mount Technology (SMT) applications. The connector is soldered on LED Modular pc boards by the SMT process, and then a Card-Edge/LED driver board (1.2 mm thickness for 1971748-2 and 1.0 mm thickness for 1-1971748-2) or the other connector can mate with it. The LED connector is *Impulse Withstand Category II* and *Protection Class II*. Voltage rating is 250V AC and Current Rating is 3A max.

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

LED Bulb Connector

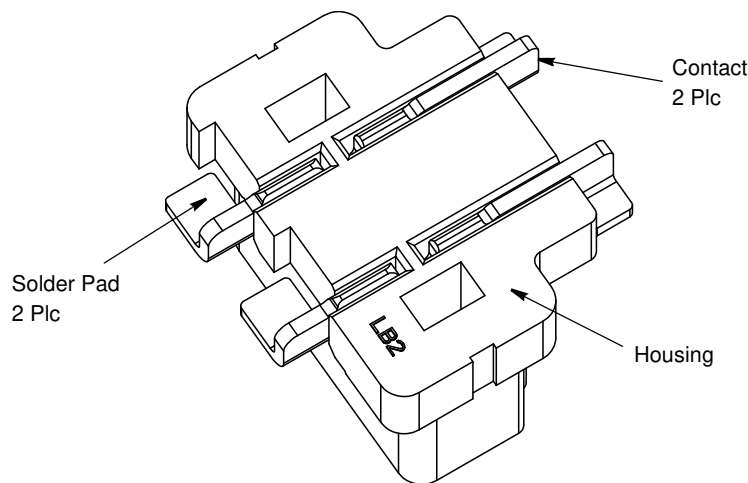


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- This document supersedes Application Specification 114-106066

2.2. Customer Assistance

Reference product base part number 1971748 and product code L012 are representative of the LED bulb connector. Use of these numbers will help identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local TE Representative.

2.3. Drawings

Customer drawings for specific products are available from the responsible TE Engineering department via the service network. The information contained in the customer drawings takes priority if there is a conflict with this specification or with any other technical documentation supplied by TE.

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.

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°C to 125°C [-40°F to 257°F].

3.3. Material

Contacts and solder pads are made of copper alloy with tin-plating; housings are made of UL 94V-0 rated thermal plastic.

3.4. Storage

A. Ultraviolet Light

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

B. Shelf Life

The contacts and connectors should remain in the shipping containers until ready for use to prevent deformation to components. The components 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 contacts or connectors near any chemical listed below as they may cause stress corrosion cracking in the components.

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

3.5. PC Board

A. Material and Thickness

Glass epoxy (FR-4 or G-10) or aluminum-clad pc boards may be used as LED modular pc board materials. The LED driver board thickness should be 1 or 1.2 mm, and LED pc board thickness may vary to meet the customer's design.

B. Tolerance

Maximum allowable bow of the pc board shall be 0.10 mm over the length of the connector. Tolerance shall be ± 0.05 mm for dimensions presented in Figure 2.

C. Pads

The pc board circuit pads must be solderable in accordance with IPC/EIA-J-STD-003.

D. Layout

The pc board layout for this connector must be designed using the dimensions provided on the customer drawing. The recommended pc board layout is shown in Figure 2. (Figure 2A is a LED pc board layout, and Figure 2B is a Card-Edge/LED driver pc board layout.)

NOTE

This connector is designed for an isolating circuit.



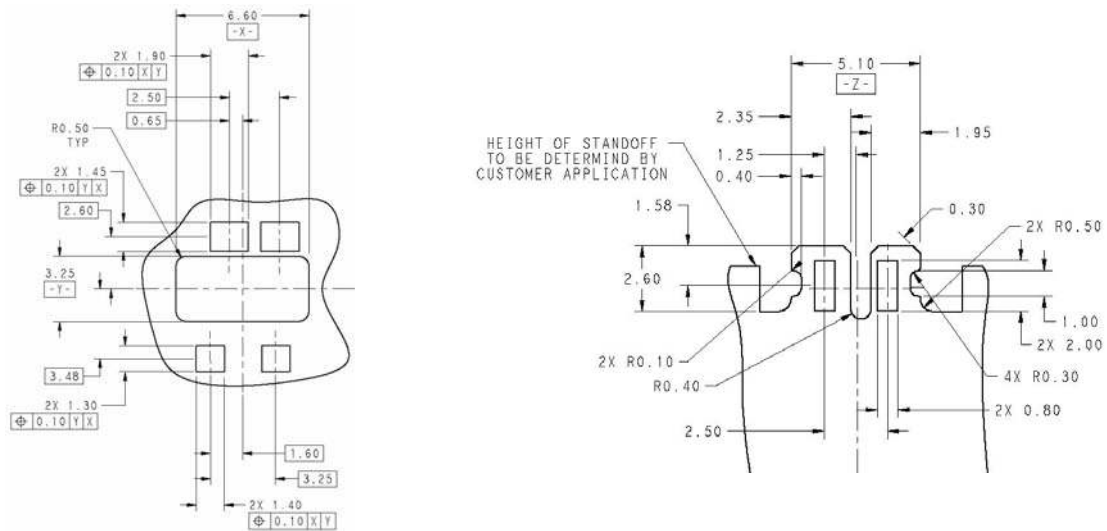


Figure 2

3.6. Component Placement

This product is packaged in tape and reel packaging per ANSI/EIA Std 481-B. Robotic/gripper/vacuum nozzle placement requires total equipment accuracy of 0.10 mm to locate the connector for insertion. This includes gripper and fixture tolerances, as well as equipment repeatability. Insertion location will be programmed by a simple pantograph/template system or software package. Optimally, the contact solder tines should be centered on the pc board pads. However, slight misalignment is permissible for the performance classifications specified in Association of Connecting Electronics Industries IPC J-STD-001, "General Requirements for Soldering Electronic Interconnection". See Figure 3.

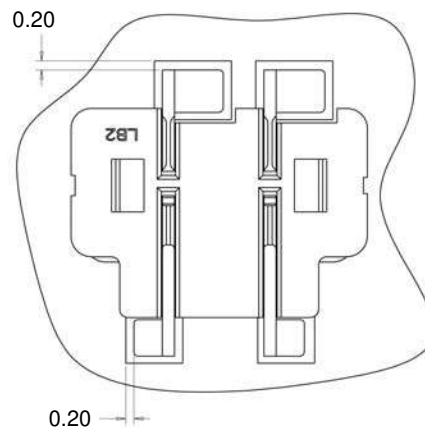


Figure 3

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. Solderability

The pc board pads must be solderable in accordance with IPC/EIA J-STD-003 and all other requirements for SMT 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 Mask

Solder mask is recommended between all pads when soldering connectors with SMT 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 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. Those most suitable are Liquid Photo Imageable and Dry Film.

D. Process

Connectors with SMT 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. These connectors will withstand the temperature and exposure time specified in Figure 4.

SOLDERING PROCESS	TEMPERATURE (MAX)	TIME (AT MAX TEMPERATURE)
IR	260°C [468°F]	10 Seconds

Figure 4

The lead-free reflow profile is shown in Figure 5.

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

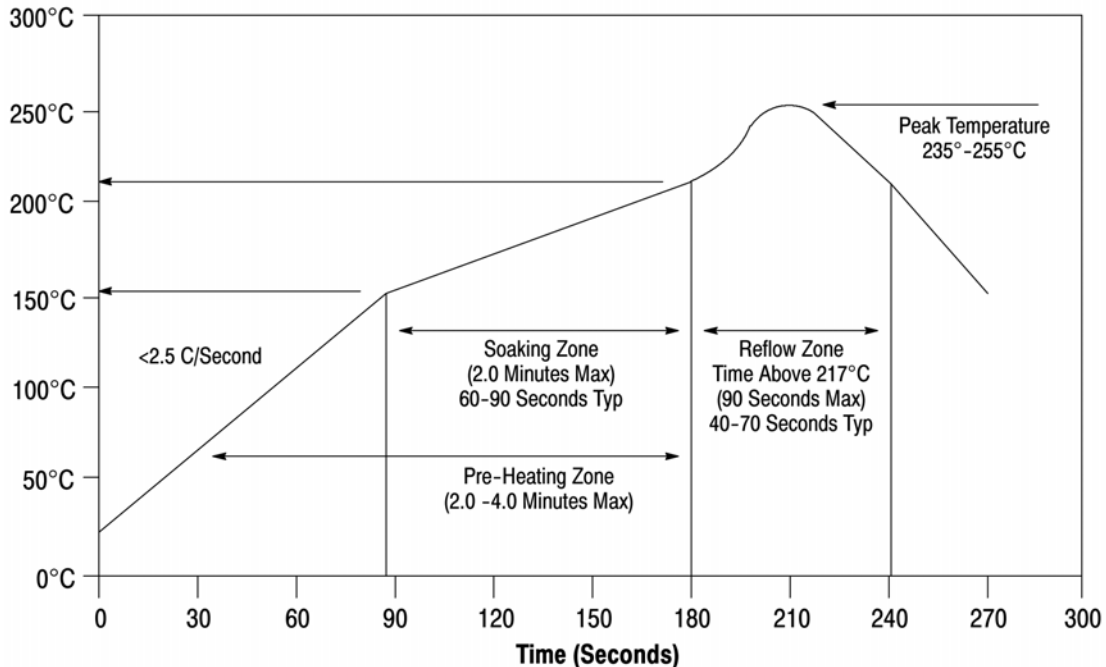


Figure 5

E. 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 6.

CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)
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		

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

Figure 6

F. Drying

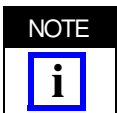
When drying cleaned assemblies and pc boards, temperatures to which the connectors are subject should not exceed 220°C [492°F] for more than 3 minutes.

3.8. Alignment

Proper alignment is essential to ensure full engagement of mating connectors and also to ensure the contacts are not bent or otherwise damaged during mating and unmating. For alignment tolerances, see Figure 7.



Figure 7



There should be a mechanical feature with a lead-in function for driver board assembly. It ensures the Card-Edge/driver board can mate with the LED modular properly. See Figure 8.

3.9. Mating Connector



This product is designed for single mate applications (not to be unmated once mated). If the product must be unmated, it is important to re-mate the same pc board that was unmated to the same LED Bulb B-B Connector, and the number of mating cycles should not exceed 30 cycles. In environments where there are multiple mated assemblies present, it would be recommended that the mating pc boards and pc board containing the LED Bulb B-B Connector is not mated to a different pc board.



There should be mechanical alignment features integrated into the bulb design to ensure the Driver pc board assembly mates properly with the TE LED Bulb Connector. The features must ensure that the Driver pc board mate perpendicular to the LED pc board. The mechanical alignment features must also ensure that torque is not applied to the TE LED Bulb Connector via the Driver pc board assembly both during assembly and in the final product application. If these precautions are not followed, the solder joints between the TE LED Bulb Connector and the LED pc board may fail.



To prevent breaking the solder joints of the TE LED Bulb Connector to the customer supplied LED pc board, the height of the standoffs on the customer supplied Driver pc board must be sized to prevent any forces transferred up through the TE LED Bulb Connector. The standoff must stop on the bottom side of the customer's LED pc board or heatsink before the card edge features bottom out inside the TE LED Bulb Connector. The dimension of the driver pc board standoffs will need to be customized for each application depending on the LED pc board thickness, thermal pads, and/or the LED Bulb heatsink. If forces are applied up through the TE LED Bulb Connector, solder joint failure are likely to occur in the application.

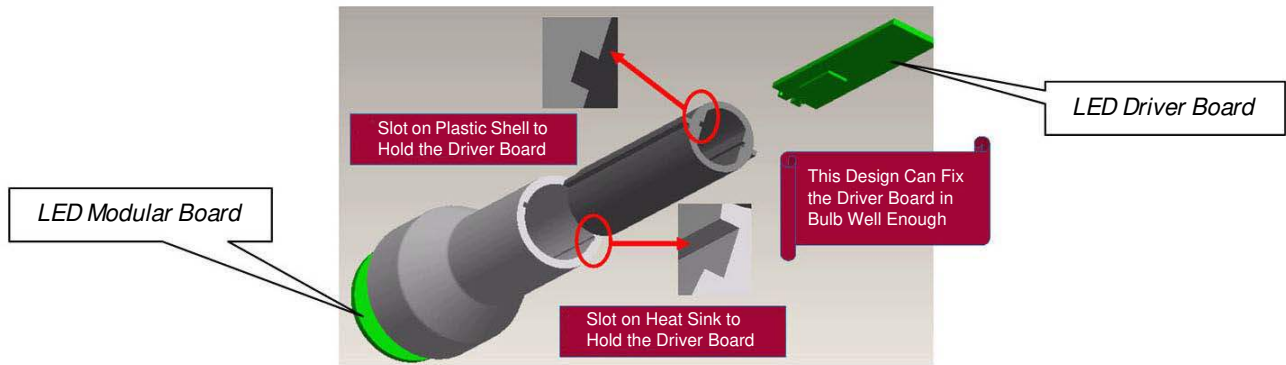


Figure 8

3.10. Checking Installed Connector

All solder joints should comply with Workmanship Specification IPC-J-STD-001. For typical fillets for SMT tine requirements, refer to Figure 9.

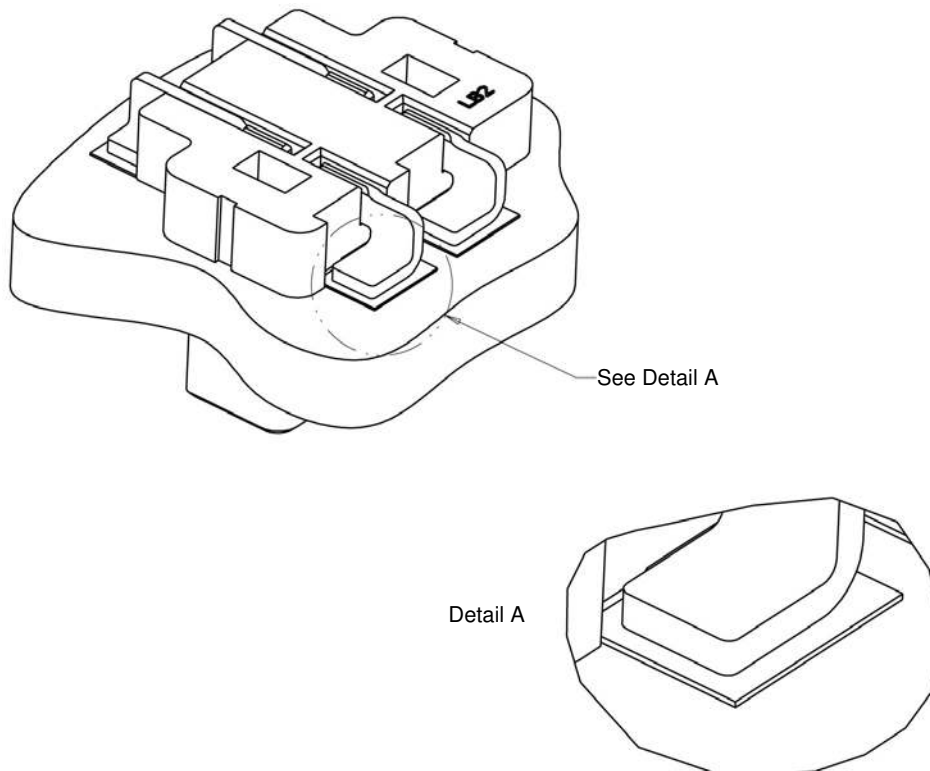


Figure 9

4. QUALIFICATIONS

No qualifying support for LED Bulb Connectors was defined at the time of publication of this document.

5. TOOLING

5.1. Robotic Equipment

The robotic equipment must have a true position accuracy tolerance of 0.10 mm to properly locate the connectors. This includes gripper/vacuum nozzle 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 connectors. 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.

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.

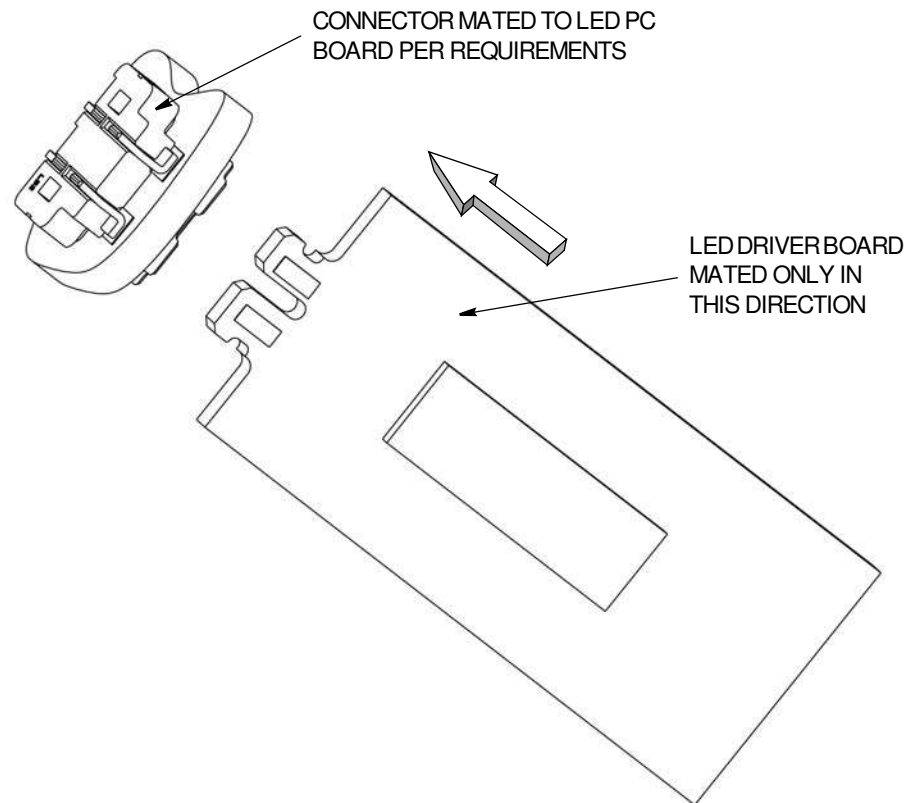


FIGURE 10. VISUAL AID