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 mm [±.005 in.] 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 7.62 mm and 15.24 mm [.300 in. and .600 in.] centerline Surface-Mount DIPLOMATE DL DIP Sockets. These requirements are applicable to hand or automatic application tooling.

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.

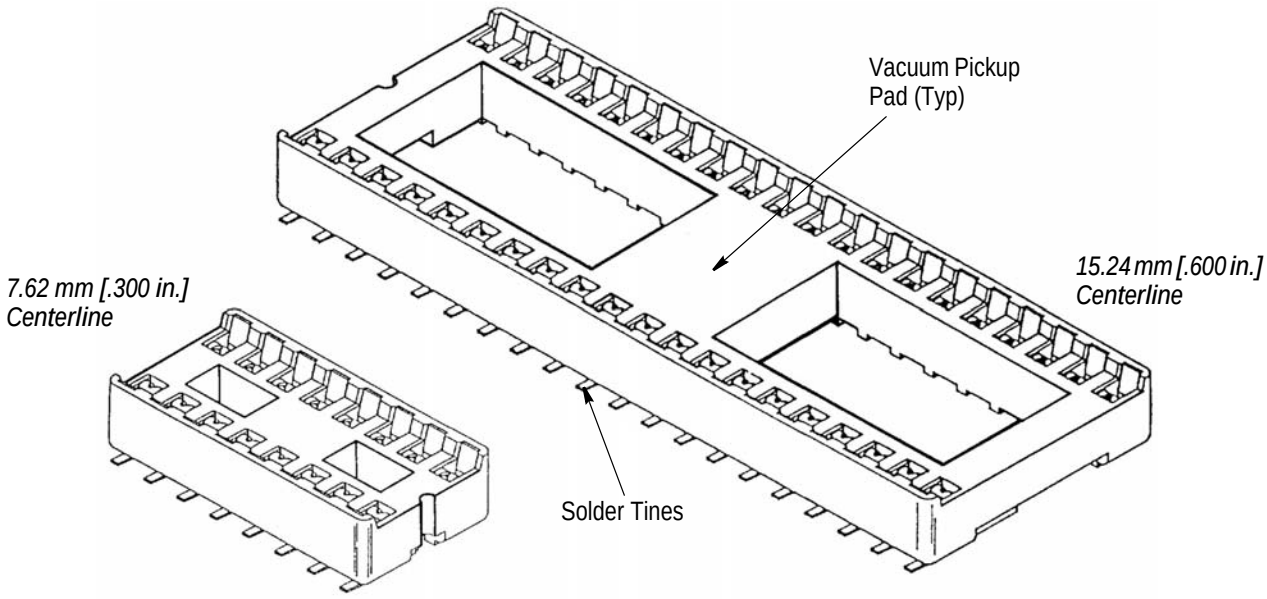


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this application specification include:

- Updated document to corporate requirements
- New logo

2.2. Customer Assistance

Reference Product Base Part Number 2-382409-3 and Product Code 1421 are representative of Surface-Mount DIPLOMATE DL DIP Sockets. 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. The information contained in Customer Drawings takes priority if there is a conflict with this specification or with any other technical documentation supplied by TE.

2.4. Specifications

Product Specification 108-1066 provides performance and test information for these sockets.

Specification 109-11 gives information pertaining to the solderability of metallic surfaces. Specification 101-21 gives information pertaining to solder fillets of surface mount-connectors. Specification 118-52000 gives information pertaining to the application of surface-mount connectors to printed circuit (pc) boards using solder paste.

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 commercial designation and flux removal procedures. A checklist is included in the manual as a guide for information on soldering problems.

3. REQUIREMENTS

3.1. Printed Circuit Boards

A. Tolerances

1. Maximum allowable bow of the pc board will be 0.13 mm [.005 in.].
2. Coplanarity of plated pads on the pc board will be 0.03 mm [.001 in.].
3. If a solder mask is used, it must allow full clearance around the pads as defined in Figure 2.

B. Material

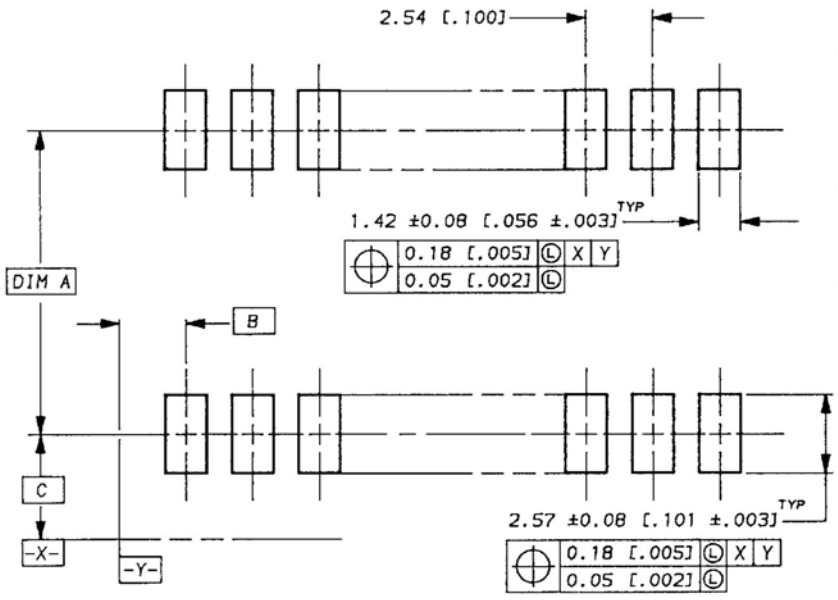
1. Board material will be glass epoxy (FR-4, G-10). Consult TE Engineering for suitability of other pc board materials.
2. Minimum board thickness shall be 0.81 mm [.032 in.] nominal. For suitability with other pc board thicknesses, contact TE Engineering.

C. Recommended Board Layout

Recommended pattern and dimensions, as well as tolerances, are shown in Figure 2.

D. Solderability

Plated pads on the pc board will be solderable as defined in TE Specification 109-11-2. Additional information on solderability and soldering variables can be found in Manual 402-40.



NUMBER OF POSITIONS	CENTERLINE-SPACING DIM. A
14 16 18 20	8.89 [.350]
24 28 40	16.51 [.650]

Figure 2

3.2. Solder Paste

A. Composition

1. Alloy type will be one of the following:
   a. 63 Sn/37 Pb
   b. 60 Sn/40 Pb
   c. 62 Sn/36 Pb/2 Ag
2. Flux incorporated in the paste will be a Rosin, Mildly Active (RMA) Type.
3. Paste will be 45% to 55% solids by volume.

B. Volume Requirements

Recommended solder paste volume on each pad before curing is $(2.89 \times 10^{-2})^3$ mm [$(4.48 \times 10^{-5})^3$ in.]. An outgassing factor (usually measured to be around 50%) will reduce the paste volume after curing. Since solder paste can be deposited with a stencil or screen, the following calculations should serve as a guideline in varying deposition parameters.

1. Stencils

   Let V_i = Solder Paste volume before curing

   a = Aperture dimension corresponding to pad width

   b = Aperture dimension corresponding to pad length

   T_p = thickness of stencil (or deposited solder paste)

   If the aperture dimensions on the stencil are the same as the nominal pad dimensions shown in Figure 2, stencil thickness can be calculated with the following relation:

   $T_p = V_i / (a \times b)$

   $= (2.89 \times 10^{-5})^3 / (1.42 \times .57)$ [$(4.48 \times 10^{-5})^3 / (0.56 \times -101)$]

   = 0.20 [.008]

   Varying aperture dimensions will change the required stencil thickness needed to deposit the recommended solder paste volume.

2. Screens

   Let T_e = Screen emulsion thickness

   T_w = Screen weave thickness

   A_o = Decimal equivalent of percent open area

   T_p = Thickness of deposited solder paste

   Weave thickness and percent open area are dependent on the mesh count of the solder screen. For example, an 80-mesh screen has a 49.5% open area and nominal weave thickness of 0.20 mm [.008 in.]. The amount of paste deposited through a solder screen is dependent on aperture dimensions, the wire mesh, and applied emulsion.

   For an 80-mesh screen with the same aperture dimensions as used in the stencil example above, the emulsion can be calculated by:

   $T_e = T_p - (T_w \times A_o) = 0.20 - (0.20 \times 12.57) = 0.10$ [.008-(.008 x .495) = .004]

   Varying aperture dimensions and mesh count will change the required emulsion thickness needed to deposit the recommended solder paste volume.

NOTE

Using paste volume in excess of those recommended could result in excessive wicking of reflowed solder up the solder tine, resulting in reduction of compliance and potential solder joint failure.

Use recommended vendor specifications for paste processing. Additional information on soldering processes and variables can be found in Manual 402-40.

3.3. Socket Placement

A. Registration

1. Sockets may be placed on the pc board by hand. After placement, no solder tines shall overhang the solder pads. Solder tines may be flush with the pad edge.

2. Solder tine positioning on the pads for automatic application tooling is the same as for hand application. In addition, clearances around the socket may be required depending on the type of pickup equipment employed (external grippers or vacuum). For reliable placement, total equipment accuracy (i.e. pickup head, centering fingers, fixtures, repeatability) must be within ±0.089 mm [±.0035 in.].

B. Seating Forces

The force required to seat the socket into the paste will be 24.9 ±0.57 Newton [.88 ±.02 oz] multiplied by the number of contact positions.

3.4. Soldering Procedures

A. Temperature and Time

The reflow temperature to which the socket body is subjected to shall not exceed 220°C [428°F] for more than three minutes.

B. Process

Socket design is compatible with vapor phase and infrared reflow solder processing. For suitability with other reflow methods, contact TE Engineering. Additional information on soldering and soldering variables can be found in Manual 402-40.

3.5. Cleaning

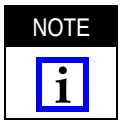
Fluxes, residues, and activators must be removed. Cleaning procedures depend on the type of flux used on the solder line. The following cleaning compounds and chemicals may be used on these sockets for a period of up to ten minutes without no harmful effects.

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		

Figure 3

Consideration must be given to toxicity and safety requirements recommended on the Material Safety Data Sheet furnished by the solvent manufacturer

.



If you have a particular solvent that is not listed, consult an TE Representative before using it on these connectors.

CAUTION

Excessive temperature may cause housing degradation or plating deterioration.

3.6. Inspection

1. All solder joints should comply with TE Workmanship Standard 201-21.
2. Socket shall be firmly attached to the pc board; There shall be no evidence of looseness or socket movement. Maximum clearance between socket standoffs and the pc board shall be 0.38 mm [.015 in.].
3. There shall be no evidence of any damage to the socket as a result of application tooling.

4. QUALIFICATIONS

Surface-Mount DIPLOMATE DL DIP Sockets are Listed by Underwriters Laboratories Inc. (UL) in UL File Number E28476, and Certified by CSA International, in CSA File Number LR7189A-307.

5. TOOLING

5.1. PC Board Support

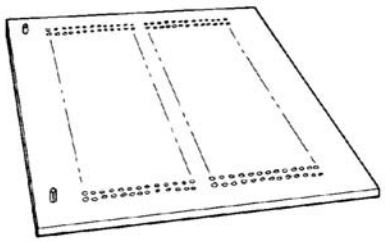
A pc board support must be used to prevent bowing of the pc board during the placement of connectors on the pc board. See Figure 4

5.2. Robotic Equipment for Insertion

The robotic equipment must have a true position accuracy tolerance of ±0.13 mm [.005 in.] to properly locate the connector for insertion. This includes gripper and fixture tolerances as well as equipment repeatability. Insertion location will be programmed by a pantograph/template system or software package. The equipment must use the connector datum surfaces detailed on the TE Customer Drawing to ensure reliable connector placement.

TE machines have been designed for a variety of application requirements. See Figure 4.

Typical PC Board Support (Must Be Custom-Made to System)



Robotic Equipment

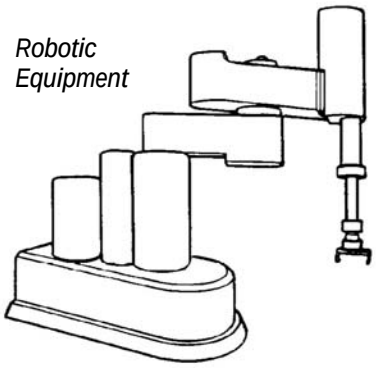


Figure 4

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.

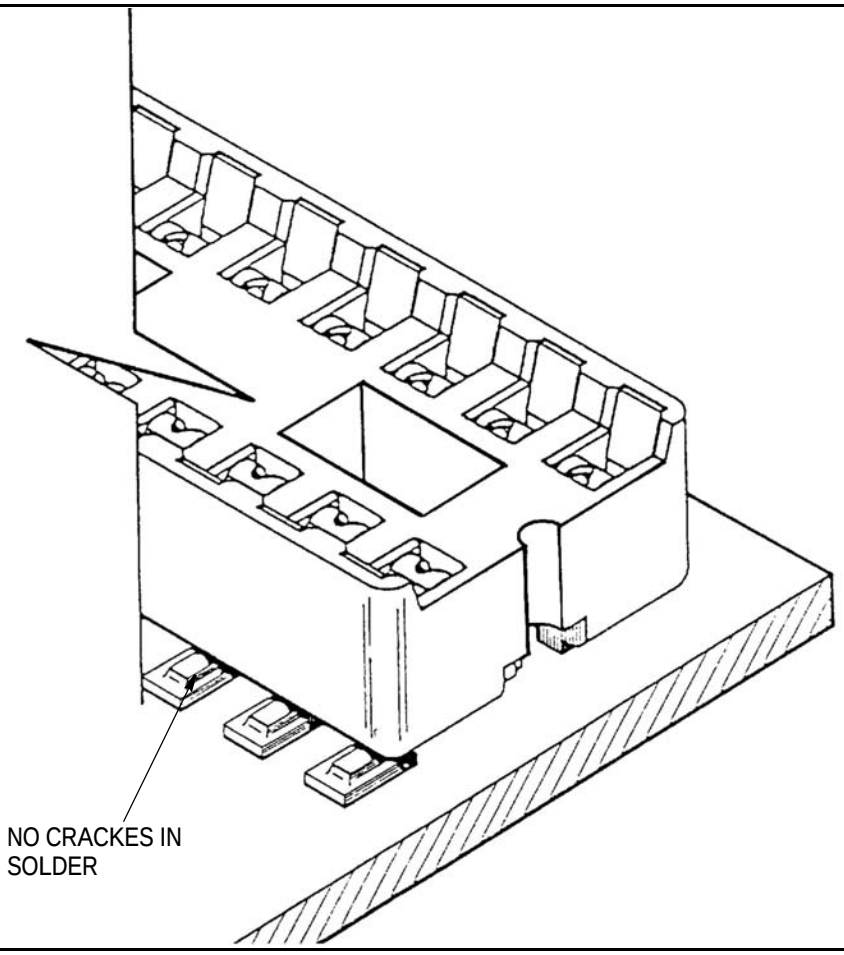


FIGURE 5. VISUAL AID