AMPMODU 2 mm Headers

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. SCOPE

This specification covers the requirements for application of AMPMODU 2 mm Headers for printed circuit board (PCB) applications. These connectors feature contacts of 0.50mm [.020 in.] x 0.50mm [.020 in.] with in-row spacing of 2.00 mm [.079 in.] centers, row-to-row spacing of 2.00 mm [.079 in.] centers, along with option for pick and place cap.

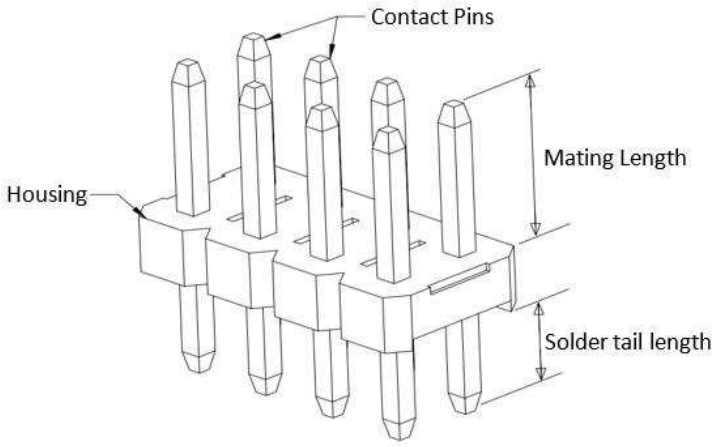
The connectors are available in following variants:

- Contact Area Plating – Gold Flash, Gold 0.38µm, Gold 0.76µm, Tin
- Solder Method – Through Hole (TH), Through Hole Reflow (THR), Surface Mount Device (SMD)
- Packaging – Tape and Reel, Tube and Bulk (Bag/Box)
- Mounting – Vertical and Right Angled
- Housing types:
  - Breakaway – Single & dual row
  - Shrouded – Dual row – Plain, Lock-ramp
- Circuit Positions – 2 to 25 positions per row.

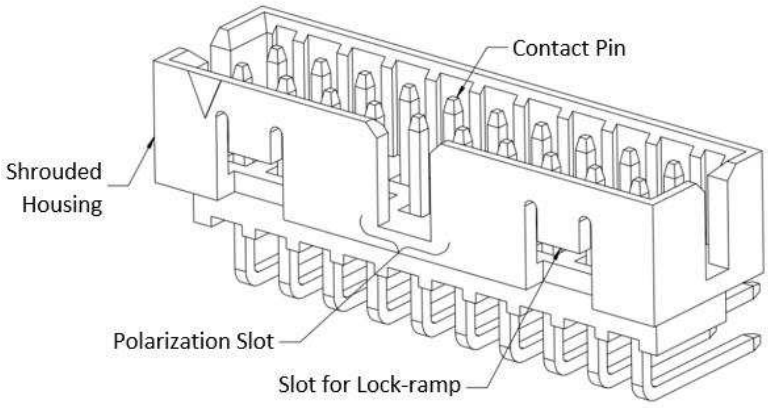
When corresponding with TE Connectivity Personnel, use the terminology provided in this specification to facilitate your enquiries for information. Basic terms and features of this product are provided in Figure 1.

Various connector sizes are shown throughout the document for representation. However, application and requirements are same for all the available positions.

Figure 1



Breakaway header

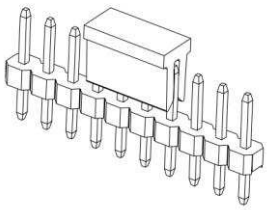
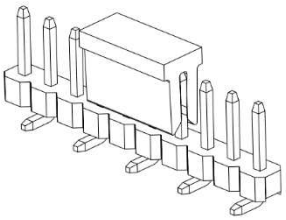
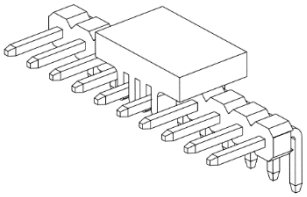
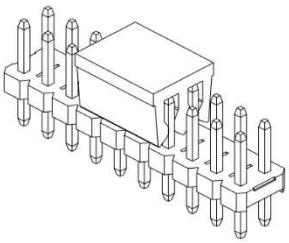
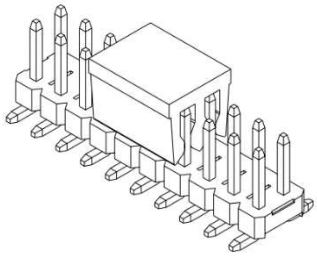
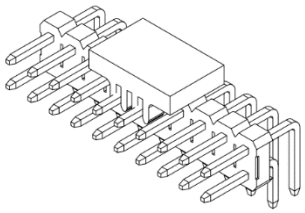
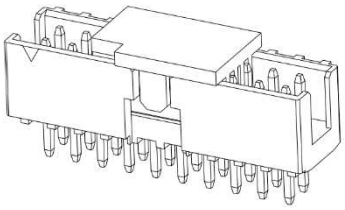
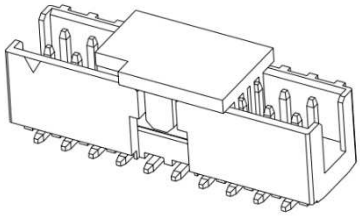
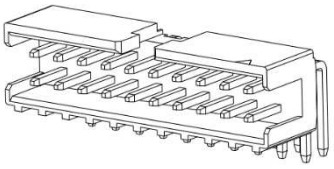
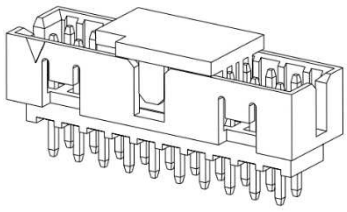
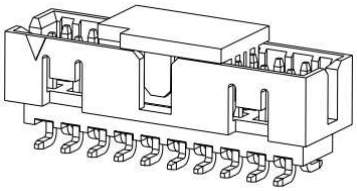
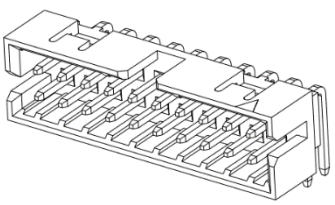


Shrouded header (Lock-ramp version)

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| Indicates Change

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Table 1 (a)

Single Row - Breakaway	 Single Row, Vertical, TH/THR Breakaway header	 Single Row, Vertical, SMD, Breakaway header	 Single Row, Right angle, TH/THR, Breakaway header
Dual Row - Breakaway	 Dual Row, Vertical, TH/THR, Breakaway header	 Dual Row, Vertical, SMD, Breakaway header	 Dual Row, Right angle, TH/THR, Breakaway header
Dual Row - Shrouded (Plain version)	 Dual Row, Vertical, TH/THR, Shrouded header	 Dual Row, Vertical, SMD, Shrouded header	 Dual Row, Right angle, TH, Shrouded header
Dual Row – Shrouded (Lock-ramp version)	 Dual Row, Vertical, TH/THR, Shrouded header	 Dual Row, Vertical, SMD, Shrouded header	 Dual Row, Right angle, TH, Shrouded header

2. REFERENCE DOCUMENTS

2.1. Revision Summary

- Revision A1 – Shrouded header details added.

2.2. Customer Drawings

Drawings for each connector 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 technical documentation supplied by TE.

2.3. Specifications

108-64040	-	Product Specification, AMPMODU 2mm Board to Board Header and Receptacles
109-11-11	-	Solderability Specification provides test procedures and solderability evaluations for these connectors.
109-201	-	Component heat resistance to lead-free reflow soldering
IPC-J-STD-001	-	Refer for connector solder joint requirements
IPC-S-815	-	General requirements for soldering electronic interconnections
101-21	-	Solder Fillets of Surface Mounted Connectors

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.

3. REQUIREMENTS

3.1. Storage

A. Ultraviolet Light

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

B. Shelf Life

Each connector is packed and shipped in an individual Antistatic Tube, Tape and Reel or Box Packaging. To prevent damage to the housings and contact solder tines, the connectors should remain in the package until ready for the installation. Also, to prevent possible storage contamination and ensure maximum solderability, the connectors should be used on a first in, first out basis.

C. Chemical Exposure

Do not store connectors near any chemical listed below as they may cause stress corrosion cracks in the contacts.

Alkalis	Ammonia	Citrates	Phosphates Citrates	Tartrates
Sulfur compounds	Amines	Carbonates	Nitrites	Sulfur Nitrites

3.2. Product Materials

AMPMODU 2mm Headers are constructed of high temperature thermoplastic, UL94V-0. The contacts are made of copper alloy, under-plated with Nickel and the mating interface of the contacts are plated with Gold or Tin. The solder tines have Tin plating.

3.3. PC Board

A. Tolerance

At the time of connector placement, the coplanarity of the pad pattern must be held to 0.05 mm [.002 in.] maximum. We recommend a solder mask to minimize solder bridging between pads. The mask must not exceed the height of the pad by more than 0.05 mm [.002 in.]

Recommended masks are:

- Photo-imageable liquid mask
- Dry film solder mask

Since the connector housings may rest on top of the solder mask, an excessively high mask will allow too much space between the solder tine and pad for a good solder joint. A solder joint under these conditions would be weak, and would not provide long term performance for the connector.

B. Material and Thickness

The PCB material could be glass epoxy (FR-4 or G-10). The nominal thickness of the PC Board shall be 1.60 [.063]

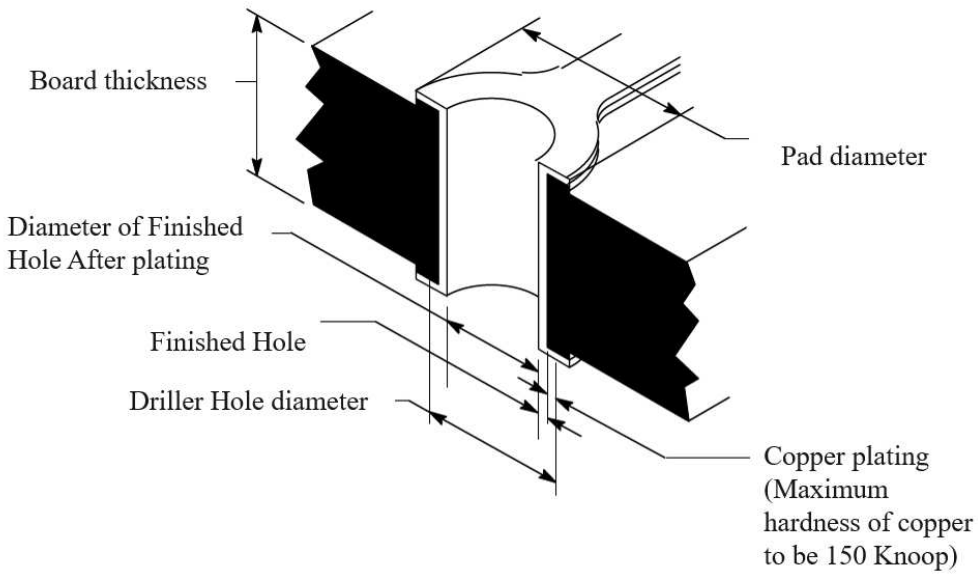
The solder tail length shall be chosen corresponding to the thickness of the PCB and the intended soldering process to ensure proper soldering and stability.

3.4. Processing requirements for TH/THR Connectors

A. PC Board Layout

Recommended PCB patterns for header connectors are provided in the respective customer drawings. The holes in the PC Board for the solder tines must be drilled and plated (for THR connectors) through to specific dimensions as provided in Customer Drawings. See Figure 2.

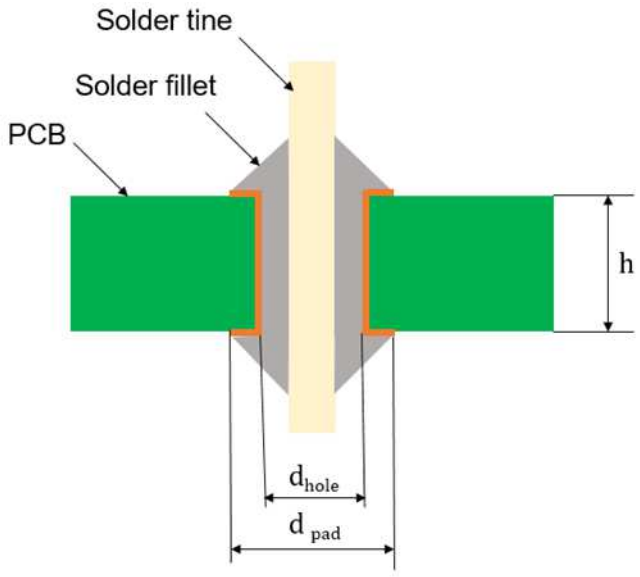
Figure 2



B. Solder Volume for THR

Following formula could be used to approximate required solder volume. Trials and Consultations with your Solder Paste supplier are advised to arrive at exact quantity.

Figure 3



d_{hole}= Diameter of the plated hole

d_{pad}= Diameter of the solder pad

h = Thickness of the PCB

W = Width of the solder tine

T = Thickness of the solder tine

To calculate the volume of the solder fillet:

$$V_f = 0.215\, r^2 \times 2\pi\,(0.2234r + a)$$

To calculate the volume of the solder inside the PCB hole:

$$V_h = \pi h\,(R^2 - a^2)$$

To calculate the total volume of the solder:

$$V_t = V_h + 2V_f$$

To calculate the required volume of the solder paste to be applied:

$$V_s = 2 \times V_t$$

Where:

$$a = \sqrt{\frac{W \times T}{\pi}}$$

$$r = \frac{d_{pad}}{2} - a \qquad R = \frac{d_{hole}}{2}$$

C. Manual Placement

Manual Placement of the headers on the PC Board is relatively easy. To avoid damage, the connectors should be emptied directly from the T&R/ tube / box in which they are supplied into a pick-up track. The connectors may be picked up and pushed evenly into the PC Board holes until the housing is seated.

D. Machine Placement

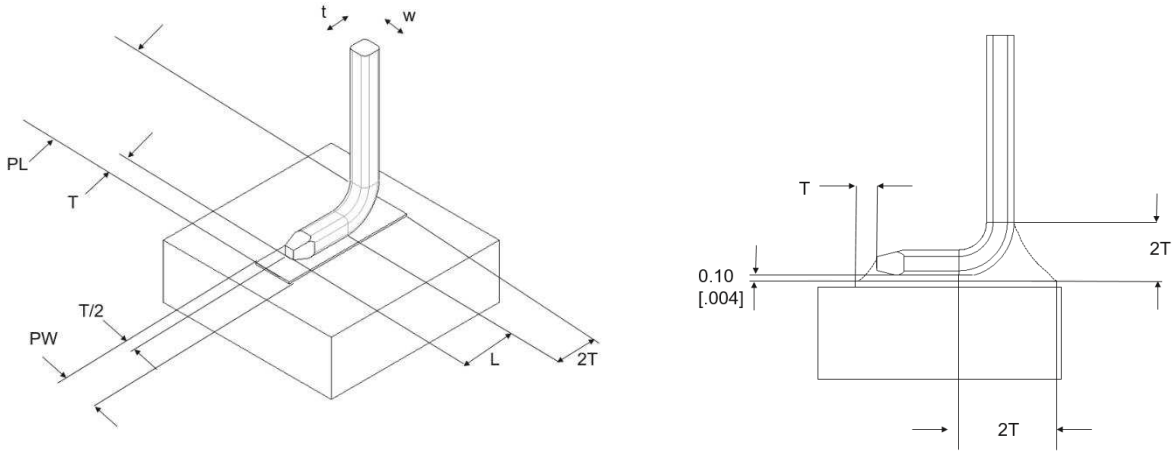
Headers may be placed using a variety of insertion machines, including semi-automatic and fully automatic in-line bench units as well as conventional robot/gripper technology. These machines and associated hardware will automatically position the connector under the insertion head using a gravity fed tube system. Insertion locations will be pre-programmed by the user by a simple pantograph/template system, or a software package in the case of robotic installation. Insertion is accomplished similarly to that of the manual process described above.

3.5. Processing requirements for SMD Connectors

A. Solder Volume

Enough volume of solder paste should be available to ensure an ideal solder fillet. Following formula could be used to approximate required solder volume. Trials and Consultations with your Solder Paste supplier are advised to arrive at exact quantity.

Figure 4



T = thickness of pin

w = width of pin

T = wetting distance

L = length

PL = Pad length

PW = Pad Width

t = w, Because Square pin.

Paste underneath the pin (mm^3) = (L + (2T)/2)) * w * 0.10

Perimeter (mm) = 2 ((L + (T+2T)/2) + (w + (T/2+T/2)/2))

Area of wetting triangle (mm^2) = ½ * (t x T/2)

Paste around the pin (mm^3) = Perimeter x area of the wetting triangle

Solder Volume before curing (mm^3) = 2*(Paste Underneath the pin + Paste Around the pin)

B. Solder Screen

Generally, we do not recommend screen application of solder paste because of the limited volume of paste that can be deposited. If a screen application is required, we recommend removal of all screen from the contact pad areas. Consult your supplier for compatibility of screen and paste, and for application techniques.

C. Solder Mask

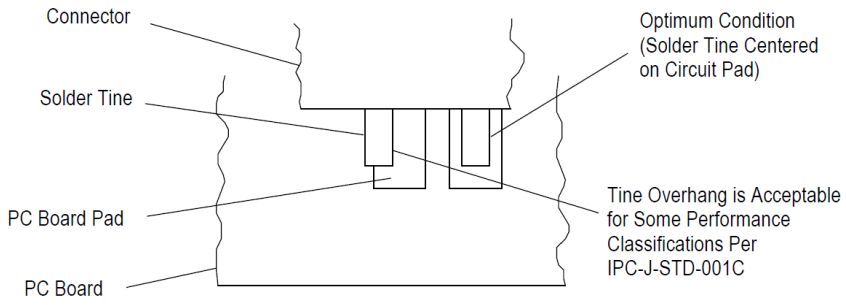
Solder mask is recommended between all pads. If a trace is run between adjacent pads on the solder side of the PC Board, a solder mask must be applied over the trace to prevent bridging and wicking of solder away from the contact solder tines. Liquid photo imageable or dry film solder masks are recommended.

D. Connector Placement

When placing connectors on the PC Board, the contact solder legs must be aligned with matching pads. It is imperative that the connector solder legs are sufficiently pressed into the solder paste. No hold-down is required for these connectors. Optimally, the contact solder legs should be centered on the pads.

Optimally, the connector tines should be aligned on the PC Board pads. However, mis registration is permissible for certain performance classifications as specified in IPC-S-815. See Figure 5.

Figure 5



3.6. Soldering

Manual 402-40 provides some guidelines for establishing soldering practices

A. Fluxing

The contact solder tines and, if applicable, attaching hardware 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 solder line, manufacturing, health, and safety requirements. Call the Product Information number at the bottom of page 1 for consideration of other types of flux. Some fluxes that are compatible with these connectors are provided in Table 3.

Table 3

FLUX TYPE	ACTIVITY	RESIDUE	COMERCIAL DESIGNATION	
			KESTER	ALPHA
Type RMA (Mildly Activated)	Mild	Non-Corrosive. Removal is recommended.	185/197	611

B. Parameters

The connectors will withstand peak temperatures of 260°C [500°F] for 20-40s. The connectors are tested for the reflow profile according to TEC-109-201 Condition B. Due to the many variables involved with the reflow process (i.e., component density, orientation, etc.), we recommend that the user conduct trial runs under actual manufacturing conditions to ensure product and process compatibility

C. Techniques

It is recommended that the connector be soldered using convection, vapor phase (VPR), double sided non-focused infrared (IR), or equivalent soldering technique provided the temperatures and exposure time are within 260°C for less than 40s.

D. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Consult with the supplier of the solder paste and flux for recommended cleaning solvents. The following is a listing of common cleaning solvents that will not affect the connectors. The connectors will be unaffected by any of these solvents if they are not exposed beyond time specified in Table 4.

Cleaners must be free of dissolved flux and other contaminants. We recommend cleaning with the PC Board on its edge. If using an aqueous cleaner, we recommend standard equipment such as a soak-tank or an automatic in-line machine.



Even when using "no clean" solder paste, it is imperative that the contact interface be kept clean of flux and residue, since it acts as an insulator. Flux may migrate under certain conditions with elevated temperatures and, therefore, cleaning is necessary even with "no clean" paste

Table 4

CLEANER		**TIME (Minutes)**	**TEMPERATURE (Maximum)**
NAME	**TYPE**		
ALPHA 2110	Aqueous	1	132°C [270°F]
MIOACT EC-7	Solvent	5	100°C [212°F]
Butyl CARBITOL Solvent	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	Solvent		



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.

If you have a solvent that is not listed, contact PRODUCT INFORMATION at the number at the bottom of page 1.

3.7. Inspecting Installed Connector

The housing must seat on the PC Board as shown in Figure 6.

Pick and Place Cap must be removed before mating with the receptacle.

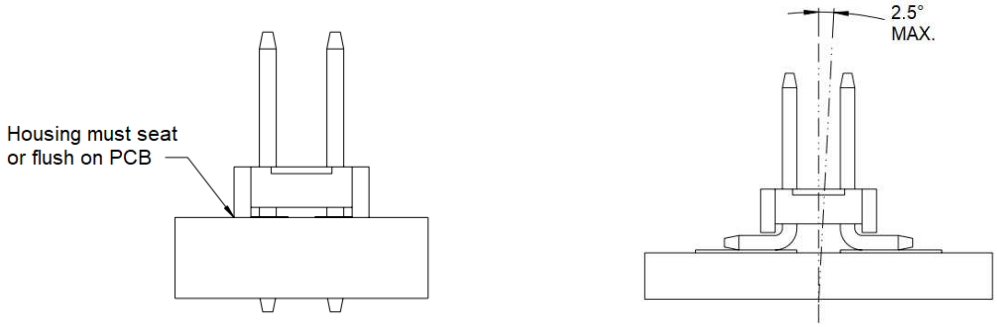


Figure 6

3.8. Repair/Removal

Connectors may be removed from the PC Board by standard de-soldering methods. Damaged connectors must be replaced.

4. QUALIFICATIONS

AMPMODU 2 mm Headers are recognized by the Component program in Underwriters Laboratories Inc. (UL file no. E28476)

5. TOOLING

No special tooling is required for the installation or removal of AMPMODU 2mm Headers. The following information is provided for the robotic application of these assemblies.

5.1. Robotic Equipment

Robotic equipment for placement of the connector on a PC Board must have a true position accuracy of 0.25 mm [.010 in.] to ensure proper location and insertion of the contact tines. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the connector datum surface to ensure reliable placement.

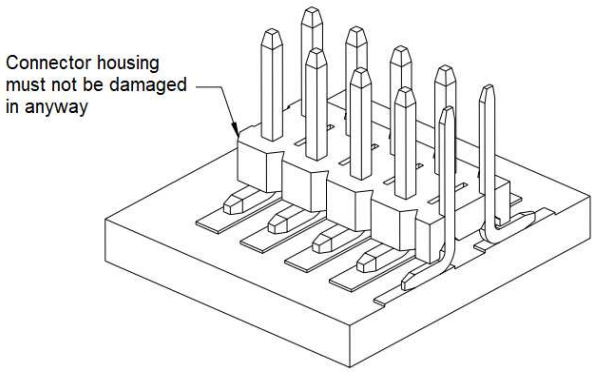
5.2. PC Board Support

A PC Board support must be used to prevent bowing of the PC Board during insertion of the assemblies. It should have a flat surface with holes or a channel large enough to receive the contact tines during installation.

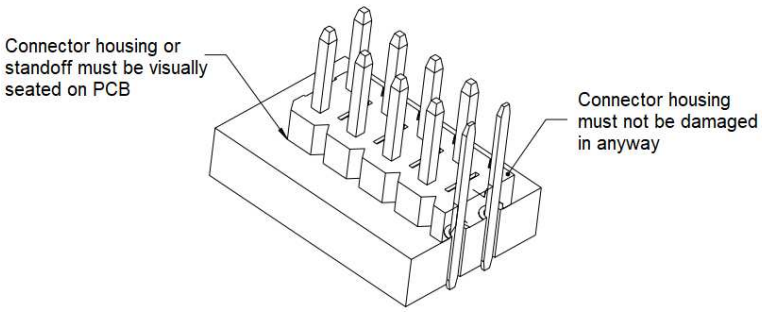
6. VISUAL AID

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. Figure 7 below shows a sectional view of connector on PCB.

Figure 7



SMD



TH/THR

7. LEGEND

Following are icons used in this document along with their meanings.

NOTE

Highlights special or important information

CAUTION

Denotes a condition which may result in product or equipment damage.

DANGER

Denotes an imminent hazard which may result in moderate or severe bodily injury.

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