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 Power Key 5.0 connector system with a 5.0 mm centerline. The Power Key 5.0 connector system supports a 14 to 24 AWG wire range.

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

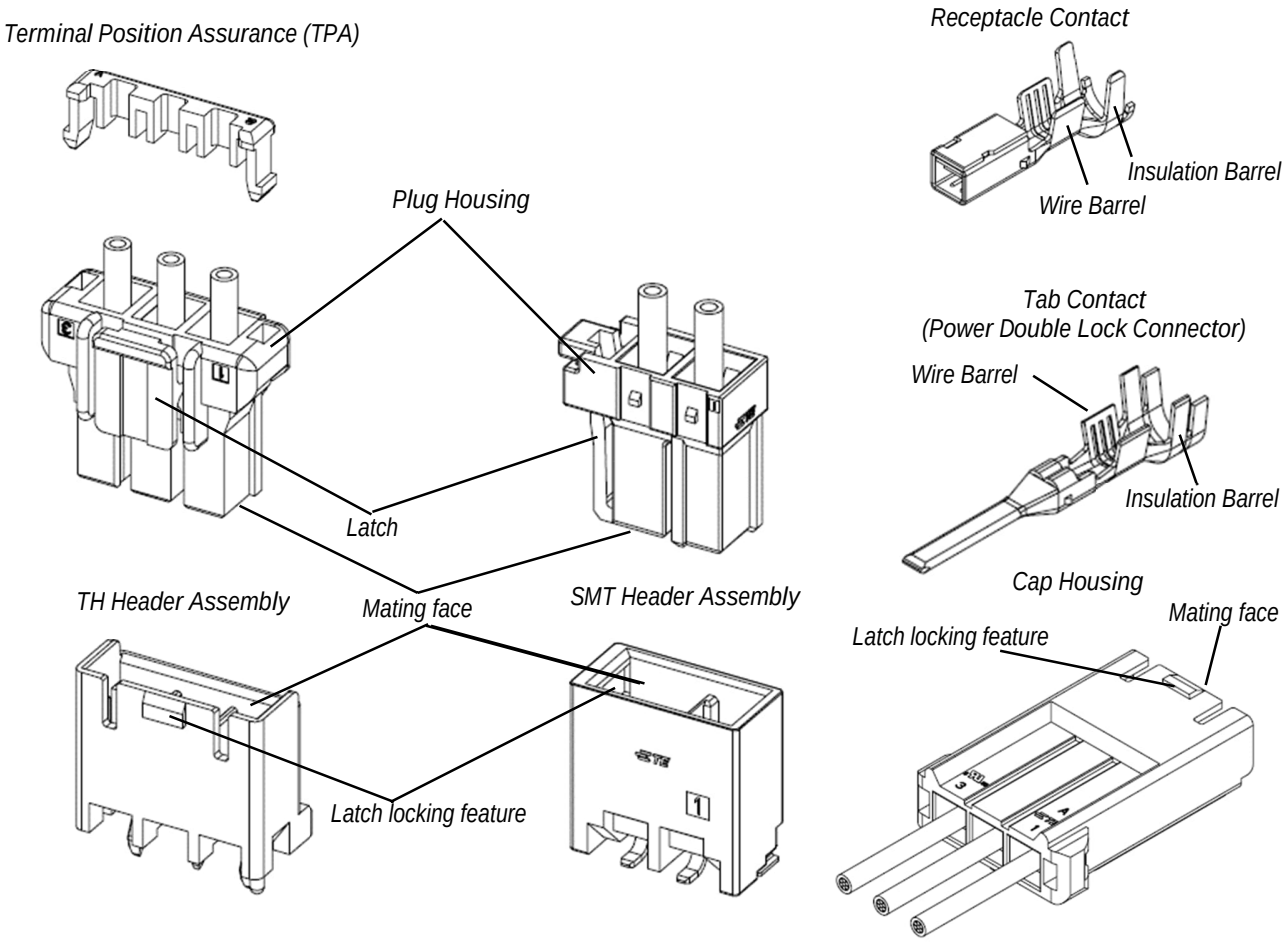


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this specification include:

Revision D2: Add Cap housing and soldering information.

2.2. Customer Assistance

Reference Product Base Part numbers are stated in Figure 2. 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.

5.0 Power Key Connector	
Product Type	Base Part Numbers
Header Assembly	1376382 - 1376387 (TH) 2171335 - 2174337 (SMT)
Plug Housing	1376388 - 1376393 (TH) 2171224 (SMT)
Receptacle Contact	2446270 (AWG14) 1376347 (AWG16-20) 1376348 (AWG20-24)
Cap Housing	2430785 - 2430788
Tab Contact (Power Double Lock Connector)	177916 (AWG20 - 26) 177917 (AWG16 - 20)
Terminal Position Assurance (TPA)	1376394 - 1376397

Figure 2

2.3. Drawings

Customer drawings for product part numbers are available from www.te.com. Information contained in the customer drawing takes priority.

2.4. Specifications

Product Specification 108-5699, 108-106528, 108-161265 provides product performance and test results.

3. REQUIREMENTS

3.1. Safety

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

3.2. 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. Reels

When using reeled contacts, store coil wound reels horizontally. When storing partial reeled contacts, the end of the strip should be secured to the flange using a wire tie or similar method.

D. 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

NOTE
Where the above environmental conditions exist, phosphor-bronze contacts are recommended instead of brass if available.

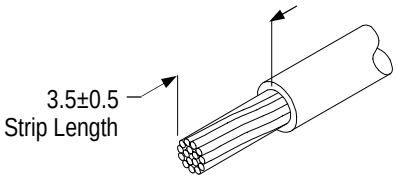
3.3. Wire Selection and Preparation

The contacts accept stranded copper wire sizes 14 AWG to 24 AWG with an insulation diameter range given in Figure 3.

Each wire must be stripped to the dimensions given in Figure 3.

CAUTION
Care must be taken not to nick, scrape, or cut any part of the wire during the stripping operation.

Note: Not to Scale



CONTACT			WIRE	
TYPE	PART NUMBER	WIRE SIZE (AWG) [mm²]	INSULATION DIAMETER	STRIP LENGTH
Receptacle Contact (M)	1376348-1	20-24 [0.53 – 0.22]	Φ 1.7– Φ 2.7	3.5±0.5
Receptacle Contact (L)	1376347-1 2468057-1	16-20 [1.38 – 0.51]	Φ 2.0~ Φ 3.1	3.5±0.5
Receptacle Contact (2L)	2446270-1	14 [2.18]	Φ 2.8~ Φ 3.6	3.5±0.5
Tab Contact	177916-1 177917-1	See Application Specification 114-5175		

Figure 3

3.4. Contact Crimp

A. Cutoff Tab

The cutoff tab is the remaining portion of the carrier strip after the contact is cut from the strip. The cutoff tab must not exceed the dimensions given in Figure 4.

B. Wire Barrel Crimp

The crimp applied to the wire barrel portion of the contact is the most compressed area and is most critical in ensuring optimum electrical and mechanical performance of the crimped contact. The crimp must be centered on the closed wire barrel. The crimp must result in an “F” crimp where the wire barrel forms a closed seam with no evidence of loose wire strands or wire strands visible in the seam. The crimp height and width must be within the dimensions given in Figure 4.

C. Insulation Barrel Crimp

The crimp applied to the insulation barrel of the contact must result in either an “F” crimp where the insulation barrel forms a closed seam with no evidence of wire insulation in the seam or an overlap crimp where the tips of the insulation barrel wraps overlap each other and wrap firmly around the wire insulation without cutting into the wire insulation. The crimp height and width must be within the dimensions provided in Figure 4.

D. Contact Stabilizer

The contact stabilizer must not be crimped or deformed in any way. The width of the stabilizer must be within the dimension given in Figure 4. Otherwise, in addition to reducing the function of the stabilizer, a deformed stabilizer will cause the TPA to be ineffective.

E. Wire Barrel Flash

Wire barrel flash is the formation that may appear on both sides of the wire barrel as the result of the crimping process. It must not exceed the dimension provided in Figure 4.

F. Twist and Roll

There should be no twist or roll of the wire barrel or mating portion of the crimped contact that would cause overstress or impair usage. See Figure 4 for allowable limits.

G. Wire End Extrusion Length

The wire conductor ends must extend beyond the end of the wire barrel within the dimensions given in Figure 4.

H. Bellmouths

The front bellmouth and rear bellmouth shall conform to the dimensions given in Figure 4.

I. Wire Location

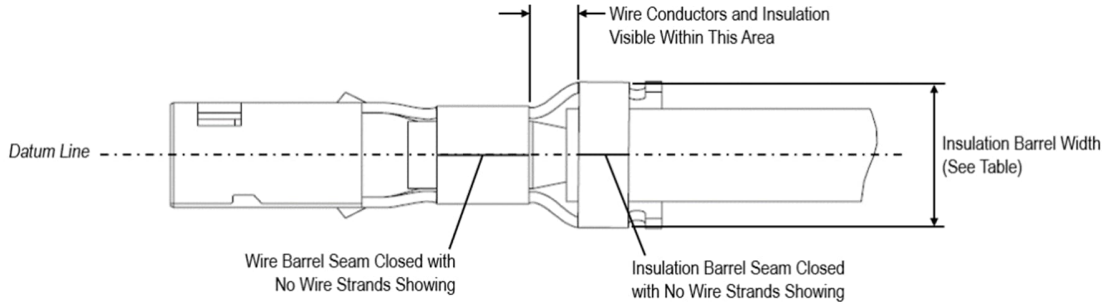
All conductors must be held firmly inside the wire barrel. No strands can be folded back over the wire insulation. The wire insulation must be inside the insulation barrel, but must not enter the wire barrel. The wire conductors and insulation must be visible within the area between the wire barrel and insulation barrel as shown in Figure 4.

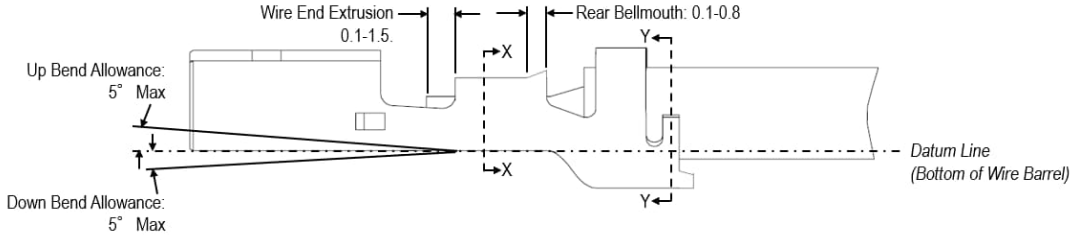
J. Bend Allowance

Then bend allowance between the wire barrel and the cable is acceptable within the limits given in Figure 4.

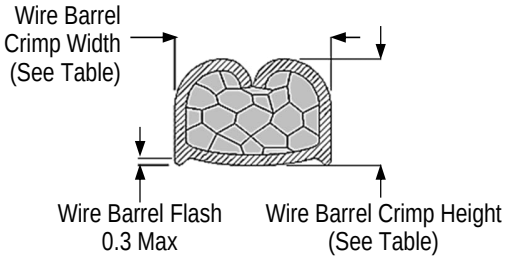
K. Mating End

There must be no damage or distortion to the mating end of the contact. See Figure 4.

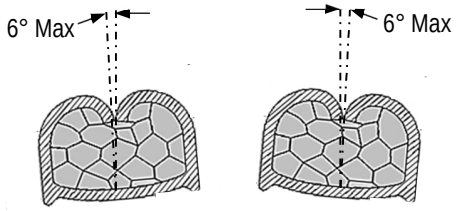




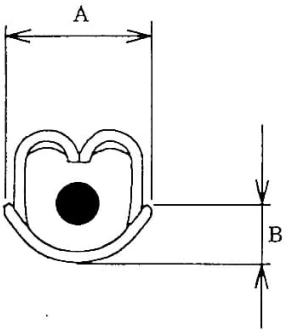
Section X-X



Avoid Twist and Roll



Section Y-Y: Stabilizer dimensions after Crimping



Part Number	Insulation Barrel Crimp Type	Dimension A	Dimension B
1376347-x	“F”	3.0-3.8	1.3 (Ref)

Figure 4 (continued)

Applicator No.	CONTACT P/N	WIRE SIZE		WIRE BARREL CRIMP		INSULATION BARREL CRIMP		Crimp Tensile Strength (kg) Min
		mm²	AWG	HEIGHT ±0.05	WIDTH	WIDTH	Finished Insulation Diameter	
1366703-2 2151079-1	1376347-x 2468057-x	0.51	20	1.05	2.03 REF "F"	3.30 REF "F"	2.0 – 3.1	6
		0.76	18	1.15				7
		1.27	16	1.29				8
1463049-2	1376348-x	0.22-0.23	24	0.80	1.57 REF "F"	3.30 REF "F"	1.7 – 2.7	3
		0.31-0.37	22	0.86				5
		0.51-0.53	20	0.96				6
1366703-2 2151079-1	2446270-x	2.18	14	1.72	2.03 REF "F"	3.30 REF "F"	2.8 – 3.6	23
-	177916-x 177917-x	See Application Specification 114-5175						

Hand Tool

Hand Tool No.	CONTACT P/N	WIRE SIZE		WIRE BARREL CRIMP		INSULATION BARREL CRIMP		Crimp Tensile Strength (kg) Min
		mm²	AWG	HEIGHT	WIDTH	WIDTH	Finished Insulation Diameter	
1729064-1	1376347-x 2468057-x	0.51	20	1.05 – 1.15	2.03 REF "F"	3.30 REF "F"	2.0 – 3.1	6
		0.76	18					7
		1.27	16	1.24 – 1.34				8
1762773-1	1376348-x	0.22-0.23	24	0.78 – 0.85	1.57 REF "F"	3.30 REF "F"	1.7 – 2.7	3
		0.31-0.37	22					5
		0.51-0.53	20	0.90 – 0.97				6

Figure 4 (end)

L. Contact Length

The contact length measured from the front of the mating end to the back of the contact stabilizer (not including the carrier strip cutoff tab) must be within the dimensions given in Figure 5.

NOTE
Exceeding the contact length given may prevent the TPA from engaging the housing.

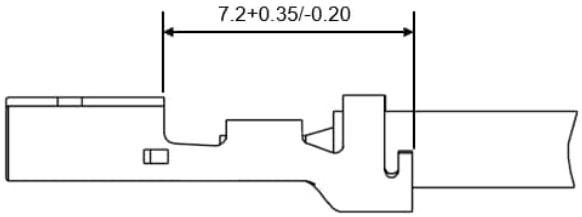


Figure 5

3.5. Inserting Contact into Housing

Grasp the wire directly behind the contact insulation barrel and push the contact straight into the cavity until it touches the bottom (there should be an audible click). Be aware that the contact must be installed in correct orientation as specified below. Pull back lightly on the wire to be sure the contact is locked in place. Refer to Figure 6

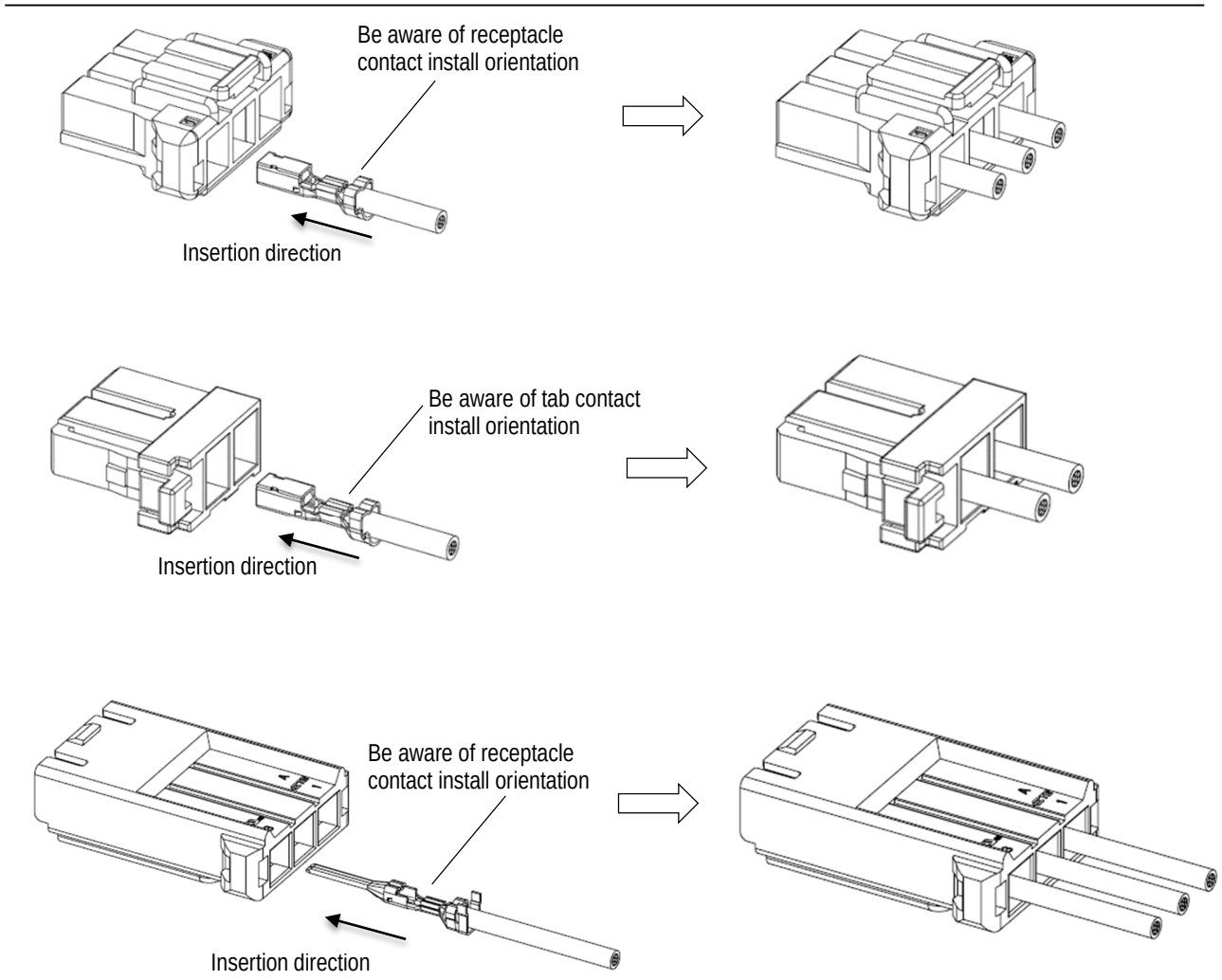


Figure 6

3.6. Mating Connectors

Be aware that the mating connectors have unique color and should be inserted into header cavities with the same color. Align the mating faces of the connectors and push them together until the locking latch fully engages the locking tab. Pull back to ensure proper engagement and to prevent any deformation of the locking mechanism. See Figure 7.

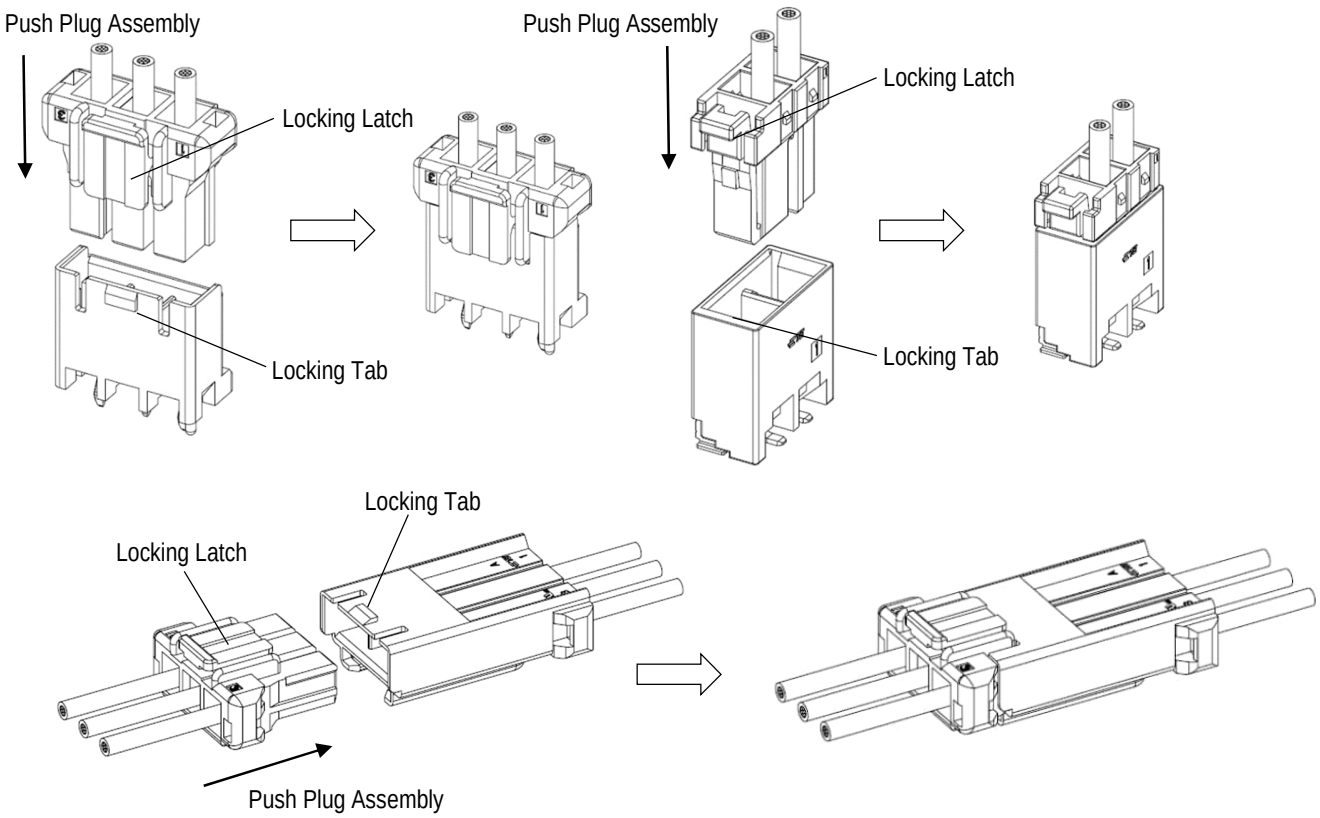


Figure 7

3.7. Unmating Connectors

To disengage mating connectors, depress latch of plug housing with thumbnail, and pull the connectors apart. Refer to Figure 8.

NOTE
DO NOT pull the connectors by the wires.

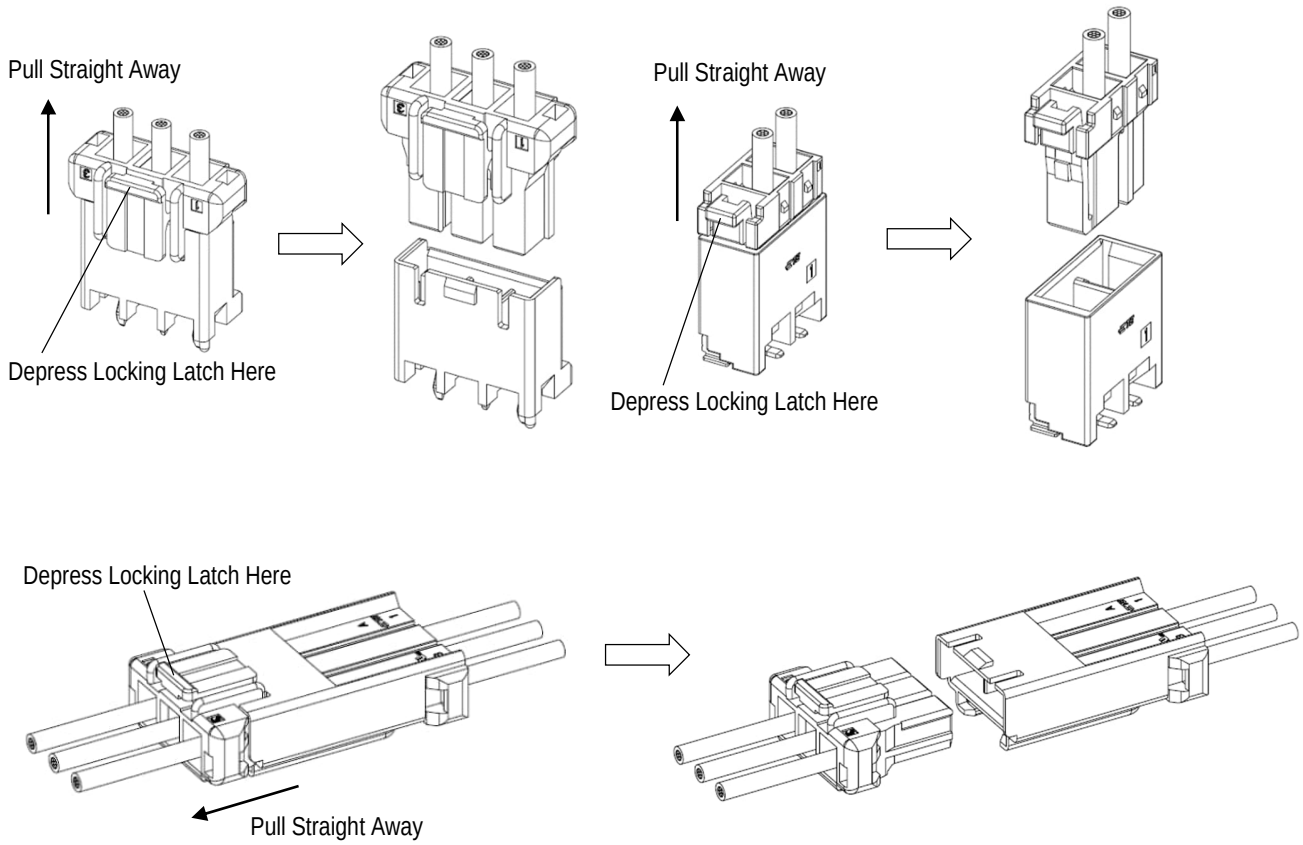


Figure 8

3.8. Installing TPA

Grasp the TPA and push it straight into the housing until it bottoms (there should be an audible click). Pull back lightly to be sure the TPA is locked in place. Refer to Figure 9.

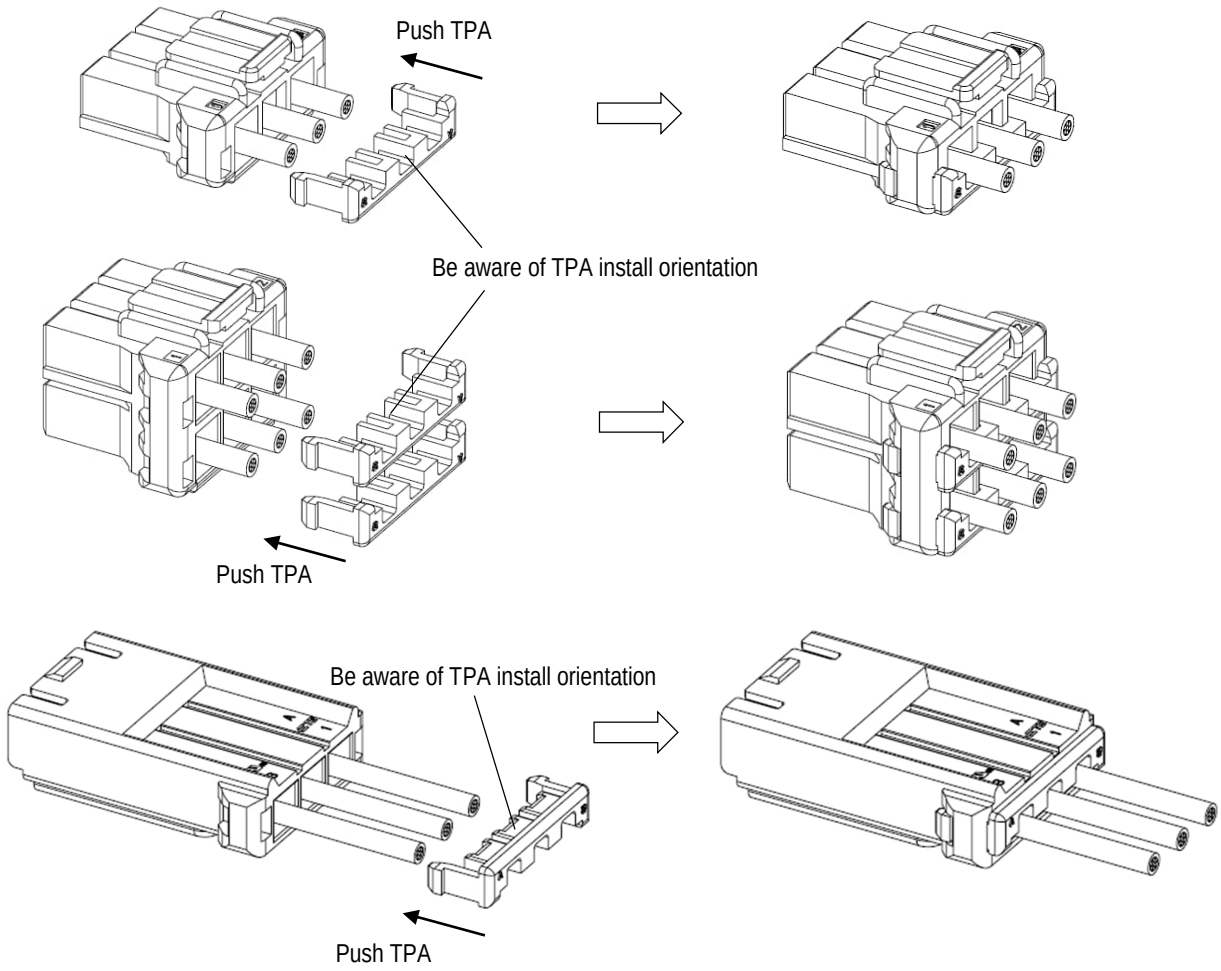


Figure 9

3.9. Clip Mounting

As an alternative mounting configuration, the bottom of the Power Key 5.0 Cap Housing contains as 11 mm wide slot that accepts mounting clips designed to meet USCAR specification EWCAP-005-11. See Figure 10.

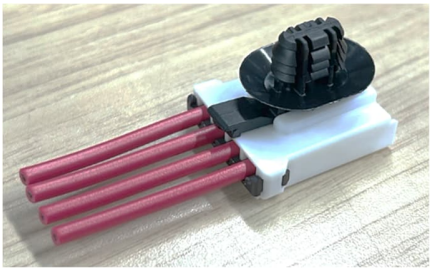


Figure 10

3.10. PC Board

A. Layout for Through Hole Mount Connectors

The mounting and contact holes in the PC board must be precisely located to ensure proper placement and optimum performance of the header assembly. Recommended PC board pad pattern, dimensions and tolerances are shown in customer drawing. The plating types and plating thickness will depend on application requirements. See Figure 11.

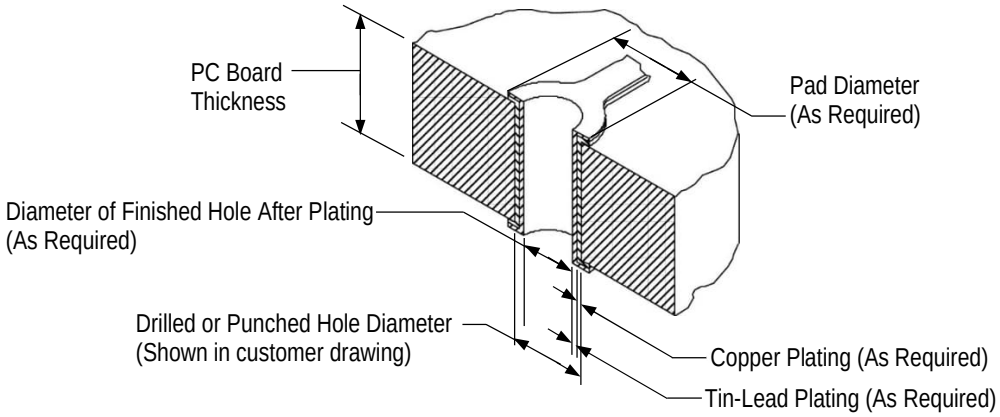


Figure 11

B. Layout for Surface Mount Connectors

The PC board pads must be solderable in accordance with EIA-638(Electronic Industries Alliance). Recommended PC board pad pattern, dimensions and tolerances are shown in customer drawing. The Stencil should be 0.15mm thick and must be using the dimensions provided on the customer drawing for the specific connector.

3.11. PC Board Header Assembly Placement

CAUTION
If connectors are placed on the board manually, the connector should be handled only by housing to avoid deformation, contamination, or damage to the contact solder tines and metal pegs.

A. Manual Placement

When placing the Surface Mount Connectors, the contact solder tines should be centered on the PC board circuit pads. However, slight misalignment is permissible as shown in Figure 12.

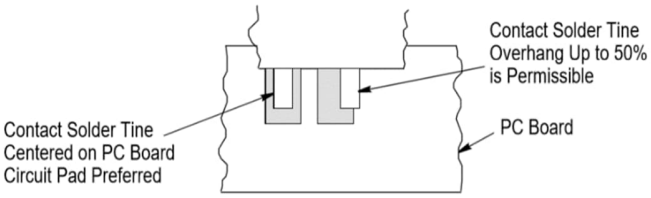


Figure 12

B. Robotic Placement

The robotic equipment must be adjusted to feed, pick up, and place the headers on the PC board with an accuracy as required. The header assembly datum surfaces detailed on the customer drawing will ensure correct placement of the header.

3.12. Replacement and Repair

Do not use defective or damaged product. These products cannot be repaired. For replacement information, call the number at the bottom of page 1.

3.13. Strain Relief and Wire Dress

Wires can be bundled together and supported using cable ties or electrical tap. The wires must remain perpendicular to the housing and avoid an excessively sharp bend radius. The wire bundle must be at least 76mm [3.0 inch] from the back of the housing before bending in any direction. Do not bend unsupported wires as this may cause strain on the contacts.

3.14. Soldering

A. Process

The contacts can be soldered using reflow soldering or equivalent soldering techniques. Temperature and exposure time shall be as specified in 108-5699 (through hole mount) and 108-106528 (surface mount).

B. Flux Selection

The contact Stabilizer Barrel must be fluxed prior to soldering with a 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 the wave solder line, manufacturing, health, and safety requirements. Call the number at the bottom of page 1 for consideration of other types of flux. Flux that is compatible with these connectors are provided in Figure 13.

TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			ALPHA	KESTER
RMA (Mildly Activated)	Mild	Noncorrosive	611	186

Figure 13

C. 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 that cleaning takes place with the PC board on its edge. If using an aqueous cleaner, it is recommended using standard equipment, such as a soak tank or automatic in-line machine. Common cleaning solvents with times and temperatures that will not affect these contacts is specified in Figure 14.

NOTE
For solvents not listed, call the number on the bottom of page 1 for recommendations.

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 14

D. Drying

When drying cleaned contacts and PC boards, temperature limitations must not be exceeded 105°C [221°F]. Excessive temperatures may cause contact degradation.

3.15. Handling and storage of SMT header assembly

Due to hydroscopic nature of material used for header connector, it is recommended to follow proper handling and storage of connectors as IPC/JEDEC J-STD-033 MSL2.

4. TOOLING

Applicators contain the tooling for feeding and crimping strip-form terminals. Automatic machines provide the power to operate the applicator. See Figure 15 for representative images.

Tooling information for product part numbers is available from www.te.com or by calling the Product Information Center at the number at the bottom of page 1.

4.1. Applicators

Applicators for product part numbers are available from the Applicator Search Portal on www.te.com or by calling the Product Information Center at the bottom of page 1.

4.2. Hand Tools

Hand tools for product part numbers are available from the Hand Tool Search Portal on www.te.com or by calling the Product Information Center at the bottom of page 1.

Ocean Applicator

Automatic Machine

Hand Tool Assembly

Figure 15