

NOTE

All numerical values are in metric units. 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 AMP* SIM/SAM SMT card connectors for use in electronic equipment. These connectors are designed for soldering directly onto the pc (printed circuit) board. The connectors are available in 6 positions (with card detection switch) and 8 positions (without card detection switch) with contact spacing on 2.54 centerlines.

The connectors accept MICROSIM[®] GSM integrated circuit cards meeting GSM 11.11 standards. The card slides into the hinged lid on the connector, and to ensure proper orientation, the notched edge on the card must align with the polarization feature (notched edge) on the connector, therefore allowing the lid to fully close. The card is retained in the connector by the rotating locking disk. When rotated to the readable position ("LOCK"), the locking disk is secured by locking latches. When the locking disk is rotated to the opened position ("OPEN"), the lid can be lifted, and the card can be removed. The alignment posts ensure that the connector, when installed, is properly located on the pc board. The connectors may be placed on the pc board by hand or automatic application tooling (typically vacuum pick and place).

When corresponding with AMP personnel, use the terminology provided in this specification to facilitate your inquiries for information. Basic terms and features of these connectors are provided in Figure 1.

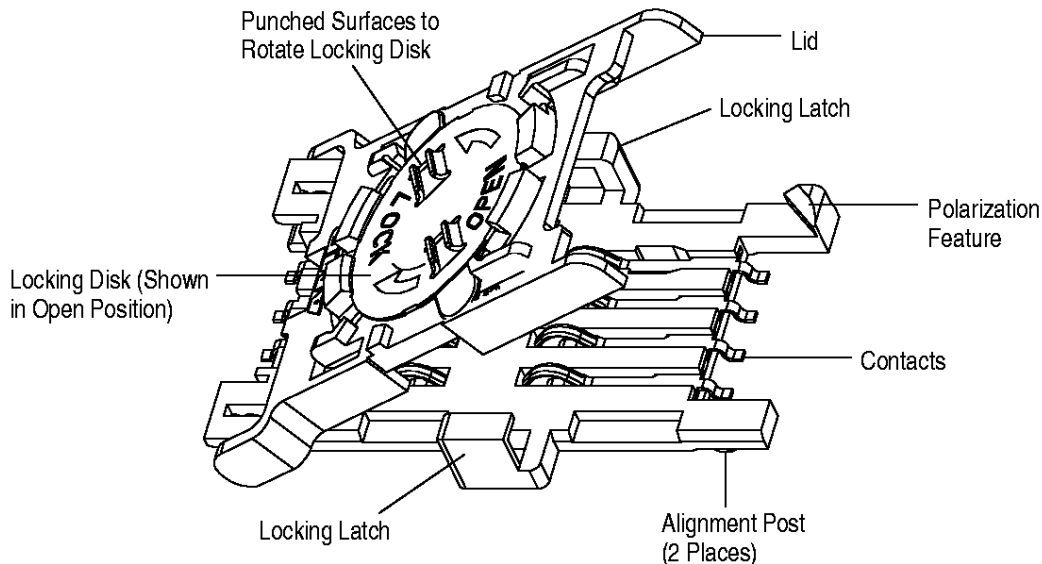


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

Per EC 0990-0348-99:

- Initial release of application specification

2.2. Customer Assistance

Product Part Number 145299 and Product Code A240 are representative of AMP SIM/SAM SMT card connectors. Use of these numbers will identify the product line and expedite your inquiries through an AMP service network established to help you obtain product and tooling information. Such information can be obtained through a local AMP Representative (Field Service Engineer, Field Applications Engineer, etc.) or, after purchase, by calling the Product Information Center at the number at the bottom of page 1.

2.3. Drawings

AMP 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 by AMP, call the Product Information Center at the number at the bottom of page 1.

2.4. Manuals

AMP Manual 402-40 is available upon request and 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

AMP Product Specification 108-1701 provides product performance and test information.

2.6. Instructional Material

AMP Instruction Sheets (408-series) provide assembly instructions. Documents available which pertain to this product are:

- 408-9816 Handling of Reeled Products
- 408-6927 Design Recommendations for PC Board Support Fixture

3. REQUIREMENTS

3.1. Material

The connector housing is made of thermoplastic, and the locking disk is made of stainless steel. The contacts and card detection switch are made of phosphor bronze plated with nickel, the contact areas are plated with gold over nickel, and the solder tines are plated with tin lead over nickel.

3.2. Storage

A. Ultraviolet Light

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

B. Shelf Life

The connectors should remain in the shipping containers until ready for use to prevent deformation to the contacts. The connectors should be used on a first in, first out basis to avoid storage contamination that could adversely affect performance.

3.3. Chemical Exposure

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

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

3.4. Special Features

These connectors accept integrated circuit cards with a 0.76 ± 0.08 thickness.

3.5. Connector Spacing

Care must be taken to avoid interference between adjacent connectors and/or other components. There is no required spacing between connectors, however spacing may be dependent on other components used.

3.6. PC Board

A. Material and Thickness

The pc board material shall be glass epoxy (FR-4 or G-10). The pc board thickness is at the discretion of the customer.

NOTE Contact the Product Information Center at the number listed at the bottom of page 1 for suitability of other board materials.

B. Tolerance

Maximum allowable bow of the pc board shall be 0.03 [.001] over the length of the connector.

C. Pads

The pc board pads must be solderable in accordance with AMP Test Specification 109-11-1.

D. Layout

The connector alignment post holes on the pc board require precise drilling dimensions and the location of the circuit pads to these holes is critical to ensure proper placement and optimum performance of the connector. Recommended printed circuit board pad pattern, dimensions, and tolerances are shown in Figure 2.

Recommended PC Board Layout

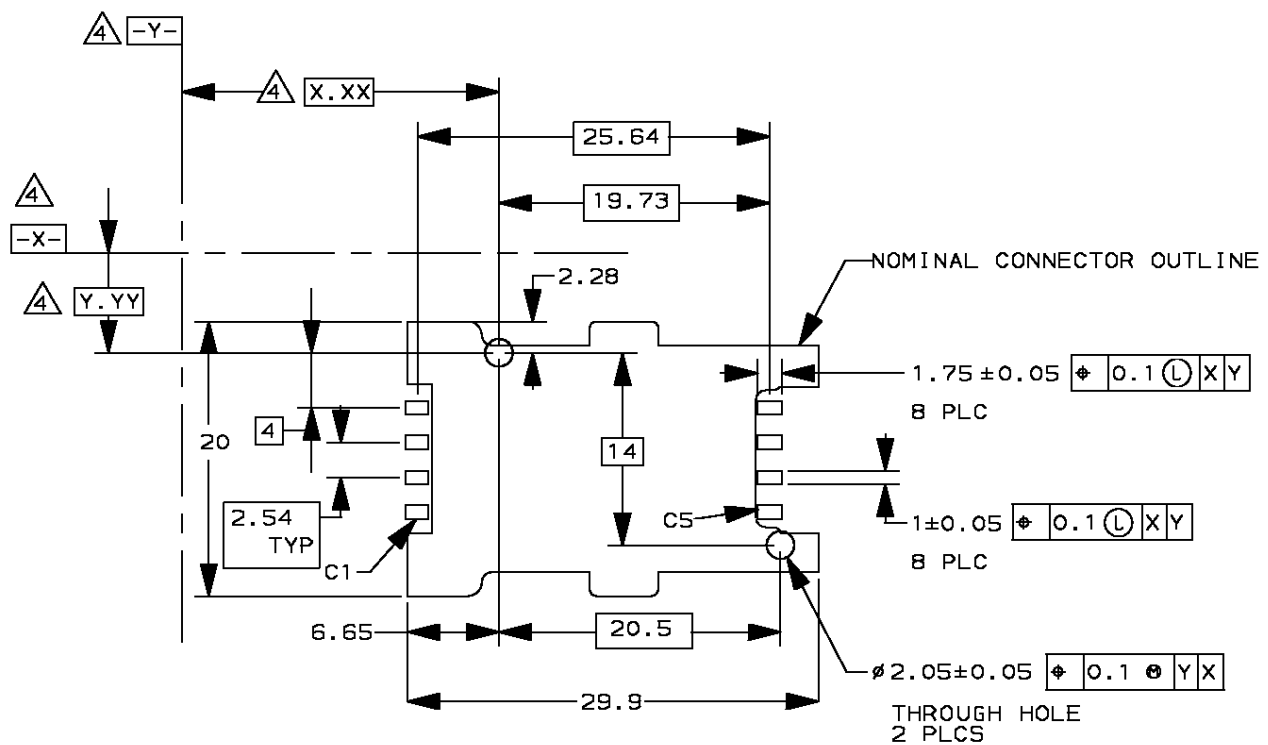


Figure 2

3.7. Processing

A. Solder Paste Characteristics

1. Alloy type shall be 63 Sn/37 Pb, 60 Sn/40 Pb, or 62 Sn/36 Pb/2 Ag
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 –200 to +325 (74 to 44 square micron openings, respectively).
5. Minimum viscosity of screen print shall be 5 x 10% cp (centipoise).
6. Minimum viscosity of stencil print shall be 7.5 x 10% cp (centipoise).

B. Solder Volume

Minimum solder volume (V) (before curing) for each circuit pad is calculated by multiplying the stencil aperture length (L) by the stencil aperture width (W) by the stencil thickness (T):

$$1.75 (L) \times 0.10 (W) \times 0.15 (T) = 0.2625 \text{ mm}^3 (V)$$

Solder volume for each connector must be at least 0.25 mm³ per contact solder tine.

NOTE

Solder volume may vary depending on solder paste composition.

C. Solder Paste Thickness

Solder paste thickness for the solder tines shall be at least 0.15.

3.8. Stencil

The stencil aperture is determined by the circuit pad size and stencil thickness. It may be any shape as long as it prevents solder bridging from one pad to another. Generally, the thinner stencil will need a larger aperture to provide the necessary volume of solder paste.

3.9. Solder Mask

Solder mask is recommended between all pads when soldering connectors to minimize solder bridging between pads. The mask must not exceed the height of the pad. 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. The mask most suitable is Liquid Photo Imageable.

CAUTION

All traces must be covered by solder mask in the solder deposit area. Exposed traces could cause bridging and create a short, or wick solder away from the solder tines, producing a weak solder joint.

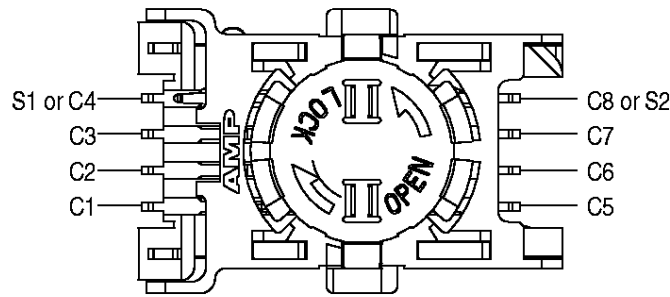
CAUTION

Since the connector housings may rest on top of the solder mask, an excessively high mask will allow too much space between the lead 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.

3.10. Connector Placement

A. Contact Assignment

Each numbered contact assignment per ISO 7816-1 are indicated in Figure 3.



CONTACT NUMBER	ASSIGNMENT	CONTACT NUMBER	ASSIGNMENT
C1	VCC (Supply Voltage)	C5	GND (Ground)
C2	RST (Reset Signal)	C6	VPP (Programming Voltage)
C3	CLK (Clock Signal)	C7	I/O (Data Input/Output)
C4 or S1	Reserved for Future Use or Card Detection Switch	C8 or S2	Reserved for Future Use or Card Detection Switch

Figure 3

B. Registration

The connector alignment posts must be placed over their intended pc board holes, and held so that the connector is parallel with the pc board, then gently pressed downward on the connector housing to seat the connector onto the pc board. Optimally, the connector contact solder tines should be centered on the pc board circuit pads. However, slight misalignment is permissible as shown in Figure 4.

CAUTION Connectors should be handled only by the housing to avoid deformation, contamination, or damage to the contact solder tines. DO NOT touch the solder tines, as moisture from the hands will contaminate the soldering process.

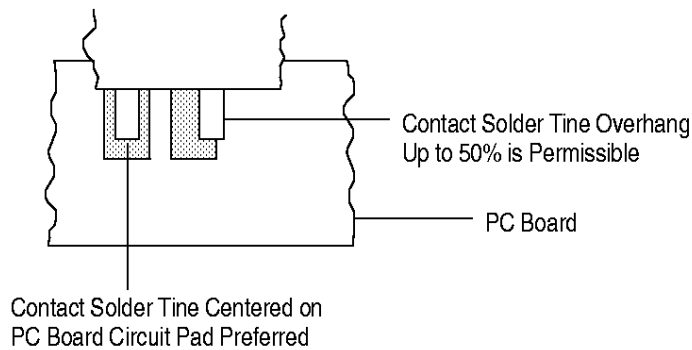


Figure 4

C. Seating Forces

Because the connector alignment posts are for clearance and fit only, the force required to seat the connector is minimal. Apply only that force necessary to seat the contact solder tines into the top surface of the solder paste.

3.11. Soldering

Guidelines and procedures must be observed when soldering contacts.

A. Flux Selection

Contact solder tines 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 the solder, manufacturing, health, and safety requirements. Call the Product Information Center at 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 5.

FLUX TYPE	ACTIVITY	RESIDUE	COMMERCIAL DESIGNATION	
			KESTER [®]	ALPHA [■]
RMA	Mild	Noncorrosive	186	611

[®] Product of Kester Solder Co. [■] Product of Alphametals Inc.

Figure 5

B. Technique

The connectors should be soldered using non-focused infrared (IR) reflow or equivalent soldering technique. The reflow temperature and time to which the housing can be subjected is specified in Figure 6.

SOLDERING PROCESS	TEMPERATURE (Max)	TIME (Max)
Vapor Phase (VPR)	215°C [419°F]▼	30 Seconds
Infrared Reflow (IR)		

▼ Peak Temperature is 230°C [446°F]

Figure 6

Due to many variables involved with the reflow process (i.e., component density, orientation, etc.), AMP recommends that trial runs be conducted under actual manufacturing conditions to ensure product and process compatibility. Recommended reflow parameters are provided in Figure 7.

VPR				IR
PRIMARY VAPOR TEMPERATURE	PREHEAT TIME	DWELL TIME	COOL DOWN TIME	CONVEYOR SPEED
215°C [419°F]	30 Seconds (In Secondary Vapor)	30 Seconds (In Primary Vapor)	30 Seconds (In Secondary Vapor)	635 [25], or 381 [15] per Minute

REFLOW TEMPERATURE (Preheat 350°C [662°F])		
ZONE 1	ZONE 2	ZONE 3
260°C [500°F]	240°C [464°F]	265°C [509°F]

Figure 7

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. AMP recommends cleaning with the pc board on its edge. If using an aqueous cleaner, standard equipment such as a soak-tank or an automatic in-line machine should be used. The following is a list of common cleaning solvents that will not the affect connectors for the time and temperature specified. See Figure 8.

CAUTION *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.*

CLEANER		TIME (Minutes)	TEMPERATURES (Maximum)	
NAME	TYPE		CELSIUS	FAHRENHEIT
Alpha 2110■	Aqueous	1	132	270
Isopropyl Alcohol	Solvent	5	100	212
Kester 5778❧	Aqueous	5	100	212
Kester 5779❧	Aqueous	5	100	212
Loncoterge 520●	Aqueous	5	100	212
Loncoterge 530●	Aqueous	5	100	212

■ Product of Fry's Metals, Inc. ❧ Product of Litton Systems, Inc. ● Product of Union Carbide Corp.

Figure 8

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. AMP does not recommend using Trichloroethylene and Methylene Chloride because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).

NOTE If you have a particular solvent that is not listed, contact the Product Information Center at the number at the bottom of page 1.

D. Drying

When drying cleaned assemblies and pc boards, make certain that temperature limitations are not exceeded: -40° to 90°C. Excessive temperatures may cause housing degradation.

3.12. Checking Installed Connector

The installed connector housing must be fully seated on the pc board. Solder must have 95% minimum solder coverage over the pc board pad. See Figure 9.

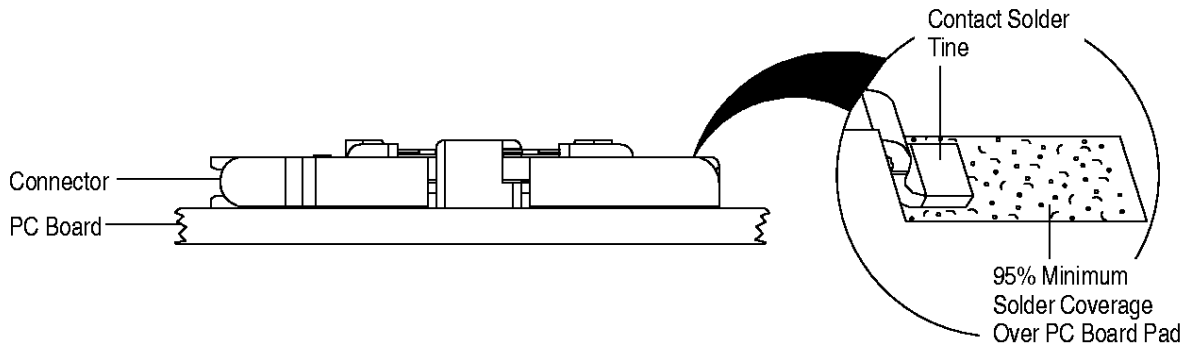


Figure 9

3.13. Card Insertion and Removal

The card must be inserted into the connector as shown in Figure 10. Removal is the opposite of insertion.

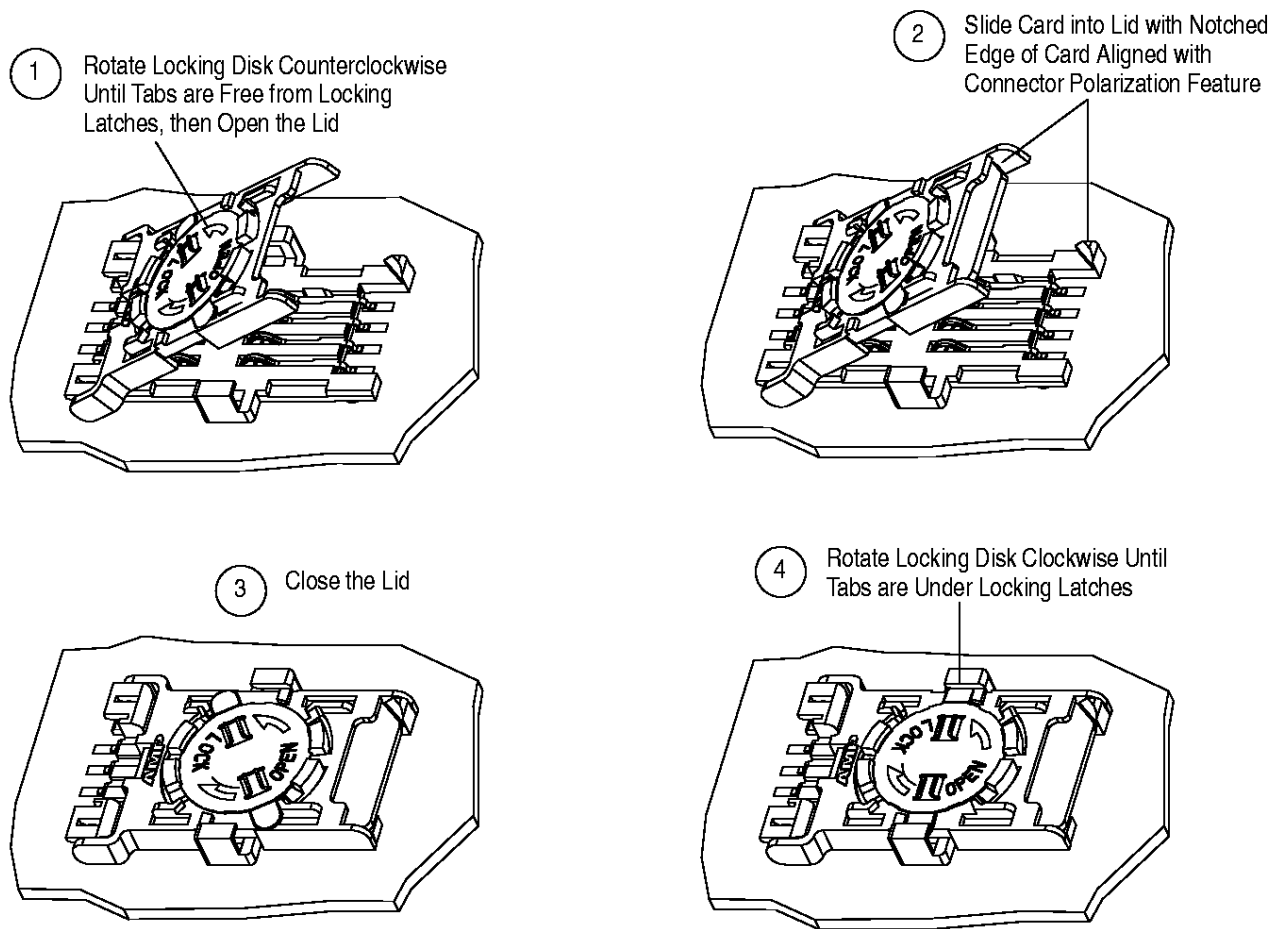


Figure 10

3.14. Repair

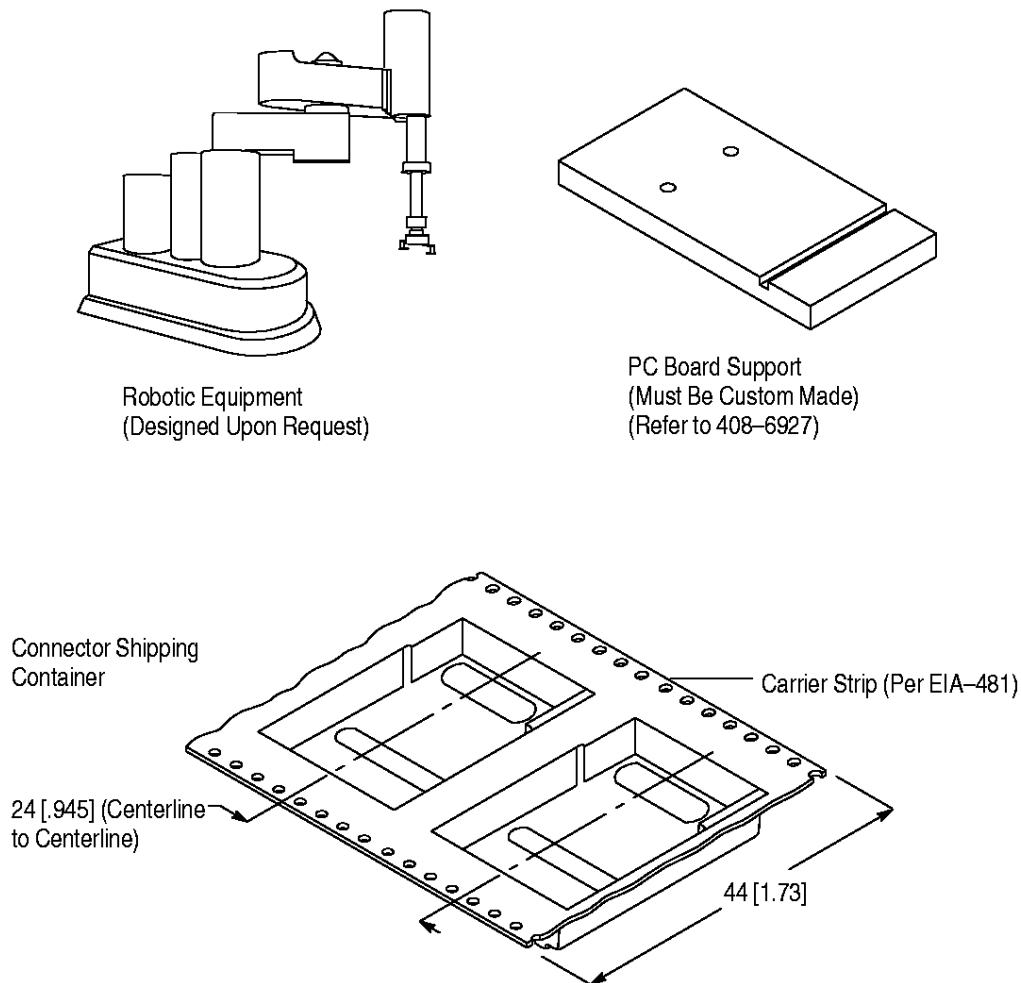
These connectors may be removed from the pc board by standard de-soldering methods and replaced with a new connector.

4. QUALIFICATION

SIM/SAM SMT card connectors have not been recognized by Underwriters Laboratories Inc. (UL) or certified by Canadian Standards Association (CSA) at the time of publication.

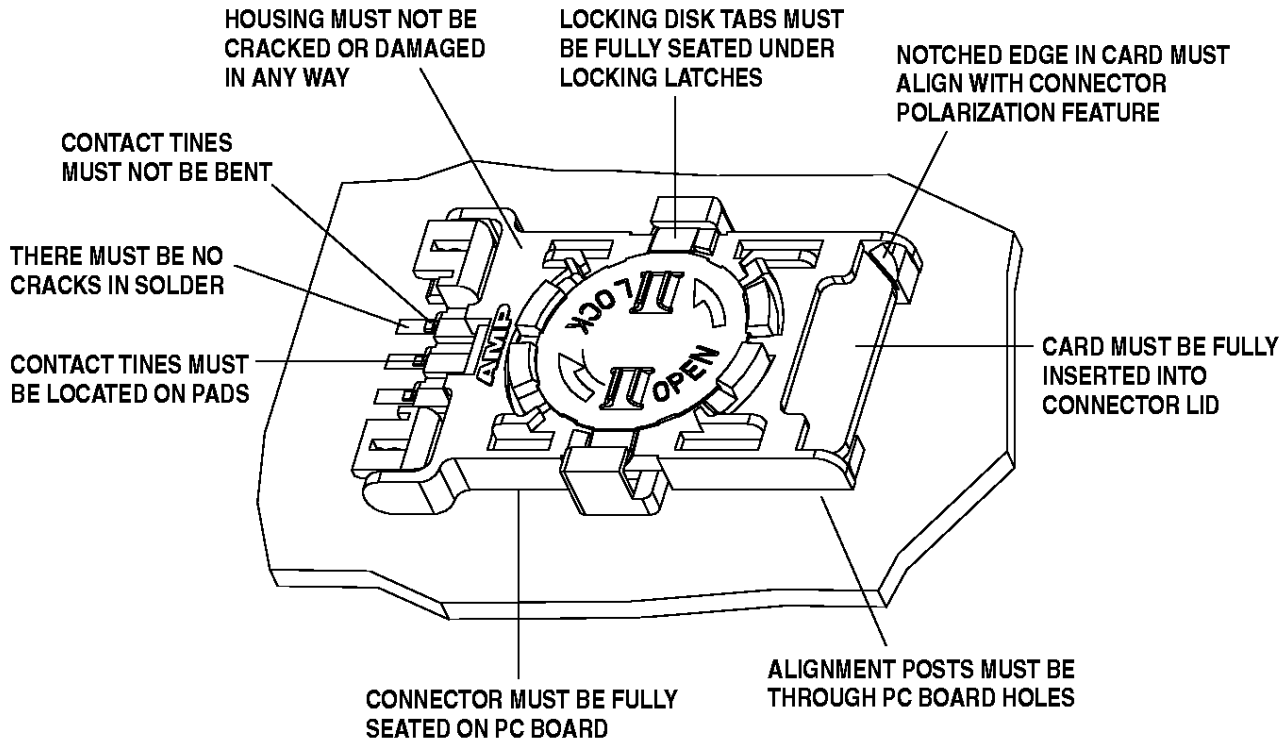
5. TOOLING

No tooling is required for manual placement of the connectors. For automatic machine placement, a pc board support must be used to prevent bowing of the pc board during the placement of connector contacts on the board. It should have flat surfaces with holes or a channel large enough and deep enough to receive the connector alignment posts. The robotic equipment must have a true position accuracy tolerance to properly locate the contact tines. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the connector datum surfaces detailed on the customer drawing to ensure reliable placement. The equipment feed mechanism must be compatible with the connector shipping containers. See Figure 11.

*Figure 11*

6. VISUAL AID

The illustration below shows a typical application of AMP SIM/SAM SMT card 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.

**FIGURE 12. VISUAL AID**