



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 [± 0.005] and angles have a tolerance of $\pm 2^\circ$. Figures and illustrations are for identification only and are not drawn to scale.

1. INTRODUCTION



Recommendations in this document are intended only for the MICTOR SB product lines.

This specification covers requirements for application of MICTOR SB (Single Beam) Vertical Board-to-Board Plug and Receptacle Connectors for Surface Mount Technology (SMT) Printed Circuit (PC) Board Applications. The connectors have in-row contact centerline spacing of 0.80 mm [.0315 in.]. Depending on the contact centerline, the connectors are designed to accommodate 38 through 300 contact positions. Connectors are designed for manual or robotic placement on pc boards of various thicknesses.

Plug connectors are available in various stack heights. The stack heights describe the board-to-board distance when assembled with a standard vertical receptacle. Plugs and receptacles have polarized mating faces, and are polarized for alignment to the pc boards by means of alignment pegs on the housing bottoms. Date codes are marked on the sides of the housings.

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.

MICTOR SB SMT Vertical Connectors

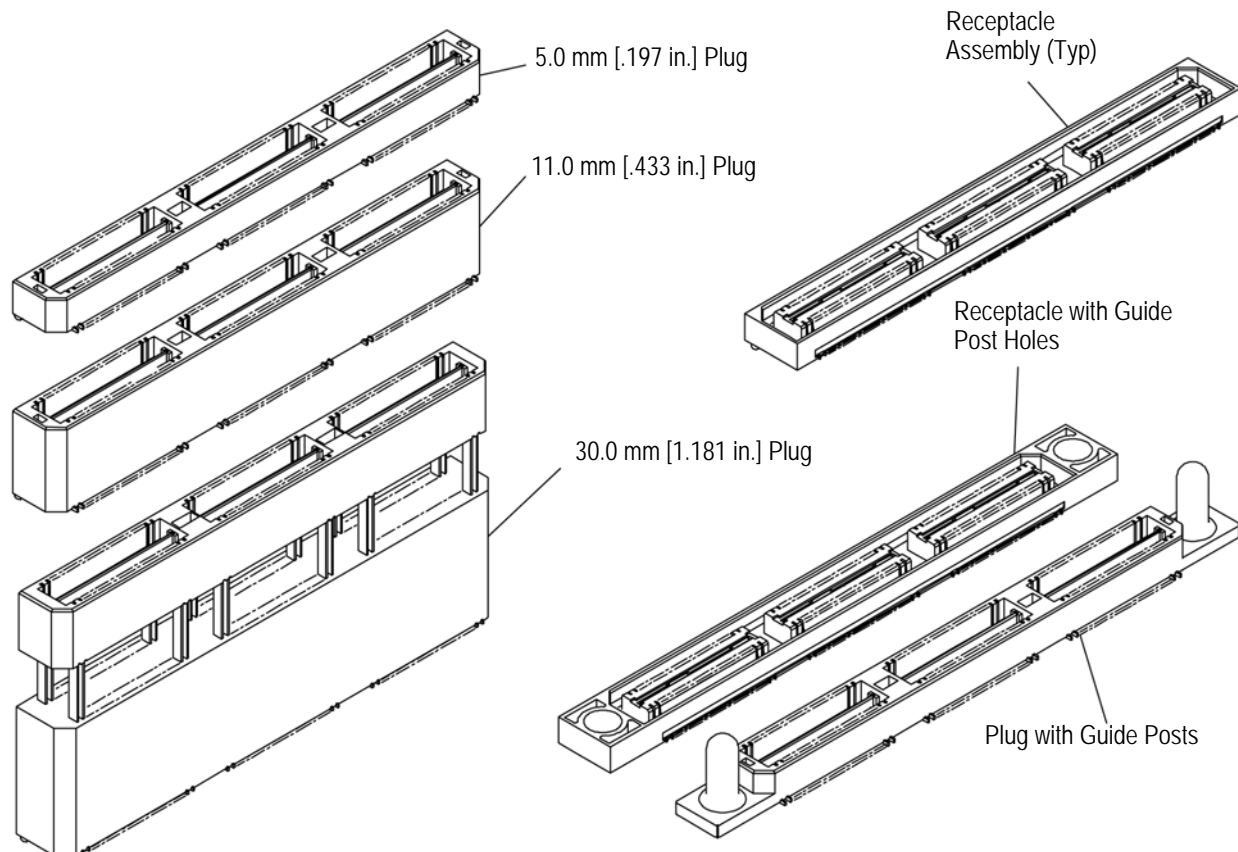


Figure 1

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements
- Deleted 0.50 centerline connectors in Introduction, Figures 2, 3, 4, 5, and 6, and Paragraph 3.8.A

2.2. Customer Assistance

Reference Part Number 1658012 and Product Code K052 are representative of MICTOR SB Vertical Connectors for SMT PC Board Applications. These numbers are used in a service network of customer service to access tooling and product application information. This service is provided by your local company representative or, after purchase, by calling the Tooling Assistance Center or the Product Information number at the bottom of page 1.

2.3. Customer Drawings

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

2.4. Specifications

Product Specification 108-2139 and Design Objective 108-2140 provide product performance requirements and test information. Solderability Specification 109-11-1 provides requirements and evaluation methods.

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 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. Product Materials

MICTOR SB SMT Connector Housings are constructed of a high temperature thermoplastic - Liquid Crystal Polymer, UL94V-0. The plug and receptacle signal contacts, and the ground buses are made of phosphor bronze. The mating interface of the signal contacts and ground buses are underplated with nickel and finished with gold plating or with gold flash. The solder leads and tines have gold or gold flash plating.

3.2. Storage

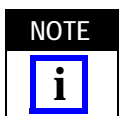
Connectors are packaged and shipped in protective anti-static trays or pocket tape which can be used for automated placement of the connector to the pc board. Connectors should remain in the containers until ready for use to prevent physical damage to the housings and contacts. The connectors should be used on a first in, first out basis to avoid storage contamination that could adversely affect signal transmissions and solderability of the contact tines.

3.3. Polarization

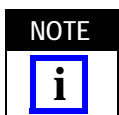
Both the vertical plug and receptacle connectors are prevented from reverse mating by an orientation feature located at the ends of the connector that interfaces with the orientation holes in the pc board. Figure 1.

3.4. Circuit Identification

MICTOR SB SMT Vertical Plugs and Receptacles are not marked with a No. 1 pin identifier. Refer to Figure 1 and the following notes for recommendations regarding circuit identification.



There is no industry standard for the callout of the pin number numbering sequence for MICTOR SB SMT Connectors. It is up to the customers' discretion. However, the most common method is to start with pin number 1 (reference recommended pc board pad identification in Figure 5, with alignment pegs aligning connector to the pc board pattern) and proceed to number 2 pin directly on the opposite side of the connector. Pin number 3 would then be adjacent pin number 1, with pin number 4 adjacent to pin number 2, and so on.



The ground bus contacts of all MICTOR SB true SMT style connectors are internally commoned within each module, with each module having four surface mount style leads. MICTOR SB SMT Connectors come in three contact centerline versions, with each version having a different number of contacts per module as listed in the table in Figure 2.

CENTERLINE VERSION	POSITIONS PER MODULE	MAXIMUM NUMBER OF MODULES	TOTAL NUMBER OF SIGNAL POSITIONS
0.80 [.0315]	40	5	200

Figure 2

3.5. Spacing

A. Connector Alignment



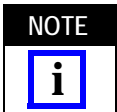
To prevent solder joint damage, care should be used when mating connectors to ensure they have the freedom to self align themselves to each other without binding in any manner that may result in axial forces being transferred through the solder joints.



TE does NOT recommend the use of more than one mating connector between two pc boards. The use of multiple connectors on one board mating to multiple connectors on another board may be plagued with issues regarding connector-to-connector positional tolerances that may result in unfavorable solder joint stress.

B. Board-to-Board Spacing

Board-to-board stacking heights for the MICTOR SB SMT Vertical Connectors are provided in the table in Figure 3.



The dimension provided does not include the paste thickness between the solder tines and solder pads of both connectors.

VERTICAL CONNECTOR STACK HEIGHTS BOARD-TO-BOARD DISTANCES (SINGLE LEAD PITCH) 0.80 [.0315] Centerline
5.00 [.197]
8.00 [.315]
11.00 [.433]
14.00 [.551]
16.00 [.630]
9.00 [.748]
22.00 [.866]
25.00 [.984]
30.00 [1.181]

Figure 3

3.6. PC Boards for MICTOR SB SMT Connectors

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.]. Maximum allowable bow of the pc board shall be 0.10 mm [.004 in.] over the length of the connector.



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.

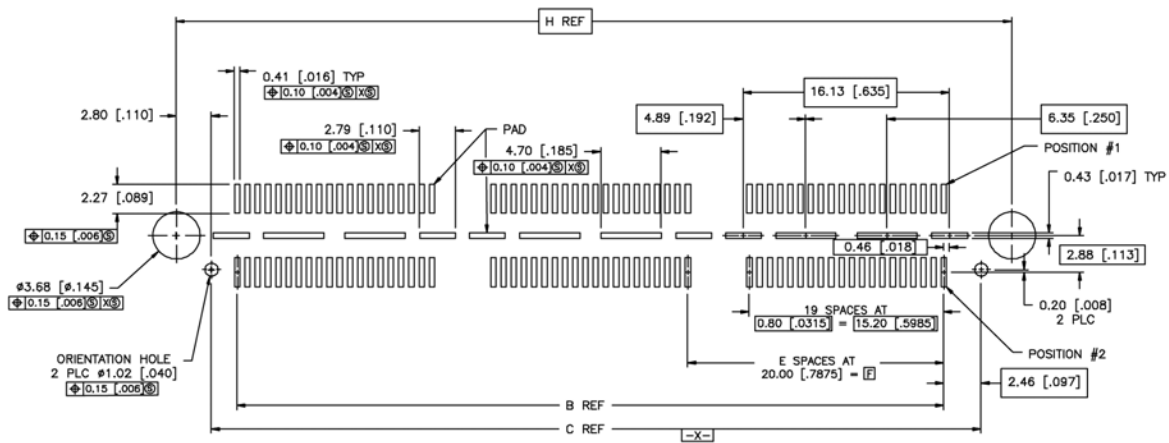
B. Material and Thickness

Since MICTOR SB SMT Vertical Connectors for Surface Mount Technology are true SMT parts, the pc board thickness is irrelevant. However, special caution should be taken to ensure the pc boards are at least thick enough to ensure board stability, (flatness, etc.) throughout the reflow process and be rigid enough to support mate and unmate cycling.

C. PC Board Layouts

The recommended pc board patterns depend on the appropriate connector centerline, 0.80 mm [.0315 in.], and type, (receptacle or plug) are provided in Figure 4. These layouts are viewed from the connector side.

**0.80 [.0315] CL Receptacles with Guide Post Features
(Omit 3.68 [.145] Diameter Holes for Parts without Guide Post Features)**



**0.80 [.0315] CL Plugs
(5.0, 8.0, 11.0, 14.0, 25.0, and 30.0 [.197, .315, .433, .551, .984, and 1.181] Stack Height Parts)**

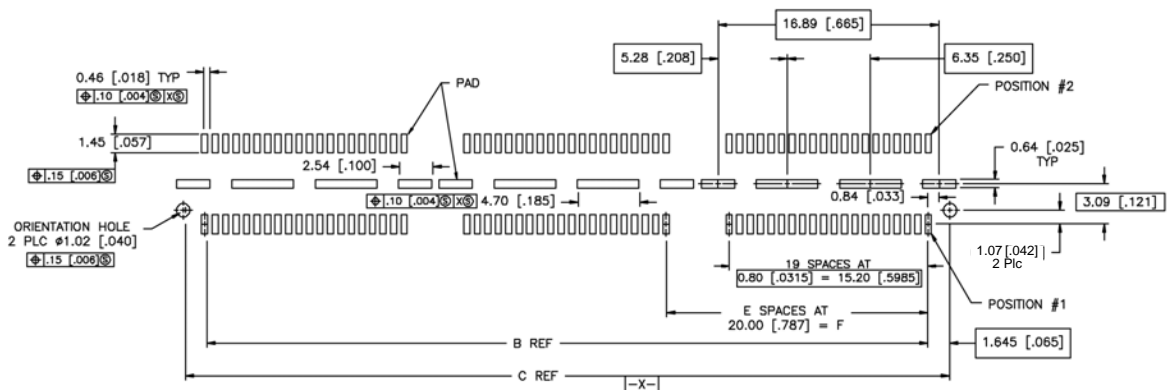
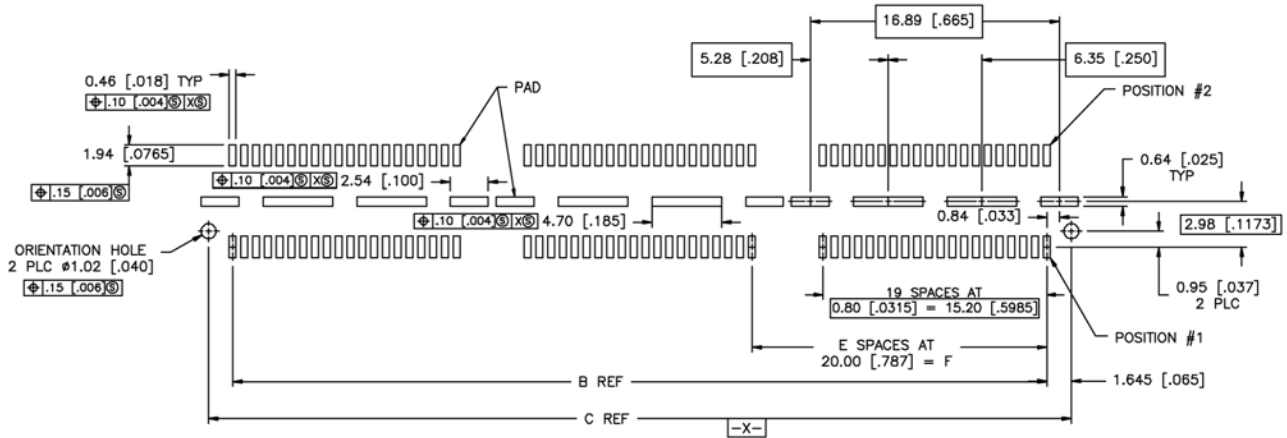


Figure 4 (Cont'd)

**0.80 [.0315] CL Plugs
(16.0, 19.0, and 22.0 [.630, .748, and .866] Stack Height Parts)**



MICTOR SB TRUE SMT VERTICAL CONNECTORS RECOMMENDED PC BOARD LAYOUT DIMENSION TABLE

CL STYLE	TYPE	STACK HEIGHT	POSITION SIZE	B	C	E	F	H
0.80 [.031]	Receptacle	All	40	15.20 [.599]	20.13 [.793]	0	0	25.72 [1.013]
			80	35.20 [1.386]	40.13 [1.580]	1	20.00 [.787]	45.72 [1.800]
			120	55.21 [2.174]	60.13 [2.367]	2	40.00 [1.575]	65.72 [2.587]
			160	75.21 [2.961]	80.14 [3.155]	3	60.00 [2.362]	85.72 [3.375]
			200	95.21 [3.749]	100.14 [3.943]	4	80.00 [3.150]	105.73 [4.163]
	Plug	All	40	15.20 [.599]	18.49 [.728]	0	0	---
			80	35.20 [1.386]	38.48 [1.515]	1	20.00 [.787]	---
			120	55.21 [2.174]	58.48 [2.302]	2	40.00 [1.575]	---
			160	75.21 [2.961]	78.49 [3.090]	3	60.00 [2.362]	---
			200	95.21 [3.749]	98.49 [3.878]	4	80.00 [3.150]	---

Figure 4 (End)



Holes for processing hold-down fixtures or pc board spacer hardware should be placed along the sides of connectors, biased toward the middle of the connector's length. Placing holes at the ends of the connectors may cause the ends of the connectors to act as fulcrum points to pry apart the opposite end or mid-portion of the connector as the hold-down or spacer hardware is tightened.

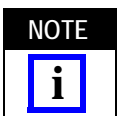


WE do NOT recommend the use of more than one mating connector between two pc boards; if such a configuration is necessary to meet design requirements, consult the Product Information number located at the bottom of page 1.

3.7. Mechanical Supports

To ensure the pc board does not bow during placement and a misapplication occurs, the pc board should be supported along the full length of the connector.

3.8. Processing



PC Boards must meet the solderability requirements of IEC 6012-12-1 (512-6: 1984 Test 12a).

A. Stencil

The recommended 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 maintain the given volume of solder paste. The formulas for calculating the apertures for the MICTOR SB SMT Connector pads are as follows. Refer to Figure 6.

0.80 mm [.0315 in.] Centerline Vertical Receptacles

- Volume of solder paste deposit per pad for signal contacts: 0.1086 mm³ [.000007 in³]
- Volume of solder paste deposit per pad for ground bus contacts:
 - Mid-module pads: 0.3086 mm³ [.000019 in³]
 - End-module pads: 0.1835 mm³ [.000011 in³]
- Width of signal contact circuit pads: 0.406 mm [.0160 in.]
- Width of ground bus contact pads: 0.432 mm [.0170 in.]
- Area of stencil aperture for signal contact pads 0.4879 mm² [.0007 in²]
- Area of stencil aperture for ground bus contact pads:
- Length of stencil aperture for signal contact pads: 2.00 mm [.0795 in.]
- Length of stencil aperture for ground bus contact pads:
 - Mid-module pads: 4.70 mm [.185 in.]
 - End-module pads: 2.79 mm [.110 in.]
- Width of stencil aperture for signal contact pads: 0.36 mm [.014 in.]

0.80 mm [.0315 in.] Centerline Vertical Plugs (5.0-14.0, 25.0, and 30.0 mm [.197-.551, .984, and 1.181 in.] Stack Height Versions)

- Volume of solder paste deposit per pad for signal contacts = 0.0737 mm³ [.000005 in³]
- Volume of solder paste deposit per pad for ground bus contacts:
 - Mid-module pads = 0.4535 mm³ [.000028 in³]
 - End-module pads = 0.2452 mm³ [.000015 in³]
- Width of signal contact circuit pads = 0.457 mm [.0180 in.]
- Width of ground bus contact pads = 0.635 mm [.0250 in.]
- Area of stencil aperture for signal contact pads 0.4879 mm² [.0007 in²]
- Area of stencil aperture for ground bus contact pads:
 - Mid-module pads = 3.01 mm² [.0046 in²]
 - End-module pads = 1.63 mm² [.0025 in²]
- Length of stencil aperture for signal contact pads = 1.19 mm [.047 in.]
- Length of stencil aperture for ground bus contact pads:
 - Mid-module pads = 4.70 mm [.185 in.]
 - End-module pads = 2.54 mm [.100 in.]
- Width of stencil aperture for signal contact pads = 0.41 mm [.016 in.]

0.80 mm [.0315 in.] Centerline Vertical Plugs (16.0-22.0 mm [.630-.866 in.] Stack Height Versions)

- Volume of solder paste deposit per pad for signal contacts = 0.0964 mm³ [.000006 in³]
- Volume of solder paste deposit per pad for ground bus contacts:
 - Mid-module pads = 0.4535 mm³ [.000028 in³]
 - End-module pads = 0.2452 mm³ [.000015 in³]
- Width of signal contact circuit pads = 0.457 mm [.0180 in.]
- Width of ground bus contact pads = 0.635 mm [.0250 in.]
- Area of stencil aperture for signal contact pads 0.640 mm² [.0010 in²]
- Area of stencil aperture for ground bus contact pads:
 - Mid-module pads = 3.01 mm² [.0046 in²]
 - End-module pads = 1.63 mm² [.0025 in²]
- Length of stencil aperture for signal contact pads = 1.56 mm [.0615 in.]
- Length of stencil aperture for ground bus contact pads:
 - Mid-module pads = 4.70 mm [.1850 in.]
 - End-module pads = 2.54 mm [.1000 in.]
- Width of stencil aperture for signal contact pads = 0.41 mm [.016 in.]



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.



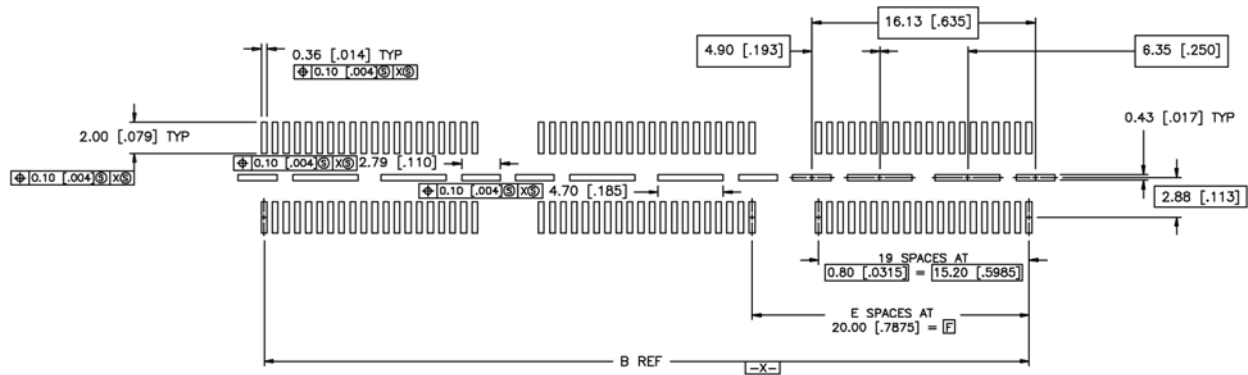
If a hold-down aperture is required other than that specified, the design must ensure that the connector housing will not sit on the solder deposit.



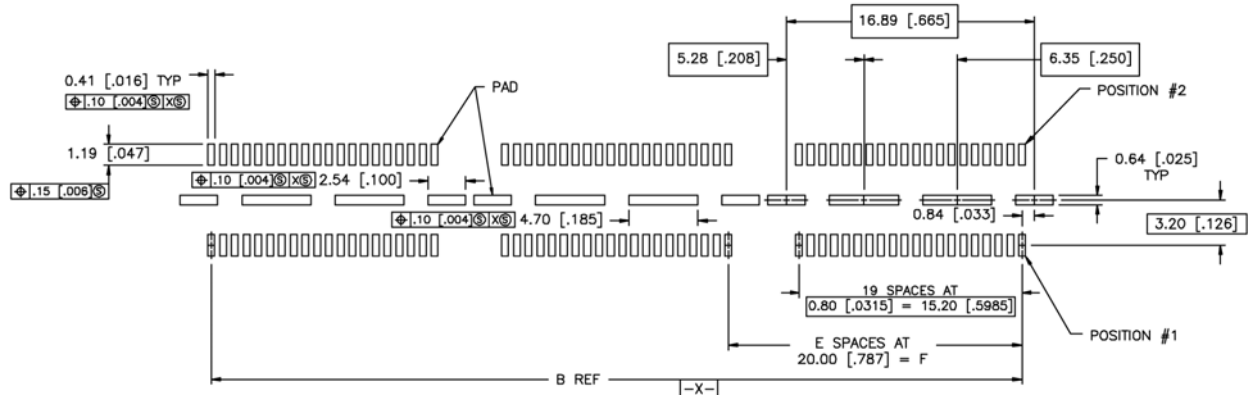
The recommended aperture width is 0.43 mm [.017 in.] for the vertical connector circuit contact pads. It may be wider; however, care must be given to ensure against solder bridging during processing.

The recommended solder stencil layouts for MICTOR SMT Connectors are shown in Figure 5.

Solder Stencil Layouts for 0.80 [.0315] CL Receptacles



**Solder Stencil Layouts for 0.80 [.0315] CL Plugs
(5.0, 8.0, 11.0, 14.0, 25.0, and 30.0 [.197, .315, .433, .551, .984, and .1.181] Stack Height Parts)**



**Solder Stencil Layouts for 0.80 [.0315] CL Plugs
(16.0, 19.0, and 22.0 [.630, .748, and .866] Stack Height Parts)**

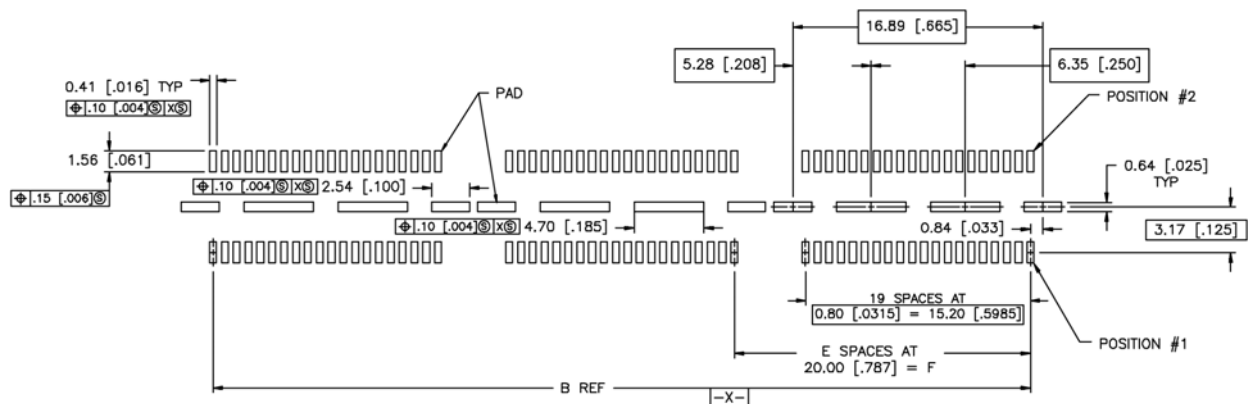


Figure 5

B. Solder Mask

Solder mask is recommended between all pads, ground bus vias, and angular rings. 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. Additionally, there should be solder mask covering any traces in the area surrounding the bus lead solder deposit. Liquid photo imageable or dry film solder masks, in step with modern processing techniques are recommended.

C. Recommended Solder Paste Characteristics

- 1) Alloy type shall be either 63 Sn/37Pb or 60 Sn/40Pb.
- 2) Flux shall be RMA type.
- 3) Solids by weight shall be 85% minimum.
- 4) Mesh designation -200 to +325 (74 to 44 square micron openings, respectively).
- 5) Minimum viscosity of screen print shall be 5×10^5 cp (centipoise).
- 6) Minimum viscosity of stencil print shall be 7.5×10^5 cp (centipoise).

D. Solder Volume

Solder volume for each circuit pad and bus tine opening is calculated by multiplying the pad length by the pad width by the stencil thickness ($\text{Volume} = L \times W \times T$). The recommended volume for these connectors is determined with a mean stencil thickness of 0.15 mm [.006 in.]. Refer to the table in Figure 6.

SOLDER PASTE VOLUMES						
TYPE	CENTERLINE	PAD TYPE	LENGTH	WIDTH	THICKNESS	VOLUME mm ³ [in ³]
Vertical Receptacle Signal Contact Pad	0.80 [.0315]	Signal Contact	2.007 [.0790]	0.356 [.0140]	0.152 [.0060]	0.1086 [.000007]
Vertical Receptacle Ground Bus Contact Pads	0.80 [.0315]	Mid-Module	4.699 [.1850]	0.432 [.0170]	0.152 [.0060]	0.3086 [.000019]
		End-Module	2.794 [.1100]	0.432 [.0170]	0.152 [.0060]	0.1835 [.000011]
Vertical Plug Signal Contact Pads	0.80 [.0315]†	Signal Contact	1.194 [.0470]	0.406 [.0160]	0.152 [.0060]	0.0737 [.000005]
	0.80 [.0315]‡	Signal Contact	1.562 [.0615]	0.406 [.0160]	0.152 [.0060]	0.0964 [.000006]
Vertical Plug Ground Bus Contact Pads	0.80 [.0315]†	Mid-Module	4.699 [.1850]	0.635 [.0250]	0.152 [.0060]	0.4535 [.000028]
		End-Module	2.540 [.1000]	0.635 [.0250]	0.152 [.0060]	0.2452 [.000015]
	0.80 [.0315]‡	Mid-Module	4.699 [.1850]	0.635 [.0250]	0.152 [.0060]	0.4535 [.000028]
		End-Module	2.540 [.1000]	0.635 [.0250]	0.152 [.0060]	0.2452 [.000015]

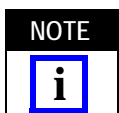
† 5.0, 8.0, 11.0, 14.0, 25.0, and 30.0 mm [.197, .315, .433, .551, .984, and 1.181 in.] Stack Height Versions

‡ 16.0-22.0 mm [.630-1.866 in.] Stack Height Versions

Figure 6



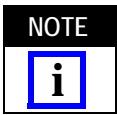
Paste volumes in excess of those recommended could result in excessive solder wicking onto the solder tine, resulting in reduction of tine compliance and/or solder joint failure.



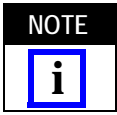
More technical information may be available from the manufacturer of the stencil.

E. Vertical Connector Placement

The vertical plugs and receptacles are positioned on the pc board by matching the orientation feature on the bottom of the housing to the unplated holes.



The pc board should be firmly supported in the area directly beneath the connector during placement to prevent the pc board from flexing. Refer to Paragraph 5.1.



Connectors are available in shipping trays or on tape reels and should be placed directly from the package to the pc board. TE does NOT recommend emptying them from the package into piles or in bowl feeders prior to placement.



Connectors should be handled only by the ends. DO NOT touch the solder tines, as moisture from the hands will contaminate the soldering process and lead position or coplanarity may be compromised.



Optimally, the connector solder tines should be centered on the pc board pads. However, slight misalignment is permissible. See Figure 7.

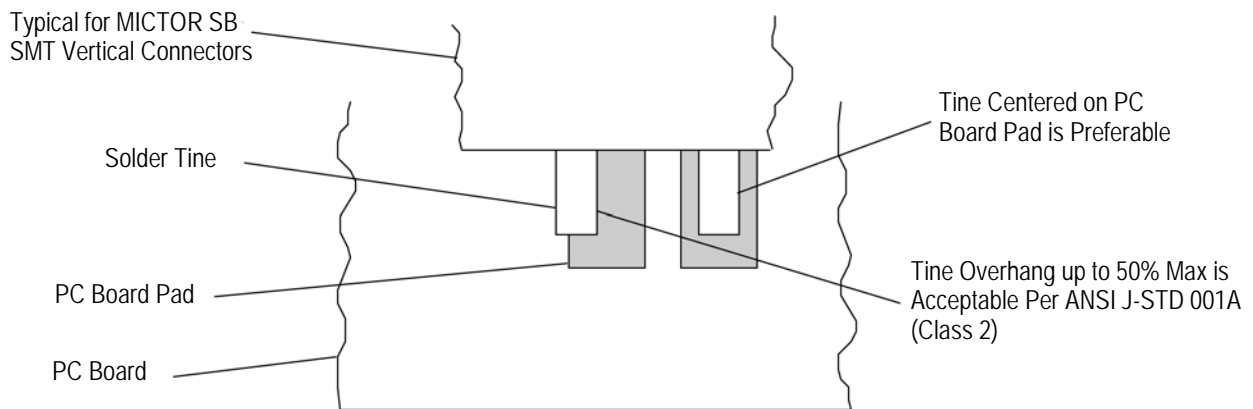
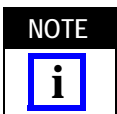


Figure 7

F. Soldering



Manual 402-40 provides some guidelines for establishing soldering practices.

- 1) 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 the ranges specified in Figure 8.

SOLDERING PROCESS	TEMPERATURE		TIME (At Max Temp)
	CELSIUS	FAHRENHEIT	
Vapor Phase Soldering	260	500	30 Seconds
Infrared Reflow Soldering			
Convection			

Figure 8

2) Connector Capacity -- Connectors will withstand the maximum temperature time limits specified in Figure 8.

3) Reflow Parameters -- Due to the many variables involved with the reflow process (that is, component density, orientation), we recommend that the user conduct trial runs under actual manufacturing conditions to ensure product and process compatibility.

G. 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 for five minutes at 105°C [221° F]. See Figure 9.

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.

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 9



MICTOR SB SMT Connectors are not designed to function as pc board stiffeners. Thermal flexing of the pc board will result in either the connector body following the pc board contour or lifting off the board.



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 affect to the connectors; however, we do 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 particular solvent that is not listed, contact the Product Information number at the bottom of page 1.

H. Drying

Air drying of cleaned connectors is recommended. Temperature for the connectors should not exceed -55 to 105°C [-67 to 221°F]. Degradation of the housings could result from extreme temperatures.

3.9. Mating and Unmating



Uneven or off-angle forces during mating and unmating of MICTOR SB SMT Connectors may cause overstress and damage to the contacts, housings or solder joints. Severe side-to-side rocking motions should be prohibited.

Unmating MICTOR SB SMT Connectors by lifting one end of the connector (peeling) is permitted. However, this should only be done to initiate separation of the mated contacts at one end of the connector. The separation angle should be kept as low as possible as the contacts continue to unmate, thereby spreading out the unmating forces over the length of the connectors. The connectors should not be "peeled" beyond a 20° angle.

Miniaturization is a design feature of these connectors and the systems in which they are used. Component density, connector location, and pc board size may make it difficult to remove the connector. Two methods are recommended to facilitate removal. If unmating board-to-board connectors, the preferred method is to have one of the pc boards securely fastened and adequately supported to withstand the pulling force applied to the other pc board. The second method is to construct a tool for your system design that will produce a straight-away separation of the connectors. See Figure 10.



Application of unmating forces to the pc boards should be done within close proximity of the connector (preferably within 25.4 mm [1.000 in.] on 1.57 mm [.062 in.] thick pc boards). Stress on the solder joints will increase as the force is applied further from the connector.

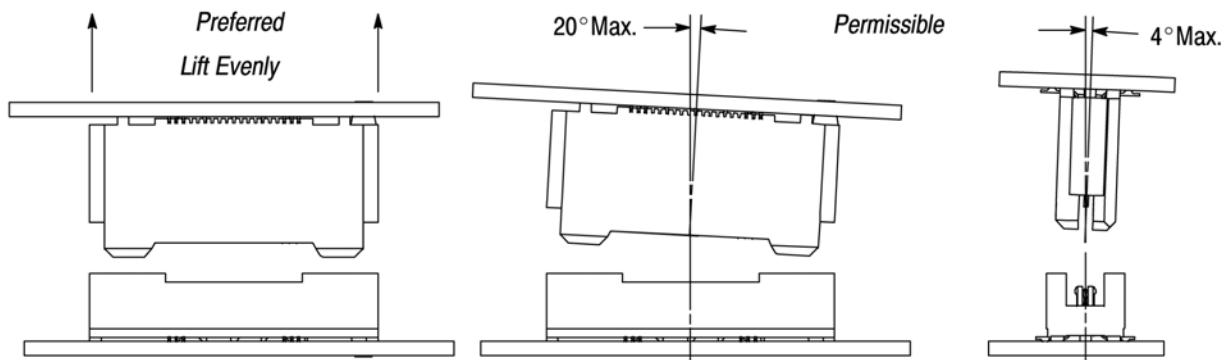


Figure 10

3.10. Repair/Removal

Connectors may be removed from the pc board by standard SMT de-soldering methods. Damaged connectors must be replaced.

4. QUALIFICATIONS

MICTOR SB SMT Connectors have been Recognized by Underwriters Laboratories (UL) in file No. E28476, and Certified by CSA International in Certificate No. 218602.

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 a connector on the board.

5.2. Robotic Equipment

MICTOR SB SMT Connectors are pick-and-place compatible. They are normally packaged in trays, but vertical receptacles and plugs are also available in pocket tape (with or without vacuum pick-up dots). MICTOR SB SMT Vertical Receptacles and Plugs may be applied using robotic grippers or vacuum heads.

Robotic placement equipment should be capable of accurately locating connectors for pc board insertion using the connector datum surfaces detailed on the customer drawing. Several robotic companies have experience with placing MICTOR SB SMT Connectors and can be called upon for assistance. They are:

Universal Instruments Corporation
P.O. Box 825
Binghamton, NY 13902
(607) 779-7522
www.uic.com

Panasonic Factory Automation
9377 West Grand Ave.
Franklin Park IL 60131
(847) 288-4400
www.panasonicfa.com

Robodyne
2818 Anthony Lane South
Minneapolis, MN 55418
(612) 789-5277
www.robodyne.com

Fuji America Corporation
171 Corporate Woods Parkways
Vernon Hills, IL 60061
(847) 913-0162
www.fujiamerica.com

6. VISUAL AID

Figure 11 shows a typical application of MICTOR SB SMT Connectors. This illustration should be used by production personnel to visually ensure suitable applications. Installations which appear visually incorrect should be inspected using the dimensional information given in the preceding pages of this application specification.

NOTE: PIN NUMBER 1 AND THE NUMBER 1 PAD ON THE PC BOARD FOOTPRINT MUST BE ALIGNED PRIOR TO MOUNTING. THIS SHOULD BE DONE BY PROPERLY ALIGNING THE HOUSING ALIGNMENT PEGS WITH THE APPROPRIATE PC BOARD PATTERN HOLES.

SOLDER FILLET SHOULD BE FORMED AROUND SOLDER TINE

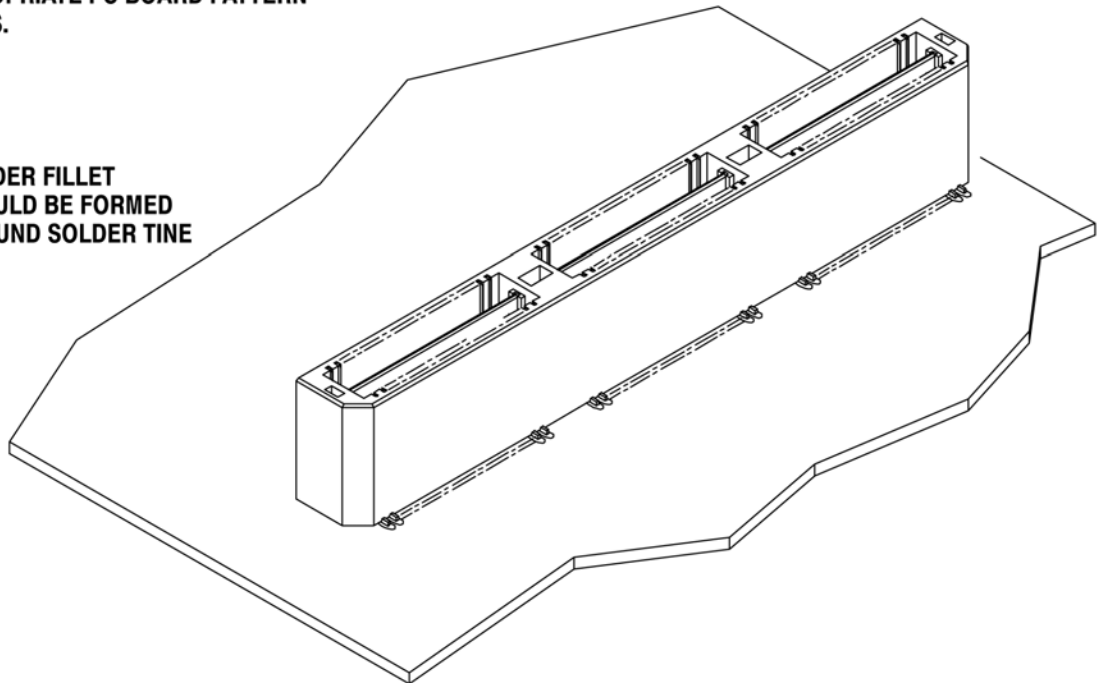


FIGURE 11. VISUAL AID