

Z-DOK* and Z-DOK + Connectors
NOTE


All numerical values are in metric units [with U.S. customary units in brackets]. 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 Z-DOK and Z-DOK + Connectors. These connectors are designed to interconnect balanced differential signals with data rates to 6.2 Gbps using the Tri-Q Contact System. Three contacts are dedicated to each differential signal consisting of two signal contacts and a signal ground contact. For purposes of this specification, this group is designated a “differential pair”. The connector size is specified by the quantity of differential pairs within the connector.

Although designed for differential systems in a 100 ohm environment, these connectors may be used in single ended applications and at substantially different impedance depending on application requirements such as risetime, data rate, and channel loss. Contact TE Connectivity with specific application requirements for evaluation of these connectors in your application.

The Z-DOK Connectors are available in right-angle plug (host), and receptacle (adapter) versions with integral guide pins for blind mate applications. These connectors are available in 24, 32, 40, 48, 56, 64, and 72 pairs with boardlocks. The boardlocks include an electrostatic discharge (ESD) contact that can engage prior to the signal ground contacts for electrostatic discharge.

The Z-DOK + Connectors are available in right-angle host and adapter versions with integral guide features for blind mate applications and multipurpose sequenced utility contacts to provide ESD, ground, power, or sense functions. These connectors are available in 8, 16, 24, 32, 40, 48, 56, 64, and 72 pairs with 1, 2, or 3 utility contacts at each outer end of the connector. There are 4 sequence levels of utility contacts. Z-DOK + Connectors can be mated inverted or not.

Z-DOK and Z-DOK + Connectors contain through hole contacts and are designed for manual placement on the printed circuit (PC) board.

When corresponding with TE Personnel, use the terminology provided on this specification to help facilitate your inquiry for information. Basic terms and features of components are provided in Figure 1.

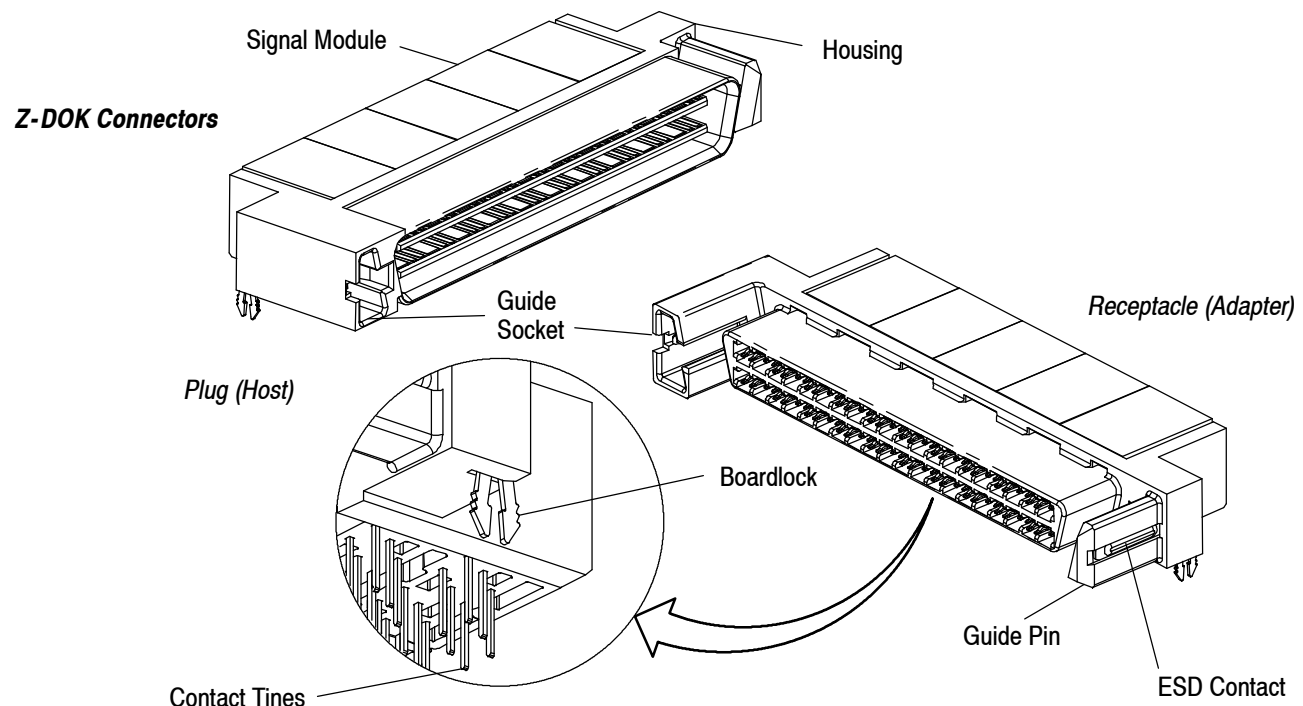


Figure 1 (cont'd)

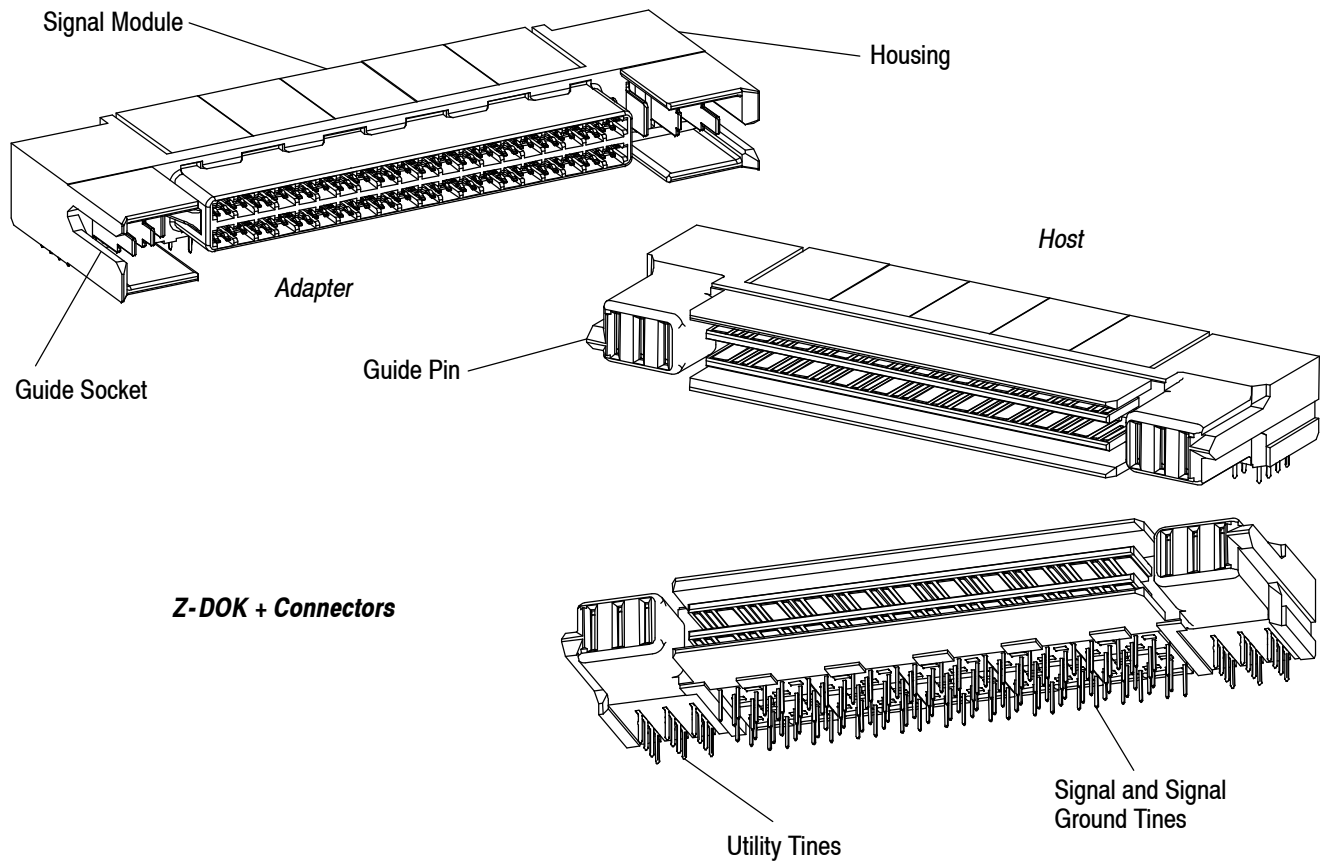


Figure 1 (end)

2. REFERENCE MATERIAL

2.1. Revision Summary

- Updated document to corporate requirements
- New logo

2.2. Customer Assistance

Reference Base Part Number 1367130 and Product Code 1971 are representative numbers of the Z-DOK Connectors. Reference Base Part Number 1367550 and Product Code H255 are representative numbers of the Z-DOK + Connectors. Use of these numbers will identify the product line and expedite your inquiries through a service network established to help you obtain product and tooling information. Such information can be obtained through a local TE Representative or, after purchase, by calling the Product Information Center at the number at the bottom of page 1.

2.3. Drawings

Customer drawings for specific products 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 108-1985 provides test, product performance, and quality requirements for Z-DOK and Z-DOK + Connectors.

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. Storage

A. Ultraviolet Light

Prolonged exposure to ultraviolet light may deteriorate the chemical composition used in the connector housings and contact modules.

B. Shelf Life

The connectors are packaged and shipped in protective anti-static tubes. The connectors should remain in the shipping containers until ready for use to prevent deformation to the connectors. The connectors should be used on a first in, first out basis to avoid storage contamination that could adversely affect signal transmissions.

C. Chemical Exposure

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

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

3.2. Unusual Characteristics of the Tri-Q Contact System

A. Tri-Q Contact Interface

Three contacts are dedicated to each differential signal consisting of two signal contacts and a signal ground contact. For purposes of this specification this group is designated a “differential pair”. Each differential pair is carefully designed to be in close proximity to a dedicated signal ground, providing true symmetrical impedance and low noise in a 100Ω system. The contact interface is illustrated in Figure 2.

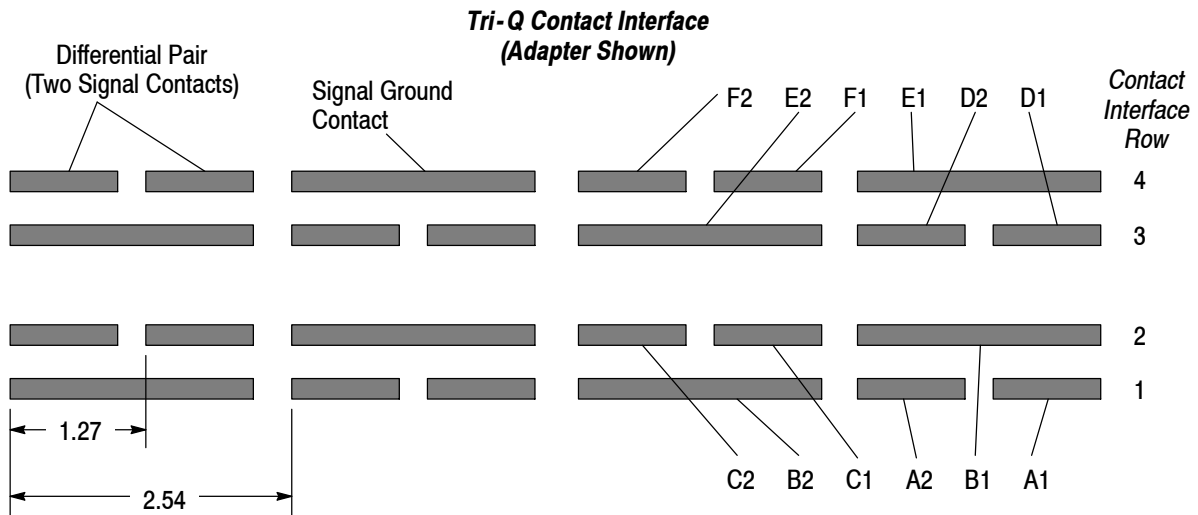
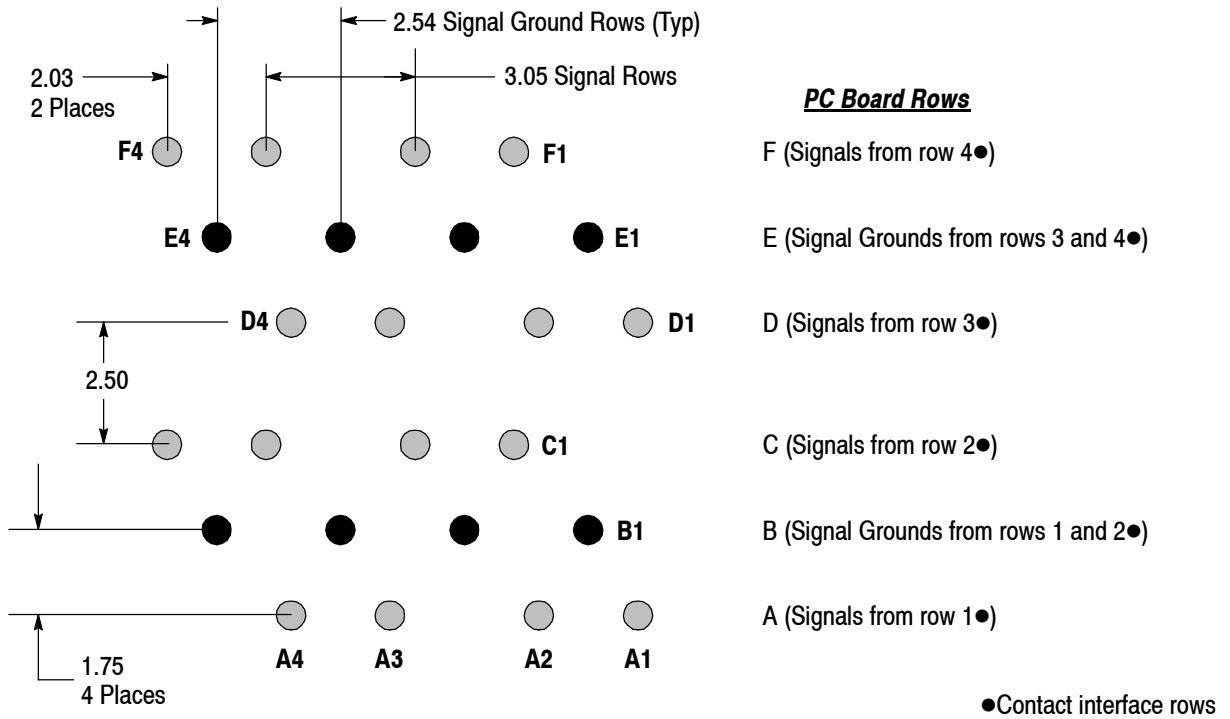


Figure 2

B. Tri-Q PC Board Layout

In the pc board layout, the signal ground contacts are confined to rows B and E to simplify trace routing, control pair-to-pair crosstalk, and to minimize impedance discontinuities at the connector-to-pc board interface. For suggested differential pair trace routing, traces are 7 mils wide with 15 mil spacing between them. This layout requires two layers to route all signals. See Figure 3 for an illustration of the adapter pc board holes and suggested trace layouts.

Tri-Q Adapter PC Board Layout



Host and Adapter PC Board Trace Routing (Suggested Two-Layer Routing Pattern)

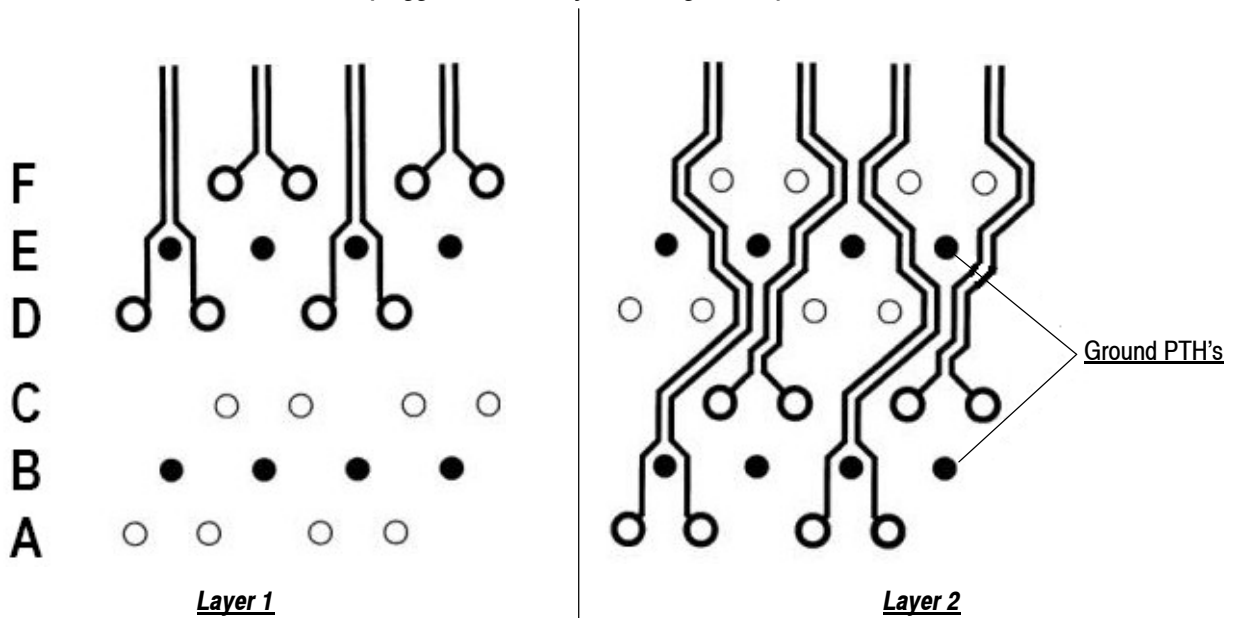


Figure 3

C. Tri-Q Average Contact Resistance

The Tri-Q Contact System allows for eight different contact lengths through a mated host and adapter. For calculation of millivolt drop through a mated connector the values specified in Figure 4 may be used. The resistance values are averages as measured in a test connector using the measurement method as described in the Product Specification.

SIGNAL CONTACTS		SIGNAL GROUND CONTACTS			
ROW	CONTACT RESISTANCE (mΩ)	EVEN NUMBERED ROWS	CONTACT RESISTANCE (mΩ)	ODD NUMBERED ROWS	CONTACT RESISTANCE (mΩ)
A	22.6	B	12.9	B	13.5
C	28.1	E	18.2	E	19.6
D	36.2	---			
F	44.5				

Figure 4

3.3. Connector Size

The Z-DOK and Z-DOK + Connector size is defined by the quantity of differential pair contacts and utility contacts that the connector can accommodate. The differential pair assembly consists of two signal contacts and their accompanying signal ground contact. Various sizes can be made available in multiples of eight differential pair (each signal contact module contains eight differential pair). Consult the appropriate customer drawing to determine availability.

3.4. Printed Circuit (PC) Boards

A. Material and Thickness

The pc board material will be glass epoxy (FR-4, G-10). The Z-DOK and Z-DOK + Connectors are designed for pc boards of 2.0 mm nominal thickness. Contact the Product Information Center number at the bottom of page 1 for suitability of other pc board materials and thicknesses.

B. Tolerance

The maximum allowable bow of the pc board shall be 0.05 mm over the length of the connector.

C. PC Board Layout

All holes in the pc board must be precisely located to ensure proper placement and optimum performance of the connector. Design the pc board using the dimensions provided in Figure 5.

NOTE

The layout dimensions apply to the component side of the pc board.



Z-DOK Plug (Host) PC Board Layout

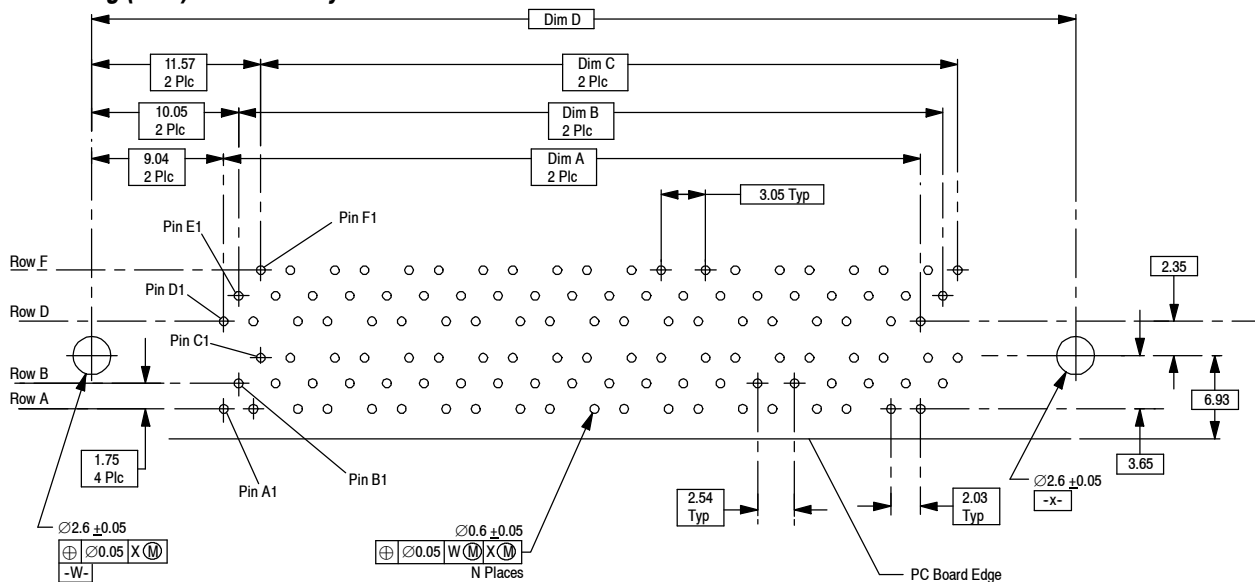
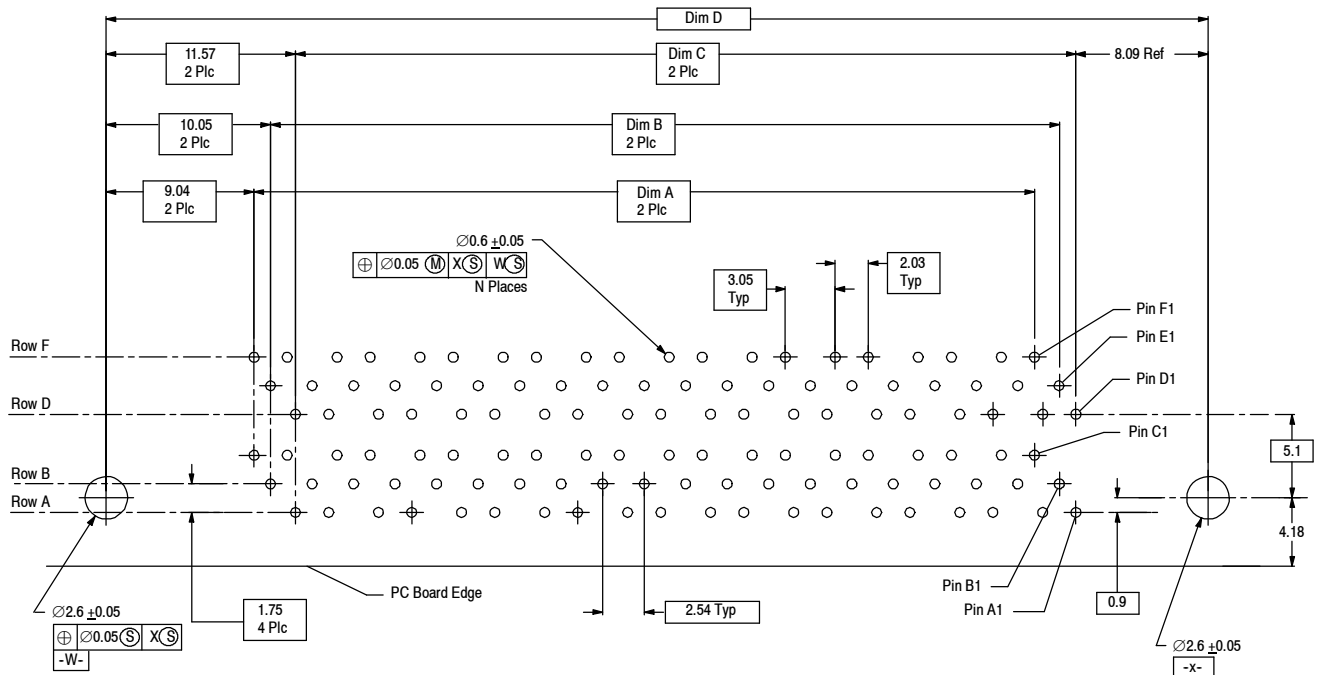


Figure 5 (cont'd)

Z-DOK Receptacle (Adapter) PC Board Layout



Z-DOK + Host PC Board Layout

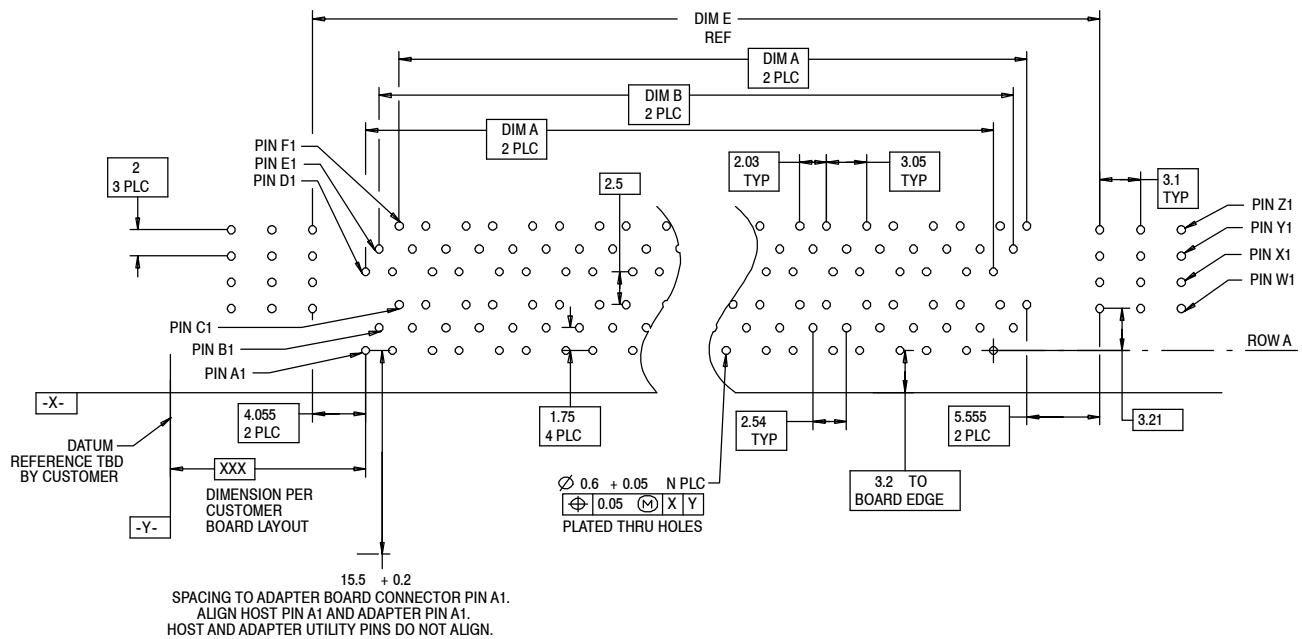
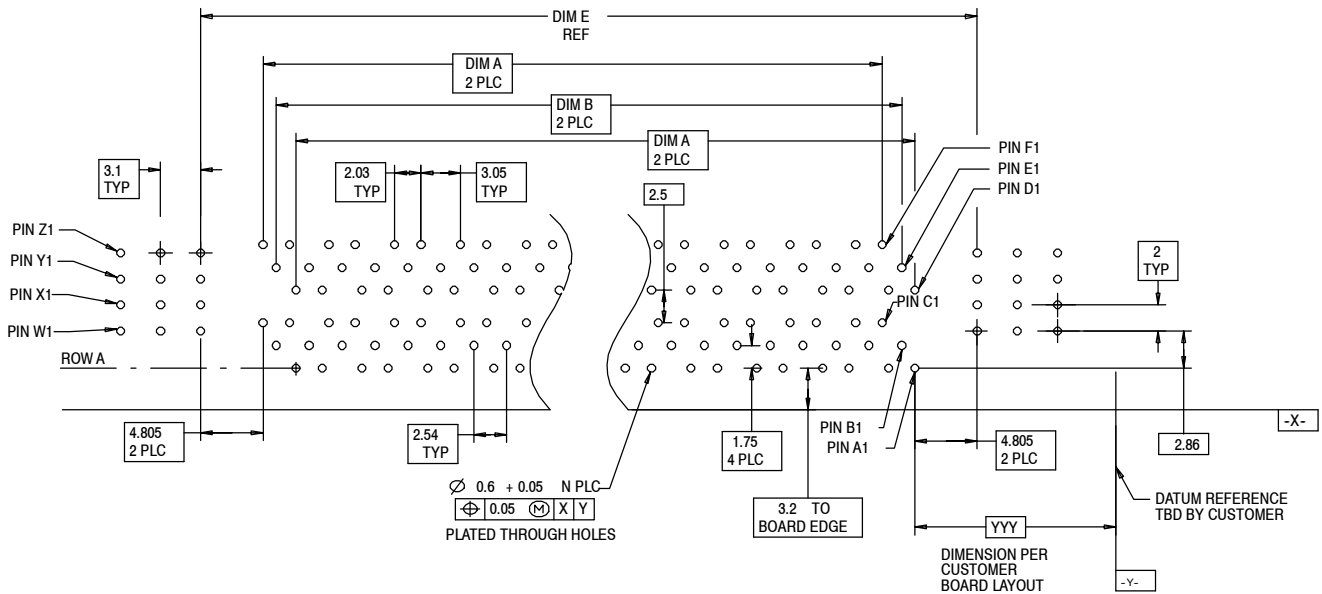


Figure 5 (cont'd)

Z-DOK + Adapter PC Board Layout



"N" POSITION	Z-DOK CONNECTOR DIMENSIONS			
	A	B	C	D
24	27.43	27.94	27.43	47.09
32	37.59	38.10	37.59	57.25
40	47.75	48.26	47.79	67.41
48	57.91	58.42	57.91	77.57
56	68.07	68.58	68.07	87.73
64	78.23	78.74	78.23	97.89
72	88.39	88.90	88.39	108.35

Z-DOK + HOLE QUANTITIES AND CONNECTOR DIMENSIONS

UTILITY CONTACTS PER SIDE			DIMENSION			DIFFERENTIAL PAIRS
1	2	3	A	B	E	
HOLE QUANTITY "N"						
32	40	48	7.11	7.62	19.26	8
56	64	72	17.27	17.78	29.42	16
80	88	96	27.43	27.94	39.58	24
104	112	120	37.59	38.10	49.74	32
128	136	144	47.75	48.26	59.90	40
152	160	168	57.91	58.42	70.06	48
176	184	192	68.07	68.58	80.22	56
200	208	216	78.23	78.74	90.38	64
224	232	240	88.39	88.90	100.54	72

Figure 5 (end)

3.5. PC Board Contact Tine Holes

The contact tine holes in the pc board must be drilled and plated through to specific dimensions. See Figure 6.

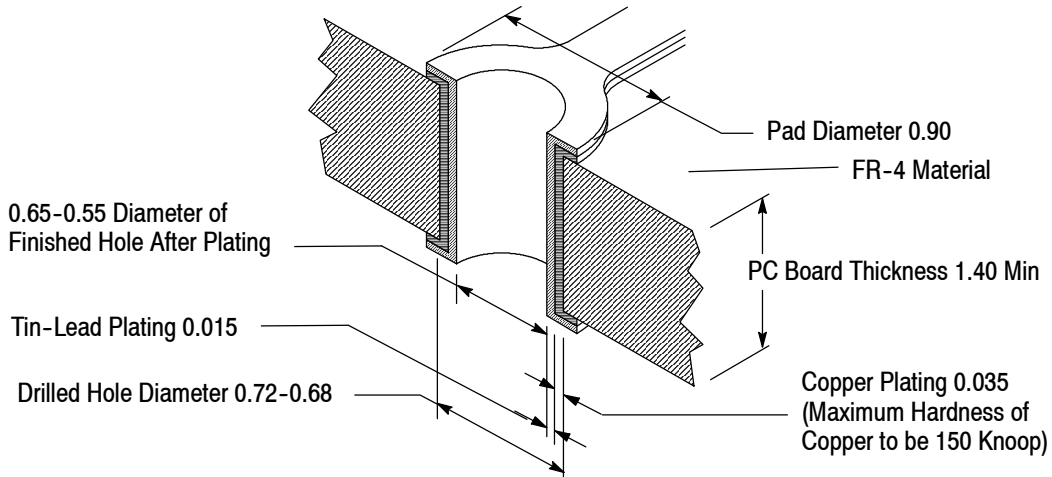
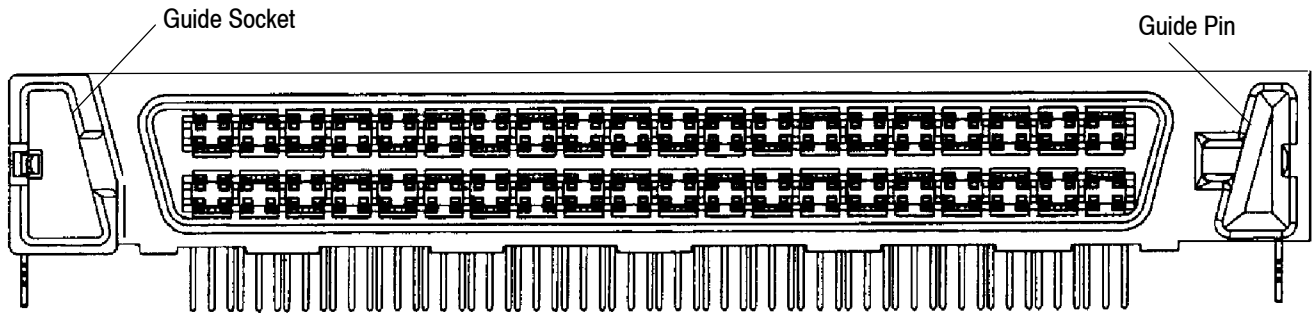


Figure 6

3.6. Orientation Features

The Z-DOK Connector is inherently polarized. The guide pin/socket configuration of each connector mating face prohibits the accidental inversion of mating connectors. See Figure 7. The Z-DOK + Connector is not polarized allowing mating inverted or not. See Figure 7 for non-inverted, inverted, and midplane/mezzanine applications.

Z-DOK Connector Polarized



Z-DOK + Connector Not Polarized

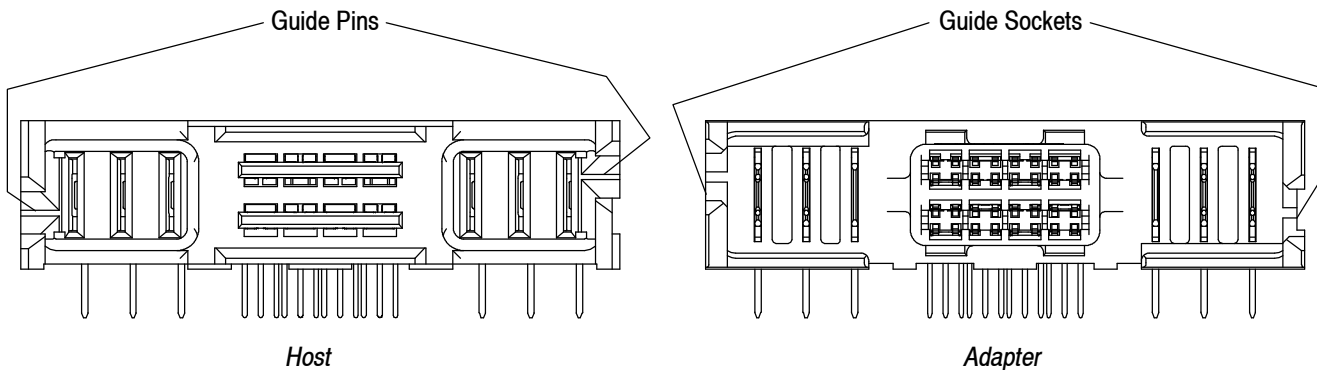
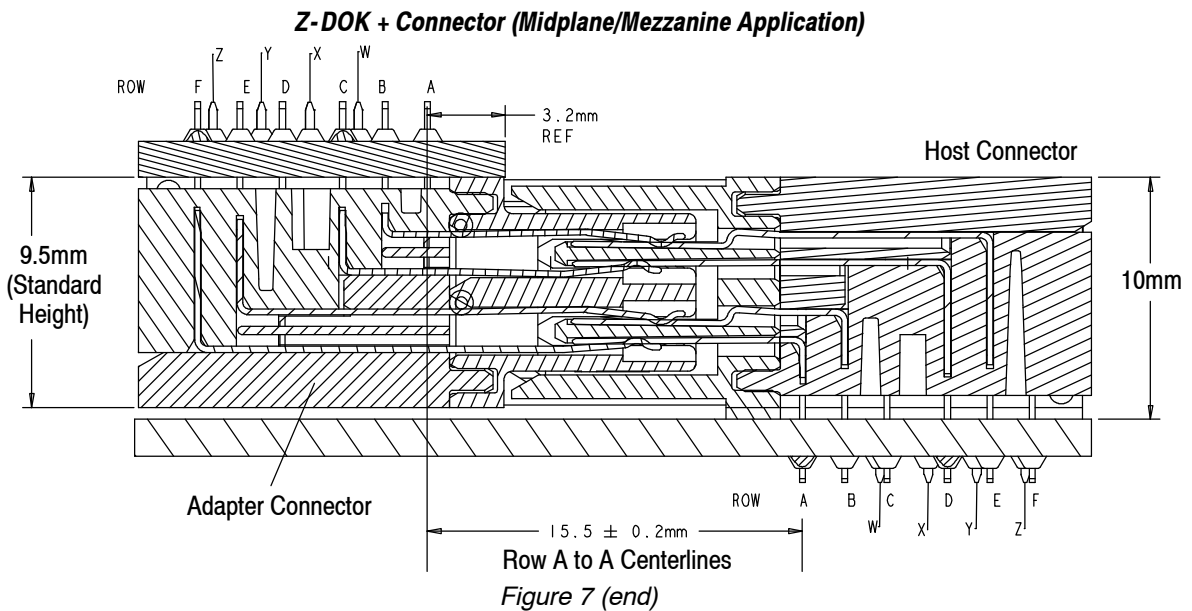
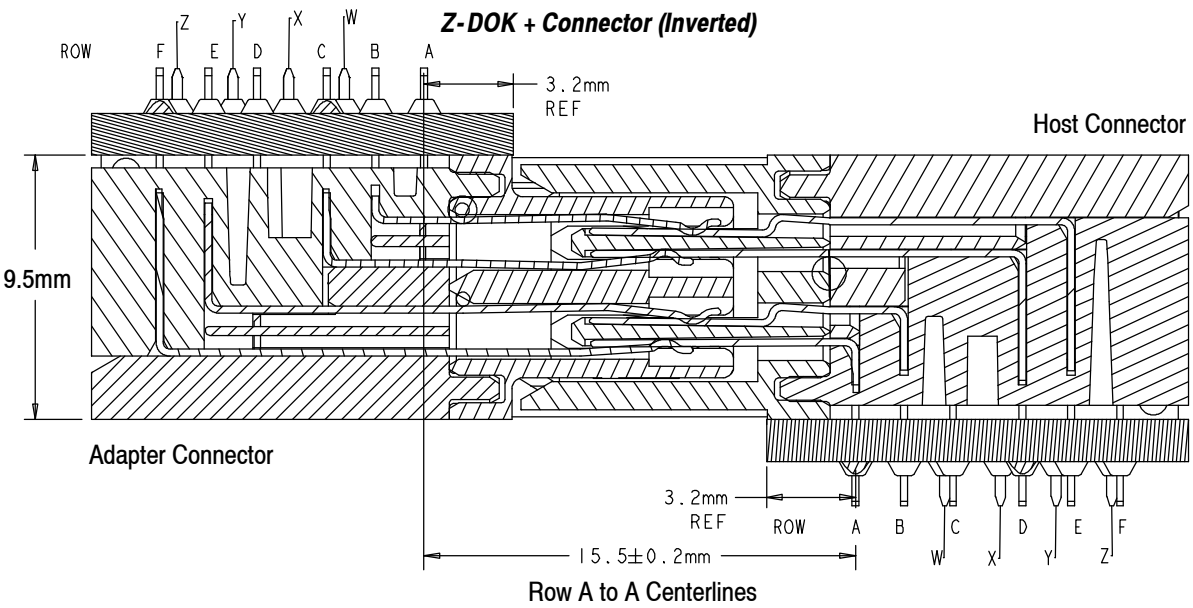
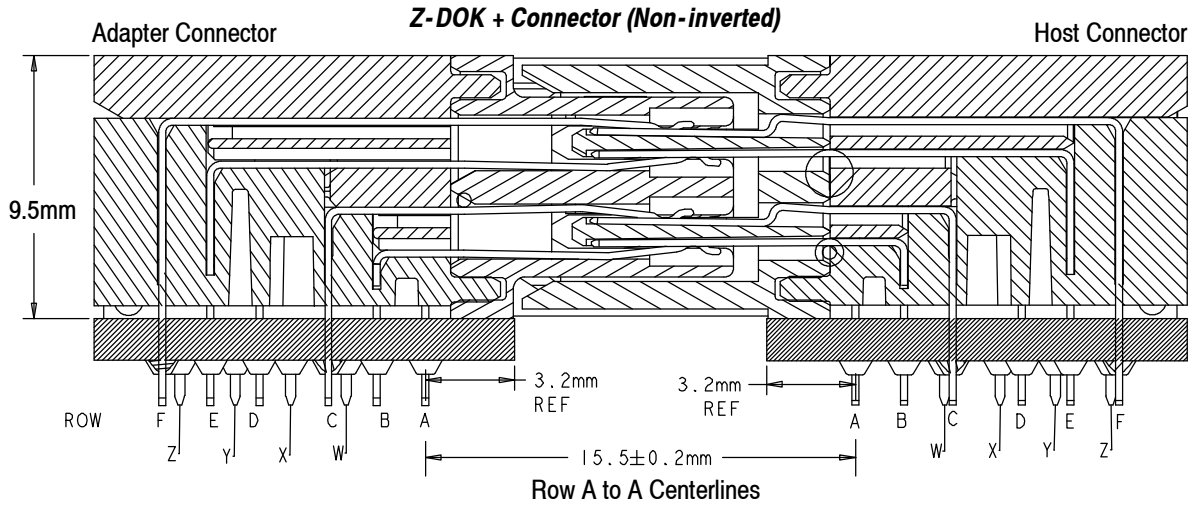


Figure 7 (cont'd)



3.7. Mating Dimensions (Sequenced)

NOTE *These dimensions must be considered when determining the method of mounting the connector.*



A. Z-DOK Connector

The boardlock centerline dimension provided in Figure 8 is required to ensure full mating of connectors with a minimum contact wipe of 2.8 mm for the signal contacts. Since the connector system features sequenced mating dimensions, the signal ground contacts will engage 1.0 mm nominal before the signal contacts. The ESD Boardlock Contacts will engage 2.0 mm nominal before the signal contacts. This dimension must be considered when determining the method of mounting the connector. See Figure 8.

B. Z-DOK + Connector

The row A to A centerline dimension provided in Figure 7 is required to ensure full mating of connectors with a minimum signal contact wipe of 2.8 mm. See the sequencing table in Figure 9 for sequenced mating dimensions for all four utility contact levels shown with signal and signal ground contact levels.

NOTE *Utility level 4 contacts are not recommended in the outermost positions for manual mate systems without guide rails.*

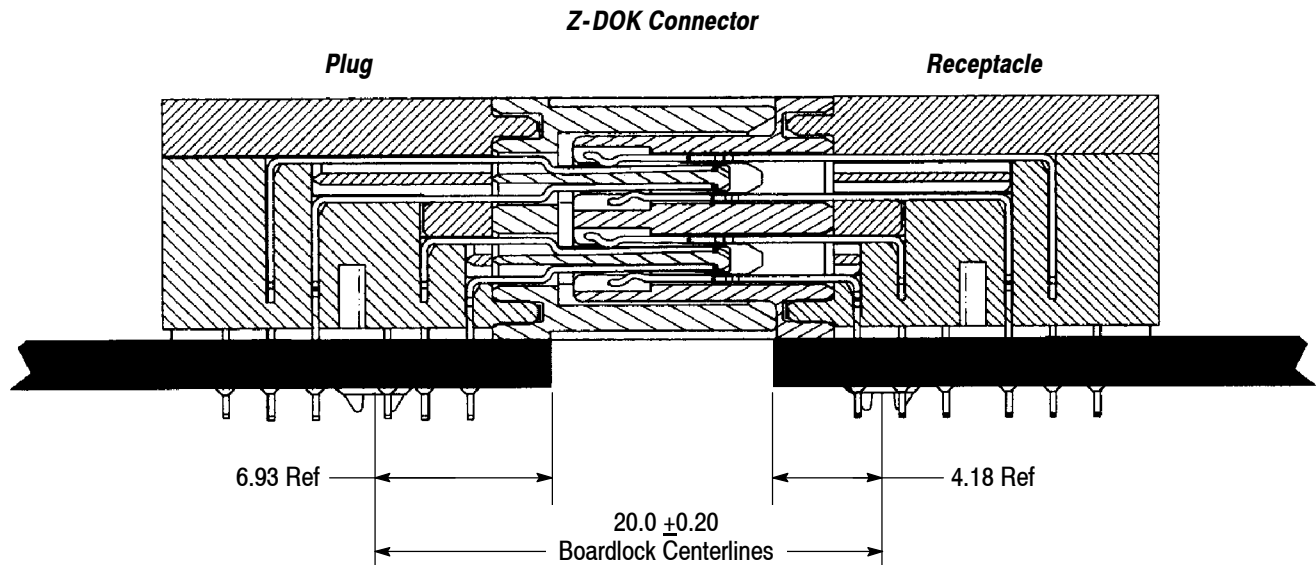


Figure 8

3.8. Circuit Identification

Due to the unique configuration of the Tri-Q Contact System, care must be taken to identify circuits. Consult the customer drawing which contains a block diagram of the front face of the connector along with a pc board layout. Refer to Paragraph 3.2.

3.9. Z-DOK Connector Boardlocks

There are two types of boardlocks used in each Z-DOK Connector half; a spring type that is assembled in the guide socket, and a pin type that is assembled in the guide pin. Each type of the boardlocks have gripping shoulders that pass through the pc board as the contact tines are inserted through the pc board. They lock into position when the housing is seated on the pc board. The initial forces are: 62 N maximum for insertion and 13 N minimum for extraction.

Z-DOK + Connector Sequencing Table

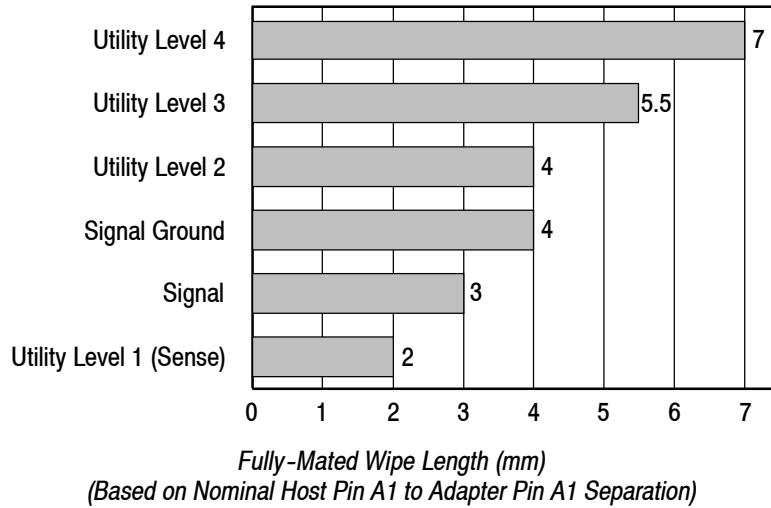


Figure 9

3.10. Connector Placement



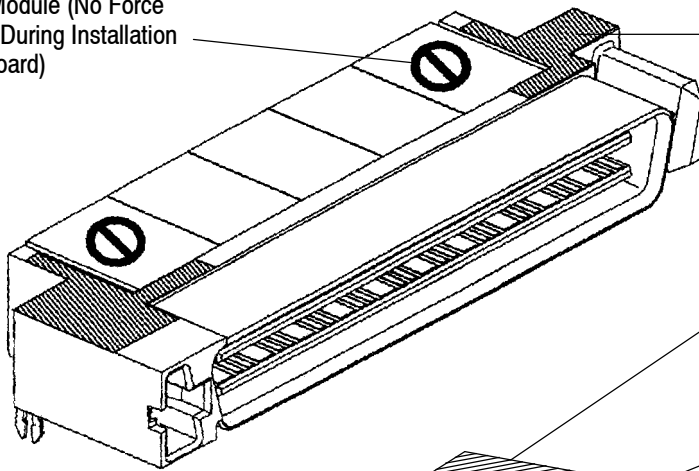
The connector should be handled only by the housing to avoid deformation, contamination, or other damage to the contact tines.

A. Manual Placement

Determine which hole in the pc board is to receive the number one contact tine, then orient the connector so the number one solder tine is aligned with the hole. Start all solder tines into the board; then, when the retention legs start to engage the pc board, press the connector until it seats on the pc board.

Signal Module (No Force Applied During Installation in PC Board)

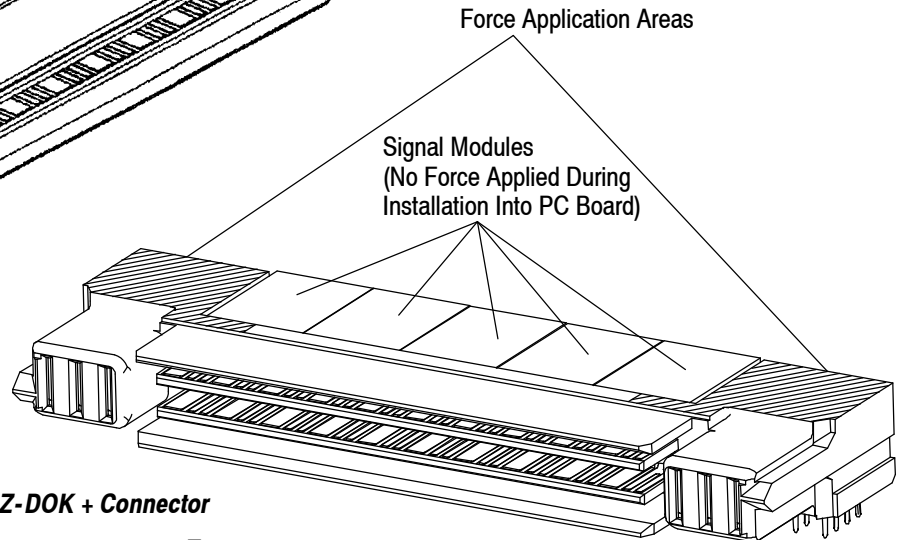
Force Application Area



Z-DOK Connector

Force Application Areas

Signal Modules (No Force Applied During Installation Into PC Board)



Z-DOK + Connector

Figure 10



When pressing the connector into the pc board, the force should only be applied to the housing. Applying force to the contact modules may displace the modules resulting in damage to the connector. See Figure 10.

B. Robotic Placement

Z-DOK and Z-DOK + Connectors are NOT designed to be placed robotically onto pc boards.

3.11. Soldering



After the connector is snapped into the pc board, the boardlocks must be soldered with the connector contact tines during the soldering process.

Z-DOK and Z-DOK + Connectors can be wave soldered, provided the temperatures and exposure time are within the ranges specified in Figure 11. TE recommends the use of SN60 or SN62 solder for the connectors. Refer to Paragraph 2.5 for information that is available for establishing soldering guidelines.

SOLDERING PROCESS	TEMPERATURE		TIME (At Max Temperature)
	CELSIUS	FAHRENHEIT	
WAVE SOLDERING	260	500	5 Seconds

Figure 11

A. Flux Selection

The 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 wave 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 Figure 12.

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

Figure 12

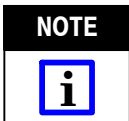
B. Cleaning

After soldering, removal of fluxes, residues, and activators is necessary. Cleaning methods depend on the type of flux used. Consult with the supplier of the solder 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 10 minutes at room temperature without any adverse effects on the contacts or housings. See Figure 13.

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. See Figure 13.



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 sockets; 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 particular solvent that is not listed, contact the Product Information number at the bottom of page 1.

C. Drying

When drying clean assemblies and pc boards, air drying is recommended. Temperature for the connectors should not exceed 85°C [185°F]. Degradation of the connectors could result from extreme temperatures.

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CLEANER		TIME (Minutes)	TEMPERATURE (Maximum)	
NAME	TYPE		CELSIUS	FAHRENHEIT
ALPHA 2110	Aqueous	1	132	270
BIOACT EC-7	Solvent	5	100	212
Butyl CARBITOL	Solvent	1	Ambient Room	
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
Terpene Solvent	Solvent	5	100	212

Figure 13

3.12. Checking Installed Connectors

All solder joints should conform to those specified in Workmanship Specification 101-21. The housing must seat on the pc board to the dimensions shown in Figure 14.

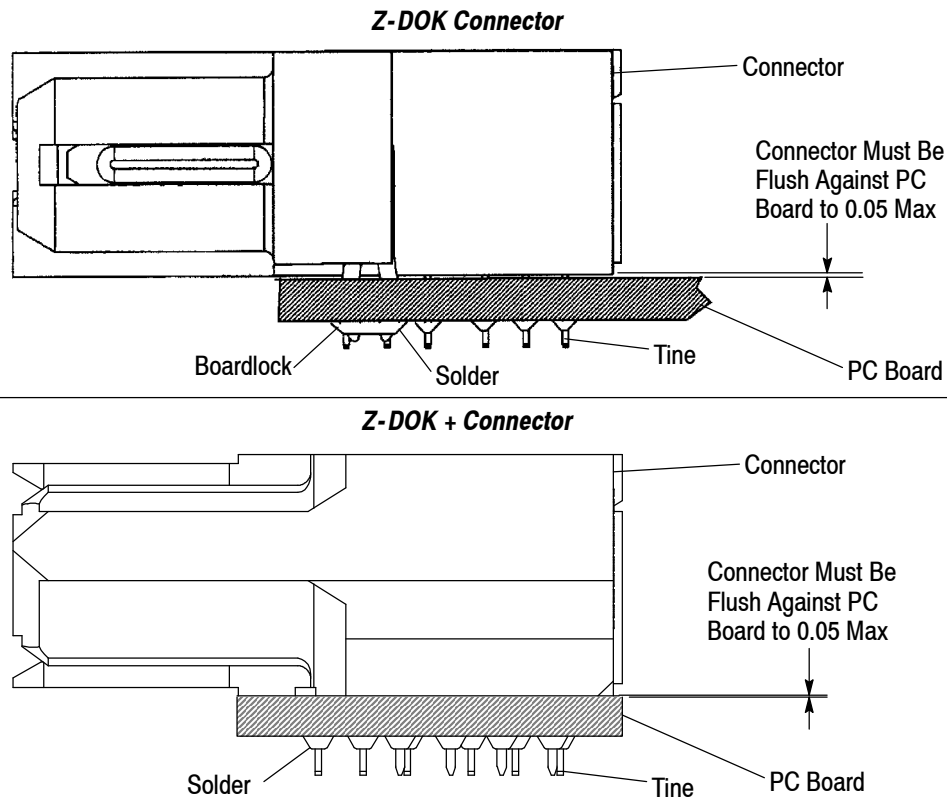


Figure 14

3.13. Precautions



Z-DOK Connectors will tolerate misalignments up to ± 1.0 mm during mating, while Z-DOK + Connectors will tolerate misalignments up to ± 1.75 mm during mating. However, the connectors are not designed to provide mechanical support between circuit boards within a system. One half of the interface (one board) must be allowed to float otherwise forces across the connector interface may result in signal discontinuities.

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3.14. Repair and Replacement

Damaged connectors must be removed, discarded, and replaced with new ones. Soldered connectors may be removed from the pc board by standard desoldering methods. See Paragraph 3.11 for soldering information.

4. QUALIFICATIONS

The Z-DOK and Z-DOK + Connector Systems have been submitted for agency evaluation.

5. TOOLING

A pc board support should be used to prevent bowing of the board during the placement of a connector on the pc board. It should have flat surfaces with holes or a channel wide and deep enough to receive the solder tines and boardlocks during installation of the connector on the pc board. See Figure 15.

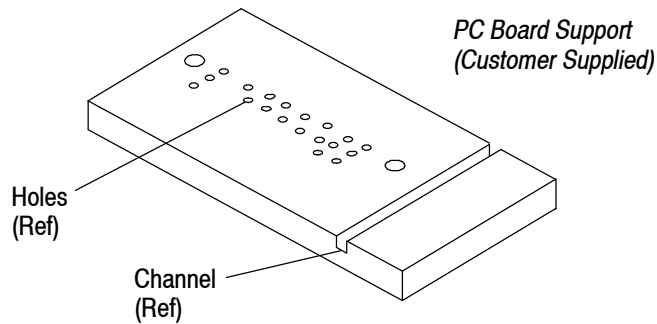


Figure 15

6. VISUAL AID

Figure 16 shows typical applications of a Z-DOK and Z-DOK + Connectors. These illustrations 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.

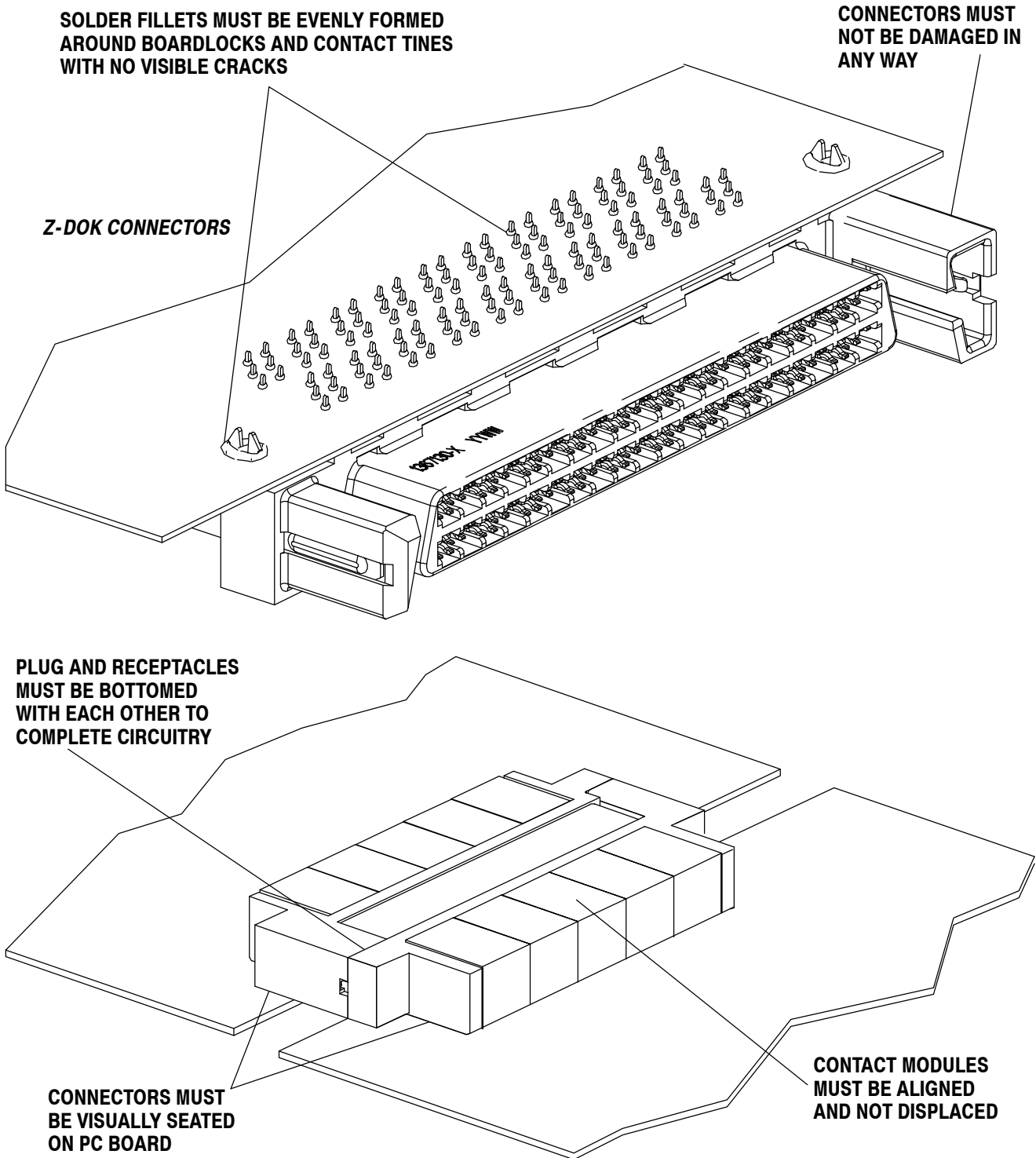


FIGURE 16. VISUAL AID (CONT'D)

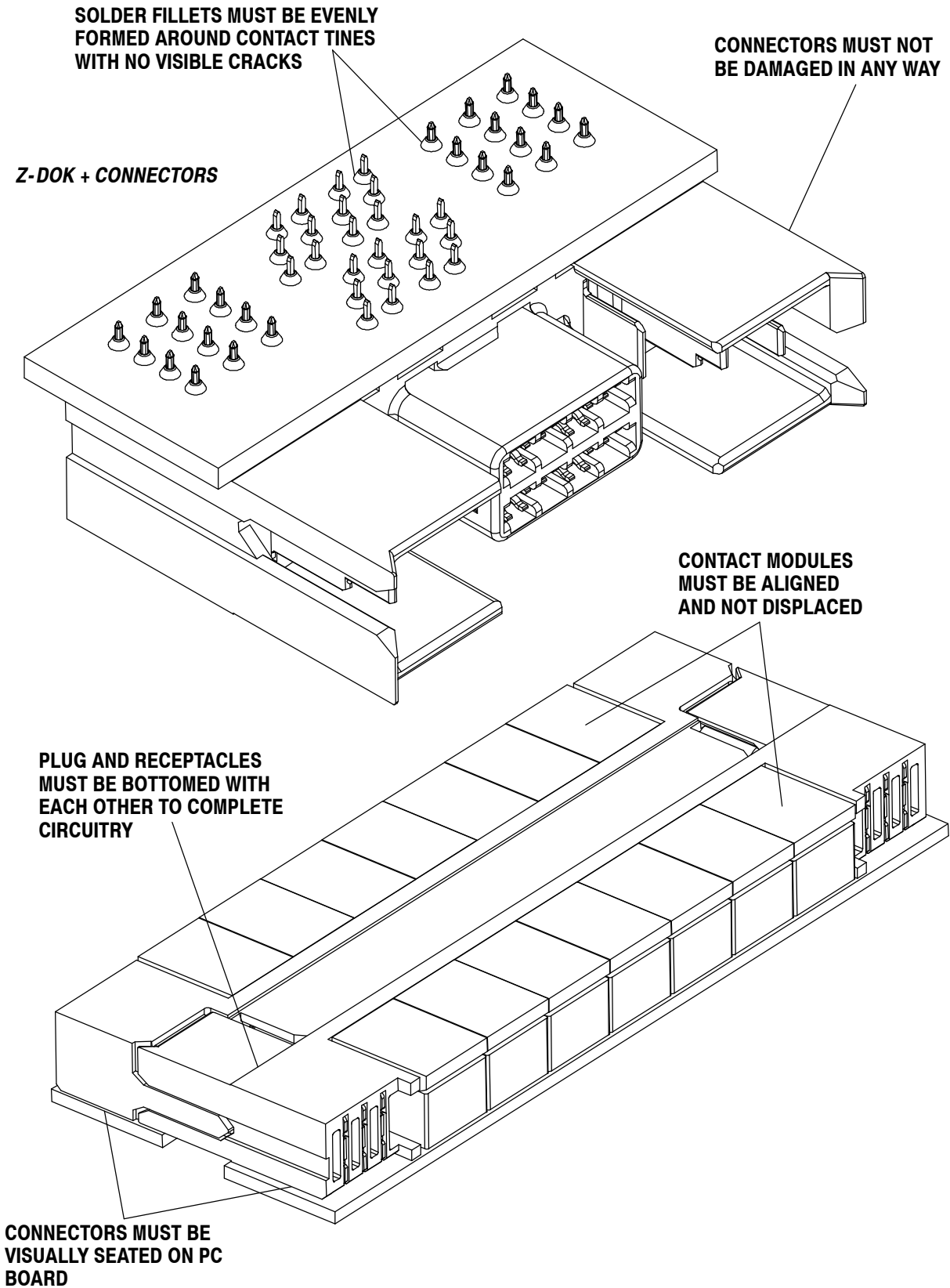


FIGURE 16. VISUAL AID (END)