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 ±2°. Figures are not drawn to scale.

1. INTRODUCTION

This specification covers the requirements for application of CFP2 and CFP4 connectors and cage assemblies used to interconnect MSA-compliant CFP transceivers to host printed circuit (pc) boards. The connector has 104 positions for CFP2 and 56 positions for CFP4. The connector features a housing with right-angle surface-mount contacts in a pitch of 0.6 and a plug entry slot that accepts a CFP2 or CFP4 compliant plug housed in a transceiver. The cage assembly features a frame with compliant pins, transceiver locking latches, and heat sink clip latches. The cage assembly has one column and is available with 1 or 2 ports for CFP2 and 1 or 4 ports for CFP4. An electromagnetic interference (EMI)/dust cover for the cage assembly is available that prevents contaminants from entering the chassis and confines any EMI emissions when the transceiver is not installed.

A hardware kit is available that consists of a cage assembly, heat sink with clip, and connector cover assembly.

The connector is supplied in tape-mounted form for manual or automatic machine placement (typically vacuum pick and place). The cage assembly is supplied in a thermo-formed tray package for manual placement.

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

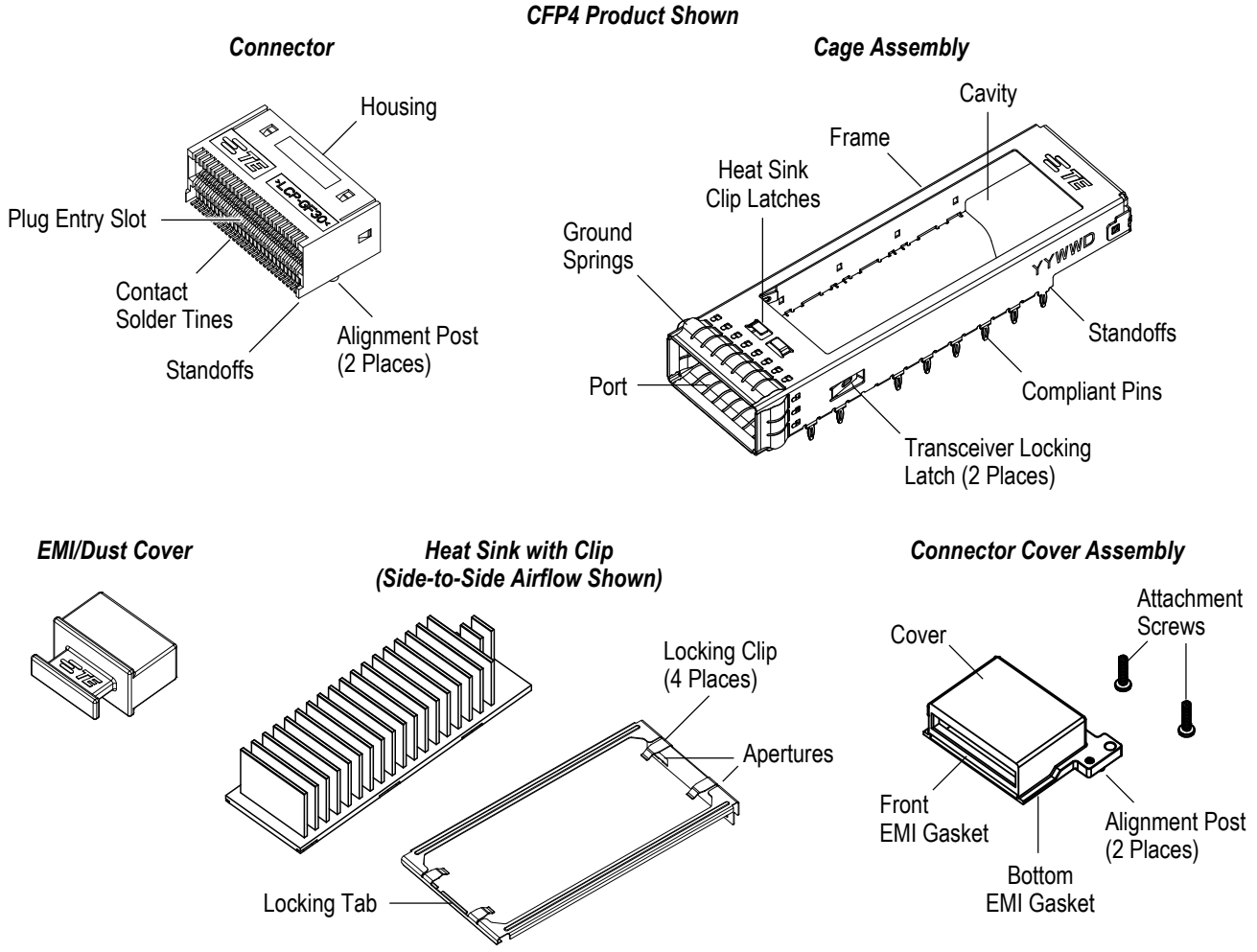


Figure 1

In applications where heat dissipation is necessary, the heat sink should be installed onto the cage assembly. The heat sink is available in two configurations based on airflow within the chassis: side-to-side and front-to-back. The clip secures the heat sink to the cage assembly. When installed, the heat sink design allows the transceiver to be installed and removed.

The connector cover assembly must be placed over the connector and secured to the host pc board using the attachment screws. The cover provides EMI isolation for the connector and a positive stop for the transceiver.

2. REFERENCE MATERIAL

2.1. Revision Summary

Revisions to this application specification include:

- Modified name of product, and changed name of entry slot and what it accepts
- Added instruction sheets to paragraph 2.6 and added paragraph 3.2
- Corrected table in Figure 9

2.2. Customer Assistance

Reference Product Base Part Number 2274843 and Product Code L322 are representative of CFP2 and CFP4 connectors and cage assemblies. 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.

2.3. Customer Drawings

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

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.

2.5. Specifications

Workmanship specification 101-21 provides quality requirements and evaluation methods for solder fillets of surface mounted connectors.

Product specification 108-32103 provides expected product performance and test results.

2.6. Instructional Material

Instruction sheets (408-series) provide product assembly instructions. Instructional material that pertains to this product is:

408-9816	Handling Reeled Product
408-6923	Manual Arbor Frame 58024-1
408-32199	CFP2 and CFP4 Cage Assembly Seating Tool Assemblies 2215078-[ ] and 2215080-[ ] (For Use With Heat Sink)
408-32200	CFP2 and CFP4 Cage Assembly Seating Tool Assemblies 2215079-[ ] and 2215081-[ ] (For Use Without Heat Sink)

2.7. Standards and Publications

EIA-364-52, “Solderability of Contact Terminations Test Procedure for Electrical Connectors and Sockets

3. REQUIREMENTS

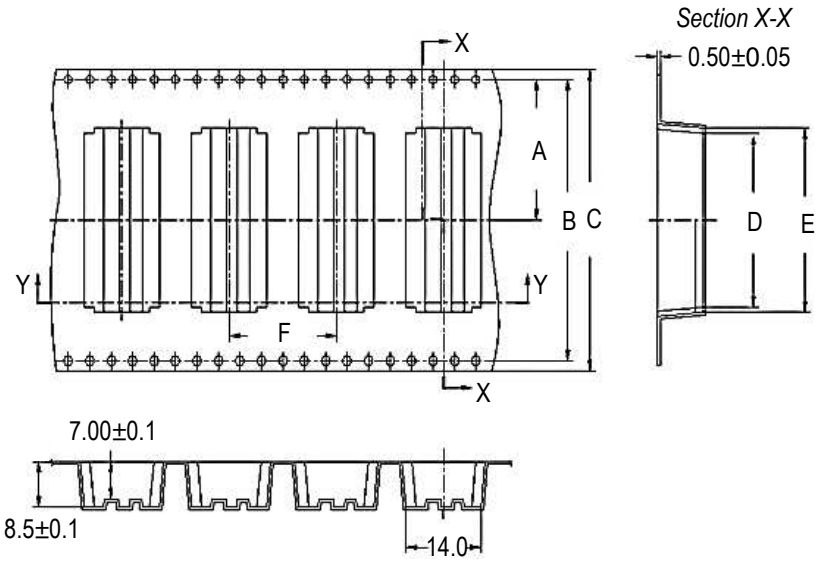
3.1. Safety

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

3.2. Packaging

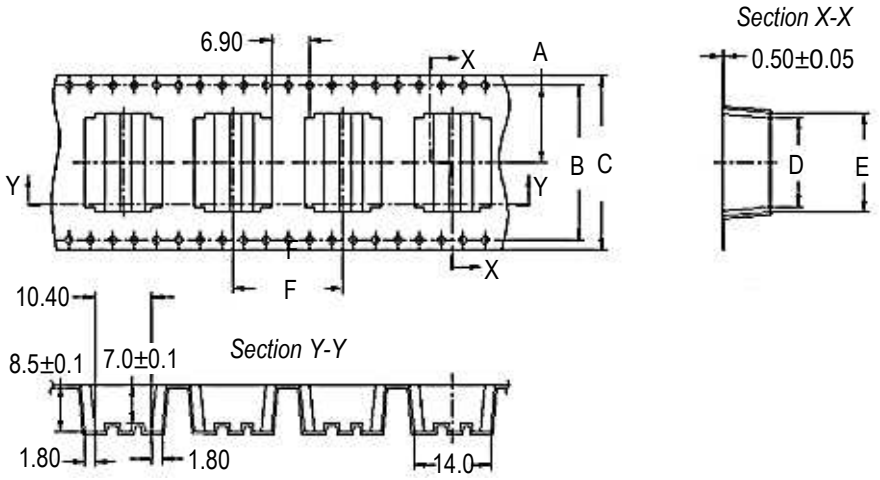
The cage assemblies are supplied in thermo-formed tray packages for manual placement. Tray package dimensions are provided in Figure 2.

CFP2 Cage Assembly Packaging



DIMENSION		
A	**B**	**C**
26.20±0.2	52.40	56.0±0.3
D	**E**	**F**
32.4	34.30	20.0±0.1

CFP4 Cage Assembly Packaging



DIMENSION		
A	**B**	**C**
14.2±0.15	28.40	32.0±0.3
D	**E**	**F**
16.2	18.10	20.0±0.1

Figure 2

3.3. 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. 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

3.4. Operating Temperature

The connectors and cage assemblies are designed to operate in a temperature range of -55° to 85°C [-67° to 185°F].

3.5. Host PC Board

A. Material and Thickness

The host pc board material shall be glass epoxy (FR-4 or G-10). The host pc board thickness shall be a minimum of 2.0 for mounting the connector and cage assembly to one side of the pc board and 3.0 for mounting the connector and cage assembly to both sides of the pc board.

B. Tolerance

Maximum allowable bow of the board shall be 0.08 over the length of the cage assembly.

C. Circuit Pads

The coplanarity of the circuit pads must be 0.03. The circuit pads must be solderable in accordance with EIA-364-52.

D. Holes

The connector and cover alignment post holes and cage assembly compliant pin holes must be drilled and plated through to specific dimensions to prevent stubbing during placement of the connector, cover, and cage assembly on the board. The drilled hole size, plating types, and plating thickness are dependent on the application requirements. The finished hole size must be as stated to provide unrestricted insertion. Refer to Figure 3.

E. Layout

Recommended circuit pad and hole pattern, dimensions, and tolerances are provided on the customer drawings for the specific connector and specific cage assembly.

3.6. Soldering (Lead-Free)

A. Solder Paste Characteristics

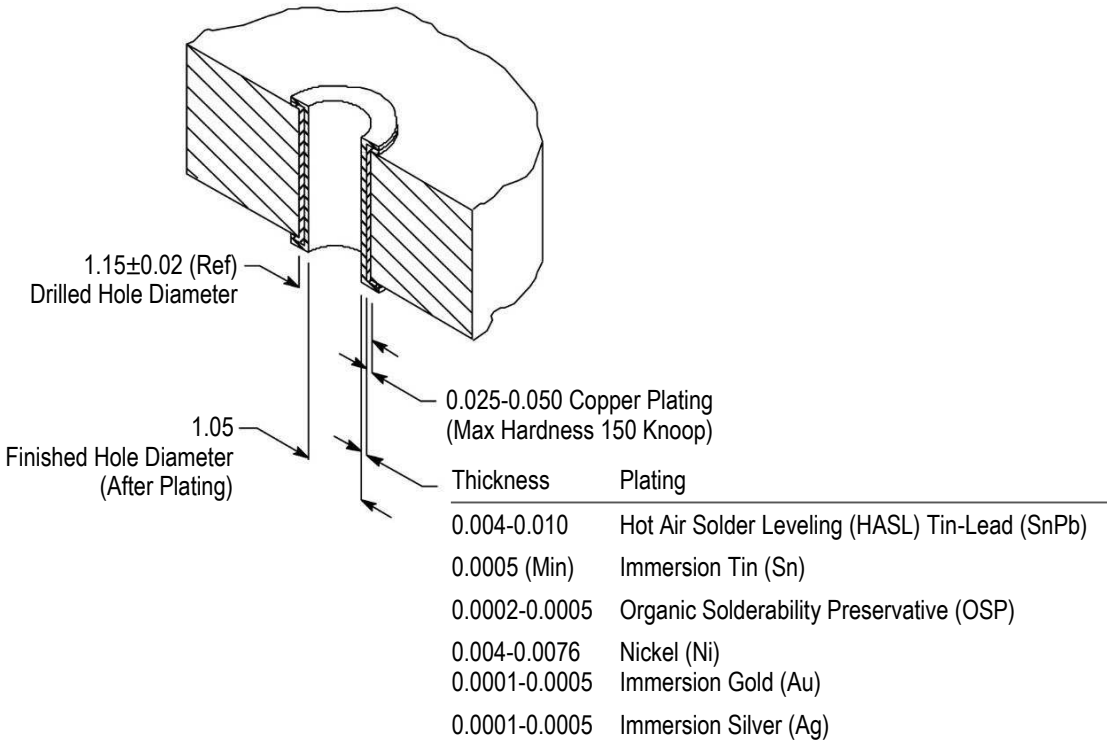
1. Alloy type for solder shall be compatible with pure tin or gold; for example, SAC305 (96.5 Sn/3 Ag/0.5 Cu) or SAC405 (95.5 Sn/4 Ag/0.5 Cu).
2. Flux incorporated in the paste shall be rosin, mildly active (RMA) type.
3. Paste will be at least 80% solids by volume.
4. Mesh designation shall be -200 to +325 (74 to 44 square micron openings, respectively).
5. Minimum viscosity of screen print shall be 5×10% cp (centipoise).
6. Minimum viscosity of stencil print shall be 7.5×10% cp (centipoise).

B. Solder Volume

Minimum solder volume (V) (before curing) for each circuit pad is calculated by multiplying the pad length (L) by the pad width (W) by the stencil thickness (T): 1.4 (L) × 0.35 (W) × 0.15 (T) = 0.074 mm^3 (V). Solder volume for each connector must be 0.074 mm^3 per contact.

NOTE
Solder volume may vary depending on solder paste composition.

Recommended Hole Dimensions and Plating for Connector, Cover, and Cage Assembly



Thickness	Plating
0.004-0.010	Hot Air Solder Leveling (HASL) Tin-Lead (SnPb)
0.0005 (Min)	Immersion Tin (Sn)
0.0002-0.0005	Organic Solderability Preservative (OSP)
0.004-0.0076 0.0001-0.0005	Nickel (Ni) Immersion Gold (Au)
0.0001-0.0005	Immersion Silver (Ag)

Figure 3

C. Solder Paste Thickness

Solder paste thickness must be at least 0.15.

D. Stencil

The stencil should be 0.15 thick.

E. Solder Mask

A solder mask is recommended between all circuit pads 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 board, a solder mask must be applied over the trace to prevent bridging and wicking of solder away from the contact solder tine. The mask most suitable is Liquid Photo Imageable.

NOTE
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 contact solder tine producing a weak solder joint.

F. Process

The connector must be soldered using non-focused infrared (IR) reflow or equivalent soldering technique. Reflow temperature and time may vary depending on the size of the host pc board and placement of other components. The reflow temperature and approximate time to which the connector can be subjected is specified in Figure 4.

CAUTION
Excessive temperature may cause connector housing degradation or plating deterioration. It is recommended that component temperatures not exceed 255°C [491°F].

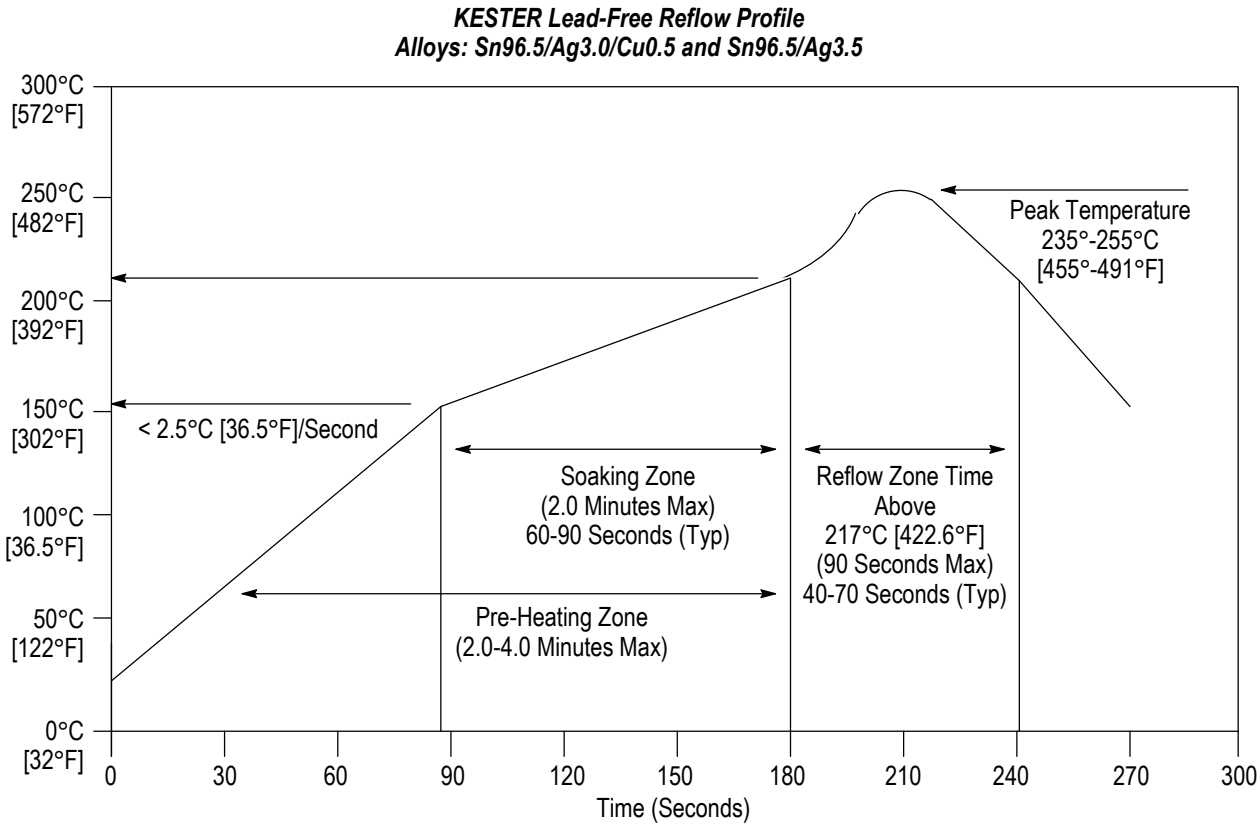


Figure 4

3.7. 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 cleaning the host pc board on its edge. If using aqueous cleaner, standard equipment such as a soak-tank or an automatic in-line machine should be used. Recommended common cleaning solvents are listed in Figure 5.

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 5

DANGER
Consideration must be given to toxicity and other safety requirements recommended by the solvent manufacturer. Refer to the material safety data sheet (MSDS) for characteristics and handling of cleaners. Trichloroethylene and methylene chloride are not recommended because of harmful occupational and environmental effects.

A. Drying

When drying cleaned assemblies and host pc boards, make certain that temperatures do not exceed 85°C [185°F]. Excessive temperatures may cause degradation.

3.8. Placement on Host PC Board

A. Connector

CAUTION
Connectors should be handled only by the housing to avoid deformation, contamination, or damage to the contact solder tines.

CAUTION
The connector must be soldered to the host pc board before placing the connector cover assembly over the connector. The soldering process will cause damage to the connector cover assembly.

Optimally, the contact solder tines should be centered on the host pc board circuit pads. However, a slight misalignment (overhang) up to 50% is permissible. All solder joints must conform to requirements given in 101-21 and specified in this document. Solder fillets must be evenly formed around each contact solder tine. Solder must have 95% minimum coverage over the circuit pad.

The connector alignment posts must be inserted into the holes in the host pc board, and the standoffs must be seated on the board. The connector housing must not contact the host pc board. See Figure 6, Detail A.

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.

B. Connector Cover Assembly

The connector cover must be placed over the connector with the alignment posts inserted into the holes in the host pc board. The connector cover must be fastened to the host pc board using the attachment screws, which must be tight enough to ensure full compression of the bottom EMI gasket. See Figure 6, Detail B.

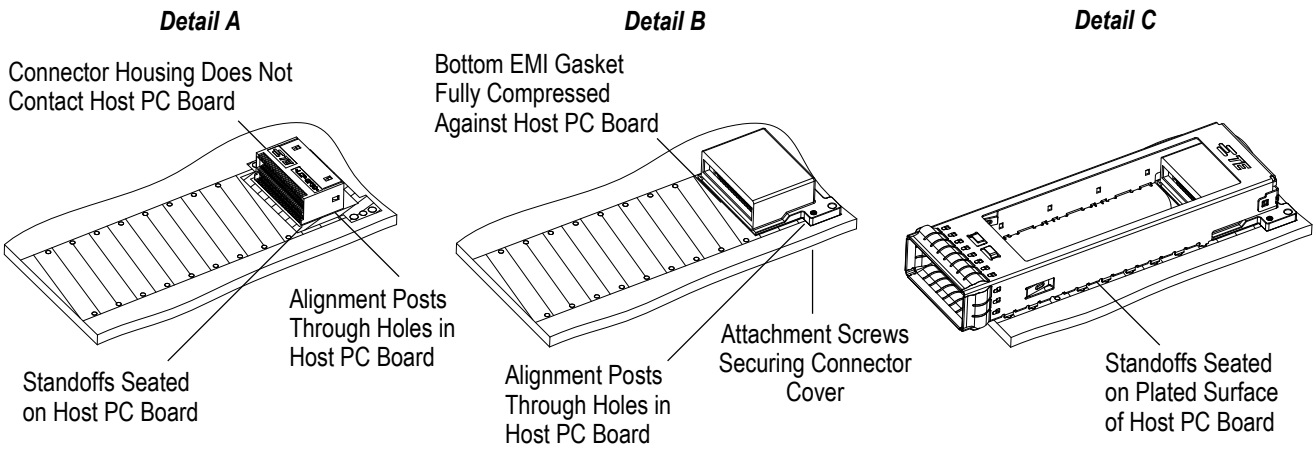


Figure 6

C. Cage Assembly

NOTE
The connector must be soldered to the host pc board before seating the cage assembly.

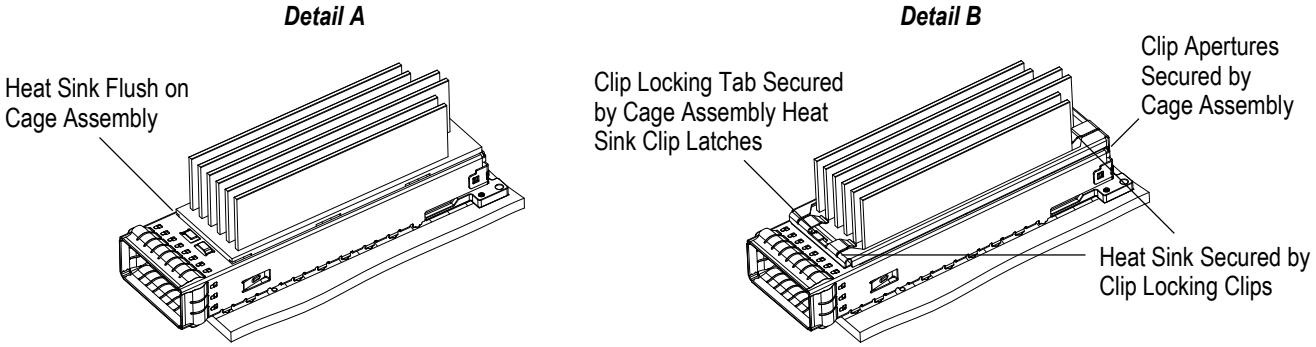
Even pressure must be applied across the cage assembly to seat the cage assembly on the host pc board. The force required to seat the cage assembly can be calculated by:
amount of compliant pins × 44.5 N [10 lbs] (force per compliant pin) = total seating force.

CAUTION
Overdriving of the cage assembly will deform parts critical to the connection. Maximum force occurs prior to the cage assembly bottoming on the host pc board.

The cage assembly standoffs must rest flush against the plated surface on the host pc board. Refer to Figure 6, Detail C.

3.9. Heat Sink Installation

The heat sink must be securely attached to the cage assembly using the clip. The installation must meet the requirements given in Figure 7.



Note: Side-to-side airflow clip shown, same requirements apply to front-to back airflow clip.

Figure 7

NOTE
Any heat sink used must be securely attached to the cage assembly.

3.10. Bezel

A. Thickness

The bezel thickness range shall be 1 through 3.

B. Cutout

The minimum allowable distance between components must be considered to ensure proper assembly. Dimensions for bezel cutout and minimum allowable distance between cutouts are given in Figure 8.

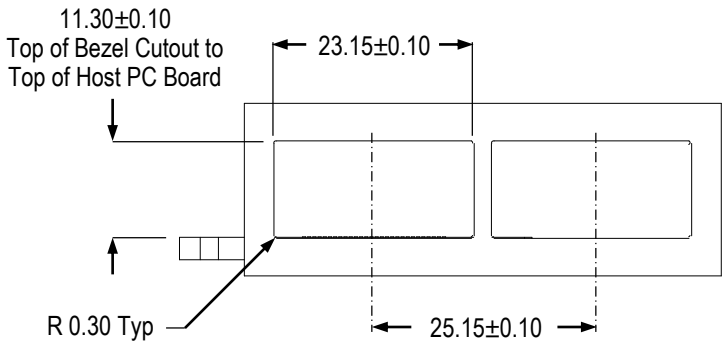
C. Position

The bezel and host pc board must be positioned in relation to each other to avoid interference with the installation or removal of the transceiver. This relationship must conform to the dimensions given in Figure 8.

3.11. Cage Assembly Installation onto Bezel

The cage assembly (seated on host pc board) must be installed onto the bezel so that the port of the cage assembly is centered over the cutout of the bezel. The cage assembly ground springs must touch the bezel. The installation must also meet the requirements given in Figure 8.

Recommended Bezel Cutout and Bezel to Host PC Board Position



Cage Assembly Installed in Bezel

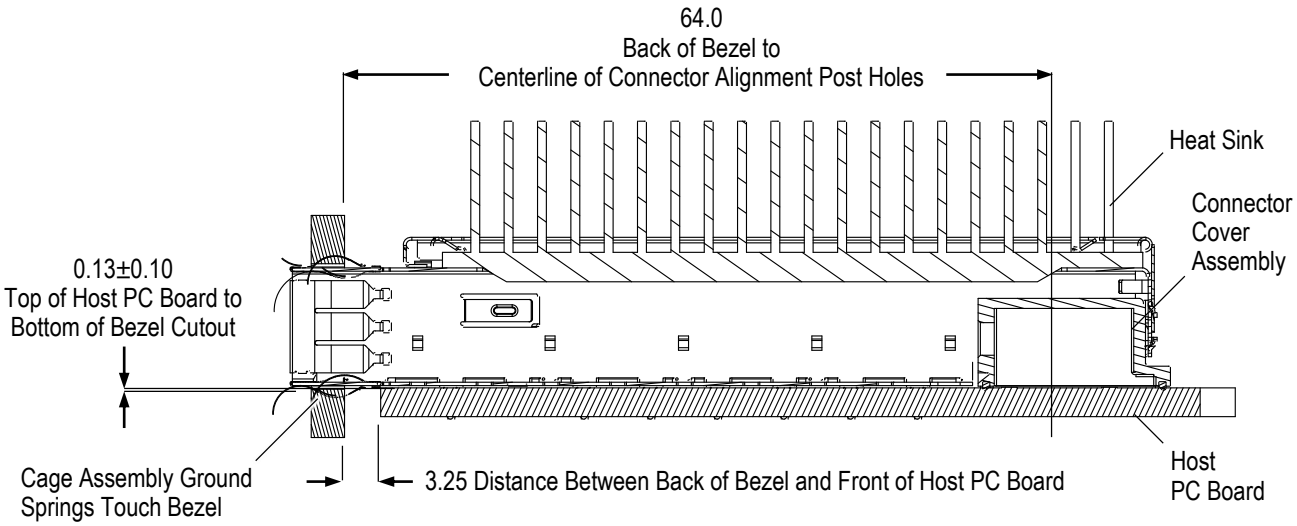


Figure 8

3.12. Removal and Repair

The components must be removed from the host pc board in the following order:

1. The heat sink clip must be removed using a tool (such as a small screwdriver) to release the apertures of the clip from the cage assembly. The clip must be pulled from the cage assembly so that the locking tab releases from the heat sink clip latches.
2. The heat sink must be lifted from the cage assembly.
3. The cage assembly must be pulled from the host pc board.
4. The connector must be removed from the host pc board using standard de-soldering methods.

The connector and cage assembly must not be re-used after removal. The connector and cage assembly are not repairable. Any defective, damaged, or deformed components must not be used.

4. QUALIFICATION

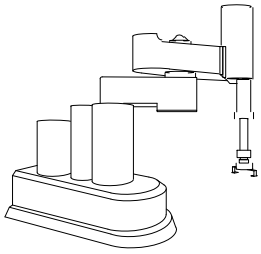
CFP2 and CFP4 connectors are Recognized by Underwriters Laboratories Inc. (UL) in File E28476.

Agency evaluation for the cage assemblies was not defined at the time of publication of this application specification.

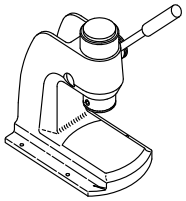
5. TOOLING

Tooling part numbers and instructional material packaged with the tooling are given in Figure 9.

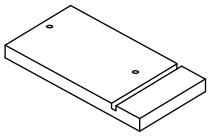
No tooling is required for manual placement of the connector or cage assembly onto the host pc board.



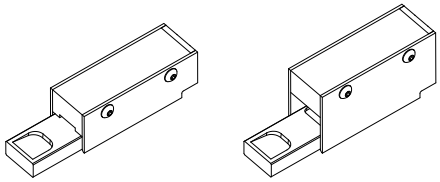
Robotic Equipment



Manual Arbor Frame
58024-1 (408-6923)



PC Board Support Fixture
(Application Specific,
Customer Supplied)



Cage Assembly Seating Tools
(Refer to Table)

CONNECTOR		SEATING TOOL	
TYPE	CONFIGURATION	USE	PART NUMBER
CFP2	1×1	With Heat Sink	2215078-1
		Without Heat Sink	2215079-1
	1×2	With Heat Sink	2218078-2
		Without Heat Sink	2215079-2
CFP4	1×1	With Heat Sink	2215080-1
		Without Heat Sink	2215081-1
	1×4	With Heat Sink	2215080-4
		Without Heat Sink	2215081-4

Figure 9

5.1. PC Board Support Fixture

A pc board support fixture must be used to provide support for the host pc board and to prevent damage to the host pc board and its adjacent components during seating or removal of the cage assembly. It must have a flat surface with holes or a channel wide and deep enough to receive any protruding components during seating.

5.2. Robotic Equipment

For automatic machine placement of the connector onto the host pc board, robotic equipment must have a true position accuracy tolerance sufficient to properly locate the connector. This includes gripper and fixture tolerances as well as equipment repeatability. It must use the connector datum surfaces to ensure reliable placement.

5.3. Seating Tool

These seating tools provides a surface to accept the force applied by the application tool to seat the cage assembly or cage assembly with heat sink onto the host pc board.

5.4. Application Tool

The manual arbor frame provides the necessary force to drive the seating tool. An automatic machine or hydraulic press can also be used with these seating tools.

6. VISUAL AID

The illustration below shows a typical application of CFP4 and CFP2 connectors and cage assemblies. 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.

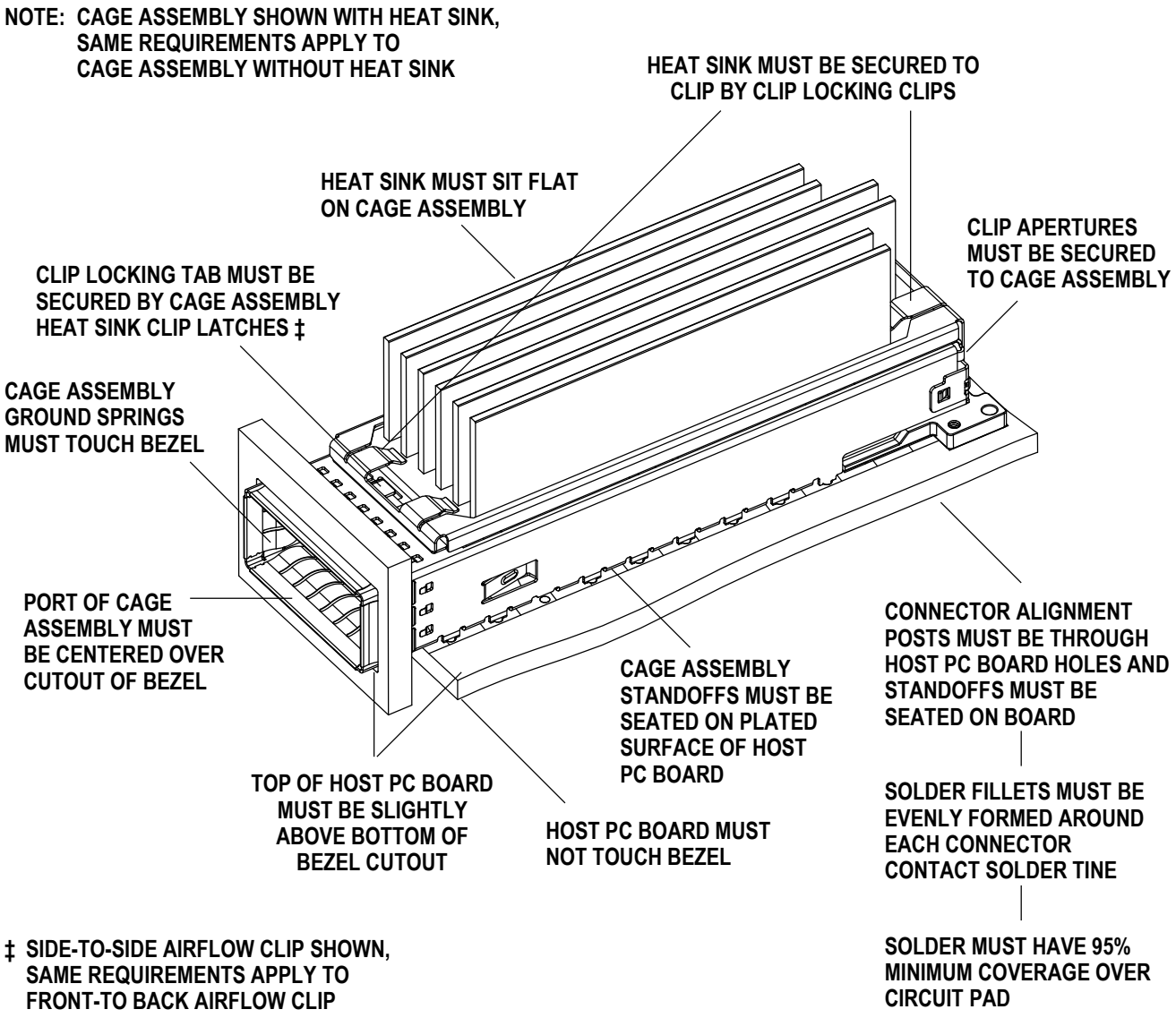


FIGURE 10. VISUAL AID