1. INTRODUCTION

This Instruction upon usage covers the MINI IO series.

This specification covers the requirements for application of industrial mini pc board and panel mount I/O receptacle connectors for wire-to-board interface. Each connector is designed with two points of contact for reliability in high-vibration environments. The connectors are available in vertical and right-angle configurations with surface mount technology (SMT) contacts . Each connector has 8 contact positions on 1.27 centerline spacing.

Each connector features a shell, housing, boardlocks for mechanical support, mounting posts, flanges that help guide the mating connector, polarization tabs (available in Type I and Type II) to prevent mis-mating, and a latching system to prevent accidental un-mating. SMT right-angle connectors have shield tabs. SMT connectors are available supplied in a tray pack or tape and reel.
When corresponding with personnel, use the terminology provided in this specification to facilitate inquiries for information. Basic terms and features of this product are provided in Figure 1.

SMT Receptacle Connectors

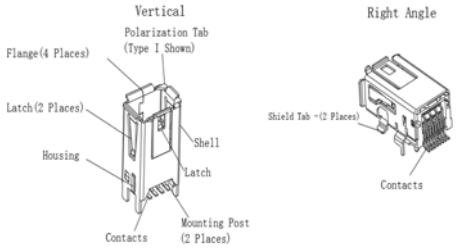


Figure 1

2. REFERENCE MATERIAL

Initial release of application specification

2.1 Drawings

Customer Drawings for product part numbers are available from www.txga.com. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, call at the net work,www.txga.com

2.2. Specifications

Application Specifications FCMNTXXXX-(series) provide product description and application requirements. Product specifications (FMNTDXX/FMNTUXX-series) provide product performance and test results. Specifications available that pertain to this product are:

FCMNTXXXX-- Industrial Mini I/O Plug Cable

(FMNTDXX/FMNTUXX-- Industrial I/O Connector

3. REQUIREMENTS

3.1. Safety

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

3.2. Exposure Limitations

A. Ultraviolet Light

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

B.Chemical

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

3.3. Storage

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.

3.4. PC Board

A.Material and Thickness

The pc board material shall be glass epoxy (FR-4, G-10, or equivalent). The pc board thickness should be 1.6±0.1 to ensure proper performance of the connector boardlocks. Consult TE for other acceptable board thicknesses.

B.Tolerance

Maximum allowable bow of the pc board shall be 0.01 over the length of the connector.

C.Pads (SMT Connectors)

The co-planarity of the pads must be 0.03.

D.Contact Holes (Through-Hole Connectors)

The contact holes must be plated through according to the customer drawing for the specific connector.

E.Layout

The mounting post holes, boardlock holes, and pads (SMT connectors) or contact holes (through-hole connectors) must be precisely located on the pc board to ensure proper placement and optimum performance of the connector. The pc board layout must be designed using the dimensions provided on the customer drawing for the specific connector.

3.5. Connector Placement

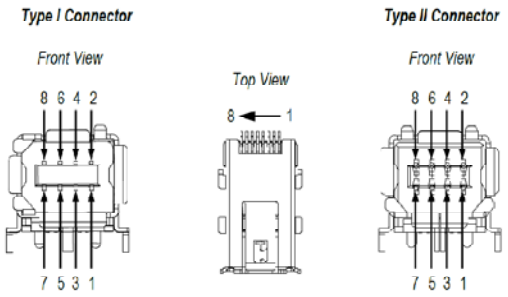
When manually placing connectors on the pc board, the connector should be handled only by the housing to prevent contamination or deformation to the contacts. Vertical connectors can be placed on the pc board using a hand loading tool according to the instructions provided with the tool.

A.Spacing

Care must be used to avoid interference between adjacent connectors and other components. Spacing is dependent on the mounting hardware used and clearance required for mating connectors.

B.Pin Assignments

Recommended connector pin assignment for each polarization option (Type I and Type II) based on data speed of the Ethernet application is given in Figure 2.



PIN	SIGNAL	
	10/100 mB	1 Gb
1	TXD_P	BI_DA_P
2	TXD_N	BI_DA_N
3	RXD_P	BI_DB_P
4	NC	BI_DC_P
5	NC	BI_DC_N
6	RXD_N	BI_DB_N
7	NC	BI_DD_P
8	NC	BI_DD_N

Figure 2

C.Position (SMT Connectors)

Optimally, the contact solder tines should be centered on the pads. A slight misalignment, as long as the entire solder tine is on the pad, is permissible for certain performance classifications according to
J-STD-001. It is imperative that the solder tines are sufficiently pressed into the solder paste. See Figure 3.

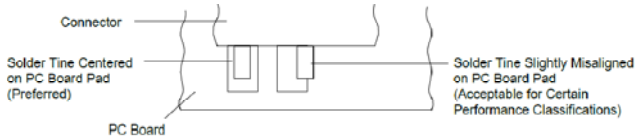


Figure 3

3.6. Soldering

NOTE

If necessary, a hold-down apparatus can be used to keep the connector in place during soldering.

A.SMT Connectors

A.1Solder Paste Characteristics

1.Alloy type (lead-free solder) shall be compatible with pure tin or gold, for example, SAC 305 (96.6 Sn/3 Ag/0.5 Cu) or SAC 405 (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 -200 to +325 (74 to 44 square micron openings, respectively).

5.Minimum viscosity of screen print shall be 5X10% cp (centipoise).

6.Minimum viscosity of stencil print shall be 7.5X10% cp (centipoise).

A2.Solder Volume

NOTE

Solder volume may vary depending on solder paste composition. The out-gassing factor (usually 50%) will reduce varying deposition parameters.

Minimum solder volume (Vi) (before curing) for each circuit pad should be calculated as follows:
Vi = a (pad width aperture b (pad length aperture) Tp (thickness of stencil or deposited solder paste)

A.3Stencil

The stencil aperture may be any shape as long as it prevents solder bridging from one pad to another. Varying aperatures will change the required stencil thickness needed to deposit the recommended solder paste volume. Generally, a thinner stencil will need a larger aperture to maintain the given volume of solder paste. Solder deposition should be within the pad area of each contact solder tine.

The stencil layout must be designed using the dimensions provided on the customer drawing for the specific connector.

A.4 Solder Mask

A solder mask is recommended between all pads to minimize solder bridging. All traces must be covered by the solder mask in the solder deposit area, including in the area of the boardlock. Exposed traces could cause bridging and wicking of solder away from the contact solder tines.

The solder mask must not exceed the height of the pad by more than 0.05. Since the connector
housing could rest on the solder mask, an excessively high mask would allow too much space between the solder tine and the pad to allow a proper solder joint.

If a hold-down aperture is required, the solder mask must prevent the connector housing from resting on the solder deposit.

Liquid photo imageable or dry film solder mask is recommended.

A.5Process

The SMT connectors can be soldered using non-focused infrared reflow (IR) or equivalent soldering techniques. The temperatures and exposure time shall be as specified in Figure 4.

SOLDERING PROCESS	TEMPERATURE	IMMERSION DURATION
IR	260±5°C [500±41°F]	10±1 Seconds

Figure 4

The reflow profile is given in Figure 5.

Average Ramp Rate and Ramp to Peak	Preheat		Time Over Liquids (217°C [422.6°F])	Peak Temperature	Time Within 5°C [41°F] of Peak	Ramp (Cool Down)	Time to Peak (25°C [77°F])
	Temperature	Time					
3°C [37.4°F] /Sec Max	150-200°C [302-392°F]	60-180 Sec	60-150 Sec	260+0/-5°C [500+0/-41°F]	20-40 Sec	6°C [42.8°F] /Sec Max	8 Min/Max

Figure 5

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 take place with the pc board on its edge. Common cleaning solvents with times and temperatures that will not affect these connectors is specified in Figure 5.

CLEANER		TIME (Minutes)	TEMPERATURE (Max)
NAME	TYPE		
ALPHA 2110	Aqueous	1	132°C [270°F]
Isopropyl Alcohol	Solvent	5	100°C [212°F]
KESTER 5778	Aqueous		
KESTER 5779	Aqueous		
LONCOTERGE 520	Aqueous		
LONCOTERGE 530	Aqueous		

Figure 7

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. Trichloroethylene and methylene chloride is not recommended because of harmful occupational and environmental effects. Both are carcinogenic (cancer-causing).

Drying

When drying cleaned assemblies and pc boards, temperature limitation must not be exceeded: 85°C 185°F]. Excessive temperatures may cause housing degradation.

3.7. Checking Installed Connector

Each mounting post and boardlock must be through the appropriate pc board hole. Solder fillets must be evenly formed around each boardlock.

In addition:

— For SMT connectors, solder must have a 75% minimum coverage over each pc board pad. All solder joints should conform to the requirements given in Workmanship Specification IPC-A-610.
— For through-hole connectors, solder fillets must be evenly formed around each contact solder tine.

3.8. Panel

A.Cutout

The panel must be cut using the dimensions provided Figure 8.

There must be a gap in the top and bottom of the panel cutout to allow the connector latches to properly engage the mating connector. The gap must be within the dimensions given in Figure 8.

B. Position

The panel cutout must be positioned in line with or beyond the mating face of the connector. See Figure 8.

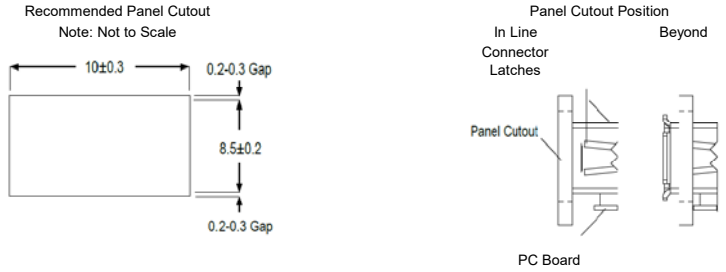


Figure 8

3.9. Cable Bend of Mated Connector

After mating, the cable should avoid a bend of no more than the angle given in Figure 9.

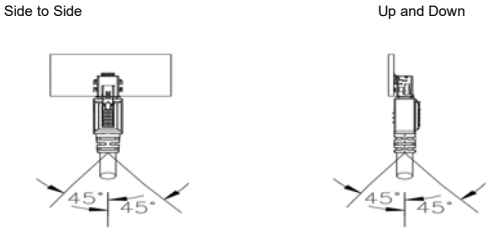


Figure 9

3.10. Removal

SMT and through-hole connectors may be removed from the pc board by standard de-soldering methods. The force required to remove through-hole connector from the pc board is 40 N [8.99 lb-force].

3.11. Replacement and Repair

The connectors are not repairable. Damaged or defective product must not be used.

4. QUALIFICATION

Industrial mini pc board and cable connectors material are Recognized Components by Underwriters Laboratories Inc.

5. TOOLING

No tooling is required to seat the connector on the pc board and mount the connector to the panel. A hand loading tool can be used to place the vertical connectors on the pc board. Robotic equipment may be used to seat SMT connectors on the pc board.