
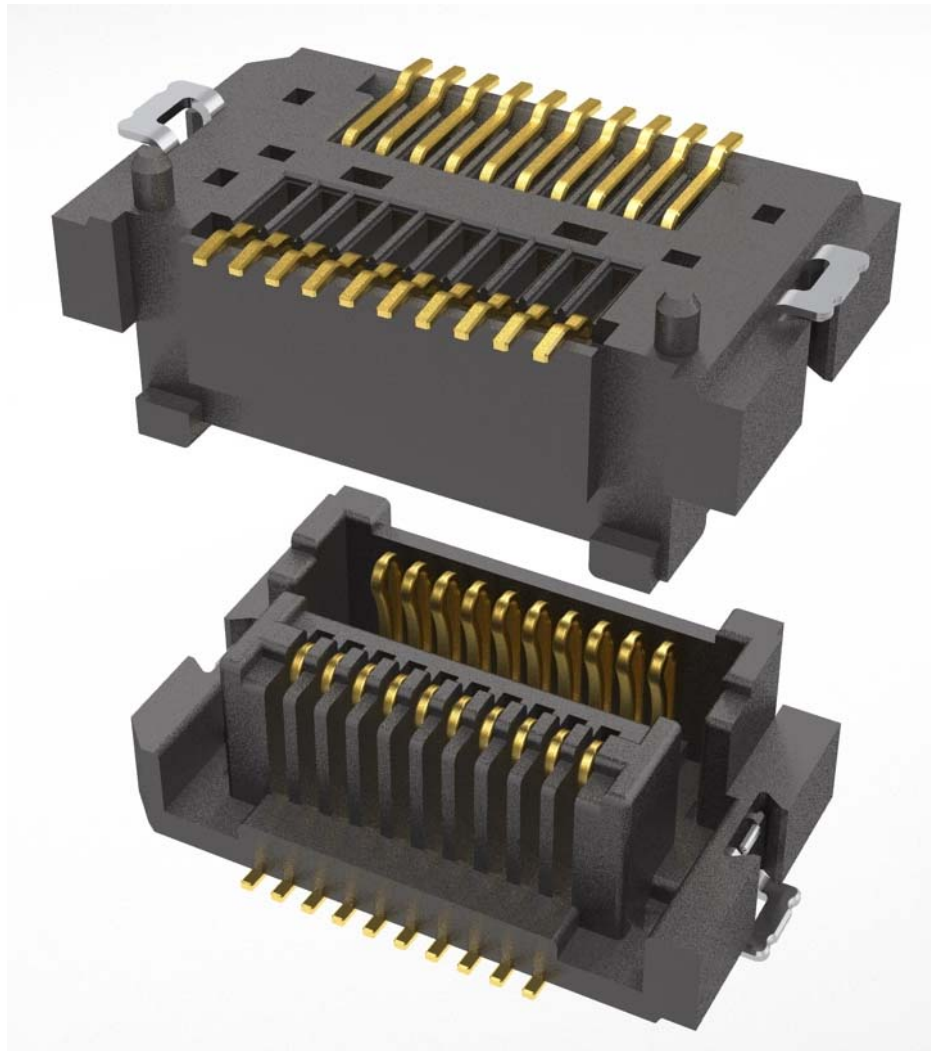


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## 1.0 OBJECTIVE

This specification defines the performance, test, quality, and reliability requirements of the MezzoStak™ 0.5 BTB Connector System as well as Lead Free product that meets the requirement of the European Union Directives of Restriction for Hazardous Substances (Directive 2002/95/EC).

## 2.0 SCOPE

This specification is applicable to the termination characteristics of the MezzoStak™ 0.5 BTB connector system, which provides for parallel interconnection of printed wiring boards in low power applications.

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### 3.0 GENERAL

<u>PARAGRAPH</u>	<u>TITLE</u>
1.0	Objective
2.0	Scope
3.0	General
4.0	Applicable Documents
5.0	Requirements
5.1	Qualification
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5.4	Design and Construction
6.0	Electrical Characteristics
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9.0	Quality Assurance Provisions
9.1	Equipment Calibration
9.2	Inspection Conditions
9.3	Sample Quantities and Description
9.4	Qualification Testing
9.5	Requalification Testing

### 4.0 APPLICABLE DOCUMENTS

In the event of a conflict between the requirements outlined in this specification and the product drawing, the product drawing shall take precedence. In the event of a conflict between the requirements outlined in this specification and the referenced documents, this specification shall take precedence.

#### 4.1 SPECIFICATIONS


4.1.1 Engineering Drawings 10088779, 10088780, 10088781, 10090516, & 10090504

#### 4.2 MILITARY STANDARDS

4.2.1 MIL-STD-202F: Test Methods for Electronic Component Parts  
4.2.2 EIA-364: Test Methods for Electrical Connectors  
4.2.3 MIL-C-45662: Equipment Calibration

#### 4.3 OTHER STANDARDS AND SPECIFICATIONS

4.4.1 UL-94: Flammability  
4.4.2 ASTM B-19: Brass  
4.4.3 ASTM B-36: Brass  
4.4.3 ASTM E-8; ASTM B422-90: Copper Tin  
4.4.4 ISO 9000

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#### 4.5 FCI SPECIFICATIONS

- 4.5.1 BUS-03-114: Capacitance Measurement
- 4.5.2 BUS-03-404: Normal Force Measurement
- 4.5.3 GS-19-037: Solderability
- 4.5.4 GS-19-036: Porosity
- 4.5.5 GS-19-039: Plating Adhesion

#### 4.6 FCI LAB REPORTS - SUPPORTING DATA

- 4.6.1 EL-2010-04-015: Qualification Testing

### 5.0 REQUIREMENTS

#### 5.1 QUALIFICATION

Connectors furnished under this specification shall be products that are capable of meeting the qualification test requirements specified herein.


#### 5.2 MATERIAL

The material for each part shall be as specified herein, or equivalent. Substitute material shall meet the performance requirements of this specification.

- 5.2.1 Hermaphroditic Terminal. The base material shall be copper alloy strip.
- 5.2.2 Hold-Down. The base material shall be full brass strip.
- 5.2.3 Insulator Housing. The insulators shall be molded of 40% mineral filled liquid crystal polymer that is rated 94V-0 or better in accordance with UL-94.
- 5.2.4 Pick-Up Cap The Pick-Up Cap shall be molded of 30% glass fiber filled liquid crystal polymer that is rated 94V-0 or better in accordance with UL-94...

#### 5.3 FINISH

- 5.3.1 The header and receptacle terminals shall be plated in the contact area with 0.38 micrometers min. GXT™ over 2.54 micrometers Nickel. The terminal solder tail shall be plated with 0.10 min. micrometers Au over 1.27 micrometers min. Nickel. The terminal areas outside of the contact area and solder tail areas shall be plated with 1.27 min. micrometers Nickel.
- 5.3.2 The hold-down shall be plated with 2.5 min micrometers min. Sn over 1.3 micrometers min. Nickel.

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#### 5.4 DESIGN AND CONSTRUCTION

The connector shall be a multi-piece assembly having two rows of contacts with surface mount solder tail terminations and solderable surface mount retention devices for installation on surface mount printed wiring boards or flexible circuits.

- 5.4.1 Mating. The connector shall be capable of mating and unmating manually without the use of special tools.
- 5.4.2 Visual Examination of Product – Under 10x magnification, connectors shall be uniform in quality and shall be free from burrs, scratches, cracks, voids, chips, blisters, pin holes, sharp edges, and other defects that will adversely affect life or serviceability. Open knit lines, which may appear as a crack, may be present in the housing as long as they do not adversely affect the performance of the connector as per the requirements outlined in this specification.

#### 6.0 ELECTRICAL CHARACTERISTICS

##### 6.1 CURRENT RATING

The maximum current rating based upon a 30 degree C temperature rise over ambient is 0.5 amps DC per contact for a 40 position connector with all contacts carrying current. The maximum current carrying capacity for an individual contact is 0.5 amps DC measured in accordance with EIA-364-70. See Figure 5.0 for thermocouple location

##### 6.2 LOW LEVEL CONTACT RESISTANCE


The low level contact resistance of the 4mm, 4.5mm, 5mm, 5.5mm, 6.0mm, 6.5mm and 7.0mm mated height connectors shall not exceed a delta of 10 milliohms max. after environmental exposure when measured in accordance with EIA-364 TP23. The following details shall apply:

- A. Test Voltage: 20 millivolts DC max. open circuit
- B. Test Current: Not to exceed 100 milliamperes.

##### 6.3 INSULATION RESISTANCE

The insulation resistance of the mated connectors shall not be less than 500 megaohms after environmental exposure when measured in accordance with EIA-364-21. The following details shall apply:

- A. Test voltage: 150 volts DC
- B. Preparation: The connectors shall be mated but not soldered to a P.C. board.
- C. Measurement points: The insulation resistance shall be measured between a minimum of 5 adjacent contacts per connector as per Figure 1.0.

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#### 6.4 DIELECTRIC WITHSTANDING VOLTAGE

There shall be no evidence of arc-over, insulation breakdown or leakage current in excess of 1 milliamperes when the unmated connector is tested in accordance with EIA-364-20. The following details shall apply:

- A. Test voltage: 500 volts rms at 60 hz.
- B. Test duration: 60 seconds
- C. Preparation: The connectors shall be mated but not soldered to a P.C. board.
- D. Measurement points: The dielectric withstanding voltage shall be applied across a minimum of 5 pair of adjacent contacts. See Figure 1.0

#### 6.5 CAPACITANCE

The capacitance between adjacent and opposing contacts in a mated connector shall not exceed 2.0 picofarads when tested in accordance with Du Pont specification BUS-03-114. The following details shall apply:

- A. Test frequency: 100 khz
- B. Preparation: The connectors shall be mated but not soldered to a P.C. board.
- C. Measurement points: The capacitance shall be measured across a minimum of 5 pair of adjacent contacts. See Figure 1.0

### 7.0 MECHANICAL CHARACTERISTICS

#### 7.1 CONTACT RETENTION


Individual contacts in the un-terminated portions of the connector shall withstand a load normal to the solder tail of 50gms min. The force shall be measured on a minimum of 5 contacts per row of an unmated connector. The crosshead speed shall be no greater than 0.2 inches per minute.

#### 7.2 MATING FORCE

The force to mate the connectors that are mounted on a P.C. board shall not exceed 68gms per mated pair of contacts. The crosshead speed shall be no greater than 1.0 inches per minute.

#### 7.3 UNMATING FORCE

The force to un-mate the connectors that are mounted on a P.C. board shall be no less than 30gms per mated pair of contacts. The crosshead speed shall be no greater than 1.0 inch per minute.

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#### 7.4 NORMAL FORCE

The contact normal force shall not be less than 25 grams (500gms per 20 position connector row) when tested in accordance with BUS-03-404 Section 3.2 (probe method). Refer to Figure 2.0. The following process shall be used:

- 7.4.1 Solder the connectors to LLCR boards.
- 7.4.2 Placed PCB assemblies vertically onto Instron cell.
- 7.4.3 Using tool 10106812, measure normal force as per instructions in Figure 2.0.

#### 7.5 BOARD RETENTION

The force to remove the connector (2x20 positions) from a P.C. board shall be no less than 10 lbs. when both the hold-downs and the terminal leads are soldered in place. The force to remove the connector (2x20 positions) from a P.C. board shall be no less than 6lbs. when only the terminal leads are soldered in place. The force required will be measured in 3 axis. Pull direction will be perpendicular to the board, side push direction will be parallel to the board and along the length of the connector and end push will be parallel to the board and across the width of the connector. The bar for the side and end push will cover the entire connector and positioned as close to the board as possible while pushing. The crosshead speed shall be no greater than 0.2 inches per minute.

### 8.0 ENVIRONMENTAL CONDITIONS

After exposure to the following environmental conditions in accordance with the specified test procedures and/or details, the product shall show no physical damage and shall meet the electrical and mechanical requirements per paragraphs 6.0 and 7.0 as specified in the Table 1.0 test sequences. Unless specified otherwise, the assemblies shall be mated during exposure.

#### 8.1 HUMIDITY, STEADY STATE – EIA-364-31, METHOD II


- A. Relative humidity: 90%-95%
- B. Temperature: 40 +/- 2 Deg. C
- C. Test Duration: 96 hours
- D. Samples: Groups 1 and 2 - unmated during exposure.

#### 8.2 THERMAL SHOCK – EIA-364-32

- A. Test condition: A - (25, 1 hour cycles).
- B. Temperature range: -55 +/- 5 to +125 +/- 5 Deg. C.
- C. Time at each temperature: 30 minutes
- D. Transfer time: 5 minutes max.

#### 8.3 TEMPERATURE LIFE – EIA-364-17

- A. Test Duration - 21 days
- B. Temperature - 125 deg. C.

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#### 8.4 SHOCK – EIA-364-27

- A. Condition - A, (50G, 11 ms half-sine) contacts shall show no evidence of discontinuity greater than one microsecond. The following details shall apply:
- B. Shocks: 3 shocks in both directions along each of 3 orthogonal axes (18 total).
- C. Mounting: See Figure 3.0.
- D. No discontinuities greater than 1.0 microseconds.

#### 8.5 VIBRATION – EIA-364-28


- A. Condition: II
- B. Vibration Amplitude: +/-10G or .06" da.
- C. Frequency range: 10 to 500 hz.
- D. Sweep time and duration: 15 minutes per sweep, 2 hours along each of 3 orthogonal axes (9 hours total).
- E. Mounting: See Figure 3.0.

#### 8.6 INDUSTRIAL MIXED FLOWING GAS - BATTELLE PROCEDURE-EIA 364-65

- A. Class: IIa
- B. Duration: 10 days unmated followed by 10 days mated, one connector exposed.

#### 8.7 SOLDERABILITY – IPC/ECA J-STD-002

- A. Contact tails shall be solderable over a minimum of .035 from the tip.
- B. Steam aging: Suspended 2 inches above boiling, distilled water for 4 hours.
- C. Acceptable coverage: 95% minimum.
- D. Flux: Type RMA.
- F. Flux immersion time: 10 seconds.
- G. Solder dwell time: Terminal held immediately above solder for 10 seconds and then immersed for 5 +/- 0.5 seconds. The solder tails shall be bent normal to the base of the connector to prevent the insulator from touching the solder bath.
- H. Solder temperature: 245 +/- 5 deg. C.
- I. Samples: Group 7 - unsoldered and unmated.

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## 8.8 RESISTANCE TO SOLDERING HEAT

- A. Expose connector to soldering profile.
- B. Duration: 90-120 seconds at 150-180°C, 60 seconds max at 200-250°C
- C. No deformation of housing or looseness of contacts.

## 8.9 DURABILITY - STANDARD LABORATORY PROCEDURES

- A. Number of cycles: 50 cycles for 0.38µm GXT Contact Finish
- B. Crosshead speed: 1 inch/minute max.

## 9.0 CORROSION SALT MIST-EIA-364-36

- A. Connector exposed to 5% salt water spray
- B. Duration: 48 hours
- C. No heavy corrosion

## 9.0 QUALITY ASSURANCE PROVISIONS

### 9.1 EQUIPMENT CALIBRATION

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with MIL-C-45662 and ISO 9000.

### 9.2 INSPECTION CONDITIONS

Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:

- A. Temperature: 25 +/- 5 deg. C.
- B. Relative humidity: 30 to 60%
- C. Barometric pressure: Local ambient.


### 9.3 SAMPLE QUANTITIES

See Table 2

### 9.4 QUALIFICATION TESTING

Qualification testing shall be performed on sample units produced with equipment and procedures normally used in production. The test sequence shall be as shown in Table 1.




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## 9.5 REQUALIFICATION TESTING


If either of the following conditions occurs, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix, Table 1.

- A. A significant design change is made to the existing product. A significant change shall include, but is not limited to, changes in the contact material composition, contact material thickness, contact force, contact surface geometry, underlying material composition, underlying material thickness, insulator design, contact base material, or contact lubrication requirements.
- B. A significant change is made to the manufacturing process which impacts the product form, fit, or function.
- C. A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

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**Table 1: Qualification Test Matrix**

TEST GROUP ID ►		1	2	3a	3b		4	5	5	5	6
TEST DESCRIPTION	SECT.	Mixed Flowing Gas	Temp Life	Thermal Shock & Humidity	Thermal Shock & Humidity		Vibration & Mech. Shock	Mech. & Plating	Mech. & Plating	Mech. & Plating	Current Rating
VISUAL EXAMINATION OF PRODUCT	5.4.2	1, 12	1, 6	1, 8	1, 7		1, 10	1	1	1, 4	1, 3
PLATING THICKNESS/ADHESION	4.5.5								2		
POROSITY	4.5.4							3			
<b>ELECTRICAL:</b>											
LLCR	6.2	3, 6, 8, 10	2, 4		2, 4, & 6		3, 6, & 8				
INSULATION RESISTANCE	6.3			2, 6							
DIELECTRIC WITHSTANDING VOLTAGE	6.4			3, 7							
CURRENT RATING	6.1										2
CAPACITANCE	6.5										
<b>MECHANICAL:</b>											
MATING FORCE	7.2	2					2				
UN-MATING FORCE	7.3	4					4				
NORMAL FORCE	7.4		5								
CONTACT RETENTION FORCE	7.1									3	
PCB RETENTION	7.5	11					9				
<b>ENVIRONMENTAL:</b>											
THERMAL SHOCK	8.2			4	3						
STEADY STATE	8.1			5	5						
TEMPERATURE LIFE	8.3		3								
MFG, UNMATED, 10-DAYS	8.6	7									
MFG, MATED, 10-DAYS	8.6	9									
VIBRATION	8.5						7				
MECHANICAL SHOCK	8.4						5				
DURABILITY, 50 CYCLES	8.9	5						2			
SOLDERABILITY	8.7									2	

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**Table 2: Qualification Sample Requirements**


TEST GROUP ID▶	1	2	3a	3b	4	5	6
SAMPLE DESCRIPTION	Mixed Flowing Gas	Temp Life	Thermal Shock & Humidity	Thermal Shock & Humidity	Vibration & Mech. Shock	Mechanical & Plating	Current Rating
CONNECTOR SETS	3	4	3	3	6	3	3
PCB RETENTION TEST BOARDS SETS							
LLCR TEST BOARD SETS	3	4		3	3		
CONTINUITY TEST BOARD SETS			3		3		3
-							
-							
-							

40 position Continuity Test Board Set - 10106807-001/10106808-001

40 position LLCR Test Board Set – 10106809-001/10106810-001

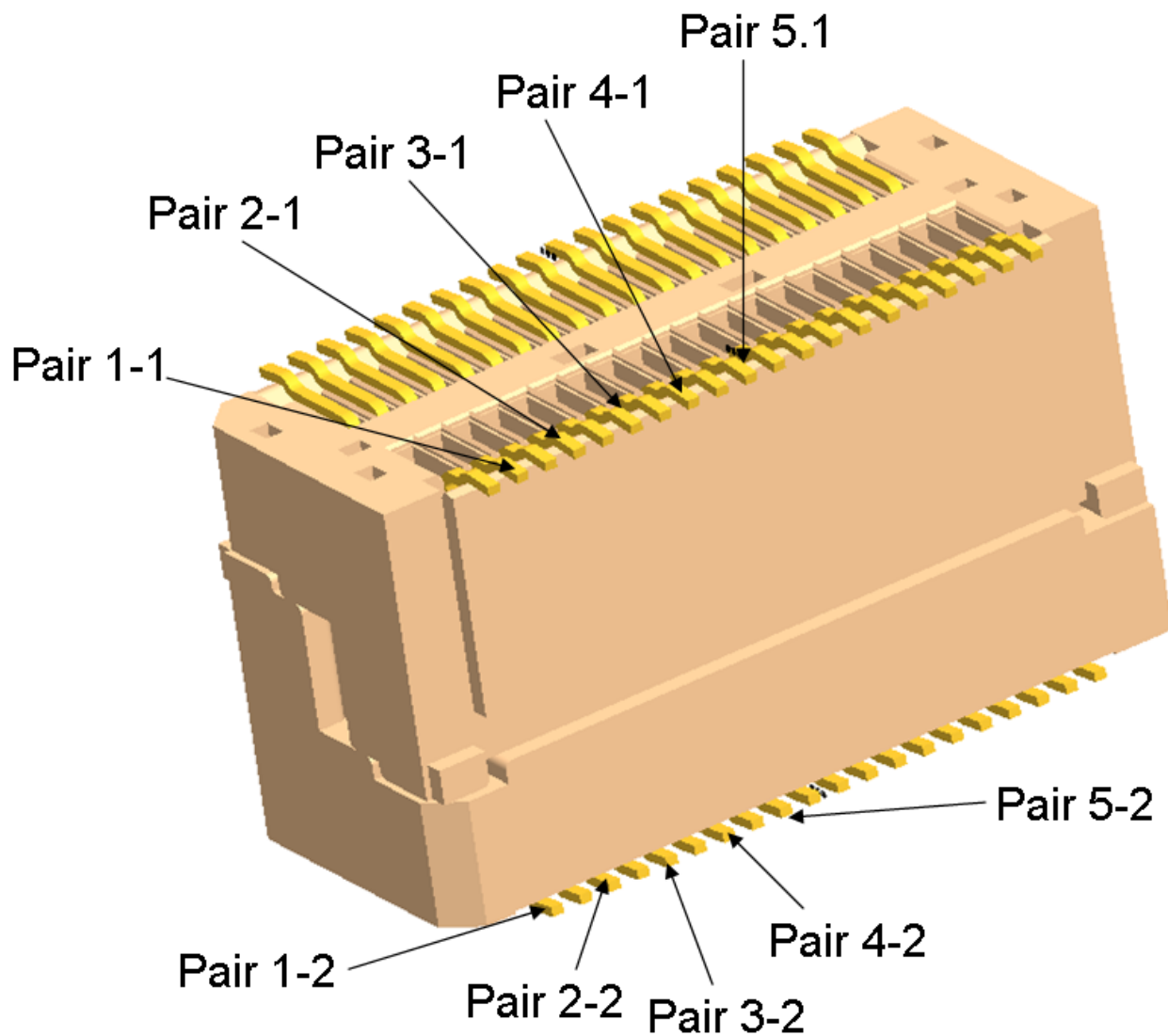
70 position Continuity Test Board Set - 10088782-001/10088783-001


70 position LLCR Test Board Set – 10088784-001/10088785-001

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**FIGURE 1.0**

Housings shown in tan for feature clarity, actual housing color is black

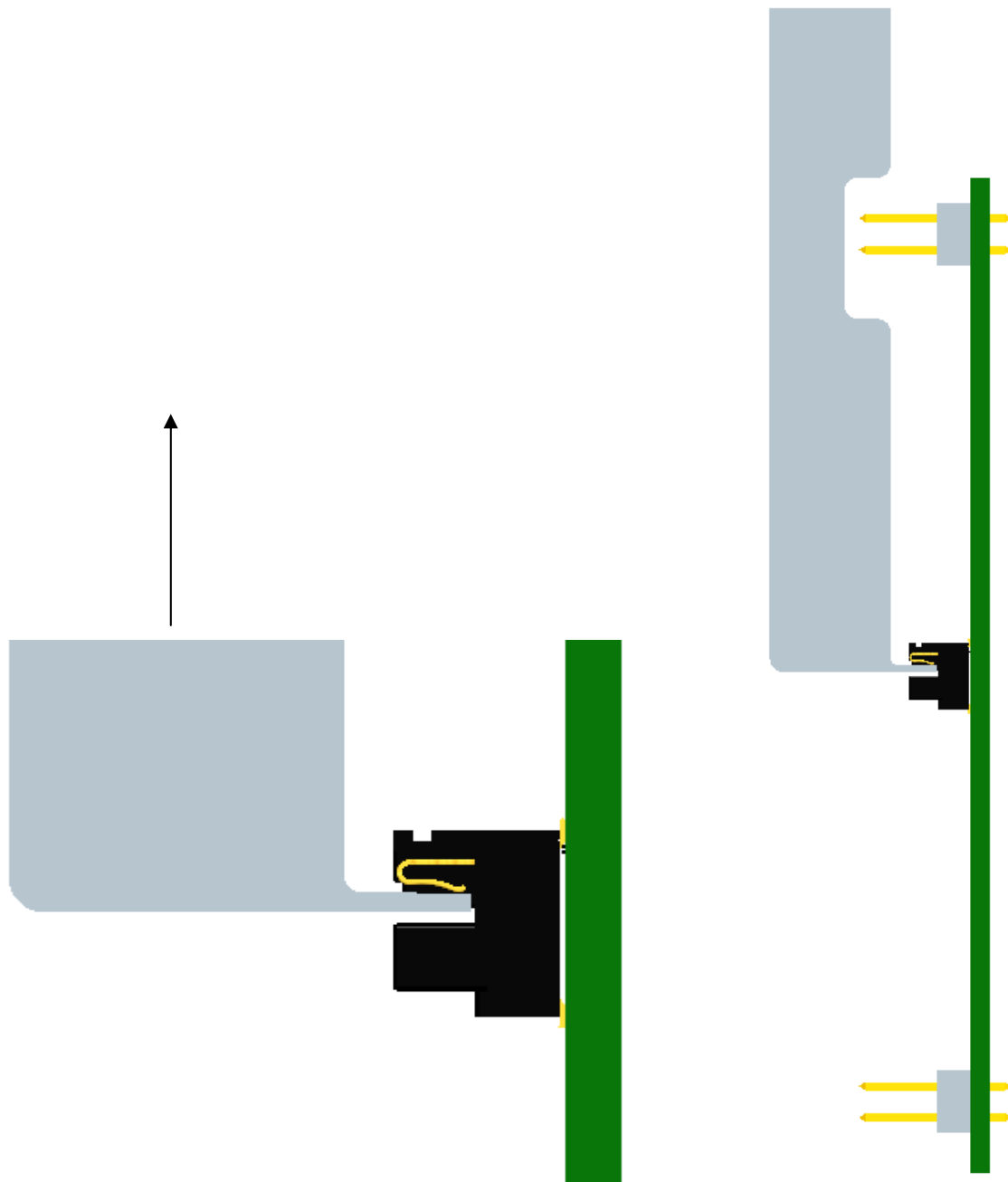



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**Figure 2.0**

Normal Force Testing Procedure on LLCR boards

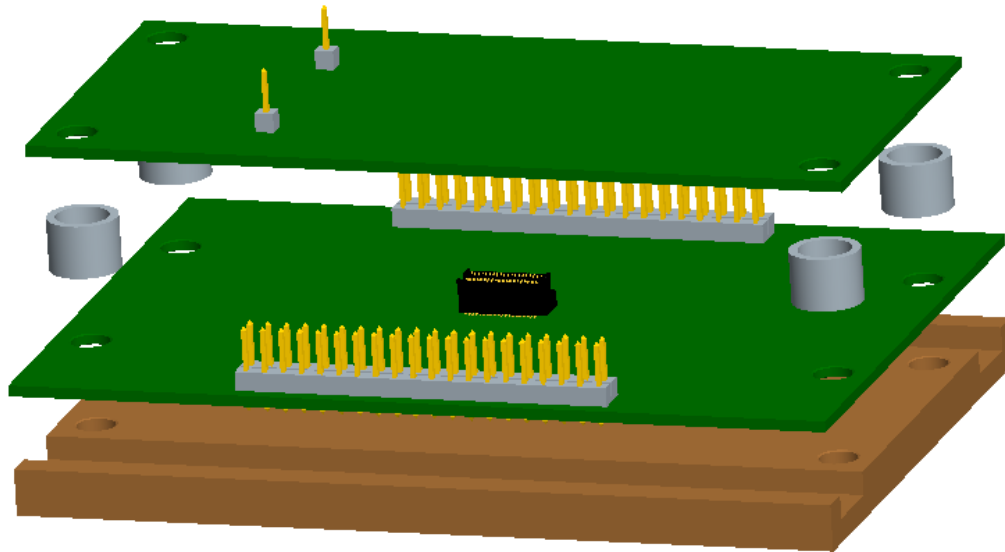
Move normal force tool (gray), P.N.10106812-001, up until engagement with contacts is sensed by Instron, then move tool upwards 0.30mm engagement point and record force.



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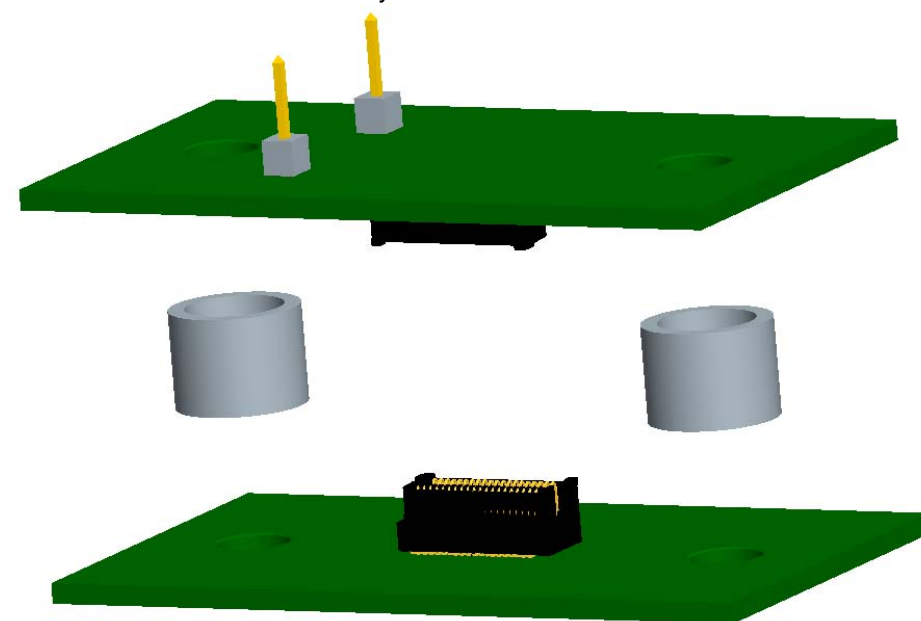
**FIGURE 3.0**


LLCR Shock and Vibe Fixture



**FIGURE 4.0**

Continuity Shock and Vibe Fixture

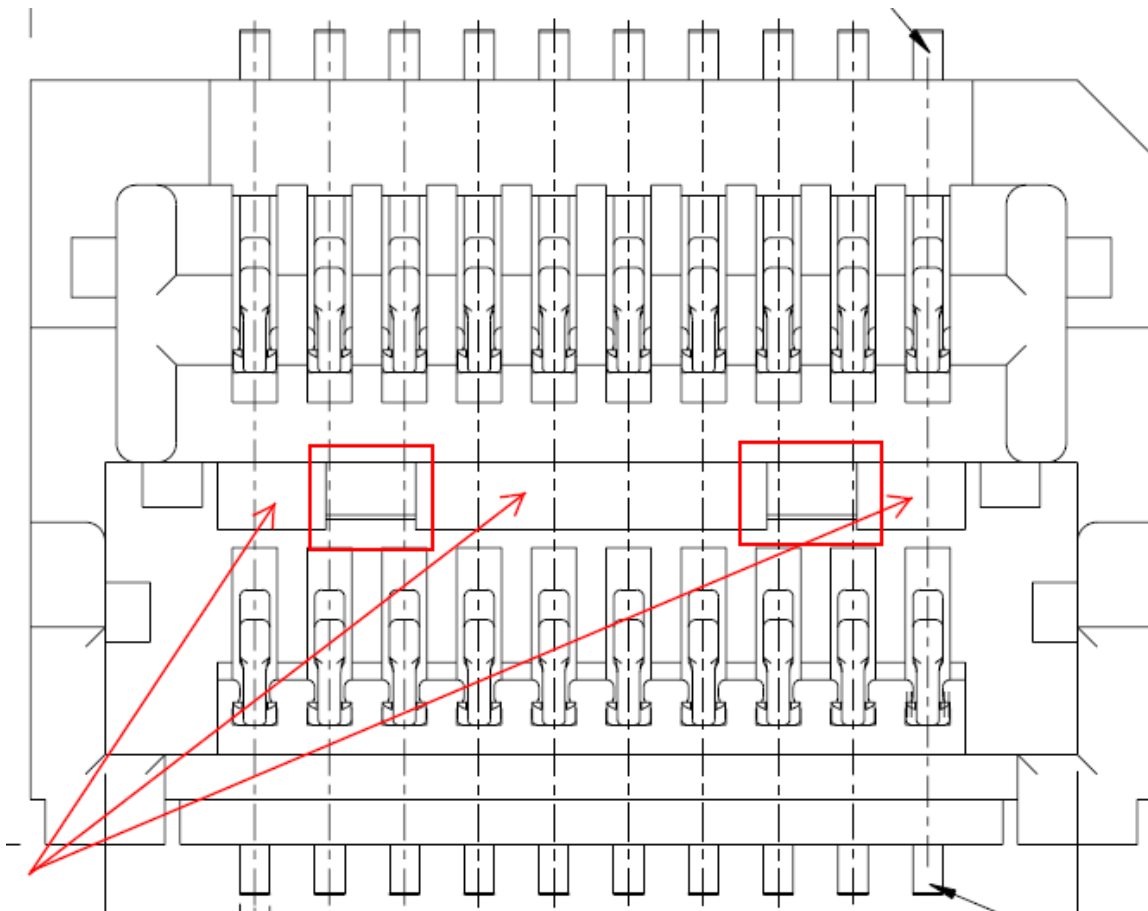



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**FIGURE 5.0**

Thermocouple location

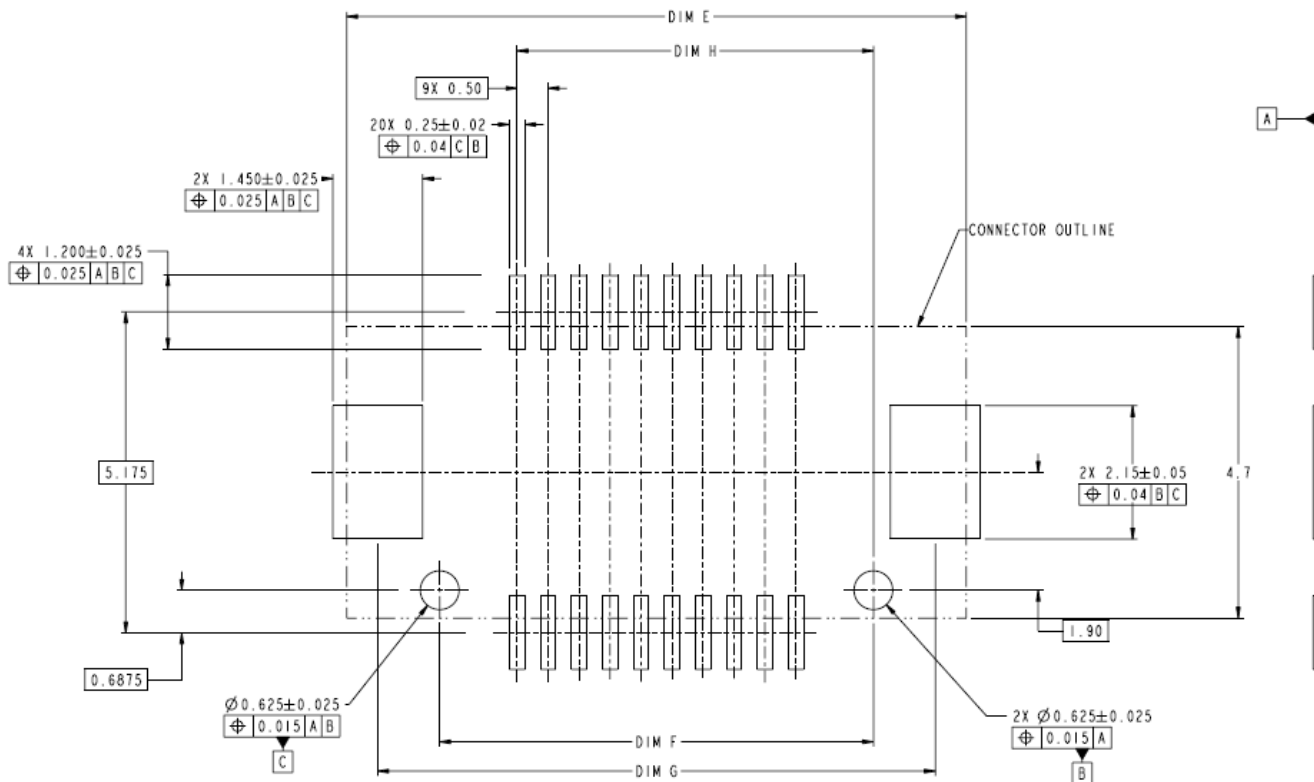
Drill down thru the connector and continuity board in one of the areas defined below by the red rectangle and then insert the thermocouple up thru the board to the surface defined by the 3 red arrows



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**Figure 6.0**

NUMBER OF POSTIONS	DIM E	DIM F	DIM G	DIM H
10	7.50	4.50	6.50	4.50
20	10.00	7.00	9.00	5.75
30	12.50	9.50	11.50	7.00
40	15.00	12.00	14.00	8.25
50	17.50	14.50	16.50	9.50
60	20.00	17.00	19.00	10.75
70	22.50	19.50	21.50	12.00



**RECOMMENDED CONNECTOR PCB LAYOUT  
SEE TABLE FOR CONNECTOR LAYOUT DIMENSIONS**



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**REVISION RECORD**

REV	PAGE	DESCRIPTION	EC #	DATE
A	ALL	Released	V10-0244	5/26/2010
B	ALL	Section 6.1, 0.5 amps was 0.3 amps Section 6.1, 40 position was 70 position	V10-0254	6/8/2010

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<a href="#"><u>10106813-041112LF</u></a>	<a href="#"><u>10106813-044112LF</u></a>	<a href="#"><u>10106813-051112LF</u></a>	<a href="#"><u>10106813-054112LF</u></a>	<a href="#"><u>10106813-064112LF</u></a>
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<a href="#"><u>10106814-064002LF</u></a>	<a href="#"><u>10106814-071002LF</u></a>	<a href="#"><u>10106814-074002LF</u></a>	<a href="#"><u>10106814-031002LF</u></a>	<a href="#"><u>10106814-021002LF</u></a>
<a href="#"><u>10106814-051002LF</u></a>	<a href="#"><u>10106814-034002LF</u></a>	<a href="#"><u>10106814-041002LF</u></a>	<a href="#"><u>10106814-044002LF</u></a>	<a href="#"><u>10106813-023112LF</u></a>
<a href="#"><u>10106813-033112LF</u></a>	<a href="#"><u>10106813-043112LF</u></a>	<a href="#"><u>10106813-053112LF</u></a>	<a href="#"><u>10106813-063112LF</u></a>	<a href="#"><u>10106813-073112LF</u></a>
<a href="#"><u>10106814-023002LF</u></a>	<a href="#"><u>10106814-033002LF</u></a>	<a href="#"><u>10106814-043002LF</u></a>	<a href="#"><u>10106814-053002LF</u></a>	<a href="#"><u>10106814-063002LF</u></a>
<a href="#"><u>10106814-073002LF</u></a>	<a href="#"><u>10106814-083002LF</u></a>	<a href="#"><u>10106814-083202LF</u></a>	<a href="#"><u>10106814-093202LF</u></a>	<a href="#"><u>10106814-093002LF</u></a>
<a href="#"><u>10106813-174112LF</u></a>				