


NUMBER GS-12-1079	TYPE PRODUCT SPECIFICATION		
TITLE RotaConnect™		PAGE 1 of 9	REVISION B
		AUTHORIZED BY Mathew Jacob	DATE 08 Nov 2013
CLASSIFICATION UNRESTRICTED			

1.0 Objective

This specification defines the performance, test, quality and reliability requirements of the Rotatable Board to Board connector (RotaConnect™).

2.0 Scope

This specification is applicable to the termination characteristics of the RotaConnect™ family of products which provides perpendicular, co-planar, or angled interconnect solutions. The hermaphroditic board-to-board connector, which mates to itself, can also be placed anywhere on the PCB, further expanding design options.

Featuring a 3mm pitch, these high powered board to board connectors are available in positions ranging from 2 up to 14 (in increments of two).

Applications include control boards, sensors, actuators, rigid LED strips and automotive electronics.

3.0 Ratings

3.1 Operating Voltage Rating = 125V AC

3.2 Operating Current Rating = 5 Amperes/contact (6 -7 Amperes Maximum)

3.3 Operating Temperature Range = -40°C to 125 °C

4.0 Applicable Documents

4.1 FCI Engineering drawings: 10120045-200C, 10120045-400C

4.2 EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications.

4.3 GS-20-0379: Application Specification.

4.4 EL-2013-06-023A: Qualification Test Report

5.0 Requirements


5.1 Qualification

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

5.2 Materials

Plug/Receptacle Terminal & Bracket: Copper alloy

Housing: High temperature thermoplastic

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5.3 Finish

Contact plating: Au + PdNi over Ni for active zone, Sn (matte) over Ni for terminal zone.

Bracket plating: Sn (matte) over Ni

5.4 Design and Construction

Connectors shall be of the design, construction, and physical dimensions specified on the applicable product drawing. There shall be no cracks, burrs, or other physical defects that may impair performance.

A Rotatable board to board SMT connector that can be used to support perpendicular, coplanar and angled connections, in multiple mating/un-mating directions.

The hermaphroditic ‘mates to itself’ design enables mating at any angle between +90⁰ and -60⁰ which enables connector to be placed anywhere on the PCB.

This design allows the uses of a single part number which will compromise both male and female contacts. The high temperature grade housing material is reflow soldering compatible. The tape and reel packaging permits vacuum pick and place application.

Features and Benefits:

1. Connector mates to itself (hermaphroditic)
2. Reliable dual beam contact.
3. Hold down for PCB retention
4. Pins are protected by housing
5. Floating and rotation possible
6. Supports multiple mating and un-mating directions
7. High temperature material for reflow process
8. RoHS Compliant


6.0 General

6.1 Visual

Visual examinations shall be performed with a magnification up to 10X (8 to 10X recommended). Parts should be free from blistering, cracks, discoloration, etc.

6.2 Banned/Restricted Substances

All products where the part number ends in ‘LF’ meet the European Union directives and other country regulations as described in GS-22-008. The part numbers that do not end in ‘LF’ meet all regulations except for Pb in SnPb plating.

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7.0 Electrical Characteristics

7.1 Low Level Contact Resistance (LLCR)

The LLCR shall not exceed 18 milliohms initially. The LLCR shall also not exceed 5 milliohms increase in resistance (from the initial measurement) after any treatment and/or environmental exposure. Measurements shall be in accordance with EIA-364-23.

The following details shall apply:

- a. Method of Connection - Attach current and voltage leads as shown in Figure 3
- b. Test Voltage - 20 milli-volts DC max open circuit.
- c. Test Current - Not to exceed 100 milli-amperes.

7.2 Insulation Resistance

The insulation resistance of unmated connectors shall not be less than 1 mega ohms after environmental exposure when measured in accordance with EIA-364-21.

The following details shall apply:

- a. Test Voltage - 500 volts DC.
- b. Electrification Time - 2 minutes, unless otherwise specified.
- c. Points of Measurement - Between adjacent contacts of unmated specimens

7.3 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown, when unmated connectors are tested in accordance with EIA-364-20, Condition 1.

The following details shall apply:


- a. Test Voltage - 1500 volts AC at sea level
- b. Test Duration - 60 seconds.
- c. Test Condition - 1 atm
- d. Points of Measurement - Between adjacent contacts of unmated specimens

7.4 Current Rating

The temperature rise above ambient shall not exceed 30 deg C at any point in the system when single contact is powered with 5 amperes.

The following details shall apply:

- a. Ambient Conditions – Still air at 25 °C
- b. Reference - EIA-364-70, Method 1

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8.0 Mechanical Characteristics

8.1 Mating/Unmating Force

The force necessary to mate and unmate specimens is as shown in the below table.

The following details shall apply:

- a. Cross Head Speed – 25.4 mm per minute.
- b. Lubrication - none.
- c. Utilize free floating fixtures.
- d. Reference – EIA-364-13

Position	Mating Force (N) maximum	Unmating force (N) minimum
2	10	2.5
4	20	5

8.2 Durability

The connector pairs shall be capable of withstanding ≥ 10 mating/unmating cycles at a maximum rate of 25.4 mm per minute. Reference EIA-364-09.

8.3 Resistance to reflow soldering heat

The housing will withstand exposure to 260⁰C peak temperature for 10 seconds in convection, infrared or vapor phase reflow oven. Housing shall be free of deformation and fusion.

9.0 Environmental Conditions


After exposure to the following environmental conditions in accordance with the specified test procedure 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 test sequences. Unless specified otherwise, assemblies shall be mated during exposure.

9.1 Thermal Shock – EIA 364-32, Test Condition VIII, No damage to parts

- a. Number of Cycles - 25
- b. Temperature Range - Between -40 and 105 °C
- c. Time at Each Temperature – 30 minutes
- d. Transfer Time - 5 minutes maximum

9.2 Humidity/Temperature cycling – EIA-364-31 Method III (cyclic temperature)

Samples are to be subjected to 10 cycles of 10 hour duration for a total of 100 hours. No damage to parts. A cycle consists of the following steps:

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- a. 2 hour ramp from 25°C at 80%-98% RH to 65°C at 90%-98% RH
- b. 4 hour dwell at 65°C at 90%-98% RH
- c. 2 hour ramp down to 25°C at 80%-98% RH
- d. 2 hour dwell at 25°C at 80%-98% RH

9.3 High Temperature Life – EIA-364-17, Method A, Test Condition 5.

The Specimen shall remain fully assembled and mated without any electrical load. No damage to parts. The following details shall apply:

- a. Test Temperature - 125±2°C
- b. Test Duration - 500 hours

9.4 Vibration (Random) – EIA 364-28, Test Condition VII, Condition letter D.

- a. Vibration Amplitude – 3.10 rms G minimum
- b. Frequency range : 20 to 500 Hz
- b. Duration – 15 minutes along each of three orthogonal axes
- d. Mounting - Rigidly mount assemblies.
- e. No discontinuities greater than 1 micro second.

9.5 Mechanical Shock – EIA 364-27, Condition H.

- a. Condition - Half-Sine 30G, 11 milli-second duration
- b. Shocks - 3 shocks in both directions along each of three orthogonal axes.
- c. Mounting - Rigidly mount assemblies
- d. No discontinuities greater than 1 microsecond.

10.0 QUALITY ASSURANCE PROVISIONS


10.1 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 ISO 9000.

10.2 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

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10.3 Sample Quantity and Description

Specimens shall be prepared in accordance with applicable instruction sheets and shall be selected at random from current production. Each test group shall consist of a minimum of 5 specimens soldered to FR-4 printed circuit boards.

Qualification inspection shall be verified by testing specimens as specified in Table 1.

10.4 Acceptance

Electrical and mechanical requirements placed on test samples as indicated in the sections of this specification shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with this product specification shall meet the stated requirements.

Failures attributed to equipment, test setup, or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.


10.5 Qualification Testing

Qualification testing shall be performed on sample units produced with equipment and procedures normally used in production. The test sequences shall be as shown in the qualification test table.

10.6 Re-Qualification Testing

If any of the following conditions occur, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix.

- a. A significant design change is made to the existing product which impacts the product form, fit or function. Examples of significant changes shall include, but not be limited to, changes in the plating material composition or thickness, contact force, contact surface geometry, 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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10.7 Qualification Test Table

Table 1

Test or Examination	Test Group (a)			
	1	2	3	4
	Test Sequence (b)			
Initial examination of product	1	1	1	1
LLCR	3,7	2,7		
Insulation resistance			2,6	
Withstanding voltage			3,7	
Temperature rise vs current		3,8(c)		
Resistance to reflow soldering heat				2
Random vibration	5	6		
Mechanical shock	6			
Durability	4			
Mating force	2(d)			
Unmating force	8(e)			
Thermal shock			4	
Humidity/temperature cycling		4(f)	5(g)	
Temperature life		5		
Final examination of product	9	9	8	3

- a. See section 10.3.
- b. Numbers indicate sequence in which tests are performed.
- c. Five specimens shall be used for initial temperature rise, while the other 5 specimens will run through the entire test sequence.
- d. Mate 5 specimens.
- e. Unmate 5 specimens
- f. Mated specimens.
- g. Unmated specimens


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Figure 1- Mated Test Sample

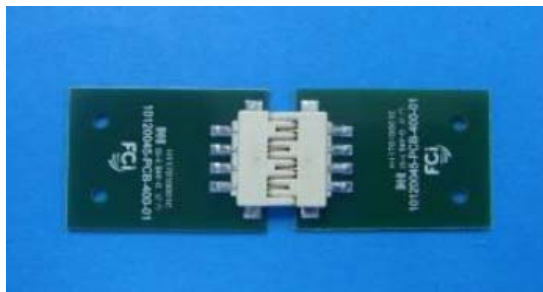


Figure 2- Current Rating Test

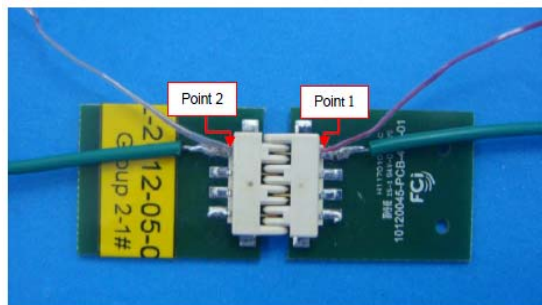
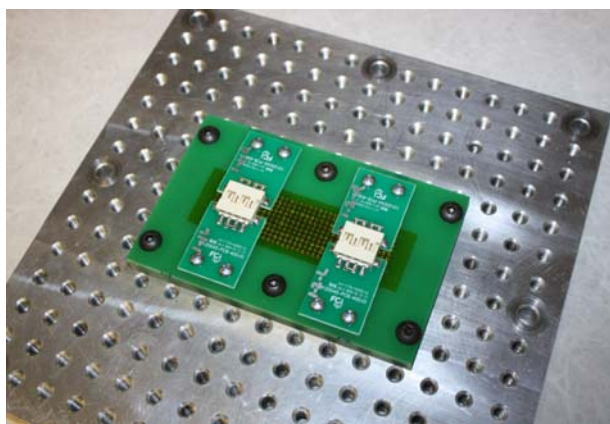



Figure 3- Vibration fixture



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REVISION RECORD

Rev	Page	Description	EC#	Date
A	All	NEW DOCUMENT	N/A	08/11/2013
B	1	CURRENT RATING UPDATED BASED ON TEST RESULT	ELX-I-16283	14/11/2013