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| NUMBER<br><b>BUS-12-114</b>                 | TYPE<br><b>PRODUCT SPECIFICATION</b> | NUMBER<br> |                   |
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|                                             |                                      | AUTHORIZATION<br>ZK HU                                                                        | DATE<br>17 May 13 |
|                                             |                                      | CLASSIFICATION<br><b>UNRESTRICTED</b>                                                         |                   |

## 1.0 OBJECTIVE

This specification defines the performance, test, quality, and reliability requirements of Duplex Plated Bergstik® II Headers.

## 2.0 SCOPE

This specification is applicable to the termination characteristics of the Duplex Plated Bergstik® II Headers. When mated with FCI's Mini PV™ terminals or other 0.025" pin compatible receptacles on 0.100" centerlines, this product provides board to board, board to cable, board to discrete wire and board to flex interconnect capabilities in vertical one, two or three row configurations and right angle one and two row configurations. This product is Lead Free and meets the requirement of the European Union Directive of Restrictions for Hazardous Substances (Directive 2002/95/EC)

## 3.0 GENERAL

This document is composed of the following sections:

| <u>Paragraph</u> | <u>Title</u>                    |
|------------------|---------------------------------|
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| 2.0              | Scope                           |
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| 5.0              | Requirements                    |
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| 5.3              | Finish                          |
| 5.4              | Design and Construction         |
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| 8.0              | Environmental Conditions        |
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| 9.3              | Sample Quantity and Description |
| 9.4              | Acceptance                      |
| 9.5              | Qualification Testing           |
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| CHART I          | IR Reflow Profile               |
| TABLE I          | Qualification Testing Matrix    |

|                                             |                                      |                                                                                               |                   |
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#### 4.0 APPLICABLE DOCUMENTS

##### 4.1 Specifications

- 4.1.1 Engineering drawings
- 4.1.2 Process drawings

##### 4.2 Military Standards

- 4.2.1 MIL-STD-202: Test methods for electronic and electrical component parts.
- 4.2.2 MIL-STD-1344: Test methods for electrical connectors
- 4.2.3 MIL-G-45204: Gold Plating, Electrodeposited
- 4.2.4 MIL-P-45209: Palladium Plating, Electrodeposited
- 4.2.5 MIL-P-81728: Plating, Tin-Lead, Electrodeposited

##### 4.3 Federal Specifications

- 4.3.1 QQ-N-290 Nickel Plating (Electrodeposited)

##### 4.4 Other Standards/Specifications

- 4.4.1 UL-94-V0: Flammability
- 4.4.2 ASTM B-159: Phosphor Bronze Wire
- 4.4.3 ANSI/ASQC M-1: American National Standard for Calibration Systems
- 4.4.4 FCI BUS-19-002: Solderability of Plated Materials or Contacts

##### 4.5 FCI Lab Reports - Supporting Data

- 4.5.1 EL-95-04-047

#### 5.0 REQUIREMENTS

##### 5.1 Qualification

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

##### 5.2 Material

The material for each component shall be as specified herein or equivalent.

5.2.1 Pins: Pins shall be Phosphor Bronze Alloy UNS C51000 drawn wire in accordance with ASTM B-159.

5.2.2 Insulator: High temperature resin with a flame retardant rating of UL-94-V0.

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### 5.3 Finish

The finish of the pins shall be as specified herein for the options as listed in the product drawings under consideration.

5.3.1 Solder tails: 100 u" minimum thickness of 60/40 tin lead per MIL-P-81728 over 50 u" nickel per QQ-N-290, Class 2. Or 100-150µ" thickness pure tin for Lead Free option over 50µ" nickel

5.3.2 Contact Area: As defined by product drawings, will be plated with the specified thickness of gold per MIL-G-45204, Type II over 50 u" of nickel per QQ-N-290, Class 2.

5.3.3 All other areas will be plated with 50 u" of nickel per QQ-N-290, Class 2.

### 5.4 Design and Construction

Connectors shall be of the design, construction and physical dimensions specified on the applicable product drawings.

## 6.0 ELECTRICAL CHARACTERISTICS

6.1 Insulation Resistance - The insulation resistance of the unmated connector shall not be less than 5,000 megohms when measured in accordance with MIL-STD-202, Method 302. The following details shall apply:

- a. Test Voltage: 500 V DC.
- b. Electrification Time: Two minutes.
- c. Points of Measurement: Between adjacent pins.

6.2 Dielectric Withstanding Voltage - There shall be no evidence of arc-over, insulation breakdown or excessive leakage current ( > 1 milliampere) when the unmated connector is tested in accordance with MIL-STD-1344, Method 3001.1. The following details shall apply:

- a. Test Voltage: 1500 Volts ( DC, RMS or AC, 60 Hz).
- b. Test Duration: 60 seconds.
- c. Test Condition: 1 (760 Torr - sea level).
- d. Points of Measurement: Between adjacent pins.

6.3 Current rating: 3 amps.

6.4 Operating temperature range: -65 deg. To +130 deg.

|                                             |                                       |                                                                                               |
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## 7.0 MECHANICAL CHARACTERISTICS

- 7.1 Pin Retention - Individual pins shall withstand an axial load of 2.0 pounds minimum applied at a rate of 0.2 inches/minute without dislodging from the insulator prior to soldering or heat exposure. Reference MIL-STD-1344A, Method 2007.1.

## 8.0 ENVIRONMENTAL CONDITIONS

After exposure to the following environmental conditions in accordance with the specified test procedure and details, the product shall show no physical damage and shall meet the electrical requirements per paragraph 6.0 as specified in the Table I test sequences. Connectors shall be unmated during exposure.

- 8.1 Thermal Shock - MIL-STD-202, Method 107G.

- Test Condition: A ( 25, 1 hour cycles ).
- Temperature Range: -55 to +105 deg. Celsius. – Nylon  
-65 to +130 deg. Celsius. – PCT, PPS&LCP
- Time at Each Temperature: 30 minutes.
- Transfer Time - 5 minutes, maximum.

- 8.2 Humidity, Steady State - MIL-STD-202, Method 103B.

- Temperature: +40 deg. Celsius.
- Relative Humidity: 95%.
- Test Condition: B (96 hours).

- 8.3 High Temperature Life - MIL-STD-202, Method 108A.

- Test Temperature: 105 deg. Celsius. – Nylon , 130 deg. Celsius. –PCT, PPS&LCP
- Test Duration: 315 hours.

- 8.4 Solderability - FCI BUS-19-002 & MIL-STD-202, Method 208F.

- Steam aging - 4 hours.
- Contact areas evaluated shall meet the Method 208 requirements.

- 8.5 Resistance to Solder Heat - MIL-STD-202, Method 210B.

- Test Condition: E
- There shall be no evidence of physical damage.

- 8.6 IR Reflow - Test IR profile per Chart I. There shall be no evidence of physical damage after reflow.

- Peak Temperature: 245 +/- 5 deg. Celsius. Chart 1.
- For lead Free peak temperature 260°C+/- 5°C (Peak Temperature).Duration 10 Seconds.  
Please refer to IPC/JEDEC J-STD-020C

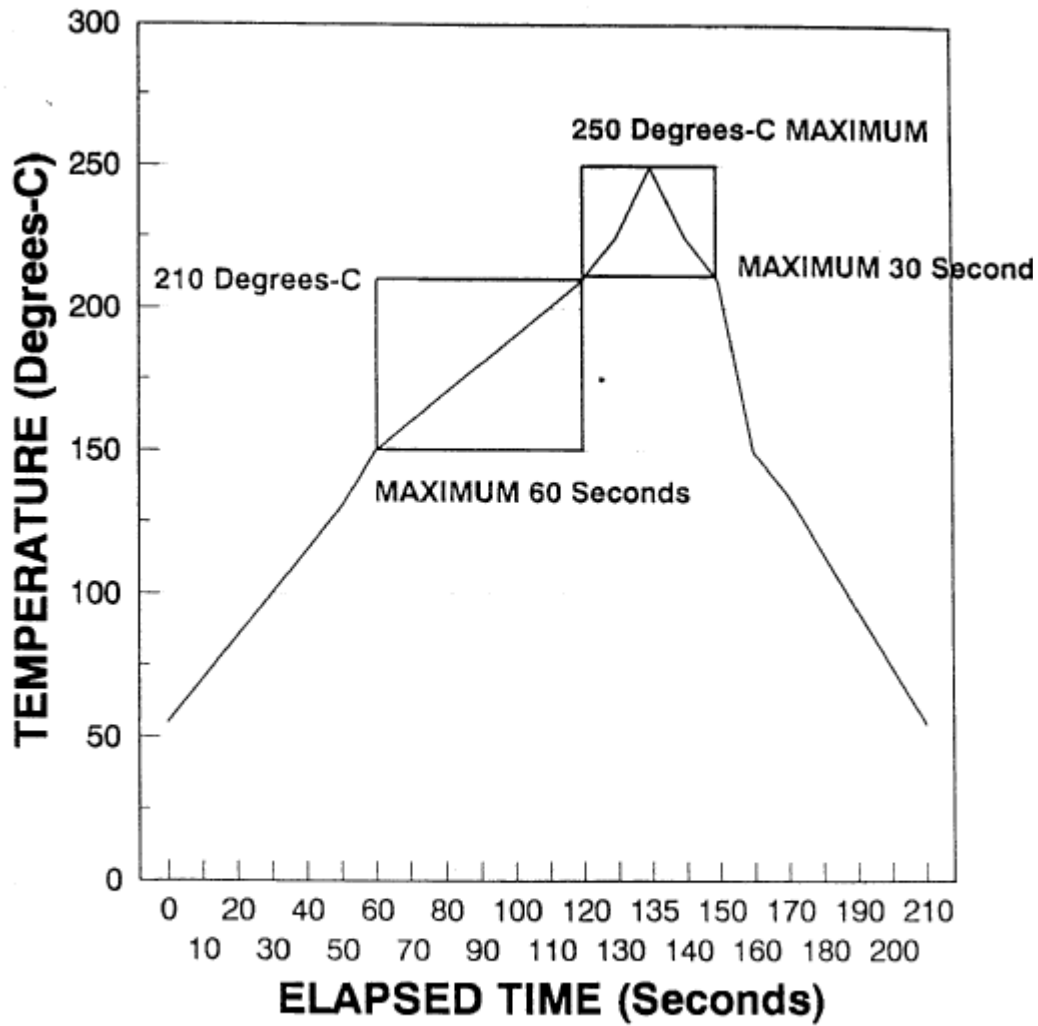
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## 9.0 QUALITY ASSURANCE PROVISIONS

- 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 ISO 9001/9002 and ANSI/ASQC M-1.
- 9.2 Inspection Conditions - Unless otherwise specified herein, all inspections shall be performed under the following ambient conditions:
- a. Temperature: 25 +/- 5 degrees Celsius
  - b. Relative Humidity: 30 to 60%
  - c. Barometric Pressure: Local ambient
- 9.3 Sample Quantity and Description
- 9.3.1 The qualification samples shall consist of nine of the largest size connectors of the particular type being tested.
- 9.4 Acceptance
- 9.4.1 Electrical and mechanical requirements placed on test samples as indicated in paragraphs 6.0 and 7.0 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.
- 9.4.2 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.
- 9.5 Qualification Testing - Qualification testing shall be performed on samples produced with equipment and procedures normally used in production. The test sequence shall be as shown in Table I.
- 9.6 Requalification 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, Table I.
- 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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**CHART I - IR REFLOW PROFILE**



☐ Panel/Convection-type IR Oven  
☐ Thermocouple Attached to PCB

|                                             |                                      |                                                                                               |                   |
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**TABLE I - QUALIFICATION TESTING**

| TEST                   | PARA. | TEST GROUP    |   |   |
|------------------------|-------|---------------|---|---|
|                        |       | 1             | 2 | 3 |
|                        |       | TEST SEQUENCE |   |   |
| NUMBER OF SAMPLES      | 9.3.1 | 3             | 3 | 3 |
| EXAMINATION OF PRODUCT | 5.4   | 1,5,9,13      | 1 | 1 |
| INSULATION RESISTANCE  | 6.1   | 2,6,10,14     |   |   |
| DIELECTRIC WITHSTAND   | 6.2   | 3,7,11,15     |   |   |
| PIN RETENTION          | 7.1   |               |   | 2 |
| THERMAL SHOCK          | 8.1   | 4             |   |   |
| HUMIDITY, STEADY STATE | 8.2   | 8             |   |   |
| HIGH TEMPERATURE LIFE  | 8.3   | 12            |   |   |
| SOLDERABILITY          | 8.4   |               | 2 |   |
| RES. TO SOLDERING HEAT | 8.5   |               |   | 3 |
| IR REFLOW              | 8.6   | 16            |   |   |

|                                             |                                      |                                                                                               |                   |
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**REVISION RECORD**

| <b><u>REV</u></b> | <b><u>PAGE</u></b> | <b><u>DESCRIPTION</u></b>                                                                        | <b><u>EC#</u></b> | <b><u>DATE</u></b> |
|-------------------|--------------------|--------------------------------------------------------------------------------------------------|-------------------|--------------------|
| A                 | All                | Released for Approval                                                                            | V50879            | 7/05/95            |
| B                 | 1, 2, 4, 5         | Updates                                                                                          | V51388            | 11/01/95           |
| C                 | All                | Revised format to be consistent with GS-01-001, and change BERG, Dupont, etc. references to FCI. | V01904            | 08/03/00           |
| D                 | 1 to 4             | Add lead free information                                                                        | M06-0161          | 4/25/06            |
| E                 | 4                  | Add item 8.1, 8.3 condition<br>-65 to +130 deg. Celsius. PCT, PPS & LCP                          | ELX-N-011670      | 05/18/12           |
| F                 | 3                  | Add operating temperature and current rate                                                       | ELX-N-14908       | 05/17/13           |



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