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## 1.0 OBJECTIVE

This specification defines the performance, test, quality and reliability requirement of the Spin Motor Connector.

## 2.0 SCOPE

This specification is applicable to the termination characteristics of the Spin Motor Connector, which provides electrical connection between parallel mounted boards.

## 3.0 GENERAL

This specification covers the compression type, surface mount connector. The specification is composing of the following sections:


| <u>PARAGRAPH</u> | <u>TITLE</u>                     | <u>PAGE</u> |
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| 2.0              | SCOPE                            | 1           |
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## 4.0 APPLICABLE DOCUMENTS

The following document of the issue in effect on the date of the latest revision of this specification shall form a part of this specification to the extent specified herein.

### EIA STANDARD

|            |  |
|------------|--|
| EIA-364-20 | Withstanding Voltage Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts  |
| EIA-364-21 | Insulation Resistance Test Procedure for Electrical Connectors, Sockets and Coaxial Contacts |
| EIA-364-23 | Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets            |
| EIA-364-27 | Mechanical Shock (Specified Pulse) Test Procedure for Electrical Connectors                  |
| EIA-364-28 | Vibration Test Procedure for Electrical Connectors and Sockets                               |
| EIA-364-31 | Humidity Test Procedure for Electrical Connectors and Sockets                                |

|                                       |                                      |   |                     |
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EIA-364-32 Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors and Sockets

EIA-364-70 Temperature Rise versus Current Test Procedure for Electrical Connectors and Sockets

EIA-638 Surface Mount Solderability Test

EIA-364-29B Contact Retention Test Procedure for Electrical Connectors

### **MILITARY STANDARD**

MIL-STD-202F Test Methods for Electronic and Electrical Component Parts

## **5.0 PROCEDURE**

### **5.1 Design and Construction**

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

### **5.2 Materials**

The material for each part shall be as specified herein or equivalent substitute material shall meet the performance requirement of this specification.

#### **5.2.1 Contact**

The contact shall be copper alloy, post plated.

#### **5.2.2 Housing**

All housing material shall be rated flame retardant 94V-0 in accordance with UL-94. The housing shall be glassed filled high temperature thermoplastic or as specified in the product drawing.

### **5.3 Mechanical Characteristics**

#### **5.3.1 Workmanship**


Connector shall be uniform in quality and shall be free from burrs, scratches, cracks, voids, chips, blisters, pinholes, and other defects that will adversely affect life or serviceability.

#### **5.3.2 Contact Normal Force**

The individual contact normal force shall be of the values specified on the applicable product drawing. For method of testing, please refer figure 1b.

#### **5.3.3 Durability after 25 Mating Cycles**

There shall be no damage to the housing or contacts. The connector shall also meet paragraph 5.4.3.

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#### 5.3.4 Solderability Test

The contact leads shall have solder coverage of 95% minimum in accordance with EIA-638 specification.

#### 5.3.5 Contact Retention

Individual contacts shall withstand an axial load as specified in the product drawing, applied at a rate 25.4mm/minute without dislodging from the housing cavity. Refer to EIA-364-29B.

### 5.4 Electrical Characteristics

#### 5.4.1 Current Rating

The maximum current through each mated contact shall be 1.0A D.C, unless otherwise specified. The maximum temperature rises due to the current flowing through all contacts shall not exceed 30°C. Reference to EIA-364-70.

#### 5.4.2 Voltage Rating - 150 V, AC/DC

#### 5.4.3 Low Level Contact Resistance

The low-level contact resistance shall not exceed 30 milliohms (Initial). The change in resistance ( $\Delta R$ ) shall not exceed 20 milliohms.


When being measured in accordance with EIA-364-23, the following details shall apply:

- (a) Method of Connection : Refer to Figure 1a
- (b) Test Current : 100 mA maximum
- (c) Open Circuit Voltage : 20 mV maximum

#### 5.4.4 Dielectric Withstanding Voltage

There shall be no breaking of insulation, flashover or excessive leakage current when the unterminated and the unmated connectors are tested in accordance with EIA-364-20. The following details shall apply:

- (a) Test Potential : 750 volts AC, RMS at 60Hz
- (b) Test Duration : 1 minute
- (c) Special Preparation : The connector shall not be terminated.
- (d) Points of Measurement : Between adjacent contact positions.

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#### 5.4.5 Insulation Resistance

When tested in accordance with EIA-364-21, the insulation resistance shall be a minimum of 1,000 Mohms. The following details shall apply:

- (a) Test Condition : B (500 volts DC)
- (b) Special Preparation : The connector shall not be terminated.
- (c) Points of Measurement : Between adjacent contact positions.

#### 5.4.6 Capacitance

The capacitance between pairs of adjacent or opposing contacts in an unmated connector shall not exceed 5 picofarads when measured in accordance with MIL-STD-202F, Method 305. The following details shall apply:

- (a) Test Frequency : 100 kHz
- (b) Special Preparation : The connector shall not be terminated.

### 5.5 Environmental Conditions


#### 5.5.1 Operating Temperature Range

-55°C to 105°C

#### 5.5.2 Mechanical Shock

There shall be no evidence of physical damage when the connectors are subjected to transient acceleration. During and after each shock, the test shall evidence no discontinuity greater than 1 microsecond. The test shall be in accordance with EIA-364-27. The following details shall apply:

- (a) Test Condition : A (50g peak, 11 ms, half-sine waveform)
- (b) Number of Shocks : 3 shocks in each direction along three mutually perpendicular axes.

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### 5.5.3 Vibration, High Frequency

There shall be no evidence of physical or mechanical damage when the mated connector is subjected to prolonged mechanical vibration. During the vibration along each axis, the contacts shall evidence no discontinuity greater than 1 microsecond. At the completion of the test, the contact resistance shall not exceed 25 milliohms (See paragraph 5.4.3). The test shall be in accordance with EIA-364-28. The following details shall apply:

- (a) Test Condition : III (15g peak, 10 to 2000 Hz)
- (b) Test Duration : 4 hours along each of three mutually perpendicular axes (12 hours total).

### 5.5.4 High Temperature Life

After exposure of the terminated and mated connector to a high temperature-operating environment, the contact resistance shall not exceed 25 milliohms (See paragraph 5.4.3). Test shall be in accordance with MIL-STD-202F, Method 108A. The following details shall apply:

- (a) Test Chamber Temperature : 105°C
- (b) Test Condition (Duration) : B (250 hours)

### 5.5.5 Humidity


Within one hour after exposure of the unmated and unterminated connector to a high humidity environment, the insulation resistance shall not be less than 1,000 Mohms (See paragraph 5.4.5). The contact resistance change of a terminated and mated connector shall not exceed 25 milliohms (See paragraph 5.4.3). The test shall be in accordance with EIA-364-31, Method-III. The following details shall apply:

- (a) Test Condition (Duration) : A (96 hours)
- (b) Relative Humidity : 90% minimum
- (c) Temperature : 50°C

### 5.5.6 Resistance to Soldering Heat

There shall be no evidence of physical damage to the insulator when the unterminated connector is subjected to the high temperature extreme imposed during soldering. The test shall be in accordance with MIL-STD-202, Method 210E. The following details shall apply:

- (a) Test Condition : B (10 seconds @ 260 +/- 5 °C)
- (b) Immersion depth : To within 1.0 +/- 0.38 mm of insulator

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### 5.5.7 Thermal Shock

After exposure of the unmated connector to alternate periods of extreme high and low temperature, there shall be no evidence of cracking or crazing of the insulator housing or other physical damage to the connector. After the test the dielectric withstanding voltage of the connector shall not be less than 500 volts (See paragraph 5.4.4). The contact resistance shall not exceed 25 milliohms (See paragraph 5.4.3). The test shall be in accordance with EIA-364-32. The following details shall apply:

- (a) Test Condition : #1 (25 one-hour cycle)
- (b) Temperature Range : -55°C to 85°C

## 6.0 PRODUCT QUALIFICATION PROVISIONS

### 6.1 Inspection Conditions

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

- (a) Temperature : 25 +/- 5 °C
- (b) Relative Humidity : 30% to 80%
- (c) Barometric Pressure : Local ambient

### 6.2 Qualification Inspection


Qualification inspection shall be performed on sample units produced with equipment normally used in production.

#### 6.2.1 Sample Selection

Connector shall be prepared in accordance with applicable instruction sheets; they shall be selected at random from current production. Test Group 1,2,3,4,5,7,9 and 10 shall consist of five (5) connectors per group. Test group 6, 8 and 11 consist of three (3) connectors. Total of 49 connector assemblies, 15 pieces of mating modules and 15 pieces of test boards are required for testing.

#### 6.2.2 Test Sequence

The sample connectors shall be subjected to the inspections specified in TABLE 1 in order shown.

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**TABLE 1 – CONNECTORS QUALIFICATION TESTS & SEQUENCES**

| TEST / OPERATION             | PARA. | TEST GROUP           |        |        |        |             |        |        |        |        |        |        |
|------------------------------|-------|----------------------|--------|--------|--------|-------------|--------|--------|--------|--------|--------|--------|
|                              |       | 1                    | 2      | 3      | 4      | 5           | 6      | 7      | 8      | 9      | 10     | 11     |
|                              |       | <i>TEST SEQUENCE</i> |        |        |        |             |        |        |        |        |        |        |
| PRODUCT EXAMINATION          | 5.1   | 1<br>5               | 1<br>5 | 1<br>3 | 1<br>8 | 1<br>7      | 1<br>5 | 1<br>6 | 1<br>3 | 1<br>3 | 1<br>3 | 1<br>1 |
| NORMAL FORCE                 | 5.3.2 |                      |        |        |        |             | 2      |        |        |        |        |        |
| DURABILITY                   | 5.3.3 | 3                    |        |        |        |             | 3      |        |        |        |        |        |
| SOLDERABILITY                | 5.3.4 |                      |        |        |        |             | 4      |        |        |        |        |        |
| CONTACT RETENTION            | 5.3.5 |                      |        |        |        |             |        |        | 2      |        |        |        |
| CURRENT RATING               | 5.4.1 |                      |        |        |        |             |        |        |        |        | 2      |        |
| CONTACT RESISTANCE LOW LEVEL | 5.4.3 | 2<br>4               | 2<br>4 |        |        | 2<br>4<br>6 |        | 2<br>5 |        |        |        |        |
| DIELECTRIC WITHSTAND         | 5.4.4 |                      |        |        | 3<br>7 |             |        |        |        |        |        |        |
| INSULATION RESISTANCE        | 5.4.5 |                      |        |        | 2<br>6 |             |        |        |        |        |        |        |
| CAPACITANCE                  | 5.4.6 |                      |        |        |        |             |        |        |        | 2      |        |        |
| MECHANICAL SHOCK             | 5.5.2 |                      |        |        |        |             |        | 4      |        |        |        |        |
| VIBRATION, HIGH FREQUENCY    | 5.5.3 |                      |        |        |        |             |        | 3      |        |        |        |        |
| HIGH TEMPERATURE LIFE        | 5.5.4 |                      | 3      |        |        |             |        |        |        |        |        |        |
| HUMIDITY, STEADY STATE       | 5.5.5 |                      |        |        | 5      | 5           |        |        |        |        |        |        |
| RESISTANCE TO SOLDERING HEAT | 5.5.6 |                      |        | 2      |        |             |        |        |        |        |        |        |
| THERMAL SHOCK                | 5.5.7 |                      |        |        | 4      | 3           |        |        |        |        |        |        |

**7.0 PACKAGING AND SHIPPING**

**7.1 Packing**

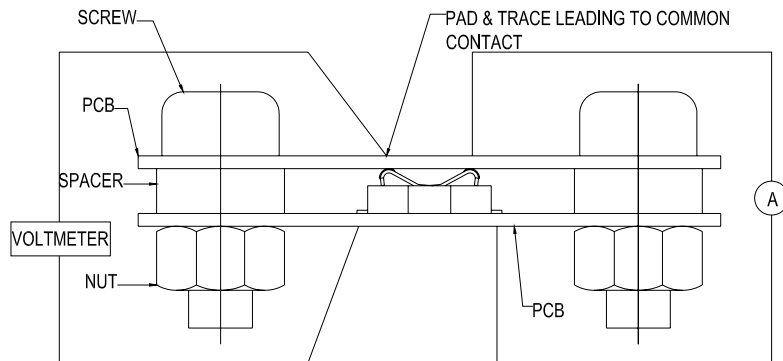
The packing and packaging shall be in accordance with the industry standard practice in a manner to insure carrier acceptance and safe delivery to destination per FCI packaging specification.

**7.2 Packaging Marking**

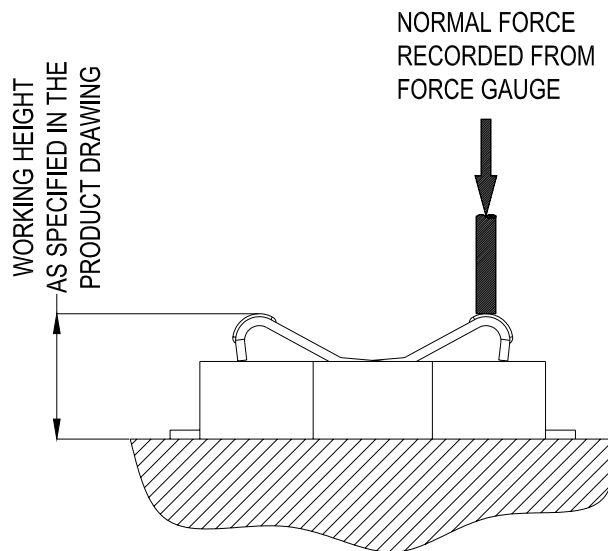
Each shipping container shall be clearly marked with the name of the contents, the amount of contained, the FCI part number, and the name of the receiving part, as listed in the procurement.

|                                       |                                      |                         |                     |
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**Figure 1a**




**Figure 1b**



**8.0 RECORD RETENTION** (If Applicable)

N.A.



|                                       |                                      |   |                     |
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**REVISION RECORD**

| <u>REV.</u> | <u>PAGE</u> | <u>REVISION</u>                           | <u>ECR #</u> | <u>DATE</u> |
|-------------|-------------|---|--------------|-------------|
| A           | All         | New released                              | S04-0030     | 02 MAR 04   |
| B           | All         | Add new test group – 3.4.1 Current rating | S05-0016     | 24 JAN 05   |
| C           | All         | Add new part number 10055612              | S05-0264     | 14 SEP 05   |
| D           | All         | Change FCI logo                           | S07-0418     | 22 NOV 07   |
| E           | All         | Add new part number 10080212              | S08-0164     | 29 MAY 08   |
| F           | All         | Change title to “Spin Motor Connector     | S10-0108     | 12 May 2010 |