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## 1.0 OBJECTIVE

This specification defines the performance, test, quality, and reliability requirements of the PLCC SMT connector products (FCI USA product series PLCC-XXP-T-SMT and PLCC-XXP-T-SMT-SOD).

## 2.0 SCOPE

This specification is applicable to the termination characteristics of the surface mount PLCC sockets accepting EIA/JEDEC Standard plastic J-leaded chip carrier IC's in lead counts of 20, 28, 32, 44, 52, 68, and 84.

## 3.0 GENERAL

- 1.0      Objective
- 2.0      Scope
- 3.0      General
- 4.0      Applicable Documents
- 5.0      Requirements
- 6.0      Electrical Characteristics
- 7.0      Mechanical Characteristics
- 8.0      Environmental Conditions
- 9.0      Quality Assurance Provisions

## 4.0 APPLICABLE DOCUMENTS

### 4.1 SPECIFICATIONS

Engineering Drawings: 59000, 59001, 59002

### 4.2 EIA and MILITARY STANDARDS

- 4.2.1    EIA 364-XX:    Test Methods for Electronic Component Parts and Connectors
- 4.2.2    MIL-C-45662:    Equipment Calibration
- 4.2.3    MIL-STD-202:    Test Methods for Electronic and Electrical Component Parts
- 4.2.4    MIL-STD-883:    Test Methods and Procedures for Microelectronics
- 4.2.5    MIL-STD-1344:    Test Methods for Electronic Connectors

### 4.3 FEDERAL SPECIFICATIONS

- 4.3.1    QQ-N-290:    Nickel Plating (Electrodeposited)
- 4.3.2    QQ-B-750:    Phosphor Bronze Alloy Strip

### 4.4 OTHER STANDARDS AND SPECIFICATIONS

- 4.4.1    UL-94:       Tests for Flammability of Plastic Materials

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#### 4.5 FCI SPECIFICATIONS

- 4.5.1 BUS-03-113: Inductance Measurement
- 4.5.2 BUS-03-114: Capacitance Measurement
- 4.5.3 BUS-03-115: Insulation Resistance
- 4.5.4 BUS-15-002: Nickel Finish
- 4.5.5 BUS-15-006: Electrodeposited 93-7 and 90-10 Tin-Lead
- 4.5.6 BUS-16-010: Phosphor Bronze Strip
- 4.5.7 BUS-19-002: Solderability
- 4.5.8 BUS-19-040: Plating Adhesion

#### 4.6 FCI LAB REPORTS - SUPPORTING DATA

ETR-0015 Surface Mount PLCC Socket (partial qualification report)

### 5.0 REQUIREMENTS

#### 5.1 DESIGN AND CONSTRUCTION

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

#### 5.2 MATERIALS

- 5.2.1 Contacts: The base material shall be phosphor bronze strip, in accordance with QQ-B-750. See Section 5.3 for plating requirements.
- 5.2.2 Insulator Housing. The insulators shall be molded of Polyphenylene Sulfide (PPS), 40% glass filled, rated flame retardant V-0 or better in accordance with UL-94.

#### 5.3 FINISH

The contacts shall be plated with 150 micro-inches min. Tin-Lead over 40 micro-inches min. Nickel. Platings to meet requirements of BUS-15-002/B (Nickel) and BUS-15-006/B (Tin-Lead).

#### 5.4 RATINGS

- 5.4.1 Operating Temperature Range: -55°C to +125°C

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## 6.0 ELECTRICAL CHARACTERISTICS

### 6.1 CURRENT RATING

The maximum current rating based upon a 30°C temperature rise over ambient is 1.0 Amp AC/DC per contact, with ambient temperature of 25°C ± 5°C.

### 6.2 LOW LEVEL CONTACT RESISTANCE (LLCR)

When tested in accordance with MIL-STD-1344, Method 3002, the low - level contact resistance shall not exceed 20 milliohms initial. The maximum change in LLCR from initial is 6 milliohms. The following details shall apply:

- A. Method of connection: Attach current and voltage leads as shown in Figure 1.0.
- B. Test Voltage: 50 millivolts DC max open circuit.
- C. Test Current: Not to exceed 100 milliamperes.

### 6.3 INSULATION RESISTANCE

When tested in accordance with MIL-STD-1344, Method 3003, Condition B, the insulation resistance of the connector shall not be less than 10,000 MΩ. The following details shall apply:

- A. Test voltage: 600 volts DC
- B. Measurement points: The insulation resistance shall be measured between adjacent circuits of unmated socket assemblies.

### 6.4 DIELECTRIC WITHSTANDING VOLTAGE

When tested in accordance with MIL-STD-1344, Method 3001, there shall be no evidence of arc-over or insulation breakdown. The following details shall apply:

- A. Test voltage: 600 VAC RMS at 60 hz.
- B. Test Duration: 60 seconds
- C. Measurement points: The dielectric withstanding voltage shall be applied across adjacent circuits of unmated socket assemblies.

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6.5      **CAPACITANCE**  
When tested in accordance with MIL-STD-202, Method 305, contact capacitance should be 1.0 picofarad maximum. The following details shall apply:

- Measurement points: Test between adjacent circuits at random locations of unmated sockets at 1 MHz.

6.6      **INDUCTANCE**

Tested in accordance with BUS-03-113:

Self Inductance: 2.0 nH maximum at 500 KHz.

Mutual Inductance: 1.0 nH maximum at 500 KHz.

**7.0      MECHANICAL CHARACTERISTICS**

7.1      **CONTACT RETENTION**

Individual contacts shall withstand a downward axial load of 10 ounces (283 grams) minimum.

7.2      **DURABILITY**

Using nominal size gage, no damage to insulator housing or contacts shall occur after 25 cycles (mate and unmate) at insertion rate of .5 inch/minute. The socket shall also meet the contact resistance requirements of paragraph 6.2 after durability testing.

7.3      **MATING FORCE**

After PLCC sockets are preconditioned (mate and unmate, 5 cycles) with a nominal size PLCC gage, the insertion force shall be 10 ounces maximum per contact when mated with a PLCC gage at maximum insertion rate of .5 inch per minute.

7.4      **UNMATING FORCE**

After PLCC sockets are preconditioned (mate and unmate, 5 cycles) with a nominal size PLCC gage, the withdrawal force shall be 0.5 ounces minimum per contact when mated with a PLCC gage at maximum withdrawal rate of .5 inch per minute.

7.5      **NORMAL FORCE**

The individual contact normal force shall not be less than 5.3 ounces (150 grams) initial when measured as shown in Figure 2.0. Connectors shall be soldered to PC Boards.

7.6      **PLATING ADHESION BENDING TEST**

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Testing and acceptance per BUS-19-040/A, Plating Adhesion Bend Test (equivalent to ASTM B571-84).

**7.7 MECHANICAL SHOCK – MIL-STD-1344, METHOD 2004, TEST G**

- A. 50 g's for 0.11 ms half-sine.
- B. Shocks: 3 shocks in both directions along each of 3 orthogonal axes (18 total).
- C. No discontinuities greater than 1.0 microseconds.

**7.8 VIBRATION – MIL-STD-1344, METHOD 2005**

- A. Condition: III
- B. Vibration Amplitude: 15G
- C. Sweep time and duration: 10-60-10 Hz in one minute, 2 hours along each of 3 orthogonal axes (6 hours total).
- D. No discontinuities greater than 1.0 microseconds

**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 TEMPERATURE CYCLING – MIL-STD-1344, Method 1002 Type II**

- A. Test time: 240 hours
- B. Relative humidity: 95%
- C. Temperature: 25 to 65°C
- D. Samples: mated during exposure.
- E. Pre-test to post-test Contact Resistance change cannot exceed 30% of initial reading when tested per paragraph 6.2. Insulation Resistance must also meet requirements of paragraph 6.3.

**8.2  THERMAL SHOCK – MIL-STD-202, METHOD 107, CONDITION B**

- A. Number of Cycles: 5

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- B. Temperature range: -55 to +125°C.
- C. Samples: mated during exposure
- D. Sockets shall show no cracking or damage to insulator or leads, Contact Resistance maximum allowable change of 6 milliohms when tested per paragraph 6.2.

#### 8.3 SOLDERABILITY TEST

Testing and acceptance per BUS-19-002/D, Solderability (equivalent to MIL-STD-202, Method 208). Contact leads shall exhibit minimum of 95% solder coverage.

#### 8.4 SOLVENT RESISTANCE

Sockets shall be capable of being fully immersed in Trichoroethylene and/or aqueous solution for 90 seconds and allowed to dry at room temperature for 30 minutes. There shall be no evidence of swelling, cracking, dimensional change, or any other defect that would affect the function and performance of the PLCC socket.

### 9.0 QUALITY ASSURANCE PROVISIONS

#### 9.1 INSPECTION CONDITIONS

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

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

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## 9.2 SAMPLE QUANTITIES

Sample quantities for the respective test groups are as follows:

TEST GROUP	NUMBER OF CONNECTORS	NOTES
1	4	
2	4	2 sockets for discontinuity testing, 2 for LLCR
3	4	Each test use 3 contacts from each connector
4	4	
5	4	
6	4	

## 9.3 ACCEPTANCE

- 9.3.1 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.
- 9.3.2 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.

## 9.4 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.

## 9.5 REQUALIFICATION TESTING

If either of the following conditions occur, 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, plating alloy, basic insulator materials, and significant modification of contact design.
- B. A significant change is made to the manufacturing process which impacts the product form, fit, or function.

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**TABLE 1 - QUALIFICATION TESTING**

TEST	PARA.	TEST GROUP					
		1	2	3	4	5	6
TEST SEQUENCE							
<b>Examination of Product</b>	<b>5.4.2</b>	<b>1</b> <b>6</b>	<b>1</b>	<b>1</b> <b>7</b>	<b>1</b>	<b>1</b>	<b>1</b>
<b>Contact Resistance Low Level</b>	<b>6.2</b>	<b>2</b> <b>6</b>	<b>2</b> <b>5</b>		<b>2</b> <b>4</b> <b>6</b>		
<b>Insulation Resistance</b>	<b>6.3</b>					<b>2</b> <b>6</b>	
<b>Dielectric Withstanding Voltage</b>	<b>6.4</b>					<b>3</b> <b>7</b>	
<b>Capacitance</b>	<b>6.5</b>						<b>2</b>
<b>Inductance</b>	<b>6.6</b>						<b>3</b>
<b>Contact Retention</b>	<b>7.1</b>			<b>2</b>			
<b>Durability</b>	<b>7.2</b>	<b>5</b>					
<b>Mating/Unmating Force</b>	<b>7.3</b> <b>7.4</b>	<b>3</b> <b>4</b>					
<b>Normal Force</b>	<b>7.5</b>			<b>3</b>			
<b>Plating Adhesion</b>	<b>7.6</b>			<b>4</b>			
<b>Mechanical Shock</b>	<b>7.7</b>		<b>4</b>				
<b>Vibration</b>	<b>7.8</b>		<b>3</b>				
<b>Humidity Temperature Cycling</b>	<b>8.1</b>				<b>5</b>	<b>5</b>	
<b>Thermal Shock</b>	<b>8.2</b>				<b>3</b>	<b>4</b>	
<b>Solderability</b>	<b>8.3</b>			<b>5</b>			
<b>Solvent Resistance</b>	<b>8.4</b>						<b>4</b>



TYPE

## PRODUCT SPECIFICATION

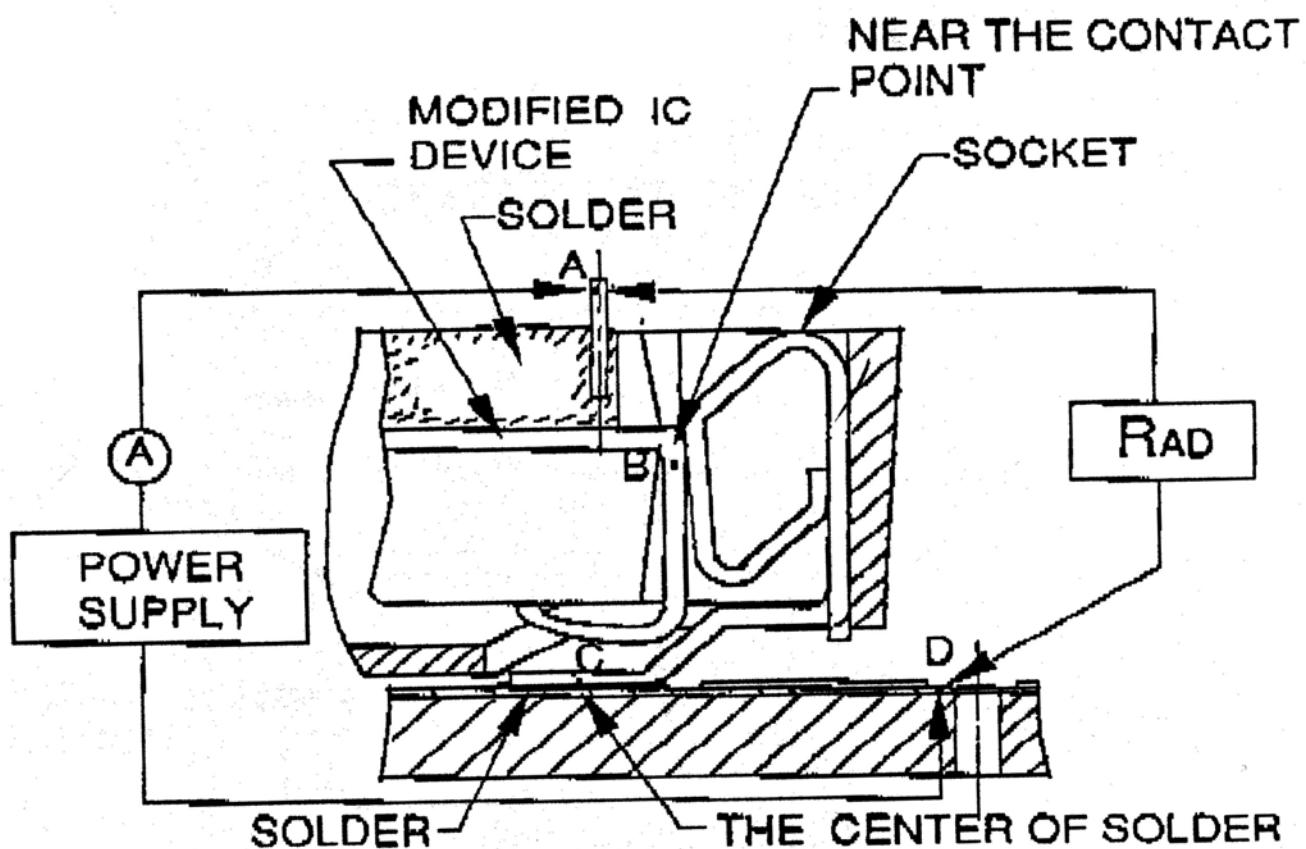
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FIGURE 1.0

## CONTACT RESISTANCE MEASUREMENT POINTS

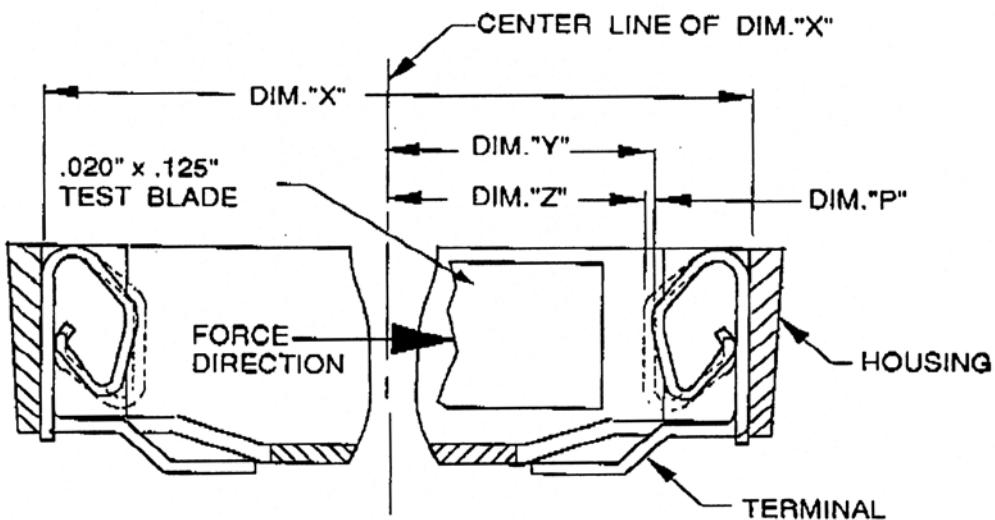


## Notes:

- 1) The contact resistance shall be measured between points B and C. The formula is  $RBC = RAD - (RAB + RCD)$ .
- 2) The outside dimensions of the modified IC Device should meet the appropriate JEDEC specification.
- 3) Solder: 63-37 Tin-Lead.

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**FIGURE 2.0**  
**NORMAL FORCE MEASUREMENT**



**Notes:**

- 1) Dim. "X" is measured across the outside edges of the terminal seating slots.
- 2) Dim. "Y" is half the minimum width dimension of the IC Device specified in the appropriate JEDEC specification (minimum normal force value is for minimum sized device).
- 3) Dim. "Z" is measured from the centerline of Dim "X" to the inside edge of the terminal contact in the undeflected state.
- 4) Dim. "P" = Dim. "Y" – Dim. "Z"
- 5) The normal force is the reaction force value recorded as the test blade applies a horizontal deflection in the amount of Dim. "P".

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#### REVISION RECORD

REV	PAGE	DESCRIPTION	EC #	DATE
1	All	Release of Preliminary Specification	V00064	02/25/00
2	All	Revised format to be consistent with GS-01-001, and change BERG, Dupont, etc. references to FCI. Change document number prefix from GES to GS.	V01949	08/16/00
A	All	New Release	V11057	03/15/01
B	ALL	New FCI Logo	V06-0701	8/31/06

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