

## ZIF PGA Socket, 462 Positions

rev. 02

### 1.0 OBJECTIVE

This specification defines the performance, test, quality and reliability requirements of the zero insertion force(ZIF) PGA Socket with 462 pin count.

### 2.0 SCOPE

This specification is applicable to the termination characteristics of the ZIF PGA Socket designed for use in conjunction with 462 positions PGA microelectronic device .

### 3.0 GENERAL

This document is composed of the following sections:

<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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9.3	Sample Quantity and Description
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9.5	Qualification Testing
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Table 1	Qualification testing matrix

### 4.0 APPLICABLE DOCUMENTS

#### 4.1 Specifications

Chupond Engineering drawings

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**4.2 EIA Specifications**

EIA-364-C      EIA Standard; Test procedure for Electrical Connectors

**4.3 Military Standards/ Specification**

MIL-STD-105      Sampling Procedures and Tables for Inspect by Attributes  
 MIL-STD-202F      Test Methods for Electronics Component Parts  
 MIL-STD-1344      Test Methods for Electrical Connectors  
 MIL-STD-45662      Calibration System Requirements  
 MIL-F-14256      Flux, soldering, Liquid (Rosin Base)  
 MIL-G-45204      Gold Plating, Electrodeposited

**4.4 Federal Specifications**

QQ-N-290      Nickel Plating (Electrodeposited)

**4.5 Industry Specifications/Standards**

UL-94      Test for Flammability of Plastic Material  
 PGA370      Design Guidelines, Intel 370-Pin Socket  
 SOCKET 462      Socket 462 Application Note, AMD Athlon Processor

**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. Substitute material shall meet the performance requirements of this specification.

5.2.1 Contacts      The base material shall be full hard copper alloy per JIS 5210 or other equivalent copper alloys.

5.2.2 Base/ Cover      The base and the cover shall be molded of flame retardant, LCP resin 30% G.F., UL94V-0 rated.

5.2.3 Actuator Arm      Stainless steel rod .

5.3 Finish      The finish for applicable components shall be as specified herein or equivalent.

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5.3.1 Contact : The contact shall be plated in the contact area with specified minimum gold or PdNi alloy, over nickel, the solder tail shall be plated with  $2.54\mu\text{m}$  ( $100\mu''$ ) min., 90/10 tin/lead over nickel  $1.27\mu\text{m}$  ( $50\mu''$ ) under plating.

5.4 Design and Construction The socket shall be of the design, construction and physical dimensions specified in Chupond applicable drawings.

**6.0 ELECTRICAL CHARACTERISTICS**

6.1 Current Rating The temperature rise above ambient shall not exceed 20 degrees Centigrade at any point in the system when contact positions are powered at 1.5 amp.; the following details shall apply:

- a. Test Standard - EIA 364, Test Procedure 70, Method 13.
- b. Test Method - All contacts in series at 1.5 amp.
- c. Ambient Condition - Still air at 25 °C.

6.2 Low Level Contact Resistance The contact resistance shall not exceed 20 milliohms before testing, 25 milliohms max. after testing, when measured in accordance with EIA 364, Test Procedure 23; the following details shall apply :

- a. Method of connection - Attached current and voltage probes as shown in Figure I.
- b. Test current - 100.0 milliamps max.
- c. Open circuit voltage - 20.0 millivolts.
- d. Test method - Apply a Daisy Chain Package to the test socket and touch the current/ voltage probes to solder tails underside of the PC board.

6.3 Insulation resistance The insulation resistance of unmated socket shall not be less than 1000 MΩ after environmental exposure, when measured in accordance with EIA 364, Test Procedure 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.

6.4 Dielectric Withstanding Voltage There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current ( $>1$  milliampere) when the unmated sockets are tested in accordance with EIA 364, Test Procedure 20; the following details shall apply:

- a. Test Voltage - 1000 volts (AC, 60Hz), with 500 volts/sec. rate of application.
- b. Test Duration - 60 seconds.
- c. Points of Measurement - Between adjacent contacts.

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- 6.5 Capacitance The capacitive coupling between adjacent contacts shall not exceed 1.0 picofarad, when measured in accordance with EIA 364, Test Procedure 30; the following details shall apply :
- Mounting Condition – Unmounted and no substrate mated.
  - The test probe tips touch to top of the desired contacts.
  - Test condition : 1 KHz
- 6.6 Inductance The inductance between adjacent contacts shall be no greater than 3.5 nH, when measured in accordance with Intel PGA 370 Design Guidelines; the following details shall apply :
- Condition : Unmounted and no substrate mated.
  - Method of connection : The socket is connected to the analyzer via the test fixture/S-parameter test set and measured from the contact point to the tip of the solder tail.
  - Test conditions : 100 MHz
  - Measurement equipment : Network Analyzer.
- 6.7 Propagation Delay The maximum propagation delay shall not exceed 120 picoseconds, when measured in accordance with EIA Test Procedure 103 and the following details :
- Mounting Condition : The test sockets shall be mounted on the printed circuit board as shown in Fig-II.
  - Method of connection : Labeled # 1 and # 2 as shown in Fig-II. The adjacent ground / power contacts should be grounded and the adjacent signal contact should be terminated to 50 ohms load.
  - Test Condition - 100 picoseconds rise time pulse (0.0 V and 2 V) with a 50 ohms termination.
  - Measurement equipment - Sampler/TDR/scope equipment with a 50 ohms reference impedance.
- 6.8 Characteristic Impedance The characteristic impedance of the test socket shall be within the range of 35 to 75 ohms when measured in accordance with Intel PGA 370 Design Guidelines and the following details :
- Mounting Condition : The connector shall be soldered to test printed circuit board as shown in Fig-II.
  - Method of Connection : Labeled # 1 and # 2 as shown in Fig-II. The adjacent ground / power contact should be grounded to ground plane.
  - Test Condition : 100 picoseconds rise time pulse (0.0 V and 2 V) with a 50 ohms termination.
  - Test Equipment : Sampler / TDR / scope equipment with a 50 ohm reference impedance.
- 6.9 Crosstalk Adjacent signal / Vss near end cross talk should not be exceed 10% in accordance with AMD Socket 462 application note. The following details shall be applied :

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- a. Mounting Condition : The test socket shall be soldered to test printed circuit board as shown in Fig-II.
- b. Method of Connection : Labeled # 3, 4, 5, 6 and 7 as shown in Fig-II. All aggressor and victim signal lines shall be terminated with 50 ohms load and the board trace impedance should be 50 ohms +/- 10%.
- c. Test Condition : 100 picoseconds rise time pulse measurement shall be made tail tip to tail tip.
- d. Measurement equipment : Sample / Pulse generator / TDR equipment with a 50 ohms reference impedance.

**7.0 MECHANICAL CHARACTERISTICS**

- 7.1 Contact Retention Force Individual contacts shall withstand an axial load of 300 grams min. applied at a rate of 5.0 mm/min. without dislodging from the support member of the contact. The test shall be in accordance with EIA 364, Test Procedure 29.
- 7.2 Withdrawal Retention Force When a 5.6 kg axial force is applied, there shall be no evidence of physical damage or unseating of the mating device from the ZIF PGA socket; the following details shall apply :
  - a. The mating device shall be inserted into the PGA socket and actuated to secure the device within the socket before performing the test.
  - b. The test sample shall be hold properly to prevent bowing during test.
  - c. The axial force applied to the mating device shall be at a rate of 0.45 kg/sec. until the specified load is reached.
- 7.3 Durability After 50 mating/unmating cycles with the mating device, the withdrawal retention force shall not be less than 5.6 kg specified in paragraph 7.2 and the contact resistance shall not exceed the 25 milliohms specified in paragraph 6.2 .

**8.0 ENVIRONMENTAL CONDITIONS**

After exposure to the following environmental conditions in accordance with the specified test procedures and/or details, the product shall be no physical damage and shall meet the electrical and mechanical requirements per paragraphs 6.0 and 7.0 as specified in Table 1.0 test sequence. Parts subjected to these environmental tests must have parts that are soldered to printed circuit boards. Unless otherwise specified, the assemblies shall be mated during exposure.

**8.1 Thermal Shock, EIA 364-32, Test Condition 1**

- a. Number of Cycles : 5 cycles
- b. Temperature Range: Between : -55 to +85°C
- c. Time at Temperature : 30 minutes

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**8.2 Humidity-Thermal Cycling, EIA 364, Test Procedure31**

- a. Temperature Conditions : 25 °C to 65 °C
- b. Relative Humidity : 90% to 95%
- c. Duration: 240 hours

**8.3 Temperature Life, EIA 364, Test Procedure17**

- a. Test Duration: 240 hours
- b. Temperature : 105 °C +/- 5 °C

**8.4 Porosity, EIA 364, Test Procedure**

- a. Test Condition : Procedure 1.1.2 for gold flash over Palladium Nickel
- b. Test Duration : 90 minutes

**8.5 Mechanical Shock , EIA 364, Test Procedure 27**

- a. Peak value: 50 G
- b. Duration : 11 milliseconds
- c. Wave form : Half –sine
- d. Velocity : 170 inches per second
- e. No. of shocks : 3 shocks/direction, 3 axis (18 total)
- f. Mounting: See figure III
- g. Requirements : No discontinuities greater than 1 microsecond

**8.6 Vibration, MIL-STD-202 method 204**

- a. Condition : B(+/-15G,10to2000 Hz / 20 min)
- b. Test Duration: 4 hours along each of three orthogonal axes(12 hours total)
- c. Mounting : See Figure III
- d. Requirements : No discontinuities greater than 1 microseconds.

**8.7 Solderability, MIL-STD-202, Method 208**

- a. Steam Aging - 60 minutes
- b. Acceptable Coverage: 95% minimum

**8.8 Resistance To Solder Heat, MIL-STD-202, Method 210**

- a. Test Condition: E
- b. There shall be no evidence of physical or mechanical damage.

**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 calibration system in accordance with MIL-STD-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°C
  - b. Relative Humidity: 30% to 60%
  - c. Barometric Pressure: Local ambient
- 9.3 Sample Quantity And Description The number of samples to be tested in each test group are defined in Table 1. All samples must be free of defects, that would impair normal connector operation, and all samples must meet dimensional requirements of the application note for Socket 462, Rev. B.
- 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 sample units produced with equipment and procedures normally used in production. The test sequence shall be as shown in Table 1.
- 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 1.
- 9.6.1 A significant design change is made to the existing product which impacts the product form and function. Examples in the plating material composition or thickness, contact force, contact surface geometry, insulator design, contact base material, or contact lubrication requirements.
- 9.6.2 A significant change is made to the manufacturing process which impacts the product form, fit or function.
- 9.6.3 A significant event occurs during production on end use requiring corrective action to be taken relative to the design on manufacturing process.

**Product Qualification Test Sequence**

Test Description	Test Group							REF. Paragraph
	1	2	3	4	5	6	7	
Visual Inspection	1,6	1,10	1,4	1,3	1,9	1,6	1	
Current Rating						2		6.1
Contact Resistance	2,5	2,7			2,6,8			6.2
Insulation Resistance		3,8						6.3
Dielectric Withstand Voltage		4,9						6.4
Pin to Pin Capacitance							2	6.5
Inductance							3	6.6
Propagation Delay							4	6.7
Characteristic Impedance							5	6.8
Crosstalk							6	6.9
Contact Retention Force						3,5		7.1
Withdrawal Force					3,5			7.2
Durability					4			7.3
Thermal Shock		5						8.1
Humidity Thermal Cycling		6						8.2
Temperature Life					7	4		8.3
Porosity			2					8.4
Mechanical Shock	3							8.5
Vibration	4							8.6
Solderability			3					8.7
Resistance to Solder Heat				2				8.8
Sample Size Per Test Group	4	4	4	4	4	4	4	

**TABLE 1**  
**QUALIFICATION TESTING**



**Fig I. Contact Resistance**

**Fig II. Test Board**

**Fig III. Mounting**

**Revision Record**

<b><u>Rev.</u></b>	<b><u>Page</u></b>	<b><u>Description</u></b>	<b><u>ECR No.</u></b>	<b><u>Date</u></b>
01	All	Preliminary		Jan. 12, 2000
02		<ul style="list-style-type: none"><li>• Update paragraph 6.6, 6.7 and 6.8</li><li>• Add paragraph 6.9 Crosstalk</li></ul>		Feb. 23, 2000