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1.0 **OBJECTIVE**

This specification defines the performance, test quality, and reliability requirements of the Standard D-Subminiature connector products.

2.0 **SCOPE**

This specification is applicable to the termination characteristics of the Standard D-Subminiature connector products designed for use in digital computer system.

3.0 **GENERAL**

This document is composed of the following sections:

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4.0 **APPLICABLE DOCUMENTS**

4.1 Specifications

4.1.1 Engineering drawings

4.2 Military Standards/Specification

4.2.1 MIL-STD-202G: Test methods for electronic and electrical component parts.

4.2.2 MIL-C-45662: Calibration system requirement.

4.3 Other Standard and Specification

4.3.1 UL94: Test flammability of plastic materials.

4.3.2 JIS-H3100: Brass strip.

4.3.3 JIS G3141: Steel, sheet, and strip, low carbon, SPCC.

4.3.4 GS-19-002 : Solderability test.

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4.3.5 IEC 512-7 Test 13b : Insertion / withdrawal force measurement.

4.3.6 IEC 512-3 Test 5b : Current rating test.

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 Female contact : Female contact shall be brass alloy in accordance with JIS-H3100, C2680R.

5.2.2 Male contact : Male contact shall be brass alloy in accordance with JIS-H3100, C2680R.

5.2.3 Plastic parts: All molded plastic parts shall be filled polyester, flame retardant UL 94V-0, color black.

5.2.4 Metal shell : The metal shell shall be SPCC strip in accordance with JIS G3141.

5.2.5 Hex screwlocks and ground clips : Copper alloy C2680 in accordance JIS-H3100.

5.3 Finish

The finish for applicable components shall be as specified in the applicable product drawing.

5.4 Design and Construction

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

5.4.1 Mating: the connector shall be capable of mating and unmating by hand without the use of special tools with specified temperature range.

5.4.2 Workmanship: Connectors shall be uniform in quality and shall be free from burrs, scratches, cracks, voids, chips, blisters, pin holes, sharp, edges and other defects that will adversely affect life or serviceability.

5.4.3 Interchangeability : Individual plugs and sockets shall be capable of mating with any appropriately constituted female or male standard D-subminiature connector of the same population without degradation in performance.

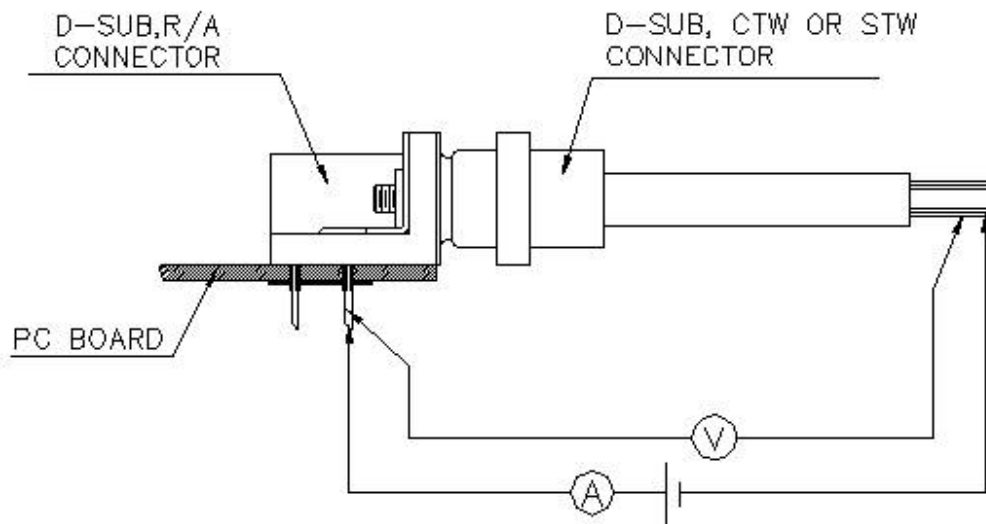
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6.0 ELECTRICAL CHARACTERISTICS

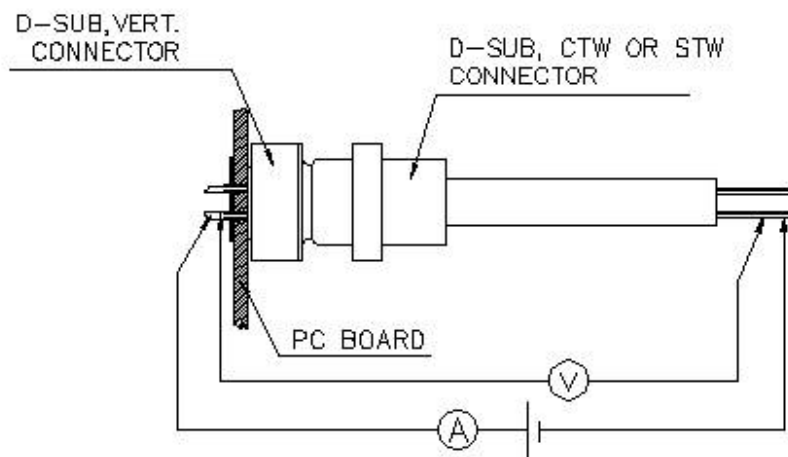
- 6.1 Contact Resistance, Low Level (LLCR) - The initial low level contact resistance shall not exceed 25 milliohms (40 milliohms max. after environmental exposure) when measured in accordance with MIL-STD-202G, Method 307. The following details shall apply:
 - a. Method of Connection - attach current and voltage leads as shown in figure 1.
 - b. Test Voltage: 20 millivolts DC maximum open circuit.
 - c. Test Current: Not to exceed 100 milliamperes.
- 6.2 Insulation Resistance - The initial insulation resistance of mated connectors shall be not less than 5,000 megohms (1,000 megohms after environmental exposure) when measured in accordance with MIL-STD-202G, Method 302. The following details shall apply:
 - a. Test Voltage: 500 volts DC.
 - b. Electrification Time : 2 minutes.
 - c. Point of Measurement : Between adjacent contacts.
- 6.3 Dielectric Withstanding Voltage - There shall be on evidence of arc over, insulation breakdown, or current leakage in excess of 1 milliampere when the mated connectors are tested in accordance with MIL-STD-202G, Method 301. The following details shall apply :
 - a. Test Voltage: 1,000 volts RMS, 60 Hz.
 - b. Test Duration: 1 minute
 - c. Test Condition: (760 torr - sea level).
- 6.4 Current Rating - The temperature rise above ambient shall not exceed 30°C at any point in system when all contacts are powered at 3 amperes. Or the connectors must be able to pass 5A permanently loaded all contacts at 70°C with a max temp of the connector of 125°C.

The following details shall apply with IEC 512-3 test 5a.

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RIGHT ANGLE TYPE



VERTICAL TYPE

FIGURE 1. CONTACT RESISTANCE MEASUREMENT

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7.0 MECHANICAL CHARACTERISTICS

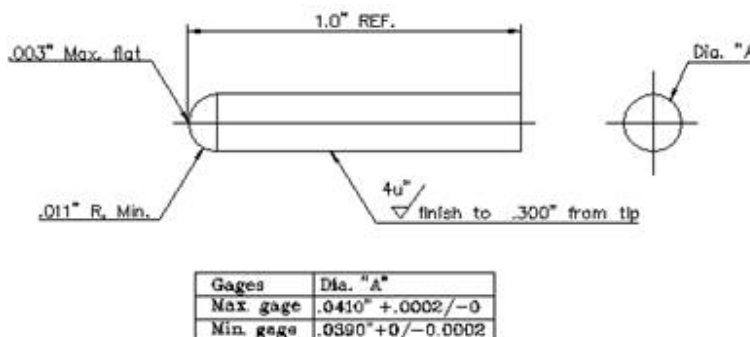
- 7.1 Total mating/unmating force - The total force to mate the male plug and female receptacle (or use VESA) shall not exceed the values shown in Table 1. The total unmating force shall not be less than the values shown in Table 1. The test shall be in accordance with EIA-364, TP-13B. Following details shall apply:
- a: Cross Head Speed : 25.4 mm per minute.
 - b: Lubrication : no.
 - c: Utilize free floating fixtures.

Table 1 - Total Insertion / Withdrawal force

Pins	Insertion force	Withdrawal force	
	Max. N	Min. N	Max. N
9	30	3.3	20
15	50	4.5	33
25	83	7.8	56
37	123	11	82

- 7.2 Individual Contact insertion / withdrawal force - The insertion force shall not exceed 5N when a maximum gauge is inserted. After three insertions with a maximum gauge, the withdrawal force shall not be less than 0.3N when measured using a minimum gauge. See Figure 2 for gauge description. Gauge shall not be lubricated. The gauge pins will be set to insert into the female connector .25" depth far away from the mating top surface. Testing shall be in accordance with FCI test specification IEC 512-7 Test 13b.

Figure 2 Contact insertion / withdrawal gauge



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- 7.3 Total Board latch retention / insertion force (for Grounding Clip version only):
- 7.3.1 Board latch retention / insertion force shall be checked on a .062 inch thick FR-4 glass / epoxy circuit board segment with a hole diameter as described below drilled through. It is preferable to check housings without terminals installed or terminals that would interfere with measurement shall be removed.
 - 7.3.2 Total maximum insertion force shall not be higher than 60 newtons while seating the connector into a 0.117 inch diameter PCB hole.
 - 7.3.3 Total latch retention force shall not be less than 10 newtons while seating the connector into a 0.123 inch diameter PCB hole.
- 7.4 Torque of hex screwlocks: Both hex - standoffs shall withstand 0.5N-m torque minimum after fastening.

8.0 **ENVIRONMENTAL CHARACTERISTICS**

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 Table III test sequences. Unless specified otherwise, assemblies shall be mated during exposure.

- 8.1 Thermal Shock - MIL-STD-202G, Method 107
 - (a) Test Condition : A (5, 1 hour cycles)
 - (b) Temperature Range : between -65 and +105 °C
 - (c) Time at Each Temperature : 30 minutes.
 - (d) Transfer time : 5 minutes, Max.
- 8.2 Humidity Steady State - MIL-STD-202G, Method 103
 - (a) Relative Humidity : 95%
 - (b) Temperature : +40 °C
 - (c) Test Duration : 48 hours
- 8.3 High Temperature Life - MIL-STD-202G, Method 108
 - (a) Plug and receptacle mated without electrical load
 - (b) Temperature Test Condition 3 : 105 °C
 - (c) Test Duration Condition C : 500 hours
- 8.4 Salt Spray - MIL-STD-202G, Method 101
 - (a) Salt Solution : 5% by weight
 - (b) Temperature : 35 °C
 - (c) Test Duration Condition C : 24 hours
- 8.5 Durability - Standard laboratory procedure
 - (a) Number of Cycles : 50 cycles plating for gold flash
 - (B) Number of Cycles : 500 cycles plating for 30u" gold
 - (a) Cycling Rate : 5 inches per minute
- 8.6 Solderability - MIL-STD-202G, Method 208

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- (a) Steam Aging : 8 hours, 93 °C , 100% RH
- (b) Solder temperature : 245 °C
- (c) Immersion duration : 5 seconds
- (d) Flux immersion : 5 - 10 seconds
- (e) Solder coverage : 95% minimum

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 MIL-C-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 80%
- (c) Barometric pressure : Local ambient

9.3 Sample Quantity and Description

9.3.1 Sample – Twenty-four (24) of the largest (37 position) and twenty-four (24) of the smallest (9 position) mated pair connectors shall be subjected to the qualification testing.

9.3.2 Preparation of Samples - The various test samples shall be configured and terminated as shown in Table II.

9.3.3 Test Sequence - The sample connectors shall be subjected to the inspections specified in Table III in order shown. The sample quantity for each test group in table III shall consist of 21 contacts for the smallest (9 position) connector and thirty(30) contacts (10 each from 3 connectors) for the largest (37 position) connectors.

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Table II – Test Sample Description

<u>Sample Number</u>	<u>Number of Contact</u>	<u>Solder to Board</u>
1	37/9	YES
2	37/9	YES
3	37/9	NO
4	37/9	NO
5	37/9	YES
6	37/9	YES
7	37/9	YES
8	37/9	NO

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 date using appropriate statistical techniques or shall other wise 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 occurred, corrective action shall be taken and samples resubmitted for qualification.

9.5 Qualification Test

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 III.

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TABLE III -QUALIFICATION TESTING

TEST	PARA.	TEST GROUP							
		1	2	5a1	5a2-1a	5a2-1b	5a2-2	5a2-3	8
		TEST SEQUENCE							
EXAMINATION OF PRODUCT	5.4	1 9	1 6	1 5	1 8	1 6	1 3	1 5	1 5
LOW LEVEL CONTACT RESISTANCE	6.1	2 8	2 5	2 4		2 5		2 4	
INSULATION RESISTANCE	6.2				2 6				
DIELECTRIC WITHSTANDING VOLTAGE	6.3				3 7				
CURRENT RATING	6.4								
MATING/UNMATING FORCE	7.1	3 6							
CONTACT INSERTION/WITHDRAWAL FORCE	7.2	4 7							
CONTACT RETENTION	7.3								2
BOARD LATCH RETENTION/ INSERTION	7.4								3
THERMAL SHOCK	8.1				4	3			
HUMIDITY, STEADY STATE	8.2				5	4			
HIGH TEMPERATURE LIFE	8.3			3					
SALT SPRAY	8.4							3	
DURABILITY	8.5	5							
SOLDERABILITY	8.6						2		
SAMPLE SIZE		3	3	3	3	3	3	3	3

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Revision Record

Revision	Page	Description	ECN No	Date
A	All	New release	T09-1034	3/12/09
B	6	8.1 & 8.3	T09-1045	4/7/09

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