Connector, USB Consortium, Plug & Receptacle

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for AMP* Universal Serial Bus (USB) Consortium plug and receptacle connectors. These connectors are cable mounted plug and printed circuit board mounted receptacle connectors.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 23Mar98. The test file number for this testing is CTL 3936-000-003. This documentation is on file at and available from the Americas Regional Laboratory.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. AMP Documents

A. 109-1: General Requirements for Test Specifications
B. 109 Series: Test Specifications as indicated in Figure 1. (Comply with MIL-STD-202, MIL-STD-1344 and EIA RS-364)
C. Corporate Bulletin 401-76: Cross-reference between AMP Test Specifications and Government or Commercial Documents
D. 114-40054: Application Specification
E. 501-427: Qualification Test Report

3. REQUIREMENTS

3.1. Design and Construction

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

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| Indicates change

3.2. Materials

A. Contact:
(1) Plug: Copper alloy, gold over palladium nickel plating on contact area, tin-lead plating on solder area, all over nickel plating or gold plating on contact area, tin-lead plating on solder area, all over nickel plating
(2) Receptacle: Copper alloy, gold over palladium nickel plating on contact area, tin-lead plating on solder area, all over nickel plating or gold plating on contact area, tin-lead plating on solder area, all over nickel plating

B. Housing:
(1) Plug: Thermoplastic, black, 130°C, UL94V-0
(2) Receptacle: Thermoplastic, black, 130°C, UL94V-0

C. Shell:
(1) Plug: Steel, bright tin-lead over copper
(2) Receptacle: Copper alloy, bright tin

3.3. Ratings

A. Voltage: 30 vac (rms)
B. Current: Signal application only, 1 ampere maximum per contact
C. Temperature: -55 to 85°C unless limited by cable or overmold

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per AMP Specification 109-1.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Examination of product.	Meets requirements of product drawing and AMP Spec 114-40054.	Visual, dimensional and functional per applicable quality inspection plan.
ELECTRICAL		
Termination resistance.	ΔR 10 milliohms maximum.	AMP Spec 109-6-6. Subject mated contacts assembled in housing to 20 mv maximum open circuit at 100 ma maximum. See Figure 3.
Insulation resistance.	1000 megohms minimum.	AMP Spec 109-28-4. Test between adjacent contacts of mated and unmated samples.
Dielectric withstanding voltage.	750 vac at sea level. 1 minute hold with no breakdown or flashover.	AMP Spec 109-29-1. Test between adjacent contacts of mated and unmated samples.
Capacitance.	2 picofarads maximum.	AMP Spec 109-47. Test between adjacent contacts of unmated samples at 1 KHz.

Figure 1 (cont)

Test Description	Requirement	Procedure
	MECHANICAL	
Solderability.	Solderable area shall have minimum of 95% solder coverage.	AMP Spec 109-11-1. Subject thru hole samples to solderability.
		AMP Spec 109-11-5. Subject surface mount samples to solderability.
Vibration, random.	No discontinuities of 1 microsecond or longer duration. See Note.	AMP Spec 109-21-5. Subject mated samples to 5.35 G's rms. 15 minutes in each of 3 mutually perpendicular planes. See Figure 4.
Physical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	AMP Spec 109-26-1, except 30 G's. Subject mated samples to 30 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 4.
Durability.	See Note.	AMP Spec 109-27. Mate and unmate samples for 1500 cycles at maximum rate of 200 cycles per hour.
Mating force.	35 Newtons maximum.	AMP Spec 109-42, Condition A. Measure force necessary to mate samples at maximum rate of 12.5mm per minute.
Unmating force.	10 Newtons minimum.	AMP Spec 109-42, Condition A. Measure force necessary to unmate samples at maximum rate of 12.5mm per minute.
Cable retention.	Cable shall not dislodge from crimp.	AMP Spec 109-46. Apply axial load of 25 Newtons to cable.
	ENVIRONMENTAL	
Thermal shock.	See Note.	AMP Spec 109-22. Subject mated samples to 25 cycles between -55 and 85°C.
Humidity-temperature cycling.	See Note.	AMP Spec 109-23-3, Condition B. Subject samples to 10, 24 hour cycles between 25 and 65°C at 95% RH.

Figure 1 (cont)

Test Description	Requirement	Procedure
Temperature life.	See Note.	AMP Spec 109-43. Subject mated samples to temperature life at 85°C for 315 hours.
Mixed flowing gas.	See Note.	AMP Spec 109-85-2. Subject mated samples to environmental class II for 14 days.

NOTE *Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in Figure 2.*

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of product	1,10	1,5	1,5	1,9	1,3
Termination resistance	3,7	2,4	2,4		
Insulation resistance				3,7	
Dielectric withstanding voltage				4,8	
Capacitance				2	
Solderability					2
Vibration	5				
Physical shock	6				
Durability	4				
Mating force	2				
Unmating force	8				
Cable retention	9				
Thermal shock				5	
Humidity-temperature cycling				6	
Temperature life		3(c)			
Mixed flowing gas			3(c)		

NOTE

(a) See Para 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Precondition samples with 10 cycles durability.

Figure 2

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. Test groups 1, 2, 3 and 4 shall each consist of a minimum of 8 connectors. Test group 5 shall consist of a minimum of 8 printed circuit board receptacle connectors. A minimum of 30 contacts shall be selected and identified for each test group. Unless otherwise specified, these contacts shall be used for all measurements.

B. Test Sequence

Qualification inspection shall be verified by testing samples as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets requirements of Figure 1. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

Applicable AMP quality inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

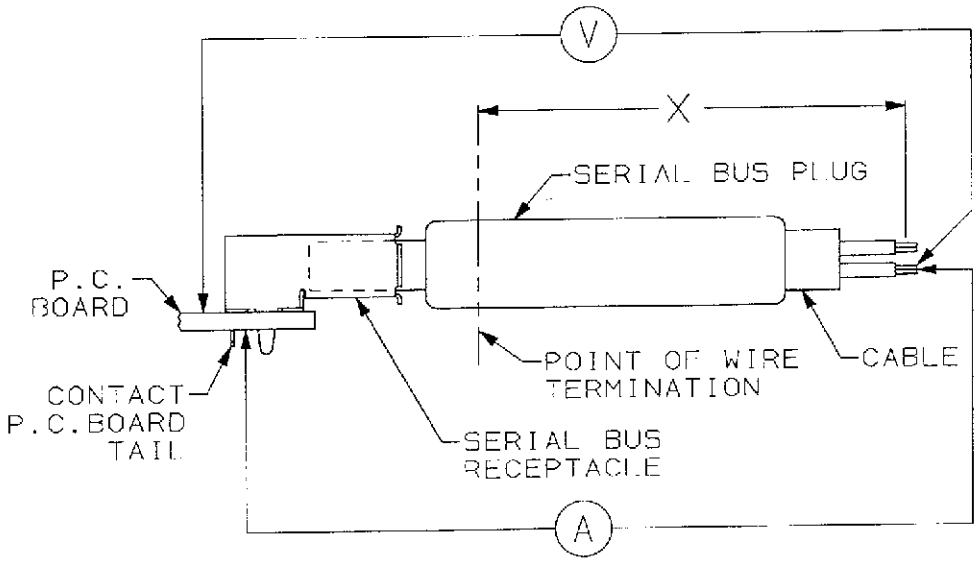

Figure 3
Termination Resistance Measurement Points

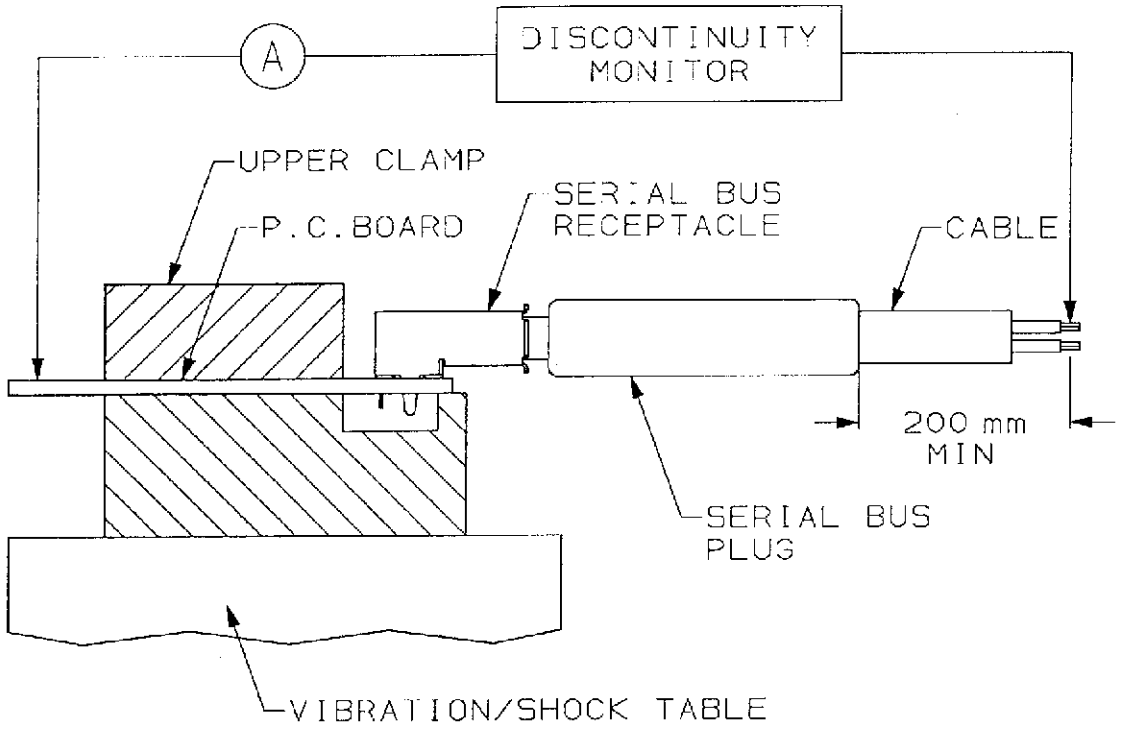

Figure 4
Vibration & Physical Shock Mounting Fixture