Qualification Test Report

501-60007-1 Rev. 0

Product Specification	:	108-60034
Date	:	02DEC2010
Classification	:	Unrestricted

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NO: 501-60007-1 | REV: O | LOC: ES

TITLE: TE Connector, USB Consortium, Plug & Receptacle Lead Free Version

1. Introduction

1.1 Objective

Testing was performed on the USB Consortium, Plug & Receptacle Lead Free Version connectors to determine if it meets the requirements of Design Objective, 108-60034, Rev. O.

1.2 Scope

This report covers the electrical, mechanical and environmental performance requirements of the USB Consortium, Plug & Receptacle Lead Free Version connectors..

1.3 Conclusion

The USB Consortium, Plug & Receptacle Lead Free Version connectors listed in paragraph 1.5, meets the electrical, mechanical and environmental performance requirements of Product Specification, 108-60034, Rev. O.

1.4 Product Description

The USB Consortium Plug & Receptacle Lead Free Version connectors are cable mounted plugs and printed circuit mounted receptacles. The contacts are made of a copper alloy with gold over palladium nickel plating in contact area, tin plating on solder area all over nickel plating. The housing material is black thermoplastic UL94V-0 rated.

1.5 Test Samples

The test samples were representative of normal production lots, and samples identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,4	8 ea.	1-974325-1	Cable Assembly
1,2,3,4,5	8 ea.	1932638-2	Receptacle Assembly

1.6 Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during test:

Temperature: 15°C to 35°C

Relative Humidity: 20 to 80%

1.7 Qualifications Test Sequence

Test of Examination	Test Group				
	1	2	3	4	5
	Test Sequence (a)				
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	
Solder ability					2
Vibration	5				
Physical Shock	6				
Durability	4				
Mating Force	2				
Unmating force	8				
Thermal Shock				5	
Humidity-Temperature Cycling				6	
Temperature Life		3(b)			
Mixed flowing gas			3(b)		

NOTE

(a) The numbers indicate sequence in which tests are performed

(b) Precondition samples with 10 cycles durability

2. Summary of testing

2.1. Examination of Product - All Groups

All samples submitted for testing were representative of normal production lots. A Certificate of Conformance was issued by the Product Assurance Department. Where specified, samples were visually examined and no evidence of physical damage detrimental to performance was observed.

2.2. Termination Resistance – Groups 1, 2 and 3

All termination resistance measurement, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage had a maximum increase in resistance(ΔR) of less than 10.0 mΩ after testing.

Test Group	Nbr of Data points	Condition	Termination Resistance (ΔR)		
			Min	Max	Mean
1	32	After Mechanical	-0.67	+6.66	+1.48
2	32	After Temp Life	-5.02	+8.18	+2.77
3	32	After Mixed Gas	-0.36	+6.29	+2.26

*All values in milliohms

2.3. Insulation Resistance – Group 4

All Insulation Resistance measurements were greater than 1,000 megohms.

2.4. Dielectric Withstanding voltage – Group 4

No dielectric break down or flashover occurred.

2.5. Capacitance – Group 4

All capacitance measurements were equal to or less than 2.0 picofarads .

2.6. Solderability – Group 5

All contact leads had a minimum of 95%soler coverage.

2.7. Vibration – Group 1

No discontinuities were detected during vibration, Following Vibration testing no cracks, breaks, or loose parts on the samples were visible.

2.8. Mechanical Shock – Group 1

No discontinuities were detected during mechanical shock. Following mechanical shock testing, no cracks, breaks, or loose parts on the samples were visible.

2.9. Durability – Group 1

No physical damage occurred to the samples as a result of mating and unmating the Samples 1,500 times.

2.10. Mating Force – Group 1

All mating force measurements were less than 35 Newtons.

2.11. Unmating Force – Group 1

All unmating force measurements were greater than 10 Newtons.

2.12. Thermal Shock – Group 4

No evidence of physical damage was visible as a result of exposure to thermal shock.

2.13. Humidity-Temperature Cycling – Group 4

No evidence of physical damage was visible as a result of exposure to humidity-temperature Cycling.

2.14. Temperature Life – Group 2

No evidence of physical damage was visible as a result of exposure to temperature Life.

2.15. Mixed Flowing Gas – Group 3

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

3. Test Methods

3.1. Examination of Product

Where specified, samples were visually examined for evidence of physical damage deterimental to product performance.

3.2. Termination Resistance

Termination resistance measurements at low level current were made using a 4 terminal measuring technique (Figure 1).The test current was maintained at 100 millamperes maximum with a 20 millivolt maximum open circuit voltage.

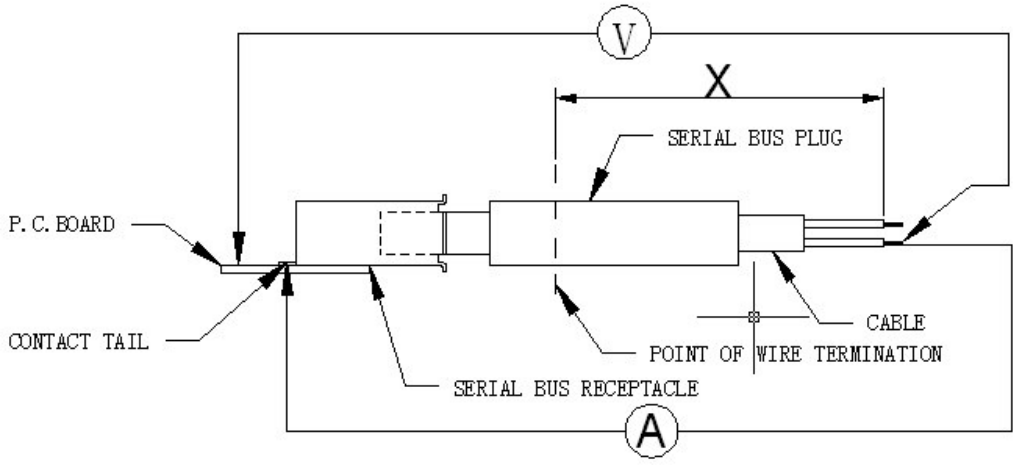

Figure 1

Typical Termination Resistance Measurement Points

3.3. Insulation Resistance

Insulation resistance was measured between the adjacent contacts of mated and unmated samples.A test voltage of 500 volts DC was applied for 1 minute before the resistance ws measured.

3.4. Dielectric Withstanding voltage

A test potential of 750 volts AC was applied between the adjacent contacts of mated and unmated samples.The potential was applied for 1 minute and then return to zero.

3.5. Capacitance

Capacitance was measured between the adjacent contacts of mated and unmated samples, using a test frequency of 1.0 KHZ

3.6. Solderability

Connector assembly contact solder tails were subjected to a solderability test. The soldertails were immersed in a no activated rosin flux for 5 to 10 seconds, allow to drain for 10 to 60 seconds, then held over molten solder without contact for 2 seconds .The solder tails were then immersed in the molten solder at a rate of approximately 1 inch per second, held for 3 to 5 seconds, then withdrawn. After cleaning in isopropyl alcohol, the samples were visually examined for solder coverage. The solder used for testing was tin and was maintained at a temperature of 260±5℃.

3.7. Vibration, Random

Mated samples were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 50 to 2000 Hz. The power spectral density at 50 Hz was 0.005G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of 0.02 G^2/Hz at 100 Hz. The spectrum was flat at 0.02 G^2/Hz from 100 to 1000 Hz. The spectrum sloped down at 6 dB per octave to upper bound frequency of 2000 Hz at which the PSD was 0.05 G^2/Hz. The root –mean square amplitude of excitation was 5.35 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for total vibration time of 45 minutes. Samples were monitored for discontinuities of 1 microsecond or greater than using a current of 100 milliamperes in the monitoring circuit.

3.8. Mechanical Shock, half-sine

Mated samples were subjected to a mechanical shock test having a half-sine waveform of 30 gravity unit (g peak) and a duration of 11 milliseconds.Three shocks in each direction were applied along the 3 mutually perpendicular planes for total 19 shocks. Samples were monitored for discontinuities of 1 microsecond or greater than using a current of 100 milliamperes DC.

3.9. Durability

Samples were mated and unmated 1,500 times at a maximum rate of 200 cycles per hour.

3.10. Mating Force

The force required to mate individual samples was measured using a tensile/compression device with the rate of travel at 12.5 mm/minute and a free floating fixture

3.11. Unmating Force

The force required to unmate individual samples was measured using a tensile/compression device with the rate of travel at 12.5 mm/minute and a free floating fixture

3.12. Thermal Shock

Mated samples were subjieced to 25 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55℃ and 85℃. The transition between temperatures was less than 1 minute.

3.13. Humidity-temperature Cycling

Mated samples were exposed to 10 cycle of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25℃ and 65℃ twice while maintaining high humidity. (Figure 2)

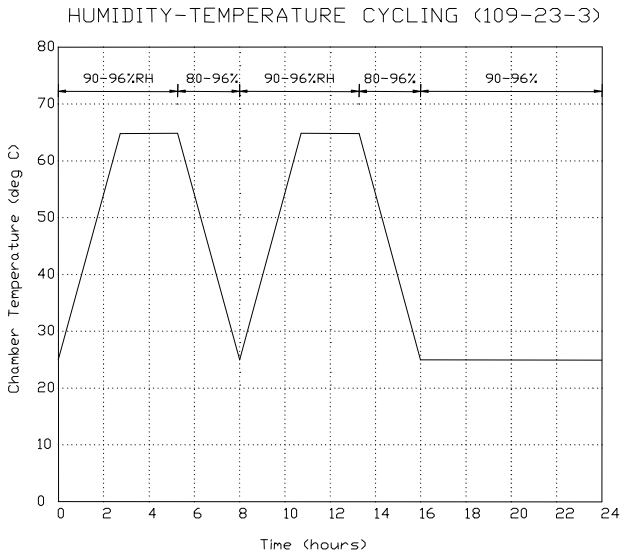

Figure 2

Typical Humidity-Temperature Cycling Profile

3.15. Temperature Life

Mated samples were exposed to a temperature of 85℃ for 250 hours. Samples were preconditioned with 10 cycles of durability.

3.16. Mixed Flowing Gas, Class Ⅱ

Mated samples were exposed for 14 days to a mixed flowing gas Class Ⅱ exposure. Class Ⅱ exposure is defined as a temperature of 30℃ and a relative humidity of 70%with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, and H_2S at 10 ppb. Samples were preconditioned with 10 cycles of durability.