1. INTRODUCTION

1.1 Testing was performed on the USB Connector to determine if it meets the requirements of

Product Specification 108-5983 Rev.A.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the USB Connector.

The qualification testing was performed between 26-Jul-2004 and 09-Aug-2004.

1.3 Conclusion

USB Connector meets the electrical, mechanical and environmental performance requirements of Product Specification 108-5983 Rev.A.

1.4 Product Description

This product have been designed under "USB" specification.

1.5 Test Samples

Samples were taken randomly from current production ,The following samples were used:

Part Number	Description
1746311-1	USB CONNECTOR
974325-X	Standard Cable Ass'y,USB Plug, 4Pos.-4Pos.

FIG.1

2. TEST CONTENTS

Para.	Test Items	Requirements	Judgement
2.1	Examination of Product	Visual Inspection No physical damage	Acceptable
2.2	Examination of Plating	Meets plating specification of product drawing.	Acceptable
		Electrical Requirements	
2.3	Termination Resistance (Low Level)	30 mΩ Max.	Acceptable
2.4	Dielectric withstanding Voltage	Initial/Final ; 750V AC, (50 Hz), 1 minute No abnormality allowed. Current leakage:1 mA Max.	Acceptable
2.5	Insulation Resistance	Impressed voltage 500 VDC Initial ; 1000MΩ Min. Final ; 1000MΩ Min.	Acceptable
2.6	Capacitance	at 10kHz, 2pF Max.	Acceptable
		Mechanical Requirements	
2.7	Vibration (Random)	Vibration Frequency: 50 to 2000 Hz Accelerated Velocity :52.43m/s^2(5.35G) Random Vibration X, Y & Z Axes : 15 minute each, 1A applied. No electrical discontinuity greater than 1μ sec. shall occur	Acceptable
2.8	Physical Shock	No electrical discontinuity greater than 1μ sec. allowed. 294 m/s^2 (30 G), Sawtooth/Halfsine Wave, 11msec. X,Y,Z ± directions each 3 drops, Total 18 drops	Acceptable
2.9	Connector Mating Force	Operation Speed: 12.5mm/min. 35N(3.57kgf)Max.	Acceptable.
2.10	Connector Un-mating Force	Operation Speed: 12.5mm/min. 10N(1kgf)Min.	Acceptable.
2.11	Contact Retention Force	3N(0.31kgf)Min. Apply an axial pull-off load to contact (at least 5 seconds)	Acceptable

Fig.2 (to be continued)

Para.	Test Items	Requirements	Judgement
2.12	Durability (Repeated Mate / Un-mating)	Operation Speed:200 cycles/hr. No. of Cycles : 1500 cycles	Acceptable
2.13	Resistance to Soldering Heat	Test connector on PCB. Flow Soldering Solder Temperature : 260±5°C Immersion Duration in Solder : 10±0.5 seconds Manual Soldering Temperature: 350±10℃ for 3(+1/-0) Seconds. No physical damage shall occur.	Acceptable
2.14	Solderability	Solder Temperature : 245±3 °C Immersion Duration in Solder : 3±0.5 seconds Immersion Duration in Flux : 5 ~ 10 seconds Solder Sample : Sn-3Ag-0.5Cu Flux Sample : Tamura Chemical Ind. NA-200 (Suitable) Wet solder coverage: 95% Min.	Acceptable
	Environmental Requirements		
2.15	Thermal Shock	-55℃ / 30min., + 85℃ / 30min. Making this a cycle, repeat 5 cycles. Insulation resistance 1000MΩ Min.(Final) To meet Dielectric withstanding Voltage.	Acceptable
2.16	Humidity, Steady State	90 ~ 95%R.H. 40℃ 96hours Insulation resistance 1000MΩ Min.(Final) To meet Dielectric withstanding Voltage	Acceptable
2.17	Temperature Life (Heat Aging)	85℃, 250hours 30 mΩ Max.	Acceptable
2.18	Examination of Whisker-1 (Thermal Shock)	-35±5℃ / 30min., + 125±5℃ / 30min. Making this a cycle, repeat 500 cycles. No whisker on surface of contact and shell.	Acceptable
2.19	Examination of Whisker-2 (Humidity, Steady State)	85%R.H. 85℃ 500hours No whisker on surface of contact and shell.	Acceptable

Fig.2(End)

3. PRODUCT QUALIFICATION TEST SEQUENCE

Test Items	Test Group								
	1	2	3	4	5	6	7	8	9
	Test Sequence(a)								
Examination of Product	1,9	1,6	1,9	1,3	1,3	1	1,3	1,3	1,3
Examination of Plating						2			
Termination Resistance	3,7	2,5							
Dielectric Withstanding Voltage			4,8						
Insulation Resistance			3,7						
Capacitance			2						
Vibration(Random)	5								
Physical Shock	6								
Connector Mating Force	2								
Connector Unmating Force	8								
Contact Retention Force					2				
Durability (Repeated Mate/Unmating)	4	3(b)							
Resistance to Soldering Heat							2		
Solderability				2					
Thermal Shock			5						
Humidity(Steady State)			6						
Temperature Life(Heat Aging)		4							
Examination of Whisker-1 (Thermal Shock)								2	
Examination of Whisker-2 (Humidity,Steady State)									2

(a) Numbers indicate sequence in which the tests are performed.

(b) Just 10 cycles durability

Fig.3

4. TEST RESULT

Test Group 1										
Conditions	Measure Item		N	Unit	Results				Requirement	Judgment
					MAX	MIN	AVE	σ		
Initial	Termination Resistance		20	mΩ	19.77	15.46	16.94	1.32	30 mΩ Max	Acceptable
After Physical Shock	Termination Resistance		20	mΩ	20.14	15.49	16.90	1.21	30 mΩ Max	Acceptable
After Vibration (Random)	Circuit Continuity (During Test)		5	μ s	No Discontinuity				1 μ s sec.Max	Acceptable
After Physical Shock	Circuit Continuity (During Test)		5	μ s	No Discontinuity				1 μ s sec.Max	Acceptable
Connector Mating/ Un-mating Force	Initial	Mating	5	N	14.9	11.6	13.58	1.25	35N Max	Acceptable
		Un-mating	5	N	27.5	22.0	25.58	2.22	10N Min.	Acceptable
	Final (1500 times)	Mating	5	N	13.9	9.9	11.90	1.93	35N Max	Acceptable
		Un-mating	5	N	17.9	12.7	16.00	2.41	10N Min.	Acceptable

Test Group 2									
Conditions	Measure Item	N	Unit	Results				Requirement	Judgment
				MAX	MIN	AVE	σ		
Initial	Termination Resistance	20	mΩ	19.11	14.80	16.53	1.08	30 mΩ Max	Acceptable
After Temperature life(Heat Aging)	Termination Resistance	20	mΩ	26.09	13.87	21.58	3.23	30 mΩ Max	Acceptable

Test Group 3									
Conditions	Measure Items	N	Unit	Results				Requirement	Judgment
				MAX	MIN	AVE	σ		
Initial	Capacitance	20	pF	0.92	0.80	0.860	0.00725	2pF Max	Acceptable
	Insulation Resistance (Between adjacent circuits)	20	Ω	Mated connector		$1x10^{13}$ΩMin		1000MΩ Min	Acceptable
				Unmated connector		$1x10^{13}$ΩMin			
	Dielectric Strength (Between adjacent circuits)	20	-	Mated connector		No Abnormalities		No Abnormalities allowed.	Acceptable
				Unmated connector		No Abnormalities			
After Humidity(Steady,State)	Insulation Resistance (Between adjacent circuits)	20	Ω	Mated connector		$1x10^{13}$ΩMin		1000MΩ Min	Acceptable
				Unmated connector		$1x10^{13}$ΩMin			
	Dielectric Strength (Between adjacent circuits)	20	-	Mated connector		No Abnormalities		No Abnormalities allowed.	Acceptable
				Unmated connector		No Abnormalities			

Test Group 4						
Conditions	Measure Item	N	Unit	Results	Requirement	Judgment
Solderability	Appearance	5	-	Wet solder coverage:95% Min.	Wet solder coverage: 95% Min.	Acceptable

Test Group 5									
Conditions	Measure Item	N	Unit	Results				Requirement	Judgment
				MAX	MIN	AVE	σ		
Initial	Contact Retention Force	20	N	16.0	9.3	12.90	3.0	3N Min.	Acceptable

Test Group 6						
Conditions	Measure Item	N	Unit	Results	Requirement	Judgment
Initial	Examination of Plating	5	-	Met plating specification of product drawing.	Meets plating specification of product drawing.	Acceptable

Test Group 7						
Conditions	Measure Item	N	Unit	Results	Requirement	Judgment
Initial	Appearance	5	-	No physical damage	No physical damage shall occur.	Acceptable
After Resistance to Soldering Heat		5	-	No physical damage		

Test Group 8						
Conditions	Measure Item	N	Unit	Results	Requirement	Judgment
Initial	Examination of Whisker	5	-	No Whisker	No Whisker on surface of contact and shell	Acceptable
After Thermal Shock		5	-	No Whisker		

Test Group 9						
Conditions	Measure Item	N	Unit	Results	Requirement	Judgment
Initial	Examination of Whisker	5	-	No Whisker	No Whisker on surface of contact and shell	Acceptable
After Humidity (Steady,State)		5	-	No Whisker		