

1. Introduction

1.1 Testing was performed on the Double Slot Type PC Cardbus Connector to determine if it meets the requirements of TYCO Specification, 108-78192, Rev.O.

1.2 Scope

This report covers the electrical, mechanical and environmental performance requirements of the Double Slot Type PC Cardbus Connector. The qualification testing was performed between 29<sup>th</sup> JUL 2005 and 13<sup>th</sup> SEP 2005.

1.3 Conclusion

The Double Slot Type PC Cardbus Connector meets the electrical, mechanical and environmental performance requirements of Product Specification, 108-78192, Rev.O.

1.4 Product Description

This connector has been designed of terminating application for PC Card.

1.5 Test Samples

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

型番 Part Number	品名 Description
6674269-1	Double Slot Type PC Card Bus Connector (Top Mount)
6612228-1	Double Slot Type PC Card Bus Connector (Bottom Mount)
6123088-1	0.6mm Pitch Card Edge, Receptacle side, 150 pos.

Fig. 1

2. Test Contents

No.	Test Items	Requirements	Judgement
2.1	Examination of Product	Visual Inspection No physical damage	Acceptable
Electrical Requirements			
2.2	Termination Resistance(Low Level)	Initial : 100mΩ Max. Final : ΔR=50mΩ Max.	Acceptable
2.3	Dielectric withstanding Voltage	Initial/Final: 500V AC, (50 Hz), 1 minute No abnormality allowed. Current leakage : 1 mA Max.	Acceptable

Fig. 2 (to be continued)

No.	Test Items	Requirements	Judgement
2.4	Insulation Resistance	Initial : 100M $\Omega$ Min. Final : 100M $\Omega$ Min.	Acceptable
2.5	Temperature Rising	30 $^{\circ}$ C Max. Test Current 0.5 A	Acceptable
Mechanical Requirements			
2.6	Card Matting Force	68 Pos. : 39.2 N (4Kgf) Max. (Initial) Head Operation Speed : 100mm/minute	Acceptable
2.7	Operation Force (Button pushed) For Rotary button	49N (5Kgf) Max. Measure button operating force to eject card at the rate of 100mm/minute under mateding with PC Card.	Acceptable
	Operation Force (Button pushed) For Push-Push type	Conventional condition $\rightarrow$ Pushed : 68.7N(7Kgf)Max. Measure button operating force to eject card at the rate of 100mm/minute under mateding with PC Card.	Acceptable
		Pushed $\rightarrow$ Conventional condition : 19.6N(2Kgf)Max. Measure button operating force to eject card at the rate of 100mm/minute under mateding with PC Card	Acceptable
2.8	Post Retention Force	9.8N (1Kgf) Min. Head Operation Speed : 100mm/minute	Acceptable
2.9	Vibration (High Frequency)	10-500-10Hz/20minutes、98 m/S <sup>2</sup> (10G) X, Y & Z Axes : 3 hours each No electrical discontinuity greater than 0.1 $\mu$ sec shall occur. Final : $\Delta R=50m \Omega$ Max.	Acceptable
2.10	Physical Shock	No electrical discontinuity greater than 0.1 $\mu$ sec allowed. 490m/s <sup>2</sup> (50G), Halfsine Wave. XYZ 3drops, Total 18 drops Final : $\Delta R=50m \Omega$ Max.	Acceptable
2.11	Durability(Repeated Mating / Unmating) (Office Environment)	Operation Speed : 400 to 600 cycles/hr. No.of Cycles : 10,000 cycles. Refer to Fig.4 Final : $\Delta R=50m \Omega$ Max.	Acceptable
2.12	Durability(Repeated Mating / Unmating) (Harsh Environment)	Operation Speed : 400 to 600 cycles/hr. No.of Cycles : 5,000 cycles. Refer to Fig.3 Final : $\Delta R=50m \Omega$ Max.	Acceptable

Fig. 2 (to be continued)

No.	Test Items	Requirements	Judgement
Environmental Requirements			
2.13	Solderability	Solder Temperature : $245 \pm 5^{\circ}\text{C}$ , $5 \pm 0.5\text{sec}$ Flux : Alpha 100 Wet solder coverage : 95% Min.	Acceptable
2.14	Resistance to Soldering Heat	Solder Temperature : $260 \pm 5^{\circ}\text{C}$ Immersion Duration : $10 \pm 1\text{sec}$ . No physical damage shall occur.	Acceptable
2.15	Humidity (Humidity-Temperature Cycling)	$25^{\circ}\text{C} \sim 65^{\circ}\text{C}$ , 90~95% RH, 10 Cycle Final : $\Delta R=50\text{m}\Omega$ Max. Final : Insulation resistance $50\text{M}\Omega$ Min. MIL-STD-202-106	Acceptable
2.16	Thermal Shock	$-55 \pm 3^{\circ}\text{C}/30\text{min.}$ , $85 \pm 2^{\circ}\text{C}/30\text{min.}$ , 5 cycles Final : $\Delta R=50\text{m}\Omega$ Max. Final : Insulation resistance $100\text{M}\Omega$ Min.	Acceptable
2.17	Temperature Life (Heat Aging)	$85 \pm 2^{\circ}\text{C}$ , 250Hrs. Final : $\Delta R=50\text{m}\Omega$ Max.	Acceptable
2.18	Resistance to Cold	$-55 \pm 3^{\circ}\text{C}$ , 96Hrs. Final : $\Delta R=50\text{m}\Omega$ Max.	Acceptable
2.19	Humidity (Steady State)	$40 \pm 2^{\circ}\text{C}$ , 90~95%RH 96Hrs. Final : $\Delta R=50\text{m}\Omega$ Max. Final : Insulation resistance $100\text{M}\Omega$ Min.	Acceptable
2.20	Industrial Gas ( $\text{H}_2\text{S}$ )	3ppm, $40^{\circ}\text{C}$ , 80% RH, 96Hrs. Final : $\Delta R=50\text{m}\Omega$ Max.	Acceptable

Fig. 2 (End)

3. Product Qualification Test Sequence

Test Items	Test Group										
	1	2	3	4	5	6	7	8	9	10	11
	Test Sequence (a)										
Examination of Product	1,9	1,3	1,4	1,3	1,6	1,5	1,8	1,3	1,6	1,5	1,5
Termination Resistance (Low Level)	2,6				2,5	2,4	2,7		2,5	2,4	2,4
Dielectric withstanding Voltage	4,8										
Insulation Resistance	3,7						5		4		
Temperature Rising		2									
Card Mating Force			2								
Operation Force			3								
Post Retention Force				4							
Vibration (High Frequency)					3						
Physical Shock					4						
Durability (Repeated Mating/Unmating) (Office environment)						3					
Durability (Repeated Mating/Unmating) (Harsh Environment)							3				
Solderability								2			
Resistance to Soldering Heat				2							
Humidity (Humidity-Temperature Cycling)	5										
Thermal Shock									3		
Temperature Life (Heat Aging)										3	
Resistance to Cold											3
Humidity (Steady State)							4				
Industrial Gas (H <sub>2</sub> S)							6				

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

<p><u>Test Sequence</u></p> <p>1,000-cycles Insertion / Extraction ↓ Humidity-Temperature Cycling Test (Para. No.3.5.19, Steady State 96Hrs.) ↓ 1,000-cycles Insertion / Extraction ↓ Humidity-Temperature Cycling Test (Para. No.3.5.19, Steady State 96Hrs.) ↓ 3,000-cycles Insertion / Extraction ↓ Humidity-Temperature Cycling Test (Para. No.3.5.19, Steady State 96Hrs.) ↓ Hydrogen Chloride Test (3.5.20, 96Hrs.)</p>	<p><u>Requirements</u></p> <p>Termination Resistance (Low-Level) Specified in Para. No. 3.5.2</p> <p><u>Specimen</u></p> <p>Mated Connectors</p> <p><u>Insertion / Extraction Test Conditioning</u></p> <p>Putting on ejector Repeat insertion and extraction at a rate of 400-600 cycles per hour.</p>
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Fig.3 Durability Test (Harsh Environment, 5,000 cycles)

<p><u>Test Sequence</u></p> <p>Termination Resistance (Low-Level) Specified in Para. No. 3.5.2 ↓ 10,000-cycles Insertion / Extraction ↓ Termination Resistance (Low-Level) Specified in Para. No. 3.5.2</p>
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Fig.4 Durability Test (Office Environment, 10,000 cycles)

4. Test Results

Test Group	Test Item	Condi-tions	Measure Item	n	Unit	Results				Re-quirement	Judg e-ment
						MAX.	MIN.	AVE.	SIG.		
1	Temperature Humidity Cycling	Initial	Appearance	5 set	—	No abnormalities				No ab-normalities	Ac-ceptable
			Termination Resistance	100 cont.	m Ω	50.33	23.77	38.18	5.73	100m Ω Max.	Ac-ceptable
			Insulation Resistance	50 cont.	Ω	1x10 <sup>11</sup> Ω Min.				100M Ω Min.	Ac-ceptable
			Dielectric	50 cont.	—	No abnormalities				No ab-normalities	Ac-ceptable
		Final	Termination Resistance	100 cont.	m Ω	49.82	29.03	39.68	5.02	—	—
			ΔR	100 cont.	m Ω	18.60	-15.32	1.47	7.79	50m Ω Max.	Ac-ceptable
			Insulation Resistance	5 set	Ω	1x10 <sup>11</sup> Ω Min.				100 M Ω Min.	Ac-ceptable
			Dielectric	50 cont.	—	No abnormalities				No ab-normalities	Ac-ceptable
2	Temperature Rising Test	Rising Data	DC 0.3A	—	℃	—				—	—
			DC 0.5A	5 set	℃	6.98				30℃ Max.	Ac-ceptable
			DC 0.7A	—	℃	—				—	—
			DC 0.9A	—	℃	—				—	—
4	Post Retention Force	Resistance to Soldering Heat	Appearance	1 set	—	No abnormalities				No ab-normalities	Ac-ceptable
		After Test	Retention Force	10 cont.	N	34.58 (3.50)	11.07 (1.13)	17.84 (1.82)	—	9.8N (1 Kgf) Min.	Ac-ceptable

Test Group	Test Item	Condi-tions	Measure Item	n	Unit	Results				Re-quire-ment	Judg e-ment
						MAX.	MIN.	AVE.	SIG.		
5	Vibration (High Frequency)	Initial	Appear-ance	4 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
			Termination Resistance	80 cont.	m Ω	39.88	24.02	31.48	3.91	100m Ω Max.	Ac-cept-able
		During Test	Circuit Continuity	80 cont.	—	No abnormalities				0.1 μ sec Max.	Ac-cept-able
		Final	Termination Resistance	80 cont.	m Ω	39.87	29.13	34.76	2.85	—	—
			ΔR	80 cont.	m Ω	12.45	-7.84	3.29	4.41	50m Ω Max.	Ac-cept-able
			Appear-ance	4 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
	Physical Shock	Initial	Appear-ance	4 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
			Termination Resistance	80 cont.	m Ω	39.76	24.97	32.56	3.59	100m Ω Max.	Ac-cept-able
		During Test	Circuit Continuity	80 cont.	—	No abnormalities				0.1 μ sec Max.	Ac-cept-able
		Final	Termination Resistance	80 cont.	m Ω	39.62	23.43	31.00	3.68	—	—
			ΔR	80 cont.	m Ω	7.89	-10.96	-1.56	4.67	50m Ω Max.	Ac-cept-able
			Appear-ance	4 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able

Test Group	Test Item	Conditions	Measure Item	n	Unit	Results				Requirement	Judgement
						MAX.	MIN.	AVE.	SIG.		
6	Durability (Repeated Mating / Un-mating) (Office Environment)	Initial	Appearance	2 set	—	No abnormalities				No abnormalities	Acceptable
			Termination Resistance	136	m Ω	43.34	21.09	33.91	5.12	100m Ω Max.	Acceptable
			Card Mating Force	2 set	N	19.19 (1.96)	14.27 (1.46)	16.73 (1.71)	—	39.2 N (4 Kgf) Max.	Acceptable
			Operation Force : Conventional Condition → Pushed	2 set	N	20.52 (2.09)	16.39 (1.67)	18.46 (1.88)	—	68.7 N (7 Kgf) Max.	Acceptable
			Operation Force : Pushed → Conventional Condition	2 set	N	3.18 (0.32)	2.06 (0.21)	2.62 (0.27)	—	19.6 N (2 Kgf) Max.	Acceptable
		Finished	Termination Resistance	136	m Ω	40.19	20.36	31.95	4.19	—	—
			ΔR	136	m Ω	14.99	-1.03	10.19	3.78	50m Ω Max.	Acceptable
			Card Mating Force	2 set	N	18.91 (1.93)	12.85 (1.31)	15.88 (1.62)	—	39.2 N (4 Kgf) Max.	—
			Operation Force : Conventional Condition → Pushed	2 set	N	22.18 (2.26)	15.19 (1.55)	18.69 (1.91)	—	68.7 N (7 Kgf) Max.	Acceptable
			Operation Force : Pushed → Conventional Condition	2 set	N	3.01 (0.31)	1.94 (0.20)	2.48 (0.25)	—	19.6 N (2 Kgf) Max.	Acceptable
			Appearance	2 set	—	No abnormalities				No abnormalities	Acceptable



Test Group	Test Item	Condi-tions	Measure Item	n	Unit	Results				Re-quire-ment	Judg e-ment
						MAX.	MIN.	AVE.	SIG.		
7	Durability (Repeated Mating / Un-mating) (Harsh Environment)	Initial	Appearance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
			Termination Resistance	100 cont.	m Ω	49.71	26.35	38.20	4.34	100m Ω Max.	Ac-cept-able
		After Humidity (Steady State)	Insulation Resistance	50 cont.	Ω	1x10 <sup>11</sup> Ω Min.				100 MΩ Min.	Ac-cept-able
		Final	Termination Resistance	100 cont.	m Ω	49.81	27.31	37.68	5.14	—	—
			ΔR	100 cont.	m Ω	11.83	-14.10	-1.52	6.12	50m Ω Max.	Ac-cept-able
			Appearance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
8	Solder-ability	Final	Appearance	2 set	—	95%Min				95%Min	Ac-cept-able
9	Thermal Shock	Initial	Appearance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
			Termination Resistance	100 cont.	m Ω	50.12	32.02	40.80	4.34	100m Ω Max.	Ac-cept-able
			Insulation Resistance	50 cont.	Ω	1x10 <sup>11</sup> Ω Min.				100M Ω Min.	Ac-cept-able
		Final	Termination Resistance	100 cont.	m Ω	45.62	37.25	41.63	1.71	—	—
			ΔR	100 cont.	m Ω	9.77	-10.04	0.83	4.65	50m Ω Max.	Ac-cept-able
			Insulation Resistance	50 cont.	Ω	1x10 <sup>11</sup> Ω Min.				100M Ω Min.	Ac-cept-able
			Appearance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able

Test Group	Test Item	Condi-tions	Measure Item	n	Unit	Results				Re-quire-ment	Judg e-ment
						MAX.	MIN.	AVE.	SIG.		
10	Tempera-ture Life (Heat Aging)	Initial	Appear-ance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
			Termi-nation Resistance	100 cont.	m Ω	49.23	34.02	41.43	3.56	100m Ω Max.	Ac-cept-able
		Final	Termi-nation Resistance	100 cont.	m Ω	48.54	36.56	42.19	2.73	—	—
			ΔR	100 cont.	m Ω	11.40	-10.04	0.76	4.31	50m Ω Max.	Ac-cept-able
			Appear-ance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
11	Resis-tance to Cold	Initial	Appear-ance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able
			Termi-nation Resistance	100 cont.	m Ω	42.67	32.51	37.52	2.49	100 m Ω Max.	Ac-cept-able
		Final	Termi-nation Resistance	100 cont.	m Ω	46.01	28.68	37.01	4.12	—	—
			ΔR	100 cont.	m Ω	9.83	-10.58	-0.51	4.94	50 m Ω Max.	Ac-cept-able
			Appear-ance	5 set	—	No abnormalities				No ab-normal-ities	Ac-cept-able

Note : All contact resistance data are included GND circuit