Title: SLIMLINE Serial ATA (SATA) Connector, Plug

Design Objective:	**108-51075 Rev C**
Test Request No.:	**T06 - 113**
Date:	**30th Jun 2011**
Classification:	**Unrestricted**
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	Table of Contents	Page

Qualification Test Report

1. Introduction

1.1 Purpose

Testing was performed on Slimline Serial ATA (SATA) Plug connector, so as to determine its conformance to the requirements of Design Objectives 108-51075 Rev C.

1.2 Scope

This report covers the electrical, mechanical and environmental performance of, Slimline Serial ATA (SATA) Plug connector manufactured by Tyco Electronics Manufacturing (S) Pte Ltd.

1.3 Conclusion

The Slimline Serial ATA (SATA) Plug connector meets all the electrical, mechanical and environmental requirements of Design Objectives 108-51075 Rev C.

1.4 Product Description

The Slimline Serial ATA (SATA) Plug connector, housing material is made of high temperature thermoplastics, glass filled, UL94V-0. The contacts are made of Brass strip. Contacts finish were Gold plating at mating area and Tin plating at solder area. All over nickel underplate.

1.5 Test Samples

The test samples used for the qualification were randomly selected from production and the conditions of the parts used for each test were summarized in the table below:

Description	Part No.
Slimline Serial ATA (SATA) Connector, Plug, 7P+6P	1735418, 1735419, 1735420, 1735424, 1735471, 1735574

1.6 Qualification Test Sequence

Test Item	Test Group						
	1	2	3	4	5	6	7
	Test Sequence (a)						
Examination of Product	1,5	1,9	1,8	1,8	1,7	1,5	1,3
Low Level Contact Resistance	2,4	3,7	2,4, 6		4,6	2,4	
Insulation Resistance				2,6			
Dielectric Withstanding Voltage				3,7			
Current Rating			7				
Solder Ability							2
Soldering Heat Resistivity						3	
Mating Force		2					
Un-mating Force		8					
Durability	3	4(b)			2(b)		
Vibration(Random)		5					
Physical Shock		6					
Reseating (Manually plug/unplug 3 time)			5		5		
Humidity				5			
Temperature Life			3				
Thermal Shock				4			
Mixed Flowing Gas					3		

NOTE:
(a) Numbers indicate sequence in which the tests are performed.
(b) Preconditioning, 20 cycles for the 50 durability cycle requirement, 50 cycles for the 500 durability cycle requirement. The mating and Un-mating cycle is at the maximum rate of 200 cycles per hour.

2. Summary of Testing

2.1 Examination of Product – All Groups

All samples were visually inspected under the scope and found to be free from any physical damages such as cracks, change of colour, corrosion etc.

2.2 Termination Resistance - Test Group 1, 2, 3, 5 & 6

All samples meet the requirement of 30 mΩ (maximum) initial termination resistance. All samples meet the requirement of ΔR 15 mΩ (maximum) after test / environmental conditions.

All Termination Resistance Measurement in mΩ

Test Group (TG)	1 (Durability)	
Test Condition	**Initial**	**After**
Sample size	5	5
No. of measurement	65	65
Overall average	17.21	17.58
Overall minimum	14.86	14.42
Overall maximum	20.09	23.35
ΔR (max)	-	4.78

Test Group (TG)	2 (Vibration & Physical Shock)	
Test Condition	**Initial**	**After Physical Shock**
Sample size	5	5
No. of measurement	65	65
Overall average	16.51	16.50
Overall minimum	14.02	14.17
Overall maximum	19.05	19.33
ΔR (max)	-	1.27

Test Group (TG)	3 (Temperature Life)		
Test Condition	**Initial**	**After Temperature Life**	**After Reseating**
Sample size	5	5	5
No. of measurement	65	65	65
Overall average	17.11	18.95	18.56
Overall minimum	14.73	15.69	15.23
Overall maximum	19.96	25.67	26.56
ΔR (max)	-	6.79	6.83

Test Group (TG)	5 (Mixed Flowing Gas - MFG)			
Sample Condition	**Group A**		**Group B**	
	Mated for 14 days		**Unmated for 7 days, mated for additional 7 days**	
Test Condition	**After MFG**	**After Reseating**	**After MFG**	**After Reseating**
Sample size	5	5	5	5
No. of measurement	65	65	65	65
Overall average	17.82	17.87	17.96	17.73
Overall minimum	15.04	14.98	14.73	14.50
Overall maximum	24.53	23.39	24.63	23.18
ΔR (max)	4.82	3.68	6.04	3.14

Test Group (TG)	6 (Soldering Heat Resistivity)	
Test Condition	**Initial**	**After**
Sample size	5	5
No.of measurement	65	65
Overall average	17.27	17.00
Overall minimum	14.79	15.13
Overall maximum	19.84	20.93
ΔR (max)	-	1.39

2.3 Mating & Un-mating – Test Group 2

The mating force meets the requirement of 2.0kgf (Max).

The un-mating force meets the requirement of 0.25kgf (Min) after 500 cycle of durability.

All force measurements in Kgf.

Test Group (TG)	2	
Test Condition	**1st Cycle Mating**	**Final Cycle Un-mating**
Sample size	5	5
Number of measurement	5	5
Average	0.416	0.299
Minimum	0.362	0.262
Maximum	0.443	0.340

2.4 Insulation Resistance – Test Group 4

All insulation resistance readings between adjacent contacts were greater than 1000MΩ (initial & final).

Test Group (TG)	4 (Thermal Shock & Humidity)	
Sample Condition	**Un-mated**	
Test Condition	**Initial**	**After Humidity**
Sample size	5	5
Number of measurement	55	55
Average	2.45E+14	7.99E+13
Minimum	1.02E+14	1.03E+13
Maximum	9.86E+14	4.04E+14

2.5 Dielectric Withstanding Voltage – Test Group 4

No dielectric breakdown or flashover or leakage of current greater than 5mA occurred when a test voltage of 500 VAC was applied between adjacent contacts of unmated connector assemblies.

2.6 Vibration & Physical Shock - Test Group 2

No Sample failed the electrical discontinuity.

2.7 Solder Ability – Test Group 7

All contact leads showed more than 95% solder coverage with no voids and pins hole observed.

2.8 Soldering Heat Resistivity– Test Group 6

No physical damage was observed after reflow.

2.9 Durability – Test Group 1, 2 & 5

No physical damage was observed after durability.

2.10 Mixed Flowing Gas – Test Group 5

No physical damage was observed after mixed flowing gas.

2.11 Temperature rise – Test Group 3

Temperature rise meets the requirement of less than 30°C

Sample size	5
No. of measurement	20
Overall average	10.28
Overall minimum	7.35
Overall maximum	12.79

3 Test Methods

3.1 Examination of Products

Samples were physically examined under the microscope before and after each test conditions for any physical damage or abnormalities on housing and contacts.

3.2 Insulation Resistance

Insulation resistance was measured between adjacent contacts of connector, using a test voltage of 500 VDC. Record reading after 1 minute. (EIA-364-21)

3.3 Dielectric Withstanding Voltage

A test potential of 500 VDC was applied between adjacent contacts of connector. This potential was held for 1 minute with a current leakage not greater than 5mA. (EIA-364-20, Method B)

3.4 Contact/Termination Resistance

Measurements shall be made on mated connector, at a voltage of 20mv max open circuit at a current of 100mA. (EIA-364-23)

3.5 Durability

Subject connector to 500 cycles of repeated mate and un-mate, with an operation speed of 12.5mm per minute. (EIA-364-09)

3.6 Humidity (Steady)

Subject mated connectors to relative humidity of 90~95%RH, temperature of 40±2°C for 96 hours. (EIA-364-31, Method II, Condition A)

3.7 Thermal Shock

Subjected mated connectors to temperature -55ºC to +85ºC for 10 cycles, each temperature dwell time 30 minutes. (EIA-364-32, Condition I)

3.8 Vibration (Random)

Subject mated connectors for 30 minutes in each of 3 mutually perpendicular planes. Frequency of 50 ~ 2000Hz with 5.35 g's RMS. (EIA-364-28, Condition V, Letter A)

3.9 Physical Shock

Subject mated connector to 50Gs half sine pulses of 11ms duration along the 3 mutually perpendicular planes. (EIA-364-27, Condition H)

3.10 Temperature Life

Subject mated connector to 85±2°C for 500 hours. (EIA-364-17, Method A, Condition III)

3.11 Mating Force

Mate connector assembly at a rate of 12.5mm per minute.

3.12 Un-mating Force

Un-mate connector assembly at a rate 12.5mm per minute.

3.13 Solder Ability

Immerse solderable portion of contact in molten solder at 245°C for 5 seconds.

3.14 Resistance to Soldering Heat

Test connector per EIA-364-56B, procedure 6, level 4.

3.15 Current Rating

Wire contact P2 & P3 in parallel for power. Wire contact P5 & P6 in parallel for return.

Apply 3A total DC current to parallel contacts P2 & P3 and return from parallel contact P5 & P6.

3.16 Mixed Flowing Gas

Expose half of samples un-mated for 7 days then mated for 7 additional days and expose other half of samples mated 14 days. (EIA-364-65, Class 2A)