

QUALIFICATION TEST REPORT

ON

**1mm FFC Connector, SMT Type, Non ZIF Type,
Vertical & Horizontal**

(General)

501-51042

Design Objectives: 108-51054 Revision A

Test Request No.: T04 - 033

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	SPEC: Qualification Test Report on 1mm FFC Connector, SMT Type, Non ZIF Type (Horizontal & Vertical) - GENERAL		501-51042
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	Table of Contents	Page
1.	Introduction	4
1.1	Purpose	4
1.2	Scope	4
1.3	Conclusion	4
1.4	Product Description	4
1.5	Test Samples	4
1.6	Qualification Test Sequence	5
2.	Summary of Testing	5
2.1	Examination of Product	5
2.2	Termination resistance	5 ~ 7
2.3	Insulation resistance	8
2.4	Dielectric Withstanding Voltage	8
2.5	Temperature rise	9
2.6	FFC Mate & Un-mate Force	9 ~ 10
2.7	Solder ability	10
3.	Test Methods	11
3.1	Examination of Product	11
3.2	Insulation Resistance	11
3.3	Dielectric Withstanding Voltage	11
3.4	Contact / Termination resistance	11
3.5	Temperature Rise	11
3.6	Solder ability	11
3.7	Durability	11
3.8	FFC Mate & Un-mate test	11
3.9	Humidity (Steady state)	12
3.10	Thermal Shock	12
3.11	Vibration	12
3.12	Physical Shock	12

3.13	Resistance to Cold	12
3.14	Temperature Life	12
3.15	Salt Spray	12
3.16	Resistance to Solder Heat	12

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Qualification Test Report

Introduction

1.1 Purpose

Testing was performed on 1mm FFC Connector, SMT Type, Horizontal & Vertical, (Non ZIF Type) so as to determine its conformance to the requirements of Design Objectives 108-51054 Rev A.

1.2 Scope

This report covers the electrical, mechanical and environmental performance of 1mm FFC Connector, SMT Type, Horizontal & Vertical, manufactured by Tyco Electronics Manufacturing (S) Pte Ltd.

1.3 Conclusion

The 1mm FFC Connector, SMT Type, Horizontal & Vertical, meets all the electrical, mechanical and environmental requirements of Design Objectives 108-51054 Rev A.

1.4 Product Description

The 1mm FFC Connector, SMT type, Horizontal & Vertical, was made up of pitch 1.0mm. Housing material is made of Hi-Temp Glass-filled Nylon, UL94V-0.

The contacts are made of Phosphor Bronze material. Contacts were plated with 1.0µm minimum of tin over nickel under-plate.

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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:

Part No.	Description
4-0084981-0	1mm FFC Connector, SMT Type, Horizontal
4-0084982-0	1mm FFC Connector, SMT Type, Vertical

This qualification report also covered the X-0084981-X, X-84982-X & X-1735042-X part nos. series.

1.6 Qualification Test Sequence

Test	Test Group									
	1	2	3	4	5	6	7	8	9	10
Confirmation of Product	1,7	1,8	1,6	1,5	1,3	1,5	1,5	1,5	1,3	1,3
Termination Resistance		2,7	2,5	2,4		2,4	2,4	2,4		
Insulation Resistance	2,5									
Dielectric Strength	3,6									
Vibration			3							
Physical Shock			4							
Solder ability									2	
Resistance to Soldering heat										2
FFC Mating force		3,6								
FFC Un-mating force		4								
Durability		5								
Temperature rise Vs Current					2					
Thermal Shock				3						
Humidity (Steady state)	4									
Salt spray							3			
Temperature Life						3				
Cold Resistance								3		

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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 2, 3, 4, 6, 7 & 8

All samples meet the requirement of 30 mΩ (maximum) initial Termination resistance. All samples meet the requirement of 50 mΩ (maximum) after test / environmental conditions.

All Termination Resistance measurement in mΩ

Test Group (TG)	2 (Durability)			
	Horizontal		Vertical	
Sample ID	Initial	After	Initial	After
Test condition	Initial	After	Initial	After
Sample size	6	6	6	6
Number of measurement	60	60	60	60
Average	17.89	18.71	17.45	18.68
Minimum	16.80	17.44	16.06	17.48
Maximum	19.61	20.05	19.15	20.31

Test Group (TG)	3 (Vibration & Physical Shock)			
	Horizontal		Vertical	
Sample ID	Initial	After Physical shock	Initial	After Physical shock
Test Condition	Initial	After Physical shock	Initial	After Physical shock
Sample size	6	6	6	6
Number of measurement	60	60	60	60
Average	18.31	18.73	16.75	19.67
Minimum	17.64	17.63	15.19	16.02
Maximum	19.53	20.09	19.07	23.61

Test Group (TG)	4 (Thermal shock)			
Sample ID	Horizontal		Vertical	
Test Condition	Initial	After	Initial	After
Sample size	6	6	6	6
Number of measurement	60	60	60	60
Average	18.41	18.86	17.13	17.91
Minimum	16.80	17.62	15.85	15.55
Maximum	20.33	20.56	18.85	20.03

Test Group (TG)	6 (Temperature Life)			
Sample ID	Horizontal		Vertical	
Test Condition	Initial	After	Initial	After
Sample size	6	6	6	6
Number of measurement	60	60	60	60
Average	18.48	19.40	16.86	17.94
Minimum	17.35	18.20	14.98	16.16
Maximum	20.35	20.66	18.97	19.38

Test Group (TG)	7 (Salt Spray)			
Sample ID	Horizontal		Vertical	
Test Condition	Initial	After	Initial	After
Sample size	6	6	6	6
Number of measurement	60	60	60	60
Average	17.50	18.55	16.27	19.30
Minimum	16.58	17.29	14.82	16.01
Maximum	18.25	19.71	17.99	24.90

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Test Group (TG)	8 (Resistance to Cold)			
Sample ID	Horizontal		Vertical	
Test Condition	Initial	After	Initial	After
Sample size	6	6	6	6
Number of measurement	60	60	60	60
Average	17.48	17.55	16.43	16.45
Maximum	16.87	16.98	15.28	14.88
Minimum	18.07	18.06	17.68	18.35

2.3 Insulation Resistance – Test group 1

All insulation resistance readings between adjacent contacts were greater than 1000 MΩ.

Test Group (TG)	1 (Humidity, Steady state)			
Sample ID	Horizontal		Vertical	
Test Condition	Initial	After	Initial	After
Sample size	5	5	5	5
Number of measurement	50	50	50	50
Average	1.64E+12	4.89E+12	1.84E+12	8.71E+12
Minimum	3.70E+11	4.56E+10	3.54E+11	1.11E+12
Maximum	8.27E+12	1.03E+13	2.98E+12	2.83E+13

2.4 Dielectric Withstanding Voltage – Test group 1

Horizontal

No dielectric breakdown or flashover or leakage of current greater than 0.5mA occurred when a test voltage of 500 VAC was applied between adjacent contacts.

Vertical

No dielectric breakdown or flashover or leakage of current greater than 0.5mA occurred when a test voltage of 500 VAC was applied between adjacent contacts.

2.5 Temperature Rise – Test group 5

Temperature rise meet the requirement of less than 30 °C.

All Temperature readings in °C

Sample ID	Vertical	Horizontal
Sample size	5	5
No of measurements	15	15
Average	13.29	14.74
Minimum	7.99	7.16
Maximum	17.67	20.10

2.6 FFC Mate / Un-mate Force – Test group 2

The Mating force meets the requirement of 10kgf (Max), for initial and after durability.

All force measurements in Kgf.

Test Group (TG)	2 (Mating Force)			
Sample ID	Horizontal		Vertical	
Test Condition	1 st Cycle	20 th Cycle	1 st Cycle	20 th Cycle
Sample size	5	5	5	5
Number of measurement	5	5	5	5
Average	4.155	4.093	4.000	3.280
Maximum	3.988	3.894	3.784	3.043
Minimum	4.361	4.353	4.325	3.616

The Un-mating force meets the requirement of 0.8kgf (Min), for initial and after durability.

All force measurements in Kgf.

Test Group (TG)	2 (Un-mating Force)			
Sample ID	Horizontal		Vertical	
Test Condition	1 st Cycle	20 th Cycle	1 st Cycle	20 th Cycle
Sample size	5	5	5	5
Number of measurement	5	5	5	5
Average	3.571	4.268	2.492	3.061
Maximum	3.471	4.012	2.178	2.629
Minimum	3.664	4.421	2.843	3.345

2.7 Vibration & Physical Shock - Test group 3

No Sample failed the electrical discontinuity.

2.8 Solder ability – Test group 9

All contact leads showed more than 90% solder coverage with no voids and pins hole observed.

2.9 Resistance to Solder Heat – Test group 10

No physical damage was observed after resistance to solder heat.

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, using a test voltage of 500 Vdc. Readings records once it has stabilized.

3.3 Dielectric Withstanding Voltage

A test potential of 500 Vac was applied between adjacent contacts. This potential was held for 1 minute with a current leakage not greater than 0.5mA.

3.4 Contact/Termination resistance

Mated connectors were subjected to a voltage of 20 mV maximum open circuit at 10mA.

3.5 Temperature Rise

Samples subjected to an applied test current of 1.0A DC.

3.6 Solder ability

Dipped solder leads into flux followed by lead free solder bath at 245 ± 5 °C for a time duration of 5 ± 1 seconds.

3.7 Durability

Subject mated connectors to repeated Mate and Un-mate for 20 cycles, at an operation speed of 10 cycles per minute.

3.8 FFC Mating & Un-mating Testing

Mate & Un-mate the connectors at an operation speed of 25.4mm per minute.

3.9 Humidity (Steady state)

Subject mated connectors to Temperature of $40 \pm 2^{\circ}\text{C}$, Humidity of 90~95%RH for 96 hours.

3.10 Thermal shock

Subjected mated connectors to temperature -55°C to 90°C for 5 cycles, each temperature dwell time 30 minutes.

3.11 Vibration

Subject mated connectors for 2 hours in each of 3 mutually perpendicular planes, with 1mA DC applied current. Amplitude of 1.52mm Peak to Peak, frequency of 10-55-10Hz shall be traversed in 1 minute.

3.12 Physical shock

Subject mated connector to 50Gs half sine pulses of 11ms duration along the 3 mutually perpendicular planes.

3.13 Resistance to Cold

Subject mated connector to $-25 \pm 3^{\circ}\text{C}$ for 48 hours.

3.14 Temperature life

Subject mated connector to $85 \pm 2^{\circ}\text{C}$ for 250 hours.

3.15 Salt Spray

Subject mated connector to salt concentration of $5 \pm 1\%$, spray time of 48 hours.

3.16 Resistance to Solder Heat

- a) Subject connectors to pre-condition of $30^{\circ}\text{C}/70\%\text{RH}$ for 192 hours. Reflow for 2 cycles. (Refer to figure 2 of product specification).
- b) Soldering iron method, bit temperature of $350 \pm 10^{\circ}\text{C}$, solder times of 3 ~ 4 seconds.