



Reference Product Specifications: **108-5390 Rev F1**

Reference Report: **Qualification Report 501-5099 Rev D1**

T04-018 / Q04-041 (Lead free)

T07-071 / Q07-069 (Lead free)

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Qualification Test Report

1. Introduction

1.1 Purpose

Testing was performed on FH 0.8mm Pitch Board-To-Board connector, so as to determine its conformance to the requirements of Product Specification 108-5390

1.2 Scope

This report covers the electrical, mechanical and environmental performance of, FH 0.8mm Pitch Board-To-Board connector manufactured by TE connectivity

1.3 Conclusion

The FH 0.8mm Pitch Board-To-Board connector meets all the electrical, mechanical and environmental requirements of Product Specification 108-5390

1.4 Product Description

The FH 0.8mm Pitch Board-To-Board connector, housing material is made of LCP. The contacts are made of Copper alloy for receptacle and Brass for plug. Contacts finish were 0.0002mm min thick Gold plated on contact area only over Nickel under-plate all over.

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 Number	Description
0-5177983-6	AMP FH 0.8mm Pitch receptacle, Ht. 5mm
5-517910-6	AMP FH 0.8mm Pitch receptacle, Ht. 13mm
177877-2	AMP FH 0.8mm Pitch receptacle, 60P
177983-3	AMP FH 0.8mm Pitch receptacle, 80P
2-5084968-1	AMP FH 0.8mm Pitch receptacle, 40P
2-5179230-6	AMP FH 0.8mm Pitch plug, Ht. 6mm
1735408-1	AMP FH 0.8mm Pitch plug, 40P
177880-2	AMP FH 0.8mm Pitch plug, 60P
917434-3	AMP FH 0.8mm Pitch right angle plug, 80P
7-5179180-1	AMP FH 0.8mm Pitch receptacle, 40P

1.6 Qualification Test Sequence

Test items	Test Group										
	1	2	3	4	5	6	7	8	9	10	11
	Test Sequence (a)										
Confirmation of product	1,9	1,9	1,5	1,5	1,5	1,5	1,5	1,5	1	1,3	1,3
Termination resistance (Low level)	2,6	2,8	2,4	2,4	2,4	2,4	2,4	2,4	2		
Dielectric Strength	4,8										
Insulation resistance	3,7										
Vibration (Frequency)			3								
Physical shock				3							
Connector Mating force		3,6									
Connector Un-mating force		4,7									
Durability (Repeatedmate/un-mate)		5									
Reflow soldering heat (SMT type)									3		
Thermal shock					3						
Humidity-Temperature cycling	5										
Salt spray						3					
Industrial Gas (SO2)							3				
Temperature life (Heat aging)								3			
Solder ability										2	
Reflow Soldering Heat (Lead free)											2

Notes: - (a) Discontinuities shall not take place in this test group, during test

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, 4, 5, 6, 7, 8 & 9

All samples meet the requirement of 30 mΩ (maximum) initial termination resistance. All samples meet the requirement of R 20 mΩ (maximum) final after test / environmental conditions.

All Termination Resistance Measurement in mΩ

Test Group (TG)	1 (Temperature-Humidity Cycling)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.42	16.27	0.85
Overall minimum	14.16	14.75	-0.39
Overall maximum	17.13	19.30	3.88
Overall Stdev	0.45	0.97	0.88
Disposition	Pass	-	Pass

Test Group (TG)	2 (Durability)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.65	15.23	-0.46
Overall minimum	14.16	13.96	-3.17
Overall maximum	18.78	19.53	3.28
Overall Stdev	0.91	0.71	0.68
Disposition	Pass	-	Pass

Test Group (TG)	3 (Vibration)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.89	16.15	0.26
Overall minimum	14.54	14.72	-2.54
Overall maximum	18.64	20.32	3.55
Overall Stdev	0.74	0.94	1.22
Disposition	Pass	-	Pass

Test Group (TG)	3 (Vibration)	
Sample ID	Lead free	
Test condition	Initial	After
No. of measurement	50	50
Overall average	16.51	16.34
Overall minimum	14.05	12.79
Overall maximum	19.61	18.84
Overall Stdev	1.33	1.45
$\Delta R(\text{Max})$	-0.89	
Disposition	-	Pass

Test Group (TG)	4 (Physical shock)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.72	15.69	-0.03
Overall minimum	14.24	14.44	-3.22
Overall maximum	18.56	18.31	2.61
Overall Stdev	0.84	0.68	1.00
Disposition	Pass	-	Pass

Test Group (TG)	4 (Physical shock)	
Sample ID	Lead free	
Test condition	Initial	After
No. of measurement	50	50
Overall average	16.05	16.06
Overall minimum	14.02	13.25
Overall maximum	17.93	18.53
Overall Stdev	1.13	1.37
$\Delta R(\text{Max})$	-	1.38
Disposition	Pass	Pass

Test Group (TG)	5 (Thermal shock)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.69	16.15	0.46
Overall minimum	14.44	14.72	-1.33
Overall maximum	18.31	20.32	3.29
Overall Stdev	0.68	0.94	0.64
Disposition	Pass	-	Pass

Test Group (TG)	5 (Thermal shock)	
Sample ID	Lead free	
Test condition	Initial	After (ΔR)
No. of measurement	320	320
Overall average	18.77	0.02
Overall minimum	16.58	-2.07
Overall maximum	20.97	5.52
Overall Stdev	0.67	0.58
Disposition	Pass	Pass

Test Group (TG)	6 (Salt spray)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.51	15.11	-0.40
Overall minimum	14.47	14.09	-1.85
Overall maximum	17.70	17.26	1.01
Overall Stdev	0.60	0.57	0.32
Disposition	Pass	-	Pass

Test Group (TG)	7 (SO ₂ Gas)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.67	16.64	0.98
Overall minimum	14.37	14.23	-1.74
Overall maximum	17.89	19.89	3.99
Overall Stdev	0.69	1.29	1.10
Disposition	Pass	-	Pass

Test Group (TG)	8 (Temperature life – 96 hours)		
Sample ID	Leaded		
Test condition	Initial	After	ΔR
No. of measurement	300	300	300
Overall average	15.25	16.17	0.93
Overall minimum	13.89	14.67	-2.29
Overall maximum	17.88	17.94	3.62
Overall Stdev	0.51	0.79	0.82
Disposition	Pass	-	Pass

Test Group (TG)	8 (Temperature life – 250 hours)	
Sample ID	Leaded	
Test condition	Initial	ΔR
No. of measurement	300	300
Overall average	16.01	0.76
Overall minimum	14.14	-1.77
Overall maximum	18.15	3.57
Overall Stdev	0.83	0.75
Disposition	-	Pass

Test Group (TG)	8 (Temperature life – 500 hours)	
Sample ID	Leaded	
Test condition	Initial	ΔR
No. of measurement	300	300
Overall average	16.20	0.94
Overall minimum	13.42	-4.08
Overall maximum	20.45	5.15
Overall Stdev	1.25	1.09
Disposition	-	Pass

Test Group (TG)	8 (Temperature life – 96 hours)	
Sample ID	Lead free	
Test condition	Initial	After (ΔR)
No. of measurement	320	320
Overall average	18.92	0.48
Overall minimum	16.65	-0.98
Overall maximum	21.27	6.91
Overall Stdev	0.79	0.66
Disposition	Pass	Pass

2.3 Connector Mating/Un-mating force

Unit: Kgf

Test Group (TG)	2 (Mating force)	
Sample ID	Leaded	
Test condition	Initial	After 100 th Cycle
No. of measurement	5	5
Overall average	1.90 (0.032 per contact)	1.97 (0.033 per contact)
Overall minimum	1.79 (0.028 per contact)	1.90 (0.032 per contact)
Overall maximum	2.00 (0.033 per contact)	2.05 (0.034 per contact)
Overall Stdev	0.090 Max (per contact)	
Disposition	Pass	Pass

Test Group (TG)	2 (Un-Mating force)	
Sample ID	Leaded	
Test condition	Initial	After 100 th Cycle
No. of measurement	5	5
Overall average	0.98 (0.016 per contact)	1.05 (0.018 per contact)
Overall minimum	0.90 (0.015 per contact)	0.95 (0.016 per contact)
Overall maximum	1.05 (0.018 per contact)	1.10 (0.018 per contact)
Overall Stdev	0.010 Max (per contact)	
Disposition	Pass	Pass

2.4 Insulation Resistance – Test Group 1

All tested samples (both Leaded and Lead free), were measured with resistance readings that exceed 500M , before and after environmental test.

2.5 Dielectric Withstanding Voltage – Test Group 1

No dielectric breakdown or flashover or leakage of current greater than 5mA occurred (both Leaded and Lead free samples) when a test voltage of 500 VAC was applied between adjacent terminals of mated/unmated connector assemblies, before and after environmental test.

2.6 Vibration & Physical Shock - Test Group 3 & 4

No Sample failed the electrical discontinuity.

2.7 Solder ability – Test Group 10

All contact leads showed more than 95% solder coverage with no voids and pins hole observed, for both Leaded and Lead free samples.

2.8 Reflow Soldering Heat (Lead free) – Test Group 11

No physical damage was observed after reflow.

2.9 Reflow Soldering Heat (Leaded) – Test Group 9

No physical damage was observed after reflow.

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

Impressed voltage 500VDC. Test between adjacent circuits of un-mated connectors.
(Spec. 109-5302)

3.3 Dielectric Strength

Test between adjacent circuits of mate/un-mated connectors. 500VAC for one minute.
(Spec. 109-5301)

3.4 Termination Resistance (Low Level)

Subject mated contacts assembled in housing to open circuit voltage of 20mV maximum, closed circuit current at 10mA maximum. (Spec. 109-5311-1)

3.5 Connector Mating/Un-mating force

Measure force required to mate and un-mate connector. Operation speed: 100mm per minute.
(Spec. 109-5206)

3.6 Durability (Repeated mate/Un-mate)

Operation speed: 100mm per minute. No. of cycles: 100 cycles. (Spec. 109-5213)

3.7 Vibration (Frequency)

Subject mated connectors to 10-55-10Hz Traverse in 1 minute at 1.52mm amplitude; 2 hours in each of the 3 mutually perpendicular planes. (Spec. 109-5201)

3.8 Physical Shock

Accelerated velocity: 50G / Duration: 11ms

Waveform: Saw tooth shock pulse

Number of drops: 18 drops / Velocity change: 11.3 m/s

Spec. 109-5208

3.9 Resistance to Reflow Soldering Heat (SMT type)

Spec. 109-201, Condition B

Step	Leaded	Lead-free
Pre-heat	100~105°C; 60 sec.min	100~105°C; 60 sec.min
Heat	210°C min.; 30 sec.max	217°C min.; 60sec. max
Peak temperature	260°C max	240°C max

3.10 Solder ability

Spec. 109-5203

Step	Leaded	Lead-free
Solder Temperature	230±2°C	250±2°C
Immersion duration	3±0.5 sec	-
Flux	Alpha 100	Sparkle ES-1020

3.11 Thermal Shock

Subject mated connector assembly to 5 cycles at -40°C for 30 minute, +125°C for 30 minute. (Spec. 109-5103)

3.12 Humidity-Temperature Cycling

Subject mated connectors to 25~65°C and 90~95%RH for 10 cycles.
(Spec. 109-5106)

3.13 Temperature Life (Heat Aging)

Subject mated connector assemblies to temperature life at 125°C for 4 days.

For Lead free test (Spec. 109-5104)

Subject mated connector assemblies to temperature life at 85°C for 4 days.

For Leaded test (Spec. 109-5104)

3.14 Salt Spray

Subject mated connectors to $5\pm 1\%$ salt concentration for 24 hours.

(MIL-STD-202, Method 101 / Spec. 109-5101)

3.15 Industrial Gas (SO₂)

SO₂ Gas: 10ppm

R.H.: 90~95%

Temperature: Room temperature

Duration: 24 hours

(Spec.109-5107)

APPENDIX
 TERMINATION RESISTANCE, LOW LEVEL (FOR LEADED SAMPLES ONLY)



