CFP 100 Gigabit Pluggable Host Connector and Transceiver Plug Connector System

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics CFP 100 Gigabit Pluggable Host Connector and Transceiver Plug Connector System to determine its conformance to the requirements of Product Specification 108-2399 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the CFP 100 Gigabit Pluggable Host Connector and Transceiver Plug Connector System. Testing was performed at the Harrisburg Electrical Components Test Laboratory between 02Nov09 and 18Nov10. The test file numbers for this testing are EA20090889T-1 and EA20100730T. This documentation is on file at and available from the Harrisburg Electrical Components Test Laboratory.

1.3. Conclusion

The CFP 100 Gigabit Pluggable Host Connector and Transceiver Plug Connector System listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2399 Revision A.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,2,3,4,5	4 each	2057630-1	CFP receptacle with PdNi plating
2,3	4 each	2057630-1	CFP receptacle with Au plating
1,4,5	4 each	2057629-1	CFP plug with PdNi plating
2,3	8 each	2057629-1	CFP plug with Au plating
1,2,3,5	8 each	2057592-2	CFP rails
1,2,3,5	4 each	2057631-1	Receptacle cover
1,2,3,5	4 each	61-1042614-1	CFP receptacle PCB
1,5	9 each	61-1042615-1	CFP plug PCB
2,3	8 each	61-1042615-1	CFP plug PCB
1,5	3 each	---	Header board cover
2,3	4 each	---	Header board cover
1,2,3	8 each	---	Long jack screws

Figure 1

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

- Temperature: 15 to 35°C
- Relative Humidity: 20 to 80%

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Initial examination of product	1	1	1	1	1
Low Level Contact Resistance (LLCR)	3,5,8	2,4,6,8	2,4,7		2,4,6,8
Insulation resistance				2,6	
Withstanding voltage				3,7	
Random vibration	6				
Mechanical shock	7				
Durability	4				
Plug/receptacle insertion force	2				
Plug/receptacle extraction force	9				
Thermal shock				4	
Thermal cycling					5
Humidity/temperature cycling		7		5	
Temperature life		3(c)			
Temperature life, pre-conditioning			3(c)		
Mixed flowing gas			5		
Dust					3(c)
Minute disturbance		5	6		7
Final examination of product	10	9	8	8	9

NOTE

(a) See paragraph 1.4.
(b) Numbers indicate sequence in which tests are performed.
(c) Precondition specimens with 20 durability cycles.

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance (C of C) was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. LLCR - Test Groups 1, 2, 3 and 5

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage had a change in resistance (ΔR) of less than 10 milliohms after testing.

Reading	Initial	After Durability	After Vibration and Shock
Test Group 1			
Minimum	13.82	-1.69	-2.99
Maximum	22.15	8.89	3.04
Average	16.49	0.53	0.15
Standard Deviation	1.85	1.27	0.87
N	256	256	256

Reading	Initial	After Temperature Life	After Minute Disturbance	After Humidity/Temperature Cycling
Test Group 2, Test Set 1				
Minimum	13.53	-5.35	-4.83	-5.79
Maximum	22.02	5.33	5.84	7.40
Average	16.78	0.06	0.53	-0.03
Standard Deviation	2.00	0.98	1.33	1.28
N	256	256	256	256
Test Group 2, Test Set 2				
Minimum	13.00	-3.30	-2.25	-3.94
Maximum	21.23	7.60	6.00	1.73
Average	16.40	-0.37	0.67	-0.67
Standard Deviation	1.86	1.17	1.33	0.83
N	256	256	256	256

Reading	Initial	After Temperature Life	After Minute Disturbance
Test Group 3, Test Set 3 First 7 Days MFG Unmated, Final 7 Days MFG Mated			
Minimum	13.47	-3.30	-3.93
Maximum	21.59	2.74	8.35
Average	16.59	-0.22	0.14
Standard Deviation	1.91	0.71	1.56
N	128	128	128

Figure 3 (continued)

Reading	Initial	After Temperature Life	After Minute Disturbance
Test Group 3, Test Set 3 Entire 14 Days MFG Mated			
Minimum	14.09	-2.74	-2.86
Maximum	21.21	2.01	2.84
Average	16.92	-0.44	-0.02
Standard Deviation	1.86	0.74	0.97
N	128	128	128
Test Group 3, Test Set 4 First 7 Days MFG Unmated, Final 7 Days MFG Mated			
Minimum	13.53	-2.37	-3.04
Maximum	19.59	5.58	8.70
Average	16.33	-0.33	-0.49
Standard Deviation	1.63	1.16	1.16
N	128	128	128
Test Group 3, Test Set 4 Entire 14 Days MFG Mated			
Minimum	13.31	-2.41	-2.04
Maximum	19.54	1.77	6.86
Average	16.09	-0.46	1.00
Standard Deviation	1.47	0.65	1.62
N	128	128	128

Reading	Initial	After Dust	After Thermal Cycling	After Minute Disturbance
Test Group 5				
Minimum	13.93	-3.73	-4.13	-4.22
Maximum	22.86	6.90	2.44	5.35
Average	16.37	-0.42	-0.50	-0.46
Standard Deviation	1.83	0.81	0.64	0.78
N	256	256	256	256

NOTE *All values in milliohms.*

Figure 3 (end)

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 100 megohms.

2.4. Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Random Vibration - Test Group 1

No discontinuities were detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.

2.6. Mechanical Shock - Test Group 1

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

2.7. Durability - Test Group 1

No evidence of physical damage was visible as a result of mating and unmating the specimens 200 times at a maximum rate of 500 cycles per hour.

2.8. Plug/receptacle Insertion Force - Test Group 1

All plug/receptacle insertion force measurements were less than 37 N [8.3 lbf].

2.9. Plug/receptacle Extraction Force - Test Group 1

All plug/receptacle extraction force measurements were less than 10 N [2.2 lbf].

2.10. Thermal Shock - Test Group 4

No evidence of physical damage was visible as a result of thermal shock testing.

2.11. Thermal Cycling - Test Group 5

No evidence of physical damage was visible as a result of thermal cycling.

2.12. Humidity/temperature Cycling - Test Groups 2 and 4

No evidence of physical damage was visible as a result of humidity/temperature cycling.

2.13. Temperature Life - Test Group 2

No evidence of physical damage was visible as a result of temperature life testing.

2.14. Temperature Life, Preconditioning - Test Group 3

No evidence of physical damage was visible as a result of temperature life preconditioning testing.

2.15. Mixed Flowing Gas - Test Group 3

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.16. Dust - Test Group 5

No evidence of physical damage was visible as a result of exposure to benign dust composition #1.

2.17. Minute Disturbance - Test Groups 2 and 3

No evidence of physical damage was visible as a result of manually unmating and remating the specimens 1 time.

2.18. Final Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS

3.1. Initial Examination of Product

A C of C was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts.

3.2. LLCR

LLCR measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts of mated and unmounted specimens. A test voltage of 300 volts DC was applied for 2 minutes before the resistance was measured.

3.4. Withstanding Voltage

A test potential of 300 volts AC was applied between adjacent contacts of mated and unmounted specimens for 1 minute and then returned to zero.

3.5. Random Vibration

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The spectrum was flat at 0.02 G^2/Hz from 20 to 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.6. Mechanical Shock

Mated specimens were subjected to a mechanical shock test having a half-sine waveform of 30 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 18 shocks. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.7. Durability

Specimens were mated and unmated 200 times at a maximum rate of 500 cycles per hour.

3.8. Plug/receptacle Insertion Force

The force required to insert the header into the receptacle was measured using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

3.9. Plug/receptacle Extraction Force

The force required to extract the header from the receptacle was measured using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

3.10. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 105°C with 1 minute transition between temperatures.

3.11. Thermal Cycling

Mated specimens were subjected to 5 cycles of thermal cycling with each cycle consisting of 30 minute dwells at 15 and 85°C with a transition rate of 5°C per minute.

3.12. Humidity/temperature Cycling

Mated specimens were exposed to 10 humidity/temperature cycles. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C twice while maintaining high humidity.

3.13. Temperature Life

Mated specimens were exposed to a temperature of 90°C for 840 hours. Specimens were preconditioned with 20 cycles of durability.

3.14. Temperature Life, Preconditioning

Mated specimens were exposed to a temperature of 90°C for 360 hours. Specimens were preconditioned with 20 cycles of durability.

3.15. Mixed Flowing Gas, Class IIA

Mated and unmated specimens were exposed for 14 days to a mixed flowing gas Class IIA exposure. Class IIA exposure is defined as a temperature of 30°C and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, H_2S at 10 ppb and SO_2 at 100 ppb.

3.16. Dust

Unmated specimens were subjected to benign dust composition #1 for 1 hour. Prior to exposure, the dust was dried at 50°C for 1 hour. After exposure, the specimens remained in the chamber for 1 hour to allow the dust to settle after which time they were tapped 5 times at a maximum rate of 25.4 mm [1 in] per minute.

3.17. Minute Disturbance

Specimens were manually unmated and remated 1 time.

3.18. Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.