IDC SSL Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics Insulation Displacement (IDC) Solid State Lighting (SSL) Connector to determine its conformance to the requirements of Product Specification 108-2404 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the IDC SSL Connector. Testing was performed at the Harrisburg Electrical Components Test Laboratory between 06May10 and 21Dec10. The test file number for this testing is EA20100403T. This documentation is on file at and available from the Harrisburg Electrical Components Test Laboratory.

1.3. Conclusion

The IDC SSL Connector listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2404 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	Notes
1	45	2106431-4	4 position yellow surface mount assembly with 18 AWG wire	1,7
	30	3-2106431-4	4 position red surface mount assembly with 24 AWG wire	2,7
	45	2016751-4	4 position yellow thru hole assembly with 18 AWG wire	1,8
	30	3-2106751-4	4 position red thru hole assembly with 24 AWG wire	2,8
2	15	2106431-4	4 position yellow surface mount assembly with 18 AWG wire	3,3
	10	3-2106431-4	4 position red surface mount assembly with 24 AWG wire	4,7
	10	1-2106431-4	4 position blue surface mount assembly with 20 AWG wire	5,7
	10	2-2106431-4	4 position green surface mount assembly with 22 AWG wire	4,7
	15	2016751-4	4 position yellow thru hole assembly with 18 AWG wire	3,8
	10	2-2106751-4	4 position green thru hole assembly with 22 AWG wire	4,8
	10	3-2106751-4	4 position red thru hole assembly with 24 AWG wire	4,8
	10	1-2016751-4	4 position blue thru hole assembly with 20 AWG wire	5,8
3	5	2106431-4	4 position yellow surface mount assembly with 18 AWG wire	6,9
	5	2106431-3	3 position yellow surface mount assembly with 18 AWG wire	6,9
	5	2106431-2	2 position yellow surface mount assembly with 18 AWG wire	6,9

Figure 1 (continued)

Test Group	Quantity	Part Number	Description	Notes
4,5	15 each	2106431-4	4 position yellow surface mount assembly with 18 AWG wire	3,7
	10 each	3-2106431-4	4 position red surface mount assembly with 24 AWG wire	4,7
	15 each	2106431-1	1 position yellow surface mount assembly with 18 AWG wire	3,7
	10 each	3-2106751-4	4 position red thru hole assembly with 24 AWG wire	4,8

NOTE

(1) 15 specimens with solid wire, 15 specimens with 7 strand wire and 15 specimens with 16 strand wire.
(2) 15 specimens with solid wire and 15 specimens with 7 strand wire.
(3) 5 specimens with solid wire, 5 specimens with 7 strand wire and 5 specimens with 16 strand wire.
(4) 5 specimens with solid wire and 5 specimens with 7 strand wire.
(5) 5 specimens with solid wire and 5 specimens with 7 strand wire.
(6) 5 specimens on solid wire.
(7) Surface mount specimens were mounted to test board part number 60-1042621-1.
(8) Thru hole specimens were mounted to test board part number 60-1042671-1.
(9) Test Group 3 specimens were not mounted to test boards.

Figure 1 (end)

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)	2,5	2,7			
Withstanding voltage			3,8		
Insulation resistance			2,7		
Temperature rise vs current		3,8			
Random vibration	3	6			
Mechanical shock	4				
Wire insertion force				2	2
Termination tensile strength, parallel				3	
Termination tensile strength, perpendicular					3
Thermal shock			4		
Humidity/temperature cycling		4	5		
Temperature life		5	6		
Final examination of product	6	9	9	4	4

NOTE *(a) See paragraph 1.4.*
(b) Numbers indicate sequence in which tests are performed.

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 and 2

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 18 milliohms initially and had a change in resistance (ΔR) of less than 5 milliohms after testing.

2.3. Withstanding Voltage - Test Group 3

No dielectric breakdown or flashover occurred.

2.4. Insulation Resistance - Test Group 3

All insulation resistance measurements were greater than 1 megohm.

2.5. Temperature Rise vs Current - Test Group 2

All specimens had a temperature rise of less than 30°C above ambient when tested using a baseline rated current of 8.5 amperes for 18 AWG wire, 7.5 amperes for 20 AWG wire , 7 amperes for 22 AWG wire and 6 amperes for 24 AWG wire.

2.6. Random Vibration - Test Groups 1 and 2

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

2.7. 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.

2.8. Wire Insertion Force - Test Groups 4 and 5

All wire insertion force measurements were less than the requirements shown in Figure 3.

Position Size	Insertion Force (N [lbf] maximum)	
	Wire Size (AWG)	
	18	24
Stranded Wire		
1	222.4 [50]	133.4 [30]
4	778.4 [175]	556 [125]
Solid Wire		
1	178 [40]	89 [20]
4	890 [200]	444.8 [100]

Figure 3

2.9. Termination Tensile Strength, Parallel - Test Group 4

All parallel termination tensile strength measurements were greater than the requirements shown in Figure 4.

Wire Size (AWG)	Crimp Tensile (N [lbf] minimum)
18 solid	102 [23]
18 stranded	53.4 [12]
24 solid	44.5 [10]
24 stranded	22.2 [5]

Figure 4

2.10. Termination Tensile Strength, Perpendicular - Test Group 5

All perpendicular termination tensile strength measurements were greater than the requirements shown in Figure 5.

Wire Size (AWG)	Crimp Tensile (N [lbf] minimum)
18 solid	13.5 [3]
18 stranded	17.8 [4]
24 solid	8.9 [2]
24 stranded	8.9 [2]

Figure 5

2.11. Thermal Shock - Test Group 3

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

2.12. Humidity/temperature Cycling - Test Groups 2 and 3

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

2.13. Temperature Life - Test Groups 2 and 3

No evidence of physical damage was visible as a result of exposure to elevated temperature.

2.14. 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 o f 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 (Figure 6). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage. Wire length was 12 inches with the measurement length being 11 inches. Wire bulk of 11 inches was removed from the measurement

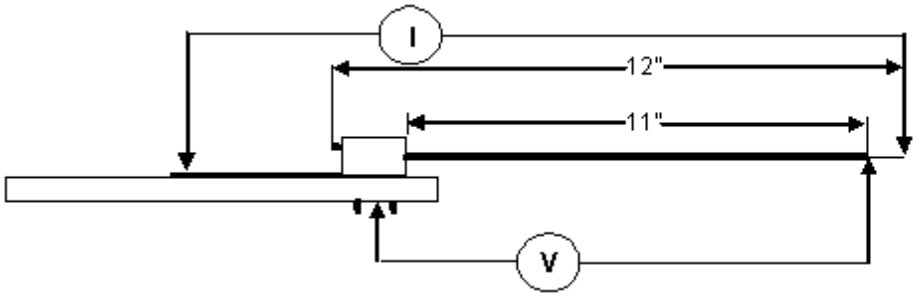

Figure 6
LLCR Measurement Points

3.3. Withstanding Voltage

A test potential of 1500 volts AC was applied between adjacent contacts. This potential was applied for 1 minute and then returned to zero.

3.4. Insulation Resistance

Insulation resistance was measured between adjacent contacts. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.5. Temperature Rise vs Current

All specimens with the same wire gauge were wired in a series circuit. Specimens were subjected to current levels of 8.5 amperes for 18 AWG wire, 7.5 amperes for 20 AWG wire, 7 amperes for 22 AWG wire and 6 amperes for 24 AWG wire. Thirty gauge Type-T thermocouples were attached to the contacts by means of thermally conductive epoxy. The IDC latch was notched away to position the thermocouple bead on the contact. These contacts were monitored for thermal stability defined as when the temperature rise of 3 consecutive readings taken at 5 minute intervals did not differ by more than 1°C. Once thermal stability was obtained, the temperature measurements were recorded.

3.6. Random Vibration

Specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The Power Spectral Density (PSD) 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.

3.7. Mechanical Shock, Half-sine

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.

3.8. Wire Insertion Force

The force necessary to insert the wire into the cover openings and press the cover onto the bottom housing at a rate of 12.7 mm [.5 in] per minute was recorded.

3.9. Termination Tensile Strength, Parallel

Parallel termination tensile strength was measured by holding 1 wire in an air jaw while the PCB with the connector was held in a vise so that the wire was pulled parallel to the board at a rate of 12.7 mm [.5 in] per minute (Figure 7).

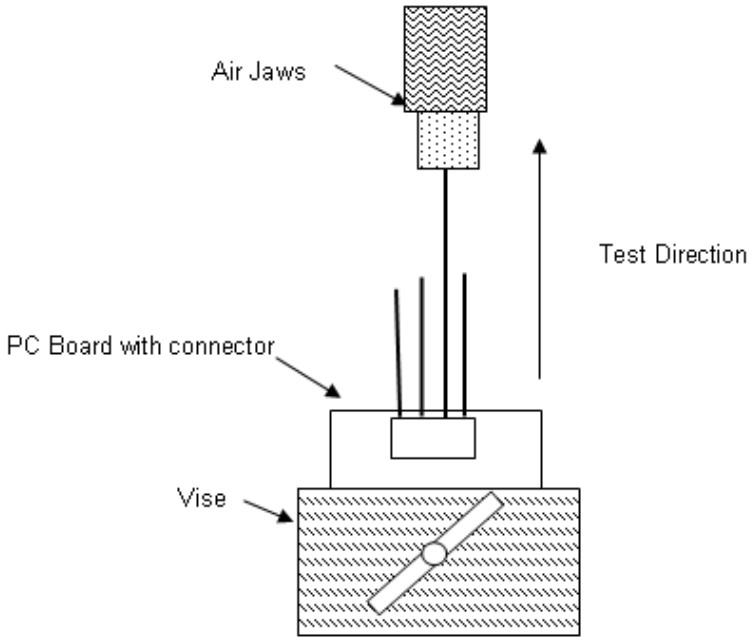

Figure 7

3.10. Termination Tensile Strength, Perpendicular

Perpendicular termination tensile strength was measured by holding 1 wire in an air jaw while the PCB with the connector was held in a vise so that the wire was pulled perpendicular to the board at a rate of 12.7 mm [.5 in] per minute (Figure 8).

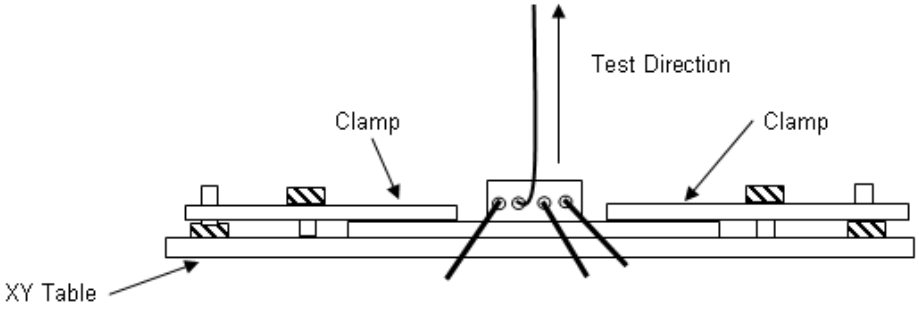

Figure 8

3.11. Thermal Shock

Specimens were subjected to 25 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 105°C and 1 minute transition between temperatures.

3.12. Humidity/temperature Cycling

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 (Figure 9).

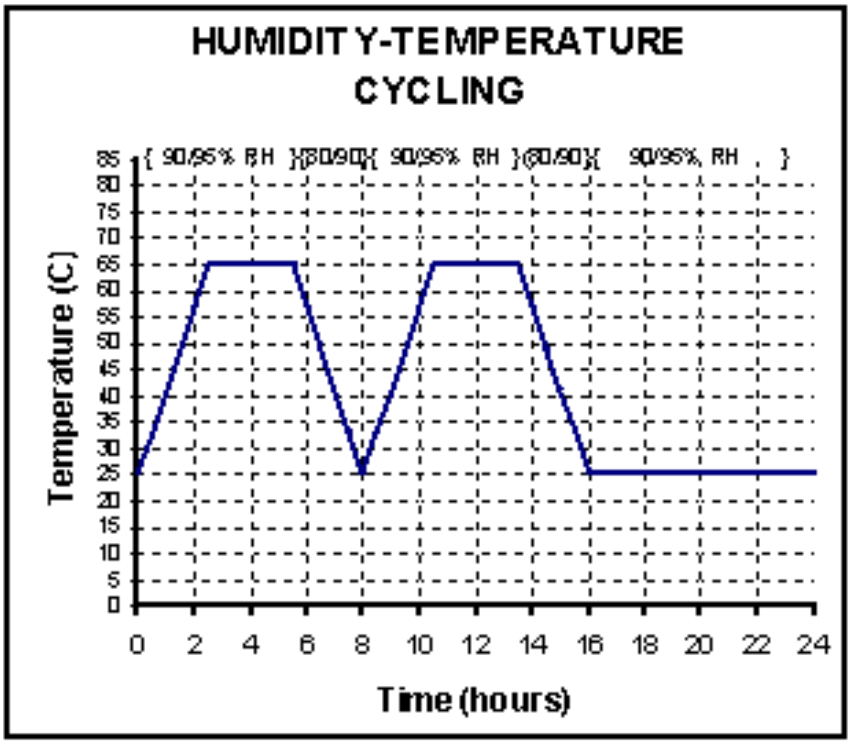

Figure 9
Humidity/Temperature Cycling Profile

3.13. Temperature Life

Specimens were exposed to a temperature of 105°C for 648 hours.

3.14. Final Examination of Product

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