Offset Stacked Modular Jack With LED's, Category 5

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics offset stacked modular jack with LED's, Category 5 to determine their conformance to the requirements of Product Specification 108-1854 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the offset stacked modular jack with LED's, Category 5. Testing was performed at the Americas Global Automotive Division Product Reliability Center, the Engineering Assurance Test Laboratory, and the EME Laboratory between 11Oct00 and 07Jun01. The test file numbers for this testing are 20000147ACL, CTL 2287-005, and EME 2287-001. This documentation is on file at and available from the laboratories listed above.

1.3. Conclusion

The offset stacked modular jack with LED's, Category 5 listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1854 Revision A.

1.4. Product Description

The offset stacked modular jack with LED's, Category 5 are designed to be used in networking equipment for office and Internet connections. The offset of this connector allows a portion of the bottom row jacks to extend below the printed circuit board.

1.5. 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	3	1116317-1	Stacked modular jack assembly, 2 X 8 with LED's, 8 position, shielded panel ground, offset, Cat 5
2,3,4,5,6,7	5		

Figure 1

1.6. Environmental Conditions

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

- Temperature: 15 to 35°C
- Relative Humidity: 25 to 75%

I Indicates change

1.7. Qualification Test Sequence

Test or Examination	Test Group (a)						
	1	2	3	4	5	6	7
	Test Sequence (b)						
Initial examination of product	1	1	1	1	1	1	1
Low level contact resistance	3,7	2,4	2,4				2,4
Insulation resistance				2,6			
Withstanding voltage				3,7			
Crosstalk (NEXT)						2	
Attenuation						3	
Return loss						4	
Surge						5	
Vibration	5						
Mechanical shock	6						
Durability	4						
Mating force	2						
Unmating force	8						
Plug retention in jack					2		
Pull rotational load							3
Thermal shock				4			
Humidity-temperature cycling				5			
Temperature life		3(c)					
Mixed flowing gas			3(c)				
Final examination of product	9	5	5	8	3	6	5

NOTE
(a) See paragraph 1.5.
(b) Numbers indicate sequence in which tests are performed.
(c) Precondition specimens with 10 cycles durability.

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 was issued by the Product Assurance Department. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Low Level Contact Resistance - Test Groups 1, 2, 3 and 7

All low level contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage had a change in resistance (ΔR) of less than 30 milliohms after testing.

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 500 megohms.

2.4. Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Crosstalk (NEXT) - Test Group 6

All crosstalk (NEXT) results were less than the specified values (Figure 3) from 1 to 100 MHz.

Category 5, 100 Ohm Twisted Pair

Frequency (MHz)	NEXT Loss (dB)	Attenuation (dB)	Return Loss (dB)
1.00	65	0.1	23
4.00	65	0.1	23
8.00	62	0.1	23
10.00	60	0.1	23
16.00	56	0.2	23
20.00	54	0.2	23
25.00	52	0.2	14
31.25	50	0.2	14
62.50	44	0.3	14
100.00	40	0.4	14

NOTE *See EIA/TIA 568-A, Oct. 1995*

Figure 3

2.6. Attenuation - Test Group 6

All attenuation results were less than the specified values (Figure 3) from 1 to 100 MHz.

2.7. Return Loss - Test Group 6

All return loss results were less than the specified values (Figure 3) from 1 to 100 MHz.

2.8. Surge - Test Group 6

No dielectric breakdown occurred.

2.9. 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.

2.10. 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.

2.11. Durability - Test Group 1

No physical damage occurred as a result of mating and unmating the specimens 750 times.

2.12. Mating Force - Test Group 1

All mating force measurements were less than 8 pounds.

2.13. Unmating Force - Test Group 1

All unmating force measurements were less than 5 pounds.

2.14. Plug Retention in Jack - Test Group 5

The plug did not dislodge from the jack.

2.15. Pull Rotational Load - Test Group 7

The plug remained mated and no physical damage occurred as a result of pull testing.

2.16. Thermal Shock - Test Group 4

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

2.17. Humidity-temperature Cycling - Test Group 4

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

2.18. Temperature Life - Test Group 2

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

2.19. 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.

2.20. 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

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

3.2. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique (Figure 4). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

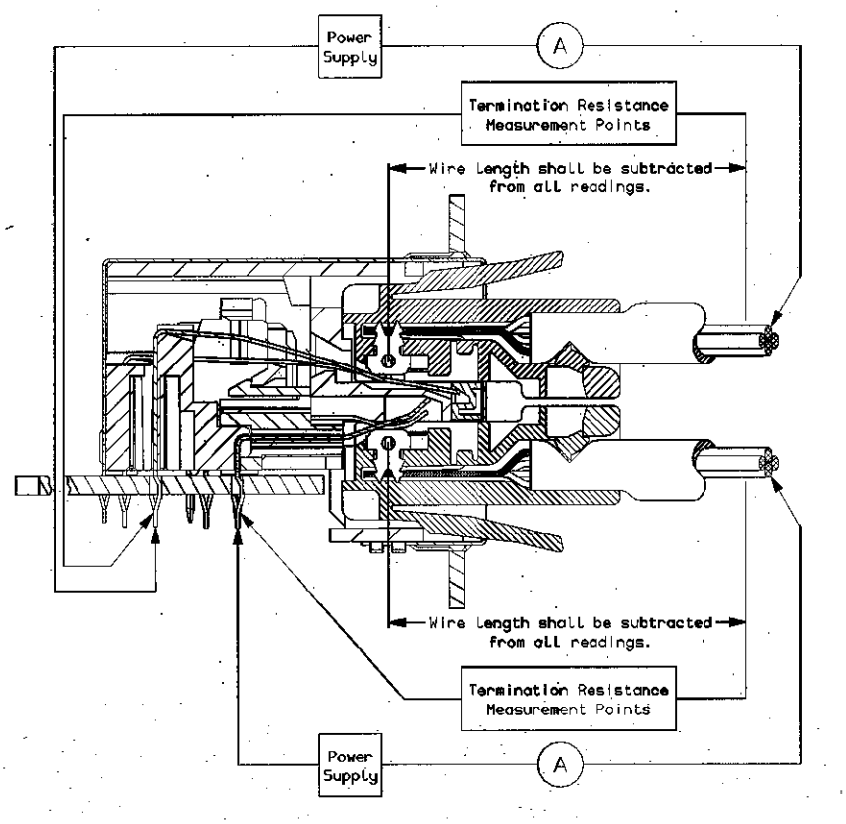

Figure 4
Low Level Contact Resistance Measurement Points

3.3. Insulation Resistance

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

3.4. Withstanding Voltage

A test potential of 1000 volts AC was applied between the adjacent contacts of mated specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Crosstalk (NEXT)

A network analyzer in the S_{21} mode was used to perform the crosstalk test. The S_{21} mode transmits power from Port 1 and receives the signal into Port 2 in a "through" type measurement.

3.6. Attenuation

A network analyzer in the S_{21} mode was used to perform the attenuation test. The S_{21} mode transmits power from Port 1 and receives the signal into Port 2 in a "through" type measurement.

3.7. Return Loss

A network analyzer in the S_{11} mode was used to perform the return loss test. The S_{11} mode transmits power from Port 1 and receives the reflected signal back into Port 1.

3.8. Surge

A surge generator was used to subject specimens to 5 surges of each polarity at 1 minute intervals. Pulses had 10/1000 microsecond shape and 1000 volt peak.

3.9. Vibration, Random

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 5 and 500 Hz. The root-mean square amplitude of the excitation was 3.13 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.

3.10. Mechanical Shock, Half-sine

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.

3.11. Durability

Specimens were mated and unmated 750 times at a maximum rate of 600 cycles per hour.

3.12. Mating Force

The force required to mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of .5 inch per minute.

3.13. Unmating Force

The force required to unmate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of travel of .5 inch per minute.

3.14. Plug Retention in Jack

A 15 pound axial load was applied to individual specimens using a tensile/compression device with a free floating fixture and a rate of travel of .5 inch per minute.

3.15. Pull Rotational Load

A 10 pound axial load was applied to individual specimens, the specimens were then rotated 45 degrees from the pull axis.

3.16. Thermal Shock

Specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -30 and 70°C. The transition between temperatures was less than 1 minute.

3.17. Humidity-temperature Cycling

Specimens were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25°C and 65°C twice while maintaining high humidity (Figure 5).

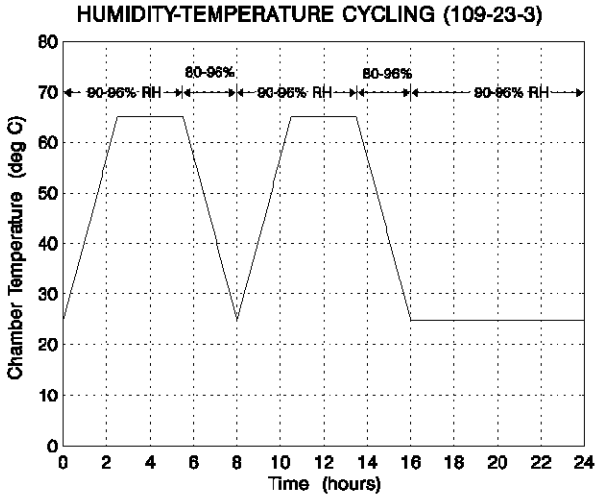

Figure 5
Typical Humidity-Temperature Cycling Profile

3.18. Temperature Life

Mated specimens were exposed to a temperature of 70°C for 500 hours. Specimens were preconditioned with 10 cycles of durability.

3.19. Mixed Flowing Gas, Class IIA

Mated 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. Specimens were preconditioned with 10 cycles of durability.

3.20. Final Examination of Product

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