

Stacked and Multiport Fast Ethernet Modular Jack (Whistler)**1. INTRODUCTION****1.1. Purpose**

Testing was performed on the Tyco Electronics stacked and multiport fast ethernet modular jack (Whistler) to determine its conformance to the requirements of Product Specification 108-1163-9 Revision O.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the stacked and multiport fast ethernet modular jack. Testing was performed at the Americas Global Automotive Division Product Reliability Center between Aug00 and Sep00 and at the Engineering Assurance Product Test Laboratory between 10Sep01 and 15Sep01. The test file numbers for this testing are ACL 20000193 and CTL B009524-007. This documentation is on file at and available from the Americas Global Automotive Division Product Reliability Center and the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

The stacked and multiport fast ethernet modular jack listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1163-9 Revision O.

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
1,3,4,5	5 each	1339114-4	2X6 stacked jack assembly
	5 each	554739-1	8 position plug assembly
	5 each	641660	26 AWG flat cable wire
2	6 each	1339114-4	2X6 stacked jack assembly
	6 each	554739-1	8 position plug assembly
	6 each	641660	26 AWG flat cable wire

Figure 1

1.5. Environmental Conditions

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

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

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	2,4		3,6		
Contact resistance, rated current					2,6
Insulation resistance		2,6			
Withstanding voltage		3,7			
Temperature rise vs current					3,5
Current carrying capacity					4
Surge				2	
Vibration	3				
Durability			5		
Mating force			2		
Unmating force			4		
Plug retention in jack				3	
Jack retention to printed circuit board				4	
Thermal shock		4			
Humidity-temperature cycling		5			
Final examination of product	5	8	7	5	7

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 was issued by Product Assurance. 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 and 3

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. Contact Resistance, Rated Current - Test Group 5

All contact resistance measurements, taken at 1.5 amperes (initial reading) and 1 ampere (final reading) had a change in resistance (ΔR) of less than 30 milliohms after testing.

2.4. Insulation Resistance - Test Group 2

All insulation resistance measurements were greater than 500 megohms.

2.5. Withstanding Voltage - Test Group 2

No dielectric breakdown or flashover occurred.

2.6. Temperature Rise vs Current - Test Group 5

All specimens had a temperature rise of less than 30°C above ambient when tested using a baseline rated current of 1 ampere and the correct derating factor value based on the specimens wiring configuration.

2.7. Current Carrying Capacity - Test Group 5

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

2.8. Surge - Test Group 4

No physical damage occurred as a result of subjecting the specimens to 5 surges in each polarity at 1 minute intervals.

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. Durability - Test Group 3

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

2.11. Mating Force - Test Group 3

All mating force measurements were less than 35.59 N [8 lbf].

2.12. Unmating Force - Test Group 3

All unmating force measurements were less than 35.59 N [8lbf].

2.13. Plug Retention in Jack - Test Group 4

Plug did not dislodge from jack under an axial load of 88.96 N [20 lbf].

2.14. Jack Retention to Printed Circuit Board - Test Group 4

Jack did not dislodge from printed circuit board jack under an axial load of 4.45 N [1 lbf] before soldering and 44.49 N [10 lbf] after soldering.

2.15. Thermal Shock - Test Group 2

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

2.16. Humidity-temperature Cycling - Test Group 2

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

2.17. Final Examination of Product - All Test Groups

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

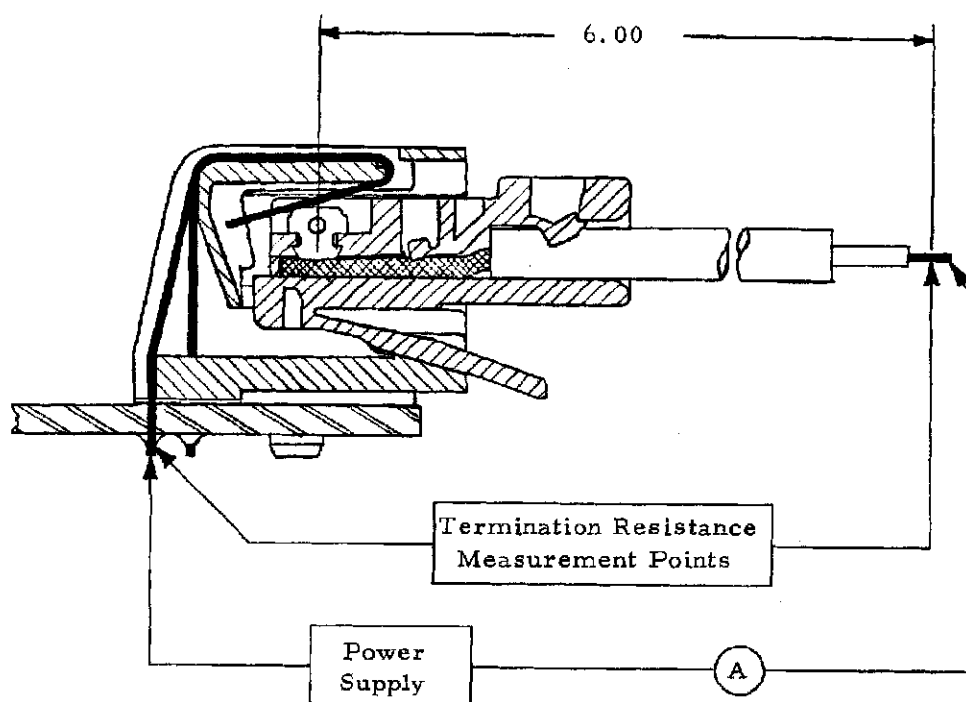
3. TEST METHODS

3.1. Initial Examination of Product

A Certificate of Conformance 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. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique (Figure 3). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.



NOTE Millivolt drop (resistance) due to the 6 inch wire length shall be subtracted from all readings.

Figure 3
Low Level Contact Resistance Measurement Points

3.3. Contact Resistance, Rated Current

Contact resistance measurements were made using a 4 terminal measuring technique (Figure 3). The test current was maintained at 1.5 amperes (initial reading) and 1 ampere (final reading).

3.4. 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.

3.5. Withstanding Voltage

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

3.6. Temperature Rise vs Current

Temperature rise curves were produced by measuring individual contact temperatures at 5 different current levels. These measurements were plotted to produce a temperature rise vs current curve. Thermocouples were attached to individual contacts to measure their temperatures. The ambient temperature was then subtracted from this measured temperature to find the temperature rise. When the temperature rise of 3 consecutive readings taken at 5 minute intervals did not differ by more than 1°C, the temperature measurement was recorded.

3.7. Current Carrying Capacity

Testing consisted of 500 cycles of current cycling, with each cycle having current ON for 15 minutes and current OFF for 15 minutes. The test current was 1.25 amperes AC.

3.8. Surge

Five pulses of a 10/1000 microsecond shape and a 1000 volt peak were applied to the adjacent contacts of the specimens in each polarity at 1 minute intervals.

3.9. Vibration, Random

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 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.

3.10. Durability

Specimens were mated and unmated 750 times at a maximum rate of 500 cycles per hour.

3.11. 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 12.7 mm [.5 in] per minute.

3.12. 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 12.7 mm [.5 in] per minute.

3.13. Plug Retention in Jack

An axial load was applied to the plug in a direction to cause it to separate from the header using a tensile/compression device with a free floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

3.14. Jack Retention to Printed Circuit Board

An axial load was applied to the header assembly in a direction to cause it to separate from the printed circuit board using a tensile/compression device with a free floating fixture and a rate of travel of 50.8 mm [2 in] per minute. The force was applied both before and after soldering.

3.15. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 60°C. The transition between temperatures was less than 1 minute.

3.16. Humidity-temperature Cycling

Mated specimens were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 4 and 60°C twice.

3.17. Final Examination of Product

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