Connector System, MTA 156 Quad

1. INTRODUCTION

1.1. Purpose

| Testing was performed on the Tyco Electronics MTA-.156 Quad Connector System to determine its conformance to the requirements of Product Specification 108-1219 Rev. B.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the MTA-.156 Quad Connector System manufactured by the Automotive/Consumer Business Group. The testing was performed between June 11, 1989 and June 5, 1992. All testing was performed by the Automotive/Consumer Business Group Test and Reliability Laboratory. This report contains data from the following test programs: ACL1521-020, 021, 022, 024, 025, 026, 027, 028, 029 and ACL1524-107. | Additional dielectric withstanding voltage testing, conducted by Underwriters Laboratories, was completed on 15Jan98. Reference UL File E28476, Volume 7, Section 42, issued 19Jun90.

1.3. Conclusion

The MTA-.156 Quad Connector System meets the electrical, mechanical, and environmental | performance requirements of Product Specification 108-1219 Rev. B.

1.4. Product Description

The MTA-.156 connector system can be mass or single wire terminated utilizing insulation displacement technology on .156 inch centerline and mates with .045 inch square posts. This system provides a reliable interconnection between wires and posts mounted on printed circuit boards. The contacts are copper alloy with bright tin-lead plating. The housing is Nylon 6/6, black, UL94V-O.

1.5. Test Samples

Test samples were randomly selected from normal current production lots. The following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1	30	644329-2	Quad receptacle, 2 position (AWG 18)
1	30	640383-2	MTA-156 header, 2 position
8	6	644370-5	Quad receptacle, 5 position
1,2,3,5,6,7	55	644329-6	Quad receptacle, 6 position (AWG 18)
9	5	644375-6	Qual receptacle, 6 position (AWG 18)
1,3,6,7	45	644370-6	Quad receptacle, 6 position (AWG 20)
1,3,6,7	45	644371-6	Quad receptacle, 6 position (AWG 22)
1,2,3,5,6,7,9	90	640383-6	MTA-156 header, 6 position
1,4	33	1-644329-0	Quad receptacle, 10 position (AWG 18)
1,4	33	1-640383-0	MTA-156 header, 10 position

* Trademark
| Indicates change

1.6. Qualification Test Sequence

Test or Examination	Test Groups								
	1	2	3	4	5	6	7	8	9
Examination of product	1,9	1,6	1,6	1,9	1,8	1,5	1,5	1	1,5
Termination resistance	3,6	2,5	2,5	2,8		2,4	2,4		2,4
Dielectric withstanding voltage					3,7				
Insulation resistance					2,6				
Temperature rise vs current				3,7					
Current cycling							3		
Vibration	5			6					
Physical shock									3
Mating force	2								
Unmating force	7								
Contact retention								2	
Crimp tensile	8								
Durability	4	3	3						
Thermal shock					4	3			
Humidity-temperature cycling			4	4	5				
Temperature life		4		5					

NOTE *The numbers indicate sequence in which tests were performed.*

2. SUMMARY OF TESTING

2.1. Examination of Product - All Groups

All samples submitted for testing were selected from normal current production lots. They were inspected and accepted by the Product Assurance Department of the Automotive/Consumer Business Group.

2.2. Termination Resistance, Dry Circuit - Groups 1, 2, 3, 4, 6, 7 and 9

All termination resistance measurements, taken at 100 milliamperes DC and 50 millivolts open circuit voltage were less than 3.0 milliohms initially and had a change in resistance (ΔR) of less than 3.0 milliohms after testing.

Test Group	Number of Samples	Condition	Min	Max	Mean
1	540	Initial	0.57	0.81	0.66
		After mechanical (ΔR)	-0.11	+1.10	+0.20
2	30	Initial	0.59	0.73	0.66
		After temperature life (ΔR)	+0.06	+1.34	+0.46
3	90	Initial	0.56	0.77	0.67
		After Humidity-temperature cycling (ΔR)	+0.04	+0.91	+0.26
4	30	Initial	0.70	0.77	0.73
		After current verification (ΔR)	+0.40	+2.85	+1.12
6	90	Initial	0.58	0.72	0.65
		After thermal shock (ΔR)	-0.05	+0.13	+0.02
7	90	Initial	0.96	1.75	1.27
		After current cycling (ΔR)	0.00	+0.46	+0.11
9	30	Initial	0.74	0.81	0.77
		After physical shock (ΔR)	+0.01	+0.09	+0.03

NOTE *All values in milliohms.*

2.3. Dielectric Withstanding Voltage - Group 5

No dielectric breakdown or flashover occurred when a test voltage was applied between adjacent contacts.

2.4. Insulation Resistance - Group 5

All insulation resistance measurements were greater than 5,000 megohms.

2.5. Temperature Rise vs Current - Group 4

All samples had a temperature rise of less than 30°C above ambient when specified current was applied.

2.6. Current Cycling - Group 7

No evidence of physical damage was visible to the test samples after 500 cycles of cycling the current on and off.

2.7. Vibration - Groups 1 and 4

No discontinuities of the contacts were detected during vibration (Group 1 only). Following vibration testing, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.8. Physical Shock - Group 9

No discontinuities of the contacts were detected during physical shock. Following physical shock testing, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.9. Mating Force - Group 1

All mating force measurements were less than 4.7 pounds for 2 position connectors, 14.5 pounds for 6 position connectors and 26.5 pounds for 10 position connectors.

2.10. Unmating Force - Group 1

All unmating force measurements were greater than 0.5 pound for 2 position connectors, 1.0 pound for 6 position connectors and 3.0 pounds for 10 position connectors.

2.11. Contact Retention - Group 8

No physical damage occurred to the contacts and no contacts dislodged from the housings as a result of supplying an axial load of 5.0 pounds to the contacts.

2.12. Crimp Tensile (Straight and Perpendicular) - Group 1

All straight tensile values were greater than 26.5 pounds for samples with AWG 18 wire, 17.0 pounds for samples with AWG 20 wire, and 12.0 pounds for samples with AWG 22 wire. All perpendicular tensile values were greater than 4.5 pounds for samples with AWG 18 wire, 4.0 pounds for samples with AWG 20 wire, and 3.4 pounds for samples with AWG 22 wire.

2.13. Durability - Groups 1, 2 and 3

No physical damage occurred to the samples as a result of mating and unmating the assemblies 25 times.

2.14. Thermal Shock - Groups 5 and 6

No evidence of physical damage to either the contacts or the connector was visible as a result of thermal shock.

2.15. Humidity-temperature Cycling - Groups 3, 4 and 5

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to humidity-temperature cycling.

2.16. Temperature Life - Groups 2 and 4

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to an elevated temperature.

3. TEST METHODS

3.1. Examination of Product

Product drawings and inspection plans were used to examine the samples. They were examined visually and functionally.

3.2. Termination Resistance, Low Level

Termination resistance measurements at low level current were made using a four terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes DC with an open circuit voltage of 50 millivolts DC.

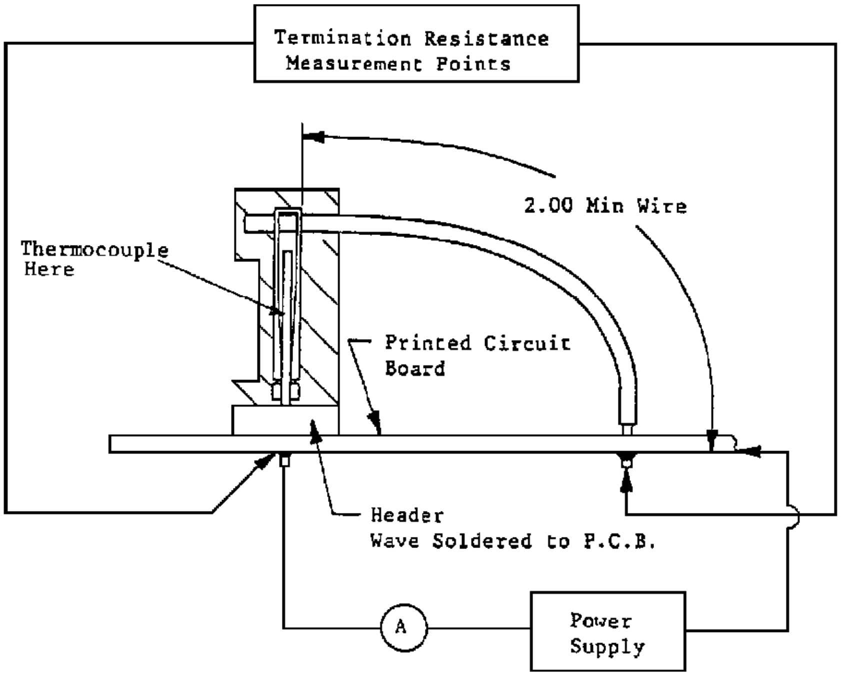

Figure 1
Typical Termination Resistance Measurement Points

3.3. Dielectric Withstanding Voltage

A test potential of 2.2 kvac was applied between the adjacent contacts. This potential was applied for one minute and then returned to zero.

3.4. Insulation Resistance

Insulation resistance was measured between adjacent contacts, using a test voltage of 500 volts DC. This voltage was applied for one minute before the resistance was measured.

3.5. Temperature Rise vs Specified Current

Assembly temperature was measured, while energized at the specified current of 10 amperes AC. Thermocouples were attached to the connectors to measure their temperatures. This temperature was then subtracted from the ambient temperature to find the temperature rise. When three readings at five minute intervals were the same, the readings were recorded.

3.6. Current Cycling

The connector assemblies were cycled on and off at 125% of the specified current. Testing consisted of 500 cycles, with each cycle having current on for 15 minutes and current off for 15 minutes.

3.7. Vibration, Sine

Mated connector assemblies were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude. The vibration frequency was varied uniformly between the limits of 10 and 55 Hz and returned to 10 Hz in one minute. This cycle was performed 120 times in each of three mutually perpendicular planes, for a total vibration time of 6 hours. Group 1 connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit. Group 4 connectors were energized with a current capable of producing an approximate temperature rise of 18°C above ambient.

3.8. Physical Shock

Mated connector assemblies were subjected to a physical shock test, having a half-sine waveform of 50 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular planes, for a total of 18 shocks. The connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.9. Mating Force

The force required to mate connector assemblies was measured, using a free floating fixture with the rate of travel at 0.5 inch/minute.

3.10. Unmating Force

The force required to unmate connector assemblies was measured using a free floating fixture with the rate of travel at 0.5 inch/minute.

3.11. Contact Retention

An increasing axial load was applied to each contact. The force was applied in a direction to cause removal of the contacts from the housing. Special housings cut away to expose the contact tops were used.

3.12. Crimp Tensile

A force parallel to the axis of the wire was applied to each sample at a crosshead rate of 1.0 inch per minute. A force perpendicular to the axis of the wire was applied to each sample at a crosshead rate of 1.0 inch per minute.

3.13. Durability

Connector assemblies were mated and unmated 25 times at a rate not exceeding 600 per hour.

3.14. Thermal Shock

Mated connector assemblies were subjected to 25 cycles of temperature extremes with each cycle consisting of 60 minutes at each temperature. The temperature extremes were -55°C and 85°C. The transition between temperatures was less than one minute.

3.15. Humidity-Temperature Cycling

Mated connector assemblies 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 the relative humidity was held at 95%. During five of the first nine cycles, the connectors were exposed to a cold shock at -10°C for 3 hours.

3.16. Temperature Life

Mated connector assemblies were exposed to a temperature of 105°C for 792 hours (33 days).