High Density Hybrid Power Connectors

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics High Density Hybrid Power Connectors to determine their conformance to the requirements of Product Specification 108-9070 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the High Density Hybrid Power Connectors. Testing was performed at the Engineering Assurance Product Testing Laboratory between 25Feb94 and 22Jul94. The test file number for this testing is CTL5248-078-054. This documentation is on file at and available from the Engineering Assurance Product Testing Laboratory.

1.3. Conclusion

The High Density Hybrid Power Connectors listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-9070 Revision A.

1.4. Product Description

The hybrid version of the Tyco Electronics HDI connectors provide for both signal and power contacts with the signal contacts on standard .100 by .100 inch spacing. The housings feature ports that accept either power or coax contacts for both board and cable mount.

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
1,2,3	12 each	532823-1	Right angle socket
1,2,3	12 each	532824-1	Vertical pin
1,2,3	3 each	532901-2	HDI hybrid receptacle assembly
1,2,3	3 each	533067-2	HDI hybrid pin assembly

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%

1.7. Qualification Test Sequence

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Examination of product	1,9	1,9	1,8
Termination resistance, dry circuit	3,7	2,7	
Insulation resistance			2,6
Dielectric withstanding voltage			3,7
Temperature rise vs current		3,8	
Vibration	5	6(c)	
Physical shock	6		
Durability	4		
Mating force	2		
Unmating force	8		
Thermal shock			4
Humidity/temperature cycling			5
Temperature life		5	
Mixed flowing gas		4	

NOTE

(a) See paragraph 1.4.
(b) Numbers indicate sequence in which tests are performed.
(c) Discontinuities shall not be measured. Energize at 18˚C level for 100% loadings per Quality Specification 102-950.

Figure 2

2. SUMMARY OF TESTING

2.1. Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. They were inspected and accepted by the Product Assurance Department of the Capital Goods Business Unit.

2.2. Termination Resistance, Dry Circuit - Test Groups 1 and 2

All termination resistance measurements, taken at 100 milliamperes DC maximum and 50 millivolts maximum open circuit voltage were less than 0.75 milliohms.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	12	Initial	0.28	0.36	0.317
		After mechanical	0.31	0.42	0.350
2	12	Initial	0.30	0.36	0.321
		After temperature rise vs current	0.30	0.37	0.334

NOTE *All values in milliohms.*

Figure 3

2.3. Insulation Resistance - Test Group 3

All insulation resistance measurements were greater than 5000 megohms.

2.4. Dielectric Withstanding Voltage - Test Group 3

No dielectric breakdown or flashover occurred.

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 25 amperes DC.

2.6. 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. Physical Shock - Test Group 1

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

2.8. Durability - Test Group 1

No physical damage occurred as a result of mating and unmating the specimens 250 times.

2.9. Mating Force - Test Group 1

All mating force measurements were less than 7.5 pounds average per contact.

2.10. Unmating Force - Test Group 1

All unmating force measurements were greater than 4 ounces average per contact.

2.11. Thermal Shock - Test Group 3

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

2.12. Humidity/temperature Cycling - Test Group 3

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

2.13. Temperature Life - Test Group 2

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

2.14. Mixed Flowing Gas - Test Group 2

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

3. TEST METHODS

3.1. Initial Examination of Product

Product drawings and inspection plans were used to visually and functionally examine the specimens.

3.2. Termination Resistance, Dry Circuit

Termination resistance measurements at low level current were made using a 4 terminal measuring technique (Figure 4). The test current was maintained at 100 milliamperes maximum with a 50 millivolt maximum open circuit voltage.

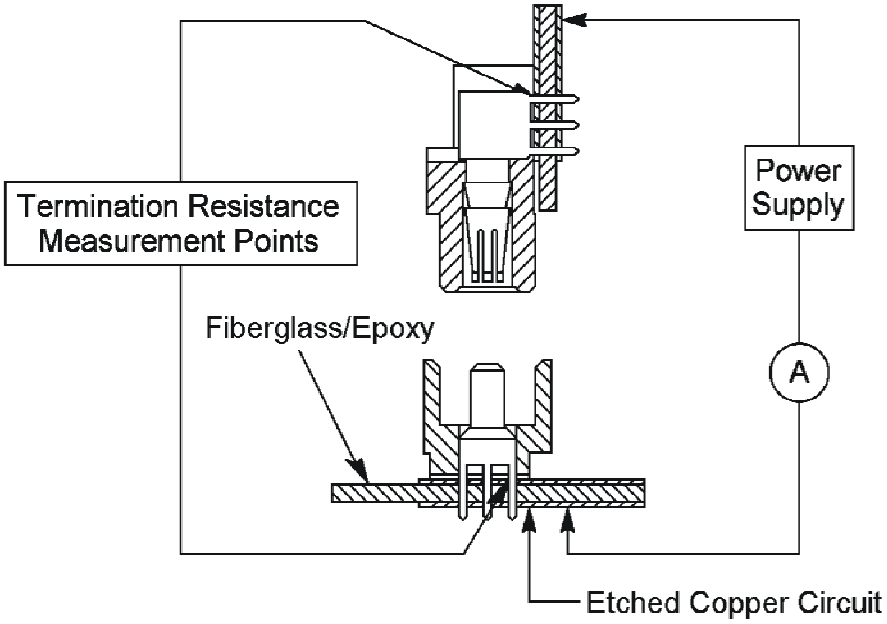

Figure 4
Termination Resistance Measurement Points

3.3. Insulation Resistance

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

3.4. Dielectric Withstanding Voltage

A test potential of 900 volts AC at sea level and 200 volts AC at 70000 feet was applied between adjacent contacts of mated specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Temperature Rise vs Current

Specimen temperature was measured while energized at the specified current of 25 amperes AC using thermocouples attached to the specimens. This temperature was then subtracted from the ambient temperature to find the temperature rise. When 3 readings at 5 minute intervals were the same, the readings were recorded.

3.6. Vibration

Mated specimens were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch or 15 G peak whichever is less. The vibration frequency was varied logarithmically between the limits of 10 and 2000 Hz and returned to 10 Hz in 20 minutes. This cycle was performed 12 times in each of 3 mutually perpendicular planes for a total vibration time of 12 hours. Specimens in test group 1 were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC. Specimens in test group 2 were energized with 20 amperes.

3.7. Physical Shock, Half-sine

Mated specimens were subjected to a physical shock test having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6 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. Durability

Specimens were mated and unmated 250 times at a maximum rate of 300 cycles per hour.

3.9. 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 1 inch per minute.

3.10. 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 1 inch per minute.

3.11. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -65 and 125˚C. The transition between temperatures was less than 1 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 125˚C for 1000 hours.

3.14. Mixed Flowing Gas, Class III

Mated specimens were exposed for 20 days to a mixed flowing gas Class III exposure. Class III exposure is defined as a temperature of 30˚C and a relative humidity of 75% with the pollutants of Cl_2 at 20 ppb, NO_2 at 200 ppb and H_2S at 100 ppb.