Spring Probe Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics Spring Probe Connector to determine its conformance to the requirements of Product Specification 108-1943 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Spring Probe Connector system. Testing was performed at the Engineering Assurance Product Test Laboratory between 25Jul00 and 28Feb01. The test file number for this testing is CTLB022766-01. This documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

The Spring Probe Connectors listed in paragraph 1.5, conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1943 Revision A.

1.4. Product Description

The High Performance Spring Probe line of products is available in both high density through-hole and low profile surface mount versions with various position sizes. The contacts are gold plated at the mating interface and contain an internal multi-point spring for redundant current paths.

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
1,2,3,4,5	10	1375623 (Rev 7)	12 position probe connector
1,2,3,4,5	15	1375613-1 (Rev 4)	23 position probe connector
1,2,3,4,5	15	1375614-1 (Rev 4)	23 position pad connector

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
	Test Sequence (b)				
Initial examination of product	1	1	1	1	1
Termination resistance	2,6	2,4	2,4		
Insulation resistance				2,6	
Dielectric withstanding voltage				3,7	
Solderability					2
Vibration	4				
Mechanical shock	5				
Durability	3				
Thermal shock				4	
Humidity-temperature cycling				5	
Temperature life		3(c)			
Mixed flowing gas			3(c)		
Final examination of product	7	5	5	8	3

NOTE

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

Figure 2

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

A Certificate of Conformance issued by Product Assurance certified that all specimens submitted for testing were representative of normal production lots. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Termination Resistance - Test Groups 1, 2 and 3

All termination resistance measurements taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 30 milliohms initially and after testing.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	24	Initial (12 position)	12.615	14.763	13.712
	24	After Mechanical (12 position)	12.643	27.855	16.138
	69	Initial (23 position)	7.435	20.781	9.640
	69	After Mechanical (23 position)	3.653	11.618	7.780
2	24	Initial (12 position)	11.687	15.613	13.783
	24	After Temperature Life (12 position)	11.558	18.636	14.458
	69	Initial (23 position)	8.074	19.503	10.807
	69	After Temperature Life (23 position)	7.238	22.239	10.252
3	24	Initial (12 position)	12.255	16.639	14.013
	24	After Mixed Flowing Gas (12 position)	12.085	14.915	13.206
	69	Initial (23 position)	4.873	13.701	9.342
	69	After Mixed Flowing Gas (23 position)	6.026	10.635	8.315

NOTE All values in milliohms.

Figure 3

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 10,000 megohms.

2.4. Dielectric Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Solderability - Test Group 5

All solderable contacts had a minimum of 95% solder coverage.

2.6. 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.

2.7. 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. Durability - Test Group 1

No physical damage occurred to the specimens as a result of mating and unmating the specimens 40,000 times.

2.9. Thermal Shock - Test Group 4

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

2.10. Humidity-temperature Cycling - Test Group 4

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

2.11. Temperature Life - Test Group 2

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

2.12. 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.

2.13. 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 Certification of Conformance was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and manufactured using the same core manufacturing processes and technologies as production parts. When specified, specimens were visually examined for evidence of physical damage detrimental to product performance.

3.2. Termination Resistance

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 20 millivolt maximum open circuit voltage.

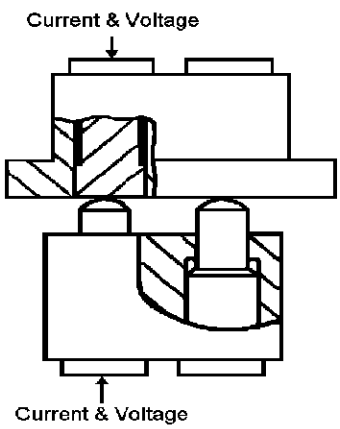

Figure 4
Typical Termination Resistance Measurement Points

3.3. Insulation Resistance

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

3.4. Dielectric Withstanding Voltage

A test potential of 500 volts AC was applied between the adjacent contacts of unmated specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Solderability

A solder paste with a composition of 63 Sn/37 Pb RMA, Visc./KCPS 1000 ± 10%, with a mesh of -325 +500 was placed onto a stencil with pad geometry opening and thickness that was appropriate for the specimens being tested. The stencil was supplied with the specimens. The solder paste was printed onto a 4.5 x 4.5 x.0395 inch ceramic substrate. The screen was removed and the specimens were placed onto the solder paste print under appropriate magnification. Care was taken to ensure that the specimens were not contaminated in any way and were tested in the "as received" condition. The specimens and ceramic substrates were placed on a conveyor belt through an infrared oven. The specimens were exposed for 60 seconds to temperatures between 150 and 170°C and for 60 seconds to temperatures between 215 and 230°C as specified in EIA Standard 638.

3.6. 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 spectrum 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

Mated specimens were subjected to a mechanical 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 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 40,000 times at a maximum rate of 600 cycles per hour. The 23 position connector probes were compressed (mated) 0.030 inch; the 12 position probes were compressed 0.050 inch.

3.9. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -25 and 85°C. The transition between temperatures was less than 1 minute.

3.10. 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 25 and 65°C twice while maintaining high humidity (Figure 5).

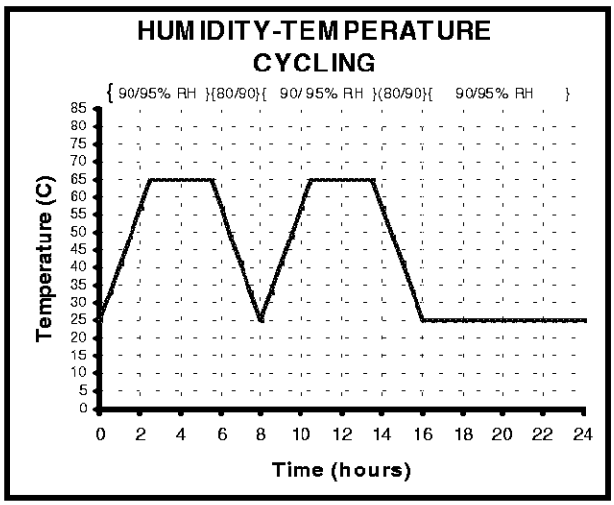

Figure 5
Typical Humidity-Temperature Cycling Profile

3.11. Temperature Life

Mated specimens were exposed to a temperature of 85°C for 500 hours. Specimens were preconditioned with 10 cycles of durability.

3.12. 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.

3.13. Final Examination of Product

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