2 Through 6 Position Inverted Through-Board SMT Connectors

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics 2 Through 6 Position Inverted Through-Board Surface Mount (SMT) Connectors to determine their conformance to the requirements of Product Specification 108-2376 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the 2 Through 6 Position Inverted Through-Board SMT Connectors . Testing was performed at the Engineering Assurance Product Testing Laboratory between 15Jul09 and 25Sep09. The test file number for this testing is EA20090545T. This documentation is on file at and available from the Engineering Assurance Product Testing Laboratory.

1.3. Conclusion

The 2 Through 6 Position Inverted Through-Board SMT Connectors listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-2376 Revision A.

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
1,2,3,4,5	5 each	2106092-1	2 position header
	5 each	2106092-5	6 position header
3,4,5	5 each	2106092-2	3 position header
	5 each	2106092-3	4 position header
	5 each	2106092-4	5 position header

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%

* Trademark
| Indicates change

1.6. Qualification Test Sequence

Test or Examination	Test Group (a)			
	1	2	3	4
	Test Sequence (b)			
Initial examination of product	1	1	1	1
Low Level Contact Resistance (LLCR)	3,8	2,7		
Insulation resistance			2,6	
Withstanding voltage			3,7	
Temperature rise vs current		4,8		
Sinusoidal vibration	6	6		
Mechanical shock	7			
Durability	4	3		
Mating force	2			
Unmating force	9			
Contact retention				2
Thermal shock			4	
Humidity/temperature cycling		5	5	
Temperature life	5			
Final examination of product	10	9	8	

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

2.2. LLCR - Test Groups 1 and 2

All LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 10 milliohms initially and 20 milliohms after testing.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	2 position, 10 readings 6 position, 30 readings	Initial	4.22	5.34	4.82
		After mechanical (ΔR)	0.37	2.23	1.19
2	2 position, 10 readings 6 position, 30 readings	Initial	4.22	5.23	4.62
		After vibration (ΔR)	-0.01	3.66	0.79

NOTE *All values in milliohms.*

Figure 3

2.3. Insulation Resistance - Test Group 3

All insulation resistance measurements were greater than 500 megohms initial and 100 megohms final.

2.4. 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 1.5 amperes for 28 AWG wire and 3.0 amperes for 24 AWG wire.

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 as a result of mating and unmating the specimens 30 times.

2.9. Mating Force - Test Group 1

All mating force measurements were less than 2.99 kgf for 2 position specimens and 4.90 kgf for 6 position specimens.

2.10. Unmating Force - Test Group 1

All unmating force measurements were greater than 0.46 kgf for 2 position specimens and 0.74 kgf for 6 position specimens.

2.11. Contact Retention - Test Group 4

All contact retention measurements were greater than 1.0 kgf.

2.12. Thermal Shock - Test Group 3

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

2.13. Humidity/temperature Cycling - Test Groups 2 and 3

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

2.14. Temperature Life - Test Group 1

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

2.15. Final Examination of Product - All Test Groups

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

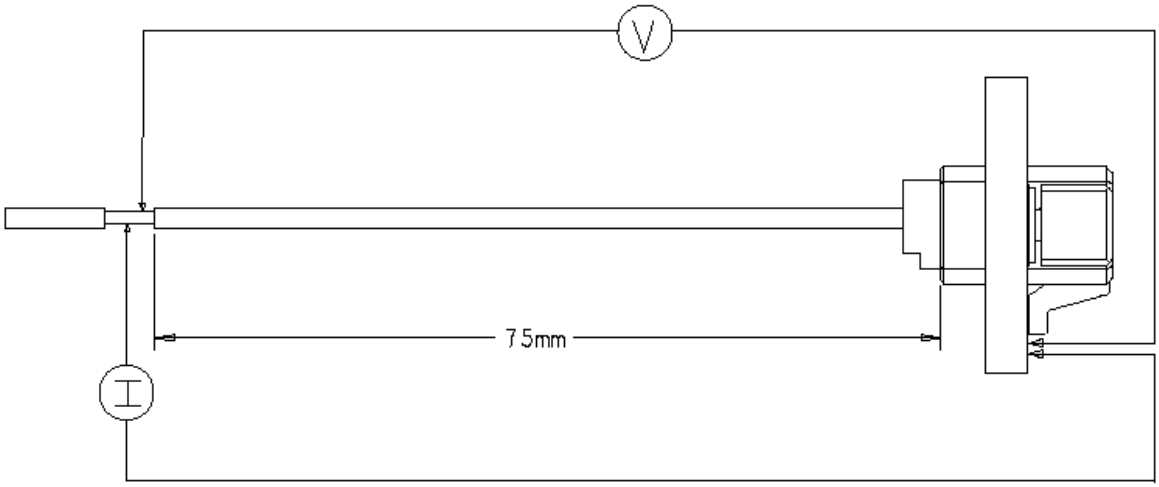
3. TEST METHODS

3.1. Initial Examination of Product

A C o f C 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. LLCR

LLCR 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.



LLCR = Total resistance - wire resistance

Figure 4
LLCR 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 before the resistance was measured.

3.4. Withstanding Voltage

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

3.5. Temperature Rise vs Current

Temperature rise curves were produced by measuring individual contact temperatures at specified current levels dependent on wire size (1.5 amperes for 28 AWG wire and 3.0 amperes for 24 AWG wire). 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.

3.6. Sinusoidal Vibration

Mated specimens were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 1.5 mm double amplitude. The vibration frequency was varied uniformly between the limits of 10 and 55 Hz and returned to 10 Hz in 1 minute. This cycle was performed for 2 hours in each of 3 mutually perpendicular planes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.7. Mechanical Shock

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 30 times at a maximum rate of 500 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 maximum rate of travel of 12.7 mm per minute. The average force per contact was calculated.

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 maximum rate of travel of 12.7 mm per minute. The average force per contact was calculated.

3.11. Contact Retention

Specimens were placed in to a slotted fixture to support the housing while a probe pushed on the contacts until the contact dislodged from the housing. The maximum force was recorded.

3.12. Thermal Shock

Unmated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 105°C with 1 minute transition between temperatures.

3.13. Humidity/temperature Cycling

Unmated 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. During 5 of the first 9 cycles, the specimens were exposed to a cold shock at -10°C for 3 hours (Figure 5).

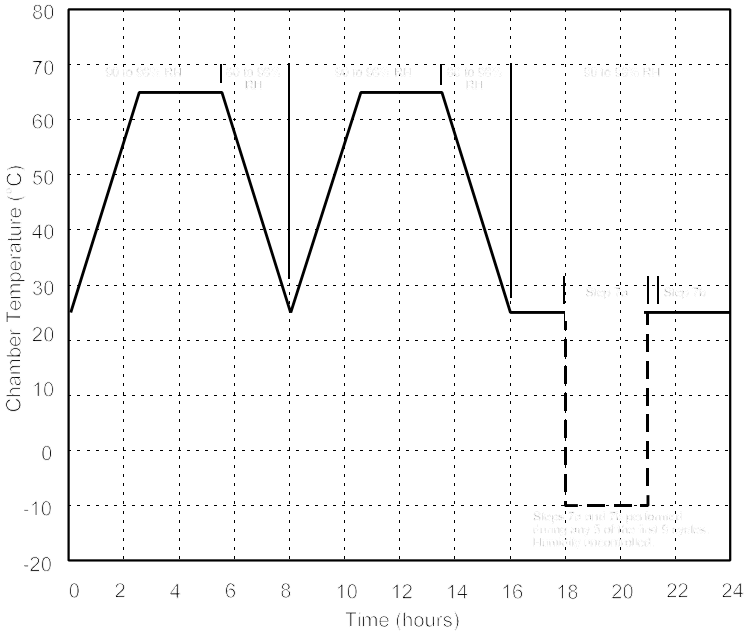


Figure 5
Humidity/Temperature Cycling Profile

3.14. Temperature Life

Mated specimens were exposed to a temperature of 105°C for 250 hours.

3.15. Final Examination of Product

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