Hooded SL 156 Connectors, Tin

1. INTRODUCTION

1.1. Purpose

Testing was performed on the AMP Hooded SL 156 Connector with tin plated contacts to determine its conformance to the requirements of Product Specification 108-1049-2 Revision B.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Hooded SL 156 Connector with tin plated contacts. The testing was performed at the GAD Americas North Product Reliability Center between Jul97 and Jun98. Additional testing was performed on 10Jul09. The test file numbers for this testing are ACL 1387-0032 and EA20090472T. This documentation is on file at and available from the GAD Americas North Product Reliability Center and the Engineering Assurance Product Testing Laboratory respectively.

1.3. Conclusion

The Hooded SL 156 Connector with tin plated contacts, listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1049-2 Revision B.

1.4. Product Description

The AMP SL 156 hooded Connector is a dual wipe tin connector system. This system is used for wire to board interconnection and mates with .045 inch square posts. It is an in-line connector system with sizes ranging from 2 to 24 position.

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	5	640383-6 Rev AA	6 position in-line SL 156 header
	5	640250-6 Rev AJ	6 position in-line hooded SL 156 housing
	30	770476-1 Rev L	SL 156 tin terminals with 18 AWG wire
2	8	1-640383-0 Rev AA	10 position in-line SL 156 header
	8	1-640250-0 Rev AJ	10 position in-line hooded SL 156 housing
	40	770476-1 Rev L	SL 156 tin terminals with 18 AWG wire
	40	770476-1 Rev L	SL 156 tin terminals with 24 AWG wire
3	15	350980-2	SL 156 Lo Force contacts crimped to 24 AWG wire on 3" leads
	15	350980-2	SL 156 Lo Force contacts crimped to 22 AWG wire on 3" leads
	15	350980-2	SL 156 Lo Force contacts crimped to 20 AWG wire on 3" leads
	15	350980-2	SL 156 Lo Force contacts crimped to 18 AWG wire on 3" leads

Figure 1

* Trademark
| Indicates change

1.6. Environmental Conditions

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

- Temperature: 15 to 35°C
- Relative Humidity: 20 to 80%

1.7. Qualification Test Sequence

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Examination of product	1,9	1,9	
Termination resistance	3,7	2,7	
Temperature rise vs current		3,8	
Random vibration	5	6(c)	
Physical shock	6		
Durability	4		
Mating force	2		
Unmating force	8		
Crimp tensile			1
Humidity/temperature cycling		4(d)	
Temperature life		5	

NOTE
(a) See paragraph 1.5.
(b) Numbers indicate sequence in which tests are performed.
(c) Discontinuities shall not be measured. Energize at 18°C level for 100% loadings per Test Specification 109-151.
(d) Precondition samples with 10 cycles durability.

Figure 2

2. SUMMARY OF TESTING

2.1. Examination of Product - All Test Groups

All samples submitted for testing were randomly selected from current production lots. A Certificate of Conformance was issued by the Product Assurance Department of Consumer/Commercial. Where specified, samples were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Termination Resistance - Test Groups 1 and 2

All termination resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 4.0 milliohms initially and a maximum ΔR of ± 20 milliohms after testing.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	30	Initial	1.47	1.65	1.57
		After mechanical (ΔR)	0.13	2.81	0.77
2	30	Initial	1.40	1.81	1.53
		After temperature life (ΔR)	-0.04	3.32	0.70

NOTE *All values in milliohms*

Figure 3

2.3. Temperature Rise vs Current - Test Group 2

All samples had a temperature rise of less than 30°C above ambient when tested using a baseline rated current of 11.05 amperes and the correct derating factor value based on the samples wiring configuration.

2.4. Random Vibration - Test Groups 1 and 2

No discontinuities were detected during vibration in Test Group 1. With applied specified current, no opens were detected in Test Group 2. Following vibration, no cracks, breaks, or loose parts on the samples were visible.

2.5. Physical Shock - Test Group 1

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

2.6. Durability - Test Group 1

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

2.7. Mating Force - Test Group 1

All mating force measurements were less than 4.0 pounds per contact using .045 inch square contacts.

2.8. Unmating Force - Test Group 1

All unmating force measurements were greater than .25 pound per contact using .045 inch square contacts.

2.9. Crimp Tensile - Test Group 3

All crimp tensile measurements were greater than 10 pounds for 24 AWG wire, 15 pounds for 22 AWG wire, 25 pounds for 20 AWG wire, 35 pounds for 18 AWG wire and 40 pounds for 16 AWG wire.

2.10. Humidity/temperature Cycling - Test Group 2

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.

3. TEST METHODS

3.1. Examination of Product

Where specified, samples 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.

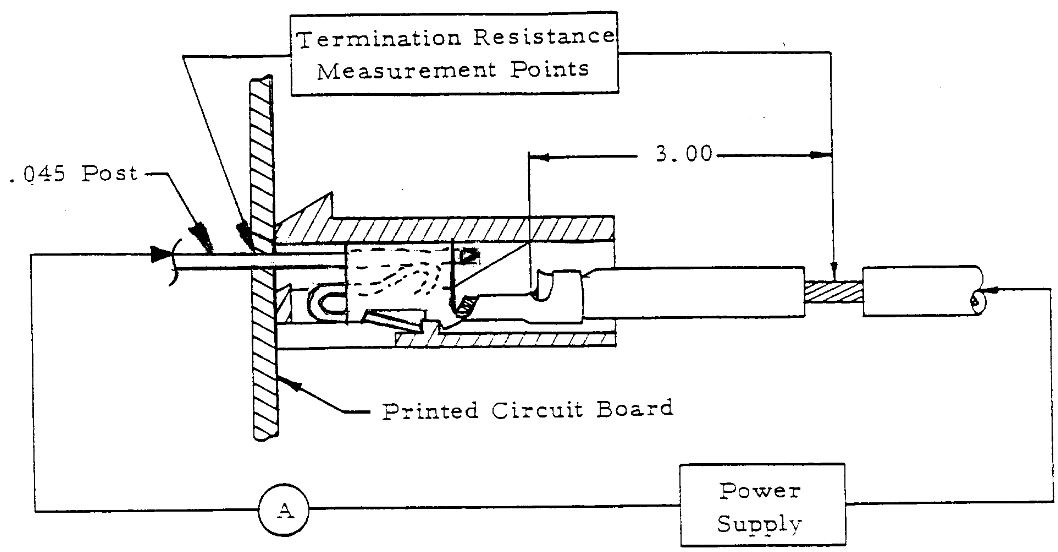

Figure 4
Typical Termination Resistance Measurement Points

3.3. 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.

3.4. Random Vibration

Wire-to-board mated samples were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 5 and 500 Hz. The power spectral density at 5 Hz was 0.000312 G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of 0.04 G^2/Hz at 16 Hz. The spectrum was flat at 0.04 G^2/Hz from 16 to 500 Hz. The root-mean square amplitude of the excitation was 3.14 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Test Group 1 samples were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC. Test Group 2 samples were 100% energized to an 18°C temperature rise level during all 3 planes.

3.5. Physical Shock

Wire-to-board mated samples were subjected to a physical shock test having a half-sine waveform of 30 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. Samples were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.6. Durability

Samples were manually mated and unmated 25 times.

3.7. Mating Force

The force required to mate individual samples with latches disengaged was measured using a tensile/compression device with the rate of travel at .5 inch per minute and a free floating fixture. The maximum force per contact was calculated.

3.8. Unmating Force

The force required to unmate individual samples with latches disengaged was measured using a tensile/compression device with the rate of travel at .5 inch per minute and a free floating fixture. The minimum force per contact was calculated.

3.9. Crimp Tensile

The force load was applied to each specimen using a tensile/compression device with the rate of travel at 1 inch per minute.

3.10. Humidity/temperature Cycling

Mated samples were exposed to 10 cycles of durability, then exposed to 50°C for 24 hours, afterward, samples were subjected 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).

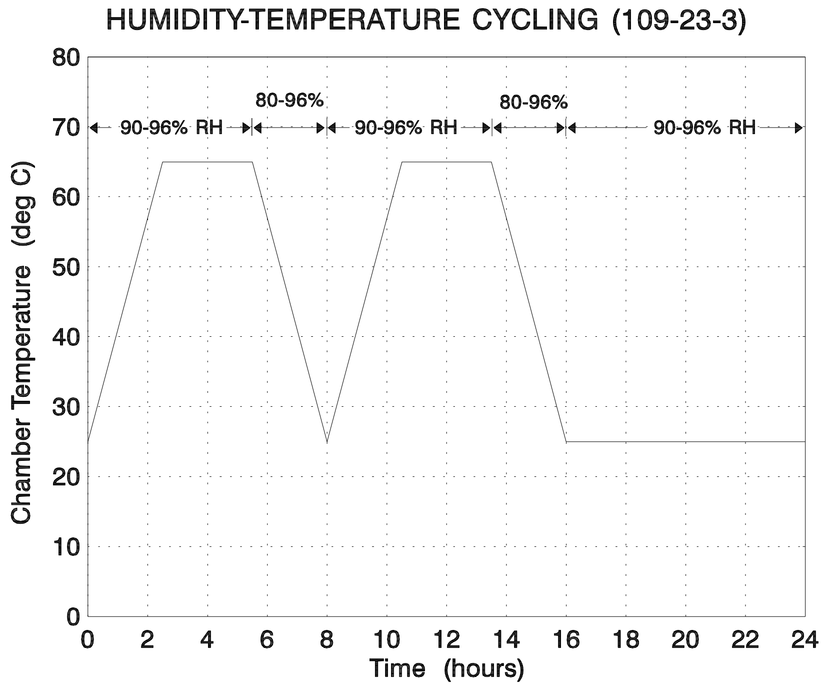

Figure 5
Typical Humidity/Temperature Cycling Profile

3.11. Temperature Life

Mated samples were exposed to a temperature of 85°C for 500 hours.