AMPLIMITE* HD-20 Subminiature "D" Solder Cup Plug and Receptacle Connectors

1. INTRODUCTION

1.1. Purpose

Testing was performed on AMPLIMITE* HD-20 Subminiature "D" Solder Cup Plug and Receptacle Connectors to determine their conformance to the requirements of Product Specification 108-40031 Revision B.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the AMPLIMITE HD-20 Subminiature "D" Solder Cup Plug and Receptacle Connectors. Testing was performed at the Engineering Assurance Product Test Laboratory between 15May03 and 06Aug03. The test file number for this testing is CTL B045116-002. This documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

The AMPLIMITE HD-20 Subminiature "D" Solder Cup Plug and Receptacle Connectors listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-40031 Revision B.

1.4. Product Description

This product consists of a two piece plastic insert with pre-installed, non-removable contacts and two metal shells.

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	5	747904-2	9 position solder cup plug with gold flash
	5	747905-2	9 position solder cup receptacle with gold flash
	5	747904-5	9 position solder cup plug with 30 µin gold
	5	747905-5	9 position solder cup receptacle with 30 µin gold
1,2,3,4	5 each	747916-2	37 position solder cup plug with gold flash
5	1		
6	10		
1,2,3,4	5 each	747917-2	37 position solder cup receptacle with gold flash
5	1		
6	10		
1,3	5 each	747917-5	37 position solder cup receptacle with 30 µin gold

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	4	5	6
	Test Sequence (b)					
Initial examination of product	1	1	1	1	1	1
Low level contact resistance	3,7	2,4	2,4			2,4
Insulation resistance				2,6		
Withstanding voltage				3,7		
Temperature rise vs current						3
Solderability, dip test					2	
Vibration, random	5					
Mechanical shock	6					
Durability	4					
Mating force	2					
Unmating force	8					
Thermal shock				4		
Humidity-temperature cycling				5		
Temperature life		3(c)				
Mixed flowing gas			3(c)			
Final examination of product	9	5	5	8	3	5

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

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Low Level Contact Resistance - Test Groups 1, 2, 3 and 6

All low level contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 10 milliohms after testing.

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 5000 megohms.

2.4. Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Temperature Rise vs Current - Test Group 6

All specimens had a temperature rise of less than 30°C above ambient when energized at specified currents.

2.6. Solderability, Dip Test - Test Group 5

All contact leads had a minimum of 95% solder coverage.

2.7. 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.

2.8. 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.

2.9. Durability - Test Group 1

No physical damage occurred as a result of mating and unmating 30 µin gold specimens 500 times, and gold flash specimens 100 times.

2.10. Mating Force - Test Group 1

All mating force measurements were less than 133.45 N [30 lbf] for 9 position specimens and 177.93 N [40 lbf] for 37 position specimens.

2.11. Unmating Force - Test Group 1

All unmating force measurements were less than 133.45 N [30 lbf] for 9 position specimens and 177.93 N [40 lbf] for 37 position specimens.

2.12. Thermal Shock - Test Group 4

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

2.13. Humidity-temperature Cycling - Test Group 4

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

2.14. Temperature Life - Test Group 2

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

2.15. 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.

2.16. 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 Certificate of Conformance 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. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique (Figure 3). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

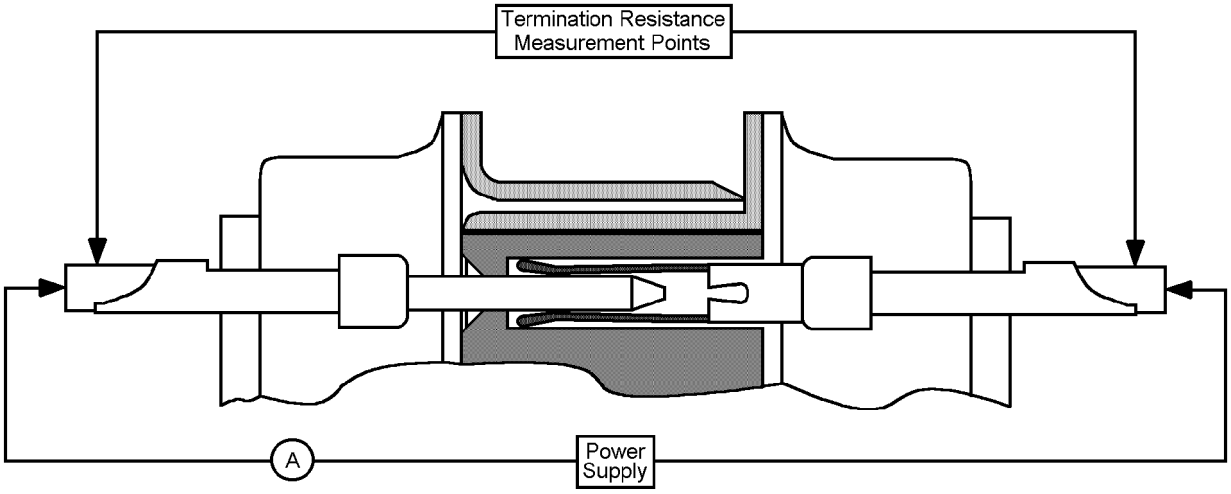

Figure 3
Low Level Contact Resistance Measurement Points

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 before the resistance was measured.

3.4. Withstanding Voltage

A test potential of 1000 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. Temperature Rise vs Current

Mated specimens terminated with 28 and 20 AWG wire were subjected to 1.2 and 3 amperes respectively. Positions 1, 10, 19, 22, 27 and 32 were series wired individually so that a single circuit of each connector was energized and measured for each run. Thermocouples were soldered to the solder cup contacts above the entry point of the conductor, which is the closest point to the interface as possible without modifying the connectors.

3.6. Solderability, Dip Test

Specimen contact solder tails were subjected to a solderability test. The soldertails were immersed in a mildly activated rosin flux for 5 to 10 seconds, allowed to drain for 5 to 20 seconds. The solder tails were then immersed in the molten solder at a rate of approximately 1 inch per second, held for 3 to 5 seconds, then withdrawn. After cleaning in isopropyl alcohol, the specimens were visually examined for solder coverage. The solder used for testing was 60/40 tin lead composition and was maintained at a temperature of 245 ± 5°C.

3.7. Vibration, Random

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 50 and 2000 Hz. The power spectral density at 50 Hz was 0.075 G^2/Hz. The spectrum sloped up at 6 dB per octave to a PSD of 0.3 G^2/Hz at 100 Hz. The spectrum was flat at 0.3 G^2/Hz from 100 to 1000 Hz. The spectrum sloped down at 6 dB per octave to the upper bound frequency of 2000 Hz at which the PSD was 0.075 G^2/Hz. The root-mean square amplitude of the excitation was 20.71 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 in the monitoring circuit.

3.8. 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.

3.9. Durability

Specimens with 30 µin gold were mated and unmated 500 times, specimens with gold flash were mated and unmated 100 times, both at a maximum rate of 200 cycles per hour.

3.10. 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 12.7 mm [.5 in] per minute.

3.11. 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 12.7 mm [.5 in] per minute.

3.12. Thermal Shock

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

3.13. Humidity-temperature Cycling

Mated specimens were exposed to 10 cycles of humidity-temperature cycling with a cold shock of -10°C during 5 of the first 9 cycles. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C twice while maintaining high humidity.

3.14. Temperature Life

Mated specimens were exposed to a temperature of 105°C for 500 hours. Specimens were preconditioned with 10 cycles of durability.

3.15. Mixed Flowing Gas, Class IIIA

Mated specimens were exposed for 20 days to a mixed flowing gas Class IIIA exposure. Class IIIA 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, H_2S at 100 ppb and SO_2 at 200 ppb. Specimens were preconditioned with 10 cycles of durability.

3.16. Final Examination of Product

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