AMPOWER* Multi-Pin Plus Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the AMPOWER* Multi-Pin Plus Connector to determine its conformance to the requirements of AMP Product Specification 108-1809 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the AMPOWER Multi-Pin Plus Connector. Testing was performed at the Americas Regional Laboratory between 18Feb98 and 28May98. The test file number for this testing is CTL 0790-000-006A. This documentation is on file at and available from the Americas Regional Laboratory.

1.3. Conclusion

The AMPOWER Multi-Pin Plus Connector listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1809 Revision A.

1.4. Product Description

The AMPOWER Multi-Pin Plus Connector is designed to fulfill the need for OEM requiring a combination of signal circuits and power circuits in 1 connector housing. The housing can be molded to accommodate a variety of signal and power connectors. The Louvertac band technology is available in all contact styles. The connectors can be rigid or float mounted to panels or power supply chassis.

1.5. Test Samples

The test samples were representative of normal production lots, samples identified with the following part numbers were used for test:

Test Group	Quantity	Part Number	Description
1,3	2	194069-3	Multi-Pin Plus Receptacle
1,3	2	194070-3	Multi-Pin Plus Plug
2	15	194069-3	Multi-Pin Plus Receptacle
2	15	194070-3	Multi-Pin Plus Plug
1	24	194032-7	3mm Socket Contact AWG 14 wire
1	24	194189-9	3mm Pin Contact AWG 14 wire
2	36	194032-7	3mm Socket Contact AWG 14 wire
2	36	194189-9	3mm Pin Contact AWG 14 wire
1	4	194037-2	9mm Socket Contact AWG 1/0
1	4	194041-6	9mm Pin Contact AWG 1/0
2	30	194037-2	9mm Socket Contact AWG 1/0
2	30	194041-6	9mm Pin Contact AWG 1/0

Figure 1 (cont)

1,3	80	66103-4	Type III+ Pin Contact AWG 16 wire
1,3	80	66105-4	Type III+ Socket Contact AWG 16 wire
2	120	66103-4	Type III+ Pin Contact AWG 16 wire
2	120	66105-4	Type III+ Socket Contact AWG 16 wire

Figure 1 (end)

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	1,8
Termination resistance	3,7	2,7	
Insulation resistance			2,6
Dielectric withstanding voltage			3,7
Temperature rise vs current		3,8	
Vibration	5	6	
Mechanical shock	6		
Durability	4		
Mating force	2		
Unmating force	8		
Thermal shock			4
Humidity-temperature cycling			5
Temperature life		5	
Mixed flowing gas		4(c)	

NOTE

(a) See Para 1.5.
(b) Numbers indicate sequence in which tests are performed.
(c) 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 representative of normal production lots. A Certificate of Conformance was issued by the Product Assurance Department. 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 6.0 milliohms for samples crimped on Type III+ contacts, 0.5 milliohms for samples crimped on 3mm contacts, and 0.3 milliohms for samples crimped on 9mm contacts.

Test Group	Contact Type	Number of Data Points	Condition	Termination Resistance		
				Min	Max	Mean
1	9mm	4	Initial	0.06	0.11	0.082
	3mm	30	Initial	0.16	0.44	0.262
	III+	32	Initial	2.11	2.39	2.188
	9mm	4	After Mechanical	0.11	0.16	0.133
	3mm	30	After Mechanical	0.15	0.35	0.228
	III+	32	After Mechanical	2.19	2.44	2.284
2	9mm	30	Initial	0.05	0.16	0.079
	3mm	230	Initial	0.23	0.37	0.275
	9mm	30	After Current Verification	0.05	0.21	0.109
	3mm	30	After Current Verification	0.30	0.48	0.397

All values in milliohms

Figure 3

2.3. Insulation Resistance - Test Group 3

All insulation resistance measurements were greater than 1,000 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 samples had a temperature rise of less than 30°C above ambient when tested using a baseline rated current of 156 amperes for 9mm samples, 52 amperes for 3mm samples, and 26.5 amperes for III+ samples and the correct derating factor value based on the samples wiring configuration.

2.6. Vibration - Test Groups 1 and 2

No discontinuities were detected during vibration (Group 1 only). Following vibration, no cracks, breaks, or loose parts on the samples were visible.

2.7. Mechanical Shock - Test Group 1

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

2.8. Mating Force - Test Group 1

All mating force measurements were less than 50 pounds maximum.

2.9. Unmating Force - Test Group 1

All unmating force measurements were greater than 20 pounds.

2.10. Durability - Test Group 1

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

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. 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.

2.14. 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. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts of mated samples. A test voltage of 500 volts DC was applied for 1 minute before the resistance was measured.

3.4. Dielectric Withstanding Voltage

A test potential of 1,000 volts AC was applied between the adjacent contacts of mated samples. 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 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.

3.6. Vibration, Random

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 0.02 G^2/Hz at 14 Hz. The spectrum was flat at 0.02 G^2/Hz from 14 to 500 Hz. The root-mean square amplitude of the excitation was 3.13 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Samples were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC (Test Group 1 only). Samples were energized at a current level sufficient to increase the contacts temperature 18°C above ambient (Group 2 only).

3.7. Mechanical Shock, Half-sine

Mated samples were subjected to a mechanical 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.

3.8. Mating Force

The force required to mate individual samples was measured using a tensile/compression device with the rate of travel at 0.5 inch/minute and a free floating fixture.

3.9. Unmating Force

The force required to unmate individual samples was measured using a tensile/compression device with the rate of travel at 0.5 inch/minute and a free floating fixture.

3.10. Durability

Samples were mated and unmated 25 times at a maximum rate of 600 cycles per hour.

3.11. Thermal Shock

Mated samples were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40 and 105°C. The transition between temperatures was less than 1 minute.

3.12. Humidity-temperature Cycling

Mated samples 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.

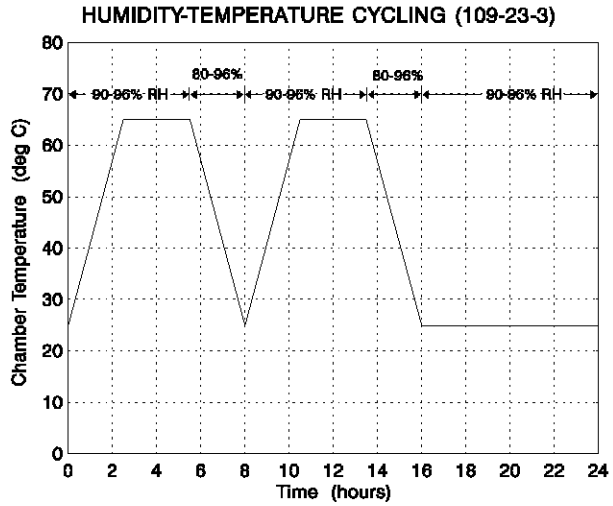

Figure 4
Typical Humidity-Temperature Cycling Profile

3.13. Mixed Flowing Gas, Class II

Mated samples were exposed for 14 days to a mixed flowing gas Class II exposure. Class II 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, and H_2S at 10 ppb. Samples were preconditioned with 10 cycles of durability.

3.14. Temperature Life

Mated samples were exposed to a temperature of 105°C for 500 hours.