Connector, Metrimate Power Drawer With Powerband Contacts

1. INTRODUCTION

1.1. Purpose

Testing was performed on the AMP* Metrimate Power Drawer connector with Powerband contacts to determine its conformance to the requirements of AMP Product Specification 108-1682 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Metrimate Power Drawer connector with Powerband contacts. Testing was performed at the Americas Regional Laboratory between 07Mar97 and 02Feb98 and between 07Jul98 and 08Oct98. The test file numbers for this testing are CTL 5018-019. This documentation is on file at and available from the Americas Regional Laboratory.

1.3. Conclusion

The Metrimate Power Drawer connector with Powerband contacts listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1682 Revision A.

1.4. Product Description

The Metrimate Power Drawer connector with Powerband contacts is designed for eight independent channels. The two halves are polarized to preserve circuit polarity. The Powerband contacts provide a high current medium with manageable insertion and extraction force.

1.5. Test Samples

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
1,2,3	5 each	213500-3	Receptacle, 8 position housing
1,2,3	5 each	213886-1	Plug, 8 position housing
I 1,2,3	40 each	213841-4	Pin contact, AWG 8 wire
1,2,3	40 each	213843-4	Socket contact, AWG 8 wire

Figure 1

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	1,10	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(c)	
Physical shock	6		
Durability	4		
Contact retention	9		
Mating force	2		
Unmating force	8		
Thermal shock			4
Humidity-temperature cycling			5
Temperature life		5	
Mixed flowing gas		4(d)	

NOTE

(a) See Para 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 AMP 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 representative of normal production lots. A Certificate of Conformance was issued by the Product Assurance Department of Circular Power Products. 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 2.0 milliohms.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	40	Initial	0.43	0.55	0.479
		After mechanical	0.51	0.77	0.619
2	40	Initial	0.38	0.54	0.464
		After verification	0.61	0.98	0.804

NOTE *All values in milliohms.*

Figure 3

2.3. Insulation Resistance - Test Group 3

All insulation resistance measurements were greater than 5000 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 45.97 amperes 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 (Test 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. Durability - Test Group 1

No physical damage occurred to the samples as a result of mating and unmating the samples 100 times.

2.9. Contact Retention - Test Group 1

A minimum force greater than 25 pounds was required to remove each contact from its connector.

2.10. Mating Force - Test Group 1

All mating force measurements were less than 10 pounds maximum average per contact.

2.11. Unmating Force - Test Group 1

All unmating force measurements were greater than 2 pounds minimum average per contact.

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 Group 3

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

2.14. Temperature Life - Test Group 2

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

2.15. 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.

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.

3.3. Insulation Resistance

Insulation resistance was measured between adjacent contacts of mated samples. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.4. Dielectric Withstanding Voltage

A test potential of 2000 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, Sinusoidal

Mated samples were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, 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 120 times in each of 3 mutually perpendicular planes for a total vibration time of 6 hours. Samples were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC (Test Group 1). Samples were energized at 30 amperes during vibration (Test Group 2).

3.7. Mechanical Shock, Half-sine

Mated samples 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. Samples were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.8. Durability

Samples were mated and unmated 100 times at a maximum rate of 600 cycles per hour.

3.9. Contact Retention

An increasing axial load was applied to each contact until the contact separated from the housing.

3.10. Mating Force

The force required to mate individual samples was measured using a tensile/compression device with a free floating fixture and a rate of travel of 0.5 inch per minute. The maximum average force per contact was calculated.

3.11. Unmating Force

The force required to unmate individual samples was measured using a tensile/compression device with a free floating fixture and a rate of travel of 0.5 inch per minute. The minimum average force per contact was calculated.

3.12. Thermal Shock

Mated samples 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 samples were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25°C and 65°C twice while maintaining high humidity (Figure 4).

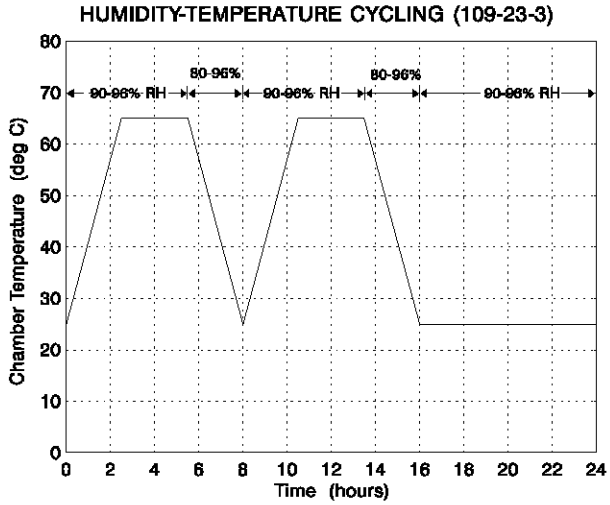

Figure 4
Typical Humidity-Temperature Cycling Profile

3.14. Temperature Life

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

3.15. 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.