Connector System, AMP-DUAC/PL*

1. INTRODUCTION

1.1. Purpose

Testing was performed on the AMP-DUAC/PL*Connector System to determine its conformance to the requirements of AMP*Product Specification 108-1646 Rev O.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the AMP-DUAC/PL Connector System manufactured by the Commercial Products Business Unit. The testing was performed between 01Nov96 and 30Ap97.

1.3. Conclusion

The AMP-DUAC/PL Connectors, listed in paragraph 1.5., meet the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1646 Rev O.

1.4. Product Description

The AMP-DUAC/PL Connector System is a 2 to 12 position receptacle connector system with mating right angle or vertical header is designed for power applications, and uses female contacts in the receptacle connector half. Headers contain 0.042 inch square posts with mate-first, break-last option. Housings are polarized to prevent smaller position sizes from being inserted into larger position sizes.

1.5. Test Samples

The test samples were randomly selected from normal current production lots, and the following part numbers were used for test:

Test Group	Quantity	Part Nbr	Description
1,2,3,4	5	794156-1	Receptacle Housing, 12 Circuit
1,2,3,4	5	794176-2	Header Assembly, Right Angle, 12 Circuit
1,2,3,4	5	794149-1	Latch Assembly, Extended
1,2,3,4	60	794138-3	Socket Contact, 18AWG
1,2,3,4	5	794145-6	Position Lock, 12 Circuit
3,4	5	794152-1	Receptacle Housing, 4 Circuit
3,4	5	794172-2	Header Assembly, 4 Circuit
3,4	5	794150-1	Latch Assembly, Standard
2	36	794139-3	Socket Contact, 26AWG
2	36	794139-3	Socket Contact, 22AWG
5	3	794156-1	Receptacle Housing, 12 Circuit
5	48	794138-3	Socket Contact, 18AWG
5	3	794152-1	Receptacle Housing, 4 Circuit

* Trademark
| Indicates change

1.6 Environmental Conditions

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

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

1.7. Qualification Test Sequence

Test or Examination	Test Groups				
	1	2	3	4	5
	Test Sequence(a)				
Examination of Product	1,9	1,11	1,8	1,4	1,4
Termination Resistance, Dry Circuit	3,7	2,5,7,9			
Dielectric Withstanding Voltage			3,7		3
Insulation Resistance			2,6		
Temperature rise vs current		3,10			
Vibration	5	8			
Physical Shock	6				
Mating Force	2				
Unmating Force	8				
Durability	4				
Contact retention				3	
Latch retention				2	
Drop					2(b)
Thermal Shock			4		
Humidity-temperature cycling			5		
Mixed Flowing Gas		4(c)			
Temperature Life		6			

NOTE

(a) The numbers indicate sequence in which tests were performed.
(b) Cable applied, connector and cable only.(.35m Cable)
(c) Precondition with 25 cycles of Durability.

2. SUMMARY OF TESTING

2.1. Examination of Product - All 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 the Commercial Products Business Unit. Where specified, samples were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Termination Resistance, Dry Circuit - Groups 1 and 2

All termination resistance measurements, taken at 100 milliamperes DC and 20 millivolts open circuit voltage, were less than 10 milliohms initially and 10 milliohms final.

Test Group	Nbr of Data points	Condition	Min	Max	Mean
1	60	Initial	3.02	3.87	3.48
		After Mechanical	3.15	4.30	3.60
2	60	Initial	2.98	3.89	3.44
		After Vibration	3.08	5.43	3.71

All values in milliohms

2.3. Dielectric Withstanding Voltage - Groups 3 and 5

No dielectric breakdown or flashover occurred.

2.4. Insulation Resistance - Group 3

All insulation resistance measurements were greater than 1 megohm.

2.5. Temperature Rise vs Current - Group 2

All samples had a temperature rise of less than 30°C above ambient when tested using a baseline rated current of 9.25 amperes and the correct derating factor value based on the samples wiring configuration.

2.6. Vibration - Groups 1 and 2

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

2.7. Physical Shock - Group 1

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

2.8. Mating Force - Group 1

All mating force measurements were less than 3.25 Newtons per contact.

2.9. Unmating Force - Group 1

All unmating force measurements were greater than 0.2 Newtons per contact.

2.10. Durability - Group 1

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

2.11. Contact Retention - Group 4

No physical damage occurred to either the contacts or the housing, and no contacts dislodged from the housings as a result of applying an axial load of 66.7 Newtons to the contacts.

2.12. Latch Retention - Group 4

Mated connectors did not unmate with a 60 Newton axial load applied to the 4 position connectors and 97 Newtons axial load applied to the 12 position connector.

2.13. Drop - Group 5

No evidence of physical damage detrimental to the operation of the product was visible as a result of drop test.

2.14. Thermal Shock - Group 3

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

2.15. Humidity-Temperature Cycling - Group 3

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

2.16. Mixed Flowing Gas - Group 2

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

2.17. Temperature Life - Group 2

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

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, Low Level

Termination resistance measurements at low level current were made using a 4 terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes DC with a 20 millivolt open circuit voltage.

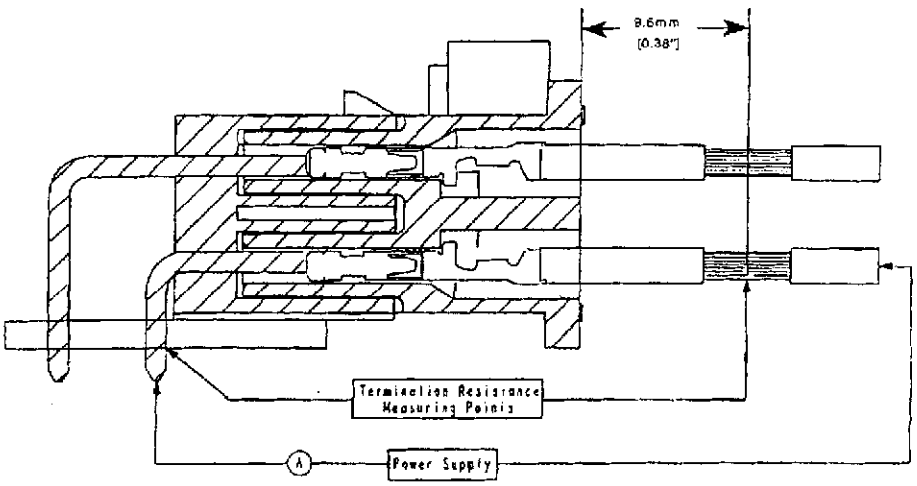

Figure 1
Typical Termination Resistance Measurement Points

3.3. Dielectric Withstanding Voltage

A test potential of 750 volts DC was applied between the adjacent contacts. This potential was applied for 1 minute and then returned to zero. A test potential of 1800 volts DC was applied between every other adjacent contacts. This potential was applied for 1 minute and then returned to zero.

3.4. Insulation Resistance

Insulation resistance was measured between adjacent contacts using a test voltage of 500 volts DC. This voltage was applied for 2 minutes before the resistance was measured.

3.5. Temperature Rise vs Specified 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 connectors were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 10 and 500 Hz. The power spectral density (PSD) at 10 Hz is 0.00026 G^2/Hz. The spectrum slopes up at 12 dB per octave to a PSD of 0.02 G^2/Hz at 14 Hz. The spectrum is flat at 0.02 G^2/Hz from 14 to 500 Hz. The root-mean square amplitude of the excitation was 3.13 G's RMS. This was performed for 1 hour in each of 3 mutually perpendicular planes, for a total vibration time of 3 hours. Connectors were monitored for discontinuities of 1 microsecond or greater, using a current of 100 milliamperes DC (Group 1). Samples were energized with enough current to produce an 18°C temperature rise (Group 2).

3.7. Physical Shock

Mated connectors 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. Connectors 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 connectors was measured, using a tensile/compression device with the rate of travel at 12.7 mm/minute and a free floating fixture.

3.9. Unmating Force

The force required to unmate individual connectors, with latches disengaged, was measured using a tensile/compression device with the rate of travel at 12.7 mm/minute and a free floating fixture.

3.10. Durability

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

3.11. Contact Retention

An axial load of 66.7 Newtons was applied to each contact and held for 60 seconds. The force was applied in a direction to cause removal of the contacts from the housing.

3.12. Latch Retention

An axial load of 97 Newtons was applied to mated 12 position connector assemblies and an axial load of 60 Newtons was applied to mated 4 and 6 position connector assemblies. The force was applied in a direction which would cause the latching mechanism to disengage.

3.13. Drop Test

Each unmated sample was dropped 3 times each from a height of 1 meter onto a hardwood surface.

3.14. Thermal Shock

Mated connectors were subjected to 5 cycles of temperature extremes with each cycle consisting of 30 minutes at each temperature. The temperature extremes were -55 and 105°C. The transition time between temperatures was less than 1 minute.

3.15. Humidity-Temperature Cycling

Mated connectors 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 the relative humidity was held at 95% (Figure 2).

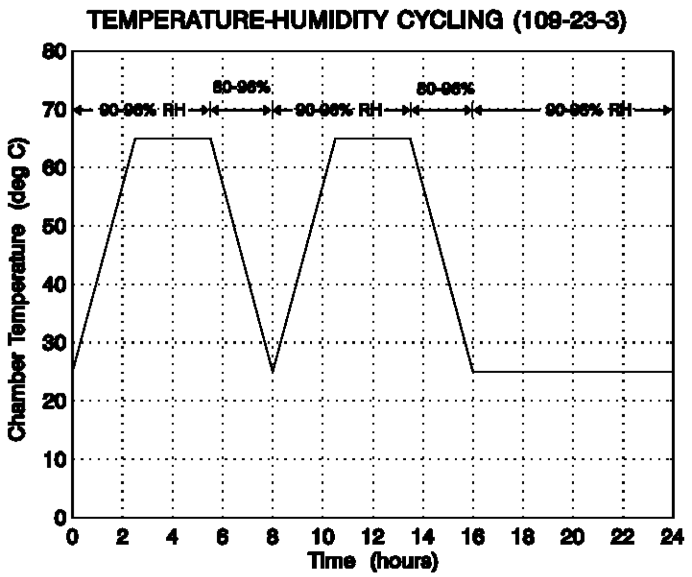

Figure 2
Typical Humidity-Temperature Cycling Profile

3.16. Mixed Flowing Gas, Class II

Mated connectors 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 25 cycles of durability.

3.17. Temperature Life

Mated samples were exposed to a temperature of 105°C for 1000 hours.

4. VALIDATION

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