QUALIFICATION TEST REPORT

CONNECTOR, AMPOWER*, WAVE CRIMP SYSTEM ACTION PIN HEADER & RECEPTACLE, DRAWER

501-243 Rev O

Product Specification:	108-1479 Rev. O
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(R2841TS2)

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Qualification Test Report
AMPOWER Wave Crimp ACTION PIN Header & Receptacle Drawer Connector

1. Introduction

1.1 Purpose

Testing was performed on AMP's AMPOWER Wave Crimp ACTION PIN Header & Receptacle Drawer Connector to determine its conformance to the requirements of AMP Product Specification 108-1479 Rev. O.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the Wave Crimp ACTION PIN Header & Receptacle Drawer Connector manufactured by the Cable Interconnection Group, Phoenix Development Lab. The testing was performed between November 1, 1993 and January 28, 1994.

1.3 Conclusion

The Wave Crimp ACTION PIN Header & Receptacle Drawer Connector meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1479 Rev. O.

1.4 Product Description

The AMPOWER Wave Crimp Drawer connector consists of 2 self-aligning mating halves, a receptacle and a header. Drawer connectors are available in 4 standard widths with the following combinations: 2 power cables with 0 signal positions; 4 power cables with 0 signal positions; 4 power with 8 signal positions; and 4 power cables with 21 signal positions. Depending on the model, the Drawer connector is equipped with 2 or 4 pairs of power contacts. Each pair of power contacts terminates one insulated flat cable having 1 or 2 copper conductors in a 1 inch wide envelope. Both .010 and .020 thick conductors are available.

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
1,2,3,5	64	1-765210-1	Cable, Flat .010
1,2,3,5	64	1-765210-2	Cable, Flat .020
1,2,3	56	765251-1	Strain Relief
1,2,3,4,6	40	765260	Header Shell
1,2,3	28	765261-1	Receptacle Shell
1,2,3,4,6	320	765257-3	ACTION PIN Header Contact
1,2,3,4,6	840	765253-6	ACTION PIN Signal Contact
1,2,3,5	128	765195-5	Transition (Long)
1,2,3,5	128	765195-6	Transition (Short)
1,2,3,5	256	765190-2	Insert
1,2,3	28	765258-1	Sense Module 2 Row
1,2,3	28	765259-1	Sense Module 1 Row

1.6 Qualification Test Sequence

Test or Examination	Test Group					
	1	2	3	4	5	6
Examination of Product	1,11	1,9	1,9	1,3	1,3	1,3
Termination Resistance, Dry Circuit	3,7	2,7				
Dielectric Withstanding Voltage			3,7			
Insulation Resistance			2,6			
T-Rise vs Current		3,8				
Vibration	5	6				
Physical Shock	6					
Mating Force	2					
Unmating Force	8					
Contact retention, header, power						2
Contact retention, header, signal						3
Contact retention, receptacle, power	9					
Contact retention, receptacle, signal	10					
Insertion Force, header				2		
Crimp tensile					2	
Durability	4					
Housing lock strength			8			
Thermal Shock			4			
Humidity-Temperature Cycling			5			
Mixed Flowing Gas		4				
Temperature Life		5				

The numbers indicate sequence in which tests were performed.

2. Summary of Testing

2.1 Examination of Product - All Groups

All samples submitted for testing were selected from normal current production lots. They were inspected and accepted by the Product Assurance Department of the Strategic Product Center, Phoenix Az.

2.2 Termination Resistance, Dry Circuit - Groups 1, 2

All termination resistance measurements, taken at 100 milliamperes DC and 50 millivolts open circuit voltage were less than 2.0 milliohms for power contacts and 30 milliohms for signal contacts.

Test Group	Nbr of Samples	Condition	Min	Max	Mean
		POWER CONTACTS			
1	48	Initial	0.24	0.37	0.296
		After Mechanical	0.25	0.44	0.317
2	48	Initial	0.25	0.47	0.318
		After Verification	0.27	0.68	0.459
		SIGNAL CONTACTS			
1	36	Initial	4.34	5.47	4.844
		After Mechanical	4.35	6.72	4.977
2	36	Initial	4.39	7.57	5.251
		After Verification	4.55	7.26	5.497

All values in milliohms

2.3 Dielectric Withstanding Voltage - Group 3

No dielectric breakdown or flashover occurred when a test voltage was applied between adjacent power and between adjacent signal contacts.

2.4 Insulation Resistance - Group 3

All insulation resistance measurements were greater than 1,000 megohms.

2.5 Temperature Rise vs Current - Group 2

All power contacts on 20 mil cable had a temperature rise of less than 30°C above ambient when a specified current of 40 amperes DC was applied. All power contacts on 10 mil cable had a temperature rise of less than 30°C above ambient when a specified current of 32 amperes DC was applied.

2.6 Vibration - Groups 1,2

No discontinuities of the contacts 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 of the contacts 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 30 pounds for 4 cable/21 signal samples.

2.9 Unmating Force - Group 1

All unmating force measurements were greater than 6 pounds for 4 cable/21 signal samples.

2.10 Contact Retention, header, power - Group 6

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 3 pounds to the each full width cable.

2.11 Contact Retention, header, signal - Group 6

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 1 pound to the each full individual wire.

2.12 Contact Retention, receptacle, power - Group 1

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 40 pounds to each full width cable.

2.13 Contact Retention, receptacle, signal - Group 1

No physical damage occurred to either the contacts or the housing, and no contacts dislodged from the housings as a result of supplying an axial load of 1 pound to each full individual wire.

2.14 Insertion Force, header - Group 4

The maximum force to insert the ACTION PIN headed into the test board was less than 40 pounds per contact.

2.15 Crimp Tensile - Group 5

All tensile values were greater than 30 pounds for 10 mil half wide cable and greater than 40 pounds for 20 mil half wide cable.

2.16 Durability - Group 1

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

2.17 Housing Lock Strength, latching mount - Group 3

Mated connectors did not unmate with a 60 pound axial load applied.

2.18 Thermal Shock - Group 3

No evidence of physical damage to either the contacts or the connector was visible as a result of thermal shock.

2.19 Humidity-Temperature Cycling - Group 3

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to humidity-temperature cycling.

2.20 Mixed Flowing Gas - Group 2

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

2.21 Temperature Life - Group 2

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to an elevated temperature.

3. Test Methods

3.1 Examination of Product

Product drawings and inspection plans were used to examine the samples. They were examined visually and functionally.

3.2 Termination Resistance, Low Level

Termination resistance measurements at low level current were made using a four terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes DC with an open circuit voltage of 50 millivolts DC.

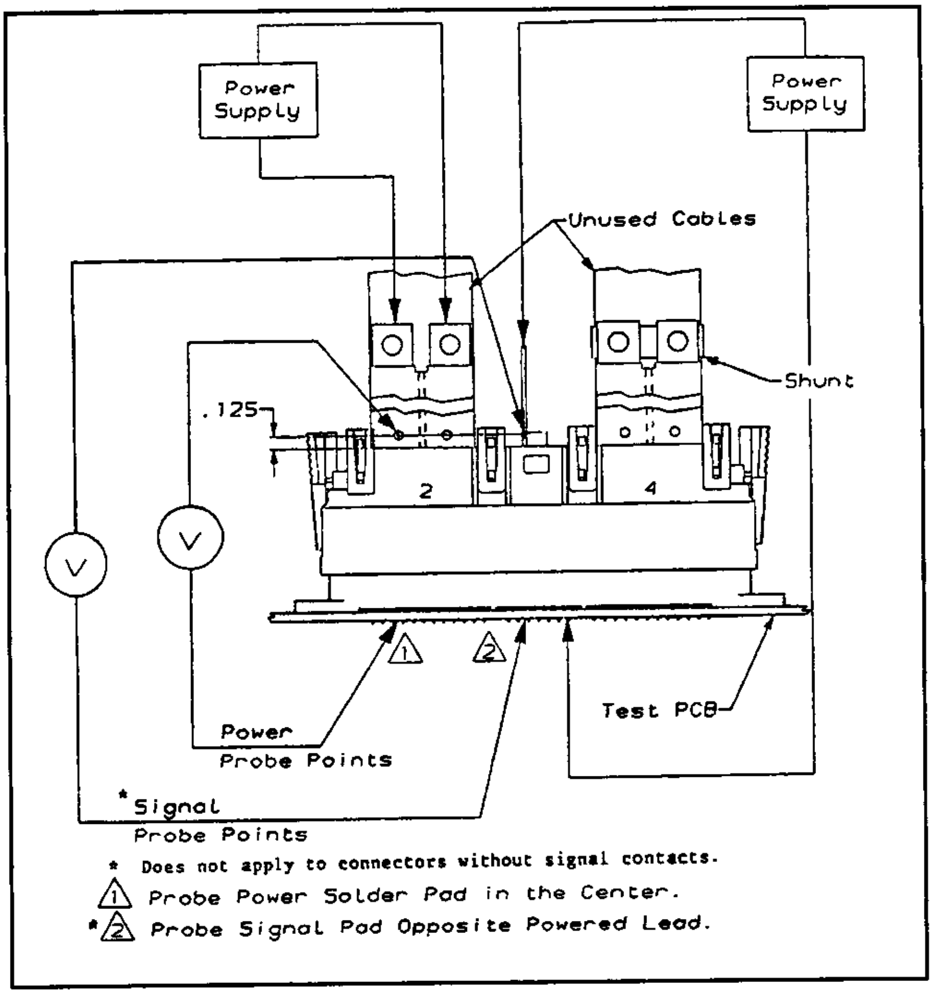

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1500 vac was applied between the adjacent power contacts and between all power contact and metal foil around the connector housing. This potential was applied for one minute and then returned to zero.
A test potential of 1200 vac was applied between the adjacent signal contacts and between all signal contact and metal foil around the connector housing. This potential was applied for one minute and then returned to zero.

3.4 Insulation Resistance

Insulation resistance was measured between adjacent power contacts, adjacent signal contacts, and between all contacts and the shell, using a test voltage of 500 volts DC. This voltage was applied for two minutes before the resistance was measured.

3.5 Temperature Rise vs Specified Current

Connector temperature was measured, while energized at the specified current of 40 amperes for 20 mil cable, 32 amperes for 10 mil cable, 2.5 amperes for signal contacts on 5 oz boards, and 2.0 amperes for signal contacts on 1 oz boards. Thermocouples were attached to the connectors to measure their temperatures. This temperature was then subtracted from the ambient temperature to find the temperature rise. When three readings at five minute intervals were the same, the readings were recorded.

3.6 Vibration, Sine

Mated connectors were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude. The vibration frequency was varied logarithmically between the limits of 10 and 500 Hz and returned to 10 Hz in 15 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes, for a total vibration time of 9 hours. Group 1 connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit. Group 2 connectors were energized with a current capable of producing an approximate temperature rise of 20° above ambient.

3.7 Physical Shock

Mated connectors were subjected to a physical 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 three mutually perpendicular planes, for a total of 18 shocks. The connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.8 Mating Force

The force required to mate individual connectors was measured, using a free floating fixture with the rate of travel at 0.5 inch/minute.

3.9 Unmating Force

The force required to unmate individual connectors was measured using a free floating fixture with the rate of travel at 1.0 inch/minute.

3.10 Contact Retention, header, power

An axial load of 3 pounds was applied to each contact and held for 60 seconds. The force was applied in a direction to cause removal of the contact from the housing.

3.11 Contact Retention, header, signal

An axial load of 1 pounds was applied to each contact and held for 60 seconds. The force was applied in a direction to cause removal of the contact from the housing.

3.12 Contact Retention, receptacle, power

An axial load of 40 pound was applied to each full wide cable and held for 60 seconds. The force was applied in a direction to cause removal of the cable from the housing.

3.13 Contact Retention, receptacle, signal

An axial load of 3 pounds was applied to each signal wire and held for 60 seconds. The force was applied in a direction to cause removal of the wire from the housing.

3.14 Insertion Force, header

An increasing axial load was applied to each header. This force was applied until the headers Action pin contacts were completely inserted into the test board

3.15 Crimp Tensile

An axial force was applied to each half wide cable at a crosshead rate of 1.0 inch per minute.

3.16 Durability

Connectors (power and signal) were mated and unmated 100 times at a rate not exceeding 600 per hour.

3.17 Housing Lock Strength

An axial load of 60 pounds was applied to mated connector assemblies. The force was applied in a direction parallel to the plane of the connector.

3.18 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 -40°C and 105°C. The transition between temperatures was less than one minute.

3.19 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°C and 65°C twice while the relative humidity was held at 95%.

3.20 Mixed Flowing Gas, Class III

Mated connectors were exposed for 20 days to a mixed flowing gas Class III exposure. Class III exposure is defined as a temperature of 30°C and a relative humidity of 75% with the pollutants of $C1_2$ at 20 ppb, NO_2 at 200 ppb, and H_2S at 100 ppb.

3.21 Temperature Life

Mated samples were exposed to a temperature of 140°C for 720 hours.

4. Validation

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