AMP

QUALIFICATION TEST REPORT

SYSTEM, AMPOWER* WAVE CRIMP SELF-ALIGNING HEADER & RECEPTACLE

501-220 REV. O

Product Specification:	108-1403 Rev. O
CTL No.:	CTL9983-064
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*Trademark

Corporate Test Laboratory Harrisburg, Pennsylvania

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(R9983TSb)

AMP

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CORPORATE TEST LABORATORY

Qualification Test Report
System, AMPOWER Wave Crimp,
self-aligning Header & Receptacle

1. Introduction

1.1 Purpose

Testing was performed on AMP's Self-aligning Header & Receptacle to determine its conformance to the requirements of AMP Product Specification 108-1403 Rev. O.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the Self-aligning Header & Receptacle manufactured by the Strategic Product Center, Phoenix Az. The testing was performed between November 22, 1992 and May 21, 1993.

1.3 Conclusion

The Self-aligning Header & Receptacle meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1403 Rev. O.

1.4 Product Description

This connector system consists of 2 self-aligning halves. The header is designed to mount to a printed circuit board with the mating axis parallel to the board. The receptacle is available in two mounting styles, latching mount and floating mount. Both header and receptacle are equipped with 4 pairs of power contacts. Each pair of power contacts terminate 1 insulated flat cable having 1 or 2 copper conductors

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	22	765210-11	Cable, Flat .010
1,2,3,5	22	765210-12	Cable, Flat .020
1,2,3,5	128	765195-5	Transition (long)
1,2,3,5	128	765195-6	Transition (short)
1,2,3	56	76251-1	Strain Relief
1,2,3	28	765239-1	Sense Module
1,2,3	128	765190-2	Insert
1,2,3	28	765224-1	Receptacle Housing
1,2,3,6,7	36	765492	Header Housing
1,2,3	28	765493	Locking Plate
1,2,3,5	81	765494-3	Header Contact (upper)
1,2,3,5	81	765495-3	Header Contact (lower)
1,2,3,5	112	765496-3	Sense Pin (upper)
1,2,3,5	112	765496-6	Sense Pin (lower)

1.6 Qualification Test Sequence

Test or Examination	Test Group 1	2	3	4	5	6	7
Examination of Product	1,10	1,9	1,10	1,3	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, power & signal	9						
Crimp Tensile					2		
Durability	4						
Housing Lock Strength			9				
Insert Retention, torque mode						2	
Insert Retention, axial mode							2
Solderability				2			
Resistance to Soldering Heat			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 18.0 milliohms for signal contacts.

Test Group	Nbr of Samples	Condition	Min	Max	Mean
1	32	Initial (power)	0.41	0.51	0.456
	32	Initial (signal)	9.41	12.68	11.031
	32	After Mechanical	0.41	0.52	0.463
	32	After Mechanical	9.74	12.56	11.266
2	48	Initial (power)	0.40	0.53	0.466
	36	Initial (signal)	9.65	12.77	11.073
	48	After Verification	0.42	0.75	0.518
	36	After Verification	9.86	13.93	11.314

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 contacts.

2.4 Insulation Resistance - Group

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

2.5 Temperature Rise vs Current - Group 2

All power contacts had a temperature rise of less than 30°C above ambient when a specified current of 35 amperes DC was applied. All signal contacts had a temperature rise of less than 30°C above ambient when a specified current of 1.0 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 2

All mating force measurements were less than 25 pounds.

2.9 Unmating Force - Group

All unmating force measurements were greater than 6.0 pounds.

2.10 Contact Retention power & 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 applying an axial load of 40 pounds to the each full width cable.

2.11 Crimp Tensile - Group 5

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

2.12 Durability - Group 1

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

2.13 Housing Lock Strength - Group 3

Mated connectors did not unmate with a 40 pound axial load applied.

2.14 Insert Retention, Torque mode - Group 6

With 8 inch pounds applied, the inserts did not spin out of the housings.

2.15 Insert Retention, Axial mode - Group 7

With 20 pounds applied, the inserts did not dislodge from the housings.

2.16 Solderability - Group 4

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

2.17 Resistance to Soldering Heat - Group 4

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

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 5

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.

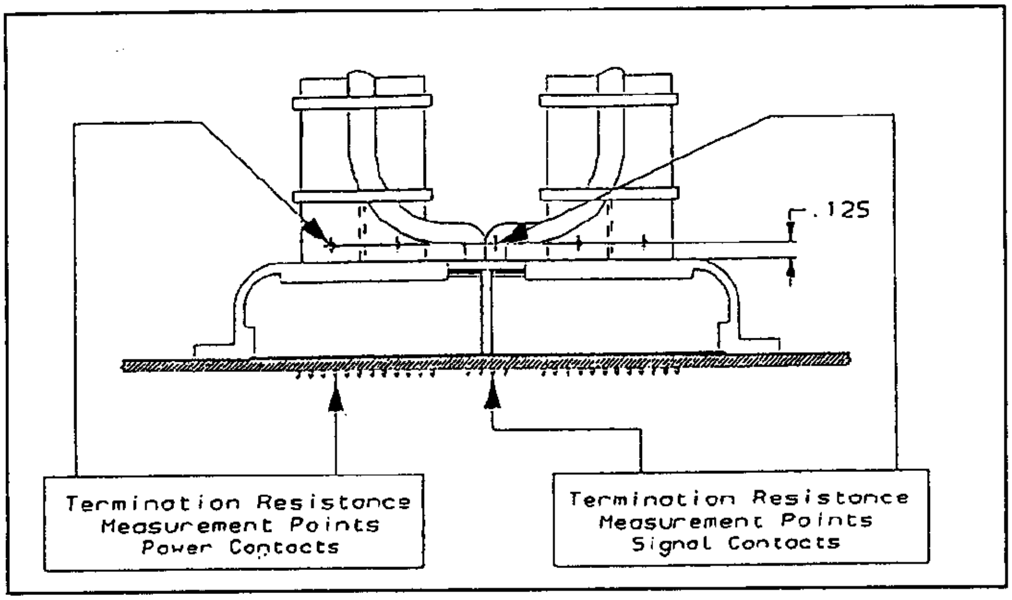

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1500 vac was applied between the adjacent power contacts. 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. 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 35 amperes for 20 mil cable, 19 amperes for 10 mil cable and 1 ampere for signal contacts with power contacts energized. 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 0.5 inch/minute.

3.10 Contact Retention

An axial load of 40 pounds 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. 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.

3.11 Crimp Tensile

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

3.12 Durability

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

3.13 Housing Lock Strength

An axial load of 40 pounds was applied to mated connector assemblies. The force was applied in a direction normal to the plane of the connector.

3.14 Insert Retention, Torque mode

An rotational torque was applied to each insert. This force was applied in a direction which would cause the insert to spin out of the housing.

3.15 Insert Retention, Axial mode

An axial force was applied to each insert. This force was applied in a direction which would cause the insert to push out of the housing.

3.16 Solderability

Connector assembly contact solder tails were subjected to a solderability test by immersing them in a nonactivated rosin flux for 5 to 10 seconds, allowed to drain for 10 to 60 seconds, then held over molten solder without contact for 2 seconds. The solder tails were then immersed in the molden solder at a rate of approximately one inch per second, held for 3 to 5 seconds, then withdrawn. After cleaning in isopropyl alcohol, the samples 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°C.

3.17 Resistance to Soldering Heat

Samples mounted to printed circuit boards were immersed in a solder bath for 10 seconds. The bath was maintained at 260°C.

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. <u>Validation</u>

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