



QUALIFICATION TEST REPORT

AMP* Miniature Rectangular (MR) Headers

501-19

Rev O

Product Specification: AMP 108-1078, Rev. 0
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Table of Contents

1.	Introduction	Page 1
1.1	Purpose	Page 1
1.2	Scope	Page 1
1.3	Conclusion	Page 1
1.4	Product Description	Page 2
1.5	Test Samples	Page 2
1.6	Qualification Test Sequence	Page 3
2.	Summary of Testing	Page 3
2.1	Examination of Product	Page 3
2.2	Termination Resistance, Specified Current	Page 3
2.3	Termination Resistance, Dry Circuit	Page 4
2.4	Dielectric Withstanding Voltage	Page 4
2.5	Insulation Resistance	Page 4
2.6	Temperature Rise vs Current	Page 4
2.7	Mating Force	Page 5
2.8	Unmating Force	Page 5
2.9	Durability	Page 5
2.10	Housing Lock Strength	Page 5
2.11	Thermal Shock	Page 5
3.	Test Results	Page 6
3.1	Examination of Product - All Groups	Page 6
3.2	Termination Resistance, Specified Current - Group 1 Only.	Page 6
3.3	Termination Resistance, Dry Circuit - Group 2 Only	Page 6
3.4	Dielectric Withstanding Voltage - Groups 2 and 3	Page 7
3.5	Insulation Resistance - Groups 2 and 3	Page 7
3.6	Temperature Rise vs Current - Group 1 Only	Page 8
3.7	Mating Force - Group 2 Only	Page 8
3.8	Unmating Force - Group 2 Only	Page 9
3.9	Durability - Group 2 Only	Page 9
3.10	Housing Lock Strength - Group 4 Only	Page 9
3.11	Thermal Shock - Group 2 Only	Page 9
4.	Figures	Page 11
4.1	Figure 1 - Resistance and Temperature Measurement Points.	Page 11
4.2	Figure 2 - Printed Circuit Board	Page 12
5.	Validation	Page 13

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CORPORATE TEST LABORATORY

Product Qualification Test Report for AMP Miniature Rectangular (MR) Headers

1. Introduction

1.1 Purpose

The purpose of testing was to determine if AMP Miniature Rectangular (MR) Headers conform to AMP Product Specification 108-1078, Revision 0.

1.2 Scope

This report covers electrical and mechanical performance of the subject product. The samples were provided by the Commercial Products Division of the Communications and Assemblies Group. Testing was performed between November 6, 1984 and March 26, 1985.

1.3 Conclusion

AMP Miniature Rectangular (MR) Headers conform to the performance requirements of the product specification.

1.4 Product Description

AMP Miniature Rectangular (MR) Headers are designed to interface with printed circuit boards in sophisticated commercial equipment. A basic mated connector assembly consists of an MR Header and an MR Socket (plug) having identical number of circuits. The MR Headers are available in 2 through 36 circuit positions (ckt). The MR Sockets (plug) can be crimped to wire sizes ranging from AWG #26 through AWG #18. The MR Headers are rated for 6 amperes maximum current at 250 volts ac. The MR Headers can operate at temperature extremes of -55°C to +105°C.

1.5 Test Samples

The test samples used for the test matrix were as follows:

*TEST GROUP	AMP PART NUMBER	PRODUCT NAME	QTY.	WIRE SIZE
1	9-350261-1	9 ckt MR Header	8	--
1	1-350242-9	9 ckt MR Plug	8	--
1	9-350276-1	36 ckt MR Header	8	--
1	1-350356-9	36 ckt MR Plug	8	--
1	641294-1	MR Standard Socket	90	18 AWG
1	350665-1	MR Cantilever Socket	90	18 AWG
1	641294-1	MR Standard Socket	90	26 AWG
1	350665-1	MR Cantilever Socket	90	26 AWG
2	9-350258-1	6 ckt MR Header	16	--
2	1-350241-9	6 ckt MR Plug	16	--
2	9-350261-1	9 ckt MR Header	8	--
2	1-350242-9	9 ckt MR Plug	8	--
2	9-350267-1	15 ckt MR Header	8	--
2	1-350244-9	15 ckt MR Plug	8	--
2	9-350276-1	36 ckt MR Header	4	--
2	1-350356-9	36 ckt MR Plug	4	--
2	641294-1	MR Standard Socket	108	18 AWG
2	350665-1	MR Cantilever Socket	108	18 AWG
2	641294-1	MR Standard Socket	108	26 AWG
2	350665-1	MR Cantilever Socket	108	26 AWG
3	9-350258-1	6 ckt MR Header	2	--
3	1-350241-9	6 ckt MR Plug	2	--
3	9-350261-1	9 ckt MR Header	2	--
3	1-350242-9	9 ckt MR Plug	2	--
3	9-350267-1	15 ckt MR Header	2	--
3	1-350244-9	15 ckt MR Plug	2	--
3	9-350276-1	36 ckt MR Header	1	--
3	1-350356-9	36 ckt MR Plug	1	--
3	641294-1	MR Standard Socket	100	18 AWG

*TEST GROUP	AMP PART NUMBER	PRODUCT NAME	QTY.	WIRE SIZE
4	9-350258-1	6 ckt MR Header	2	--
4	1-350241-9	6 ckt MR Plug	2	--
4	9-350261-1	9 ckt MR Header	2	--
4	1-350242-9	9 ckt MR Plug	2	--
4	9-350267-1	15 ckt MR Header	2	--
4	1-350244-9	15 ckt MR Plug	2	--
4	9-350276-1	36 ckt MR Header	2	--
4	1-350356-9	36 ckt MR Plug	2	--

*Samples from Test Groups 1 and 2 were mounted on printed circuit board, shown in Figure 2.

1.6 Qualification Test Sequence

The test samples were divided into four groups. Each group was tested independently and in accordance with the following sequence:

		Test Group			
		1	2	3	4
Paragraph	Test or Examination	Test Sequence (a)			
2.1	Examination of Product	1	1	1	1
2.2	Termination Resistance, Specified Current	3			
2.3	Termination Resistance, Dry Circuit		3,5,7		
2.4	Dielectric Withstanding Voltage		9	3	
2.5	Insulation Resistance		8	2	
2.6	Temperature Rise vs Current	2			
2.7	Mating Force		2		
2.8	Unmating Force		10		
2.9	Durability		4		
2.10	Housing Lock Strength				2
2.11	Thermal Shock		6		

(a) Numbers indicate sequence in which tests were performed.

2. Summary of Testing

2.1 Examination of Product

All connectors submitted for testing were selected from production lots that were subjected to inspection by the Quality Department of the Commercial Products Division.

2.2 Termination Resistance, Specified Current

Mated connector assemblies were measured for termination resistance at the specified currents of 1.0 amperes d.c. for AWC

#26 wire and 6.0 amperes d.c. for AWG #18 wire. Measurements were made on group #1 samples after temperature-rise vs. current testing. Measurement points and points of electrification were as indicated in Figure #1.

2.3 Termination Resistance, Dry Circuit

Mated connector assemblies were measured for termination resistance at a current of 100 milliamperes d.c. and an open circuit voltage of 50 millivolts d.c. Measurements were made on group #2 samples initially, after durability, and after thermal shock. Measurement points and points of electrification were as indicated in Figure #1.

2.4 Dielectric Withstanding Voltage

The MR Headers were mated with their respective MR Plugs and subjected to dielectric withstanding voltage test. The applied voltage between the adjacent contacts of the assembly was 2500 volts (rms) for a period of one minute. The rate of voltage rise was 500 volts (rms) per second with 60 Hz frequency. During the test period, the samples were monitored for breakdown or flashover.

2.5 Insulation Resistance

The insulation resistance measurements were taken between adjacent contacts of mated connector assemblies. A test voltage of 500 volts d.c. was used for the measurements with an electrification time of two minutes.

2.6 Temperature Rise vs Current

Mated connector assemblies were energized at the rated current until thermal stabilization was achieved. After stabilization, the temperature of the contacts was measured at the location illustrated in Figure #1. The contact temperature rise was calculated by subtracting the ambient temperature from the contact temperature.

Miniature Rectangular (MR) Header Rated Current

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Wire Size (AWG)</u>	<u>Rated Current (amperes dc)</u>
9-350261-1	9 ckt	26	3.5
9-350261-1	9 ckt	18	6.0
9-350276-1	36 ckt	26	2.5
9-350276-1	36 ckt	18	5.0

2.7 Mating Force

The connectors were mated to a point .100 inch from the point of initial contact. The rate of mating was 0.5 inch per minute. The locking latches were on the samples during mating. An average force per contact was calculated by dividing the mating force of the connector assembly by the number of contacts in the assembly. The requirement of the specification is 1.0 pound per contact maximum. Mating force was measured initially on test group #2.

2.8 Unmating Force

The connectors were unmated from a mated depth of .100 inch at a rate of 0.5 inch per minute. The locking latches were removed from the assemblies. An average force per contact was calculated by dividing the unmating force of the connector assembly by the number of contacts in the assembly. The requirement of the specification is 0.25 pounds per contact.

2.9 Durability

The connector assemblies were mated and unmated a total of 25 times. Connectors were measured for termination resistance, dry circuit, following durability.

2.10 Housing Lock Strength

An axial force was exerted on the mated connectors, separating the housings at a constant rate of speed of 0.5 inches/minute. All contacts were removed from the housings with only the locking clips holding the housings together. The force to disengage the locking clips was measured and recorded.

2.11 Thermal Shock

The mated and mounted assemblies were subjected to 25 cycles of thermal shock between the temperature extremes of -55°C to 105°C. Each cycle consisted of exposing the samples to -55°C temperature for 30 minutes and to +105°C temperature for another 30 minutes. The transition time between the two temperature extremes was less than one minute. Following thermal shock, the samples were inspected for any physical damage. The samples were then checked for dry circuit termination resistance per paragraph 2.3. The samples were then checked for insulation resistance per paragraph 2.5. The samples were then tested for dielectric withstanding voltage per paragraph 2.4.

3. Test Results

3.1 Examination of Product - All Groups

All test samples conformed to the requirements of the product drawings.

3.2 Termination Resistance, Specified Current - Group 1 Only

All samples conformed to the specified termination resistance requirements.

Maximum Contact Termination Resistance (Milliohms)

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Test Current (Amperes)</u>	<u>Wire Size (AWG)</u>	<u>Measured</u>	<u>Specified</u>
9-350261-1	9 ckt	1.0	26	3.30	5.00
9-350261-1	9 ckt	6.0	18	2.82	4.00
9-350276-1	36 ckt	1.0	26	3.06	5.00
9-350276-1	36 ckt	6.0	18	3.10	4.00

3.3 Termination Resistance, Dry Circuit - Group 2 Only

All samples conformed to the specified termination resistance after they were subjected to the specified environment.

Maximum Contact Termination Resistance (Milliohms) After Mating Force Testing

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Wire Size (AWG)</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	26	3.60	5.50
9-350258-1	6 ckt	18	3.23	5.50
9-350261-1	9 ckt	26	3.61	5.50
9-350261-1	9 ckt	18	3.11	5.50
9-350267-1	15 ckt	26	3.87	5.50
9-350267-1	15 ckt	18	3.01	5.50
9-350276-1	36 ckt	26	3.81	5.50
9-350276-1	36 ckt	18	3.10	5.50

Maximum Contact Termination Resistance (Milliohms)
After Durability Testing

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Wire Size (AWG)</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	26	3.48	6.00
9-350258-1	6 ckt	18	3.62	6.00
9-350261-1	9 ckt	26	3.72	6.00
9-350261-1	9 ckt	18	3.38	6.00
9-350267-1	15 ckt	26	3.83	6.00
9-350267-1	15 ckt	18	3.88	6.00
9-350276-1	36 ckt	26	4.45	6.00
9-350276-1	36 ckt	18	5.86	6.00

Maximum Contact Termination Resistance (Milliohms)
After Thermal Shock Testing

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Wire Size (AWG)</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	26	3.47	6.75
9-350258-1	6 ckt	18	3.44	6.75
9-350261-1	9 ckt	26	3.50	6.75
9-350261-1	9 ckt	18	3.33	6.75
9-350267-1	15 ckt	26	3.83	6.75
9-350267-1	15 ckt	18	3.43	6.75
9-350276-1	36 ckt	26	4.04	6.75
9-350276-1	36 ckt	18	4.04	6.75

3.4 Dielectric Withstanding Voltage - Groups 2 and 3

No breakdown or flashover occurred when the samples were subjected to 2500 volts rms.

3.5 Insulation Resistance - Groups 2 and 3

Samples in both test groups conformed to the minimum specified contact insulation resistance.

Group 2
Minimum Insulation Resistance (Megohms)

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Wire Size (AWG)</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	26	1.0×10^6	1.5×10^3
9-350258-1	6 ckt	18	1.3×10^6	1.5×10^3
9-350261-1	9 ckt	26	4.0×10^5	1.5×10^3
9-350261-1	9 ckt	18	1.8×10^5	1.5×10^3
9-350267-1	15 ckt	26	1.0×10^5	1.5×10^3
9-350267-1	15 ckt	18	4.0×10^5	1.5×10^3
9-350276-1	36 ckt	26	1.3×10^5	1.5×10^3
9-350276-1	36 ckt	18	2.6×10^5	1.5×10^3

Group 3
Minimum Insulation Resistance (Megohms)

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	2.4×10^6	1.5×10^3
9-350261-1	9 ckt	1.5×10^6	1.5×10^3
9-350267-1	15 ckt	1.8×10^6	1.5×10^3
9-350276-1	36 ckt	1.3×10^5	1.5×10^3

3.6 Temperature Rise vs Current - Group 1 Only

All of the samples conformed to the maximum specified temperature rise requirements.

Maximum Contact Temperature Rise (°C)

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Wire Size (AWG)</u>	<u>Rated Current (Amperes)</u>	<u>Measured</u>	<u>Specified</u>
9-350261-1	9 ckt	26	3.5	24.8	30.0
9-350261-1	9 ckt	18	6.0	20.8	30.0
9-350276-1	36 ckt	26	2.5	29.5	30.0
9-350276-1	36 ckt	18	5.0	28.0	30.0

3.7 Mating Force - Group 2 Only

All of the samples conformed to the maximum specified contact mating force requirements.

Maximum Contact Mating Force (Pounds)

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	0.95	1.00
9-350261-1	9 ckt	0.90	1.00
9-350267-1	15 ckt	0.75	1.00
9-350276-1	36 ckt	0.94	1.00

3.8 Unmating Force - Group 2 Only

All of the samples conformed to the minimum specified contact unmating force requirements.

Minimum Contact Unmating Force (Pounds)

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	0.48	0.25
9-350261-1	9 ckt	0.62	0.25
9-350267-1	15 ckt	0.79	0.25
9-350276-1	36 ckt	1.03	0.25

3.9 Durability - Group 2 Only

The samples did not show any evidence of damage, cracking or chipping following their exposure to 25 cycles of durability testing. The contact termination resistance test results are described in paragraph 3.3.

3.10 Housing Lock Strength - Group 4 Only

All of the samples conformed to the minimum specified housing lock strength requirements.

Minimum Force to Disengage Locking Clips (Pounds)

<u>AMP Part Number</u>	<u>Number of Circuits</u>	<u>Measured</u>	<u>Specified</u>
9-350258-1	6 ckt	26.8	20.0
9-350261-1	9 ckt	24.0	20.0
9-350267-1	15 ckt	46.2	20.0
9-350276-1	36 ckt	29.5	20.0

3.11 Thermal Shock - Group 2 Only

The samples did not show any evidence of damage, cracking or chipping following their exposure to 25 cycles of thermal shock testing.

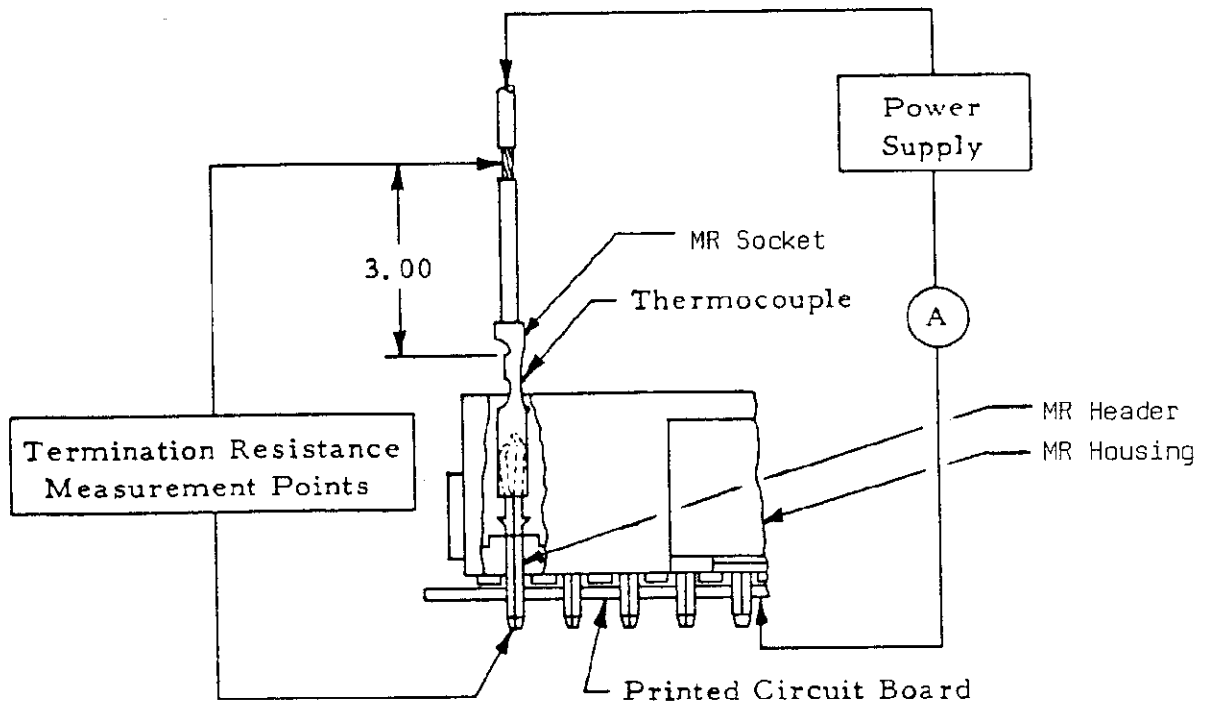
The contact termination resistance test results are described in paragraph 3.3.

The insulation resistance test results are described in paragraph 3.5.

The dielectric withstanding voltage test results are described in paragraph 3.4.

4. Figures

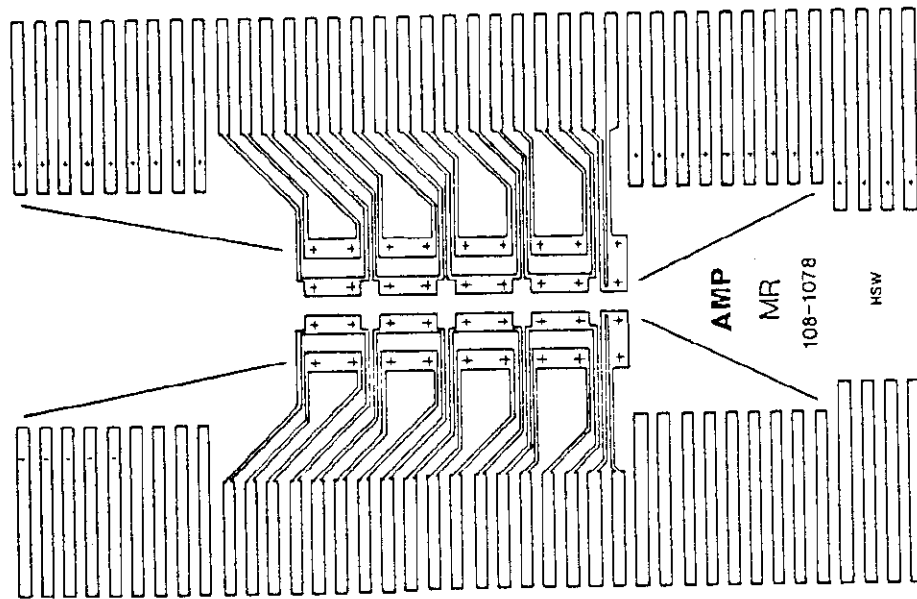
4.1 Figure 1



- Notes:
1. A foot minimum length of continuous lead for heat dissipation.
 2. Termination resistance equals millivolts divided by test current less resistance of 3 inches of wire.
 3. Printed circuit board is 2 ounce copper single side.

Resistance and Temperature Measurement Points

4.2 Figure 2



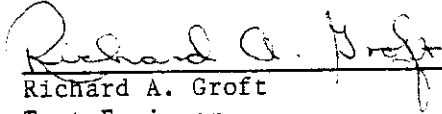
Notes:

- (a) This board shall be used for test groups 1 and 2.
- (b) Current trace width is .080 inch.

Printed Circuit Board

5. Validation


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