Table of Contents

AMP INCORPORATED

HARRISBURG, PENNSYLVANIA 17105 • PHONE: 717-564-0100 • TWX 510-657-4110

CORPORATE TEST LABORATORY

Product Qualification Test Report
AMP Commercial MATE-N-LOK Panel Mount Connectors

1. Introduction

1.1 Purpose

Testing was conducted to determine product performance when tested in accordance with the requirements of AMP Product Specification 108-1000, Rev. E.

1.2 Scope

This report covers electrical and mechanical performance of AMP Commercial MATE-N-LOK Panel Mount Connectors, produced by the Components and Assemblies Division of the Communications and Assemblies Group. Testing was performed between December 13, 1982, and July 1, 1983.

1.3 Conclusions

The AMP Commercial MATE-N-LOK panel mount connectors conform the performance requirements of the product specification.

1.4 Product Description

The AMP Commercial MATE-N-LOK Panel Mount Connectors are primarily designed to have the socket housing (plug) mounted in a flat panel. The pin housing (cap) is then inserted in the mounted housing. The locking device which holds the two halves together permits the use of these connectors as free-hanging devices. Crimp, removable, precision formed pin and socket contacts are available which cover a range of wire sizes from #14 AWG through #30 AWG.

1.5 Test Samples

Part Number	Description
1-480304-0	3 Circuit Socket Housing
1-480305-0	3 Circuit Pin Housing
1-480425-0	4 Circuit Socket Housing
1-480426-0	4 Circuit Pin Housing
1-480273-0	6 Circuit Socket Housing
1-480276-0	6 Circuit Pin Housing
1-480274-0	9 Circuit Socket Housing
1-480277-0	9 Circuit Pin Housing
1-480275-0	12 Circuit Socket Housing
1-480278-0	12 Circuit Pin Housing
1-480323-0	15 Circuit Socket Housing
1-480324-0	15 Circuit Pin Housing
61117-1	Socket Contact 20-14 AWG
61118-1	Pin Contact 20-14 AWG
61314-1	Socket Contact 24-18 AWG
61116-1	Pin Contact 24-18 AWG
350078-1	Socket Contact 30-22 AWG
350079-1	Pin Contact 30-22 AWG

The quantity of each part number and sample preparation details will be found at the beginning of each test group.

1.6 Qualification Test Sequence

Test or Examination	Test Group							
	1	2	3	4	5	6	7	8
Examination of Product	1							
Termination Resistance Specified Current			2					
Termination Resistance Dry Circuit		4,6,9,11		1,3,5,7				
Dielectric Withstanding Voltage		2,13						
Insulation Resistance		3,12						
Temperature Rise vs. Current			1					
Vibration				2				
Physical Shock				4				
Mating Force		1						
Unmating Force		7						
Contact Retention						1		
Crimp Tensile					1			
Durability		5						
Housing Panel Retention							1	
Housing Lock Strength								1
Thermal Shock		8						
Humidity-Temperature Cycling		10						
Corrosion, Salt Spray				6				

2. Summary of Testing

2.1 Test Group 1

2.1.1 Examination of Product

All samples submitted for testing were selected from production lots that were subjected to inspection and found to be acceptable by the Quality Department of the Components and Assemblies Division.

2.2 Test Group 2

2.2.1 Sample Description

One sample each of pin and socket housings of 3, 6, 12, and 15 positions were loaded with pin contact (#61118-1) or socket contacts (#61117-1) which had been crimped on each end of one foot of #14 AWG wire.

2.2.2 Mating Force

Connector halves were mounted in fixtures, aligned when mechanical mating began and then mated for 0.10 inch at a speed of 0.5 inch per minute while the mating force was measured. The locking latches were disengaged.

Test Results

Pounds per Contact

Min.	Max.	Average	Required
2.08	2.53	2.33	4.0 Maximum

The mating forces were less than the specified maximum.

2.2.3 Dielectric Withstanding Voltage

A test voltage of 1500 volts, 60 hertz was applied to adjacent contacts of mated connector assemblies. The test was performed initially and after humidity-temperature cycling.

Test Results

All assemblies withstood the test voltage of 1500 volts for a period of one minute with no evidence of breakdown or flashover.

2.2.4 Insulation Resistance

Insulation resistance measurements were performed between adjacent contacts of mated connectors. A test voltage of 500 volts dc was used with a two-minute electrification time. The test was performed initially and after humidity-temperature cycling.

Test Results

All assemblies met the minimum insulation resistance of 500 megohms.

2.2.5 Termination Resistance, Dry Circuit

Termination resistance measurements across mated contact pairs were performed after insulation resistance (Step 4), durability (Step 6), thermal shock (Step 9), and humidity-temperature cycling (Step 11). The test current was 100 milliamperes dc with an open circuit voltage not exceeding 50 millivolts.

Test Results

Step	Resistance (milliohms)			Requirement (milliohms)
	Min.	Max.	Avg.	Max.
4	1.025	2.550	1.747	4.0
6	1.375	2.510	1.644	4.5
9	1.550	3.735	2.376	5.0
11	1.985	5.555	4.316	6.0

All samples conformed to the requirements of the product specification as noted.

2.2.6 Durability

Connector assemblies were mated and unmated manually for 50 cycles.

Test Results

No physical damage occurred and assemblies met the required termination resistance of 4.5 milliohms, maximum.

2.2.7 Unmating Force

The force needed to unmate the connector assemblies was measured with the locking latches disengaged. Separation was performed at a speed of 0.5 inch per minute.

Test Results

Housing Size	Pounds per Contact
3 position	3.73
6 position	1.75
12 position	1.25
15 position	1.80

All assemblies met the requirement of 0.7 pounds per contact.

2.2.8 Thermal Shock

Mated connector assemblies were subjected to 25 cycles of thermal shock with temperature extremes of -55°C and 85°C. Connectors were at each extreme for 30 minutes with a transition time of less than five minutes.

Test Results

No physical damage occurred and assemblies met the required termination resistance of 5.0 milliohms, maximum.

2.2.9 Humidity-Temperature Cycling

Mated connector assemblies were subjected to a ten-day humidity-temperature test. A 24-hour period consisted of cycling between 25°C and 65°C twice at 95% relative humidity. On five of the first nine days, a cold shock of -10°C for three hours followed by fifteen minutes of vibration at 10 to 55 hertz with 0.06 inch total excursion, was performed. Humidity was not controlled during cold shock and vibration.

Test Results

No physical damage occurred and assemblies met the required termination resistance of 6.0 milliohms maximum.

2.3 Test Group 3

2.3.1 Sample Description

Two samples each of pin and socket housings of 4 and 12 position were loaded with pin contacts (#61118-1) or socket contacts (#61117-1) which had been crimped on each end of one foot of #14 AWG wire. Two additional samples each of the 4 and 12 position housings were loaded with pin contacts (#61116-1) and socket contacts (#61314-1) which had been crimped on each end of one foot of #20 AWG wire.

2.3.2 Temperature Rise vs. Current

Connector assemblies were energized at the specified current in a draft-free enclosure until the temperature of the assemblies stabilized. The temperature was measured and the temperature rise above ambient was calculated.

Test Results

Wire Size	Housing Size	Test Current	Temperature Rise Above Ambient (°C) Min.	Max.	Avg.
#14	4	15a. dc	15.2	23.7	20.1
#14	12	11a. dc	13.9	19.9	16.8
#20	4	7a. dc	13.1	16.2	15.1
#20	12	5a. dc	5.1	15.2	10.8

All assemblies met the requirement of 30°C maximum temperature rise above ambient.

2.3.3 Termination Resistance, Specified Current

Termination resistance was measured across mated contact pairs using the current specified.

Test Results

Wire Size	Housing Size	Test Current	Resistance (Milliohms) Min.	Max.	Avg.
#14	4	10.0	1.32	1.49	1.40
#14	12	10.0	1.33	1.79	1.48
#20	4	4.5	1.55	2.01	1.81
#20	12	4.5	1.80	2.16	1.94

All contact pairs conformed to the requirements of 2.75 milliohms, maximum for #14 wire and 3.00 milliohms, maximum for #20 wire.

2.4 Test Group 4

2.4.1 Sample Description

One sample each of pin and socket housings of 3, 6, 12 and 15 positions were loaded with pin contacts (#61118-1) or socket contacts (#61117-1) which had been crimped on each end of one foot of #14 AWG wire.

2.4.2 Termination Resistance, Dry Circuit

Termination resistance measurements across mated contact pairs were performed initially (Step 1), after vibration (Step 3), physical shock (Step 5), and corrosion (Step 7). The test current was 100 milliamperes dc with an open circuit voltage not exceeding 50 millivolts.

Test Results

Step	Resistance (milliohms) Min.	Max.	Avg.	Requirement (milliohms) Max.
1	1.265	2.075	1.462	4.0
3	1.240	1.635	1.463	4.25
5	1.425	2.485	1.809	4.5
7	1.380	4.460	2.270	5.5

All samples conformed to the requirements of the product specification as noted.

2.4.3 Vibration

Mated connectors were subjected to vibration having sinusoidal motion with an amplitude of 0.06 inch total excursion. The vibration frequency was 10 to 55 and return to 10 hertz in a one-minute period. Samples were vibrated for two hours in each of three mutually perpendicular axes. They were monitored for discontinuities greater than 10 microseconds using a current of 100 milliamperes in the monitoring circuit.

Test Results

No discontinuities were observed, no physical damage occurred during the test, and assemblies met the termination resistance requirement of 4.25 milliohms.

2.4.4 Physical Shock

Mated connectors were subjected to physical shock. The parameters were a sawtooth waveform of 50 gravity units for a duration of 11 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular axes. Samples were monitored for discontinuities greater than 10 microseconds, using a current of 100 milliamperes in the monitoring circuit.

Test Results

No discontinuities were observed, no physical damage, occurred during the test, and assemblies met the termination resistance requirement of 4.5 milliohms.

2.4.5 Corrosion, Salt Spray

Mated connectors were subjected to a 5% salt fog atmosphere for a period of forty-eight hours.

Test Results

No physical damage occurred and assemblies met the termination resistance requirement of 5.5 milliohms.

2.5 Test Group 5

2.5.1 Sample Description

Pin and socket contacts were crimped on one end of six-inch lengths of wire. A total of 15 pin contacts and 15 socket contacts for each wire size and contact wire range were prepared.

2.5.2 Crimp Tensile

Tensile specimens were pulled to destruction using a separation rate of one-inch per minute.

Test Results

Wire Size	Contacts Pin/Socket	Crimp Tensile (Lbs) Min.	Max.	Avg.	Requirement (Lbs) Min.
#14	61118-1/ 61117-1	65.0	77.0	71.6	35
#16	61118-1/ 61117-1	61.5	75.0	68.1	30
#18	61118-1/ 61117-1	33.0	49.5	42.3	30
#18	61116-1/ 61314-1	38.8	44.0	42.6	30
#20	61118-1/ 61117-1	22.0	33.0	29.4	20
#20	61116-1/ 61314-1	25.8	30.0	28.3	20
#22	61116-1/ 61314-1	18.0	21.3	20.5	15
#22	350078-1/350078-1	21.5	24.0	23.1	15
#24	61116-1/ 61314-1	12.6	15.3	14.1	10
#24	350079-1/350078-1	15.8	16.8	16.4	10
#26	350079-1/350078-1	7.4	9.3	8.6	7
#28	350078-1/350078-1	5.1	6.9	6.5	3
#30	350079-1/350078-1	2.5	4.5	3.7	2

All specimens conformed to the tensile requirements of the product specification.

2.6 Test Group 6

2.6.1 Sample Description

Fifteen (15) pin contacts (#61118-1), crimped on one end of one-foot of #14 AWG wire, were assembled into a 15 position pin housing (#1-480324-0). Fifteen socket contacts (#61117-1), crimped on one end of one-foot of #14 AWG wire, were assembled into a fifteen position socket housing (#1-480323-0).

2.6.2 Contact Retention

An axial load of fifteen pounds was applied to each contact by pulling on the #14 wire. The load was applied for five seconds.

Test Results

None of the contacts were dislodged from the housings.

2.7 Test Group 7

2.7.1 Sample Description

Socket housings were installed in metal panels, approximately 0.045 inch thick, which contained recommended mounting cut-outs.

2.7.2 Housing Panel Retention

The force required to dislodge the socket housings from the metal panels by a direct push on the wire side of the housing was measured.

Test Results

Housing Size	Part Number	Force (pounds) Min.	Max.	Required (pounds) Min.
# 3	1-480304-0	60.0	68.0	40
# 4	1-480425-0	53.5	62.0	40
# 6	1-480273-0	83.0	89.5	65
# 9	1-480274-0	72.0	77.5	65
#12	1-480275-0	69.0	92.0	65
#15	1-480323-0	73.0	77.0	65

All housings exceeded the specification requirement for housing panel retention.

2.8 Test Group 8

2.8.1 Sample Description

Pin and socket housings, without contacts, were mated with the locking mechanism engaged. Housings with 6, 9, 12, and 15 positions were tested.

2.8.2 Housing Lock Strength

The force required to disengage the mated housings, with the locking mechanism engaged, by a direct axial pull was measured.

Test Results

Housing Size	Housing P/N Socket	Pin	Force (pounds) Min.	Max.	Requirement (pounds) Min.
# 6	1-480273-0	1-480276-0	43.0	52.0	25
# 9	1-480274-0	1-480277-0	39.0	44.5	25
#12	1-480275-0	1-480278-0	46.0	58.0	25
#15	1-480323-0	1-480324-0	45.0	49.0	25

All mated housings exceeded the specification requirements for housing lock strength.

Note: This test is not applicable to three and four position housings which use a detent locking device.

3. Validation

Report prepared by,

J.J. Edwards 7/20/83

J.J. Edwards
Senior Test Engineer
Product Testing Section
Corporate Test Laboratory

Reviewed by,

James R. Kohout 7/20/83

James R. Kohout
Manager
Product Testing Section
Corporate Test Laboratory

Approved by,

Roland P. Heinrichs 8/8/83

Roland P. Heinrichs
Manager, Product Assurance
Components & Assemblies Division
Communication & Assemblies Group

JJE/rm