AMP*

QUALIFICATION TEST REPORT

Connector, AMPLIMITE* HD-20,
Printed Circuit Board Mounted

501-168 Rev. 0

Product Specification:	108-40025, Rev.0
CTL No.:	CTL4941-090-004
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Classification:	Unrestricted
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(R4941JD)

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Qualification Test Report
Connector, AMPLIMITE HD-20,
Printed Circuit Board Mounted

1. Introduction

1.1 Purpose

Testing was performed on AMP's AMPLIMITE HD-20 Connector, Printed Circuit Board Mounted, to determine its conformance to the requirements of AMP Product Specification 108-40025, Rev.0.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the AMPLIMITE HD-20, PC Board Mounted Connector manufactured by the Interconnection Components and Assemblies Products of the Capital Goods Business Unit. The testing was performed between January 22,1992 and February 24,1992.

1.3 Conclusion

The AMPLIMITE HD-20, PC Board Mounted Connector meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-40025, Rev. 0.

1.4 Product Description

AMPLIMITE HD-20 printed circuit board mounted connectors are available in right angle front metal shell, straight posted all plastic and front metal shell, and right angle & straight posted full metal shell.

All housings for plug and receptacle connectors are a molded black thermoplastic with a 94V-0 rating. The front metal shell is made of steel with tin plating. The full metal shell is made of steel with either tin or zinc plating.

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 Number	Description
1	5	745781-2	9 Pos. Recept., Front-Metal Rgt. Angle, PC Board Mounted
	5	*205204-3	9 Pos. Plug, W/O Grd. Indents
	5	207830-4	50 Pos. Recept., All-Plastic Straight Post, Board Mounted
	5	*205212-2	50 Pos. Plug, W/O Grd. Indents
2,3	5	745784-2	37 Pos. Recept., Front-Metal Rgt. Angle, PC Board Mounted
	5	*205210-2	37 Pos. Plug, W/O Grd. Indents
4	35	747462-1	37 Pos. Recept., All-Plastic Rgt. Angle, PC Board Mounted
	35	745098-1	37 Pos. Recept., All-Plastic Rgt. Angle, PC Board Mounted
	35	745100-1	50 Pos. Recept., All-Plastic Rgt. Angle, PC Board Mounted
5	2	747467-3	9 Pos. Plug, All-Plastic Rgt. Angle PC Board Mounted
	2	*205203-3	9 Pos. Receptacle, Standard
	2	747470-1	37 Pos. Plug, All-Plastic Rgt. Angle, PC Board Mounted
	2	*205209-2	37 Pos. Receptacle, Standard
	2	747459-1	9 Pos. Recept., All-Plastic Rgt. Angle, PC Board Mounted
	2	*205204-4	9 Pos. Plug, W/Grd. Indents
	2	747462-1	37 Pos. Recept., All-Plastic Rgt. Angle, PC Board Mounted
	2	*205210-3	37 Pos. Plug, W/Grd. Indents
	2	747009-2	9 Pos. Plug, Front-Metal Rgt. Angle PC Board Mounted
	2	*205203-3	9 Pos. Receptacle, Standard

Test Group	Quantity	Part Number	Description
5 (Cont.)	2	747049-2	37 Pos. Plug, Front-Metal Rgt. Angle, PC Board Mounted
	2	*205209-2	37 Pos. Receptacle, Standard
	2	747010-2	9 Pos. Recept., Front-Metal Rgt. Angle, PC Board Mounted
	2	*205204-3	9 Pos. Plug, W/O Grd. Indents
	2	747050-2	37 Pos. Recept., Front-Metal Rgt. Angle, PC Board Mounted
	2	*205210-2	37 Pos. Plug, W/O Grd. Indents
	2	745351-4	9 Pos. Plug, Metal-Shell Rgt. Angle, PC Board Mounted
	2	*205203-3	9 Pos. Receptacle, Standard
	2	745355-4	50 Pos. Plug, Metal-Shell Rgt. Angle, PC Board Mounted
	2	*205211-2	50 Pos. Receptacle, Standard
	2	745112-2	9 Pos. Recept., Metal-Shell Rgt. Angle, PC Board Mounted
	2	*205204-3	9 Pos. Plug, W/O Grd. Indents
	2	745116-2	50 Pos. Recept., Metal-Shell Rgt. Angle, PC Board Mounted
	2	*205212-2	50 Pos. Plug, W/O Grd. Indents
6	3	747461-1	25 Pos. Recept., All-Plastic Rgt. Angle, PC Board Mounted
	3	747469-1	25 Pos. Plug, All-Plastic Rgt. Angle, PC Board Mounted
	3	747048-2	25 Pos. Recept., Front-Metal Rgt. Angle, PC Board Mounted
	3	747047-2	25 Pos. Plug, Front-Metal Rgt. Angle, PC Board Mounted
	3	745114-2	25 Pos. Recept., Metal-Shell Rgt. Angle, PC Board Mounted
	3	745353-2	25 Pos. Plug, Metal-Shell Rgt. Angle, PC Board Mounted
	5	207830-4	50 Pos. Recept., All-Plastic Straight Post, Board Mounted
7	3	747461-3	25 Pos. Recept., All-Plastic Rgt. Angle, PC Board Mounted
	3	747469-3	25 Pos. Plug, All-Plastic Rgt. Angle, PC Board Mounted
	3	747047-4	25 Pos. Plug, Front-Metal Rgt. Angle, PC Board Mounted
8	2	747150-2	9 Pos. Recept., Front-Metal Straight Post, Board Mounted
	2	*205204-4	9 Pos. Plug, W/Grd. Indents

Test Group	Quantity	Part Number	Description
8(Cont.)	2	747299-2	15 Pos. Recept., Front-Metal Straight Post, Board Mounted
	2	*205206-3	15 Pos. Plug, W/Grd. Indents
	2	745967-2	25 Pos. Recept., Front-Metal Straight Post, Board Mounted
	2	*207464-2	25 Pos. Plug, W/Grd. Indents
	2	747301-2	37 Pos. Recept., Front-Metal Straight Post, Board Mounted
	2	*205210-3	37 Pos. Plug, W/Grd. Indents

* - Mated with connectors for test purposes only.

1.6 Qualification Test Sequence

	Test Groups							
Test or Examination	1	2	3	4	5	6	7	8
Examination of Product	1,9	1,6	1,6	1,3	1,5	1,8	1,3	1,5
Termination Resistance, Dry Circuit	3,7	2,5	2,5		2,4			
Dielectric Withstanding Voltage						3,7		
Insulation Resistance						2,6		
T-Rise vs. Current				2				
Vibration	5							
Physical Shock	6							
Mating Force	2							2
Unmating Force	8							4
Durability	4	3	3					3
Solderability							2	
Thermal Shock						4		
Humidity-Temperature Cycling			4			5		
Industrial Mixed Flowing Gas					3			
Temperature Life		4						

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 Capital Goods Business Sector.

2.2 Termination Resistance, Dry Circuit - Groups 1,2,3, & 5

All termination resistance measurements, taken at 100 milliamperes dc. and 50 millivolts open circuit voltage, the initial measurements were less than 15 milliohms and final measurements were less than 20 milliohms.

Test Group	No. of Samples	Condition	Min.	Max.	Mean
1	10	Initial	3.30	7.80	5.00
		After Phy. Shock	3.37	8.35	5.10
2	5	Initial	5.28	7.35	6.25
		Aft. Temp. Life	5.69	9.02	7.09
3	5	Initial	5.41	7.44	6.31
		Aft. Temp/Hum.	5.46	7.94	6.58
5	24	Initial	5.94	10.25	7.50
		After I.M.F.G.	5.41	10.83	7.79

All values in milliohms

2.3 Dielectric Withstanding Voltage - Group 6

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

2.4 Insulation Resistance - Group 6

All insulation resistance measurements were greater than 5000 megohms initially and 100 megohms after test.

2.5 Temperature Rise vs. Current - Group 4

All samples had a temperature rise of less than 30°C above ambient when a specified current was applied.

P/N	Wire Size AWG	Test Current	Temperature Rise Above Ambient (Max)
747462-1	18	6.0	13.3°C
745098-1	24	4.3	12.9°C
745100-1	28	2.9	9.4°C

2.6 Vibration - Group 1

No discontinuities of the contacts were detected during vibration. 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 - Groups 1 & 8

All mating force measurements were less than the specification requirements.

2.9 Unmating Force - Groups 1 & 8

All unmating force measurements were less than the specification requirements.

2.10 Durability - Groups 1,2,3, & 8

No physical damage occurred to the samples as a result of mating and unmating the connector 500 times.

2.11 Solderability - Group 7

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

2.12 Thermal Shock - Group 6

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

2.13 Humidity-Temperature Cycling - Groups 3 & 6

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

2.14 Industrial Mixed Flowing Gas - Group 5

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

2.15 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.

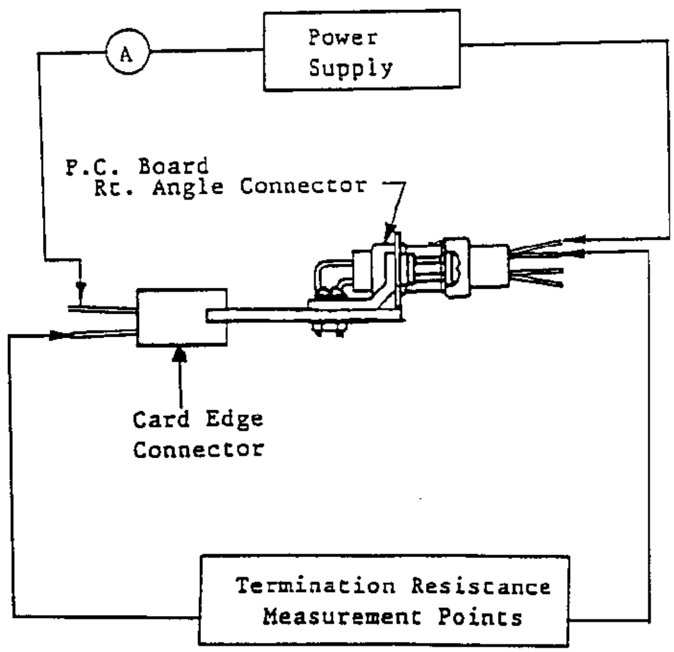

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1000 vac was applied between the adjacent contacts. This potential was applied for one 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

Connector temperature was measured, while a single circuit was energized at the specified current. 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, Random

Mated connectors were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 50 and 2000 hertz. The power spectral density at 50 hz is 0.075 G^2/Hz. The spectrum slopes up at 6 dB per octave to a PSD of 0.3 G^2/Hz at 100 Hz. The spectrum is flat at 0.3 G^2/Hz from 100 to 1000 Hz. The spectrum slopes down at 6 dB per octave to the upper bound frequency of 2000 Hz, at which the PSD is 0.075 G^2/Hz. The root-mean square amplitude of the excitation was 20.71 GRMS.

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 were measured, using a free floating fixture with the rate of travel at 1.0 inch/minute.

3.9 Unmating Force

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

3.10 Durability

Connectors were mated and unmated 500 times at a rate not exceeding 200 per hour.

3.11 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 molten 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.

3.12 Thermal Shock

Mated connectors were subjected to 100 cycles of temperature extremes, with each cycle consisting of 30 minutes at each temperature. The temperature extremes were -55°C and 105°C. The transition between temperatures was less than one minute.

3.13 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%. (During five of the first nine cycles, the connectors were exposed to a cold shock at -10°C for 3 hours.)

3.14 Industrial Mixed Flowing Gas, Class III

Mated connectors were exposed for 20 days to an industrial 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 Cl_2 at 20 ppb, NO_2 at 200 ppb, and H_2S at 100 ppb.

3.15 Temperature Life

Mated samples were exposed to a temperature of 105°C for 500 hours.

4. Validation

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