AMP

QUALIFICATION TEST REPORT

AMP* COMMERCIAL PRESS FIT PRINTED
CIRCUIT BOARD CONNECTORS

501-67 REV. 0

Product Specification:	108-12103, Rev. 0.
CTL No.:	CTL3347-010-031
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Corporate Test Laboratory Harrisburg, Pennsylvania

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501-67

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CORPORATE TEST LABORATORY

Qualification Test Report
AMP Commercial Press-Fit BNC PCB Connector
Part Numbers: 222006-1, 225395-6

1. Introduction

1.1 Purpose

Testing was conducted to measure product performance of Commercial Press-Fit BNC PCB Connectors when tested to the requirements of AMP Product Specification 108-12103, Rev. 0.

1.2 Scope

This report covers electrical and mechanical performance of Commercial Press-Fit BNC PCB connectors made by the Signal Components Division of the Signal Transmission Products Group. They were submitted to the Corporate Test Laboratory on October 14, 1987 and testing was performed between December 16, 1987 and April 4, 1988.

1.3 Conclusion

AMP Commercial Press-Fit BNC PCB connectors conforms to the performance requirements of product specification 108-12103, Rev. 0.

1.4 Product Description

The AMP commercial press-fit BNC coaxial receptacle connector provides a means of mounting a BNC receptacle connector on a printed circuit board having tin/lead over copper plated thru holes.

1.5 Test Samples

Test groups 1, 2, and 3 each consisted of 3 press-fit BNC printed circuit board receptacles and 3 BNC dual crimp plugs. All plugs were terminated on 12 inches of RG-142 B/U cable.

Part Number	Quantity	Description
222006-1	9	Press-Fit BNC Receptacle
225395-6	9	BNC Dual Crimp Plug

1.6 Qualification Test Sequence

	Test Group		
Test or Examination	1	2	3
	Test Sequence (a)		
Examination of Product	1	1	1
Termination Resistance, Specified Current	4,9	3,8	4,6
Dielectric Withstanding Voltage	6	9	
Insulation Resistance	5		3,7
R.F. High Potential		6	
Permeability	2		
Vibration	7		
Physical Shock	8		
Connector Insertion Force	3	2	2
Connector Retention	11	10	9
Contact Engaging Force		4	
Contact Separating Force		5	
Durability			8
Thermal Shock		7	
Humidity-Temperature Cycling			5
Corrosion, Salt Spray	10		

(a) Number indicates sequence in which tests were performed.

2. Summary of Testing

2.1 Examination of Product

All connectors submitted for testing were from production lots that were subjected to inspection and found to be acceptable by the Product Assurance Department of the Signal Components Division.

2.2 Permeability - Group 1

All samples met the specification requirement of 2.0 Mu maximum.

2.3 Connector Insertion Force - Groups 1, 2, & 3

All samples met the specification requirement of 500 pounds maximum to insert the connector into a printed circuit board.

Sample Number	Insertion Force (lbs.)
1A	421
1B	410
1C	430
2A	382
2B	412
2C	405
3A	375
3B	460
3C	397

2.4 Termination Resistance, Specified Current - Groups 1, 2, & 3.

All samples met the specification maximum initial and final requirements for the center and outer conductors. Resistances were calculated. See data package for actual millivolt drop measurements.

Group 1 (Readings are in milliohms)

Sample No.	*Initial Resistance	*Aft. Physical Shock
1A (center)	1.69	1.88
1A (outer)	<.001	<.001
1B (center)	1.90	2.08
1B (outer)	<.001	<.001
1C (center)	1.77	2.22
1C (outer)	<.001	<.001

*Maximum Resistance Requirements (Readings are in milliohms)

Type Contact	Initial	Final
Center	2.5	3.0
Outer	2.0	2.5

Group 2 (Readings are in milliohms)

Sample No.	*Initial Resistance	*Aft. Thermal Shock
2A (center)	1.76	1.94
2A (outer)	<.001	0.921
2B (center)	1.82	1.88
2B (outer)	<.001	0.783
2C (center)	1.73	2.40
2C (outer)	<.001	0.727

Group 3 (Readings are in milliohms)

Sample No.	*Initial Resistance	*Aft.High-Temp/Humidity
3A (center)	1.64	1.96
3A (outer)	<.001	<.001
3B (center	1.48	1.72
3B (outer)	<.001	<.001
3C (center)	1.59	1.85
3C (outer)	<.001	<.001

*Maximum Resistance Requirements (Readings are in milliohms)

Type Contact	Initial	Final
Center	2.5	3.0
Outer	2.0	2.5

2.5 Insulation Resistance - Groups 1 & 3

All samples met the requirement for insulation resistance testing. All measured resistances were above the 5×10^3 megohms minimum initial and the samples of group 3 were above the 20×10^2 megohms minimum final requirement following humidity-temperature cycling.

(Readings are in megohms).

Group 1	Sample No.	Resistance
	1A	1.6×10^7
	1B	2.5×10^7
	1C	8.0×10^7

Group 3	Sample. Number	Initial Res. (megohms)	Final Res. (megohms)
	3A	2.5×10^7	1.7×10^7
	3B	3.0×10^7	1.6×10^6
	3C	1.8×10^7	4.1×10^6

2.6 Dielectric Withstanding Voltage - Groups 1 & 2

All samples of groups 1 & 2 met the requirement for dielectric withstanding voltage testing. No breakdown, flashover or arcing occurred when 1500 volts ac rms was applied between adjacent contacts for a one minute hold period.

2.7 Vibration - Group 1

During vibration testing there were no discontinuities greater than one microsecond. Following vibration testing, the connectors were visually examined and there was no evidence of cracks, breaks or loose parts on the connectors.

2.8 Physical Shock - Group 1

During physical shock testing there were no discontinuities greater than one microsecond. Following physical shock testing, the connectors were visually examined and there was no evidence of cracks, breaks or loose parts on the connectors.

2.9 Corrosion; Salt Spray - Group 1

Mated connectors were exposed to a 5% salt solution spray for 48 hours. The connectors met the requirement of no base metal exposure on interface or mating surfaces after the test.

2.10 Connector Retention - Group 1

A 100 pound axial load was applied to the connector in a direction away from the PC board and held for 30 seconds. Pull rate was one inch/minute. All connectors met the requirement for connector retention with no physical damage or electrical discontinuities.

2.11 Contact Engaging Force - Group 2

A .0570 inch test gage was inserted one time into each center contact to condition it. Following this, a .0540 inch gage was inserted into each connector center contact and the engagement forces were measured. All connectors met the specification requirement of 32.0 ounces maximum for the center contact. See measured values which follow.

Sample Number	Engaging Force (ounces)
2A	9.87
2B	7.55
2C	5.06

2.12 Contact Separating Force - Group 2

A .0520 inch test gage was inserted into each connector socket and the force to withdrawl it was measured. All samples met the minimum separation force requirement of 2.0 ounces.

Sample Number	Separating Force (ounces)
2A	3.14
2B	3.06
2C	2.72

2.13 R.F. High Potential - Group 2

All samples met the specification requirement with no breakdown or flashover occurring when 1000v ac rms at 5 Mhz was applied to each connector for a one minute hold period.

2.14 Thermal Shock - Group 2

Connectors were exposed to five cycles of thermal shock between the temperatures of -65°C and 125°C. There was no damage to the samples. All samples met the requirements for dielectric withstanding voltage and termination resistance, specified current, following thermal shock. See individual tests for specific values.

2.15 Humidity-Temperature Cycling - Group 3

After ten days of humidity-temperature cycling, there was no damage to the connectors. All samples met the final insulation resistance requirement of 200 megohms minimum. See individual test for actual measured values.

2.16 Durability - Group 3

Connectors were mated and unmated at a rate of less than 720 cycles/hour. After 500 cycles, all connectors met the requirement with no visible wear or damage occurring.

3. Test Methods

3.1 Examination of Product

The product drawing and inspection plan were used to examine the samples. They were examined visually, dimensionally and functionally.

3.2 Permeability - Group 1

The magnet of the hand held permeability indicator was alternately applied to and delicately removed from all metallic surfaces of the connectors. A 2.0 Mu pellet was used.

3.3 Connector Insertion Force - Groups 1, 2, & 3

All connector receptacles were inserted into printed circuit boards at a rate of 0.2 inch per minute. The force to insert the connectors was measured. Maximum force requirement was 500 pounds.

3.4 Termination Resistance, Specified Current - Groups 1, 2, & 3

Termination resistance was measured on all contacts in each test group. Current during the test was maintained at one ampere dc. A four-terminal measuring circuit was used.

3.5 Insulation Resistance - Groups 1 & 3

Insulation resistance was measured between center contacts and outer shells of mated connectors. A voltage of 500 volts dc was applied for two minutes or until the insulation resistance measured met or exceeded the specification requirement of 5,000 megohms initial or 200 megohms final.

3.6 Dielectric Withstanding Voltage - Groups 1 & 2

A test voltage of 1500v ac rms was applied between the center contacts and the outer shell of mated connectors. The voltage was applied at a rate of 500 volts per second, and was held for one minute. Leakage trip current was set at five milliamperes maximum.

3.7 Vibration - Group 1

Mated connectors were subjected to vibration having sinusoidal motion. The amplitude was either 0.06 inch, double amplitude or 15 gravity units peak, whichever was less. The vibration frequency was varied between the limits of 10 and 2000 Hz and returned to 10 Hz in 20 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes. Connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.8 Physical Shock - Group 1

Mated connectors were physically shocked. The parameters were a half sine waveform of 50 gravity units for 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.

3.9 Corrosion, Salt Spray - Group 1

Mated connector assemblies of group 1 were exposed to 5% salt concentration for 48 hours. After exposure the connectors were washed with water not warmer than 37.8°C. They were then dried in a circulating air oven at a temperature of 38°C for a maximum period of 24 hours.

3.10 **Connector Retention - Groups 1, 2, & 3**

An axial load of 100 pounds was applied to each connector receptacle in a direction away from the printed circuit board. The pull rate was 1 inch/minute and the load was held for 30 seconds.

3.11 **Contact Engaging Force - Group 2**

Using a .0570 inch gage, the center contact of each connector was preconditioned one time. Then using a .0540 inch gage the force to engage the contact a distance of .125 inch, excluding lead in length, was measured.

3.12 **Contact Separating Force - Group 2**

A .0520 inch gage was insert into each connector center contact to a depth of .125 inch, excluding lead in length. The force to separate the gage from the contact was then measured.

3.13 **R.F. High Potential - Group 2**

A test voltage of 1000 volts rms at 5MHz was applied for 1 minute between the center and the outer contacts of each mated connector. The requirement being no breakdown or flashover occurring.

3.14 **Thermal Shock - Group 2**

Mated and unmated connectors were subjected to five cycles of thermal shock. The temperature extremes were -65°C and +125°C. Each cycle consisted of 30 minutes at each temperature. Transition between temperatures was less than five minutes.

3.15 **Humidity-Temperature Cycling - Group 3**

Mated connectors were exposed to 10 cycles of humidity-temperature cycling. Each cycle took 24 hours, and consisted of cycling the temperature between 25°C and 65°C twice. The relative humidity was held at 95%. During five of the first nine cycles, connectors were exposed to a cold shock of -10°C for 3 hours.

3.16 Durability - Group 3

Connectors were mated and unmated 500 times at a rate of less than 720 cycles per hour, maximum. The requirement for durability testing was no physical damage after testing.

4. Validation

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