AMP

QUALIFICATION TEST REPORT

CONNECTOR, COAXIAL, 75 OHM,
BNC SERIES,
COMMERCIAL, AND DUAL CRIMP TYPES

501-194 Rev. A

Product Specification:	108-12095 Rev. O
CTL No.:	CTL3486-105-004
Date:	October 28, 1992
Classification:	Unrestricted
Prepared By:	Terrance M. Shingara
Per EC:	0990-0062-94

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Corporate Test Laboratory Harrisburg, Pennsylvania

Table of Contents

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CORPORATE TEST LABORATORY

Qualification Test Report
75 Ohm BNC Connector

1. Introduction

1.1 Purpose

Testing was performed on AMP* 75 Ohm BNC Connector to determine its conformance to the requirements of AMP Product Specification 108-12095 Rev.0.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the 75 Ohm BNC Connector manufactured by the Signal Transmission Products Division of the Capital Goods Business Group. The testing was performed between May 5, 1992 and October 26, 1992.

1.3 Conclusion

The 75 Ohm BNC Connector meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-12095 Rev. 0.

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1.4 Product Description

This connector is designed to have a true 75 ohm impedance the complete length of the connector. The plug contains the male inner contact and a rotating collar for locking purposes. The jack contains the female inner contact and may be either cable, panel or bulkhead mounted types. The body is brass, zinc or copper alloy , nickel plated. the contacts are beryllium copper or brass with gold over nickel 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
1,2,3,4,5,6	5 ea.	221185-2	BNC 75 ohm plug
1,2,3,4,5,6	5 ea.	221199-2	BNC 75 ohm jack
1,2,3,4,5,6	5 ea.	221402-2	BNC 75 ohm R/A plug
1,2,3,4,5,6	5 ea.	221221-2	BNC 75 ohm BHD jack

1.6 Qualification Test Sequence

	Test Groups					
Test or Examination	1	2	3	4	5	6
Examination of Product	1,13	1,5	1,5	1,8	1,5	1,4
Termination Resistance, Dry Circuit	4,8	2,4	2,4			
Dielectric Withstanding Voltage				3,7		
Insulation Resistance				2,6		
RF high potential						3
RF insertion loss					3	
Shielding Effectiveness					2	
Voltage Standing Wave Ratio					4	
Corona						2
Vibration	6					
Physical Shock	7					
Mating Force	2,9					
Unmating Force	3,10					
Cable Retention	11					
Coupling nut retention	12					
Durability	5					
Thermal Shock				4		
Humidity-Temperature Cycling				5		
Mixed Flowing Gas			3			
Temperature Life		3				

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 Group.

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

All termination resistance measurements, taken at 100 milliamperes dc. and 50 millivolts open circuit voltage, had a change in resistance (ΔR) of less than 1.5 milliohms for the enter contact and less than 3.0 milliohms for the outer contact.

Center contacts

Test Group	No. of Samples	Condition	Min.	Max.	Mean
1	6	After Mechanical	-0.37	0.40	0.061
2	6	After Temp Life	-0.60	0.27	-0.188
3	6	After Mixed Flowing Gas	-0.22	0.34	0.126

Outer contacts

Test Group	No. of Samples	Condition	Min.	Max.	Mean
1	6	After Mechanical	-1.45	1.93	0.158
2	6	After Temp Life	0.27	2.71	1.080
3	6	After Mixed Flowing Gas	-0.16	1.96	0.619

All values in milliohms

2.3 Dielectric Withstanding Voltage - Group 4

No dielectric breakdown or flashover occurred when a test voltage was applied between the center and outer contacts.

2.4 Insulation Resistance - Group 4

All insulation resistance measurements were greater than 5000 megohms.

2.5 RF Hi Pot - Group 6

There was no breakdown or flashover between center and outer contact when a test voltage of 1000 vac 5.0 MHz was applied for one minute.

2.6 Insertion Loss - Group 5

All insertion loss results were less than .15dB at 2 GHz.

2.7 Shielding Effectiveness - Group 5

When tested thru the frequency range of 100 to 2100 MHz, radiation was reduced a minimum of 40dB up to 1500 MHz and a minimum of 20dB up to 2100 MHz.

2.8 Voltage Standing Wave Ratio - Group 5

All voltage standing wave ratio measurements were less than the specification requirement of 1.30 from 100 to 2000 MHz.

2.9 Corona/Altitude - Group 6

There was no corona discharge greater than 5 picocoulombs at or below a potential of 375 volts dc at an altitude of 70,000 feet.

2.10 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.

2.11 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.

2.12 Mating Force - Group 1

All mating force measurements were less than 6 pounds longitudinal and 6 inch pounds torque.

2.13 Unmating Force - Group 1

All unmating force measurements were less than 6 pounds longitudinal and 6 inch pounds torque.

2.14 Cable Retention - Group 1

There was no loss of electrical continuity or physical damage as a result of applying a 60 pound tensile load to the cable for 30 seconds.

2.15 Coupling Nut Retention - Group 1

The coupling nut did not loosen or dislodge from the plug body as a result of applying a tensile load of 60 pounds between the coupling nut and plug body for 2 minutes.

2.16 Durability - Group 1

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

2.17 Thermal Shock - Group 4

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

2.18 Humidity-Temperature Cycling - Group 4

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

2.19 Mixed Flowing Gas - Group 3

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.

2.20 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.

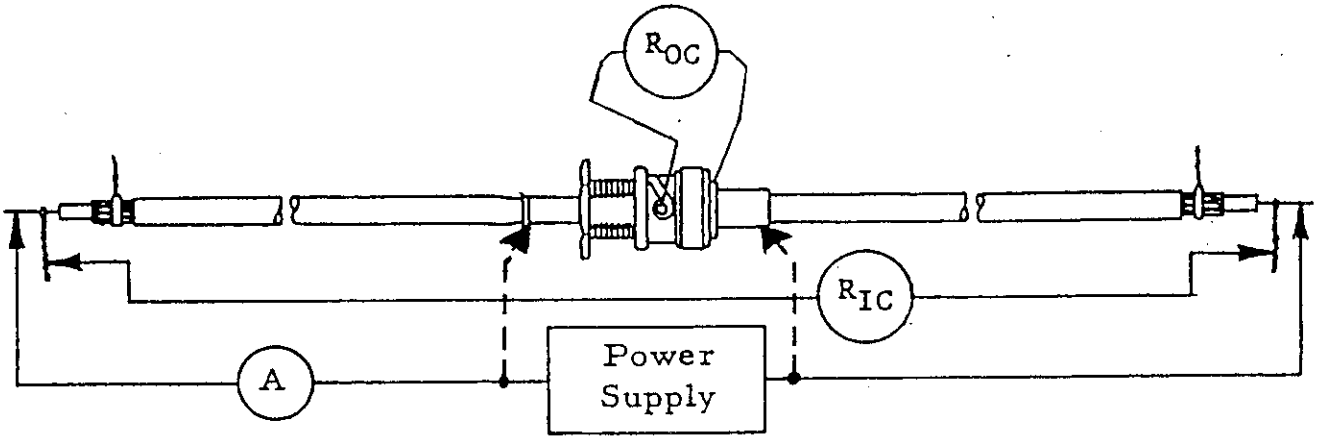

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1500 vac was applied between the outer and inner contacts. This potential was applied for one minute and then returned to zero.

3.4 Insulation Resistance

Insulation resistance was measured between outer and inner contacts, using a test voltage of 500 volts dc. This voltage was applied for 2 minutes before the resistance was measured.

3.5 RF High Potential

An RF test potential of 1000 volts (rms) 5 Megahertz was applied between center contact and outer contact of the mated connectors. This potential was applied for 1 minute and then returned to zero.

3.6 RF Insertion Loss

A full Two-Port Calibration was performed on a network analyzer and the insertion loss, S_{21}, of the sample was measured.

3.7 Shielding Effectiveness

The radiated response from unshielded cable while conductors were excited between 100 and 2100 MHZ, was measured. The procedure was repeated, using jacks and plugs terminated to shielded cable. The difference in response is the shielding effectiveness in dB.

3.8 Voltage Standing Wave Ratio

VSWR was measured on mated samples using an HP8510B network analyzer. The sweep range was 100 to 2100 MHz.

3.9 Corona/Altitude

A test voltage of 375 v(rms) at a 5 picocoulombs maximum discharge was applied between the center contact and outer contact of the mated connectors. This test voltage was applied with a simulated altitude of 70,000 feet.

3.10 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 2000 Hz and returned to 10 Hz in 20 minutes. This cycle was performed 9 times in each of three mutually perpendicular planes, for a total vibration time of 9 hours. Connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.11 Physical Shock

Mated connectors were subjected to a physical shock test, having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6 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.

3.12 Mating Force

The force required to mate plugs and jacks was measured, using a free floating fixture with the rate of travel at 0.5 inch/minute.

3.13 Unmating Force

The force required to unmate plugs and jacks was measured, using a free floating fixture with the rate of travel at 0.5 inch/minute.

3.14 Cable Retention

A tensile load of 60 pounds was applied between the connector and cable for 30 seconds, during this hold period the connectors were monitored for discontinuities.

3.15 Coupling Nut Retention

A tensile load of 60 pounds was applied between the coupling nut and the plug body for a 1 minute hold period. The coupling nut was rotated for 2 revolutions in each direction, during this hold period.

3.16 Durability

Connectors were mated and unmated 500 times at a rate not exceeding 12 per minute.

3.17 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 -55°C and 85°C. The transition between temperatures was less than one minute.

3.18 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.

3.19 Mixed Flowing Gas, Class II

Mated connectors were exposed for 20 days to an mixed flowing gas Class II exposure. Class II exposure is defined as a temperature of 30°C and a relative humidity of 70%, with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, and H_2S at 10 ppb.

3.20 Temperature Life

Mated connectors were exposed to a temperature of 85°C for 96 hours.

4. Validation

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