# QUALIFICATION TEST REPORT

CONTACT, COAXIAL,
MULTIPLE SIZE 8, 50 OHM,
IN SERIES 109 HOUSINGS

501-147 Rev. A

| | |
|---|---|
| Product Specification: | 108-12102 Rev. A |
| CTL No.: | CTL3361-002 |
| Date: | February 13, 1995 |
| Classification: | Unrestricted |
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**Corporate Test Laboratory Harrisburg, Pennsylvania**

## Table of Contents



(R3361ts)

AMP

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CORPORATE TEST LABORATORY

Qualification Test Report

## 1. Introduction

### 1.1 Purpose

Testing was performed on AMP* Multiple Size 8 Coaxial Contacts to determine its conformance to the requirements of AMP Product Specification 108-12102 Rev. A.

### 1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the Multiple Size 8 Coaxial Contact manufactured by the Signal Transmission Products Division of the Utility, Networking & Communications Products Group. The testing was performed between September 20, 1994 and February 8, 1995.

### 1.3 Conclusion

The Multiple Size 8 Coaxial Contact meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-12102 Rev. A.

### 1.4 Product Description

The Size 8 coaxial contacts are crimp snap type contacts. They are compatible with industry standard size 8 contacts. They are available in straight and right angle style as well as a printed circuit board version. The contacts are Brass/Phosphor Bronze with either bright Tin-Lead or Gold plating. The center dielectric is Nylon.

* Trademark

## 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 Nbr | Description |
|---|---|---|---|
| 1,2,3,4 | 5 ea. | 228604-1 | Right Angle Socket |
| 1,2,3,4,5 | 5 ea. | 221980-1 | Straight Pin |
| 1,2,3,4,5 | 5 ea. | 221981-1 | Straight Socket |
| 1,2,3,4 | 5 ea. | 228611-1 | Right Angle Socket |
| 1,2,3,4,5 | *2 ea. | 212059-1 | 5C5 Receptacle |
| 1,2,3,4,5 | *2 ea. | 212491-1 | 5C5 Plug |

* for testing purpose only

## 1.6 Qualification Test Sequence

| | Test Groups | | | | |
|---|---|---|---|---|---|
| Test or Examination | 1 | 2 | 3 | 4 | 5 |
| Examination of Product | 1,10 | 1,5 | 1,5 | 1,8 | 1,6 |
| Termination Resistance, Dry Circuit | 3,7 | 2,4 | 2,4 | | |
| Dielectric Withstanding Voltage | | | | 3,7 | |
| Insulation Resistance | | | | 2,6 | |
| Voltage Standing Wave Ratio | | | | | 3 |
| Shielding Effectiveness | | | | | 5 |
| RF Insertion Loss | | | | | 2 |
| RF Crosstalk | | | | | 4 |
| Vibration | 5 | | | | |
| Physical Shock | 6 | | | | |
| Mating Force | 2 | | | | |
| Unmating Force | 8 | | | | |
| Cable Retention | 9 | | | | |
| Durability | 4 | | | | |
| 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 Signal Transmission Products Division.

### 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 maximum increase in resistance (ΔR) of less than 6 milliohms for the center contact and a maximum increase in resistance (ΔR) of less than 2 milliohms for the braid.

| Test Group | Nbr of Data points | Condition | Min | Max | Mean |
|---|---|---|---|---|---|
| 1 | 5 | After Mechanical | +0.12 | +2.56 | +1.668 |
| 2 | 5 | After Temp Life | -0.42 | +5.03 | +2.270 |
| 3 | 5 | After Mixed Gas | -0.21 | +0.76 | +0.143 |
| | | Center Contact | | | |
| 1 | 5 | After Mechanical | +0.22 | +0.33 | +0.271 |
| 2 | 5 | After Temp Life | -0.21 | +0.03 | -0.114 |
| 3 | 5 | After Mixed Gas | -0.21 | +0.76 | +0.037 |
| | | Braid | | | |

All values in milliohms

### 2.3 Dielectric Withstanding Voltage - Group 4

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

### 2.4 Insulation Resistance - Group 4

All insulation resistance measurements were greater than 5,000 megohms.

### 2.5 Voltage Standing Wave Ratio - Group 5

All voltage standing wave ratio measurements were less than the specification requirement of 1.20 for the frequency range 30 MHz to 2000 MHz.

### 2.6 Shielding Effectiveness - Group 5

When tested through the frequency range of 50 to 2000 MHz, radiation was reduced a minimum of 40dB up to 400 MHz and a minimum of 30dB up to 2000 MHz.

2.7 RF Insertion Loss - Group 5

All insertion loss results were less than .15 dB @4.0 GHz.

2.8 RF Crosstalk - Group 5

All crosstalk results were less than 80 dB from 5 MHz to 500 MHz.

2.9 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.

2.10 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.

2.11 Mating Force - Group 1

All mating force measurements were less than 5 pounds.

2.12 Unmating Force - Group 1

All unmating force measurements were greater than 2 ounces per contact.

2.13 Cable Retention - Group 1

There was no loss of electrical continuity or physical damage as a result of applying a 20 pound tensile load to RG 188B cable for 1 minute.

2.14 Durability - Group 1

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

2.15 Thermal Shock - Group 4

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

2.16 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.

2.17 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.

2.18 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.

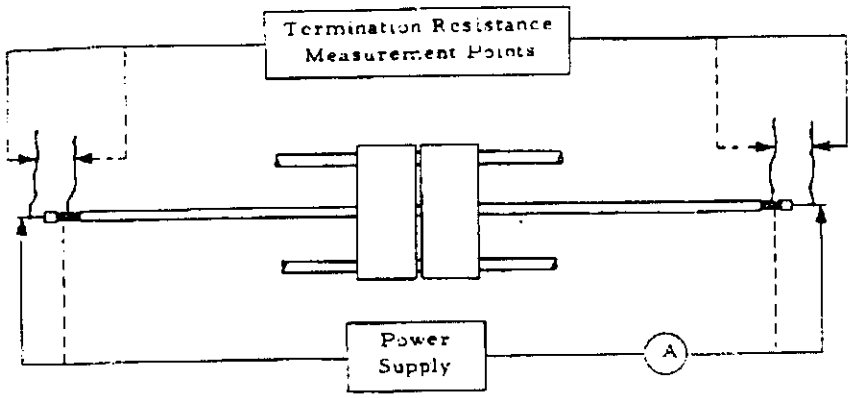


Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

Test potentials of 800 vac at sea level, 525 vac at 30,000 ft, and 275 vac at 70,000 ft were applied between the adjacent contacts. These potentials were 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 two minutes before the resistance was measured.

3.5 Voltage Standing Wave Ratio

VSWR was measured on mated samples using an HP8510B network analyzer. The sweep range was 0 to 2 GHz.

3.6 Shielding Effectiveness

The radiated response from unshielded cable while conductors were excited between 50 and 2000 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.

3.7 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.

3.8 RF Crosstalk

Sinusoidal frequencies of 5 MHz to 500 MHz were applied to one end of the "driven line". The "quiet line" was monitored with a network analyzer to measure any crosstalk signals.

3.9 Vibration, Sine

Mated connectors were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude or 10 G's (whichever is less). The vibration frequency was varied logarithmically between the limits of 10 and 500 Hz and returned to 10 Hz in 15 minutes. This cycle was performed 12 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.

3.10 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.

3.11 Mating Force

The force required to mate individual connectors was measured, using a free floating fixture. The crosshead rate of travel at 0.5 inch/minute.

3.12 Unmating Force

The force required to unmate individual connectors was measured, using a free floating fixture. The crosshead rate of travel at 0.5 inch/minute.

3.13 Cable Retention

A tensile load of 20 pounds was applied between the connector and cable for 60 seconds; during this hold period the connectors were monitored for discontinuities.

3.14 Durability

Connectors were mated and unmated 500 times at a rate not exceeding 720 cycles per hour.

3.15 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 125°C. The transition between temperatures was less than one minute.

3.16 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%.

3.17 Mixed Flowing Gas, Class III

Mated connectors were exposed for 20 days to a 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. Samples were preconditioned with 10 cycles of durability.

3.18 Temperature Life

Mated samples were exposed to a temperature of 125°C for 1,000 hours. Samples were preconditioned with 10 cycles of durability.

4. Validation

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