AMP

# RETENTION OF QUALIFICATION TEST REPORT

R.F. Microminiature Multiple
COAXICON Contacts

501-61 Rev. 0

Rev. C

| | |
|---|---|
| Product Specification: | 108-12049 |
| CTL No.: | CTL3349-002-005 |
| Date: | 20 November 1987 |
| Classification: | Unrestricted |
| Prepared By: | Richard Groft |
| Reference: | 110-12018 |

*Trademark of AMP Incorporated

# Table of Contents

Table of Contents (Cont'd.)



RAG/kd
(501-61, Rev. 0/LABREP9)

AMP INCORPORATED

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

CORPORATE TEST LABORATORY

Retention of Qualification Test Report
Microminiature COAXICON Contacts
Part Numbers 227604-1, 227605-1, 227606-1,
227602-1, 227603-1

## 1. Introduction

### 1.1 Purpose

Testing was conducted to measure the performance of Microminiature R.F. COAXICON Contacts when tested to the requirements of AMP Product Specification 108-12049, Rev. B.

### 1.2 Scope

This report covers the environmental, electrical, and mechanical performance of the Microminiature RF COAXICON Contacts made by the Signal Components Division of the Signal Transmission Products Group. They were submitted to the Corporate Test Laboratory on August 11, 1987. Testing was performed between August 19, 1987 and November 13, 1987.

### 1.3 Conclusion

AMP Microminiature RF COAXICON Contacts meet the environmental, electrical, and mechanical performance requirements of Product Specification 108-12049, Rev. B. The initial qualification requirements were met per Test Report 110-12018.

## 1.4 Product Description

The AMP Multiple COAXICON Microminiature RF Coaxial Contact is used in special cavities of printed circuit board or panel mounted multiple connectors. Connectors of this type include cable and printed circuit board mounted connectors. Cable connectors are intended for use on RG 178 double braid coaxial cable.

## 1.5 Test Samples

Connectors were taken randomly from current production. Test Groups 4, 5, and 6 consisted of 2 mated pairs. Test samples used for Groups 3, 5, and 6 were crimped on RG-178 double braided coaxial cable. Test Group 4 used printed circuit board mounted connectors.

Samples tested were:

| | |
|---|---|
| P/N 227602-1 | Right Angle Printed Circuit Board Pin Contact |
| P/N 227603-1 | Vertical Printed Circuit Board Socket Contact |
| P/N 227604-1 | Cable Pin Contact |
| P/N 227605-1 | Cable Socket Contact |
| P/N 227606-1 | Right Angle Cable Socket Contact |

## 1.6 Requalification Test Sequence

| Test or Examination | Test Group | | | |
|---|---|---|---|---|
| | 3 | 4 | 5 | 6 |
| | Test Sequence (a) | | | |
| Examination of Product | 1 | 1 | 1 | 1 |
| Termination Resistance, Dry Circuit | | | 2,6 | |
| Dielectric Withstanding Voltage | | 3,7 | | 3 |
| Insulation Resistance | | 2,6 | | 2,6 |
| R.F. Crosstalk | 3 | | | |
| Voltage Standing Wave Ratio | 2 | | | |
| Vibration | | | 4 | |
| Physical Shock | | | 5 | |
| Mating Force | | | 7 | |
| Unmating Force | | | 8 | |
| Contact Retention | | | 10 | |
| Durability | | | 3 | |
| Cable Retention | | | 11 | |
| Solderability | | 4 | | |
| Resistance to Soldering Heat | | 5 | | |
| Thermal Shock | | | | 4 |
| Humidity-Temperature Cycling | | | | 5 |
| Corrosion, Salt Spray | | | 9 | |

(a) Numbers show the sequence in which the tests are performed.

## 2. Summary of Testing

### 2.1 Examination of Product - All Groups

All connectors submitted for testing were selected from production lots. They were inspected and accepted by the Product Assurance Department of the Signal Components Division, and were delivered to the STP Group Laboratory on August 11, 1987.

### 2.2 Termination Resistance, Dry Circuit - Group 5

All samples met the requirements of the specification.

The initial termination resistance of the contacts were as follows:

Straight Connectors

| Sample No. | Shield Resistance | Center Contact Resistance |
|---|---|---|
| 1 | -3.68 milliohms | -4.82 milliohms |
| 2 | -3.58 milliohms | -3.92 milliohms |
| 3 | -3.38 milliohms | -1.12 milliohms |
| 4 | -3.28 milliohms | -4.22 milliohms |

Right Angle Connectors

| | | |
|---|---|---|
| 1 | -7.40 milliohms | -2.00 milliohms |
| 2 | -7.30 milliohms | -13.50 milliohms |
| 3 | -7.40 milliohms | -5.62 milliohms |
| 4 | -7.30 milliohms | -14.50 milliohms |

The termination resistance after vibration and physical shock was as follows:

Straight Connectors

| Sample No. | Shield Resistance | Center Contact Resistance |
|---|---|---|
| 1 | -3.73 milliohms | -3.97 milliohms |
| 2 | -3.68 milliohms | -4.07 milliohms |
| 3 | -3.13 milliohms | -0.82 milliohms |
| 4 | -3.48 milliohms | -5.47 milliohms |

Right Angle Connectors

| | | |
|---|---|---|
| 1 | -3.83 milliohms | -15.62 milliohms |
| 2 | -3.13 milliohms | -12.22 milliohms |
| 3 | -3.53 milliohms | -9.47 milliohms |
| 4 | -3.78 milliohms | -14.72 milliohms |

Specification requirements were +6 milliohms maximum for the center contact and +3 milliohms maximum for the shield contact.

2.3 Dielectric Withstanding Voltage - Groups 4 and 6

There was no voltage breakdown or flashover when voltage was applied between adjacent contacts.

2.4 Insulation Resistance - Groups 4 and 6

The insulation resistance was greater than 1000 megohms when measured initially, and greater than 500 megohms when measured after temperature-humidity cycling.

2.5 Vibration - Group 5

During vibration, there were no discontinuities greater than one microsecond. Following vibration, there were no cracks, breaks or loose parts.

2.6 Physical Shock - Group 5

During physical shock testing, there were no discontinuities greater than one microsecond. Following physical shock, there were no cracks, breaks or loose parts.

2.7 Mating Force - Group 5

All samples met the requirements of the specification.

All readings are in pounds.

| Sample | Force per Contact | Requirement |
|---|---|---|
| Straight Connectors | 0.97 lbs. | 1.5 lbs. max. |
| Right Angle Connectors | 0.95 lbs. | 1.5 lbs. max. |

2.8 Unmating Force - Group 5

All samples met the requirements of the specification.

All readings are in ounces.

| Sample | Force per Contact | Requirement |
|---|---|---|
| Straight Connectors | 14.4 oz. | 2.0 oz. |
| Right Angle Connectors | 11.6 oz. | 2.0 oz. |

2.9 Contact Retention - Group 5

All samples met the requirement of the specification. All samples held six pounds for one minute.

2.10 Durability - Group 5

There was no evidence of physical damage to the samples as a result of the testing.

2.11 Cable Retention - Group 5

Contacts did not separate from the cable or display any electrical discontinuities in the center or outer contact circuits.

2.12 Solderability - Group 4

Contact pins had a solder coverage of 95% minimum.

2.13 Resistance to Soldering Heat - Group 4

There was no evidence of physical damage to any of the samples as a result of the testing.

2.14 Thermal Shock - Group 6

Connectors were exposed to 5 cycles of thermal shock between the temperatures of -55°C and 125°C. There was no damage to the samples.

2.15 Humidity-Temperature Cycling - Group 6

After ten days of humidity-temperature cycling, there was no damage to the connectors.

2.16 Corrosion, Salt Spray - Group 5

After 48 hours of Salt Spray exposure, there was no physical damage to the connectors.

2.17 R.F. Crosstalk - Group 3

The connectors met the requirement of 90 db minimum over the frequency range of 5 to 2000 MHz.

2.18 Voltage Standing Wave Ratio - Group 3

The connectors met the requirement of 1.22 + .052(F) GHz for straight connectors and 1.22 + .084(F) GHz for right angle connectors.

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 Termination Resistance, Dry Circuit

Termination resistance was measured on the center contact and the shield contact on all samples in Test Group 5. Current during the test was maintained at 100 milliamperes with 50 millivolts maximum open circuit voltage.

3.3 Dielectric Withstanding Voltage

The test voltage was applied between the inner contact and the outer shell of mated connector assemblies. The voltage applied at sea level was 450 v ac. Testing was also conducted at the simulated altitudes of 25,000 and 75,000 feet. The voltage applied at 25,000 feet was 260 v ac, and the voltage applied at 75,000 feet was 150 v ac. Electrification time was one minute, and the rate of rise was 500 volts per second.

3.4 Insulation Resistance

Insulation Resistance was measured between the inner contact and the outer shell of mated connector assemblies. A voltage of 500 v dc was applied for two minutes, and the insulation resistance was measured.

3.5 Vibration

Mated connectors were subjected to vibration having sinusoidal motion. The amplitude was either 0.06 inch double amplitude or 70 gravity units peak, whichever was less. The vibration frequency was varied logarithmically between the limits of 10 and 500 Hz and return to 10 Hz in 20 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes. The connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.6 Physical Shock

Mated connectors were subjected to a physical shock test having the parameters of 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.

3.7 Mating Force

Connector halves were mounted in free floating fixtures. The force required to mate them from the point of initial contact was measured. The speed of mating was 2 inch/minute.

3.8 Unmating Force

The force to unmate the connectors was measured. The mating force fixturing was used, and the rate of unmating was 2 inch/minute.

3.9 Contact Retention

An axial load of 6 pounds was applied to the contact in the normal removal direction, at a uniform rate of one pound per second. This load was held on the contact for one minute. The contact was then extracted with the proper tool and inserted 3 times. The 6 pound axial load was then applied again for one minute.

3.10 Durability

Connectors were mated and unmated 100 times at a rate of 12 cycles per minute, maximum. The mating force fixturing was used.

3.11 Cable Retention

A 15 pound force was applied to the cable directed longitudinally away from the connector. Equal force was applied to both the center conductor and the braid. This force was held for one minute. Continuity was checked in both the center conductor and the braid during and after the test.

3.12 Solderability

Prior to dipping the connectors into the solder, they were aged by suspending them over boiling water for eight hours. The samples were then dipped into a SN60 solder bath. A non-activated rosin of 25% water white rosin and 75% isopropyl alcohol was used.

3.13 Resistance to Soldering Heat

One connector pair mounted on a printed circuit board was subjected to the heat from molten solder at a temperature of 260°C. This exposure was for 10 seconds.

3.14 Thermal Shock

Unmated connectors were subjected to five cycles of thermal shock. The temperature extremes were -55°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

Mated connectors were subjected to a ten day temperature-humidity exposure. A 24-hour period consisted of cycling the temperature between 25°C and 65°C twice, while holding the humidity at 95%. A cold shock was performed on the connectors during five of the first nine days. The cold shock was -10°C for three hours.

3.16 Corrosion, Salt Spray

Mated connectors were exposed to a 5% salt concentration for 48 hours.

3.17 R.F. Crosstalk

Fully mated Coaxial contacts were positioned in adjacent connector cavities. A swept frequency from 5 to 2000 MHz was transmitted on one line, and the coupled signal was measured in the adjacent assembly.

3.18 Voltage Standing Wave Ratio

VSWR was measured between 0 to 2 GHz using Long line method. Included in the measurement was the adapter, connector and cable.

4. Validation

Prepared by:

Richard A. Groft 12/8/87
Richard A. Groft
Test Engineer
Design Assurance Testing
Corporate Test Laboratory

Reviewed by:

J. J. Edwards 12/15/87
J. J. Edwards
Supervisor
Design Assurance Testing
Corporate Test Laboratory

Approved by:

Dean Hooper 12/17/87
Dean Hooper
Manager
Signal Components Division