CONNECTOR,SNAP-LOCK,MINIATURE UHF PLUG & BULKHEAD JACK

1. Introduction

1.1 Purpose

Testing was performed on AMP® miniature UHF plug and bulkhead jack snap-lock connector to determine its conformance to the requirements of AMP® Product Specification 108-1584 Rev. O.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the miniature UHF plug and bulkhead jack snap-lock connector manufactured by the Signal Transmission Products Division of the Communications Business Unit. The testing was performed between January 20, 1996 and June 27, 1996.

1.3 Conclusion

The miniature UHF plug and bulkhead jack snap-lock connector, listed in paragraph 1.5, meet the electrical, mechanical, and environmental performance requirements of AMP® Product Specification 108-1584 Rev O.

1.4 Product Description

AMP® miniature UHF plug and bulkhead snap-lock connectors are designed to be terminated to either RG58/U or RG174/U coaxial cable. The plug features a spring loaded collar instead of threads, and is capable of being mated to the bulkhead jack simply by pushing it onto the jack. Once the plug is secured on the jack, it can only be removed by pulling back the spring loaded collar. The bulkhead jack, having both conventional threads and the snap-lock retention feature, can be mated with both the standard miniature UHF plug and the snap-lock plug.

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 Groups	Quantity	Part Nbr	Description
1,2,3,4,5	60	415011-1	Snap Lock Plug
	60	415012-2	Snap Lock Bulkhead Jack

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1.6 Qualification Test Sequence

Test or Examination	Test Groups 1	2	3	4	5
Examination of Product	1,11	1,6	1,7	1,8	1,5
Termination Resistance, Dry Circuit	4,7	2,4	2,4,6		
Dielectric Withstanding Voltage				3,7	
Insulation Resistance				2,6	
RF Insertion Loss					2
Voltage Standing Wave Ratio					4
RF Leakage					3
Vibration	5				
Physical Shock	6				
Mating Force	2,9				
Unmating Force	3,8				
Cable Retention		5			
Housing Lock Strength	10				
Thermal Shock				4	
Humidity-Temperature Cycling			3	5	
Salt Spray Corrosion			5		
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 randomly selected from current production lots. A Certificate of Conformance was issued by the Product Assurance Department of the Communications Business Unit. Where specified, samples were visually examined and no evidence of physical damage detrimental to product performance was observed.

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

All termination resistance measurements, taken at 100 milliamperes DC and 20 millivolts open circuit voltage were less than 6.0 milliohms for the center contact, and less than 3 milliohms for the outer contact initially and the change in resistance did not exceed 2.0 milliohms for the center contact, or 1.0 milliohm for the outer contact after testing.

Termination Resistance Summary								
Test Group	Number of Data Points	Condition	Center Contact			Outer Braid		
			Min	Max	Max Change	Min	Max	Max Change
1	12	Initial	1.81	3.78	-	0.0	0.16	-
	12	After Mechanical	2.47	3.53	1.28	0.0	0.25	0.11
2	12	Initial	3.38	4.75	-	0.25	0.73	-
	12	After Temp. Life	3.34	5.25	1.57	0.81	1.67	0.94.
3	12	Initial	3.56	5.29	-	0.34	0.55	-
	12	After Hum. /Temp. Cycling	3.62	5.18	0.26	0.03	0.99	0.47
	12	After Salt Spray	3.81	5.57	1.11	1.1	2.13	
			All values are in milliohms. Cable bulk resistance was subtracted from the measurement.					

2.3 Dielectric Withstanding Voltage - Group 4

No dielectric breakdown or flashover occurred.

2.4 Insulation Resistance - Group 4

All insulation resistance measurements were greater than 20 megohms.

2.5 Insertion Loss - Group - 5

All insertion loss results were less than 0.5 dB at 3.0 GHz).

2.6 Voltage Standing Wave Ratio - Group - 5

All voltage standing wave ratio measurements were less than the specification requirement of 1.8 between the frequencies of 0.1 to 2.0 GHz.

2.7 RF Leakage - Group - 5

There was less than 50 dB of leakage when a 10 dBm signal was applied between 30 kHz and 2 GHz.

2.8 Vibration - Group 1

No discontinuities were detected during vibration. Following vibration, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.9 Physical Shock - Group 1

No discontinuities were detected during physical shock. Following physical shock testing, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.10 Mating Force - Group 1

All mating force measurements were less than 70 Newtons.

2.11 Unmating Force - Group 1

All unmating force measurements were greater than 12 Newtons.

2.12 Cable Retention - Group 2

All RG-58/U cables tested maintained a force of 175 Newtons minimum before pulling out of the connectors. All RG 174/U cables maintained a force of 85 Newtons minimum before pulling out of the connectors.

2.13 Housing Lock Strength - Group - 1

Mated connectors did not unmate with an 80 Newton axial load applied.

2.14 Thermal Shock - Group 4

No evidence of physical damage was visible as a result of exposure to thermal shock.

2.15 Humidity-Temperature Cycling - Groups 3 & 4

No evidence of physical damage was visible as a result of exposure to humidity-temperature cycling.

2.16 Corrosion, Salt Spray - Group 3

No evidence of physical damage to either the contacts or the connector was visible as a result of exposure to a salt spray atmosphere.

2.18 Temperature Life - Group 2

No evidence of physical damage was visible as a result of exposure to temperature life.

3. Test Methods

3.1 Examination of Product

Where specified, samples were visually examined for evidence of physical damage detrimental to product performance.

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 a 20 millivolt open circuit voltage.

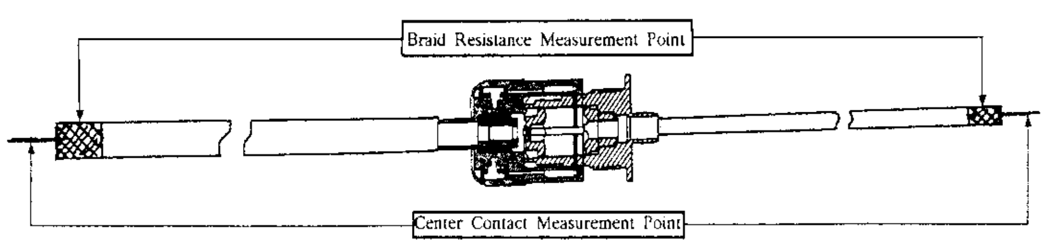

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1500 volts DC 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 two minutes before the resistance was measured.

3.5 Insertion Loss

A signal generator was used to send each frequency into the sample while a spectrum analyzer measured the power exiting the sample. Test lead losses were subtracted to determine the insertion loss of the sample.

3.6 Voltage Standing Wave Ratio

VSWR was measured on mated samples using an HP8510B network analyzer. The sweep range was 0.1 to 2.0 GHz.

3.7 RF Leakage

RF leakage was measured using the network analyzer. The instrument was set up to sweep from 30 kHz to 4 GHz with an output power of 10 dBm and 201 data points. A thru (S_{21}) calibration was performed with a coaxial cable the same physical length as the triazial cavity's cable. This normalized the receiving end of the network analyzer (port 2) to 0 dB. This cable was removed. The sample, fixtured within the triaxial cavity, was then attached to the network analyzer. The RF leakage (S_{21}) was then measured.

3.8 Vibration, Random

Mated connectors were subjected to a random vibration test, specified by a random vibration spectrum with excitation frequency bounds of 5 and 500 hertz. The power spectral density at 5 hz was 0.000312 G^2/Hz. The spectrum sloped up at 12 dB per octave to a PSD of 0.020 G^2/Hz at 14 Hz. The spectrum was flat at 0.020 G^2/Hz from 14 to 500 Hz. The root-mean square amplitude of the excitation was 3.13 GRMS. This was performed for 1 hour in each of three mutually perpendicular planes for a total vibration time of 3 hours. Connectors were monitored for discontinuities of one microsecond or greater using a current of 100 milliamperes DC.

3.9 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. Connectors were monitored for discontinuities of one microsecond or greater using a current of 100 milliamperes DC.

3.10 Mating Force

The force required to mate individual connectors was measured using a tensile/compression device with a crosshead travel speed of 0.5 inch/minute and free floating fixturing.

3.11 Unmating Force

The force required to unmate individual connectors was measured using a tensile/compression device with a crosshead travel speed of 0.5 inch/minute and free floating fixturing.

3.12 Cable Retention

A tensile load of 85 Newtons was applied between the connector and cable for 30 seconds. After the hold period, the force was increased at a rate of 1.0 inch per minute until failure occurrd.

3.13 Housing Lock Strength

The bulkhead jack was held in a fixture, and an axial load was applied to the RG58/U cable attached to the mated plug at a rate of 1.0 inch per minute.

3.14 Thermal Shock

Mated connectors were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minutes dwells at -40 and 85°C. The transition between temperatures was less than one minute.

3.15 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 and 65°C twice while the relative humidity was maintained at a high level. (Figure 2)

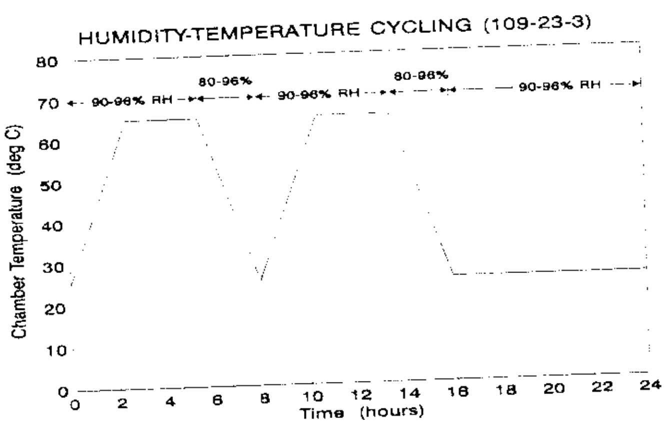

Figure 2
Typical Humidity-Temperature Cycling Profile

3.16 Corrosion, Salt Spray

Mated connectors were subjected to a 5% salt spray environment for 48 hours. The temperature of the box was maintained at approximately 95°C, and the pH of the salt solution was between 6.5 and 7.2.

3.18 Temperature Life

Mated samples were exposed to a temperature of 85°C for 1000 hours.

4. Validation

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