QUALIFICATION TEST REPORT

CONTACT, COAXICON*
modified SIZE 1 for use in
ARINC 600 SERIES TCAS CONNECTORS

501-233 Rev. O

Product Specification:	108-1427 Rev. O
CTL No.:	CTL3313-109-004
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*Trademark

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(R3313TS)

AMP

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CORPORATE TEST LABORATORY

Qualification Test Report

1. Introduction

1.1 Purpose

Testing was performed on the AMP* COAXICON size 1 (modified) Contacts to determine their conformance to the requirements of AMP Product Specification 108-1427 Rev. 0.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of the COAXICON size 1 (modified) Contacts manufactured by the Federal Systems Business Group a division of the Aerospace & Government Systems Sector. The testing was performed between June 6, 1993 and October 20, 1993.

1.3 Conclusion

The COAXICON size 1 (modified) Contacts meets the electrical, mechanical, and environmental performance requirements of AMP Product Specification 108-1427 Rev. 0.

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1.4 Product Description

The size 1 COAXICON contacts were designed and modified for use in ARINC 600 series Traffic Alert and Collision Avoidance System (TCAS) system. The tested socket contacts were designed to be crimped to RG-142/U coaxial cable. The Pin contacts are an adapter designed to accept SMA Plugs.

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
1,2,3,4,5,6	45	446748-1	Size 1 Plug Adapter
1,2,3,4,5,6	45	446549-1	Size 1 Receptacle
1,2,3,4,5,6	45	228634-1	SMA Plug
1,2,3,4,5,6	6	445717-2	ARINC series 600 Plug Housing
1,2,3,4,5,6	6	445718-2	ARINC series 600 Receptacle Housing

1.6 Qualification Test Sequence

	Test Groups					
Test or Examination	1	2	3	4	5	6
Examination of Product	1,12	1,5	1,7	1,5	1,8	1
Termination Resistance, Dry Circuit	4,8	2,4	2,4	2,4		
Dielectric Withstanding Voltage					3,7	
Insulation Resistance					2,6	
Voltage Standing Wave Ratio						3
RF Insertion Loss						2
Vibration	6					
Physical Shock	7					
Mating Force	2,10		5			
Unmating Force	3,9		6			
Crimp Tensile	11					
Durability	5					
Thermal Shock					4	
Humidity-Temperature Cycling					5	
Mixed Flowing Gas				3		
Temperature Life		3				
Salt Spray			3			
The number 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 Aerospace and Government Systems Sector.

2.2 Termination Resistance, Dry Circuit - Group

All termination resistance measurements, taken at 100 milliamperes DC and 50 millivolts open circuit voltage had a maximum change in resistance (ΔR) of less than 2.0 milliohms when comparing initial measurements with final measurements.

Test Group	Nbr of Samples	Condition	Min	Max	Mean
1	16**	After Mechanical	-0.36	+0.41	+0.160
2	16**	After Temp Life	-0.63	+0.88	+0.171
3	16**	After Salt Spray	-1.81	+0.48	-0.043
4	16**	After Mixed Gas	-0.09	+1.35	+0.391

All values in milliohms
** 8 inner contacts & 8 outer contacts

2.3 Dielectric Withstanding Voltage - Group 5

No dielectric breakdown or flashover occurred when a test voltage was applied between adjacent contacts at sea level and 50,000 ft. The leakage current was less than 5.0 milliamperes.

2.4 Insulation Resistance - Group 5

All insulation resistance measurements were greater than 5000 megohms initially and 1000 megohms after test.

2.5 Voltage Standing Wave Ratio - Group 6

All voltage standing wave ratio measurements were less than the specification requirement of 1.5.

2.6 RF Insertion Loss - Group 6

All insertion loss results were less than -0.3 dB.

2.7 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.

2.8 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.

2.9 Mating Force - Groups 1,3

All mating force measurements were less than 15 pounds maximum average per contact.

2.10 Unmating Force - Groups 1,3

All unmating force measurements were greater than 1 pound minimum average per contact.

2.11 Crimp Tensile - Group 1

All tensile values were greater than 60 pounds for contacts crimped on RG-142/U cable.

2.12 Durability - Group 1

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

2.13 Thermal Shock - Group 5

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

2.14 Humidity-Temperature Cycling - Group 5

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

2.15 Mixed Flowing Gas - Group 4

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.

2.16 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.

2.17 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.

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.

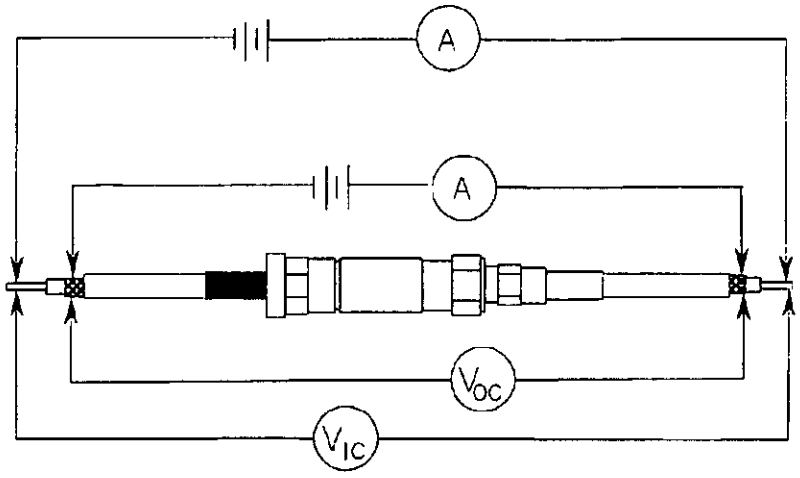

Figure 1
Typical Termination Resistance Measurement Points

3.3 Dielectric Withstanding Voltage

A test potential of 1000 vac was applied between the inner and outer contacts of mated contact assemblies. This potential was applied for one minute and then returned to zero.

Initially, a test potential of 500 vac was applied, at 50,000 feet altitude, between the inner and outer contacts of mated contact assemblies. This potential was applied for one minute and then returned to zero.

3.4 Insulation Resistance

Insulation resistance was measured between the inner and outer contacts of mated contact assemblies, 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 0.045 to 2.0 GHz.

3.6 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 Vibration, Random

Mated connectors were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 50 and 2000 hertz. The power spectral density at 50 hz is 0.05 G^2/Hz. The spectrum slopes up at 6 dB per octave to a PSD of 0.20 G^2/Hz at 100 Hz. The spectrum is flat at 0.20 G^2/Hz from 100 to 1000 Hz. The spectrum slopes down at 6 dB per octave to the upper bound frequency of 2000 Hz, at which the PSD is 0.05 G^2/Hz. The root-mean square amplitude of the excitation was 16.91 GRMS. The connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.8 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.

3.9 Mating Force

The force required to mate individual connectors was measured, using a free floating fixture with the rate of travel at 0.5 inch/minute. The maximum average force per contact was calculated.

3.10 Unmating Force

The force required to unmate individual connectors was measured using a free floating fixture with the rate of travel at 0.5 inch/minute. The minimum average force per contact was calculated.

3.11 Crimp Tensile

An increasing axial load was applied to each sample at a crosshead rate of 1.0 inch per minute.

3.12 Durability

Connectors were mated and unmated 500 times at a rate not exceeding 250 cycles per hour.

3.13 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 -65°C and 165°C. The transition between temperatures was less than one minute.

3.14 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. Samples remained at room ambient to 24 hours before final insulation resistance measurements were taken.

3.15 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 $C1_2$ at 20 ppb, NO_2 at 200 ppb, and H_2S at 100 ppb.

3.16 Temperature Life

Mated connectors were exposed to a temperature of 165°C for 1000 hours.

3.17 Corrosion, Salt Spray

Mated connectors were subjected to a 5% salt spray environment for 48 hours. The temperature of the box was maintained at 95 +2/-3°C, and the pH of the salt solution was between 6.5 and 7.2.

4. Validation

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