QUALIFICATION TEST REPORT

AMP* TNC Series Coaxial Connector
for Semi-Rigid Cable

501-13 Rev A

Product Specification:	108-12032 Rev A
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AMP INCORPORATED

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

CORPORATE TEST LABORATORY

Qualification Report
AMP TNC Series Coaxial Connector
for Semi-Rigid Cable
P/N 228179-2 and 228502-1

1. Introduction

1.1 Purpose

Testing was conducted to determine product compliance to AMP Specification 108-12032, Rev. 0.

1.2 Scope

This report covers the electrical and mechanical performance of the AMP TNC Series Coaxial Connector for Semi-Rigid Cable, produced by the Signal Components Division of the Signal Transmission Products Group. Testing was performed between May 3, 1984 and December 20, 1984.

1.3 Conclusion

The AMP TNC Series Coaxial Connector for Semi-Rigid Cable conforms to the requirements of the specification.

1.4 Product Description

The TNC Series Coaxial Connector is a small light weight connector equipped with a 7/16-28 threaded coupling, a gold plated captive center contact, and PTFE dielectric. These connectors are intended for use on RG-402/U semi-rigid coaxial cable, having an 0.D of .141 inch.

1.5 Test Samples

Part Number	Description	Cable Size	Quantity
228179-2	TNC Coaxial Plug	RG-402/U	12
228502-1	TNC Coaxial Jack	RG-402/U	12

1.6 Test Sequence

Test	Test Group			
	1	2	3	4
Examination of Product	1	1	1	1
Termination Resistance, Specified Current			9,11,13,15	
Dielectric Withstanding Voltage			8,16,19	
Insulation Resistance	7	7	7,18	7
Permeability	6	6	6	6
Voltage Standing Wave Radio		8		
Altitude Corona			20	
R.F. High Potential			21	
R.F. Leakage				9
R.F. Insertion Loss				8
Vibration			10	
Physical Shock			12	
Force to Engage/Disengage	3,5,10	3,5,10	3,5,24	3,5
Mating Characteristics	2	2,11	2	2
Cable Retention			22	
Durability		9		
Coupling Proof Torque	4	4	4	4
Coupling Nut Retention			23	
Center Contact Retention	8			
Thermal Shock			14	
Temperature-Humidity Cycling			17	
Corrosion, Salt Spray	9			

2. Summary of Testing

2.1 Examination of Product - All Samples

All samples met the visual, dimensional, and functional requirements of the product drawing.

2.2 Mating Characteristics - All Samples

Plugs - Measured force to insert into a .319" maximum ID test ring to .093" depth, then measure depth from tip ends of spring members to contact a .324" I.D. minimum test ring. The specification requirements are 5 lbs. maximum for insertion of .319" I.D. ring and the .324" I.D. ring shall contact all slotted spring members within .031" of their tip ends.

Jacks - Center contact was preconditioned by inserting a .057" gage one time to a .125" minimum depth. Force was then measured to insert a .054" gage to a .125" minimum depth. A .052" gage was then inserted to a minimum depth of .125" and the force to withdraw it was measured. The specification requirements are a two pound maximum insertion force for the .054 gage and a two ounce minimum withdrawal force for the .052 gage.

Measurements were taken on all samples initially and on Group #3 after testing.

Test Results

All samples tested met the requirements of the specification.

2.3 Force to Engage/Disengage - All Samples

Connectors were fully engaged and disengaged with a standard mating part. Connectors are fully engaged when reference planes coincide. The specification requirements were 2 inch pounds maximum.

Test Results

All samples tested met the requirements of the specification.

2.4 Coupling Proof Torque - All Samples

The plug was coupled to its standard mating part, tightened to 15 inch pounds for 1 minute, then disengaged. Requirements were for the coupling mechanism not to become dislodged from the connector. The connector interface dimensions must stay within their specified tolerances.

Test Results

All samples tested met the requirements of the specification.

2.5 Permeability - All Samples

Samples were measured for magnetic permeability with an indicator conforming to MIL-I-17214.

Test Results

All samples met the specification requirement of less than 2 Mu.

2.6 Insulation Resistance - All Samples

Measurements were taken between the center and the outer contact of the unmated connector assembly. A test voltage of 500 volt d.c. was applied to the connector assembly for a period of two minutes. Samples were read initially and after the temperature-humidity cycling of Group Three. Specification limits are 5×10^3 megohms minimum when read initially and 2×10^2 megohms minimum when read after testing.

Test Results

Test Group	Sample	Measurement
1	Plug	8.8×10^6_5 megohm
1	Jack	3.5×10^6_6 megohm
2	Plug	8.6×10^5_5 megohm
2	Jack	4.9×10^6_5 megohm
3	Plug	2.0×10^5_5 megohm
3	Jack	34.4×10^5_9 megohm
3 After Humidity	Plug	$.8 \times 10^9_9$ megohm
3 After Humidity	Jack	$.9 \times 10^7_6$ megohm
4	Plug	7.6×10^6_5 megohm
4	Jack	4.5×10^5 megohm

2.7 Dielectric Withstanding Voltage - Group 3

A test voltage of 1500 vac was applied between the center and outer contacts of the unmated connector assemblies. This voltage was sustained for one minute, during which the connector was checked for breakdown and flashover. Testing was performed on the assemblies initially, after thermal shock, and after temperature-humidity cycling.

Test Results

The test assemblies met the requirements of the specification of no breakdowns or flashover during the one minute of voltage application.

2.8 Voltage Standing Wave Ratio - Group 2

The test assemblies were measured between 500 MHz and 15 GHz using a discrete frequency network analyzer. The specification limit is 1.35 max.

Test Results

Sample No.	Type	Max. VSWR	Frequency
1	Plug	1.14	10.4 GHz
2	Plug	1.17	10.5 GHz
3	Plug	1.16	10.4 GHz
1	Jack	1.19	15.0 GHz
2	Jack	1.29	15.0 GHz
3	Jack	1.22	15.0 GHz

All samples met the requirements of the specification.

2.9 Altitude Corona - Group 3

A voltage of 375 vrms minimum was applied to the test assemblies at a simulated altitude of 70,000 feet. The voltage was applied for a period of one minute, and the samples were monitored for breakdown or detectable corona which exceeded 5 picocoulombs.

Test Results

The test samples met the requirements of the specification of no breakdowns or conona discharge exceeding 5 picocoulombs.

2.10 R.F. High Potential - Group 3

A potential of 1000 vrms at 5 megahertz was applied between the center and outer contact of the unmated connectors. This potential was applied for a period of one minute, during which the connectors were monitored for breakdowns or flashovers.

Test Results

No breakdowns or flashovers occurred during application of the test potential.

2.11 R.F. Leakage - Group 4

A frequency of 2.5 GHz was applied to the connector assemblies and the amount of leakage measured. Specification limits are -60 dB minimum.

Test Results

Test samples met the requirements of the specification with the following reading:

Sample #1	-87 dB
#2	-90 dB
#3	-80 dB

2.12 R.F. Insertion Loss - Group 4

R.F. Insertion Loss was measured at 3 GHz and 6 GHz. The specification requirements are .06 F(HGz) or .104 dB max. at 3 GHz and .147 dB max. at 6 GHz.

Test Results

All samples tested met the requirements of the specification at both 3 GHz and 6 GHz.

2.13 Vibration - Group 3

Mated connectors were subjected to sinusodal vibration of 20 G's. The frequency was varied logarithmically between 10 and 2000 Hz. Connectors were vibrated for four hours in each of three mutually perpendicular axes, during which they were monitored for physical damage and electrical discontinuities greater than one microsecond.

Test Results

No discontinuities occurred during test, and no physical damage was evident to the samples.

2.14 Physical Shock - Group 3

Mated connectors were subjected to a shock test with a sawtooth waveform of 100 g's and a duration of 6 milliseconds. Three shocks in each direction were applied along the three mutually perpendicular axes of the sample for a total of 18 shocks. The connectors were monitored for discontinuities greater than one microsecond and for physical damage.

Test Results

No discontinuities occurred during test, and no physical damage was evident to the samples.

2.15 Cable Retention - Group 3

An axial load of 60 pounds was applied between the connector and cable for 30 seconds, during which the sample was monitored for electrical continuity. A torque of 55 inch-ounces was then applied 1 cable diameter from the connector. This torque was applied in both directions. The axial load of 60 pounds was then reapplied and electrical continuity rechecked.

Test Results

There was no loss of electrical continuity or evidence of physical damage to the connector assemblies.

2.16 Durability - Group 2

The connector assemblies were mated and unmated a total of 500 times.

Test Results

There was no physical damage to the connector assemblies after test.

2.17 Coupling Nut Retention - Group 3

A tensile load of 100 pounds was applied for 1 minute between the coupling nut and plug body. During this application, the nut was rotated two revolutions in each direction.

Test Results

The coupling nut did not loosen or dislodge from plug body.

2.18 Center Contact Retention - Group 1

A force of 6 pounds was applied axially to the center contact for 5 seconds minimum in both directions.

Test Results

The center contact was not displaced from the specified interface dimensions.

2.19 Thermal Shock - Group 3

Mated connectors were subjected to 5 cycles of extreme heat and cold. The temperature extremes were -65°C and +115°C. One hour of exposure at the high temperature, followed by one hour at the low temperature, constituted one cycle. The transition time between extremes was less than 3 minutes.

Test Results

There was no physical damage to the connector assemblies as a result of this testing.

2.20 Temperature-Humidity Cycling - Group 3

Mated connectors were subjected to 10 temperature-humidity cycles between 25°C and 65°C at 95% R.H. Five cold shocks at -10°C were induced during the first nine cycles. Insulation resistance was measured within 5 minutes of removal from chamber.

Test Results

There was no physical damage to the connector assemblies as a result of this testing.

2.21 Salt Spray Corrosion - Group 1

Unmated uncabled connectors were subjected to 5% salt concentration for 48 hours.

Test Results

There was no base metal exposure on any mating or interface surface of the connectors.

2.22 Termination Resistance, Specified Current - Group 3

Mated connectors were measured for potential drop using a test current of 1 ampere d.c. Initial measurements were made on the inner contact, outer contact, and on the shield to body interface. Measurements made after testing were made only on the inner contact. The specification limits are 3.0 milliohms initial and 4.0 milliohms after test on the inner contact, .2 milliohms on the outer contact, and .5 milliohms on the shield to body interface.

Test Results

All Readings are in Milliohms

	Inner Contact		Outer Contact		Shield to Body	
	Min.	Max.	Min.	Max.	Min.	Max.
Initial	0.35	0.71	0.022	0.036	0.060	0.302
After Vibration	0.70	0.96	N/A		N/A	
After Physical Shock	0.42	0.86	N/A		N/A	
After Thermal Shock	0.56	0.87	N/A		N/A	

All samples met the requirements of the specification.

3.0 Validation

Report prepared by,

Richard A. Groft 1/23/85

Richard A. Groft
Test Engineer
Design Assurance Testing
Corporate Test Laboratory

Reviewed by,

J. J. Edwards 1/23/85

J. J. Edwards
Supervisor
Design Assurance Testing
Corporate Test Laboratory

Approved by,

T. DiClemente 2/1/85

T. DiClemente
Manager, Product Assurance
Signal Components Division
Connector and Electronics Products Group