AMP

QUALIFICATION TEST REPORT

AMP* Tandem Spring Shunt Connectors

501-78 Rev. 0

Product Specification:	108-9062 Rev. 0
CTL No.:	CTL5273-004
Date:	August 5, 1988
Classification:	Unrestricted
Prepared By:	James A. D'Angelo
Test Performed By:	Charles Zahora
	Emery Buziak
	William Newell

*Trademark of AMP Incorporated

Corporate Test Laboratory Harrisburg, Pennsylvania

Table of Contents

AMP

AMP INCORPORATED

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

CORPORATE TEST LABORATORY

Qualification Test Report
AMP Tandem Spring Shunt Connectors
Part Numbers 530153-2 2-530153-2
3-530153-2

1. Introduction

1.1 Purpose

Testing was conducted to measure product performance of the Tandem Spring Shunt Connector when tested to the requirements of AMP Product Specification 108-9062, Rev. 0.

1.2 Scope

This report covers the electrical and mechanical performance of Tandem Spring Shunt Connector made by the Integrated Circuit Connector Division of the Packaging Systems Products Group. Test samples were submitted to the Corporate Test Laboratory on February 23, 1987. Testing was performed between February 26, 1988 and June 29, 1988.

1.3 Conclusion

The AMP Tandem Spring Shunt Connector conforms to the performance requirements of Product Specification 108-9062, Rev. 0.

1.4 Product Description

The Tandem Spring Shunt Connectors feature one-piece contact construction and have two points of contact. A wide variety of shunts are produced, which mate and common pairs of .025" square or round posts and .022" formed posts. These shunts are available in gold or tin finish, with a beryllium copper or phosphor bronze contact material; shunts with 94V-0 rated housings are spaced on .100 and .200 inch centers. Shunts are stackable on .100 and standard configurations include shunts for one pair of posts.

1.5 Test Samples

The connectors were taken randomly from current production. Test Group 1 and 2 consisted of 30 samples each with 100 microinches of tin plating and 15 & 30 microinches of gold plating. Test Group 3 consisted of 30 samples with 100 microinches of tin plating. Test Group 4 consisted of 30 samples each with 15 & 30 microinches of gold plating. Each sample in Test Groups 1 thru 4 was mated with a .025 square post header assembly of the same plating. Test Group 5 consisted of 25 samples each with 100 microinches of tin plating and 15 & 30 microinches of gold plating.

Samples tested were:

Part No.	2-530153-2	100 µinches Tin plated contacts.
Part No.	3-530153-2	15 µinches Gold plated contacts.
Part No	530153-2	30 µinches Gold plated contacts.

1.6 Qualification Test Sequence

Test or Examination	Test Group 1	2	3	4	5
	Test Sequence (a)				
Examination of Product	1,8	1,7	1,6	1,6	1
Shunt Resistance, Rated Current	7				
Shunt Resistance, Low Level	2,6		2,5	2,5	
Insulation Resistance		2,5			
Vibration	4				
Dielectric Withstanding Voltage		6			
Physical Shock	5				
Shunt Engaging Force					2
Shunt Separating Force					3
Durability	3		3	3	
Thermal Shock		3			
Humidity-Temperature Cycling		4	4		
Industrial Mixed Flowing Gas				4	

(a) Numbers show sequence in which tests are performed

2. Summary of Testing

2.1 Examination of Product - All Groups

All connectors submitted for testing were selected from current production lots. They were inspected and accepted by the Product Assurance Department of the Integrated Circuit Connector Division and were delivered to the Corporate Test Laboratory on January 18, 1988.

2.2 Shunt Resistance, Rated Current - Group 1

All samples met the requirement of 20 milliohms maximum, as specified for gold plated samples, and 30 milliohms maximum, as specified for tin plated samples.

The shunt resistance of the samples in this group were as follows:

Resistance in Milliohms

Test Group	Sample Number	Plating Type	Min.	Max.	Mean	Standard Deviation
1	101	30µ"Gold	14.57	18.79	15.63	0.9518
	102	100µ"Tin	10.25	18.94	13.24	2.2486
	103	15µ"Gold	14.22	19.04	15.73	1.1331

2.3 Shunt Resistance, Low Level - Groups 1, 3 & 4

All samples met the initial and final requirements of 20 milliohms maximum, as specified for gold plated samples, and 30 milliohms maximum, as specified for tin plated samples.

The initial shunt resistance of the samples in this group were as follows:

Resistance in Milliohms

Test Group	Sample Number	Plating Type	Min.	Max.	Mean	Standard Deviation
1	101	30µ"Gold	14.79	16.76	15.73	0.4534
	102	100µ"Tin	8.15	10.63	8.81	0.7511
	103	15µ"Gold	14.38	15.79	15.15	0.3912
3	302	100µ"Tin	8.09	10.67	9.37	0.9890
4	401	30µ"Gold	14.73	16.99	15.46	0.5533
	403	15µ"Gold	14.27	15.95	14.99	0.4353

The final shunt resistance of the samples in this group were as follows:

Resistance in Milliohms

Test Group	Sample Number	Plating Type	Min.	Max.	Mean	Standard Deviation
1	101	30µ"Gold	14.14	19.53	15.35	1.0743
	102	100µ"Tin	9.98	17.61	11.96	1.6931
	103	15µ"Gold	13.97	19.61	15.58	1.3433
3	302	100µ"Tin	10.25	16.78	12.32	1.3139
4	401	30µ"Gold	13.86	17.66	15.58	0.9096
	403	15µ"Gold	14.26	16.87	15.31	0.5603

2.4 Insulation Resistance - Group 2

All samples met the initial and final insulation resistance requirement of $1.0X10^3$ megohms minimum. The final insulation resistance measurements were measured after humidity-temperature cycling was completed. The insulation resistance measurements were as follows:

All values are in megohms.

	Minimum	Maximum	Min. Required
Initial	$6.0X10^4$	$1.8X10^7$	$1.0X10^3$
Final	$2.0X10^4$	$1.8X10^5$	$1.0X10^3$

2.5 Vibration - Group 1

During vibration there were no discontinuities greater than one microsecond. Following vibration, there was no evidence of cracks, breaks, or physical damage that would affect the performance of the connectors.

2.6 Dielectric Withstanding Voltage - Group 2

There was no dielectric breakdown or flashover, when 1000 Volts ac was applied to adjacent shunts, initially and after humidity-temperature cycling.

2.7 Physical Shock - Group 1

During physical shock testing, there were no discontinuities greater than one microsecond. Following physical shock, there was no evidence of cracks, breaks, or physical damage that would affect the performance of the connectors.

2.8 Shunt Engaging Force - Group 5

All samples met the maximum specified requirement of 25.0 ounces.

All forces are in ounces

Sample Number	Plating Type	Min.	Max.	Mean	Standard Deviation
501	30μ"Gold	7.0	14.3	11.1	1.8083
502	15μ"Gold	6.0	10.0	7.9	0.8476
503	100μ"Tin	5.6	24.2	14.4	4.2885

2.9 Shunt Separating Force - Group 5

All samples met the minimum specified requirement of 2.8 ounces.

All forces are in ounces

Sample Number	Plating Type	Min.	Max.	Mean	Standard Deviation
501	30μ"Gold	3.8	7.8	5.1	0.8709
502	15μ"Gold	3.2	5.1	4.3	0.5300
503	100μ"Tin	2.9	5.8	4.2	0.8156

2.10 Durability - Groups 1, 3 and 4

After durability cycling, there was no contact wear or physical damage that would affect the performance of the connectors.

2.11 Thermal Shock - Group 2

After exposure to thermal shock, there was no evidence of physical damage to the connectors.

2.12 Humidity-Temperature Cycling - Groups 2 and 3

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

2.13 Industrial Mixed Flowing Gas - Group 4

After exposure to industrial mixed flowing gas, there was no evidence of physical damage to all the connectors.

3. Test Methods

3.1 Examination of Product

The product drawing and inspection plan were used to examine the connectors. They were examined visually, dimensionally and functionally.

3.2 Shunt Resistance, Rated Current

Shunt resistance was measured on all connectors in Group 1. A four terminal resistance measuring system was used. A test current of 3.0 amperes dc was applied to each connector. See Figure #1 for shunt resistance measurement points.

3.3 Shunt Resistance, Low Level

Shunt resistance was measured on all connectors in each test group. A four terminal resistance measuring system was used. Current during the test was maintained at 100 milliamperes dc with 20 millivolts dc maximum open circuit voltage. See Figure #1.

3.4 Insulation Resistance

Insulation resistance was measured between adjacent connectors; the shunts were mated to adjacent square header posts. A test voltage of 500 V dc was applied for one minute, and the insulation resistance measurement was recorded.

3.5 Vibration

The mated connectors were subjected to vibration having a harmonic motion, with an amplitude of either 0.06 inch, double amplitude or 15 gravity units peak, whichever was less. The vibration frequency was varied logarithmically between the limits of 10 and 2000 Hz, and returned to 10 Hz in 20 minutes. This cycle was performed 12 times in each of three mutually perpendicular planes. Connectors were monitored for discontinuities greater than one microsecond, using a current of 100 milliamperes in the monitoring circuit.

3.6 Dielectric Withstanding Voltage

A test voltage of 1000 Volts ac was applied between adjacent connectors; the shunts were mated to adjacent square header posts. The test voltage was applied at a rate of 500 Volts per second, for a one minute hold period. The leakage current was set at 1.0 milliampere.

3.7 Physical Shock

The mated connectors were subjected to a sawtooth waveform of 100 gravity units (peak G's) for a duration of 6 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.

3.8 Shunt Engaging Force

The force required to engage a maximum specified test gage with each shunt was measured. The .026 inch square gage was mated a distance of approximately 0.230 inch from the top of the shunt connector. The test gage was mounted in a free floating fixture. Testing was performed at a rate of 0.5 inch per minute. See Figure #2.

3.9 Shunt Separating Force

The force required to separate a minimum specified test gage from each shunt was measured. Each shunt connector was sized three times with the maximum test gage. The .024 inch square gage was unmated a distance of approximately 0.230 inch from the shunt connector. The test gage was mounted in a free floating fixture. Testing was performed at a rate of 0.5 inch per minute. See Figure #2.

3.10 Durability

All shunt connectors were subjected to a specified number of mating and unmating cycles with their matching header assemblies. The gold plated samples were mechanically cycled at a rate of one inch per minute. The tin plated samples were cycled manually. The shunts with 30 and 15 microinches of gold plating were subjected to 200 and 100 cycles of durability, respectively. The shunts with 100 microinches of tin plating were subjected to 25 cycles.

3.11 Thermal Shock

The mated connectors were subjected to five cycles of thermal shock. The temperature extremes were -65°C and 105°C for gold plated connectors, and -40°C and 85°C for tin plated connectors. Each cycle consisted of 30 minutes at each extreme, with a transition time of approximately 30 seconds.

3.12 Humidity-Temperature Cycling

The mated connectors were exposed to humidity-temperature cycling for ten days. The connectors were preconditioned for 24 hours at 50°C in a dry oven. Each 24 hour period consisted of cycling the temperatures between 25°C and 65°C twice, while holding the humidity at 95%.

3.13 Industrial Mixed Flowing Gas

The mated connectors were subjected to a Class III exposure of 20 days. The parameters of Class III exposure are a temperature of 30°C and a relative humidity of 75%. Pollutants are Cl_2 at 20 ppb, NO_2 at 200 ppb and H_2S at 100 ppb.

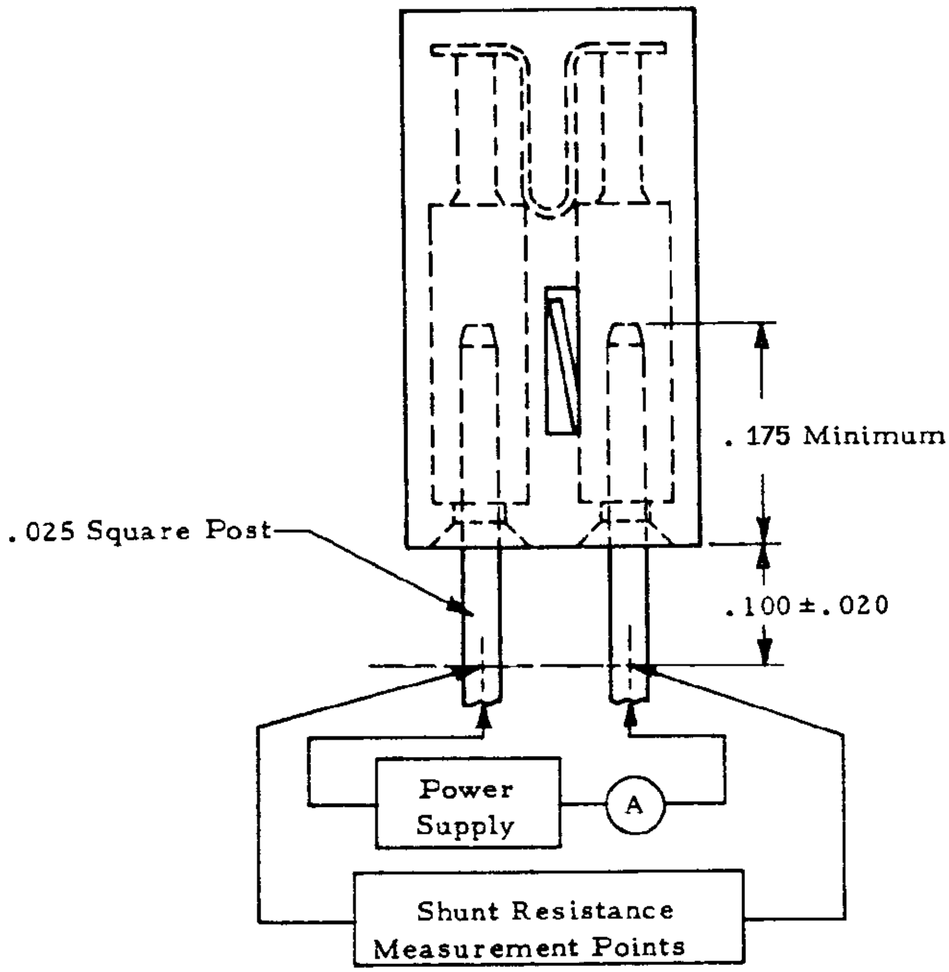
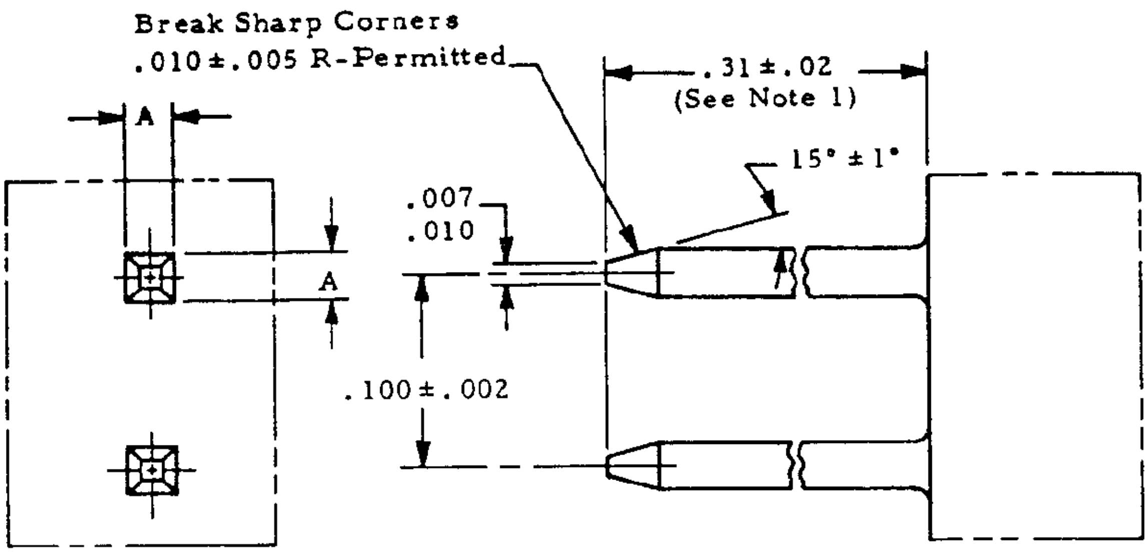


Figure 1

Shunt Resistance Measurement Points



Gage	A
Engaging (Maximum)	.026 +.0000 -.0001
Separating (Minimum)	.024 +.0001 -.0000
Durability	.025 ± .0001

Notes:

1. Finish in this area must be √4 on all surfaces.
2. Material: Tool Steel
3. Heat treat: R_c 60 minimum

Figure #2

Shunt Post Simulator

4. Validation

Prepared by:

_______________________________ ___/___/___

James A. D'Angelo
Engineering Assistant
Product Testing Section
Corporate Test Laboratory

Reviewed by:

_______________________________ ___/___/___

Richard A. Groft
Supervisor, Design Assurance Testing
Product Testing Section
Corporate Test Laboratory

Approved by:

_______________________________ ___/___/___

William O. Robinson
Manager, Product Assurance
Integrated Circuit Connector Division