Dual Beam Shunt

1. INTRODUCTION

1.1. Purpose

| Testing was performed on the Tyco Electronics Dual Beam Shunt to determine its conformance to the requirements of Product Specification 108-1674 Rev. O.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the Dual Beam Shunt manufactured by Personal Computer Business.

1.3. Conclusion

The Dual Beam Shunt, listed in paragraph 1.5., meets the electrical, mechanical, and environmental
| performance requirements of Product Specification 108-1674 Rev O. The testing was performed
| between 11Feb97 and 30Oct97. The test file number for this testing is CTL5239-056-021. This
| documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.4. Product Description

The Dual Beam shunt is a separable electrical connection device for mating two .025 inch square posts. The centerline spacing between posts is .100 inch. The contacts are phosphor bronze with gold over nickel plating. The housing material is glass filled polyester, UL94V-0.

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 Number	Description
|	1,2,3	30 each	390088-2	Dual beam shunt assembly
	1.2.3	1 each	4-103185-0	40 position breakaway header, single row

1.6. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature: 15 to 35˚C
Relative Humidity: 20 to 80%

1.7. Qualification Test Sequence

Test or Examination	Test Groups		
	1	2	3
	Test Sequence (a)		
Examination of product	1,9	1,9	1,8
Termination resistance, dry circuit	3,7	2,7	
Dielectric withstanding voltage			3,7
Insulation resistance			2,6
Temperature rise vs current		3,8	
Vibration, sinusoidal	5	6	
Physical shock	6		
Durability	4		
Mating force	2		
Unmating force	8		
Thermal shock			4
Humidity -temperature cycling			5
Temperature life		5	
Mixed flowing gas		4(b)	

NOTE *(a) The numbers indicate sequence in which tests were performed.*
(b) Precondition with 2 cycles of durability.

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 Personal Computer Business. 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 and 2

All termination resistance measurements, taken at 100 milliamperes maximum and 20 millivolts open circuit voltage were less than 20 milliohms initially and had a maximum increase in resistance (ΔR) of less than 10 milliohms per shunt after testing.

Test Group	Number of Data Points	Condition	Termination Resistance Min	Max	Mean
1	30	Initial	14.69	16.91	15.636
	60	After mechanical (ΔR)	-1.14	+2.28	+0.803
2	30	Initial	14.18	16.52	15.600
		After current verification (ΔR)	-2.07	+2.74	+0.815

All values in milliohms

2.3. Dielectric Withstanding Voltage - Group 3

No dielectric breakdown or flashover occurred.

2.4. Insulation Resistance - Group 3

All insulation resistance measurements were greater than 10,000 megohms.

2.5. Temperature Rise vs Current - Group 2

All samples had a temperature rise of less than 30°C above ambient when tested using a baseline rated current of 3.46 amperes and the correct derating factor value based on the samples wiring configuration.

2.6. Vibration - Groups 1 and 2

No discontinuities were detected during vibration (Group 1 only). Following vibration, no cracks, breaks, or loose parts on the connector assemblies were visible.

2.7. 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.

2.8. Durability - Group 1

No physical damage occurred to the shunts as a result of mating and unmating the connector 25 times.

2.9. Mating Force - Group 1

All mating force measurements were less than 25 ounces per shunt.

2.10. Unmating Force - Group 1

All unmating force measurements were greater than 1.25 ounces per shunt.

2.11. Thermal Shock - Group 3

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

2.12. Humidity-Temperature Cycling - Group 3

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

2.13. Temperature Life - Group 2

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

2.14. Mixed Flowing Gas - Group 2

No evidence of physical damage was visible as a result of exposure to the pollutants of mixed flowing gas.

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 4 terminal measuring technique (Figure 1). The test current was maintained at 100 milliamperes maximum with a 20 millivolt open circuit voltage.

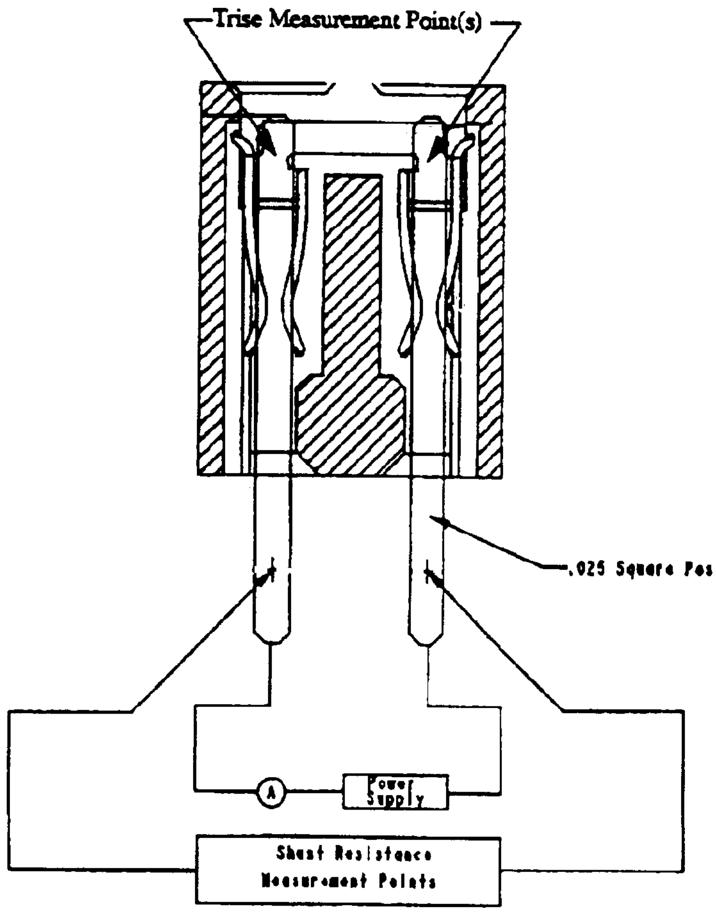

Figure 1
Typical Termination Resistance Measurement Points

3.3. Dielectric Withstanding Voltage

A test potential of 1,000 volts AC was applied between the adjacent shunts. This potential was applied for 1 minute and then returned to zero.

3.4. Insulation Resistance

Insulation resistance was measured between adjacent shunts, using a test voltage of 500 volts DC. This voltage was applied for 2 minutes before the resistance was measured.

3.5. Temperature Rise vs Current

Temperature rise curves were produced by measuring individual contact temperatures at 5 different current levels. These measurements were plotted to produce a temperature rise vs current curve. Thermocouples were attached to individual contacts to measure their temperatures (See figure 1). The ambient temperature was then subtracted from this measured temperature to find the temperature rise. When the temperature rise of 3 consecutive readings taken at 5 minute intervals did not differ by more than 1°C, the temperature measurement was recorded.

3.6. Vibration, Sinusoidal

Mated shunts and headers were subjected to sinusoidal vibration, having a simple harmonic motion with an amplitude of 0.06 inch, double amplitude or 15 gravity unit (g's peak). The vibration frequency was varied uniformly between the limits of 10 and 2,000 Hz and returned to 10 Hz in 20 minutes. This cycle was performed 12 times in each of 3 mutually perpendicular planes for a total vibration time of 12 hours. Connectors were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC (Group 1 only). Samples were energized with 2.0 amperes DC (Group 2 only).

3.7. Physical Shock

Mated shunts and headers were subjected to a physical shock test having a sawtooth waveform of 100 gravity units (g peak) and a duration of 6 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 18 shocks. Connectors were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.8. Durability

Shunts and headers were mated and unmated 25 times at a rate of 600 cycles per hour.

3.9. Mating Force

The force required to mate individual shunts was measured using a tensile/compression device with the rate of travel at 0.5 inch per minute and a free floating fixture.

3.10. Unmating Force

The force required to unmate individual shunts was measured using a tensile/compression device with the rate of travel at 0.5 inch per minute and a free floating fixture.

3.11. Thermal Shock

Mated shunts and headers were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -65 and 105˚C. The transition between temperatures was less than 1 minute.

3.12. Humidity-Temperature Cycling

Mated shunts and headers 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 maintaining high humidity (Figure 2).

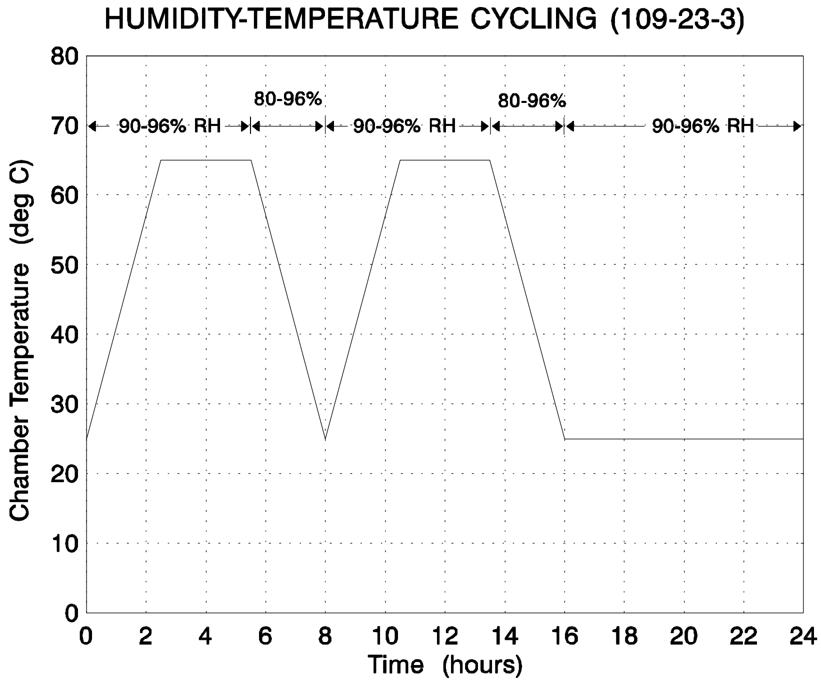

Figure 2
Typical Humidity-Temperature Cycling Profile

3.13. Temperature Life

Mated shunts and headers were exposed to a temperature of 105˚C for 96 hours.

3.14. Mixed Flowing Gas, Class III

Mated shunts and headers 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 Cl_2 at 20 ppb, NO_2 at 200 ppb, and H_2S at 100 ppb. Samples were preconditioned with 2 cycles of durability.