ELCON Micro Power Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on ELCON Micro Power Connector to determine their conformance to the requirements of Product Specification 108-128068.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of ELCON Micro Power Connector.

1.3. Conclusion

The ELCON Micro Power Connector listed in paragraph 1.4., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-128068.

1.4. Test Specimens

Test specimens were representative of normal production lots. Specimens identified with the following part numbers were used for test:

Part Number	Description
1-2204801-8	ELCON Micro Power Connector Header, Vertical Dip, 3.00mm Pitch, 2X2 Circuits
3-2204801-8	ELCON Micro Power Connector Header, Vertical Dip, 3.00mm Pitch, 2X4 Circuits
7-2204801-8	ELCON Micro Power Connector Header, Vertical Dip, 3.00mm Pitch, 2X8 Circuits
TBD	ELCON Micro Power Connector Receptacle with 16 AWG wire, 3.00mm Pitch, 2X2 Circuits, 2X4 Circuits, 2X8 Circuits
8-2356499-9	ELCON Micro Power Connector Header, SMT, 3.00 Pitch, 2X12 Circuits

Figure 1

1.5. Environmental Conditions

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

- Temperature: 15 to 35°C
- Relative Humidity: 25 to 75%

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1.6. Qualification Test Sequence

Test or Examination	Test Group (a)					
	1	2	3	4	5	6
	Test Sequence (b)					
Initial examination of product	1	1	1	1	1	1
Low level contact resistance	2,4		2,6,9			
Insulation resistance		2,6				
Dielectric withstanding voltage		3,7				
Temperature rise vs current				3		
Random vibration			7			
Mechanical shock			8			
Durability			5	2		
Mating force			3			
Unmating force			4			
Terminal retention force					4	
Thermal shock		4				
Humidity-temperature cycling		5				
Temperature life	3					
Solderability					2	
Resistance to soldering heat					3	
Resistance to reflow soldering heat						2
Final examination of product	5	8	10	4	5	3

NOTE *(a) See paragraph 1.4.*
(b) Numbers indicate sequence in which tests are performed.

Figure 2

2. SUMMARY OF TESTING

2.1. Initial examination of product - All Test Groups

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance (C of C) was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Low level contact resistance - Test Groups 1, 3

All power contact LLCR measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 5 milliohms initially and 6 milliohms after testing.

2.3. Insulation resistance - Test Group 2

All insulation resistance measurements were greater than 1000 megohms.

2.4. Dielectric withstanding voltage - Test Group 2

No dielectric breakdown or flashover occurred.

2.5. Temperature rise vs current - Test Group 4

All temperature rise measurements at current rating (12A for 2X2 circuits, 10.5A for 2X4 circuits, 8.5A for 2X8 circuits) were less than 30°C.

2.6. Random vibration - Test Group 3

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

2.7. Mechanical Shock - Test Group 3

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

2.8. Durability - Test Groups 3, 4

No physical damage occurred as a result of mating and unmating the specimens 30 cycles for regular plugging at a maximum rate of 500 cycles per hour.

2.9. Mating force - Test Group 3

All mating force measurements were less than 8.0 N per circuit for Tin plated and 5.6 N per circuit for Gold plated.

2.10. Unmating force - Test Group 3

All unmating force measurements were greater than 2.0 N per circuit for Tin plated and 1.5 N per circuit for Gold plated.

2.11. Terminal retention force – Test Group 5

All terminal retention force measurements were greater than 13.7 N per pin.

2.12. Thermal Shock - Test Group 2

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

2.13. Humidity-temperature cycling - Test Group 2

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

2.14. Temperature Life - Test Group 1

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

2.15. Solderability - Test Group 5

All solderable areas had a minimum of 95% solder coverage.

2.16. Resistance to soldering heat - Test Group 5

No evidence of physical damage was visible as a result of subjecting the specimens to wave soldering.

2.17. Resistance to soldering heat - Test Group 6

No defects, damage, or discoloration was observed on any specimen as a result of the moisture soak preconditioning. No melting, cracking, blistering or other damage that would affect connector performance was observed on any of the specimens due to the 3 reflow heat exposures.

2.18. Final examination of product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS

3.1. Initial examination of product

A C o f C was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts.

3.2. Low level contact resistance

LLCR measurements were made using a 4 terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

3.3. Insulation resistance

Insulation resistance was measured between adjacent contacts of mated specimens. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured.

3.4. Withstanding voltage

A test potential of 1000 volts DC was applied between adjacent contacts of mated specimens. These potentials were applied for 1 minute and then returned to zero.

3.5. Temperature rise vs current

Temperature rise curves were produced by measuring individual contact temperatures at 4 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. 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. Random vibration

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum, with excitation frequency bounds of 20 and 500 Hz. The Power Spectral Density (PSD) was flat at 0.05 G^2/Hz from 20 to 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. This was performed for 15 minutes in each of 3 mutually perpendicular planes for a total vibration time of 45 minutes. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.7. Mechanical Shock

Mated specimens were subjected to a mechanical 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 3 mutually perpendicular planes for a total of 18 shocks. Specimens were monitored for discontinuities of 1 microsecond or greater using a current of 100 milliamperes DC.

3.8. Durability

Specimens were mated and unmated 30 cycles for regular plugging at a maximum rate of 500 cycles per hour.

3.9. Mating force

The force required to mate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of 25.4 mm per minute.

3.10. Unmating force

The force required to unmate individual specimens was measured using a tensile/compression device with a free floating fixture and a rate of 25.4 mm per minute.

3.11 Terminal retention force

The force required to remove a terminal from the housing was measured using a tensile/compression device with a free floating fixture and a rate of 25.4 mm per minute.

3.12. Thermal shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40°C and 105°C and 1 minute transition between temperatures.

3.13. Humidity-temperature cycling

Mated specimens were exposed to 10 humidity/temperature cycles. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C twice while maintaining high humidity (Figure 4).

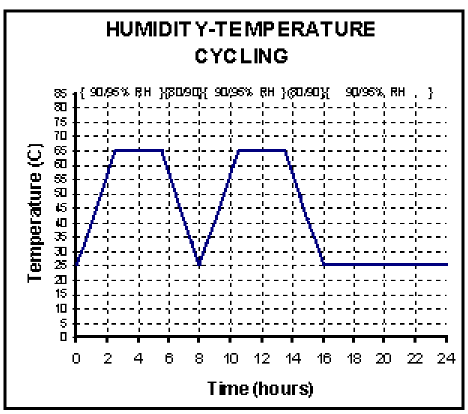

Figure 4
Humidity-temperature cycling profile

3.14. Temperature life

Mated specimens were exposed to a temperature of 105°C for 240 hours.

3.15 Solderability

The solderable areas of the specimens were immersed in Kester 145 type ROL0 flux for 5 to 10 seconds. This flux is a non-activated rosin flux having a nominal composition of 25% by weight of water white gum rosin in a solvent of 99% isopropyl alcohol. The specific gravity of the flux was between 0.838 and 0.858. The flux was maintained at room temperature. The specimens were then removed from the flux and the excess was allowed to drain off for 5 to 20 seconds. The specimens were immersed at a maximum rate of 25.4 mm per second into a soldering bath filled with melted lead free solder (96.5% Sn, 3.0% Ag and 0.5% Cu) controlled at 245 ± 5°C until the solderable surface was coated. The specimens were held in the solder bath for 4 to 5 seconds. The specimens were then removed from the solder bath at a maximum rate of 25.4 mm per second and subjected to a 5 minute cleaning in isopropyl alcohol. The specimens were then given a visual examination using 30X magnification.

3.16 Component Heat Resistance to Wave Soldering

All specimens were checked dimensionally before and after exposure to heat. The solderable areas of the specimens were immersed in Kester 145 type ROL0 flux for 5 to 10 seconds. This flux is a nonactivated rosin flux having a nominal composition of 25% by weight of water white gum rosin in a solvent of 99% isopropyl alcohol. The specific gravity of the flux was between 0.838 and 0.858. The flux was maintained at room temperature. The specimens were then removed from the flux and the excess was allowed to drain off for 5 to 20 seconds. The specimens were attached to a dipping machine and immersed at a maximum rate of 25.4 mm per second into a soldering bath filled with melted lead free solder (96.5% Sn, 3.0% Ag and 0.5% Cu) controlled at 265 ± 5°C until the solderable surface was coated. The specimens were held in the solder bath for 10 seconds. The specimens were then removed from the solder bath at a maximum rate of 25.4 mm per second and subjected to a 5 minute cleaning in isopropyl alcohol. The specimens were then given a visual examination using 30X magnification.

3.17 Component Heat Resistance to Wave Soldering

Moisture Soak
Specimens were placed in a clean, dry, shallow container in such a manner that they did not overlap or touch and were exposed to 85・C at 85% relative humidity for 168 hours. Within 15 minutes to 4 hours after removal from the moisture soak, the specimens were subjected to the heat exposure described below.

Component Heat Resistance to Lead Free Reflow Soldering
The specimens were placed on a conveyor belt through a convection air oven. The specimens were exposed to temperatures between 150°C and 200°C for 60 to 180 seconds and between the temperatures of 255°C and 260°C for 20 to 40 seconds, and above liquidus (217°C) for 60 to 150 seconds as specified in specification TEC-109-201 Rev E. The specimens and substrates were allowed to cool to ambient temperatures and then run back through the oven two more times for a total of 3 exposures.

3.18. Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.