PC/104 and PC/104-Plus Connector Systems

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics PC/104 and PC/104-Plus connector systems to
I determine their conformance to the requirements of Product Specification 108-1956 Revision B.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the PC/104 and PC/104-Plus connector systems. Testing was performed at the Engineering Assurance Test Laboratory
I between 03May01 and 21Jun01. The test file number for this testing is CTL B022115-009. Additional
I testing to verify the increase in durability cycles from 10 to 50 cycles was performed between 06Aug02
I and 12Aug02. The test file number for this additional testing is CTLE 095-002. This documentation is on file at and available from the Engineering Assurance Test Laboratory.

1.3. Conclusion

The PC/104 and PC/104-Plus connector systems listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1956 Revision
I B.

1.4. Product Description

The PC/104 connector uses .025 inch square posts with .100 inch centerline spacing in 102 or 104 positions. The PC/104-Plus uses .020 inch square posts with 2 mm spacing in 120 positions. Both systems use either compliant pin technology or standard solder tails to terminate to .062 inch thick printed circuit boards. Both systems were tested using both stackthrough and non-stackthrough styles.

1.5. Test Specimens

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

Test Group	Quantity	Part Number	Description
1,2,3,4	5 each	1375794 (Rev 3)	PC/104 assembly with non-stackthrough contacts
		1375795 (Rev 3)	PC/104 assembly with stackthrough contacts
		1375798 (Rev 3)	PC/104-Plus assembly with non-stackthrough contacts
		1375799 (Rev 3)	PC/104-Plus assembly with stackthrough contacts

NOTE *Part numbers 1375794 revision 3 and 1375798 revision 3 were mounted to printed circuit board part number 60-469875-1 revision O. Part numbers 1375795 revision 3 and 1375799 revision 3 were mounted to printed circuit board part number 60-469876-1 revision O.*

Figure 1

1.6. Environmental Conditions

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

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

1.7. Qualification Test Sequence

Test or Examination	Test Group (a)			
	1	2	3	4
	Test Sequence (b)			
Initial examination of product	1	1	1	1
Low level contact resistance	3,7	2,4	2,4	
Insulation resistance				2,6
Withstanding voltage				3,7
Vibration	5			
Mechanical shock	6			
Durability	4			
Mating force	2			
Unmating force	8			
Thermal shock				4
Humidity-temperature cycling				5
Temperature life		3(c)		
Mixed flowing gas			3(c)	
Final examination of product	9	5	5	8

NOTE *(a) See paragraph 1.5.*
(b) Numbers indicate sequence in which tests are performed.
(c) Precondition specimens with 10 durability cycles.

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 was issued by the Product Assurance Department. Specimens were visually and dimensionally examined per the product drawing and no evidence of physical damage detrimental to product performance was observed.

2.2. Low Level Contact Resistance - Test Groups 1, 2 and 3

All low level contact resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 30 milliohms initially and had a change in resistance (ΔR) of less than 10 milliohms after testing.

PC/104					
Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	30	Initial	4.00	5.90	4.92
		After mechanical	4.05	6.71	5.12
		ΔR	-1.20	1.21	0.20
2	30	Initial	3.73	5.89	4.71
		After temperature life	4.04	7.41	4.92
		ΔR	-0.84	1.53	0.20
3	30	Initial	3.96	5.79	4.71
		After mixed flowing gas	4.10	6.80	5.05
		ΔR	-0.93	1.31	0.34

NOTE *All values in milliohms.*

PC/104-Plus					
Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	30	Initial	4.90	5.60	5.24
		After mechanical	5.08	5.73	5.49
		ΔR	-0.22	0.59	0.25
2	30	Initial	5.12	6.04	5.41
		After temperature life	5.16	6.01	5.50
		ΔR	-0.30	0.47	0.09
3	30	Initial	5.06	5.60	5.34
		After mixed flowing gas	5.15	5.90	5.51
		ΔR	-0.07	0.44	0.17

NOTE *All values in milliohms.*

Figure 3

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 1,000 megohms.

2.4. Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Vibration - Test Group 1

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

2.6. Mechanical Shock - Test Group 1

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

2.7. Durability - Test Group 1

No physical damage occurred as a result of manually mating and unmating the specimens 50 times.

2.8. Mating Force - Test Group 1

All mating force measurements were less than 142.3 N [32 lb] for PC/104, and 151.2 N [34 lb] for PC/104-Plus.

2.9. Unmating Force - Test Group 1

All unmating force measurements were greater than 66.72 N [15 lb] for PC/104, and 80.07 N [18 lb] for PC/104-Plus.

2.10. Thermal Shock - Test Group 4

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

2.11. Humidity-temperature Cycling - Test Group 4

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

2.12. Temperature Life - Test Group 2

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

2.13. Mixed Flowing Gas - Test Group 3

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

2.14. 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

Where specified, specimens were visually and dimensionally examined per the product drawing (C of C)for evidence of physical damage detrimental to product performance.

3.2. Low Level Contact Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique (Figure 4). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

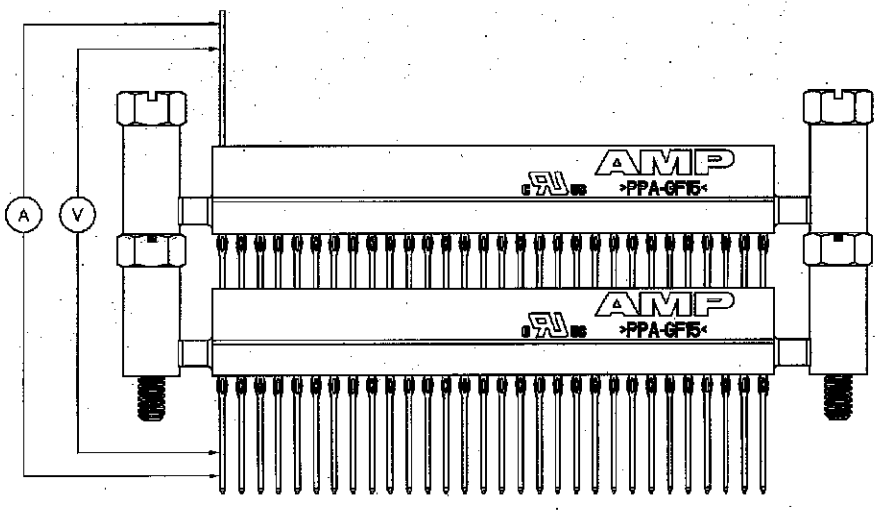

Figure 4
Low Level Contact Resistance Measurement Points

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 500 volts AC was applied between the adjacent contacts of mated specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Vibration, Random

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 spectrum remains flat at 0.1 G^2/Hz from 20 to 500 Hz. The root-mean square amplitude of the excitation was 6.93 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.

3.6. Mechanical Shock, Half-sine

Mated specimens were subjected to a mechanical shock test having a half-sine waveform of 30 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.

3.7. Durability

Specimens were manually mated and unmated 50 times at a maximum rate of 300 cycles per hour.

3.8. 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 travel of 12.7 mm [.5 in] per minute. The maximum average force per contact was calculated.

3.9. 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 travel of 12.7 mm [.5 in] per minute. The minimum average force per contact was calculated.

3.10. Thermal Shock

Mated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 105°C. The transition between temperatures was less than 1 minute.

3.11. Humidity-temperature Cycling

Mated specimens 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 5).

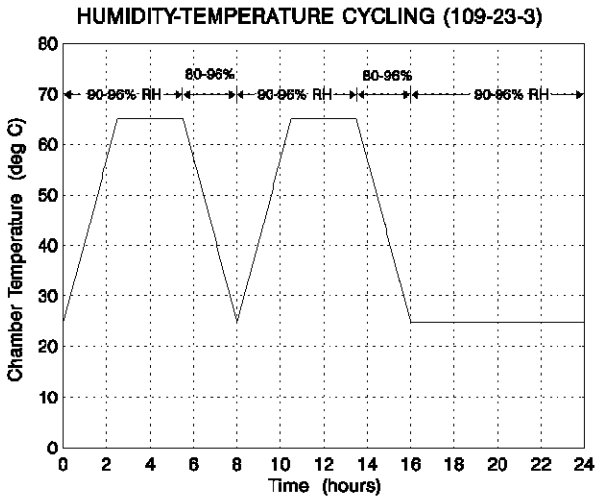

Figure 5
Typical Humidity-Temperature Cycling Profile

3.12. Temperature Life

Mated specimens were exposed to a temperature of 105°C for 500 hours. Specimens were preconditioned with 10 cycles of durability.

3.13. Mixed Flowing Gas, Class IIA

Mated specimens were exposed for 14 days to a mixed flowing gas Class IIA exposure. Class IIA exposure is defined as a temperature of 30°C and a relative humidity of 70% with the pollutants of Cl_2 at 10 ppb, NO_2 at 200 ppb, H_2S at 10 ppb and SO_2 at 100 ppb. Specimens were preconditioned with 10 cycles of durability.

3.14. Final Examination of Product

Where specified, specimens were visually examined for evidence of physical damage detrimental to product performance.