High Speed Serial Data 2 Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics High Speed Serial Data 2 (HSSDC2) connector to determine its conformance to the requirements of Product Specification 108-1965 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the HSSDC2. Testing
I was performed at the Engineering Assurance Test Laboratory between 07Mar01 and 30Jul01. The test
I file numbers for this testing are CTL B016811-003 and CTL B016811-006. This documentation is on file at and available from the Engineering Assurance Test Laboratory.

1.3. Conclusion

The HSSDC2 listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1965 Revision A.

1.4. Product Description

The Tyco Electronics HSSDC2 is designed for applications requiring extremely high data transfer rates over long distances. This is a right angle surface mount receptacle with 7 high speed contacts. The plug connector assembly includes a printed circuit board terminated to the cable at one end, and an edge card circuit pattern on the other end. The shielded cable has 4 conductors. A latch is included in the plug design.

1.5. Test Specimens

I Test specimens were representative of normal production lots. Eight groups of specimens were
I submitted for testing per the matrix in paragraph 1.7. Test groups 1 through 4 each consisted of 6
I HSSDC2 connector assemblies PN 1364532 (PhBr), and 6 HSSDC2 connector assemblies PN 1364532
I (CuNiSi). Test groups 6 through 8 each consisted of 6 HSSDC2 connector assemblies PN 1364532
I (PhBr).

I **NOTE**
I **Receptacle contacts**: Phosphor bronze per 100-255, 10M. Interface plating: 0.00127
I minimum gold over 0.00127 minimum nickel. SMT plating: 0.00381 minimum tin-lead over
I 0.00127 minimum nickel.
I **Receptacle contacts**: Copper-nickel-silicone per 100-1384. Interface plating: 0.00127
I minimum gold over 0.00127 minimum nickle. SMT plating: 0.00381 minimum tin-lead over
I 0.00127 minimum nickel.
I **Receptacle shell**: Phosphor bronze per 100-255, 10M. 0.00300 bright tin-lead per 112-26-1
I over 0.00127 minimum nickel per 112-25-2.
I **Cable shells**: Zinc die cast Zamak PN 703534-1. Plating: 0.003 to 0.006 minimum bright tin-
I lead per 112-25-1 over 0.00127 minimum nickel over 0.00508 minimum copper per 112-300-
I 2.

I Indicates change

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	5	6	7	8
	Test Sequence (b)							
Initial examination of product	1	1	1	1	1	1	1	1
Dry circuit resistance	3,7	2,4	2,4					
Insulation resistance				2,6				
Dielectric withstanding voltage				3,7				
Solderability					2			
Vibration	5							
Mechanical shock	6							
Durability	4							
Mating force	2							
Unmating force	8							
Retention force						2(d)		
Side load force							2(d)	
Longitudinal force								2(d)
Thermal shock				4				
Humidity-temperature cycling				5				
Temperature life		3(c)						
Mixed flowing gas			3(c)					
Final examination of product	9	5	5	8	3	3	3	3

NOTE

(a) See paragraph 1.5.
(b) Numbers indicate sequence in which tests are performed.
(c) Precondition specimens with 50 durability cycles.
(d) Test shall be conducted with receptacles soldered to printed circuit boards and mounted to an I/O panel.

Figure 1

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

All specimens submitted for testing were representative of normal production lots. . The Product Assurance Department of the Global Communications, Computer and Consumer Electronics Business Unit issued a Certificate of Conformance. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Dry Circuit Resistance - Test Groups 1, 2 and 3

All termination resistance measurements, taken at 100 milliamperes DC maximum and 20 millivolts maximum open circuit voltage were less than 70 milliohms initially and had a change in resistance (ΔR) of < 20 milliohms after testing.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1 (PhBr)	12	Initial	45.00	53.44	49.51
		After mechanical	44.09	52.79	48.75
2 (PhBr)	12	Initial	44.31	49.19	46.04
		After temperature life	44.61	51.89	47.15
3 (PhBr) +	12	Initial	44.21	50.92	46.61
		After mixed flowing gas	43.90	51.86	47.07
1 (CuNiSi)	12	Initial	31.32	44.88	36.58
		After mechanical	30.44	45.20	36.02
2 (CuNiSi)	12	Initial	33.22	39.08	36.28
		After temperature life	34.16	41.74	37.19
3 (CuNiSi)	12	Initial	32.52	37.61	34.94
		After mixed flowing gas	33.39	40.87	36.50

NOTE *All values in milliohms.*

Figure 2

2.3. Insulation Resistance - Test Group 4

All insulation resistance measurements were greater than 1000 megohms.

2.4. Dielectric Withstanding Voltage - Test Group 4

No dielectric breakdown or flashover occurred.

2.5. Solderability - Test Group 5

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

2.6. 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.

2.7. 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.

2.8. Durability - Test Group 1

No physical damage occurred as a result of mating and unmating the specimens 250 times.

2.9. Mating Force - Test Group 1

All mating force measurements were less than 30 N [6.7 lb].

2.10. Unmating Force - Test Group 1

All unmating force measurements were greater than 10 N [2.25 lb].

2.11. Retention Force - Test Group 6

Specimens remained mated when a force of 75 N [16.9 lb] was applied in an axial direction. There were no opens detected.

2.12. Side Load Force - Test Group 7

Specimens remain mated when a force of 75 N [16.9 lb] was applied to the cable plug in a plane parallel to the I/O panel. There were no opens detected.

2.13. Longitudinal Force - Test Group 8

Specimens remain mated when a force of 100 N [22.5 lb] was applied to the cable plug in a plane parallel to the I/O panel. There were no opens detected.

2.14. Thermal Shock - Test Group 4

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

2.15. Humidity-temperature Cycling - Test Group 4

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

2.16. Temperature Life - Test Group 2

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

2.17. 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.

2.18. 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

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

3.2. Dry Circuit Resistance

Low level contact resistance measurements were made using a 4 terminal measuring technique (Figure 3). The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage.

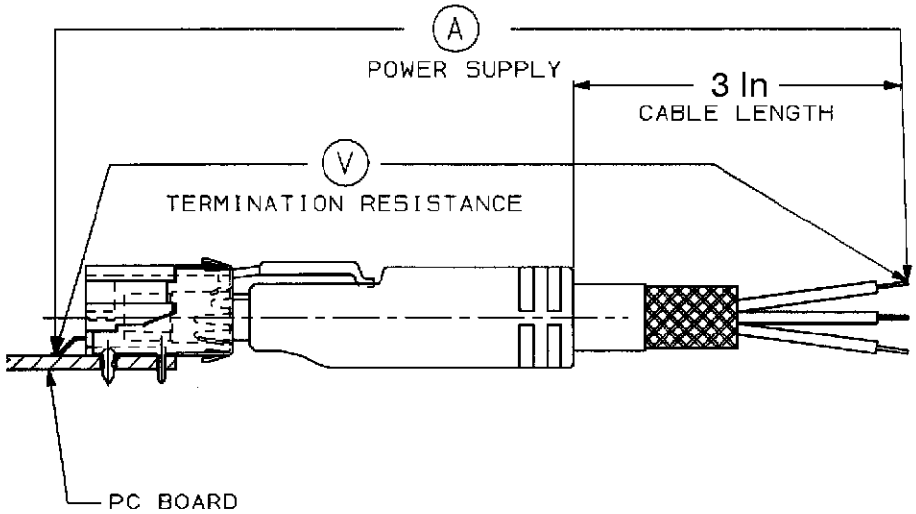

Figure 3
Dry Circuit Resistance Measurement Points

3.3. Insulation Resistance

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

3.4. Dielectric Withstanding Voltage

A test potential of 350 volts AC was applied between the adjacent contacts of unmated specimens. This potential was applied for 1 minute and then returned to zero.

3.5. Solderability

A solder paste with a composition of 63 Sn/37 Pb RMA, Visc./KCPS 1000 ± 10%, with a mesh of -325 +500 was placed onto a stencil with pad geometry opening and thickness that was appropriate for the specimens being tested. The stencil was supplied with the specimens. The solder paste was printed onto a 4.5x4.5x.0395 inch ceramic substrate. The screen was removed and the specimens were placed onto the solder paste print under appropriate magnification. The specimens were exposed to 60 seconds between the temperatures of 150 and 170°C and to 60 seconds between the temperatures of 215 and 230°C in an infrared oven as specified in EIA Standard 638. After reflow was completed, the specimens were removed from the ceramic substrate and allowed to cool. The specimens were then given a visual examination under a microscope at 10X magnification.

3.6. 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 0.02 G^2/Hz from 20 Hz to the upper bound frequency of 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. Connectors were monitored for discontinuities of 1 microsecond or greater, using a current of 100 milliamperes DC.

3.7. 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.

3.8. Durability

Specimens were mated and unmated 250 times 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 travel of 12.7 mm [.5 in] 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 travel of 12.7 mm [.5 in] per minute.

3.11. Retention Force

Specimens were unmated at a rate of 12.7 mm [.5 in] per minute until retention latches failed. This force was then recorded.

3.12. Side Load Force

Side loading force was performed with the receptacle PC board held in a vice to allow the sides of the cable plug to have a force of 75 N [16.9 lb] applied 7.00 mm [.28 in] from the front of the I/O plate location. The specimens were monitored for discontinuities.

3.13. Longitudinal Force

Longitudinal loading force was performed with the receptacle PC board clamped down to allow the top and bottom of the cable plug to have a force of 100 N [22.5 lb] applied 7.00 mm [.28 in] from the front of the I/O plate location. The specimens were monitored for discontinuities.

3.14. Thermal Shock

Unmated specimens were subjected to 5 cycles of thermal shock with each cycle consisting of 30 minute dwells at -10 and 70°C. The transition between temperatures was less than 1 minute.

3.15. Humidity-temperature Cycling

Unmated 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 4).

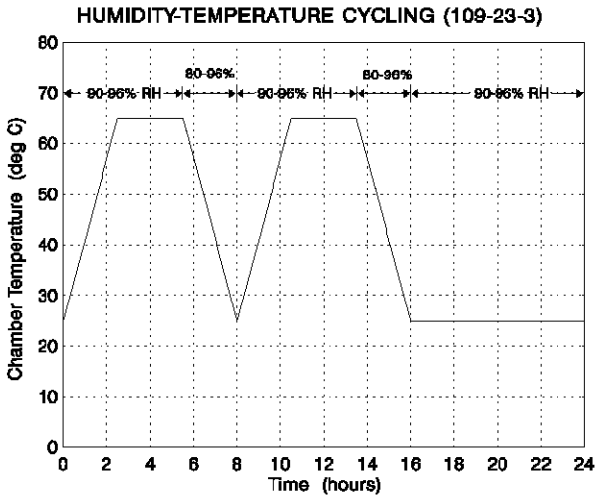

Figure 4
Typical Humidity-Temperature Cycling Profile

3.16. Temperature Life

Mated specimens were exposed to a temperature of 70°C for 500 hours. Specimens were preconditioned with 50 cycles of durability.

3.17. Mixed Flowing Gas, Class IIA

Specimens were exposed for 14 days (unmated for the first 7 days and mated for the last 7 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 50 cycles of durability.

3.18. Final Examination of Product

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