SFP 20 Position Connector

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Small Form-factor Pluggable (SFP) 20 position connector to determine its conformance to the requirements of Product Specification 108-1949 Revision A.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the SFP 20 position connector. Testing was performed at the Americas Regional Laboratory between 24Jul00 and 18Aug00. The test file number for this testing is CTL B019292-009. This documentation is on file at and available from the Americas Regional Laboratory.

1.3. Conclusion

The SFP 20 position connector listed in paragraph 1.5., conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-1949 Revision A.

1.4. Product Description

The SFP 20 position connector is designed to interconnect SFP fiber optic or copper transceivers to printed circuit boards. The connector consists of a housing with right angle surface mount contacts and is available in 20 positions with contact spacing on 0.8 mm centerline.

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 through 6	5 each	1367034-1	SFP lower cage
1 through 6	5 each	1367035-1	SFP Upper cage
1 through 6	5 each	1367073-1	SFP connector

Figure 1

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 Group (a)					
	1	2	3	4	5	6
	Test Sequence (b)					
Initial examination of product	1	1	1	1	1	1
Dry circuit resistance	2,5(c)	2,4(c)	2,5	2,4,6(c)		2,5
Dielectric withstanding voltage						3,6
Vibration			3(d)(e)			
Mechanical shock			4			
Durability						4
Solderability					2	
Thermal shock	3(f)					
Humidity-temperature cycling	4					
Temperature life		3(f)				
Mixed flowing gas				3(d)		
Thermal disturbance				5		
Final examination of product	6	5	6	7	3	7

NOTE

(a) See paragraph 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Post-stress reseating 3 times and reread dry circuit resistance.
(d) Precondition specimens with 20 durability cycles and temperature life of 192 hours at 115°C.
(e) Socket shall be mated with a mechanical device of the approximate size and mass of the module.
(f) Precondition specimens with 20 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. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Termination Resistance - Test Groups 1, 2, 3, 4 and 6.

All termination resistance measurements, taken at 100 milliamperes maximum and 20 millivolts maximum open circuit voltage were less than 35 milliohms.

Test Group	Number of Data Points	Condition	Termination Resistance		
			Min	Max	Mean
1	88	Initial	10.85	14.33	12.534
		After humidity-temperature cycling	10.56	13.90	12.225
		After post-stress	10.91	14.27	12.635
2	90	Initial	10.57	13.61	12.107
		After temperature life	10.82	13.62	12.263
		After post-stress	10.82	14.20	12.416
3	90	Initial	10.89	14.50	12.538
		After mechanical shock	11.11	14.42	12.717
4	90	Initial	10.27	14.06	12.154
		After mixed flowing gas	10.44	26.87	12.322
		After thermal disturbance	10.50	18.22	12.207
		After post-stress	10.98	23.33	13.280
6	90	Initial	10.53	14.08	12.253
		After durability	10.40	14.26	12.139

NOTE *All values in milliohms.*

Figure 3

2.3. Dielectric Withstanding Voltage - Test Group 6

No dielectric breakdown or flashover occurred.

2.4. 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.

2.5. 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.

2.6. Durability - Test Group 6

No physical damage occurred as a result of mating and unmating the specimens 100 times.

2.7. Solderability - Test Group 5

All contact leads had a minimum of 95% solder coverage.

2.8. Thermal Shock - Test Group 1

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

2.9. Humidity-temperature Cycling - Test Group 1

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

2.10. Temperature Life - Test Group 2

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

2.11. Mixed Flowing Gas - Test Group 4

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

2.12. Thermal Disturbance - Test Group 4

No evidence of physical damage was visible as a result of 10 thermal cycles.

2.13. 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. Termination Resistance

Termination resistance measurements at low level current 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. Dielectric Withstanding Voltage

A test potential of 300 volts AC was applied between the adjacent contacts (12/13 and 18/19) of unmated specimens. This potential was applied for 1 minute and then returned to zero.

3.4. 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 power spectral density was 0.02 G^2/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.

3.5. 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.

3.6. Durability

Specimens were manually mated and unmated 100 times at a maximum rate of 600 cycles per hour with the latch retention feature operable.

3.7. Solderability

Prior to testing, specimens were prepared by removing the locating studs to enable the specimens to sit flush on the ceramic substrate. Solder paste with a composition of 63 Sn/37 Pb mildly activated rosin, visc/KCPS 1000 ± 10%, with a mesh of -325 +500 was placed onto a stencil with pad geometry opening and thickness appropriate for the specimens being tested. The stencil was supplied with the specimens. The solder paste was printed onto a 4.5 X 5.5 X .0395 inch ceramic substrate. The screen was removed and the specimens were placed onto the solder paste print under appropriate magnification. Care was taken to ensure that the specimens were not contaminated in any way and were tested in the "as received" condition. The specimens and the ceramic substrate were placed in an oven. The temperature on the ceramic substrate, at a point close to the specimen, was monitored to enable temperature profiling. The specimens were exposed to temperatures starting at 180°C and increasing to 215°C over the first 2 minutes, and then increasing to 228°C at 5 minutes. After reflow was completed, the specimens were removed from the ceramic substrate and allowed to cool. Any flux residue was removed by immersing the specimens in an ultrasonic cleaner and alcohol for 5 minutes. Specimens were visually examined under 10X magnification.

3.8. Thermal Shock

Mated specimens were subjected to 10 cycles of thermal shock with each cycle consisting of 30 minute dwells at -55 and 85°C. The transition between temperatures was less than 1 minute. Specimens were preconditioned with 20 cycles of durability.

3.9. Humidity-temperature Cycling

Mated specimens were exposed to 24, 3 hour cycles of humidity-temperature cycling between 25°C at 80% RH and 65°C at 50% RH (Figure 3).

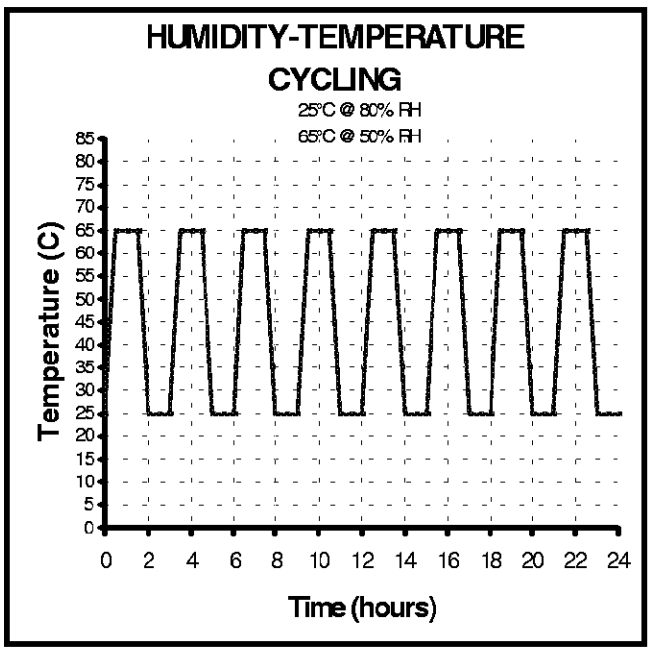

Figure 3
Typical Humidity-Temperature Cycling Profile

3.10. Temperature Life

Mated specimens were exposed to a temperature of 115°C for 432 hours. Specimens were preconditioned with 20 cycles of durability.

3.11. 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 20 cycles of durability and 192 hours at 115°C.

3.12. Thermal Disturbance

Specimens were subjected to 10, 120 minute temperature cycles between 15 and 85°C. The transition rate was 2°C per minute with a minimum of 5 minutes dwell at each temperature extreme (Figure 4).

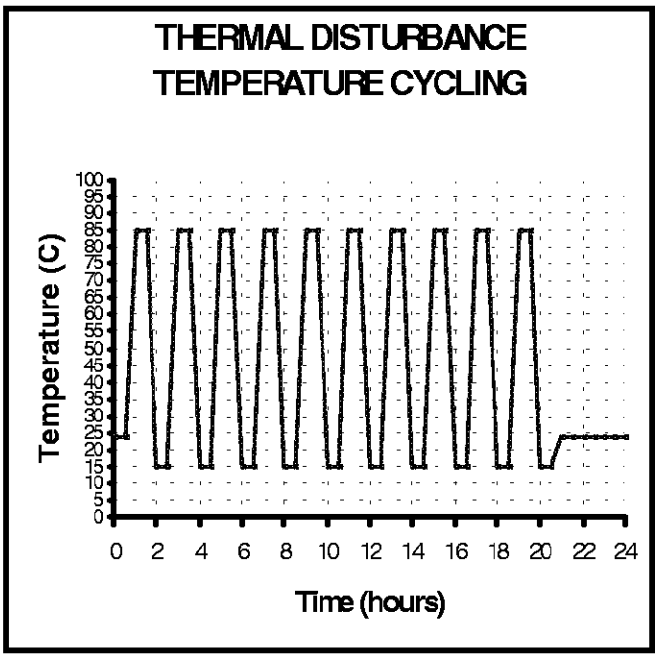

Figure 4
Typical Thermal Disturbance Profile

3.13 Final Examination of Product

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