

SFP HSSDC II Copper Module Transceiver

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Tyco Electronics SFP HSSDC II Copper Module Transceiver to determine its conformance to the requirements of Product Specification 108-2061, Revision C.

1.2. Scope

This report covers the electrical, mechanical, and environmental performance of the SFP HSSDC II Copper Module Transceiver. Testing was performed at the Engineering Assurance Product Testing Laboratory between 19Feb02 and 27May03. The test file numbers for this testing are CTL B025488 and EME B025488-003. This documentation is on file at and available from the Engineering Assurance Product Test Laboratory.

1.3. Conclusion

The SFP HSSDC II Copper Module Transceivers listed in paragraph 1.5 conformed to the electrical, mechanical, and environmental performance requirements of the Product Specification 108-2061, Revision C.

1.4. Product Description

The SFP Transceiver is a copper transceiver module for use in fibre channel applications. The transceiver sends and receives pre-encoded data over two differential copper wire pairs. The module, which operates from a single +3.3 volt power supply, contains separate AC-coupled transmitter and receiver sections that have PECL/LVPECL compatible data interfaces. The HSSDC II Copper Transceivers can be utilized in 1.06 and 2.125 Gb/s fibre channel. The module had been designed with grounding and shielding features that minimize EMI susceptibility and radiated emissions.

1.5. Test Specimens

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

Test Group	Quantity	Part Number	Description
1,2,3	4 each	1367251-1	SFP HSSDC II Copper Module Transceiver
4,5	5 each	1367251-1	SFP HSSDC II Copper Module Transceiver

Figure 1

NOTE Specimens were used with a two-piece SFP Cage, PN 1367035-1 (top) and PN 1367034-1 (bottom), and with a printed circuit board PN 60-469830-1 Revision 0 and a printed circuit board bracket tooled specifically for the purposes of this test. Test group 5 used an HSSDC II cable assembly PN 1434120-1.

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

I	Test or Examination	Test Group (a)				
		1	2	3	4	5
		Test Sequence (b)				
I	Initial examination of product	1	1	1	1	1
I	Functional test	2,7	2,5	2,4	2,4	2,4
I	ESD, SFP transceiver				3	
I	ESD, SFP transceiver through HSSDC II cable assembly					3
I	Vibration	5				
I	Mechanical shock	6				
I	Durability	4				
I	Mating force, SFP transceiver	3				
I	Unmating force, SFP transceiver	8				
I	Retention, SFP transceiver	9				
I	Thermal shock		3			
I	Humidity-temperature cycling		4			
I	Temperature life			3(c)		
I	Final examination of product	10	6	5	5	5

- 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 group Product Assurance. Where specified, specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Functional Test - All Test Groups

Functional testing was performed in accordance with paragraph 5 of Product Specification 108-2061. All specimens met the requirements.

- I 2.3. ESD, SFP Transceiver - Test Group 4
 - I No damage to the Loss Of Signal (LOS) line before or after test.
- I 2.4. ESD, SFP Transceiver Through HSSDC II Cable Assembly - Test Group 5
 - I No damage to the LOS line before or after test.
- I 2.5. Vibration, Random - Test Group 1
 - I No LOS was detected during vibration testing. Following vibration testing, no cracks, breaks, or loose parts on the specimens were visible.
- I 2.6. Mechanical Shock, Half-sine - Test Group 1
 - I Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.
- I 2.7. Durability - Test Group 1
 - I No physical damage occurred as a result of mating and unmating the specimens 100 times.
- I 2.8. Mating Force - Test Group 1
 - I All mating force measurements were less than 40 N [9 lb].
- I 2.9. Unmating Force - Test Group 1
 - I All unmating force measurements, with latch disabled, were less than 20 N [4.5 lb].
- I 2.10. Retention Force - Test Group 1
 - I All retention force measurements, with latch enabled, were greater than 90 N [20.2 lb].
- I 2.11. Thermal Shock - Test Group 2
 - I No physical damage occurred as a result of thermal shock testing.
- I 2.12. Humidity-Temperature Cycling - Test Group 2
 - I No LOS was detected during humidity-temperature cycling. No physical damage occurred as a result of humidity-temperature cycling.
- I 2.13. Temperature Life - Test Group 3
 - I No LOS was detected during temperature life. No physical damage occurred as a result of temperature life testing.
- I 2.14. Final Examination of Product - All Test Groups
 - I 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 Certification of Conformance was issued stating that all specimens in this test package have been produced, inspected, and accepted as conforming to product drawing requirements, and manufactured using the same core manufacturing processes and technologies as production parts. The connector interfaces of the SFP HSSDC II Copper Module Transceiver are designed to a draft of the Fibre Channel HSSDC2 Specification and have previously been qualified, therefore plating thickness measurements were not required.

3.2. Functional Test

Functional testing was performed in accordance with paragraph 5 of Product Specification 108-2061.

I 3.3. ESD, SFP Transceiver

I Specimens were subjected to 1000 volts minimum with no damage and no LOS detected on each
I specimen before or after test.

I 3.4. ESD, SFP Transceiver Through HSSDC II Cable Assembly

I Mated specimens were subjected to 500 volts minimum through the HSSDC2 cable assembly, no LOS
I detected on each specimen before or after test.

I 3.5. Vibration, Random

The parameters of this test condition are specified by a random vibration spectrum with excitation frequency bounds of 20 and 500 Hz. The spectrum remains flat at 0.02 G²/Hz from 20 Hz to the upper bound frequency of 500 Hz. The root-mean square amplitude of the excitation was 3.10 GRMS. The specimens were subjected to this test for 15 minutes in each of the 3 mutually perpendicular axes, for a total test time of 45 minutes. The LOS lines were monitored for any state changes during random vibration testing.

I 3.6. Mechanical Shock, Half-sine

The parameters of this test condition are a half-sine waveform with an acceleration amplitude of 30 gravity units (g's peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular axes of the test specimen, for a total of 18 shocks. The LOS lines were monitored for any state changes during mechanical shock testing.

I 3.7. Durability

Specimens were manually mated and unmated 100 times at a maximum rate of 500 cycles per hour. Durability was performed between the SFP transceiver and the PCB connector.

I 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.

I 3.9. Unmating Force

The force required to unmate individual specimens with the latch disabled 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.

I 3.10. Retention Force

The force required to unmate individual specimens with the latch enabled 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 machine crosshead was operated until the retention latch failed.

I 3.11. Thermal Shock

Mated 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.

I 3.12. 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, see Figure 3. The LOS line on each specimen was monitored for any state changes during humidity-temperature cycling testing.

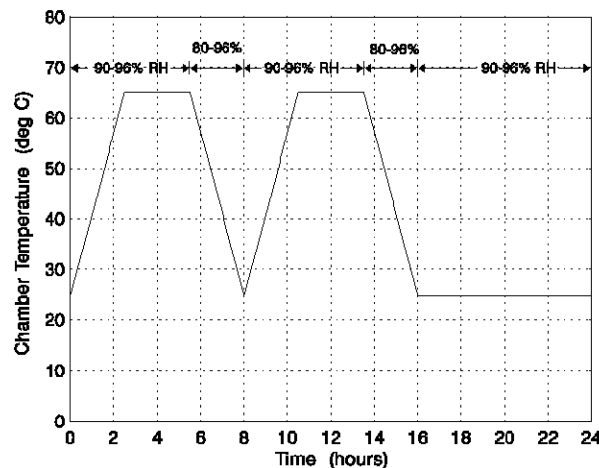


Figure 3
Typical Humidity-Temperature Cycling Profile

I 3.13. Temperature Life

Mated specimens were exposed to a temperature of 70°C for 500 hours. Specimens were preconditioned with 10 cycles of durability. The LOS line on each specimen was monitored for any state changes during temperature life testing.

I 3.14. Final Examination of Product

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