Two, Three and Four Pair HM-Zd Connectors

1. SCOPE

1.1. Content

This specification covers performance, tests and quality requirements for the TE Connectivity (TE) Z-PACK* HM-Zd connector system. This connector system uses a modular concept and interconnects 2 printed circuit boards. Both receptacle and pin connectors are connected to the printed circuit board with plated thru-hole compliant press-fit leads. A connector has a matrix configuration of either 4, 6 or 8 rows and a variable number of columns. Each column consists of either 2 or 4 shielded pairs of contacts.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 1 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

1.3. Qualification Test Results

Successful qualification testing on the subject product line was completed on 09Sep03. The Qualification Test Report number for this testing is 501-568. Additional testing was completed on 03Mar05. This documentation is on file at and available from Engineering Practices and Standards (EPS).

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the latest edition of the document applies. In the event of conflict between the requirements of this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1. TE Documents

- 109 Series: Test Specifications as indicated in Figure 1
- 109-197: TE Test Specifications vs EIA and IEC Test Methods
- 114-13059: Application Specification (Z-PACK* HMZd Connector System)
- 408-8500: Instruction Sheet (Seating Tools 91347-1 and 91350-1 for HMZd Receptacle Connectors)
- 408-8501: Instruction Sheet (Seating Tools 91348-1 and 91349-1 for HMZd Header Connectors)
- 501-568: Qualification Test Report

2.2. Commercial Standard

EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications

3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable product drawing.

3.2. Materials

Materials used in the construction of this product shall be as specified on the applicable product drawing.

3.3. Ratings

- Operating Voltage: 250 volts AC maximum peak (⅓ of minimum breakdown voltage)
- Current: .7 ampere per contact (fully loaded)
- Temperature: -65 to 105°C

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in Figure 1. Unless otherwise specified, all tests shall be performed at ambient environmental conditions per EIA-364.

3.5. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing.	EIA-364-18. Visual and dimensional © of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Low level contact resistance.	20 milliohms maximum initial for right angle receptacle and vertical header. 50 milliohms maximum initial for right angle receptacle and right angle header. ΔR < 5 milliohms average final. ΔR < 10 milliohms individual reading final (applies to both signal and ground contacts).	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. See Figure 3.
Low level compliant pin resistance.	1 milliohm maximum initial. ΔR = 1 milliohm maximum change from initial.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage. Measurements shall be taken between PCB hole and pin tip.
Insulation resistance.	10000 megohms minimum.	EIA-364-21. Test between any adjacent signal contacts, and between any signal contact and adjacent ground contacts at 100 volts DC. Specimens shall be fully mated.

Figure 1 (continued)

Test Description	Requirement	Procedure
Withstanding voltage.	1 minute hold with no breakdown or flashover.	EIA-364-20, Condition I. 650 volts AC at sea level between mated pairs of signal contacts. 550 volts AC at sea level between mated ground and signal contacts. Test between adjacent signal contacts, and closest signal and ground contact.
Temperature rise vs current.	30°C maximum temperature rise at .7 ampere per contact, fully energized.	EIA-364-70, Method 1. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C.
MECHANICAL		
Vibration, random.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition VII, Condition D. Subject mated specimens to 3.10 G's rms between 20-500 Hz. 15 minutes in each of 3 mutually perpendicular planes. See Figure 4.
Mechanical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, Method A. Subject mated specimens to 490m/s^2 (50 G's) half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. See Figure 4.
Durability.	See Note.	EIA-364-9. Mate and unmate specimens for 250 cycles at a maximum rate of 600 cycles per hour.
Mating force.	0.38 N [.085 lbf] maximum average per mated contact. “mated contact” refers to signal pins and ground blades, i.e., each signal pin = 1 contact and each ground blade = 1 contact.	EIA-364-13. Measure force necessary to mate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Unmating force.	0.15 N [.03 lbf] minimum average per contact (applies to both signal and ground contacts).	EIA-364-13. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm [.5 in] per minute.

Figure 1 (continued)

Test Description	Requirement	Procedure
Compliant pin insertion force.	44.5 N [10 lbf] maximum average per pin.	TE Spec 109-41. Measure force necessary to seat pins into a printed circuit board at a maximum rate of 12.7 mm [.5 in] per minute.
Compliant pin retention force.	4.4 N [1 lbf] minimum average per pin.	TE Spec 109-30. Measure force necessary to unseat pins from a printed circuit board at a maximum rate of 12.7 mm [.5 in] per minute.
Minute disturbance.	See Note.	Unmate and mate each connector pair a distance of approximately 0.1 mm [.004 in].
Receptacle cover retention.	111.25 N [25 lbf] minimum per 25 mm [.984 in] long module.	Measure force necessary to remove receptacle front cover from chicklet at a maximum rate of 5.08 mm [.2 in] per minute. Connectors are to be inserted into the PCB's.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32, Test Condition II. Subject mated specimens to 5 cycles between -65 and 105°C.
Humidity-temperature cycling.	See Note.	EIA-364-31, Method III. Subject specimens to 50 cycles (50 days) between 5 and 85°C at 80 to 100% RH.
Temperature life.	See Note.	EIA-364-17, Method A, Test Condition 4, Test Time Condition D. Subject mated specimens to 105°C for 1000 hours.
Mixed flowing gas.	See Note.	EIA-364-65, Class IIIA. Subject mated and unmated specimens to environmental Class IIIA for 20 days total.
Dust contamination.	See Note.	EIA-364-91.Subject unmated specimens to dust contamination #1 for 1 hour. Air flow shall be 360 cfm.

NOTE *Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification Test Sequence shown in Figure 2.*

Figure 1 (end)

3.6. Product Qualification and Requalification Test Sequence

A. Two and Four Pair HM-Zd Connectors (right angle receptacle, vertical header)

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	4,7,9,11,13	5,8,10,12,14	5(c),8	4,6,8,10,12,14,16,18		
Low level compliant pin resistance	2,15	3,18	3,10	2,20		
Insulation resistance		15				
Withstanding voltage		16				
Temperature rise vs current					2	
Vibration	10					
Mechanical shock	12					
Durability	6	7		5(d),17(d)		
Mating force	3,16	4,19	4,11	3		
Unmating force	5,14	6,17	6,9	19		
Compliant pin insertion force		2	2			
Compliant pin retention force		20	12			
Minute disturbance				15		
Receptacle cover retention						2
Thermal shock		11				
Humidity-temperature cycling		13				
Temperature life			7			
Mixed flowing gas (mated)				11(e),13(e)		
Mixed flowing gas (unmated)				7(e),9(e)		
Dust contamination	8	9				
Final examination of product	17	21	13	21	3	3

NOTE

(a) See paragraph 4.1.A.
(b) Numbers indicate sequence in which tests are performed.
(c) Perform 10 durability cycles prior to initial measurement.
(d) Perform 125 durability cycles before, and 125 durability cycles after mixed flowing gas testing.
(e) Exposure interval of 5 days.

Figure 2A

B. Four Pair HM-Zd Connectors (right angle receptacle, right angle header)

Test or Examination	Test Group (a)	
	1	2
	Test Sequence (b)	
Low level contact resistance	1,3,5	
Vibration	2	
Mechanical shock	4	
Temperature rise vs current		1

NOTE *(a) See paragraph 4.1.A.*
(b) Numbers indicate sequence in which tests are performed.

Figure 2B

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production. All test groups shall each consist of a minimum of 4 specimens.

B. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in Figure 2.

4.2. Requalification Testing

If changes significantly affecting form, fit or function are made to the product or manufacturing process, product assurance shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality and reliability engineering.

4.3. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 1. Failures attributed to equipment, test setup, operator deficiencies, or applied non-Tyco component(s) shall not disqualify the product. If product failure occurs, corrective action shall be taken and specimens resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4. Quality Conformance Inspection

The applicable quality inspection plan shall specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

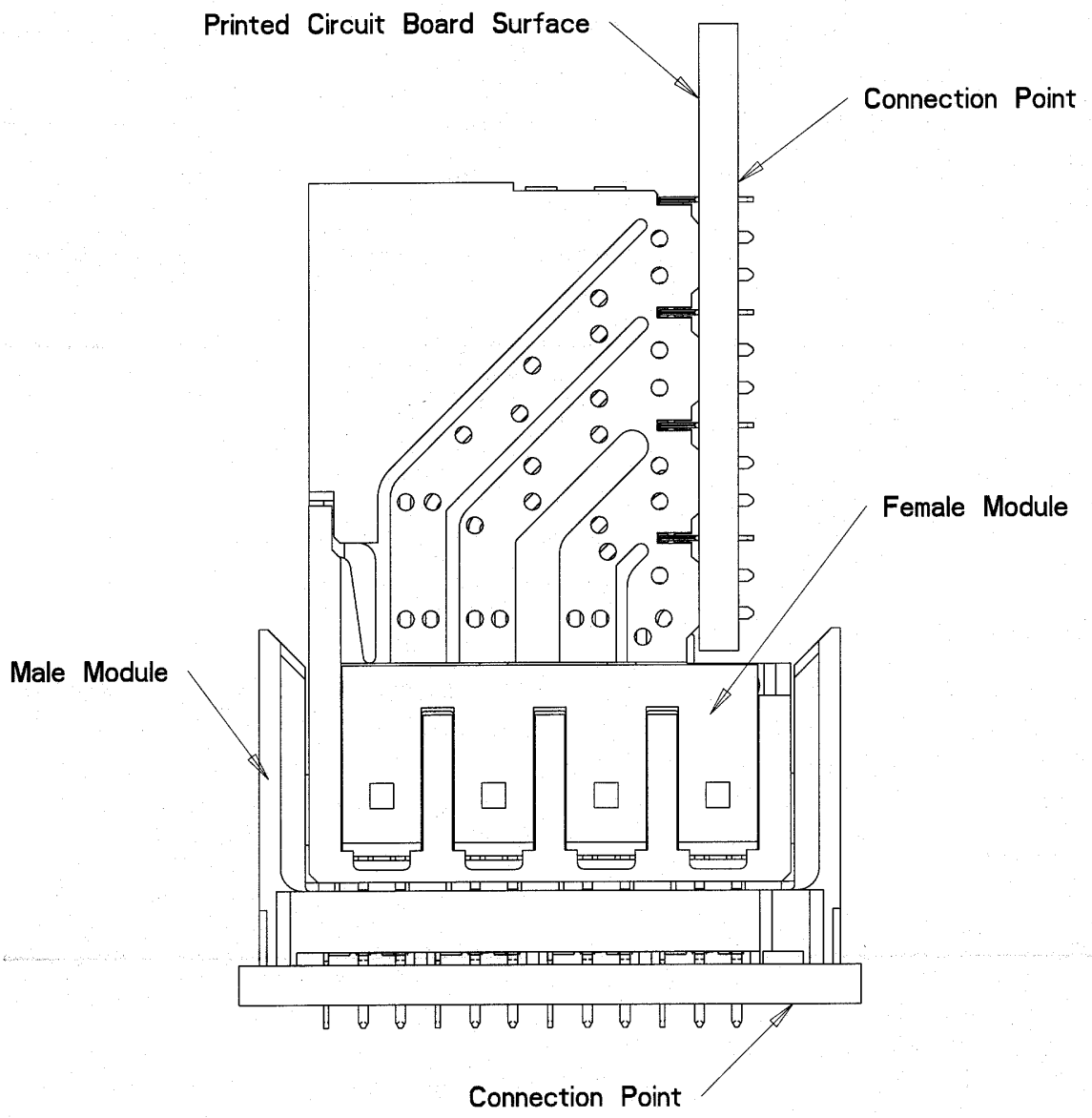

Figure 3
Contact Resistance Measurement Points

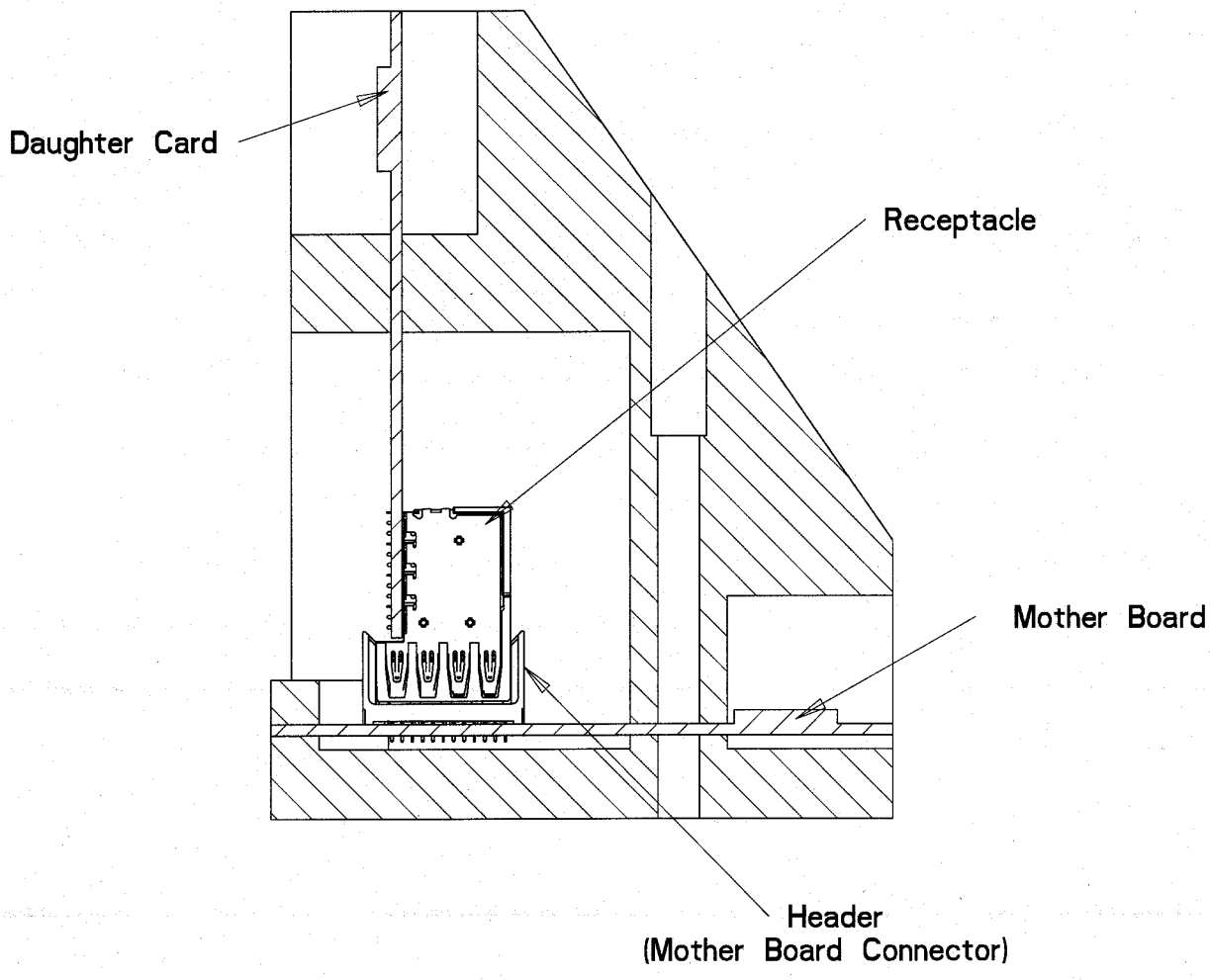

Figure 4
Vibration & Mechanical Shock Mounting Fixture