
Fortis Zd* LRM Connector System

1. SCOPE

1.1. Content

This specification defines performance, tests, and quality requirements for the TE Fortis Zd LRM Connector System. This connector system uses a modular concept, utilizing two metal shells with multiple cavities that connect two printed circuit boards (PCBs). It can accommodate up to nine modules consisting of a mix of Fortis Zd, Low Power (UPM Style), and High Power (MULTI-BEAM XLE* Style) Modules. The Fortis Zd module is a differential pair connector with three pairs per column, the Low Power Module is a five-position power connector, and the High Power Module is a two position high power connector. Fortis Zd, Low Power, and High Power pin and receptacle modules are connected to the PCB with plated thru-hole compliant pin press-fit leads.

1.2. Qualification

When tests are performed on the subject product line, procedures specified in Figure 2 shall be used. All inspections shall be performed using the applicable inspection plan and product drawing.

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

- [114-13267](#) Application Specification (Fortis Zd Modular Connector System)
- [114-13251](#) Application Specification (MULTI-BEAM XLE* Connectors)
- [108-2409](#) Product Specification (Fortis Zd Modular Connector System)
- [108-2292](#) Product Specification (Multi-Beam XLE Power Distribution Connector System)
- [501-134028](#) Qualification Test Report (Fortis Zd LRM Connector System)

2.2. Industry Documents

- EIA-364: Electrical Connector/Socket Test Procedures Including Environmental Classifications
- SAE AIR4789: Aerospace Information Report on Evaluating Corrosion Testing of Electrical Connectors and Accessories for the Purpose of Qualification

2.3. Government Document

MIL-STD-810: Environmental Engineering Considerations and Laboratory Tests

2.4. Reference Document

[109-197](#): Test Specification (TE Test Specifications vs. EIA and IEC Test Methods)

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.



NOTE

Printed circuit boards consisted of 6 layers: 2 layers contained 5-ounce copper traces for energizing the HP modules and 2 layers contained 4-ounce copper traces for energizing the LP modules.

3.3. Ratings

- Voltage: See Figure 1
- Current: See Figure 1
- Temperature: -65°C to 125°C
- Characteristic Impedance: 100 ohms ±10% for Fortis Zd Module

CONTACT TYPE	SINGLE POWER CONTACT	
	VOLTS	CURRENT (Amps)
Fortis Zd	250 AC	1.5**
High Power	200 DC	55
Low Power	60 DC●	15

- Denotes Safety Extra Low Voltage (SELV) circuits
- ** Single Circuit free air

Figure 1

3.4. Performance and Test Description

Product is designed to meet the electrical, mechanical and environmental performance requirements specified in the table in Figure 2. Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

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 (C of C) inspection per product drawing.
Final examination of product.	Meets visual requirements.	EIA-364-18. Visual inspection.
ELECTRICAL		
Low Level Contact Resistance (LLCR).	Fortis Zd Signal and ground contacts: 30 milliohms maximum initial; ΔR 10 milliohms maximum. High Power Module contacts: 10 milliohms maximum initial; 20 milliohms maximum final. Low Power Module contacts: 5 milliohms maximum.	EIA-364-23. Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Insulation resistance.	10000 megohms minimum initial. 5000 megohms minimum final. See Note.	EIA-364-21 mated. 500 volts DC, 2 minute hold. Test between adjacent contacts and contact to shell.
Withstanding voltage.	One minute hold with no breakdown or flashover.	EIA-364-20, Condition I mated. 750 volts AC at sea level. Test between adjacent contacts and contact to shell.
Temperature rise vs. current (power contacts only).	30°C maximum temperature rise at specified current.	EIA-364-70, Method 1. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C.
Shell to shell grounding.	Four milliohms maximum across shells.	EIA-364-83. Subject specimens to a test current of 1.0 ± 0.1 ampere DC at 1.5 volts maximum passed through the mated connector or through the mated connector and the mounting surface (bulkhead).

Figure 2 (cont'd)

Test Description	Requirement	Procedure
MECHANICAL		
Random vibration.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-28, Test Condition V, Condition Letter E. Subject mated specimens to 16.91 G's rms between 50 to 2000 Hz. Eight hours in each of 3 mutually perpendicular planes.
Mechanical shock.	No discontinuities of 1 microsecond or longer duration. See Note.	EIA-364-27, Method G. Subject mated specimens to 100 G's sawtooth shock pulses of 6 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks.
Durability.	See Note.	EIA-364-9. Mate and unmate specimens for the number of specified cycles in Figure 3 at a maximum rate of 250 cycles per hour.
Mating force.	Maximum mating force shall not exceed the sum of individual forces of the modules. Fortis Zd: 1.11 N maximum per contact High Power Module: 5.00 N maximum per contact. Low Power Module: 1.00 N maximum per contact.	EIA-364-13. Measure force necessary to mate specimens at a maximum rate of 12.7 mm per minute.
Unmating force.	Minimum unmating force shall be greater than the sum of individual forces of the modules Fortis Zd: 0.4 N minimum per contact High Power Module: 2.2 N minimum per contact Low Power Module: 0.5 N minimum per contact	EIA-364-13. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm per minute.
Bench handling.	See Note.	MIL-STD-810, Method 516.6, Procedure VI. Subject unmated specimens to 8 drops from a height of 122 mm.
ENVIRONMENTAL		
Thermal shock.	See Note.	EIA-364-32, Method A, Test Condition III, mated. Subject specimens to 500 cycles between -65 and 125°C with 30 minute dwells at temperature extremes and 1 minute maximum transition between temperatures.
Humidity/temperature cycling.	See Note.	EIA-364-31, Method III, with cold shock. Subject mated specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.

Figure 2 (cont'd)

Test Description	Requirement	Procedure
Temperature life.	See Note.	EIA-364-17, Method A, Test Condition 5, Test Time Condition D. Subject mated specimens to 125°C for 1000 hours.
Mixed flowing gas.	See Note.	EIA-364-65, Class IIA (4 gas). Subject mated specimens to environmental Class IIA for 20 days.
Salt fog.	Shall meet Pass/Fail criteria of SAE AIR4789, Paragraph 4.2. See Note.	EIA-364-26, Condition B. Subject mated specimens to 5% salt-laden atmosphere for 48 hours in an enclosure with drain holes simulating a plug-in unit.



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 the table in Figure 3.

Figure 2 (end)

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Initial examination of product	1	1	1
LLCR	3,7,9,12,15		2,5
Insulation resistance		2,6	
Withstanding voltage		3,7	
Temperature rise vs. current	4,13		
Shell to shell grounding			3,7
Random vibration	10(c)		
Mechanical shock	11		
Durability 50 cycles	5		
Durability 450 cycles	14		
Mating force	2		
Unmating force	16		
Bench handling			4
Thermal shock		4	
Humidity/temperature cycling		5	
Temperature life	8		
Mixed flowing gas	6		
Salt fog			6
Final examination of product	17	8	8



NOTE

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Energize High Power Module contacts at a current level which provides an 18° Celsius temperature rise.

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

4.2. Specimen Selection

Specimens shall be prepared in accordance with applicable instruction sheets and shall be selected at random from current production. Each test group shall consist of a minimum of 3 specimens.

Test Sequence - Qualification inspection shall be verified by testing specimens as specified in Figure 3.

4.3. 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.

4.4. Acceptance

Acceptance is based on verification that the product meets the requirements of Figure 2. Failures attributed to equipment, test setup or operator deficiencies 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.

4.5. 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.