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## FORTIS ZD\* Modular Connector System

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### 1. SCOPE

#### 1.1. Content

This specification covers performance, tests and quality requirements for the FORTIS ZD Connector. The FORTIS ZD is a modular right-angle connector designed for use in the Aerospace, Defense, and Marine sector, but can be used in various applications where high speed and robust connections are required. The backplane side is comprised of a vertical connector with four beam Mini-Box contacts as the electrical interface. Both pin and receptacle connectors are connected to the PCB with plated thru-hole compliant pin press-fit leads. The daughter card side is comprised of a right angle housing with overmolded leadframes. There are a variety of daughter card modules including 10-column right, 10-column center, 20-column center, 10-column left, 10-column stand alone, and 20-column stand alone. There are also a variety of backplane modules including 10-column end, 10-column center, 20-column center, 10-column stand alone, and 20-column stand alone. The product comes in a standard, a shielded, and a machined metal shell version. The connector system comes in a 3-Pair size to accommodate up to 30 differential pairs per .75 inch of board edge and a 2-Pair size to accommodate up to 20 differential pairs per .75 inch of board edge. The connector is impedance matched at 100 ohms and can be used in differential pair or single-ended configurations.

#### 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. Successful qualification testing on the 3-pair product line was completed on 02Aug11. An abbreviated qualification testing for the 2-pair product line was completed on 15Feb12. An abbreviated qualification testing of the Metal Shell Kit was completed on 12April12. The Qualification Test Report number for this testing is 501-752.

### 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 Connectivity (TE) Documents

- 114-13267: Application Specification (FORTIS ZD\* Modular Connector System)
- 501-752: Qualification Test Report (FORTIS ZD\* Modular Connector System)

#### 2.2. Industry Document

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

#### 2.3. Reference Documents

- IEC 60352-5: Solderless Connections – Part 5: Press-in Connections – General Requirements, Test Methods and Practical Guidance – Edition 3.0
- MIL-DTL-55302: Connectors, Printed Circuit Subassembly and Accessories
- 109-197: Test Specification (TE Test Specifications vs EIA and IEC Test Methods)
- GR-63-CORE: NEBS Requirements: Physical Protection (Issue 3 – March 2006)

**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

- Voltage: 250 volts AC
- Current: 1.5 amperes (single circuit, free air)
- Temperature: -65 to 125°C
- Characteristic Impedance: 100 ohms

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.

3.6. Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
Initial examination of product.	Meets requirements of product drawing and Application Specification 114-13267.	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.
<b>ELECTRICAL</b>		
Low Level Contact Resistance (LLCR).	30 milliohms maximum initial. ΔR 10 milliohms maximum. Applies to both signal and ground contacts.	EIA-364-23. Subject mated specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
LLCR compliant pin.	1 milliohm maximum initial. ΔR 1 milliohm maximum.	EIA-364-23. Subject unmated specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Insulation resistance.	10000 megohms minimum initial. 5000 megohms minimum final.	EIA-364-21. 500 volts DC, 2 minute hold. Test between adjacent contacts of unmated specimens.
Withstanding voltage.	One minute hold with no breakdown or flashover. Five milliamperes maximum leakage current.	EIA-364-20, Condition I. 750 volts AC at sea level. Test between adjacent contacts of unmated specimens.

Figure 1 (continued)

Temperature rise vs current.	15°C maximum temperature rise above ambient at 1.5 amperes.	EIA-364-70, Method 2, Condition 1. Unstressed connectors, single circuit, free air.
MECHANICAL		
Random vibration.	No discontinuities of 10 nanoseconds 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 10 nanoseconds or longer duration. See Note.	EIA-364-27, Condition 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 500 cycles at a maximum rate of 600 cycles per hour.
Mating force.	1.11 N [4.0 ozf] maximum average per contact.	EIA-364-13. Measure force necessary to mate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Unmating force.	0.4 N [1.44 ozf] minimum average per contact.	EIA-364-13. Measure force necessary to unmate specimens at a maximum rate of 12.7 mm [.5 in] per minute.
Compliant pin insertion force.	44.5 N [10 lbf] maximum average per pin.	EIA-364-5. Measure force necessary to properly insert pins into a PCB with gold plating 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.	EIA-364-5. Measure force necessary to remove pins from a PCB with gold plating at a maximum rate of 12.7 mm [.5 in] per minute.
Minute disturbance.	See Note.	Unmate and mate specimens a distance of approximately 0.1 mm [.004 in].
Drop Test	See Note.	GR-63-CORE Issue 3, March 2006; Section 5.3.2, Test Procedure – Circuit Packs (free-fall drops) from a height of 99mm (3.9"). Unmated, board mounted connectors tested.

Figure 1 (continued)

ENVIRONMENTAL

Thermal shock.	See Note.	EIA-364-32, Method A, Test Condition III. Subject mated 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 IV. Subject mated specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH with -10°C cold shocks.
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 specimens to environmental Class IIA for 20 days (10 days unmated followed by 10 days mated).
Salt fog.	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.

Figure 1 (end)

**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.*

## 3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)							
	1	2	3	4	5	6	7(g)	8(h)
	Test Sequence (b)							
Initial examination of product	1	1	1	1	1	1	1	1
LLCR	3,11	4,6	3,6		3,7,9,11,14		4,9	
LLCR compliant pin		3,7	2,7		2,6,12			
Insulation resistance				2,6				
Withstanding voltage				3,7				
Temperature rise vs current						2		
Random vibration	6							3(i)
Mechanical shock	7							4(i)
Durability	5				4(c),13(c)		6	
Mating force	2,9						3,8	
Unmating force	4,8						5,7	
Compliant pin insertion force		2					2	
Compliant pin retention force		8			15		10	
Minute disturbance					10			
Drop Test								2
Thermal shock			4	4				
Humidity/temperature cycling			5	5				
Temperature life		5(d)						
Mixed flowing gas					5(e),8(f)			
Salt fog	10							
Final examination of product	12	9	8	8	16	3	11	5

Figure 2

**NOTE**

- (a) See paragraph 4.1.A.
- (b) Numbers indicate sequence in which tests are performed.
- (c) Perform 250 cycles of durability before and 250 cycles after mixed flowing gas testing.
- (d) Precondition specimens with 10 durability cycles.
- (e) Exposure interval of 10 days with specimens unmated.
- (f) Exposure interval of 10 days with specimens mated.
- (g) Abbreviated testing for 2-pair version.
- (h) Abbreviated testing for FORTIS ZD Metal Shell Kit.
- (i) Not monitored for discontinuity.

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#### 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. Each test group shall consist of a minimum of 3 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 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.

##### 4.4. 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.