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**Connector, FSD\*, Multimode, Polymer Ferrule, Fiber Optic**

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**1. SCOPE****1.1. Content**

This specification covers performance, tests and quality requirements for FSD\* polymer ferrule multimode connectors. This system consists of an FSD connector and a duplex-to-duplex coupling assembly.

**1.2. Qualification**

When tests are performed on subject product line, procedures specified in EIA-455 shall be used. All inspections shall be performed using 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, latest edition of the document applies. In the event of conflict between requirements of this specification and product drawing, product drawing shall take precedence. In the event of conflict between requirements of this specification and referenced documents, this specification shall take precedence.

**2.1. AMP Documents**

- A. 102-1099: Quality Specification
- B. 408-9972: Instruction Sheet
- C. 501-299: Test Report

**2.2. Commercial Standard**

- EIA-455: Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Connecting and Terminating Devices

**3. REQUIREMENTS****3.1. Design and Construction**

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

**3.2. Optical Power Source**

- I Primary wavelength for optical power source(s) shall be  $1310 \pm 30\text{nm}$  or  $850 \pm 30\text{nm}$  as stated in test report.

3.3. Ratings

Performance	Value	Units
Insertion Loss, typical See Note.	0.5	dB
Storage Temperature	-40 to 85	°C
Operating Temperature	-40 to 85	°C
Cable Retention	267 (60)	Newtons (Pounds)
Durability	250	Cycles
Flex Cycling	500	Cycles

**NOTE** See Figure 3 for maximum values.

Figure 1

3.4. Performance and Test Description

Product is designed to meet mechanical, environmental and optical transmittance performance requirements specified 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
Examination of product.	Meets requirements of product drawing.	EIA-455-13. Visual, dimensional and functional per applicable quality inspection plan.
Insertion loss.	See Figure 3. See Note.	EIA-455-34, Method C. Launch fiber/cable shall be wrapped 5 times around mandrel so that fiber loop shall be 20mm (.787 inch) for 62.5/125 fiber or 25mm (.98 inch) for 50/125 and 100/140 fiber. Wraps shall be close wound turns on a smooth surface and be secured in such a manner to guarantee integrity for duration of test. See Figure 5 for cable length.

Figure 2 (cont)

Test Description	Requirement	Procedure
Temperature cycling.	<p>Maximum change in optical transmittance during testing is 0.3 dB average and 0.5 dB for any single sample.</p> <p>Maximum change in optical transmittance after testing is 0.2 dB average and 0.4 dB for any single sample.</p> <p>See Note.</p>	<p>EIA-455-3, Test Condition C2.</p> <p>Subject mated samples to 5 cycles between -40 and 85°C. Measure optical transmittance before and after test with samples in place in test chamber and 5 to 10 minutes before end of each dwell during each cycle. Take final readings after samples have been inspected and cleaned.</p> <p>See Para 5.2.</p>
Humidity, steady state.	<p>Maximum change in optical transmittance during testing is 0.3 dB average and 0.5 dB for any single sample.</p> <p>Maximum change in optical transmittance after testing is 0.2 dB average and 0.4 dB for any single sample.</p> <p>See Note.</p>	<p>EIA-455-5, Test Type 1, Test Condition B.</p> <p>Subject mated samples to steady state humidity at 90 to 95% RH at 60°C for 96 hours. Measure initial optical transmittance at least 1 hour after preconditioning with samples in place in test chamber. Measure optical transmittance once every 24 hours. Measure optical transmittance 1 to 2 hours after humidity exposure with samples in place in test chamber. Take final readings after samples have been inspected and cleaned.</p> <p>See Para 5.2.</p>
Cable retention.	<p>Maximum change in optical transmittance after testing is 0.2 dB average and 0.4 dB for any single sample.</p> <p>See Note.</p>	<p>EIA-455-6, Method 1.</p> <p>While holding behind strain relief nut, apply 267N (60 pound) tensile load to cable of 1 connector of mated test sample for 1 minute. Measure optical transmittance before and after test. Take final readings after samples have been inspected and cleaned.</p>
Coupling mechanism strength.	<p>Maximum change in optical transmittance during testing is 0.3 dB average and 0.5 dB for any single sample.</p> <p>Maximum change in optical transmittance after testing is 0.2 dB average and 0.4 dB for any single sample.</p> <p>See Note.</p>	<p>EIA/TIA-4750000-B, Section 4.5.2.</p> <p>While holding adapter, apply 150N (33.7 pound) tensile load for 1 minute at maximum rate of 2.54mm (.1 inch) per minute. Measure optical transmittance before, during applied load, and after test. Take final readings after samples have been inspected and cleaned.</p>

Figure 2 (cont)

Test Description	Requirement	Procedure
Cable flexing.	Maximum change in optical transmittance during/after testing is 0.2 dB average and 0.4 dB for any single sample. See Note.	EIA-455-1, Figure 2 apparatus. Using a 7.6 cm (3 inch) mandrel, apply 0.5 kg (1.1 pound) tensile load to cable of mated sample. Flex 1 side $\pm 90^\circ$ per cycle for 500 cycles at maximum rate of 15 cycles per minute. Measure optical transmittance before test and after every 50 cycles with load removed.
Twist.	Maximum change in optical transmittance after testing is 0.2 dB average and 0.4 dB for any single sample. See Note.	EIA-455-36. Apply 4.0kg (8.82 pound) tensile load to cable of mated sample. Twist and return $\pm 90^\circ$ from center for 10 cycles at maximum rate of 30 cycles per minute. Measure optical transmittance before and after test with load removed.
Durability.	Maximum change in optical transmittance during/after testing is 0.2 dB average and 0.4 dB for any single sample. See Note.	EIA-455-21. Mate and unmate samples 250 times. Measure optical transmittance every 50 cycles, cleaning optical interface before each measurement.
Change in optical transmittance.	Maximum of 0.3 dB average and 0.5 dB for any single sample after completion of sequence.	EIA-455-20. Measure optical transmittance after all tests have been performed. Calculate change from last measurement taken for insertion loss test. See Para 5.2.

**NOTE**

*Shall meet visual requirements, show no physical damage and shall meet requirements of additional tests as specified in Test Sequence in Figure 4.*

Figure 2 (end)

Insertion Loss	50/125	62.5/125	100/140
Maximum allowed average of all values per test group (dB)	0.7	0.5	0.5
Maximum allowed individual value for any single sample (dB)	1.5	0.9	0.9

Figure 3

3.6. Product Qualification and Requalification Test Sequence

Test or Examination	Test Group (a)				
	1	2	3	4	5
	Test Sequence (b)				
Examination of product	1	1	1	1	1
Insertion loss	2	2	2	2	2
Temperature cycling	3				
Humidity, steady state	4				
Cable retention		4	3		
Coupling mechanism strength		3			
Cable flexing		5	4		
Twist		6	5		
Durability		7			
Change in optical transmittance	5	8	6		

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

Figure 4

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Sample Selection

Samples shall be prepared in accordance with applicable Instruction Sheets and shall be selected at random from current production per Figure 5. Cable used for qualification shall be of type and length specified in Figure 5 and terminated with connectors on each end as required for equipment interfacing. Test cables shall be installed on test equipment and test samples by cutting test cables in center and terminating cut ends with sample connectors. This procedure shall be followed as part of insertion loss measurements at start of each test sequence.

Test Group	1	2	3	4	5
Fiber size (microns/microns)	62.5/125	62.5/125	62.5/125	50/125	100/140
Cable type	LDD(a)	LDD(a)	DUALAN(b)	LDD(a)	LDD(a)
Cable PN	502086-1	502086-1	501749-1	502085-1	502087-1
Connector kit PN	503347-5	503347-5	503347-1	503347-5	503347-6
Coupling bushing PN	501926-1	501926-1	501926-1	501926-1	501926-1
Test cable length	10m (32.81 feet)	10m (32.81 feet)	10m (32.81 feet)	5m (16.4 feet)	5m (16.4 feet)
Test samples required	5	5	5	5	5
Control cable required	1	0	0	0	0

**NOTE** (a) *Light Duty Dual, Zipcord Style, 3.0mm diameter*  
 (b) *DUALAN, 4.75mm diameter*

Figure 5

**B. Test Sequence**

Qualification inspection shall be verified by testing samples as specified in Figure 4.

**4.2. Requalification Testing**

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

**4.3. Acceptance**

Acceptance is based on verification that product meets requirements of Figure 2. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

**4.4. Quality Conformance Inspection**

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

**5. SPECIAL INSTRUCTIONS**

**5.1. Cleaning**

If at any time, a connector sample is uncoupled during qualification testing, optical interface shall be cleaned according to applicable Instruction Sheet prior to any subsequent optical measurements.

**5.2. Control cables**

Control cables shall be subjected to climatic environmental tests. Transmittance shall be recorded each time a sample transmittance is made. Changes in control cable power of less than 0.05 dB may be neglected in test sample power and loss calculations. If control cable power changes by more than 0.05 dB over test or sequence of tests, change in control cable power shall be included in power and loss calculation per EIA-455-20.