VITA 66.5, Style A, Fiber Optic Connector for Use with Multi-Mode MT Ferrules

1. SCOPE

1.1. Content

This specification defines the performance, tests and quality requirements for the TE Connectivity (TE) VITA 66.5 Style A, Fiber Optic Connector. Using a 12-fiber multi-mode MT ferrule interface, the connector enables a single, 12-count fiber ribbon to interface directly to a transceiver.

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.

1.3. Qualification Test Results

The product qualification test results are reported in 501-163035.

1.4. Revisions

- Editorial corrections to Title, to Paragraph 1.1, to Paragraph 3.3, Note 2, and to Paragraph 4.4.
- In Figure 2, removed reference to Paragraph 5.2 from the Procedure for Temperature Cycling.
- In Figure 2, clarified the Procedure for End of Service Life.
- In Figure 2, clarified the optical discontinuity Requirement is measured at 1300 nm for the Sinusoidal Vibration, Random Vibration and Shock tests.
- Revised the Temperature Cycling Profile, Figure 5, to list the actual temperature ramp and dwell periods used for Temperature Cycling.

2. APPLICABLE DOCUMENTS AND FORMS

The following documents and forms constitute a part of this specification to the extent specified herein. Unless otherwise indicated, 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

- 101-46: Workmanship Specification (Polished Optical End Faces)
- 108-2467: Product Specification (VITA 66.1 Fiber Optic Connectors)
- 114-163023: Application Specification (VITA 66.5, Fiber Optic Connectors for Use with Multi-Mode MT Ferrules)
- 115-1215: Engineering Specification (MT Ferrule End Face, Geometry and Tolerance of)
- 501-163035: Qualification Test Report (VITA 66.5, Style A, Fiber Optic Connectors for Use with Multi-Mode MT Ferrules)

2.2. Commercial / Industry Documents

- Telcordia Technologies GR-1435-CORE, Issue 1: Generic Requirements for Multi-Fiber Optical Connectors
- TIA/EIA-455: Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices and Other Fiber Optic Components

2.3. Government Document

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

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3. REQUIREMENTS

3.1. Design and Construction

Product shall be of the design, construction, materials and physical dimensions specified on the applicable product drawing. Cable is Type I Media – Multiple fibers arranged in a linear array and bound with a matrix material into a single unit (i.e., fiber ribbon).

3.2. Optical Power Source

The optical power source wavelengths shall be 850 ±30 and 1300 ±30 nanometers for multi-mode product, or as stated in the Test Report.

3.3. Ratings

Performance	With 12-Fiber MT Ferrules Installed		Units
	Value at 850 nm	Value at 1300 nm	
Attenuation, Typical (see Note 1)	0.1	0.1	dB
Storage Temperature	-55 to +85 (see Note 2)		°C
Operating Temperature	-40 to 85		°C
Durability	100		Cycles

NOTE

1. Typical values represent the median of the sample data for new product.
2. The Storage Temperature rating is based on similarity to the TE VITA 66.1 Connector, qualified per TE Product Specification 108-2467, since they are built using similar materials.

Figure 1

3.4. Performance Requirements

Product is designed to meet the mechanical, environmental, and optical transmittance performance requirements specified in Figure 2.

3.5. Qualification Test Descriptions, Requirements and Procedures Summary

Unless otherwise specified, all tests shall be performed at ambient environmental conditions.

TEST DESCRIPTION	REQUIREMENT	PROCEDURE
Visual and mechanical inspection	Connectors meet requirements of product drawings. MT ferrules & cable assemblies meet end face requirements per Workmanship Specification 101-46 and Engineering Specification 115-1215-16.	TIA/EIA-455-13. Visual, dimensional and functional per applicable quality inspection plan.
OPTICAL		
Attenuation	For pre-test measurements (random mate): Maximum attenuation value for any single specimen (connector joint or fiber) is 1.2 dB. Maximum average attenuation for any connector assembly is 0.7 dB. Maximum average attenuation for the test group (lot) is 0.65 dB. See Note 1.	TIA/EIA-455-171, Method D1, with the encircled flux launch condition. Measure all fiber paths initially and at the end of the test sequence. Clean per standard cleaning procedure and take pre-test measurement. See Paragraph 5.1.

Figure 2

End of service life	Maximum attenuation value for any single specimen (connector joint or fiber) is 1.2 dB. Maximum attenuation increase for any single specimen (connector joint or fiber) is 0.75 dB. Maximum average attenuation for any connector assembly is 0.7 dB. Maximum average attenuation for the test group (lot) is 0.65 dB. See Note 1.	TIA/EIA-455-20. After completing all testing, measure attenuation for all fibers in each specimen. Calculate the overall attenuation increase from initial attenuation to the to the last measurement of the final test. See Paragraph 5.1.
ENVIRONMENTAL		
Temperature cycling	Maximum attenuation value for any single specimen (connector joint or fiber) during and after testing is 1.2 dB. Maximum attenuation increase for any single specimen (connector joint or fiber) during and after testing is 0.75 dB. See Notes 1 and 2.	EIA/TIA-455-3, Test Condition C, except hot extreme first. Subject mated specimens to 21 cycles between -40±2°C and 85±2°C. Dwell at each temperature extreme and 23±2°C for 1 hour each. Measure attenuation at least 30 minutes into each plateau during test. Record final attenuation of all fiber paths at ambient, 2 hours after testing, with the specimens in place in the test chamber. See Figure 5.
MECHANICAL		
Vibration, sinusoidal	Maximum attenuation value for any single specimen (connector joint or fiber) after testing each plane is 1.2 dB. Maximum attenuation increase for any single specimen (connector joint or fiber) after testing each plane is 0.75 dB. An optical discontinuity is defined as a degradation in optical power of 1.0 dB or more for a period of 1 µsec or longer, measured at 1300 nm. See Notes 1 and 2.	TIA/EIA-455-11, Test Condition 1. Measure attenuation after installation on test fixture. Vibrate specimens for 2 hours at an amplitude of 1.5 mm (peak-to-peak) with the frequency sweeping continuously between 10 and 55 Hz. Mount and run in other 2 planes. Monitor 3 fiber paths per ferrule for optical discontinuities: fibers 1, 12 and one additional random fiber. Record attenuation after vibration in each plane for all fiber paths, except those being monitored for optical discontinuities.
Vibration, random	Maximum attenuation value for any single specimen (connector joint or fiber) after testing each plane is 1.2 dB. Maximum attenuation increase for any single specimen (connector joint or fiber) after testing each plane is 0.75 dB. An optical discontinuity is defined as a degradation in optical power of 1.0 dB or more for a period of 1 µsec or longer, measured at 1300 nm. See Notes 1 and 2.	TIA/EIA-455-11, Test Condition VI, Condition Letter D, and ANSI/VITA 47.1. Subject mated and mounted specimens to 11.95 G_{RMS} (0.1 G^2/Hz) between 50 and 2000 Hz. One hour in each of 3 mutually perpendicular planes. Monitor 3 fiber paths per ferrule for optical discontinuities: fibers 1, 12 and one additional random fiber. Record attenuation after vibration in each plane for all fiber paths, except those being monitored for optical discontinuities.
Shock	Maximum attenuation value for any single specimen (connector joint or fiber) after testing each plane is 1.2 dB. Maximum attenuation increase for any single specimen (connector joint or fiber) after testing each plane is 0.75 dB. An optical discontinuity is defined as a degradation in optical power of 1.0 dB or more for a period of 1 µsec or longer, measured at 1300 nm. See Notes 1 and 2.	TIA/EIA-455-14, Condition E. Subject mated and mounted specimens to 50 Gs sawtooth shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. Monitor 3 fiber paths per ferrule for optical discontinuities: fibers 1, 12 and one additional random fiber. Record attenuation after vibration in each plane for all fiber paths, except those being monitored for optical discontinuities.

Figure 2 cont.

Bench handling shock	Maximum attenuation value for any single specimen (connector joint or fiber) after testing is 1.2 dB. Maximum attenuation increase for any single specimen (connector joint or fiber) after testing each plane is 0.75 dB. See Notes 1 and 2.	MIL-STD-810, Method 516.6, Procedure VI. Eight drops on each fixture edge while in the upright orientation, for a total of 32 drops for each connector half.
Durability	Applicable to measurements following a cleaning: Maximum attenuation value for any single specimen (connector joint or fiber) after testing and cleaning is 1.2 dB. Maximum attenuation increase for any single specimen (connector joint or fiber) after testing is 0.75 dB. See Notes 2 and 3.	EIA-455-21. Mate and unmate specimens 100 times. Measure attenuation at 5 cycle intervals during testing and after completion of testing. Clean the specimens every 25 cycles per the cleaning schedule in GR-1435-CORE Issue 1, Table 5-1, except double-sided cleaning and up to 3 tries are permitted at all cleaning intervals. Record attenuation immediately before and immediately after cleaning. See Paragraph 5.1.

NOTE

1. Test shall be performed, and optical measurements made, at the minimum insertion condition, corresponding to a Module Engagement Dimension of 23.5 mm as shown in Figure 6.
2. Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification Test Sequence shown in Figure 3.
3. For the durability test, product shall be tested at the maximum insertion condition, corresponding to a Module Engagement Dimension of 22.5 mm per Figure 6.

Figure 2 end

3.6. Product Qualification Test Sequence

TEST OR EXAMINATION	TEST GROUP (a)	
	1	2
	TEST SEQUENCE (b)	
Visual and mechanical inspection	1	1
Attenuation	2	2
Temperature cycling	3	
Vibration, sinusoidal		3
Vibration, random	4	
Shock		4
Bench handling shock		5
Durability	5	
End of service life	6	6

NOTE

(a) See Paragraph 4.1.B.

(b) Numbers indicate sequence in which tests are performed.

Figure 3

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification / Requalification Testing

A. Test Sequence

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

B. Specimen Selection

Specimens shall be selected at random from current production per Figure 4. Cable assemblies used for qualification shall be as listed in Figure 4.

Test Group	Component	Part Number/Type
Group 1	Backplane connector	2332700-1
	Module connector	2332701-1
	Test cable assembly (12F MT to 12F MPO)	2828720-2
	MPO Pin holder (REF)	2313279-1
	MPO Spring, for 12-fiber MT ferrules (REF)	2332702-1
	Cable PN (REF)	1-5599749-0
	VERSAFIT Heat-Shrink Tubing	217225J001
	Test cable length (REF)	5 m
	Cable type	Bare ribbon
	Fiber size, microns / microns (REF)	50/125
	Test specimens required	3 mated pair connectors, with one 12-fiber MT ferrule per connector
Group 2	Backplane connector	2332700-1
	Module connector	2332701-1
	Test cable assembly (12F MT to 12F MPO)	2828720-2
	MPO Pin holder (REF)	2313279-1
	MPO Spring, for 12-fiber MT ferrules (REF)	2332702-1
	Cable PN (REF)	1-5599749-0
	VERSAFIT Heat-Shrink Tubing	217225J001
	Test cable length (REF)	5 m
	Cable type (REF)	Bare ribbon
	Fiber size, microns / microns (REF)	50/125
	Test specimens required	3 mated pair connectors, with one 12-fiber MT ferrule per connector

Figure 4

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 2. Failures attributed to equipment, test setup or operator deficiencies shall not disqualify the product. When 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 will specify the acceptable quality level to be used in sampling. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

5. SPECIAL INSTRUCTIONS

5.1. Cleaning

If at any time, a connector specimen is uncoupled during qualification testing, the optical interfaces shall be cleaned in accordance with TE recommended cleaning instructions prior to any subsequent optical measurements. Additional cleaning techniques deemed necessary by Product Engineering shall be described in the test report. If, after cleaning the connector as prescribed, loss performance exceeds the specified limit, or, if the operator suspects the presence of debris at the optical interface, perform the cleaning procedure a second time. If the resultant optical reading still exceeds the specification, clean the interface a third time and accept that reading.

Cleaning is permitted between any two tests. After any other disconnects that occur during testing (such as to mount a specimen to a test fixture), clean per TE recommended cleaning procedure.

During initial attenuation test, during durability test, and after storage temperature endurance test follow cleaning recommendations in GR-1435-CORE, Issue 1, Table 5-1. For standard cleaning procedure, see GR-1435-CORE, Issue 1, Section 5.4.1.

Hours into Cycle	Temperature (°C)
0	23
1.5	85
2.5	85
4	23
5	23
6.75	-40
7.75	-40
9.5	23
10.5	23

Figure 5
Temperature Cycling Profile

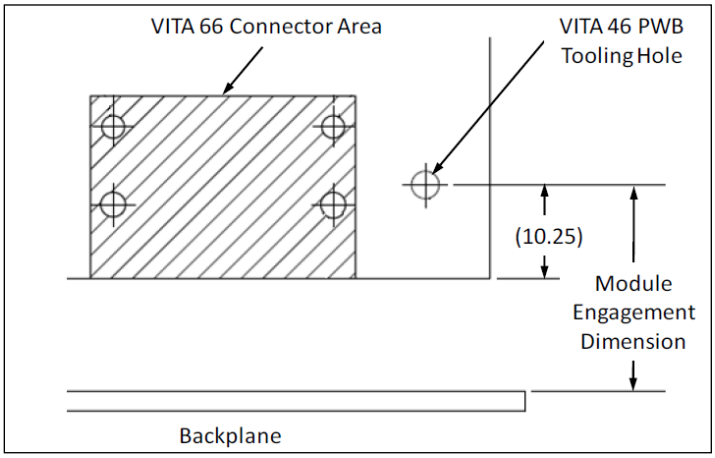

Figure 6
Module Engagement