MT-RJ Patch Panel and Outlet Jacks (Standard, XG, SECURE and SECURE XG)

1. SCOPE

1.1. Content

This specification, which meets the Optical Fiber Cabling Components Standard TIA/EIA-568-B.3, covers the performance, tests and quality requirements for TE Connectivity (TE) MT-RJ Jack, 39 mm, multimode fiber optic connectors in the following configurations: Standard, XG and MT-RJ SECURE.

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(s) and product drawing(s).

1.3. Qualification Test Results

Successful qualification testing on the Standard product line was completed on 31Oct03. Qualification of the XG compatible jack was completed on 17Feb04, and the MT-RJ SECURE product line qualification was completed on 01Mar05. The Qualification Test Report number for this testing is 501-545. 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

- 102-952: Quality Specification (Qualification of Fiber Optic Connectors and Cable Assemblies)
- 408-4555: Instruction Sheet (39 mm Patch Panel MT-RJ Jack Kits 1278303-[ ], 1278807-[ ], 1278808-[ ], and 1693951-[ ])
- 408-8718: Instruction Sheet (MT-RJ Jack Kits 1278414-[ ], 1278415-[ ], 1278810-[ ], 1278811-[ ], 1588878-[ ], 1588879-[ ], 1588880-[ ], 1693949-[ ], and 1754252-[ ])
- 501-545: Qualification Test Report (MT-RJ Patch Panel and Outlet Jacks (Standard, XG, SECURE and SECURE XG))

2.2. Commercial Standards

- TIA/EIA-455-B: Standard Test Procedures for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices and Other Fiber Optic Components
- TIA/EIA-526-14A: Optical Power Loss Measurement of Installed MM Cable Plant
- TIA/EIA-568-B.3: Optical Fiber Cabling Components Standard
- TIA/EIA-604-12: Fiber Optic Connector Intermateability Standard (FOCIS) - Type MT-RJ

3. REQUIREMENTS

3.1. Design and Construction

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

3.2. Optical Power Source

Primary wavelengths for optical power source(s) shall be 850 ± 30 nm and 1300 ± 30 nm unless otherwise stated in the Qualification Test Report.

3.3. Ratings

Performance	Value	Units
Attenuation, Typical (See Note)	0.36	dB
Return Loss, Typical (See Note)	35	dB
Storage Temperature	0 to 60	℃
Operating Temperature	0 to 60	℃
Cable Retention	2.2 [0.5]	N [lbf]
Durability	500	Cycles
Flex Cycling	100	Cycles

NOTE *Typical values represent the median of the sample data. See Figure 3 for maximum values.*

Figure 1

3.4. Performance and Test Description

Product is designed to meet the 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
Visual and mechanical inspection.	Meets requirements of product drawing. Complies with dimensional requirements of FOCIS, TIA/EIA-604-12. See Note (a).	TIA/EIA-455-13A. Visual, dimensional and functional per applicable quality inspection plan.

Figure 2 (continued)

Test Description	Requirement	Procedure
Attenuation (insertion loss).	Maximum attenuation for any single specimen is 0.75 dB. See Note (b).	TIA/EIA-455-171A, Method D1 except launch is part of pair under test and is not reference quality. Launch fiber/cable shall be wrapped in order to achieve Category 1 launch conditions according to TIA/EIA-526-14A. Wraps shall be close wound turns on a smooth surface and be secured in such a manner to guarantee integrity for the duration of the test. Use the following protocol for jack termination: Terminate the jack in accordance with Instruction Sheet 408-4555 or 408-8718 as appropriate. If the initial IL reading is 0.65 dB or greater, then the field fiber should be removed, and re-inserted. If the second reading is 0.65 dB or greater the fiber should be cut off, prepared, and terminated per the specifications for fiber preparation in 408-4555 or 408-8718.
Return loss.	Minimum return loss for any single specimen is 20 dB. See Note (b).	EIA/TIA-455-107A, or TIA/EIA-455-8. An optical time domain reflectometer may be substituted for the coupler method.
Low temperature.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. Maximum change in attenuation for any single specimen is 0.3 dB during test. See Note (b).	EIA/TIA-455-188. Subject mated specimens to 0 ± 3℃ for 96 hours. Precondition specimens for 24 hours at 23 ± 5℃ with 20 to 70% RH. Measure both attenuation and return loss before and after test. Record optical transmittance after precondition and at 4 hour intervals during test. Take final attenuation and return loss readings after the specimens have returned to ambient conditions. See paragraph 5.2.

Figure 2 (continued)

Test Description	Requirement	Procedure
Humidity, steady state.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. Maximum change in attenuation for any single specimen is 0.4 dB during test. See Note (b).	TIA/EIA-455-5C, Test Method A, Test Condition A. Subject mated specimens to steady state humidity at 90 to 95% RH and 40 ± 2℃ for 96 hours. Measure initial optical transmittance at least 1 hour after preconditioning with specimens in place in the test chamber. Record optical transmittance once every 4 hours during test and calculate change. Measure final attenuation and return loss within 1 to 2 hours of the chamber's return to ambient conditions, with specimens in place in the test chamber. See paragraph 5.2.
Temperature life.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. See Note (b).	TIA/EIA-455-4C. Subject mated specimens to 60 ± 2℃ for 96 hours. Precondition specimens for 2 hours at 23℃ and 20 to 70% RH. Measure both attenuation and return loss before and after test with specimens undisturbed in the chamber at ambient conditions. See paragraph 5.2.
Strength of coupling mechanism.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. See Note (b).	EIA/TIA-455-185. Fixture module assembly of a mated specimen. Apply a 33 N [7.4 lbf] tensile load to the housing on the plug side of a mated specimen at a rate of 25.4 mm [1 in] per minute. Hold for a minimum of 5 seconds. Measure attenuation and return loss before and after test.

Figure 2 (continurd)

Test Description	Requirement	Procedure
Cable retention, 0 degrees.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. Maximum attenuation increase for any single specimen is 0.5 dB after test. See Note (b).	EIA/TIA-455-6B, Method 1, 0-degrees: Using a 7.5 cm [3 in] mandrel located 23 cm [9 in] from behind the back end of the module assembly, apply a 2.2 N [0.5 lbf] tensile load to each buffered or coated fiber. Apply load at a rate of 25.4 mm [1 in] per minute at 0 degree pull angle to the mated test specimen. Hold for 5 seconds. Measure attenuation and return loss before and after test.
Cable retention, 90 degrees.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. Maximum attenuation increase for any single specimen is 0.5 dB after test. See Note (b).	EIA/TIA-455-6B, Method 1, 90-degrees: Repeat cable retention test with tensile load applied at a 90-degree pull angle. Use 2.2 N [0.5 lbf] tensile load for each buffered or coated fiber when testing the module assembly.
Durability.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. See Note (b).	EIA-455-21A. Mate and unmate plug-to-jack connection 500 times. Measure attenuation and return loss before and after test. Clean the specimen every 25 cycles. Record attenuation every 50 cycles. Record final readings after the specimens have been inspected and cleaned.
Cable flexing.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. See Note (b).	TIA/EIA-455-1B, Figure 2 apparatus. Using a 7.5 cm [3 in] mandrel, apply a 224 g [0.5 lbf] tensile load to buffered or coated fiber at a minimum distance of 20 cm [8 in] behind the end of the module assembly on the receive side of the mated specimen. Flex loaded side ± 90 degrees per cycle for 100 cycles at maximum rate of 15 cycles per minute. Measure attenuation and return loss before and after test with the load removed.

Figure 2 (continued)

Test Description	Requirement	Procedure
Twist.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. See Note (b).	EIA-455-36A. Apply a 2.2 N [0.5 lbf] tensile load to buffered or coated fiber at a point 23 cm [9 in] from the back of the module assembly on the jack side of the mated specimen. Rotate the loaded side ± 2.5 revolutions per cycle for 10 cycles at a maximum rate of 30 cycles per minute. Measure attenuation and return loss before and after test with the load removed.
Impact.	Maximum attenuation for any single specimen is 0.75 dB before and after test. Minimum return loss for any single specimen is 20 dB after test. See Note (b).	TIA/EIA-455-2C, Method B. Unmate the jack connector from the plug and drop the module assembly end 8 times from a height of 1.8 m [70.9 in]. Randomize the module orientation for each drop. Record attenuation and return loss before and after test. Clean the specimen before mating for final readings. After the completion of 8 impacts, each specimen should be opened, and re-terminated per the instructions for jack termination in 408-4555 or 408-8718 as appropriate. The re-termination shall include repositioning of the fiber only, recleaving of the fiber is not permitted.

NOTE

(a) Dimensions not measured on actual test specimens are covered by First Article approval, which includes a review of product drawing(s) to verify conformance with dimensions specified in the FOCIS document, TIA/EIA-604-12.

(b) 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)

Attenuation and Return Loss	Multimode
Maximum allowed attenuation for any single specimen	0.75 dB
Minimum allowed return loss for any single specimen	20 dB

Figure 3

3.6. Product Qualification Test Sequence

Test or Examination	Test Group (a)						
	1	2	3	4	5	6	7
	Test Sequence (b)						
Visual and mechanical inspection	1	1	1	1	1	1	1
Attenuation (insertion loss)	2	2	2	2	2	2	2
Return loss	3	3	3	3	3	3	3
Low temperature	4			4			
Humidity, steady state	5			5			
Temperature life	6			6			
Strength of coupling mechanism		4					4
Cable retention, 0 degrees		5			4		
Cable retention, 90 degrees		6			5		
Durability		7					6
Cable flexing			4		6		
Twist			5		7		
Impact			6		8		5

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

Figure 4

4. QUALITY ASSURANCE PROVISIONS

4.1. Qualification Testing

A. Specimen Selection

Specimens shall be prepared according to normal manufacturing means 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 on each end as required for equipment interfacing.

Test Group	1	2	3	4	5	6	7
Fiber size: (µm/µm)	50/125			62.5/125	50/125	50/125	50-125
Cable type (receive end)	900 µm Tight Buffer			900 µm Tight Buffer	250 µm Coated Fiber	250 µm Coated Fiber	900 µm Tight Buffer
MT-RJ Plug Cable Assembly PN	1-1278128-0			1-1278032-0	1278128-3		1-1278873-0 1-1828264-0 (MT-RJ SECURE plug)
MT-RJ Jack Module Assembly PN	1588495-2			1588495-1	1-1374395-1	1-1374395-3 (XG)	1588493-1 (red) 1588493-7 (brown) MT-RJ SECURE jack
MT-RJ Connector Kit PN	6278750-1						1918356-1 (red) 1918356-7 (brown) MT-RJ SECURE plug
Test specimens required	8	8	8	8	8	15	8 (see Note)
Control cable required	1	0	0	1	0	0	0

NOTE

Two colors were tested to represent the MT-RJ SECURE product line. The test group of 8 specimens consisted of 4 each from the part numbers shown.

Figure 5

B. Cable Assembly Preparation

Launch cables shall be prepared from specified cable assembly part numbers by cutting the cable assembly in half and attaching to the test equipment. Receive cables shall be factory prepared cable assemblies using specified cable part number and the applicable test interface connector.

C. Test Sequence

Qualification inspection shall be verified by testing specimens as specified in 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 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 sampling acceptable quality level to be used. 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 specimen is uncoupled during qualification testing, the specimen shall be cleaned according to the applicable Instruction Sheet(s) prior to any subsequent optical measurements. Additional cleaning techniques deemed necessary by Product Engineering shall be described in the Qualification Test Report. If, after cleaning the specimen 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 specimen a third time and accept that reading.

5.2. Control Cables

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