Modular Plugs, Unshielded and Shielded

1. INTRODUCTION

1.1. Purpose

Testing was performed on modular plugs to determine their conformance to the requirements of Product Specification 108-131013 Revision A. Test specimens are representative of the entire modular plug product line.

1.2. Scope

This report covers the electrical, mechanical, environmental and transmission performance of modular plugs. Testing was performed and test reports are on file with the Commscope test lab.

1.3. Conclusion

The modular plugs listed in paragraph 1.5 conformed to the electrical, mechanical, environmental and transmission performance requirements of Product Specification 108-131013 Revision A.

1.4. Product Description

Shielded and Unshielded Modular Plugs used to provide a universal connection interface between premise wiring of an office and the user's network of communications equipment (for data and voice networking systems). These assemblies are designed for installation onto various cables. Plugs incorporate IPC terminal for terminating twisted pair communications cable. See customer drawings for cable conductor diameter, insulation diameter and cable diameter compatibility

1.5. Test Specimens

Test specimens were representative of normal production lots. Specimens used as control specimens are not listed in the table below, but shown on the respective test requests in the final test reports. Specimens identified with the following part numbers were used for each test sequence:

Catalog No.	Part Number	Description
MP-6S-(X)	6-2111989-(X)	8P Cat. 6 Shielded Plug
MP-5EMT-B-(X)	6-2111986-(X)	8P Cat 5e EMT Shielded Plug
MP-5EU-(X)	6-569278-(X)	8P Cat. 5e UTP Plug
MP-88U-R-(X)	6-557315-(X)	8P Cat. 5 UTP Plug
MP-44U-F-(X)	6-641334-(X)	4P UTP Plug
MP-6AU-PLUG-A-(X)	6-2843007-(X)	8P UTP Plug
MP-6AU-PLUG-B-(X)	6-2843008-(X)	8P UTP Plug

NOTE *"(X)" Represents packaging quantity designation.*

1.6. Test Conditions:

Unless otherwise stated, tests have been performed at the following ambient conditions:

- Temperature: 70°F ± 5°F
- Relative Humidity: 50% ±10%

1.7. Test Sequence

Test or Examination	Test Sequence								
	IPC / Wire Interface			Plug / Jack					Patch Cord
	A1	A2	A3	B1	B2	B3	B4	B5	C1
Initial examination of product	1	1	1	1	1	1	1	1	1
Visual examination of product	5	7	5	12,17	13	8	8	3	13
Length, uncoiled patch cord									5
Contact resistance, IPC/wire interface	2,4	2,6	2,4						
Input to output resistance				2,7,10,14	4,6,8,10	2,6	2,9		
Input to output resistance unbalance									
Insulation resistance				3,9	2,11	3,7	3,6		
Voltage proof				4,11	3,12	4	4,7		
Current carrying capacity								2	
Plug insertion & withdrawal force				5,15					
Plug retention in jack				6,16					
Cable bending	3								
Mechanical operation durability					5,9				
Vibration, plug/jack						5			
Vibration, IPC/wire		3							
Tensile, patch cord									8
Flexural, patch cord									9
Torsional, patch cord									10
Rapid change of temp, plug/jack				8					
Rapid change of temp, IPC/wire		4							
Cyclic damp heat				13					
Climatic Sequence		5							
Electrical load and temperature							5		
Flowing mixed gas corrosion, plug/jack					7				
Flowing mixed gas corrosion, IPC/wire			3						
Wire Map, patch cord coiled									2
Return Loss, patch cord coiled									3
Next loss, patch cord coiled									4
Return Loss, patch cord uncoiled									6, 11
Next loss, patch cord uncoiled									7, 12

2. SUMMARY OF TESTING

2.1. Initial Examination of Product – All Test Sequences.

All specimens submitted for testing were representative of normal production lots. A Certificate of Conformance was issued and stored in the lab test files storage location.

2.2. Visual Examination of Product – All Test Sequences

All specimens were visually examined after testing and no evidence of physical damage detrimental to product performance was observed.

2.3. Length, Uncoiled Patch Cords – Test Sequence C1

All patch cord lengths were measured to be within print tolerances.

2.4. Contact Resistance, IPC/Wire Interface – Test Sequences A1, A2, & A3

Final delta resistance measurements taken at 100 mA maximum and 20 mV maximum open circuit voltage were within specified limits.

2.5. Input to Output DC Resistance – Test Sequences B1, B2, B3, & B4

Maximum total mated connector resistance measured values were less than 200 mΩ.

2.6. Input to Output DC Resistance Unbalance – Test Sequences B1, B2, B3, & B4

The differences between maximum and minimum total connector resistance measured values were less than 50 mΩ.

2.7. Insulation Resistance – Test Sequence B1, B2, B3, & B4

All insulation resistance measurements were greater than 500 MΩ minimum.

2.8. Voltage Proof - Test Sequence B1, B2, B3, & B4

All specimens passed testing with no dielectric breakdown or flashover occurring.

2.9. Current Carrying Capacity – Test Sequence B5

The maximum allowed environmental temperature at rated current is 60℃.

2.10. Plug Insertion & Withdrawal Force – Test Sequence B1

All forces were less than 20 N.

2.11. Plug Retention in Jack – Test Sequence B1

All specimens withstood an applied axial load of 50 N with latch engaged for 60 seconds.

2.12. Mechanical Operation Durability – Test Sequence B2

No physical damage occurred to the specimens as a result of mating and un-mating the specimens for 375 cycles with latch inoperative.

2.13. Cable Bending – Test Sequence A1

No physical damage or discontinuity occurred to the specimens as a result of cable bending for the total number of cycles.

2.14. Vibration, IPC/Wire Interface – Test Sequence A2

All specimens passed vibration testing with no evidence of physical damage.

2.15. Vibration, Plug/Jack – Test Sequence B3

All specimens passed vibration testing with no evidence of physical damage.

2.16. Rapid Change of Temp, IPC/Wire Interface – Test Sequence A2

No evidence of physical damage was visible as a result of exposure to rapid change in temperature.

2.17. Rapid Change of Temp, Plug/Jack – Test Sequence B1

No evidence of physical damage was visible as a result of exposure to rapid change in temperature.

2.18. Climatic Sequence – Test Sequence A2

No evidence of physical damage was visible as a result of exposure to climatic sequence.

2.19. Cyclic Damp Heat – Test Sequence B1

No evidence of physical damage was visible as a result of exposure to cyclic damp heat sequence.

2.20. Electrical Load and Temperature – Test Sequence B4

No evidence of physical damage was visible as a result of exposure to stress relaxation.

2.21. Flowing Mixed Gas Corrosion, IPC/Wire Interface – Test Sequence A3

No evidence of physical damage was visible as a result of exposure to flowing mixed gas corrosion.

2.22. Flowing Mixed Gas Corrosion, Plug/Jack – Test Sequence B2

No evidence of physical damage was visible as a result of exposure to flowing mixed gas corrosion.

2.23. Tensile, Patch Cord – Test Sequence C1

No physical damage occurred to the specimens for the applied tensile load.

2.24. Flexural, Patch Cord – Test Sequence C1

No physical damage occurred to the specimens for the total number of flexural cycles.

2.25. Torsional, Patch Cord – Test Sequence C1

No physical damage occurred to the specimens for the total number of torsional cycles.

2.26. Wire Map, Patch Cord – Test Sequence C1

Specimens passed the wire maps.

2.27. Return Loss, Patch Cord – Test Sequence C1

Specimens passed RL requirements before and after mechanical testing.

2.28. NEXT, Patch Cord – Test Sequence C1

Specimens passed NEXT requirements before and after mechanical testing.

3. TEST METHODS

3.1. Initial Examination of Product

A Certificate of Conformance was issued stating that all specimens in this test package have been produced, inspected, and accepted as conforming to product drawing requirements, and made using the same core manufacturing processes and technologies as production parts.

Contact termination heights were measured and recorded to confirm within acceptable tolerance limits.

3.2. Visual Examination of Product – All Test Sequences

Visual inspection was performed at the end of each test sequence.

3.3. Length, Uncoiled Patch Cords – Test Sequence C1

Physical length of each patch cord assembly was measured for reference.

3.4. Contact Resistance, IPC/Wire Interface – Test Sequences A1, A2, & A3

Termination resistance measurements were derived by measuring the total voltage drop from an applied 20 mV maximum open circuit voltage at 100 mA maximum across the plugs IPC contact and terminated wire, then subtracting the average bulk resistance of these components.

3.5. Input to Output DC Resistance – Test Sequences B1, B2, B3, & B4

Input to output resistance measurements were made using the four-terminal technique as shown in Figure 1.

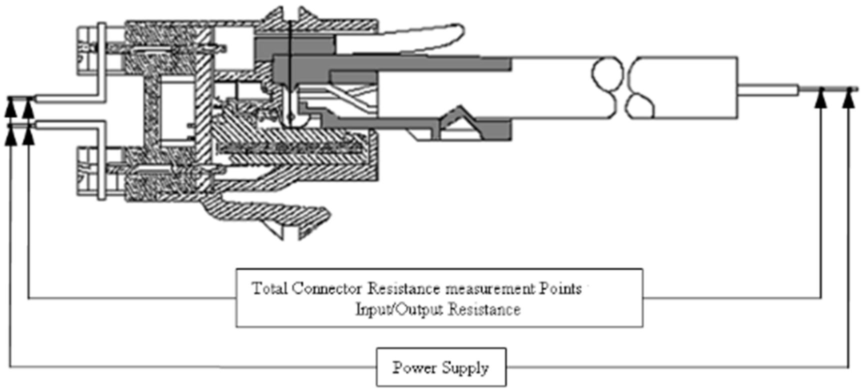

Figure 1

Input to Output DC Resistance Measurement Points

3.6. Input to Output DC Resistance Unbalance – Test Sequences B1, B2, B3, & B4

Input to output resistance unbalance was calculated as the maximum difference between maximum and minimum resistance measurements.

3.7. Insulation Resistance – Test Sequence B1, B2, B3, & B4

Insulation resistance was measured between adjacent contacts of mated specimens. A test voltage of 100 volts DC, 500 MΩ minimum was applied for a 1 minute hold.

3.8. Voltage Proof - Test Sequence B1, B2, B3, & B4

A test potential of 1000 volts DC was applied to a terminated jack with a mated plug, between each contact and all other contacts being connected together, and held for 1 minute.

3.9. Current Carrying Capacity – Test Sequence B5

A series of DC loading currents were applied to the specimen, each application of current being allowed to reach thermal stability. The hottest contact temperature and ambient temperature were recorded at each current. The average temperature rise was calculated and used to generate the basic current current-carrying curve, which was in turn used to generate the de-rating curve. The de-rating curve was compared with the ambient temperature rating.

3.10. Plug Insertion & Withdrawal Force – Test Sequence B1

The force required to mate & unmate individual specimens was measured with latch depressed at a maximum rate of 50 mm per minute per IEC 60512-13-2.

3.11. Plug Retention in Jack – Test Sequence B1

An axial load of 50N was applied for 60 seconds to mated connector assemblies in a direction that would cause the connector latches to disengage.

3.12. Mechanical Operation Durability – Test Sequence B2

Specimens were mated and unmated for 375 cycles with latch inoperative; maximum rate was 10mm/sec.

3.13. Cable Bending – Test Sequence A1

An axial load of 22 N was applied to the free end of a cable terminated to a plug. The plug was then rotated 30 degree in both directions to bend the cable a total of 5 cycles in each direction. Contact disturbance was monitored throughout the test.

3.14. Vibration, IPC/Wire Interface – Test Sequence A2

Specimens were subjected to sinusoidal vibration from 10 to 55 Hz; displacement amplitude: 0.35mm; 10 sweeps per axis of 3 mutually perpendicular axes.

3.15. Vibration, Plug/Jack Interface – Test Sequence B3

Specimens were subjected to sinusoidal vibration from 10 to 500 Hz; displacement amplitude: 0.35mm; acceleration: 5g; 10 sweeps per axis of 3 mutually perpendicular axes.

3.16. Rapid Change of Temp, IPC/Wire Interface – Test Sequence A2

Terminated plugs were subjected to 5 cycles between -40℃ & 70℃ with 30 minute dwells at temperature extremes. 2 hour recovery time.

3.17. Rapid Change of Temp, Plug/Jack – Test Sequence B1

Specimens were subjected to 25 cycles between -40℃ & 70℃ with 30 minute dwells at temperature extremes. 2 hour recovery time.

3.18. Climatic Sequence – Test Sequence A2

Terminated plugs were subjected to a dry heat of 70℃ & -40℃ for 1 cycle.

3.19. Cyclic Damp Heat – Test Sequence B1

Specimens were subjected to 21 cycles between 25 and 65℃ with 93% RH with 5 subcycles at -10℃.

3.20. Electrical Load and Temperature – Test Sequence B4

Specimens were subjected to 70℃ for 500 hours, 2 hour recovery. Half of the specimens were energized with 0.8 ampere DC, the remaining half not energized.

3.21. Flowing Mixed Gas Corrosion, IPC/Wire Interface – Test Sequence A3

Terminated plugs were exposed for 10 days to a mixed flowing gas per IEC 60512-11-7 Method 1. Exposure is defined as a temperature of 25℃ and a relative humidity of 75% with the pollutants of H_2S: 100±20 (10^{-9} vol/vol), SO_2: 500±100 (10^{-9} vol/vol).

3.22. Flowing Mixed Gas Corrosion, Plug/Jack – Test Sequence B2

Specimens were exposed for 4 days to a mixed flowing gas per IEC 60512-11-7 Method 1. Exposure is defined as a temperature of 25℃ and a relative humidity of 75% with the pollutants of H_2S: 100±20 (10^{-9} vol/vol), SO_2: 500±100 (10^{-9} vol/vol). Half of the specimens were mated (terminated plug/jack) & half unmated.

3.23. Tensile, Patch Cord – Test Sequence C1

An axial load of 22 N was applied to the common axis of the cable and plug with a 1 minute hold.

3.24. Flexural, Patch Cord – Test Sequence C1

An axial load of 2 N was applied to the free end of a cable terminated to a plug. The plug was then rotated 90 degrees in both directions to flex the cable. Flexural cycles were performed between two perpendicular axis with a total of 250 cycles applied for stranded conductor wire and 50 cycles for solid conductor wire.

3.25. Torsional, Patch Cord – Test Sequence C1

An axial load of 10 N was applied to the free end of a cable terminated to a plug. The plug was then rotated 180 degrees in both direction with the cable fixed at a distance of 330 mm from the plug to apply a torsional force. Rate was 20 complete torsion cycles per minute.

3.26. Wire Map, Patch Cord – Test Sequence C1

Patch cord cable assemblies were tested in wire map scanning mode using a calibrated Fluke DTX-1800 cable analyzer together with patch cord test heads.

3.27. NEXT, Return Loss, & Wire Map, Patch Cord – Test Sequence C1

Transmission testing was performed using a calibrated Fluke Networks DTX-1800 cable analyzer together with the appropriate patch cord test heads.

4. REVISION SUMMARY

- Revision A – Initial Release
- Revision B – Remove 2.1 Test Sequence / Report Summary, Add 2 additional Catalog Nos.