Medusa Power Cable Verification Test Report

1. INTRODUCTION

1.1. Purpose

Testing was performed on the Medusa Power cable to determine its conformance to the requirements of Product Specification 108-152000 and customer special request during their audit in TE.

1.2. Scope

This report covers the electrical, mechanical and environmental test of Medusa Power cable. Testing was performed at the TE Connectivity Shanghai Testing Laboratory at Aug 2014 and Nov 2014 to Mar 2015.

1.3. Conclusion

All test specimens conformed to the electrical, mechanical and environmental performance requirements of Product Specification 108-152000.

1.4. Test Specimens

Medusa cable assembly PN: 2820303-2.
Include CCJ silver plating conn. Part Number: 2204040-1.
MBXLE gold plating conn, Part Number: 1-1892903-2.
8AWG Red wire PN: 1760457-5,8AWG black wire: 1760457-4.

1.5. Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:

- Temperature: 25±10°C
- Relative Humidity: 50±25% RH

| Indicates Change

1.6. Qualification Test Sequence:

Table 1 – Test Sequence

Test Item	Test Group									
	1	2	3	4	5	6	7	8	9	10
	Test Sequence(a)									
Examination of Product	1,5	1,5	1,9	1,5	1,4	1,3	1,8	1,8	1,4	1,3
Contact resistance	2,4	2,4	3,8	2,4			3,6			
Temperature rise vs current.				3						
Crimp tensile.						2				2
Mating force			2				2			
un-mating force			7				7			
Durability			4(b)				4			
Contact retention, straight pull.					2				2	
Contact retention, angled pull.					3				3	
Vibration, random.			5				5			
Mechanical shock.			6							
Salt Spray Test	3									
Insulation resistance.								2,6		
Withstanding voltage.								3,7		
Thermal shock.								4		
Temperature life.		3								
Humidity-temperature cycling.								5		
Sample Size per Test Group	5	5	5	5	5	5	5	5	5 MBXLE side	5 MBXLE side

Note: **(a) Numbers indicate sequence in which tests are performed.**
(b) Measure contact resistance after every 10 cycles up to 50.

2. SUMMARY OF TESTING

2.1. Initial Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2. Contact resistance-Group 1,2,3,4 and 7

All CCJ contact resistance measurements, taken at rated current were less than 0.5 milliohms in initial and final testing (refer to Figure 2)

Test Group	Number of Data Points	Condition	LLCR(milliohms)		
			Minimum	Maximum	Average
1	10	Initial(actual)	0.07	0.08	0.07
	10	Final (after salt spray)	0.08	0.11	0.09
2	10	Initial(actual)	0.07	0.08	0.07
	10	Final (after Temperature Life)	0.10	0.12	0.11
3	10	Initial(actual)	0.07	0.09	0.07
	10	Final (after durability/vibration/shock)	0.07	0.10	0.09
4	10	Initial(actual)	0.08	0.09	0.08
	10	Final (after Temperature Rise)	0.08	0.10	0.09
7	10	Initial(actual)	0.06	0.09	0.08
	10	Final (after durability/vibration)	0.13	0.15	0.14

Figure 2

2.3. Temperature rise vs current contact resistance-Group 4

All specimens had a temperature rise of less than 30°C about ambient when tested using a baseline rated current of 120A for CCJ power connector.

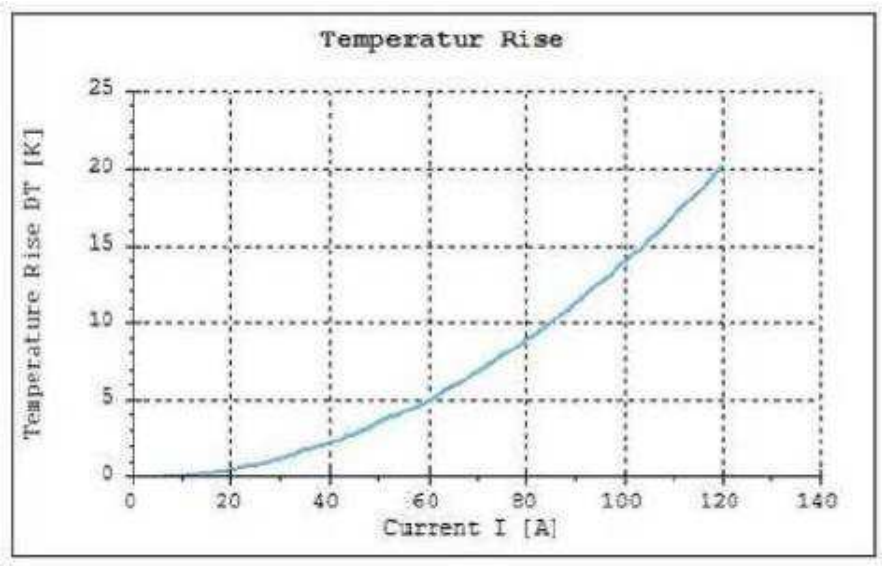

Figure 3

2.4. Crimp tensile test and Contact retentions -CCJ conn --Group 5 and 6

All CCJ contacts crimp tensile measurements meet 90 pounds (min).

All straight pull CCJ contact retention measurements meet 30 pounds (min).

All angled pull CCJ contact retention measurements meet 30 pounds (min) at a 45-degree angle in 4 each direction.

2.5. Crimp tensile test and Contact retentions -MBXLE conn --Group 9 and 10

All MBXLE STD contacts crimp tensile measurements meet 80 pounds (min).

All MBXLE MFBL contacts crimp tensile measurements meet 80 pounds (min).

All straight pull MBXLE STD contacts retention measurements meet 30 pounds (min).

All angled pull MBXLE STD contacts retention measurements meet 30 pounds (min) at a 45degree angle in 4 each direction.

All straight pull MBXLE MFBL contact retention measurements meet 30 pounds (min).

All angled pull MBXLE MFBL contact retention measurements meet 30 pounds (min) at a 45-degree angle in 4 each direction.

2.6. Mating force - Group 3 and 7

All average mating force measurements were less than 50N.

2.7. Un-Mating force - Group 3 and 7

All average un-mating force measurements were greater than 2.5 N.

2.8. Durability - Group 3 and 7

No physical damage occurred as a result of mating and un-mating the specimens 50 cycles.

2.9. Vibration - Group 3 and 7

No discontinuities were detected during vibration testing. Following vibration testing, no plastic deformation and no contact dislodging on the specimens were visible.

2.10. Mechanical shock - Group 3

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no plastic deformation and no contact dislodging on the specimens were visible.

2.11. Salt spray - Group 1

No evidence of physical damage was visible as result of exposure to the pollutants of salt spray test.

2.12. Insulation resistance - Group 8

All insulation resistance measurements were greater than 1000 megaohms between adjacent contacts.

2.13. Withstanding voltage - Group 8

No dielectric breakdown or flashover occurred.

2.14. Thermal shock - Group 8

No evidence of physical damage was visible as result of thermal shock testing.

2.15. Temperature life - Group 2

No evidence of physical damage was visible as result of temperature life testing.

2.16. Humidity-Temperature cycling - Group 8

No evidence of physical damage was visible as result of humidity-temperature cycling testing.

2.17. Final Examination of Product - All Test Groups

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3. TEST METHODS.

3.1. Initial Examination of Product.

Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed. Per drawing and standard EIA-364-18.

3.2. Contact Resistance.

Contact resistance measurements at rated current were made using a 4-terminal measuring technique. The test specimens were energized at the rated current in accordance with Product Specification 108-152000

3.3. Temperature rise vs current

Temperature rise curves were established for specimens with a single circuit energized. Current up to 120A. Test the temperature at 30A, 60A, 90A and 120A. The temperature is measured after the stabilization period. Stabilize are a single current level until 3 readings at 5 minute intervals are within 1°C.The specimens were placed in the stable air environment of a temperature rise enclosure. In accordance with EIA-364-70.

3.4. Crimp Tensile.

A small metal fixture was inserted into the contact socket to assist in clamping the contact during test. Specimens were clamped in a vise at the contact and air jaws were used to grip the wire end apply the load in a vertical motion. The load was applied at rate of .5 inch per minute until failure.

3.5. Contact Retention, Straight Pull.

CCJ contacts were measured by applying a 30 pounds weight to the wire and holding for 6 seconds. MBXLE STD contacts were measured by applying a 30 pounds weight to the wire and holding for 6 seconds.

MBXLE MFBL contacts were measured by applying a 30 pounds weight to the wire and holding for 6 seconds.

3.6. Contact Retention, Angled Pull.

CCJ contacts were measured by applying a 30 pounds weight to the wire and holding for 6 seconds at a 45-degree angle in each 4 directions.

MBXLE STD contacts were measured by applying a 30 pounds weight to the wire and holding for 6 seconds at a 45-degree angle in each 4 directions.

MBXLE contacts were measured by applying a 30 pounds weight to the wire and holding for 6 seconds at a 45-degree angle in each 4 directions.

3.7. Mating force &un-mating (initial and final).

The force required to mate & un-mate individual specimens was measured using a tensile/compression device with a free-floating fixture and a rate of travel of 12.7 mm [.5 in] per minute.

3.8. Durability

Specimens were mated and unmated 50 cycles at a maximum rate of 500 cycles per hour. And Measure contact resistance after every 10 cycles up to 50 cycles.

3.9. Vibration

Mated specimens were subjected to a random vibration test, per test condition 0.5g, 1.5mm amplitude, 5-500 Hz, 10 sweeps @ 1 octave/minute in all orthogonal axes. This was performed for 66 minutes in each of 3 mutually perpendicular planes for a total vibration time of 198 minutes. Specimens were monitored for discontinuities of 1 microsecond.

3.10. Mechanical shock.

Mated specimens were subjected to a mechanical shock test having a half-sine waveform of 50 gravity units (g peak) and a duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 18 shocks. Specimens were monitored for discontinuities of 1 microsecond.

3.11. Salt Spray.

Mated specimens were exposed for 48 hours to a 5% solution salt spray, at 35 +1/-2°C, in accordance with EIA–364-26.

3.12. Insulation Resistance.

Insulation resistance was measured between adjacent power contacts of mated specimens. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured, in accordance with EIA–364-21.

3.13. Withstanding Voltage.

A test potential of 2500 volts AC was applied between the adjacent power contacts of mated specimens. This potential was applied for 1 minute and then returned to zero. In accordance with EIA–364-20 Condition I.

3.14. Thermal Shock.

Mated specimens were subjected to 36 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40° and 125°C. The transition between temperatures was less than 5 minutes. In accordance with EIA–364-32.

3.15. Temperature Life.

Mated specimens were exposed to a temperature of 125°C for 504 hours (21 days). In accordance with EIA–364-17 Method A.

3.16. Humidity-Temperature cycling.

Mated specimens were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 40°C at 80 to 100 %RH. With no cold shock. In accordance with EIA–364-31 Method III.

3.17. Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to product performance.