3 mm Micro MATE-N-LOK* Connector

1. INTRODUCTION

1.1 Purpose

Testing was performed on 3 mm Micro MATE-N-LOK* Connectors to determine its conformance related to the requirements of product specification 108-1836 Rev.E.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of 3 mm Micro MATE-N-LOK* Connectors. Testing was performed at the Shanghai Electrical Components Test Laboratory between May 29, 2018 and Aug.24, 2018. The associated test number is TP-18-01416.

1.3 Conclusion

Based on the test results, all meet the requirement.

1.4 Test Specimens

Specimens with the following part numbers as Table 1 were used for test, all wired specimens used 22AWG and 20AWG wire.

Table 1

Type	Part No	Description	Qty.	Comments
1	2315752-4	RECEPTACLE HOUSING, SINGLE ROW, MICRO MATE-N-LOK	5 pairs/group	Only 2315752-4, 2315785-4, 3-794617-0 and 3-794615-0 are required to do group 5 test (glow wire test), and 2pcs/part no. for this test.
	2315785-4	PLUG HOUSING, SINGLE ROW, FREE HANGING MICRO MATE-N-LOK		
2	2315752-4	RECEPTACLE HOUSING, SINGLE ROW, MICRO MATE-N-LOK	5 pairs/group	
	2315786-4	PLUG HOUSING, SINGLE ROW, PANEL MOUNT, MICRO MATE-N-LOK		
3	3-794617-0	RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK	5 pairs/group	
	3-794615-0	PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, PANEL MOUNT, MICRO MATE-N-LOK		
4	3-794617-0	RECEPTACLE HOUSING, 2 TO 24 POSITION, DUAL ROW, MICRO MATE-N-LOK	5 pairs/group	
	3-794616-0	PLUG HOUSING, 2 TO 24 POSITION DUAL ROW, FREE HANGING, MICRO MATE-N-LOK		

| Indicates Change

1.5 Test Sequence

Table 2

Test	Test Group				
	1	2	3	4	5
	Test Sequence				
Examination of Product	1,9	1,8	1,8	1	1
Termination resistance	3,7	2,6			
Insulation resistance			2,6		
Dielectric withstanding			3,7		
Temperature rise vs current		3,7			
Temperature rise					
Vibration, random	5				
Mechanical shock	6				
Durability	4	2			
Mating force	2		2		
Unmating force	8				
Housing lock strength				5	
Thermal shock			4	3	
Humidity/temperature cycling			5	4	
Temperature life		5			
Mixed flowing gas		4			
Crimp contact retention			9		
Glow wire end-products test					2
Crimp contact insertion force				2	

Note:
a). Test group defined per customer requirement
b). Numbers indicate sequence in which tests are performed.

1.6 Environmental Conditions

Unless otherwise stated, the following environmental conditions prevailed during testing:
Temperature: 15℃ to 35℃
Relative Humidity: 25% to 75%

2. TEST PROCEDUES

2.1. Examination of Product

Visual Inspection: appearance, and function of specimens pursuant to the applicable inspection plan.
Requirements: Meets requirements of product drawing and no physical damage.
Test Method: EIA-364-18 B

2.2. Termination resistance

Subject specimens to 100 milliamperes maximum and 20 millivolts maximum open circuit voltage.
Requirements: 20 mΩ Max.
Test Method: IEC 60512-2-1-2002

2.3. Insulation Resistance
Test between adjacent contacts of mated specimens with 500 V DC for 2 minutes.
Requirements: 1000MΩ. Min (initial); 500MΩ. Min (final)
Test Method: EIA-364-21E

2.4. Dielectric withstanding
1500 volts AC at sea level. Test between adjacent contacts of mated specimens. 1 minute hold with no breakdown, flashover, or 0.5 milliampere maximum leakage.
Requirements: No breakdown or flashover.
Test Method: EIA-364-20D

2.5. Temperature rise
Stabilize at a single current level until 3 readings at 5 minute intervals are within 1℃. Test current: 5A DC for 4 Pos. 4.25A DC for 10 Pos. All wired specimens used 20 AWG wire for this group.
Requirements: 30 ℃ Max.
Test Method: EIA-364-70C, Method 1.

2.6. Vibration, random
Subject mated specimens to 3.10 G's rms between 20-500 Hz. 15 minutes in each of 3 mutually perpendicular planes.
Requirements: No discontinuities of 1 microsecond or longer duration.
Test Method: EIA-364-28F, Test Condition VII, Condition D

2.7. Mechanical shock
Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. 3 shocks in each direction applied along 3 mutually perpendicular planes, 18total shocks.
Requirements: No discontinuities of 1 microsecond or longer duration.
Test Method: EIA-364-27C, Method A

2.8. Durability
Mate and unmate specimens for 30 cycles for tin plated specimens, 75 cycles for 15 µin gold plated specimens, and 150 cycles for 30 µin gold plated specimens at a maximum rate of 500 cycles per hour.
Requirements: no physical damage.
Test Method: EIA-364-9C

2.9. Mating force&unmating
Measure the force necessary to mate and unmate sampels with a rate of 5.08 mm /min.
Requirements: Mating fore 4 Pos. 27.44 N Max.(0.7kgf*4*9.8=27.44N, 0.7kgf Max. per contact);
10 Pos. 68.60 N Max.(0.7kgf*10*9.8=68.60, 0.7kgf Max. per contact);
Unmating force 4 Pos. 2.74 N Min. (0.07kgf*4*9.8=2.74N, 0.07kgf Min. per contact);
10 Pos. 6.86 N Min. (0.07kgf*10*9.8=6.86N, 0.07kgf Min. per contact).
Test Method: EIA-364-13E-2011

2.10. Housing Locking Strength
Determine housing lock strength at a maximum rate of 12.7 mm per minute.
Requirements: 26.46 N Min.
Test Method: EIA-364-98-1997

2.11. Thermal shock
Mated connector -40℃/30 min., 105℃/30 min. Making this a cycle, repeat 5 cycles.
Requirements: No physical damage.
Test Method: EIA-364-32G

2.12. Humidity/temperature cycling

Subject specimens to 10 cycles (10 days) between 25 and 65°C at 80 to 100% RH.

Requirements: No visible defects or deviations, no cracks on the isolating parts.
Test Method: EIA-364-31E-2017, Method III.

2.13. Temperature life

Subject mated specimens to 105°C for 500 hours.

Requirements: No visible defects or deviations, no cracks on the isolating parts.
Test Method: EIA-364-17C, Method A.

2.14. Mixed flowing gas

Subject mated specimens to environmental Class IIA for 20 days (30℃ and 70%R.H., Cl_2 10ppb, NO_2 200ppb, H_2S 10ppb, SO_2 100ppb).
Requirements: No physical damage, and meet requirement of subsequent test.
Test Method: EIA-364-65, Class IIA.

2.15. Crimp contact retention

Apply an axial load of 1.81 kgf to contacts at a rate of 0.45 kgf per second and hold for 6 seconds.
Requirements: Contact shall not dislodge.
Test Method: EIA-364-29C.

2.16. Glow wire end-products test

The extremity of the wire is positioned horizontally and brought into contact with the sample with a force between 0.85 and 1.2N for a period of 30s. Test temperature: 750℃ Time of Glow tip application Ta: 30s
Requirements: Te-Ti ≤2s or no flame
Test Method: IEC 60335-1 edition 5.2 2016-05.

2.17. Crimp contact insertion force

Measure force necessary to insert crimped contacts into housing.
Requirements: 6.86 N Max.
Test Method: 108-1836 Rev.E.

3. SUMMARY OF TESTING

Group	Test Item	QTY	Condition	Test Result				Requirement	Conclusion
				Max	Min	Ave	Unit		
1	Examination of Product	20	initial	No physical damage occurred			/	No abnormalities	Meet spec
	Mating force	5	Initial-type1	17.88	13.19	14.46	N	27.44 N Max.	Meet spec
		5	Initial-type2	25.26	11.91	18.89			
		5	Initial-type3	46.16	32.84	37.33	N	68.60 N Max.	
		5	Initial-type4	39.04	26.01	32.97			
	Termination resistance	5	Initial-type1	5.37	3.66	4.24	mΩ	20 mΩ Max.	Meet spec
		5	Initial-type2	9.23	5.18	7.21			
		5	Initial-type3	6.85	3.85	4.53			
		5	Initial-type4	5.28	3.79	4.56			
	Durability	20	final	No physical damage occurred			/	No abnormalities	Meet spec
	Vibration, random	20	final	No physical damage, no electrical discontinuity greater than 1 μs			/	No abnormalities	Meet spec
	Mechanical shock	20	final	No physical damage, no electrical discontinuity greater than 1 μs			/	No abnormalities	Meet spec
	Termination resistance	5	final-type1	14.10	4.22	7.82	mΩ	20 mΩ Max.	Meet spec
		5	final-type2	16.58	4.74	10.09			
		5	final-type3	11.73	4.09	5.99			
		5	final-type4	13.93	4.19	6.95			

Group	Test Item	QTY	Condition	Test Result				Requirement	Conclusion
				Max	Min	Ave	Unit		
	Unmating force	5	final-type1	8.88	7.91	7.34	N	2.74 N Min.	Meet spec
		5	final-type2	3.63	3.01	3.20			
		5	final-type3	13.06	10.06	12.08	N	6.86 N Min.	
		5	final-type4	14.97	10.28	12.52			
	Examination of Product	20	final	No physical damage occurred			/	No abnormalities	Meet spec
2	Examination of Product	20	initial	No physical damage occurred.			/	No abnormalities	Meet spec
	Termination resistance	5	Initial-type1	4.89	3.63	4.14	mΩ	20 mΩ Max.	Meet spec
		5	Initial-type2	4.75	4.75	3.89			
		5	Initial-type3	5.30	2.54	4.23			
		5	Initial-type4	5.50	3.41	4.25			
	Temperature rise vs current	5	Initial-type1	20.22	15.55	18.00	˚C	30 ˚C Max.	Meet spec
		5	Initial-type2	19.55	13.84	16.40			
		5	Initial-type3	23.18	19.39	21.09			
		5	Initial-type4	23.99	19.13	21.47			
	Mixed flowing gas	20	final	No physical damage occurred			/	No abnormalities	Meet spec
	Temperature life	20	final	No physical damage occurred			/	No abnormalities	Meet spec
	Termination resistance	5	final-type1	7.67	3.86	5.20	mΩ	20 mΩ Max.	Meet spec
		5	final-type2	8.05	4.21	5.53			
		5	final-type3	7.59	4.16	5.14			
		5	final-type4	8.30	4.26	5.24			
	Temperature rise vs current	5	final-type1	22.31	16.60	18.98	˚C	30 ˚C Max.	Meet spec
		5	final-type2	23.77	18.14	20.23			
		5	final-type3	25.11	20.20	22.54			
		5	final-type4	23.97	20.49	22.04			
	Examination of Product	20	final	No physical damage occurred			/	No abnormalities	Meet spec
3	Examination of Product	20	initial	No physical damage occurred			/	No abnormalities	Meet spec
	Crimp contact insertion force	5	Initial-type1	5.33	1.27	3.32	N	6.86 N Max.	Meet spec
		5	Initial-type2	5.73	1.07	3.49			
		5	Initial-type3	5.54	1.39	3.52			
		5	Initial-type4	5.42	1.60	3.58			
	Insulation resistance	5	Initial-type1	3.73	0.55	1.45	10^{11}Ω	1000 MΩ Min.	Meet spec
		5	Initial-type2	1.66	0.54	1.12			
		5	Initial-type3	1.57	0.60	0.97			
		5	Initial-type4	4.19	0.73	0.97			
	Dielectric withstanding	20	initial	No breakdown, no flashover			/	No abnormalities	Meet spec
	Thermal shock	20	final	No physical damage occurred			/	No abnormalities	Meet spec
	Humidity/temperature cycling	20	final	No physical damage occurred			/	No abnormalities	Meet spec
	Insulation resistance	5	final-type1	4.40	1.85	3.04	10^{10}Ω	500 MΩ Min.	Meet spec
		5	final-type2	5.26	2.37	3.32			
		5	final-type3	4.40	1.17	1.91			
		5	final-type4	3.00	1.24	1.93			
	Dielectric withstanding	20	final	No breakdown, no flashover			/	No abnormalities	Meet spec
	Examination of Product	20	final	No physical damage occurred			/	No abnormalities	Meet spec
	Crimp contact retention	20	final	Contact were not dislodged.			/	Contact shall not dislodge	Meet spec

Group	Test Item	QTY	Condition	Test Result				Requirement	Conclusion
				Max	Min	Ave	Unit		
4	Examination of Product	20	initial	No physical damage occurred			/	No abnormalities	Meet spec
	Thermal shock	20	initial	No physical damage occurred			/	No abnormalities	Meet spec
	Humidity/temperature cycling	20	final	No physical damage occurred			/	No abnormalities	Meet spec
	Housing lock strength	5	final-type1	34.02	32.58	33.28	N	26.46 N Min	Meet spec
		5	final-type2	34.14	33.67	33.99			
		5	final-type3	32.81	30.86	32.23			
		5	final-type4	38.92	34.09	35.50			
5	Examination of Product	8	initial	No physical damage occurred			/	No abnormalities	Meet spec
	Glow wire end-products test	8	final	No flame			/	Te-Ti ≤2s or no flame	Meet spec

Note: 1 kgf=9.8 N; 100 MΩ=10^8 Ω.

4. CALIBRATION

4.1 Calibration Statement

All equipment containing a calibration number is calibrated and traceable through TE Connectivity (TE).

5. VALIDATION

Requested by:
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