

MAG-MATE* Slim Line Terminals with Multispring

1. INTRODUCTION

1.1 Purpose

Testing was performed on MAG-MATE Slim Line Terminals with Multispring to determine its conformance related to the requirements of product specification 108-1484 Rev. C.

Scope of the test is the qualification of 2120743-2, 2120744-2, 2120745-2, 2120746-2 and 2120747-2 contact with Multispring with copper wires according to 108-1484 have been performed. Terminal insertion and extraction force was performed for 2120747-2 only.

1.2 Scope

This report covers the electrical, mechanical and environmental performance of MAG-MATE Slim Line Terminals with Multispring.

Testing was performed at the Shanghai Electrical Components Test Laboratory between Jan. 08, 2019 and May. 20, 2019. The associated test number are TP-18-03627 and TP-19-00539.

1.3 Conclusion

Based on the test results, all tests meet the requirement according to applicant's requirement and product specification 108-1484 Rev. C.

1.4 Test Specimens

Specimens with the following part numbers were used for test:

Table 1

Contact P/N	Description	Sample Type	Cavity Samples P/N	Sample Quantity(pcs)	Current Cycling Test Current(A)
2120743-2	MAG-MATE Slim Line Terminal with Cu Wire 0.18mm	Single wire	2339190-1	10	1
	MAG-MATE Slim Line Terminal with Cu Wire 0.265mm	Single wire	2339190-1	10	3.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.265mm	Double wire	2339190-1	10	3.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.25mm	Single wire	2339190-1	10	3.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.25mm	Double wire	2339190-1	10	3.5
2120744-2	MAG-MATE Slim Line Terminal with Cu Wire 0.265mm	Single wire	2339190-1	10	3.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.265mm	Double wire	2339190-1	10	3.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.4mm	Single wire	2339190-2	10	7.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.4mm	Double wire	2339190-2	10	7.5
2120745-2	MAG-MATE Slim Line Terminal with Cu Wire 0.4mm	Single wire	2339190-2	10	7.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.4mm	Double wire	2339190-2	10	7.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.63mm	Single wire	2339190-2	10	12.5

	MAG-MATE Slim Line Terminal with Cu Wire 0.56mm	Double wire	2339190-2	10	11
2120746-2	MAG-MATE Slim Line Terminal with Cu Wire 0.63mm	Single wire	2339190-3	10	12.5
	MAG-MATE Slim Line Terminal with Cu Wire 0.85mm	Single wire	2339190-3	10	16
2120747-2	MAG-MATE Slim Line Terminal with Cu Wire 0.85mm	Single wire	2339190-4	10	16



Fig.1 Typical samples for Test Group 1&2



Fig.2 Test samples for Group 3

1.5 Test Sequence

The specimens listed in Table 1 were subjected to the test sequences listed in Table 2.

Table 2

Test Item	Test Group (a)		
	1	2	3
	Test Sequence (b)		
Examination of Product	1,9	1,5	1,4
Low Level Contact Resistance	2, 4(c), 6(c), 8(c)	2,4	
Current Cycling		3(d)	
Terminal Insertion Force			2
Terminal Extraction Force			3
Thermal Shock	7(c)		
Humidity-Temperature Cycling	5(c)		
Temperature Life	3(c)		

- Note:
- a). Test group defined per customer requirement
 - b). Numbers indicate sequence in which tests are performed.
 - c). Termination Resistance measurements are made periodically throughout testing cycles,
 - d). Current Cycling test samples has been monitored the temperature rise throughout the testing cycles.

1.6 Environmental Conditions

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

Temperature: 15°C to 35°C
 Relative Humidity: 25% to 75%

2. TEST PROCEDUES

2.1 Visual Examination of Product

Before test, a certificate of conformance was issued stating that all specimens in this test package were produced, inspected, and accepted as conforming to product drawing requirements, and were manufactured using the same core manufacturing processes and technologies as production parts.

After test, there shall be no corrosive influence on the performance and no physical damage that would impair product performance.

Test Method: EIA-364-18.

2.2. Low Level Contact Resistance

Subject contacts assembled in a housing to 50mV (max.) open circuit at 100 mA (max.). Including the resistance of the wire length 1.5inch(38.1mm) from the measurement. Connection per Figure 3.

Requirement see table 3:

Test Method: EIA-364-23.

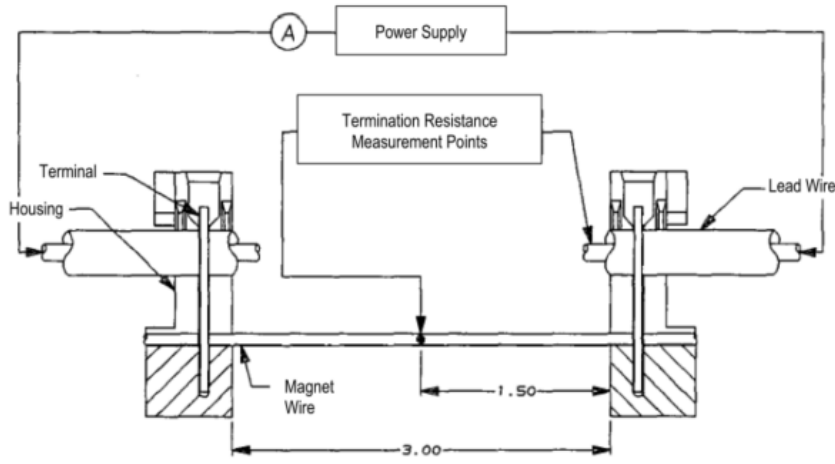


Figure 2: Termination Resistance, Dry Circuit, Measurement Points

Fig.3

2.3. Current Cycling

Subject mated contacts to 480 cycles at test Current for 15 minutes ON and 15 minutes OFF.

Requirement: Test Current see Table 1.

Must meet termination resistance requirements in Table 3.

Test Method: EIA 364-55.

2.4. Terminal Insertion Force

Measure force necessary to insert tab into housing. Operation Speed: 25.4 mm/min.

Requirement: 356N maximum

Test Method: EIA-364-05.

2.5. Terminal Extraction Force

Measure force necessary to remove tab from housing cavity. Operation Speed: 25.4 mm/min.

Requirement: 22.25N minimum
 Test Method: EIA-364-29.

- 2.6. Thermal Shock
 Subject specimens to 25 cycles between -65 and 125°C with 30 minute dwells at temperature extremes and less than 1 minute transition time between temperatures
 Requirement: No damage which could impair normal usage.
 Must meet termination resistance requirements in Table 3.
 Test Method: EIA-364-32
- 2.7. Humidity-Temperature Cycling
 Subject terminations to 10 humidity-temperature cycles between 25°C and 65°C at 95% RH.
 Requirement: No damage which could impair normal usage.
 Must meet termination resistance requirements in Table 3.
 Test Method: EIA-364-31.
- 2.8. Temperature Life
 Subject terminations to temperature life at 118°C for 33 days. Measure termination resistance initially and after 16 and 33days.
 Requirement: No damage which could impair normal usage.
 Must meet termination resistance requirements in Table 3.
 Test Method: EIA-364-17.

3. SUMMARY OF TESTING

- 3.1 Visual Examination
 All group specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.
- 3.2. Low Level Contact Resistance
 Test result are shown in Table 4. Test setup is shown in Figure 3.

Table 3

Unit: mΩ

Group	Sample	Quantity (pcs)	Condition	Low Level Contact Resistance			Requirement	Judgement
				Max.	Min.	Ave.		
1	2120743-2 with 0.18mm Single wire	10	Initial	30.24	27.13	28.60	35.2mΩ Max.	Meet spec.
			After Temperature Life (first 16 days)	29.32	25.59	27.98	35.2mΩ Max.	Meet spec.
			After Temperature Life (33 days)	30.28	27.40	28.60	35.2mΩ Max.	Meet spec.
			After Humidity-Temperature Cycling	34.84	23.87	28.99	35.2mΩ Max.	Meet spec.
			After Thermal Shock	34.50	24.99	29.64	35.2mΩ Max.	Meet spec.
	2120743-2 with 0.265 mm Single wire	10	Initial	13.16	12.27	12.74	17.7mΩ Max.	Meet spec.
			After Temperature Life (first 16 days)	13.04	12.11	12.56	17.7mΩ Max.	Meet spec.
			After Temperature Life (33 days)	13.44	12.31	12.81	17.7mΩ Max.	Meet spec.
			After Humidity-Temperature Cycling	13.44	10.71	12.60	17.7mΩ Max.	Meet spec.

1	2120743-2 with 0.265 mm Double wire	10	After Thermal Shock	14.04	10.76	12.57	17.7mΩ Max.	Meet spec.
			Initial	13.22	12.26	12.85	17.7mΩ Max.	Meet spec.
			After Temperature Life (first 16 days)	13.26	12.04	12.73	17.7mΩ Max.	Meet spec.
			After Temperature Life (33 days)	13.67	12.42	12.97	17.7mΩ Max.	Meet spec.
			After Humidity-Temperature Cycling	14.61	11.79	12.92	17.7mΩ Max.	Meet spec.
			After Thermal Shock	16.83	11.18	13.48	17.7mΩ Max.	Meet spec.
	2120743-2 with 0.25 mm Single wire	10	Initial	14.76	13.34	14.14	17.7mΩ Max.	Meet spec.
			After Temperature Life (first 16 days)	14.96	13.04	14.11	17.7mΩ Max.	Meet spec.
			After Temperature Life (33 days)	14.96	13.60	14.30	17.7mΩ Max.	Meet spec.
			After Humidity-Temperature Cycling	15.41	12.81	14.14	17.7mΩ Max.	Meet spec.
			After Thermal Shock	16.81	13.50	14.81	17.7mΩ Max.	Meet spec.
	2120743-2 with 0.25 mm Double wire	10	Initial	14.93	13.39	14.03	17.7mΩ Max.	Meet spec.
			After Temperature Life (first 16 days)	15.21	13.39	14.27	17.7mΩ Max.	Meet spec.
			After Temperature Life (33 days)	15.35	13.58	14.38	17.7mΩ Max.	Meet spec.
			After Humidity-Temperature Cycling	15.41	10.78	13.28	17.7mΩ Max.	Meet spec.
After Thermal Shock			15.93	8.74	13.69	17.7mΩ Max.	Meet spec.	
2120744-2 with 0.265 mm Single wire	10	Initial	12.69	12.14	12.36	17.7mΩ Max.	Meet spec.	
		After Temperature Life (first 16 days)	12.71	11.50	12.16	17.7mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	13.17	11.88	12.38	17.7mΩ Max.	Meet spec.	
		After Humidity-Temperature Cycling	13.14	10.77	12.09	17.7mΩ Max.	Meet spec.	
		After Thermal Shock	13.29	10.70	12.52	17.7mΩ Max.	Meet spec.	
2120744-2 with 0.265 mm Double wire	10	Initial	12.90	11.19	12.43	17.7mΩ Max.	Meet spec.	
		After Temperature Life (first 16 days)	13.31	11.13	12.51	17.7mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	13.20	11.28	12.46	17.7mΩ Max.	Meet spec.	
		After Humidity-Temperature Cycling	13.89	9.89	12.37	17.7mΩ Max.	Meet spec.	
		After Thermal Shock	13.83	9.02	12.51	17.7mΩ Max.	Meet spec.	
2120744-2 with 0.4 mm Single wire	10	Initial	4.88	4.34	4.49	7mΩ Max.	Meet spec.	
		After Temperature Life (first 16 days)	4.72	4.22	4.41	7mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	4.98	4.13	4.59	7mΩ Max.	Meet spec.	
		After Humidity-Temperature	5.02	3.81	4.64	7mΩ Max.	Meet spec.	

			Cycling					
			After Thermal Shock	5.02	4.02	4.54	7mΩ Max.	Meet spec.
2120744-2 with 0.4 mm Double wire	10	Initial	4.71	4.31	4.51	7mΩ Max.	Meet spec.	
		After Temperature Life (first 16 days)	4.92	3.93	4.49	7mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	5.17	4.10	4.60	7mΩ Max.	Meet spec.	
		After Humidity-Temperature Cycling	6.66	3.93	4.73	7mΩ Max.	Meet spec.	
		After Thermal Shock	6.25	3.20	4.88	7mΩ Max.	Meet spec.	
		Initial	4.54	4.24	4.38	7mΩ Max.	Meet spec.	
2120745-2 with 0.4 mm Single wire	10	After Temperature Life (first 16 days)	4.58	4.22	4.35	7mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	4.76	4.32	4.44	7mΩ Max.	Meet spec.	
		After Humidity-Temperature Cycling	4.61	4.20	4.46	7mΩ Max.	Meet spec.	
		After Thermal Shock	5.25	4.37	4.65	7mΩ Max.	Meet spec.	
		Initial	4.61	4.20	4.46	7mΩ Max.	Meet spec.	
2120745-2 with 0.4 mm Double wire	10	After Temperature Life (first 16 days)	4.58	4.05	4.36	7mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	4.73	4.15	4.51	7mΩ Max.	Meet spec.	
		After Humidity-Temperature Cycling	5.06	3.89	4.44	7mΩ Max.	Meet spec.	
		After Thermal Shock	5.08	3.98	4.43	7mΩ Max.	Meet spec.	
		Initial	2.63	2.40	2.50	3.3mΩ Max.	Meet spec.	
2120745-2 with 0.63 mm Single wire	10	After Temperature Life (first 16 days)	2.43	2.22	2.37	3.3mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	2.77	2.40	2.57	3.3mΩ Max.	Meet spec.	
		After Humidity-Temperature Cycling	2.60	2.25	2.38	3.3mΩ Max.	Meet spec.	
		After Thermal Shock	2.71	2.07	2.33	3.3mΩ Max.	Meet spec.	
		Initial	3.28	3.08	3.17	3.5mΩ Max.	Meet spec.	
2120745-2 with 0.56 mm Double wire	10	After Temperature Life (first 16 days)	3.29	2.81	3.10	3.5mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	3.24	2.95	3.15	3.5mΩ Max.	Meet spec.	
		After Humidity-Temperature Cycling	3.44	2.77	3.10	3.5mΩ Max.	Meet spec.	
		After Thermal Shock	3.27	1.95	3.02	3.5mΩ Max.	Meet spec.	
		Initial	2.56	2.40	2.47	3.3mΩ Max.	Meet spec.	
2120746-2 with 0.63 mm Single wire	10	After Temperature Life (first 16 days)	2.79	2.10	2.44	3.3mΩ Max.	Meet spec.	
		After Temperature Life (33 days)	2.64	2.42	2.56	3.3mΩ Max.	Meet spec.	

	2120746-2 with 0.85 mm Double wire	10	After Humidity- Temperature Cycling	3.14	1.94	2.51	3.3mΩ Max.	Meet spec.
			After Thermal Shock	3.09	2.20	2.66	3.3mΩ Max.	Meet spec.
			Initial	1.53	1.41	1.47	2.1mΩ Max.	Meet spec.
			After Temperature Life (first 16 days)	1.50	1.39	1.44	2.1mΩ Max.	Meet spec.
			After Temperature Life (33 days)	1.55	1.44	1.49	2.1mΩ Max.	Meet spec.
			After Humidity- Temperature Cycling	1.74	1.25	1.44	2.1mΩ Max.	Meet spec.
			After Thermal Shock	1.75	0.95	1.36	2.1mΩ Max.	Meet spec.
1	2120747-2 with 0.85 mm Single wire	10	Initial	1.58	1.47	1.51	2.1mΩ Max.	Meet spec.
			After Temperature Life (first 16 days)	1.59	1.42	1.48	2.1mΩ Max.	Meet spec.
			After Temperature Life (33 days)	1.59	1.42	1.52	2.1mΩ Max.	Meet spec.
			After Humidity- Temperature Cycling	1.78	1.28	1.50	2.1mΩ Max.	Meet spec.
			After Thermal Shock	1.91	1.35	1.62	2.1mΩ Max.	Meet spec.
2	2120743-2 with 0.18mm Single wire	10	Initial	31.48	27.20	29.54	45.7mΩ Max.	Meet spec.
			After Current Cycling	38.29	27.52	29.43	45.7mΩ Max.	Meet spec.
	2120743-2 with 0.265mm Single wire	10	Initial	13.35	12.05	12.65	23mΩ Max.	Meet spec.
			After Current Cycling	13.34	12.29	12.79	23mΩ Max.	Meet spec.
	2120743-2 with 0.265mm Double wire	10	Initial	13.29	11.65	12.59	23mΩ Max.	Meet spec.
			After Current Cycling	13.34	12.03	12.72	23mΩ Max.	Meet spec.
	2120743-2 with 0.25mm Single wire	10	Initial	15.27	13.72	14.53	23mΩ Max.	Meet spec.
			After Current Cycling	15.63	13.79	14.59	23mΩ Max.	Meet spec.
	2120743-2 with 0.25mm Double wire	10	Initial	15.53	13.41	14.50	23mΩ Max.	Meet spec.
			After Current Cycling	15.85	13.37	14.65	23mΩ Max.	Meet spec.
2	2120744-2 with 0.265mm Single wire	10	Initial	13.13	12.48	12.84	23mΩ Max.	Meet spec.
			After Current Cycling	13.20	12.57	12.91	23mΩ Max.	Meet spec.
	2120744-2 with 0.265mm Double wire	10	Initial	13.86	11.94	12.84	23mΩ Max.	Meet spec.
			After Current Cycling	14.06	12.20	12.97	23mΩ Max.	Meet spec.
	2120744-2 with 0.4mm Single wire	10	Initial	4.61	4.18	4.38	9.1mΩ Max.	Meet spec.
			After Current Cycling	4.64	4.10	4.38	9.1mΩ Max.	Meet spec.
	2120744-2 with 0.4mm Double wire	10	Initial	4.79	4.01	4.32	9.1mΩ Max.	Meet spec.
			After Current Cycling	4.70	3.75	4.33	9.1mΩ Max.	Meet spec.

2	2120745-2 with 0.4mm Single wire	10	Initial	4.57	4.15	4.35	9.1mΩ Max.	Meet spec.
			After Current Cycling	4.55	4.31	4.43	9.1mΩ Max.	Meet spec.
	2120745-2 with 0.4mm Single wire	10	Initial	4.47	4.02	4.18	9.1mΩ Max.	Meet spec.
			After Current Cycling	4.81	4.19	4.52	9.1mΩ Max.	Meet spec.
	2120745-2 with 0.63mm Single wire	10	Initial	2.60	2.40	2.51	4.3mΩ Max.	Meet spec.
			After Current Cycling	2.67	2.45	2.57	4.3mΩ Max.	Meet spec.
2120745-2 with 0.56mm Double wire	10	Initial	3.64	2.72	3.21	4.6mΩ Max.	Meet spec.	
		After Current Cycling	3.30	2.45	2.95	4.6mΩ Max.	Meet spec.	
2	2120746-2 with 0.63mm Single wire	10	Initial	2.73	2.41	2.54	4.3mΩ Max.	Meet spec.
			After Current Cycling	2.87	2.50	2.68	4.3mΩ Max.	Meet spec.
	2120746-2 with 0.85mm Double wire	10	Initial	1.71	1.34	1.33	2.7mΩ Max.	Meet spec.
			After Current Cycling	1.79	1.39	1.58	2.7mΩ Max.	Meet spec.
2	2120747-2 with 0.85mm Single wire	10	Initial	1.79	1.41	1.64	2.7mΩ Max.	Meet spec.
			After Current Cycling	2.54	1.58	1.88	2.7mΩ Max.	Meet spec.



Fig.4

3.3. Current Cycling

Test result is shown in Table 4, Test Group 2. Typical test setup as shown in Figure 5.

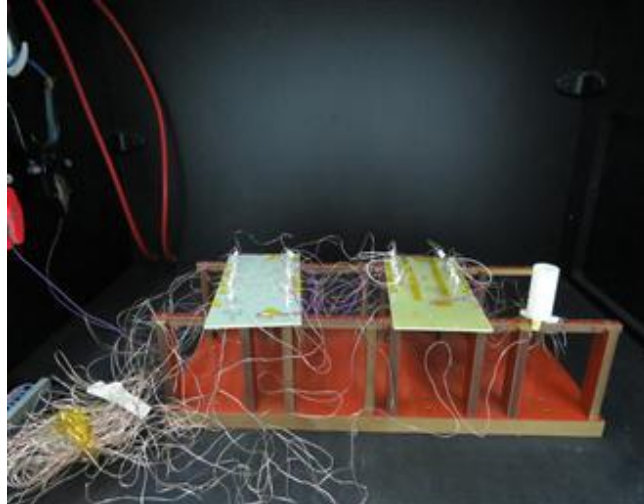


Fig.5

3.4. Terminal Insertion Force
Test result are shown in Table 4.

Table 4

Unit: N

Group	Quantity	Specimen Description	Terminal Insertion Force			Requirement	Judgement
			Max.	Min.	Ave.		
3	20	SLIM LINE MAG-MATE TERMINAL	32.15N	27.47N	29.60N	356N (80pounds) Max.	Meet spec.

3.5. Terminal Extraction Force
Test result are shown in Table 5.

Table 5

Unit: N

Group	Quantity	Specimen Description	Terminal Insertion Force			Requirement	Judgement
			Max.	Min.	Ave.		
3	20	SLIM LINE MAG-MATE TERMINAL	36.17N	27.57N	30.89N	22.25N (5pounds) Min.	Meet spec.

3.6. Thermal Shock
No physical damage. Discolor was found after test.

3.7. Humidity-Temperature Cycling
No physical damage was found after test.

3.8. Temperature Life
No physical damage. Discolor was found after test.



4. CALIBRATION

4.1 Calibration Statement

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

5. VALIDATION

Requested by:

Subramanian, Vijai 2018 12 12
_____ / ____ / _____

Product Engineer
TE Connectivity USA product engineer

Prepared by:

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