

# Qualification Test report

## Micro Motor Connector

501-137039 Rev. A1

Micro Motor Connector

**1. Introduction**

1.1. Testing was performed on Micro Motor Connector to verify whether it meets the requirement of product specification 108-137039,rev:A1

**1.2. Scope:**

This report covers mechanical, electrical and environment performance requirements of Micro Motor Connector

**1.3. Conclusion**

The Micro Motor Connector meets mechanical, electrical and environment performance requirements of product specification 108-137039, Rev:A1

**1.4. Product Description**

This connector is for Micro Motor Power and brake.

1.5. Test Sample P/N:2271268-1

**2. Test Content**

**2.1 EXAMINATION:**

Test Description	Requirement	Procedure
Examination of the product	Meets visual requirements.	Visual inspection per product drawing. Per EIA-364-18

**2.2 ELECTRICAL**

Test Description	Requirement	Procedure
Contact Resistance	30 mΩ Max(initial),50 mΩ Max(final) 100 mΩ Max(for grounding initial) 150 mΩ Max(for grounding final)	Subject specimens to rated current. Per EIA-364-06
Insulation resistance.	500MΩ Min.	Unmated connector with 500 V DC between adjacent contacts for 1 min. Per EIA-364-21
Dielectric withstanding Voltage	No breakdown.	Unmated connector with 2500 V AC between adjacent contacts for 1 min. Per EIA-364-20
Temperature Rising	The temperature rise should be 30°C Max.	Mated connector measured at max rated current with series all contacts. Per EIA-364-70

**2.3 MECHANICAL**

Test Description	Requirement	Procedure
Mating force	17.64N Max.	Measure the force at a max rate of 25mm without outer housing per min. Per EIA-364-13
Unmating force	0.72 N Min.(initial) 0.48N Min.(after durability)	Measure the force required at a max rate of 25mm without outer housing per min. Per EIA-364-13
Contact Insertion force	7.84N Max. per contact	Apply an axial pull-off load to crimped wire. Operation Speed : 25 mm/min.
Contact retention force	14.7N Min. per contact	Apply an axial pull-off load to crimped wire. Operation Speed : 25 mm/min.
Contact crimp strength	18AWG 65N,22AWG 45N	Apply an axial pull-off load to crimped wire of contact secured on the tester, Operation Speed : 25 mm/min.
Durability	No mechanical damage No change to performance Contact resistance: 30mΩ Max.	Mating and unmating specimens for 100 cycles by manual without outer housing Per EIA-364-09.

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Sinusoidal vibration	No discontinuities of 1 microsecond or longer duration.	Mated connectors 100 mA applied. Vibration Frequency : 10~500~10 Hz / 15 min at 1.5 mm amplitude. Accelerated Velocity : 98 m/s <sup>2</sup> ( 10 G ) Vibration Direction: X,Y,Z Duration: 3 hours each EIA 364-28 Test Condition 2
Mechanical shock	No discontinuities of 1 microsecond or longer duration.	Subject mated specimens to 50 G's half-sine shock pulses of 11 milliseconds duration. Three shocks in each direction applied along 3 mutually perpendicular planes, 18 total shocks. Per EIA-364-27, Condition E.

2.4 Environmental

Test Description	Requirement	Procedure
Thermal shock	No physical damage, and meet requirements of additional tests specified in Product Qualification Test Sequence (Item 3.6.5)	Mated connector -55°C/30 min., 85°C/30 min. Making this a cycle, repeat 25 cycles. The measurement is held after being left indoor for 3 hours. EIA 364-32 Method A
Humidity (Temperature cycling)	No physical damage, and meet requirements of additional tests specified in Product Qualification Test Sequence (Item 3.6.5)	Mated connector, 25~65°C, 80~98 % R. H. Cold shock -10°C for 3 hour as figure 2 in EIA-364-31, 1cycle=24hours Repeat 10 cycles The measurement is held after being left indoor for 3 hours. EIA 364-31C Method 4
SO <sub>2</sub> Gas	No corrosion influence performance	Mated conn. SO <sub>2</sub> Gas : 10ppm. 95%RH 25°C, 96hours
Temperature life	No physical damage, and meet requirements of additional tests specified in Product Qualification Test Sequence (Item 3.6.5)	Subject mated specimens to 105 °C for 96 hours. Per EIA-364-17B, Method A, Test Condition 4.
Waterproof	No change to performance	Under 1 m depth water for 30 minutes Per IEC 60529 IP67, 12.5L/min for 3 minutes one side, IP65

*Remark: The text “No mechanical damage” means No structure is damaged/No connection becomes loose/The specimen still is fully functional in electricity after testing.*

3. Product Qualification and Requalification Test Sequence (Sample Size: 5pcs for each group)

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Test group	1	2	3	4	5	6	7	8	9
Examination of product	1,7	1,19	1,3	1,4	1,3	1,7	1,7	1,5	1,9
Contact Resistance	2,4,6	2,5,8,12,14,18						2,4	2,6
Insulation resistance.		3,16				2,5	2,5		3,7
Dielectric withstanding Voltage		4,17				3,6	3,6		4,8
Temperature Rising			2						
Mating force		6,10							
Unmating force		7,11							
Contact insertion force				2					
Contact retention force				3					
Contact crimp strength					2				
Durability		9							
Sinusoidal vibration	3								
Mechanical shock	5								
Water proof						4(IP X7)	4(IP X5)		
Thermal shock		13							
Humidity (Temperature cycling)		15							
SO2 Gas								3	
Temperature life									5

## 4. Test Result

Test Group	Test Item		Unit	Result				Spec.	Judgment
				Set	Max.	Min.	Ave.		
1.1	Examination of product			No Physical damages					Pass
1.2	Contact Resistance	Power&Brake	mΩ	5	11.30	5.05	7.36	30 max.	Pass
		Ground			7.82	5.00	5.96	100 max.	
1.3	Sinusoidal vibration			5	No discontinuities of 1 microsecond or longer duration				Pass
1.4	Contact Resistance	Power&Brake	mΩ	5	15.01	4.97	8.62	50 max.	Pass
		Ground			13.74	4.49	6.87	150 max.	
1.5	Mechanical shock			5	No discontinuities of 1 microsecond or longer duration				Pass
1.6	Contact Resistance	Power&Brake	mΩ	5	9.36	2.42	5.81	50 max.	Pass
		Ground			10.59	4.51	6.15	150 max.	
1.7	Examination of product			No Physical damages					Pass

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Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
2.1	Examination of product		No Physical damages					Pass
2.2	Contact Resistance	mΩ	5	11.00	4.79	7.84	30 max.	Pass
	Power&Brake Ground			7.36	4.42	5.82	100 max.	
2.3	Insulation resistance.	10 <sup>11</sup> Ω	5	6.36	3.09	4.52	500MΩ min.	Pass
2.4	Dielectric withstanding Voltage		5	No breakdown.				Pass
2.5	Contact Resistance	mΩ	5	11.36	5.56	8.25	50 max.	Pass
	Power&Brake Ground			7.95	5.37	6.29	150 max.	
2.6	Mating force	N	5	4.47	3.20	3.87	17.64N max	Pass
2.7	Unmating force	N	5	4.09	3.09	3.60	0.72N min.	Pass
2.8	Contact Resistance	mΩ	5	18.56	6.09	11.06	50 max.	Pass
	Power&Brake Ground			9.30	6.62	8.12	150 max.	
2.9	Durability	Cycle	5	100				pass
2.10	Mating force	N	5	3.49	2.85	3.24	17.64N max	Pass
2.11	Unmating force	N	5	3.39	1.95	2.66	0.48N min.	Pass
2.12	Contact Resistance	mΩ	5	14.79	7.53	10.77	50 max.	Pass
	Power&Brake Ground			8.81	6.75	7.89	150 max.	
2.13	Thermal shock		5	No Physical damages				Pass
2.14	Contact Resistance	mΩ	5	16.74	6.67	12.03	50 max.	Pass
	Power&Brake Ground			13.62	7.29	10.32	150 max	
2.15	Humidity (Temperature cycling)		5	No Physical damages				Pass
2.16	Insulation resistance.	10 <sup>11</sup> Ω	5	5.95	3.01	4.77	500MΩ min.	Pass
2.17	Dielectric withstanding Voltage		5	No breakdown.				Pass
2.18	Contact Resistance	mΩ	5	45.07	11.53	23.33	50 max.	Pass
	Power&Brake Ground			33.55	11.93	18.16	150 max	
2.19	Examination of product		No Physical damages					Pass

Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
3.1	Examination of product		No Physical damages					Pass
3.2	Temperature Rising	°C	5	11.70	10.61	11.42	30 max.	Pass
3.3	Examination of product		No Physical damages					Pass

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Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
4.1	Examination of product		No Physical damages					Pass
4.2	Contact Insertion force	N	5	3.30	1.40	2.25	7.84 max	Pass
4.3	Contact Retention force	N	5	41.02	24.74	31.06	14.7 min	Pass
4.4	Examination of product		No Physical damages					Pass

Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
5.1	Examination of product		No Physical damages					Pass
5.2	Contact Crimp strength	18AWG	5	85.3	72.3	80.8	65 min.	Pass
		22AWG		66.8	60.1	63.6	45 min	
5.3	Examination of product		No Physical damages					Pass

Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
6.1	Examination of product		No Physical damages					Pass
6.2	Insulation resistance	$10^{11} \Omega$	5	7.90	3.95	5.96	$500M \Omega$ min.	Pass
6.3	Dielectric withstanding Voltage		5	No breakdown.				Pass
6.4	Water proof		5	No change to performance				Pass
6.5	Insulation resistance	$10^{11} \Omega$	5	9.89	6.87	9.09	$500M \Omega$ min.	Pass
6.6	Dielectric withstanding Voltage		5	No breakdown.				Pass
6.7	Examination of product		No Physical damages					Pass

Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
7.1	Examination of product		No Physical damages					Pass
7.2	Insulation resistance	$10^{11} \Omega$	5	7.90	3.95	5.96	$500M \Omega$ min.	Pass
7.3	Dielectric withstanding Voltage		5	No breakdown.				Pass
7.4	Water proof		5	No change to performance				Pass
7.5	Insulation resistance	$10^{11} \Omega$	5	9.89	6.87	9.09	$500M \Omega$ min.	Pass
7.6	Dielectric withstanding Voltage		5	No breakdown.				Pass
7.7	Examination of product		No Physical damages					Pass

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Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
8.1	Examination of product		No Physical damages					Pass
8.2	Contact Resistance	mΩ	5	15.58	5.52	9.12	30 max.	Pass
	Power&Brake Ground			8.51	5.63	7.15	100 max.	
8.3	SO <sub>2</sub> Gas		5	No corrosion influence performance				Pass
8.4	Contact Resistance	mΩ	5	18.63	6.78	11.52	50 max.	Pass
	Power&Brake Ground			12.66	6.44	9.65	150 max.	
8.5	Examination of product		No Physical damages					Pass

Test Group	Test Item	Unit	Result				Spec.	Judgment
			Set	Max.	Min.	Ave.		
9.1	Examination of product		No Physical damages					Pass
9.2	Contact Resistance	mΩ	5	14.18	4.89	7.76	30 max.	Pass
	Power&Brake Ground			9.82	5.01	7.10	100 max.	
9.3	Insulation resistance	10 <sup>11</sup> Ω	5	6.71	3.40	5.00	500MΩ min.	Pass
9.4	Dielectric withstanding Voltage		5	No breakdown.				Pass
9.5	Temperature life		5	No physical damage				Pass
9.6	Contact Resistance	mΩ	5	10.23	5.70	8.09	50 max.	Pass
	Power&Brake Ground			8.89	6.40	7.70	150 max.	
9.7	Insulation resistance	10 <sup>11</sup> Ω	5	4.56	0.70	2.50	500MΩ min.	Pass
9.8	Dielectric withstanding Voltage		5	No breakdown.				Pass
9.9	Examination of product		No Physical damages					Pass