

Test Report

MULTI 6P DOUBLE LOCK CONNECTOR

TE Connectivity (Shanghai) Co., Ltd.

1. INTRODUCTION**1.1 Purpose**

Testing was performed on Multi 6p double lock Connector to determine its conformance to the requirements of Product Specification 108-106071, Rev A.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of Multi 6p double lock Connector.

1.3 Product Description

Product Part No	Description
1983658-1	6p housing
1983659-1	4p housing
1983660-1	2p housing
1983661/2-1	Rec. contact(16-20,22-26Awg)
1983663/4-1	Tab contact(16-20,22-26Awg)
1983665-1	1p double lock plate
1983666-1	2p double lock plate
1983667-1	3p double lock plate
1971882-1	2p housing(HV)
1971883-1	4p housing(HV)
1971884-1	6p housing(HV)

Fig. 1**1.4 Environmental Conditions**

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

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

1.5 Qualification Test Sequence

Test or Examination	Test group									
	1	2	3	4	5	6	7	8	9	10
	Test sequence									
Examination of product	1	1	1	1	1	1	1	1	1	1
Termination Resistance (Low Level)		2,5	2,4,6,8,10	2,5						
Dielectric withstanding Voltage						3,6				
Insulation Resistance						2,5				
Temperature Rising					2					
Vibration		3								
Physical Shock		4								
Connector Mating Force	2,5									
Connector Un-mating Force	3,6									
Housing Locking Strength							2			
Contact Insertion Force								2		
Contact Retention Force								3		
Crimp Tensile Strength									2	
Durability	4		3	3						
Thermal Shock			7							
Humidity- Temperature cycling			9			4				
Industrial SO ₂ GAS				4						
Temperature life			5							
Housing Panel Retention Force										2

Fig. 2

* Notes:

Numbers indicate the sequence in which the tests are performed.

2. TEST CONTENT

No.	2.1		
Test Items	Examination of Product		
Requirements	Meets requirements of product drawing and TE Specification (114-5425) After test, no corrosion influence performance.		
Procedures	Visual inspection No physical damage		
Electrical Requirements			
No.	2.2.1		
Test Items	Termination Resistance (Low Level)		
Requirements	40 milliohms max		
Procedures	TE Spec 109-5311-1. Subject mated contacts assembled in housing to 50mV max open circuit at 100mA, closed circuit. see Fig.4		
No.	2.2.2		
Test Items	Dielectric withstanding Voltage		
Requirements	Neither creeping discharge nor flashover shall occur. Current leakage: 0.5mA max.		
Procedures	TE Spec 109-5301 MIL-STD-202 Method 301 Test between adjacent circuits of mated connectors.		
No.	2.2.3		
Test Items	Insulation Resistance		
Requirements	500MΩ min		
Procedures	TE Spec. 109-5302 MIL-STD-202 Method 302 condition B Impressed voltage 500VDC. Test between adjacent circuits of mated connectors.		
No.	2.2.4		
Test Items	Temperature Rising		
Requirements	30°C max. Under loaded specified current or rating current.		
Procedures	TE Spec. 109-5310 Measure temperature rising by energized current. Subject measurement must do at the place of no influence from convection of air. And contacts assembled in housing all of circuits. The thermocouple attach to the contact of center circuit number.		
Mechanical Requirements			
No.	2.3.1		
Test Items	Contact Retention Force		
Requirements	41.16N min.		
Procedures	TE Spec. 109-30 Apply axial pull-off load to crimped wire. Operation speed: 100mm/min		
No.	2.3.2		
Test Items	Crimp Tensile Strength		
Requirements	Wire Size		Crimp Tensile(min.)
	mm ²	(AWG)	N
	0.14	#26	19.6
	0.22	#24	29.4
	0.34	#22	49.0
	0.51	#20	58.8
	0.89	#18	68.6
	1.27	#16	78.5

Procedures	TE Spec. 109-5205 Condition A Apply an axial pull-off load to crimped wire of contact secured on the tester, Operation speed: 25mm/min	
No.	2.3.3	
Test Items	Physical Shock	
Requirements	No electrical discontinuity greater than 1µsec. shall occur. Termination Resistance (Low Level)	
Procedures	TE Spec. 109-5208 Condition A MIL-STD-202, Method 213 Condition A Accelerated Velocity: 490m/s ² Waveform: Sin wave Duration: 11ms Velocity change: 3.4m/s Number of Drops : 3 drops each to normal and reversed directions of X, Y and Z axis, totally 18 drops	
No.	2.3.4	
Test Items	Connector Mating Force	
Requirements	24.5 N max. per 1 contact	
Procedures	TE Spec. 109-5206 Condition B Operation speed: 100mm/min Measure the force required to mate connectors	
No.	2.3.5	
Test Items	Connector un-mating Force	
Requirements	1.47N min per 1 contact	
Procedures	TE Spec. 109-5206 Condition B Operation speed: 100mm/min Measure the force required to mate connectors	
No.	2.3.6	
Test Items	Contac Insertion Force	
Requirements	14.7 N max. per 1 contact	
Procedures	Measure the force required to insert contact into housing.	
Environmental Requirements		
No.	2.4.1	
Test Items	Vibration Sinusoidal High Frequency	
Requirements	No electrical discontinuity greater than 1µ sec shall occur	
Procedures	TE Spec. 109-5202 Condition A MIL-STD-202 Method 204, Condition A Vibration frequency: 10~500 HZ /15 min Accelerated velocity: 98m/s ² Vibration direction: X,Y,Z Duration: 2 hours each	
No.	2.4.2	
Test Items	Durability (repeated mating / un-mating)	
Requirements	Termination resistance (Low Level).	
Procedures	TE Spec. :109-27	
	Plating	Cycles
	Tin (0.8µm)	15
No.	2.4.3	
Test Items	Housing Locking Strength	
Requirements	49N min.	
Procedures	TE spec: 109-5210 Measure housing locking strength. Operation speed: 12.5mm/min	

No.	2.4.4
Test Items	Housing Panel retention force
Requirements	78.4N min.
Procedures	TE spec: 109-5214 Measure Panel retention force using panel of nominal cut-out dimensions as specified in the TE customer drawing
No.	2.4.5
Test Items	Thermal Shock
Requirements	Termination Resistance (Low Level)
Procedures	TE spec: 109-5103 condition A MIL-STD-202 method 107 condition A-1 Mated/Unmated connector -30°C/30min, +85°C/30min Making this a cycle, repeat 25 cycles.
No.	2.4.6
Test Items	Humidity-Temperature cycling
Requirements	Insulation resistance Dielectric strength Termination resistance (Low Level)
Procedures	TE spec: 109-5106 MIL-STD-202 method 106 Mated connector, 25-65°C 90-95% R.H. 10cycles Cold shock -10°C
No.	2.4.7
Test Items	Industrial Gas (SO ₂)
Requirements	Termination Resistance
Procedures	TE spec: 109-5107 condition C Mated connector SO ₂ gas: 10ppm, 90% R.H. 25°C, 96 hours
No.	2.4.8
Test Items	Temperature life (Heat Aging)
Requirements	Termination resistance (Low Level)
Procedures	TE spec: 109-5104-3 condition C MIL-STD-202 Method 108 Mated connector 105°C, Duration: 250 hours

Fig. 3

*** Notes**

- A) Product must be without rust, corrosion transformation, crack and discoloration.
- B) Shall meet visual requirements, show no physical damage, and meet requirements of additional tests as specified in the Product Qualification and Requalification.

3. TEST RESULT

3-1. Test Group 1

3-1-1. Mating/Un-mating Force

UNIT: N

	Initial				After Durability			
	Mating Force		Un-mating Force		Mating Force		Un-mating Force	
	2P	4P	2P	4P	2P	4P	2P	4P
Number of Sample	3	3	3	3	3	3	3	3
Max.	14.56	28.38	15.03	28.16	19.47	31.41	17.13	35.72
Min.	12.71	24.44	12.19	23.16	17.81	28.88	15.75	31.84
Ave.	13.38	26.79	13.45	26.21	18.55	29.91	16.52	33.70
Specification	49.0N Max.	98.0N Max.	2.94N Min.	5.88N Min.	49.0N Max.	98.0N Max.	2.94N Min.	5.88N Min.
Judgment	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

3-2. Test Group 2

3-2-1. Termination Resistance (Low Level)

UNIT: mΩ

	Initial	After Vibration/Physical Shock
Crimped with Single Wire		
Number of Sample	3	3
Max.	3.42	3.52
Min.	2.58	2.59
Ave.	2.86	2.96
Specification	40mΩ max.	40mΩ max.
Judgment	Pass	Pass

3-2-2. Vibration (Low Frequency) & Physical Shock

No electrical discontinuity greater than 1usec occurred.

3-3. Test Group 3

3-3-1. Termination Resistance (Low Level)

UNIT: mΩ

Crimped with Single Wire	Initial	After Durability	After Temperature life	After Thermal Shock	After Humidity
Number of Sample	3	3	3	3	3
Max.	2.76	3.81	4.48	4.27	3.09
Min.	2.00	2.81	1.84	2.85	2.50
Ave.	2.32	3.58	3.58	3.49	2.82
Specification	40mΩ max.	40mΩ max.	40mΩ max.	40mΩ max.	40mΩ max.
Judgment	Pass	Pass	Pass	Pass	Pass

3-4. Test Group 4

3-4-1. Termination Resistance (Low Level)

UNIT: mΩ

Crimped with Single Wire	Initial	After Durability/Industrial SO ₂ GAS
Number of Sample	5	5
Max.	4.41	11.38
Min.	3.64	8.01
Ave.	3.91	9.62
Specification	40mΩ max.	40mΩ max.
Judgment	Pass	Pass

3-5. Test Group 5

3-5-1. Temperature Rising

UNIT: °C

Crimped with Single Wire	16AWG	18AWG	20AWG	22AWG	24AWG	26AWG
Current	9A	8A	7A	5A	4A	3A
Number of Sample	3	3	3	3	3	3
Max.	25.4	29.4	27.7	23.4	19.3	16.4
Min.	23.5	27.1	24.0	20.8	16.5	14.5
Ave.	24.67	28.03	26.0	22.23	17.97	15.17
Specification	30°C max.	30°C max.	30°C max.	30°C max.	30°C max.	30°C max.
Judgment	Pass	Pass	Pass	Pass	Pass	Pass

3-6. Test Group 6

3-6-1 Insulation Resistance

UNIT: Ω

Crimped with Single Wire	Initial	After Humidity Temperature Cycling
Number of Sample	3	3
Max.	2.19x10 ¹³	2.98x10 ¹¹
Min.	6.78x10 ¹²	0.43x10 ¹¹
Ave.	1.79x10 ¹³	1.26x10 ¹¹
Specification	500MΩ min.	500MΩ min.
Judgment	Pass	Pass

3-6-2 Dielectric Withstanding Voltage

No creeping discharge, No flashover occurred.

3-7. Test Group 7

3-7-1 Housing Lock Strength

UNIT: N

	2P	4P
Number of Sample	6	6
Max.	60.00	87.313
Min.	55.30	76.750
Ave.	57.53	82.056
Specification	49N Min	49N Min
Judgment	Pass	Pass

3-8. Test Group 8

3-8-1. Contact Insertion/Retention Force

UNIT: N

Crimped with Single Wire	Contact Insertion Force		Contact Retention Force	
	Pin	Rec.	Pin	Rec.
Number of Sample	3	3	3	3
Max.	6.29	6.64	49.26	48.71
Min.	3.36	4.34	48.63	48.70
Ave.	4.83	5.49	48.94	48.70
Specification	14.7N Max.	14.7N Max.	41.16N Min.	41.16N Min.
Judgment	Pass	Pass	Pass	Pass

3-9. Test Group 9

3-9-1. Crimp Tensile Strength

UNIT: N

Crimped with Single Wire	16AWG		18AWG		20AWG	
	Pin	Rec.	Pin	Rec.	Pin	Rec.
Number of Sample	2	2	5	5	5	5
Max.	269.56	213.19	149.60	150.70	104.72	91.59
Min.	256.97	180.13	137.01	135.77	81.78	86.16
Ave.	263.27	196.66	142.59	141.51	91.46	88.43
Specification	78.5N Min.	78.5N Min.	58.8N Min.	58.8N Min.	58.8N Min.	58.8N Min.
Judgment	Pass	Pass	Pass	Pass	Pass	Pass

UNIT: N

Crimped with Single Wire	22AWG		24AWG		26AWG	
	Pin	Rec.	Pin	Rec.	Pin	Rec.
Number of Sample	5	5	5	5	5	5
Max.	78.05	73.52	66.56	62.03	50.03	45.47
Min.	70.46	62.58	58.97	51.09	42.38	32.03
Ave.	74.46	69.91	62.97	58.42	47.63	41.63
Specification	49.0N Min.	49.0N Min.	29.4N Min.	29.4N Min.	19.6N Min.	19.6N Min.
Judgment	Pass	Pass	Pass	Pass	Pass	Pass

3-10. Test Group 10

3-10-1. Housing Panel Retention Force

UNIT: N

Number of Sample	3
Max.	676.41
Min.	379.84
Ave.	454.24
Specification	78.4N min.
Judgment	Pass

4. Conclusion

Multi 6P Double Lock Connector conformed to the electrical, mechanical, environmental requirements of Product Specification 108-106071, Rev A.

5. VALIDATION

Requested by:

Daniel Zhang 12 11 20
_____ / ____ / ____

Product Engineer
Shanghai Engineering Center (CIS)

Prepared by:

Coco Xu 12 11 20
_____ / ____ / ____

Test Engineer
Shanghai Engineering Center (CIS)

Approved by:

YH Mao 12 11 20
_____ / ____ / ____

Manager
Shanghai Engineering Center (CIS)