

Qualification Test Report

D1500 Junction Box

TE Connectivity. (Shanghai) Co., Ltd.

1. INTRODUCTION

1.1 Purpose

Testing was performed on D1500 Junction box to determine its conformance to the requirements of Design Objective 108-106027, Rev. A1.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of Terminal block.

1.3 Product Description

P/N	Name	Remarks
1971151-1	D1500 Junction box 34P "H" type	AWG #26 & #22
1971151-2	D1500 Junction box 34P "V" type	AWG #26 & #22
1971150-1	Receptacle 10P Plug Housing	Existing part no.
1-1827579-1	Dynamic D1500T Rec HSG 3 Pos	Existing part no.
1827570-2	Dynamic D1000 Series Rec Contact (M type)	--
1971181-1	Dynamic D1500 attachment Housing	--
1-2069029-2	Dynamic D1500T Rec HSG 6 Pos	--
1-2069029-3	Dynamic D1500T Rec HSG 9 Pos	-
1-2069029-4	Dynamic D1500T Rec HSG 12 Pos	--

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	11	12
	Test Sequence (a)											
Confirmation of Product	1,4	1,3	1,3	1,3	1,3	1,6	1,7	1,4	1,4	1,4	1,4	1,4
Termination Resistance (Low Level)						2,5	2,6	2,5	2,6	2,5	2,5	2,5
Dielectric withstanding Voltage									4,8			
Insulation Resistance									3,7			
Temperature Rising				2								
Vibration (High Frequency)						3						
Physical Shock						4						
Connector Mating Force							3					
Connector Unmating Force							4					
Contact Insertion Force			2									
Contact Mating Force	2											
Contact Unmating Force	3											
Durability (Repeated Mating/Unmating)							5					
Housing Locking Strength		2										
Humidity-Temperature Cycling									5			
Thermal Shock								3				
Salt Spray										3		
Contact Retention Force					2							
Temperature Life(Heat Asing)											3	
SO ₂												3

(a) Numbers indicate the sequence in which the tests are performed.

Fig. 2

2. TEST CONTENT

No.	3.5.1
Test Items	Examination of Product
Requirements	Meets requirements of product drawing and AMP Specification (114-5377) After test, no corrosion influence performance.
Procedures	Visual inspection No physical damage
Electrical Requirements	
No.	3.5.2
Test Items	Termination Resistance (Low Level)
Requirements	10 mΩ Max. (Initial) 20 mΩ Max. (Final)
Procedures	Subject mated contacts assembled in housing to 20mV Max. open circuit at 10mA. Take the resistance of the wire only away from measurement. AMP Spec. 109-5311-1
No.	3.5.3
Test Items	Insulation Resistance
Requirements	1000 MΩ Min. (Initial) 100 MΩ Min. (Final)
Procedures	Impressed voltage 500 V DC. Test between adjacent circuits contact of mated connectors. AMP Spec. 109-5302 MIL-STD-202, Method 302 Condition B
No.	3.5.4
Test Items	Dielectric withstanding Voltage
Requirements	No creeping discharge nor flashover shall occur. Current leakage : 0.5 mA Max.
Procedures	1500V AC for 1 minute. Test between adjacent circuits contact of mated connectors.
No.	3.5.5
Test Items	Temperature Rising
Requirements	30°C Max. under loaded specified current.
Procedures	Install Contact in the housing, energize, and measure the rise in heat by energizing. The measurement is measured on the condition of not receiving the influence of the convection of air. The thermo-couple is measured attaching to Crimp of the wire barrel of Contact. AMP Spec. 109-5310
Mechanical Requirements	
No.	3.5.6
Test Items	Vibration (High Frequency)
Requirements	No electrical discontinuity greater than 1 μ sec. shall occur. 20 mΩ Max. (Final)
Procedures	Subject mated connectors to 10-500-10 Hz traversed in 1cycle per 15 minute at 1.52mm amplitude 3 hours each of 3 mutually perpendicular planes. 100 mA applied. AMP Spec : 109-5202, Condition A MIL-STD-202 : Method 204, Condition A The product is mounted as Fig 7,8,9.

No.	3.5.7
Test Items	Shock
Requirements	No electrical discontinuity greater than 1 μ sec. shall occur. 20 m Ω Max. (Final)
Procedures	Mated connectors Accelerated Velocity : 490m/s ² Waveform : Sign Curve Duration : 11 m sec. Number of Drops : 3 drops each to normal and reversed directions of X, Y and Z axes, totally 18 drops. The product is mounted as fig 7, 8 and 9. AMP Spec. 109-5208 MIL-STD-202, Method 213 Condition A
No.	3.5.8
Test Items	Connector Mating/Unmating Force
Requirements	Mating Force (2.94 \times Pos.)N Max. (300 \times Pos.)g Max.
	Unmating Force (0.12 \times Pos.)N Min. (1st) (12 \times Pos.)g Min. (1st) (0.08 \times Pos.)N Min. (50th) (8 \times Pos.)g Min. (50th)
Procedures	Operation Speed : 25 mm/min. Measure the force required to mate/unmate connectors. However, It is measure without HSG Lock
No.	3.5.9
Test Items	Contact Insertion Force
Requirements	7.84N (0.8 kgf) Max.per contact
Procedures	Measure the force required to insert contact into housing. AMP Spec. 109-5211
No.	3.5.10
Test Items	Contact Retention Force
Requirements	14.7N(1.5kgf) Min.
Procedures	Apply an axial pull-off load to crimped wire. Operation Speed : 100 mm / min. AMP Spec. 109-5210

No.	3.5.11
Test Items	Contact Mate/Unmating Force
Requirements	Mate 2.94N(300g)Max.(1st~50th)
	Unmating 0.12N(12g)Min. (1st) 0.08N (8g)Min. (50th)
Procedures	Operation speed 100 mm/min AMP Spec. 109-5206
No.	3.5.12
Test Items	Durability (Repeated Mate/Unmating)
Requirements	20 mΩ Max.
Procedures	No. of Cycles : 50 cycles
No.	3.5.13
Test Items	Housing Locking Strength
Requirements	24.5 N (2.5 kgf) Min.
Procedures	Measure connector locking strength. Operation Speed : 100 mm/min. AMP Spec. 109-5210
No.	3.5.14
Test Items	Thermal Shock
Requirements	20 mΩ Max. (Final)
Procedures	Mated connector -55°C/30 min., 85°C/30 min. Making this a cycle, repeat 25 cycles. AMP Spec. 109-5103 Condition A MIL-STD-202 Method 107-1 Condition A-1 The measurement is held after being left indoor for 3 hours.
No.	3.5.15
Test Items	Humidity-Temperature Cycling
Requirements	Dielectric withstanding voltage 1 minute.(Final) 2.0 mm pitch: 1000V AC 2.5 & 3.5mm pitch: 1500V AC Current leakage : 0.5 mA Max. Insulation resistance 100 MΩ Min. (Final) Termination resistance 20 mΩ Max. (Final)
Procedures	Mated connector, 25~65°C, 80~98 % R. H. 10 cycles Cold shock -10°C(not) performed AMP Spec. 109-5106 MIL-STD-202, Method 106 The measurement is held after being left indoor for 3 hours. 1cycle=24hours

Environmental Requirements	
No.	3.5.16
Test Items	Salt Spray
Requirements	20 mΩ Max. (Final) No corrosion influence performance
Procedures	Subject mated connectors to 5 ± 1% salt concentration for 48 hours : MIL-STD-202, Method 101 Condition B The measurement is held after remove the salt and dry up at indoor.
No.	3.5.17
Test Items	Temperature Life (Heat Aging)
Requirements	20 mΩ Max. (Final)
Procedures	Mated Conn. 105 ± 2°C Duration :96 hr AMP Spec. 109-5104-3 Condition A The Measurement is held after being left indoor for 3 hours.
No.	3.5.18
Test Items	SO ₂ Gas
Requirements	20 mΩ Max. (Final) No corrosion influence performance
Procedures	Mated conn. SO ₂ Gas : 10ppm. 95%RH 25°C, 96hours AMP Spec. 109-5107 Condition C

Fig. 3

Product must be without rust, corrosion transformation, crack and discoloration.

3. TEST RESULT

3-1 Test Group 1

3-1-1 Contact Mating / Unmating Force

UNIT: N

	Mating(1st~50th)	Unmating (1 st)	Unmating (50 th)
Number of sample	10	10	10
Max.	0.69	0.43	0.59
Min.	0.34	0.29	0.37
Ave.	0.47	0.36	0.45
Specification	2.94Max.	0.12Min	0.08Min
Judgment	Acceptable	Acceptable	Acceptable

3-2 Test Group 2

3-2-1 Housing Locking Strength

UNIT: N

	10P	3P	6P	9P	12P
Number of sample	10	10	5	5	5
Max.	100.6	45.20	63.22	129.31	168.06
Min.	86.64	42.12	58.22	110.75	146.75
Ave.	94.33	44.07	55.08	115.34	156.92
Specification	24.5 Min.	24.5 Min.	24.5 Min.	24.5 Min.	24.5 Min.
Judgment	Acceptable	Acceptable	Acceptable	Acceptable	Acceptable

3-3 Test Group 3

3-3-1 Contact Insertion Force

UNIT: N

	10P
Number of sample	10
Max.	1.53
Min.	1.01
Ave.	1.35
Specification	7.84 Max.
Judgment	Acceptable

3-4 Test Group 4

3-4-1 Temperature Rising

UNIT: °C

	AWG#22(3A)	AWG#26(1A)
Number of sample	4	4
Max.	18.13	5.15
Min.	2.00	0.35
Ave.	11.30	2.75
Specification	30 Max.	30 Max.
Judgment	Acceptable	Acceptable

3-5 Test Group 5

3-5-1 Contact Retention force

UNIT: N

Number of sample	10
Max.	31.8
Min.	29.0
Ave.	29.8
Specification	14.7 Min.
Judgment	Acceptable

3-6 Test Group 6

3-6-1 Termination Resistance (Low Level)

UNIT: mΩ

	Initial	Final
Number of sample	5	5
Max.	7.31	15.69
Min.	4.40	4.77
Ave.	4.88	5.93
Specification	10 Max.	20 Max.
Judgment	Acceptable	Acceptable

3-6-2 Vibration

No electrical discontinuity greater than 1 μ sec shall occur. -----Acceptable

3-6-3 Physical Shock

No electrical discontinuity greater than 1 μ sec shall occur. -----Acceptable

3-7 Test Group 7

3-7-1 Termination Resistance (Low Level)

UNIT: mΩ

	Initial	Final
Number of sample	5	5
Max.	6.26	9.46
Min.	4.12	3.71
Ave.	4.84	5.04
Specification	10 Max.	20 Max.
Judgment	Acceptable	Acceptable

3-7-2 Connector Mating / Unmating Force

3-7-2-1 10P

UNIT: N

	Mating (1 st)	Unmating (1 st)	Unmating (50 th)
Number of sample	5	5	5
Max.	8.16	8.27	7.26
Min.	5.96	5.20	4.14
Ave.	7.25	7.05	6.00
Specification	29.40 Max.	1.20 Min.	0.80 Min.
Judgment	Acceptable	Acceptable	Acceptable

3-7-2-2 3P

UNIT: N

	Mating (1 st)	Unmating (1 st)	Unmating (50 th)
Number of sample	5	5	5
Max.	1.85	2.03	1.71
Min.	1.16	1.31	1.07
Ave.	1.39	1.66	1.43
Specification	8.82 Max.	0.36 Min.	0.24 Min.
Judgment	Acceptable	Acceptable	Acceptable

3-7-2-3 6P

UNIT: N

	Mating (1 st)	Unmating (1 st)	Unmating (50 th)
Number of sample	5	5	5
Max.	5.98	5.00	2.26
Min.	3.91	3.19	2.11
Ave.	4.88	4.42	2.16
Specification	17.64 Max.	0.72 Min.	0.48 Min.
Judgment	Acceptable	Acceptable	Acceptable

3-7-2-4 9P

UNIT: N

	Mating (1 st)	Unmating (1 st)	Unmating (50 th)
Number of sample	5	5	5
Max.	15.76	15.25	8.65
Min.	8.06	11.63	7.66
Ave.	12.41	13.73	7.99
Specification	26.46 Max.	1.08 Min.	0.72 Min.
Judgment	Acceptable	Acceptable	Acceptable

3-7-2-5 12P

UNIT: N

	Mating (1 st)	Unmating (1 st)	Unmating (50 th)
Number of sample	5	5	5
Max.	16.10	32.31	7.43
Min.	9.34	16.72	6.35
Ave.	12.46	22.91	7.11
Specification	35.28 Max.	1.44 Min.	0.96 Min.
Judgment	Acceptable	Acceptable	Acceptable

3-8 Test Group 8

3-8-1 Thermal Shock

UNIT: mΩ

	Initial	Final
Number of sample	5	5
Max.	5.52	7.53
Min.	4.09	4.30
Ave.	4.73	5.08
Specification	10 Max.	20 Max.
Judgment	Acceptable	Acceptable

3-9 Test Group 9

3-9-1 Termination Resistance (Low Level)

UNIT: mΩ

	Initial	Final
Number of sample	5	5
Max.	8.99	9.11
Min.	3.56	4.18
Ave.	4.51	5.15
Specification	10 Max.	20 Max.
Judgment	Acceptable	Acceptable

3-9-2 Insulation Resistance

UNIT: Ω

	Initial	Final
Number of sample	5	5
Result	1.0×10^{13} Min.	1.0×10^{12} Min.
Specification	1.0×10^9 Min.	1.0×10^8 Min.
Judgment	Acceptable	Acceptable

3-9-3 Dielectric withstanding Voltage

	Initial	Final
Number of sample	5	5
Result	No creeping discharge, no flashover occurred.	No creeping discharge, no flashover occurred.
Specification	Test voltage: 1.5KAC	Test voltage: 1.5KAC
Judgment	Acceptable	Acceptable

3-10 Test Group 10

3-10-1 Salt Spray

UNIT: m Ω

	Initial	Final
Number of sample	5	5
Max.	6.03	7.63
Min.	4.38	4.31
Ave.	4.95	5.52
Specification	10 Max.	20 Max.
Judgment	Acceptable	Acceptable

3-11 Test Group 11

3-11-1 SO₂

UNIT: m Ω

	Initial	Final
Number of sample	5	5
Max.	6.02	7.28
Min.	4.15	4.08
Ave.	4.80	5.13
Specification	10 Max.	20 Max.
Judgment	Acceptable	Acceptable

4. Conclusion

D1500 Junction Box conformed to the electrical, mechanical, and environmental performance requirements of Design Objective 108-106027, Rev A1.

5. VALIDATION

Requested by:

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_____/_____/_____

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