Validation Test Report

2.3 DIA CLUSTER BLOCK

October 09, 2014.

Tested & Reported By	Reviewed By	Approved By	Test Date	From September 24, 2014 To October 08, 2014
			Classification	Unrestricted

TE CONNECTIVITY RELIABILITY TEST REPORT

Test Name : Validation for 2.3 DIA CLUSTER BLOCK.

1. Introduction

1-1 Purpose

Testing was performed on the 2.3 DIA CLUSTER BLOCK to determine
if it conformance to the requirements of Product Specification 108-61239, Rev.A
This experiment is intended to verify the reliability of the add raw material.
(GWT Version)

1-2 Scope

This report covers the electrical, mechanical, environmental performance requirements
of the 2.3 DIA CLUSTER BLOCK.
The testing was performed between September 24, 2014 and October 08, 2014.

1-3 Test Samples

The test samples were randomly selected from normal current production lots.

P/N	Description
171370-4	2.3 DIA CLUSTER BLOCK(GWT)
5-170063-2	2.3 DIA CLUSTER PIN RECEPTACLE

1-4 Conclusion

The 2.3 DIA CLUSTER BLOCK meets the electrical, mechanical and
environmental performance requirements of Product Specification 108-61239, Rev.A

1-5 Attachment

1) Test Sequence
2) Requirements and Test Procedure
3) Test Result
4) Photograph of Test

1) Test Sequence

Test or Examination	Test Group									
	1	2	3	4	5	6	7	8	9	10
	Test Sequence(a)									
Examination of Product	1,3	1,3	1,7	1,3	1,3	1,3	1,3	1,5	1,3	1,3
Terminal Resistance (LLCR)			2,6					2,4		
Dielectric withstanding Voltage	2									
Temperature Rising		2								
Connector Mating Force			3							
Connector Unmating Force			4							
Durability(Repeated Mate/Unmating)			5							
Contact Retention Force				2						
Contact Unmating Force					2					
Crimp Tensile Strength						2				
Contact Insertion Force							2			
Thermal shock								3		
Heat resistance									2	
Glow Wire Test 750℃										2

2) Requirements and Test Procedure

No.	Test Items	Requirements	Procedures
3.5.1	Examination of Product	Meets requirements of product drawing and Application Specification 114-5235. After test, no corrosion influence performance and no physical damage	Visual inspection EIA-364-18
		Electrical Requirements	
3.5.2	Terminal Resistance (Low Level Contact Resistance)	5 mΩ Max.(Initial) 8 mΩ Max.(Final)	Subject mated contact assembled in housing to 20mV Max. open circuit at 100mA. Take the resistance of the wire and the Fusite pin away from measurement. See Fig.4 TE Spec. 109-5311-1 EIA-364-23
3.5.3	Dielectric withstanding Voltage	Neither creeping discharge nor flashover shall occur.	2.2 kV AC for 1 minute. Test between adjacent circuits of unmated connectors. Current leakage : 5 mA Max. EIA-364-20,Condition I
3.5.4	Temperature Rising	When subjected to test current of 10 amp d.c., mated connectors shall not show a temperature rise greater than 35℃	According to the test method specified in Fig.4, while increasing test potential by 5amp d.c., measurement shall be done until the temperature rises up to 150℃. The applicable pin shall be the Fusite Pin of Part No. 398-38. TE Spec. 109-5310 EIA-364-70, Method 1.
		Mechanical Requirements	
3.5.5	Connector Mating Force	3 Positions : 134.4N (13.7kgf) Max. (Initial) 156.8N (16.0kgf) Max. (6th)	Measure the force required to mate connectors. Operation speed : 100mm/min TE Spec. 109-5206 Condition : The gauge pin shown in Fig.2 shall be used.
3.5.6	Connector Unmating Force	3 Positions : 37.3N (3.8kgf) Min.	Measure the force required to unmate connectors. Operation speed : 100mm/min. Amp Sped. 109-5206 Condition : The gauge pin shown in Fig.2 shall be used.
3.5.7	Durability(Repeated Mate/Unmating)	8 mΩ Max.	No. of Cycles : 6 cycles

<table>
<tr><td>3.5.8</td><td>Contact Retention Force</td><td colspan="3">68.6N (7kgf) Min. per contact.</td><td>The contacts crimped on an approximately 150mm long wire and then assembled in the housing shall be set to a tensile tester, and an axial pull-off load shall be applied to the crimped wire.
Operation speed : 100mm/min.
EIA-364-29</td></tr>
<tr><td>3.5.9</td><td>Contact Unmating Force</td><td colspan="3">12.1N (1.23kgf) Min.</td><td>Measure the force required to unmate contact.
Operation speed : 100mm/min.
Condition : The applicable pin shown in Fig.5 shall be used.</td></tr>
<tr><td rowspan="5">3.5.10</td><td rowspan="5">Crimp Tensile Strength</td><td colspan="2">Wire Size</td><td>Tensile Strength (Min)</td><td rowspan="5">Apply an axial pull-off load to crimped on a 150mm long wire of contact secured on the tester.
Take insulation barrel away.

Operation speed : 100mm/min.
TE Spec. 109-5205</td></tr>
<tr><td>mm2</td><td>AWG</td><td>N (kgf)</td></tr>
<tr><td>0.50</td><td>20</td><td>78.4 (8.0)</td></tr>
<tr><td>0.75</td><td>18</td><td>98.0 (10.0)</td></tr>
<tr><td>1.25</td><td>16</td><td>147.0 (15.0)</td></tr>
<tr><td>3.5.11</td><td>Contact Insertion Force</td><td colspan="3">14.7N (1.5kgf) Max.</td><td>Measure the force required to insert contact in housing.
AMP Spec. 109-5211</td></tr>
<tr><td colspan="6">Environmental Requirements</td></tr>
<tr><td>3.5.12</td><td>Thermal shock</td><td colspan="3">8mΩ Max.(Final)</td><td>Mated connector,
-40℃ 30min./ 85℃ 30min.
Making this a cycle, repeat 250cycles.
EIA 364-32
The Measurement is held after being left indoor for 3 hours.</td></tr>
<tr><td>3.5.13</td><td>Heat resistance</td><td colspan="3">No crazing and deformations observed.</td><td>The housing shall be placed into an oven held at 160℃ for 6 hours.</td></tr>
<tr><td>3.5.14</td><td>Glow Wire Test 750℃</td><td colspan="3">1.Te-Ti ≤2s or no flame
2.Light tissue paper should not burns</td><td>1. The extremity of the wire is positioned horizontally and brought into contact with the sample with a force between 0.8 and 1.2N for a period of 30s.

2. Test temperature: 750℃

3. Execute visual check and take picture after the test. IEC 60695-2-11</td></tr>
</table>

3) Test Result

- Test Group 1

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Dielectric withstanding Voltage	Initial	Neither creeping discharge nor flashover shall occur.	-	-	OK	OK	OK	OK	OK	-	-	-	OK

- Test Group 2

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Temperature Rising	Initial	Δ 35 ℃ Max. AWG16 : 10A AWG18 : 7A AWG20 : 5A	℃	#16	25.89	20.02	25.19	22.96	23.69	20.02	25.89	23.55	OK
					#18	16.14	15.48	15.78	16.09	15.62	15.48	16.14	15.82	OK
					#20	9.15	8.64	7.75	8.87	8.15	7.75	9.15	8.51	OK

- *Test Group 3*

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Termination Resistance (Low Level)	Initial	5 mΩ Max.	mΩ	-	4.21	4.36	4.37	4.26	4.27	4.21	4.37	4.29	OK
		After Durability	8 mΩ Max.			4.38	4.40	4.41	4.35	4.30	4.30	4.41	4.37	OK
3	Connector Mating Force	Initial	13.7 kgf Max.	kgf	-	13.40	12.15	11.43	13.17	12.43	11.43	13.40	12.52	OK
		After Durability	16 kgf Max.			12.38	11.91	10.98	12.22	11.67	10.98	12.38	11.83	OK
4	Connector Un-Mating Force	Initial	3.8 kgf Min.			8.44	8.66	8.71	7.93	8.76	7.93	8.76	8.50	OK

- *Test Group 4*

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Contact Retention Force	Initial	7 kgf Min.	kgf	-	14.62	14.25	14.60	15.15	14.43	14.25	15.15	14.61	OK

- *Test Group 5*

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Contact Unmating Force	Initial	1.23 kgf Min.	kgf	-	2.56	2.68	2.70	2.35	2.44	2.35	2.70	2.55	OK

- *Test Group 6*

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Crimp Tensile Strength	Initial	15 kgf Min.	kgf	#16	28.58	27.98	30.31	29.77	31.21	27.98	31.21	29.57	OK
			10 kgf Min.		#18	23.09	22.89	22.57	21.98	23.16	21.98	23.16	22.74	OK
			8 kgf Min.		#20	12.49	12.25	12.34	12.44	12.57	12.25	12.57	12.42	OK

- *Test Group 7*

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Contact Insertion Force	Initial	1.5 kgf Max.	kgf	-	1.34	1.09	1.22	1.07	1.31	1.07	1.34	1.21	OK

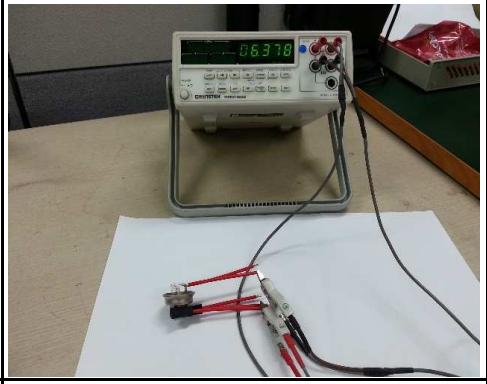
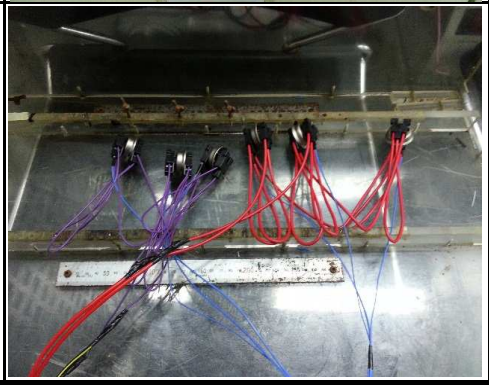
- *Test Group 8*

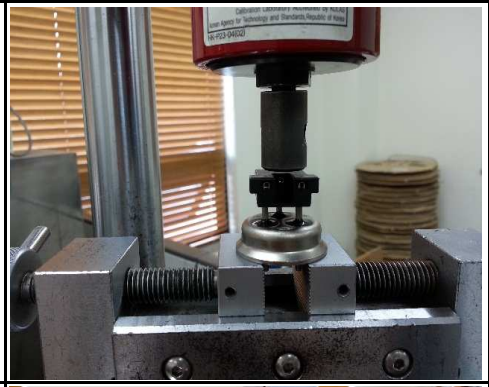
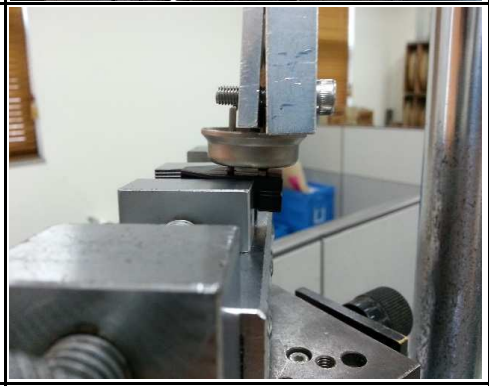
NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Termination Resistance (Low Level)	Initial	5 mΩ Max.	mΩ	-	4.32	4.60	4.24	4.51	4.61	4.24	4.61	4.46	OK
		After Thermal Shock	8 mΩ Max.		-	4.42	4.84	4.46	4.63	4.68	4.42	4.84	4.61	OK

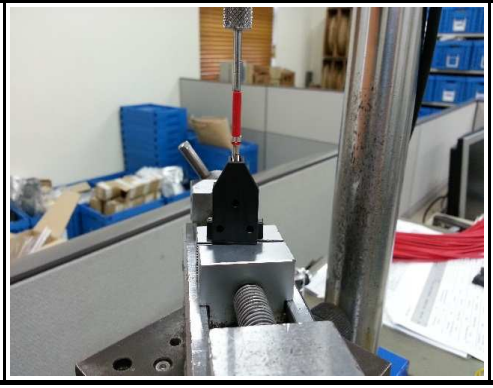
- *Test Group 9*

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result									Judgment
					Wire (AWG)	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	Meets requirements of product drawing	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final	No corrosion influence performance and no physical damage			OK	OK	OK	OK	OK	-	-	-	OK
2	Heat Resistance	Initial	No crazing and deformations observed.	-	-	OK	OK	OK	OK	OK	-	-	-	OK

4) Photograph of Test

NO.	Test Items	Photograph	Remark
1	Termination Resistance (Low Level)		-
2	Dielectric Withstanding Voltage		-
3	Temperature Rising		-

NO.	Test Items	Photograph	Remark
4	Connector Mating Force		-
5	Connector Unmating Force		-
6	Contact Retention Force		-

NO.	Test Items	Photograph	Remark
7	Contact Unamting Force		-
8	Crimp Tensile Strength		-
9	Contact Insertion Force		-

NO.	Test Items	Photograph	Remark
10	Thermal Shock		-
11	Temperature Life (Heat Aging)		-
12	-	-	-