

Validation Test Report

HYB 20P CAP/PLUG HSG

October 13, 2014.



Tested & Reported By	Reviewed By	Approved By	Test Date	From September, 2014 To October 10, 2014
			Classification	Unrestricted

● TE CONNECTIVITY RELIABILITY TEST REPORT

Test Name : Validation for HYB 20P CAP/PLUG HSG.

1. Introduction

1-1 Purpose

Testing was performed on the HYB 20P CAP/PLUG HSG to determine if it conformance to the requirements of Product Specification 108-61192, Rev.A

1-2 Scope

This report covers the electrical, mechanical, environmental performance requirements of the HYB 20P CAP/PLUG HSG.

The testing was performed between September 15, 2014 and October 10, 2014.

1-3 Test Samples

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

P/N	Description
2188645-1	HYB 20P PLUG HSG(2R)
2188646-1	HYB 20P CAP HSG(2R)
2188647-2	HYB 20P TPA HSG
2232499-1	PTL Rec Contact (AWG 2 x #20 ~ #18)
2232498-1	PTL Tab Contact (AWG 2 x #20 ~ #18)
1971783-1	PTL Rec Contact (AWG #19 ~ #16)
1971784-1	PTL Tab Contact (AWG #19 ~ #16)
1971785-1	PTL Rec Contact (AWG #22 ~ #20)
1971786-1	PTL Tab Contact (AWG #22 ~ #20)
177915-1	PDL Rec Contact (AWG #20 ~ #16)
177914-1	PDL Rec Contact (AWG #26 ~ #22)
177917-1	PDL Tab Contact (AWG #20 ~ #16)
177916-1	PDL Tab Contact (AWG #26 ~ #22)
1743728-1	FG Rec Contact (AWG #26 ~ #22)
1743729-1	FG Rec Contact (AWG #20 ~ #16)

1-4 Conclusion

The HYB 20P CAP/PLUG HSG meets the electrical, mechanical and environmental performance requirements of Product Specification 108-61192, 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	11
		Test Sequence (a)										
1	Examination of Product	1,7	1,8	1,9	1,11	1,5	1,3	1,3	1,4	1,4	1,3	1,3
2	Terminal Resistance (Low Level Contact Resistance)	2,4,6	3,6	2,5,7	2,6,8	2,4						
3	Insulation Resistance				3,9							
4	Dielectric withstanding Voltage				4,10							
5	Temperature Rising			3,8								
6	Sinusoidal Vibration (Low Frequency)	3										
7	Mechanical Shock	5										
8	Connector Mating Force		2									
8	Connector Unmating Force		4,7									
9	Contact Insertion Force								2			
10	Contact Retention Force								3			
11	Contact Mating / Unmating Force							2				
12	Crimp Tensile Strength						2					
13	Durability (repeated Mate / Unmating)		5									
14	Housing Locking Strength									2		
15	Housing Panel Retention Force									3		
16	Drop Test										2	
17	Thermal shock				5							
18	Humidity-Temperature Cycling			4 (b)	7							
19	Temperature Life			6								
20	Salt spray					3						
21	Glow Wire Test 750℃											2

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

(b) Connectors shall be preconditioned with 5 cycles of durability.

2) Requirements and Test Procedure

No.	Test Items	Requirements	Procedures
3.5.1	Examination of Product	Meets requirements of product drawing and TE/AMP specification (114-5175 and 114-61085). 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)	7 mΩ Max.(Initial) 10 mΩ Max.(Final)	Subject mated contact assembled in housing to 20mV Max. open circuit at 100mA. Take the resistance of the wire only away from measurement. Fig.3 TE Spec. 109-5311-1 EIA-364-23
3.5.3	Insulation Resistance	1000 MΩ Min.(Initial) 500 MΩ Min.(Final)	Impressed voltage 500 V DC for 2minute. Test between adjacent circuits and between the surface of housing and contact of mate connectors. TE Spec: 109-5302 EIA-364-21
3.5.4	Dielectric	Neither creeping discharge nor	2.2 kV AC for 1 minute.
	withstanding Voltage	flashover shall occur. Current leakage: 5 mA Max.	Test between adjacent circuits and between the surface of housing and contact of mated connectors. EIA-364-20, Condition I
3.5.5	Temperature Rising	30°C Max. under loaded specified current	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 with all of circuits connected. The thermocouple attach to the contact of center circuit number. Stabilize at a single current level until 3 readings at 5 minute intervals are within 1°C. TE Spec. 109-5310 EIA-364-70, Method 1.
		Mechanical Requirements	
3.5.6	Sinusoidal Vibration (Low Frequency)	No electrical discontinuity greater than 1 μsec shall occur. LLCR 10 mΩ Max. (Final) No physical damage.	Subject mated connectors to 10-55-10 Hz traversed in 1 minute at 1.52mm amplitude maximum total excursion, 2 hours each of 3 mutually perpendicular planes. 100 mA Applied TE Spec. 109-5201 EIA-364-28, Test Condition I
3.5.7	Mechanical Shock	No electrical discontinuity greater than 1 μsec shall occur. LLCR 10 mΩ Max. (Final). No physical damage.	Subject mated connector to 50G's half-sine shock pulse of 11ms duration. 3 drops each to normal and reversed directions of X, Y and Z axes, totally 18 drops TE Spec. 109-5208 EIA-364-27, Method A.

3.5.8	Connector Mating / Unmating Force		PDL Contacts	PTL Contacts	Operation speed: 25mm/min. Measure the force required to mate connectors without locking latches. TE Spec. 109-5206 EIA-364-13
		Mating	(5.39 x Pos.) N Max. (0.55 x Pos.) Kgf Max.	(6.86 x Pos.) N Max. (0.70 x Pos.) Kgf Max.	
		Un-mating	(1.47 x Pos.) N Min. (0.15 x Pos.) Kgf Min.	(1.47 x Pos.) N Min. (0.15 x Pos.) Kgf Min.	
3.5.9	Contact Insertion Force	14.7N (1.5kgf) Max. per PDL contact 13.3N Max.(1.36kgf) per PTL contact			Measure the force required to insert contact into housing. TE Spec. 109-5211 EIA-364-5
3.5.10	Contact Retention Force	Without TPA 46.16N (4.2kgf) Min. per PDL contact 80N (8.16kgf) Min. per PTL contact			Apply an axial pull-off load to crimped wire. Operation speed: 25mm/min. TE Spec. 109-5210 EIA-364-29
		With TPA 58.8N (6.0kgf) Min. per PDL contact 98N (10.0kgf) Min. per PTL contact			
3.5.11	Contact Mating / Unmating Force	Mating 6.86N (700g) Max. (1st ~25th) Unmating 0.58N (60g) Min. (1st) 0.39N (40g)Min. (25th)			Operation speed: 25mm/min. Measure the force required to mate and un-mate contacts. TE Spec. 109-5206 EIA-364-13
3.5.12	Crimp Tensile Strength	Wire Size (AWG)	Crimp Tensile (Min.) N (kgf)		Apply an axial pull-off load to crimped wire of contact secured on the tester. Operation speed: 25mm/min. Take insulation barrel away. TE Spec. 109-5205 EIA-364-5
		26	19.6 (2)		
		24	29.4 (3)		
		2x24	29.4 (3)		
		22	49.0 (5)		
		20	58.8 (6)		
		18	89.0 (9.1)		
		16	89.0 (9.1)		
		2 x 20	58.8 (6)		
		2 x 18	89.0 (9.1)		
3.5.13	Durability (repeated Mate / Unmating)		PDL Contact	PTL Contact	Manually mate and unmate specimens No. of Cycles: 25 cycles
		Mating	(5.39 x Pos.) N Max. (0.55 x Pos.) Kgf Max.	(6.86 x Pos.) N Max. (0.70 x Pos.) Kgf Max.	
		Un-mating	(1.47 x Pos.) N Min. (0.15 x Pos.) Kgf Min.	(1.47 x Pos.) N Min. (0.15 x Pos.) Kgf Min.	

3.5.14	Housing Locking Strength	98N (10kgf) Min.	Measure connector locking strength. Operation speed: 25mm/min. TE Spec: 109-5210 EIA-364-98
3.5.15	Housing Panel Retention Force	98N (10kgf) Min.	Measure panel retention force using nominal panel cut dimensions as specified in the customer drawing.
			Operation speed: 25mm/min. EIA-364-97
3.5.16	Drop Test	No crack and no physical damage influencing the performance	Subject mated connector wired 150mm length to -30 °C for 24 hours, and drop at 50cm height down to a steel plate.
		Environmental Requirements	
3.5.17	Thermal shock	LLCR 10 mΩ Max. (Final)	Subject mated specimens to 25 cycles between -40 °C and 85 °C with 30 minutes dwells at temperature extremes and 1 minute transition between temperatures. TE Spec. 109-5103 Condition A EIA-364-32, test condition I. This measurement is held after being left indoor for 3 hours.
3.5.18	Humidity-Temperature Cycling	Dielectric withstanding voltage (final) 2.2 kV AC 1 minute Insulation resistance (final) 500 MΩ Min. Termination resistance 10 mΩ Max. (Final)	Subject mated specimens to 10 cycles between 25 °C and 65 °C at 80~100% R.H. TE Spec. 109-5106 EIA-364-31, method III. The measurement is held after being left indoor for 3 hours. 1 cycle=24hours
3.5.19	Temperature Life	Termination resistance 10 mΩ Max. (Final)	Subject mated connector to 105±2°C for a duration of 96hours TE spec. 109-5104-3 Condition A EIA-364-17, method A The measurement is held after being left indoor for 3 hours.
3.5.20	Salt spray	Termination resistance 10 mΩ Max. (Final) No corrosion influence performance	Subject mated connectors to 5±1% salt concentration for 48 hours; EIA-364-28B, condition B. The measurement is held after remove the salt and dry up indoor.
3.5.21	Glow Wire Test 750 °C	1.Te-Ti ≤2s or no flame 2.Light tissue paper should not burns	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 °C 3. Execute visual check and take picture after the test. IEC 60695-2-11

3) Test Result
- Test Group 1

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final					OK	OK	OK	OK	OK	-	-	-	OK
2	Termination Resistance (Low Level)	Initial	7 mΩ Max.	mΩ	-	PTL	2.46	2.63	2.42	2.46	2.50	2.42	2.63	2.49	OK
		After Vibration	PDL			1.81	1.81	1.78	1.84	1.84	1.78	1.84	1.82	OK	
			PTL			2.52	2.67	2.59	2.68	2.61	2.52	2.68	2.61	OK	
			PDL			1.83	1.86	1.82	1.89	1.90	1.82	1.90	1.86	OK	
			PTL			2.58	2.7	2.76	2.9	2.71	2.58	2.90	2.73	OK	
		After Shock	PDL			1.84	1.91	1.85	1.94	1.96	1.84	1.96	1.90	OK	
3	Sinusoidal Vibration(Low Frequency)	Initial	No electrical discontinuity greater than 1μ sec. Shall occur.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
4	Mechanical Shock	After Vibration	No electrical discontinuity greater than 1μ sec. Shall occur.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK

- Test Group 2

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final					OK	OK	OK	OK	OK	-	-	-	OK
2	Termination Resistance (Low Level)	Initial	7 mΩ Max.	mΩ	-	PTL	2.68	2.49	2.63	2.55	2.72	2.49	2.72	2.61	OK
		PDL	3.12			2.98	2.94	3.38	2.75	2.75	3.38	3.03	OK		
		After Durability	10 mΩ Max.			PTL	1.87	1.75	1.84	1.72	1.85	1.72	1.87	1.81	OK
		PDL	2.23			2.08	2.38	2.01	2.31	2.01	2.38	2.20	OK		
3	Connector Mating Force	Initial	11.6 kgf Max.		-	PTL/PD L	6.85	7.36	6.88	6.95	7.24	6.85	7.36	7.06	OK
						PTL/FG	9.26	9.89	9.58	9.62	9.47	9.26	9.89	9.56	OK
4	Connector Unmating Force	Initial	3 kgf Min.	kgf	-	PTL/PD L	6.27	6.33	6.30	6.25	6.29	6.25	6.33	6.29	OK
		PTL/FG				11.56	13.34	12.05	12.66	12.18	11.56	13.34	12.36	OK	
		After Durability				PTL/PD L	4.35	4.67	5.01	4.78	4.59	4.35	5.01	4.68	OK
		PTL/FG				9.72	10.88	10.54	10.32	10.17	9.72	10.88	10.33	OK	

- Test Group 3

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		OK					OK	OK	OK	OK	-	-	-	OK	
2	Termination Resistance (Low Level)	Initial	7 mΩ Max.	mΩ	-	PTL	2.53	2.76	2.73	2.73	2.60	2.53	2.76	2.67	OK
		PDL	1.76			1.84	1.83	1.88	1.86	1.76	1.88	1.83	OK		
		PTL	3.43			3.09	3.43	2.90	3.18	2.90	3.43	3.21	OK		
		PDL	2.02			2.06	2.00	1.99	2.02	1.99	2.06	2.02	OK		
		PTL	3.38			2.95	3.45	3.67	3.10	2.95	3.67	3.31	OK		
		PDL	2.07			2.12	2.11	1.92	2.10	1.92	2.12	2.06	OK		
3	Temperature Rising	Initial	30℃ Max. under loaded specified current. AWG16 : 7A AWG18*2 : 3.5A AWG20 : 4A AWG26 : 1.5A	℃	#18*2	PTL	5.47	8.03	8.22	6.75	8.13	5.47	8.22	7.32	OK
					#20		4.91	5.15	3.88	5.03	4.52	3.88	5.15	4.70	OK
					#16	PDL	8.46	11.97	11.24	10.22	11.61	8.46	11.97	10.70	OK
					#26		4.38	4.90	5.13	4.64	5.02	4.38	5.13	4.81	OK
		After Temperature Life			#18*2	PTL	14.77	12.90	10.81	13.84	11.86	10.81	14.77	12.83	OK
					#20		10.19	10.88	9.73	10.54	10.31	9.73	10.88	10.33	OK
					#16	PDL	15.44	13.72	15.21	14.58	14.47	13.72	15.44	14.68	OK
					#26		10.29	8.02	10.89	9.16	9.46	8.02	10.89	9.56	OK

- Test Group 4

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final					OK	OK	OK	OK	OK	-	-	-	OK
2	Termination Resistance (Low Level)	Initial	7 mΩ Max.	mΩ	-	PTL	2.52	2.78	2.67	2.75	2.66	2.52	2.78	2.68	OK
						PDL	1.84	1.86	1.81	1.88	1.76	1.76	1.88	1.83	OK
		After Thermal Shock	10 mΩ Max.			PTL	2.92	3.28	3.16	3.23	3.16	2.92	3.28	3.15	OK
						PDL	1.92	2.00	1.93	2.10	1.94	1.92	2.10	1.98	OK
						PTL	3.10	3.33	3.74	3.65	3.50	3.10	3.74	3.46	OK
						PDL	1.93	2.03	2.35	2.28	1.97	1.93	2.35	2.11	OK
3	Insulation Resistance	Initial	1000MΩ Min.	GΩ	-	-	1.71	1.53	1.61	1.63	1.57	1.53	1.71	1.61	OK
		After Humidity	500MΩ Min.				1.47	1.37	1.45	1.43	1.38	1.37	1.47	1.42	OK
4	Dielectric withstanding Voltage	Initial	No creeping discharge nor flashover shall occur Current Leakage : 5mA Max.	mA	-	-	0.15	0.14	0.16	0.14	0.15	0.14	0.16	0.15	OK
		After Humidity					0.15	0.17	0.15	0.15	0.16	0.15	0.17	0.16	OK

– Test Group 5

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final					OK	OK	OK	OK	OK	-	-	-	OK
2	Termination Resistance (Low Level)	Initial	7 mΩ Max.	mΩ	-	PTL	2.69	2.58	2.94	2.64	2.69	2.58	2.94	2.71	OK
						PDL	1.81	1.85	1.83	1.82	1.87	1.81	1.87	1.84	OK
		After Salt Spray	10 mΩ Max.			PTL	3.19	3.13	3.43	2.97	3.09	2.97	3.43	3.16	OK
						PDL	2.42	1.98	2.05	2.49	2.01	1.98	2.49	2.19	OK

- Test Group 6

NO	Test Items	Test Condition	Acceptance criteria		Unit	Test Result										Judgment
						Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.		-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final						OK	OK	OK	OK	OK	-	-	-	OK
2	Crimp Tensile Strength	Initial	Tab	9.1 kgf Min.	kgf	#16	PTL	22.60	21.37	22.42	20.97	22.05	20.97	22.60	21.88	OK
				9.1 kgf Min.		#18		18.53	18.34	17.88	18.16	18.22	17.88	18.53	18.23	OK
				6 kgf Min.		#20		11.54	10.96	11.21	11.30	10.91	10.91	11.54	11.18	OK
				9.1 kgf Min.		#18*2		14.31	13.78	14.09	13.99	14.20	13.78	14.31	14.07	OK
				6 kgf Min.		#20*2		9.98	9.75	9.64	9.87	9.69	9.64	9.98	9.79	OK
			9.1 kgf Min.	#16		PDL	22.14	23.42	21.05	23.11	22.16	21.05	23.42	22.38	OK	
			2 kgf Min.	#26			2.52	2.77	3.21	2.70	2.80	2.52	3.21	2.80	OK	
			Rec	9.1 kgf Min.		#16	PTL	26.41	25.93	25.79	26.31	26.27	25.79	26.41	26.14	OK
				9.1 kgf Min.		#18		16.76	16.54	16.39	16.45	16.33	16.33	16.76	16.49	OK
				6 kgf Min.		#20		10.99	11.05	10.85	11.13	10.94	10.85	11.13	10.99	OK
				9.1 kgf Min.		#18*2		14.75	14.98	14.56	15.01	14.70	14.56	15.01	14.80	OK
				6 kgf Min.		#20*2		9.62	9.50	9.77	9.37	9.28	9.28	9.77	9.51	OK
				9.1 kgf Min.		#16	PDL	25.44	24.29	23.51	23.11	24.07	23.11	25.44	24.08	OK
				2 kgf Min.		#26		3.04	2.97	3.37	3.03	2.25	2.25	3.37	2.93	OK

- Test Group 7

NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final					OK	OK	OK	OK	OK	-	-	-	OK
2	Contact Mating Force	Initial	700 gf Max.	gf	-	PTL	490	470	550	500	550	470	550	512	OK
						PDL	260	210	250	210	220	210	260	230	OK
						FG	450	470	460	450	450	450	470	456	OK
		After 25th				PTL	240	230	270	200	190	190	270	226	OK
						PDL	180	150	170	140	150	140	180	158	OK
						FG	390	400	380	380	390	380	400	388	OK
3	Contact Unmating Force	Initial	60 gf Min.			PTL	490	420	360	460	400	360	490	426	OK
						PDL	230	200	210	230	200	200	230	214	OK
						FG	480	500	470	480	510	470	510	488	OK
		After 25th	PTL			240	170	180	100	160	100	240	170	OK	
			PDL			140	130	150	140	120	120	150	136	OK	
			FG			400	420	390	410	410	390	420	406	OK	

– Test Group 8

NO	Test Items	Test Condition	Acceptance criteria		Unit	Test Result										Judgment
						Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.		-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final						OK	OK	OK	OK	OK	-	-	-	OK
2	Contact Insertion Force	Initial	CAP	1.36 kgf Max.	kgf	-	PTL	0.42	0.53	0.34	0.62	0.54	0.34	0.62	0.49	OK
				1.5 kgf Max.			PDL	0.6	0.71	0.54	0.62	0.47	0.47	0.71	0.59	OK
			PLUG	1.36 kgf Max.			PTL	0.61	0.58	0.48	0.57	0.50	0.48	0.61	0.55	OK
				1.5 kgf Max.			PDL	0.97	1.15	1.01	0.96	0.87	0.87	1.15	0.99	OK
3	Contact Retention Force	Initial	Without TPA (CAP)	8.16 kgf Min.			PTL	9.05	9.02	9.27	9.18	9.60	9.02	9.60	9.22	OK
				4.2 kgf Min.			PDL	5.98	4.95	6.36	5.49	5.02	4.95	6.36	5.56	OK
			With TPA (CAP)	10.0 kgf Min.			PTL	12.23	13.79	12.63	12.54	11.77	11.77	13.79	12.59	OK
				6.0 kgf Min.			PDL	7.67	7.49	7.02	7.33	7.72	7.02	7.72	7.45	OK
			Without TPA (PLUG)	8.16 kgf Min.			PTL	11.60	9.71	9.12	10.05	10.23	9.12	11.60	10.14	OK
				4.2 kgf Min.			PDL	6.04	6.12	5.47	6.31	6.17	5.47	6.31	6.02	OK
			With TPA (PLUG)	10.0 kgf Min.			PTL	12.50	13.30	13.20	12.79	13.18	12.50	13.30	12.99	OK
				6.0 kgf Min.			PDL	9.72	8.51	8.71	10.15	8.98	8.51	10.15	9.21	OK

– Test Group 9

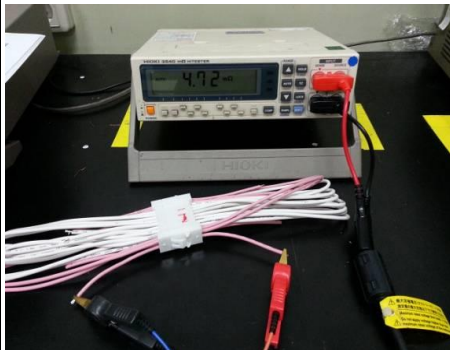
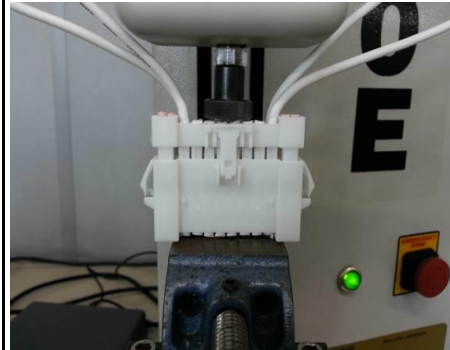
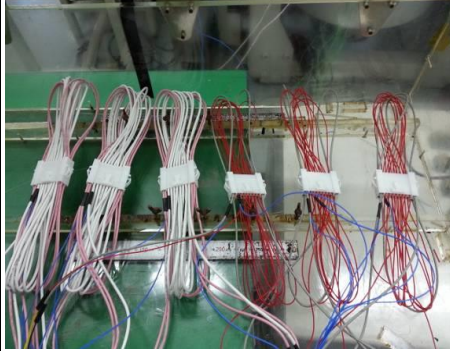
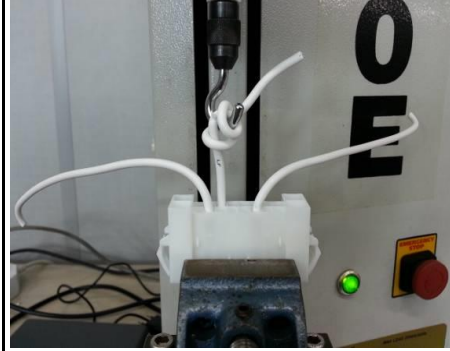
NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final					OK	OK	OK	OK	OK	-	-	-	OK
2	Housing Locking Strength	Initial	10 kgf Min.	kgf	-	-	10.15	10.39	10.41	10.06	10.10	10.06	10.41	10.22	OK
3	Housing Panel Retention Force	Initial	10 kgf Min.				19.49	19.19	18.75	18.92	19.08	18.75	19.49	19.09	OK

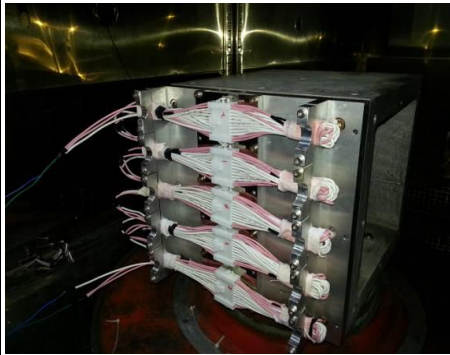
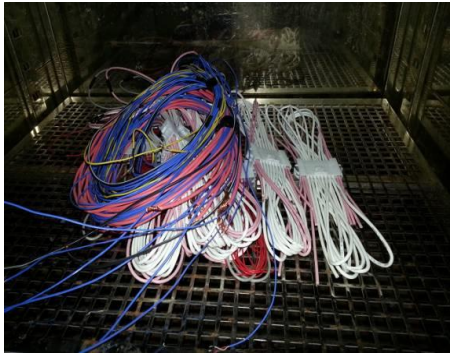
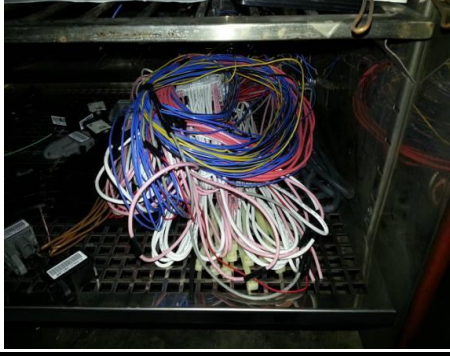
– Test Group 10

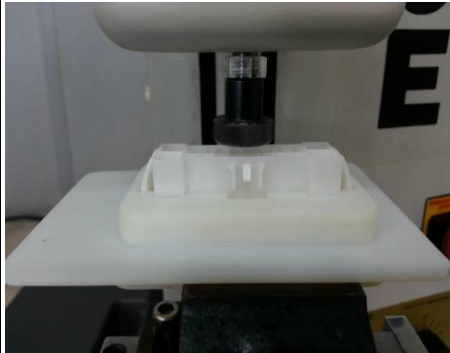
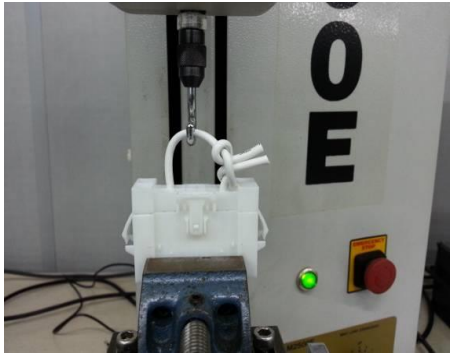
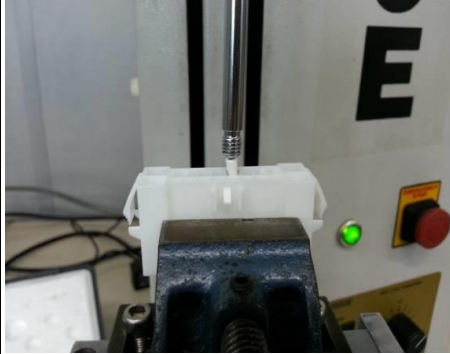
NO	Test Items	Test Condition	Acceptance criteria	Unit	Test Result										Judgment
					Wire (AWG)	Contact	S1	S2	S3	S4	S5	Min.	Max.	Avg.	
1	Examination of Product	Initial	No corrosion influence performance and no physical damage.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK
		Final					OK	OK	OK	OK	OK	-	-	-	OK
2	Drop Test	Initial	No crack and no physical damage influencing the performance.	-	-	-	OK	OK	OK	OK	OK	-	-	-	OK

4) Photograph of Test

501-61083

NO.	Test Items	Photograph	Remark	NO.	Test Items	Photograph	Remark
1	Termination Resistance (Low Level)		-	4	Connector Mating Force		-
2	Insulation Resistance / Dielectric Withstanding Voltage		-	5	Connector Unmating Force		-
3	Temperature Rising		-	6	Contact Retention Force		-

NO.	Test Items	Photograph	Remark	NO.	Test Items	Photograph	Remark
7	Sinusoidal Vibration / Mechanical Shock		-	10	Thermal Shock		-
8	Crimp Tensile Strength		-	11	Humidity Temperature Cycling		-
9	Salt Spray		-	12	Temperature Life		-

NO.	Test Items	Photograph	Remark	NO.	Test Items	Photograph	Remark
13	Housing Panel Retention Force		-	16	Housing Locking Strength		-
14	Contact Mating / Unmating Force		-	17	-	-	-
15	Contact Insertion Force		-	18	-	-	-

HYB 20P PLUG/ CAP HSG(2R) AND TPA HSG

1. INTRODUCTION**1.1 Purpose**

Testing was performed on HYB 20P PLUG/ CAP HSG(2R) AND TPA HSG to determine its conformance to the customer requirements.

1.2 Scope

This report covers the Glow Wire Test performance of HYB 20P PLUG /CAP HSG(2R) AND TPA HSG. Testing was performed at the Shanghai Electrical Components Test Laboratory between Nov.01 to Nov.04,2014. The associated test number is TP-14-02581.

1.3 Conclusion

Based on the test results, all meet the requirement according to IEC 60335-1, 2013, and IEC 60695-2-11, 2014.

1.4 Test Specimens

Specimens with the following part numbers were used for test:

Test request No.	Housing P/N	Position	Qty	Part Description	Material
TP-14-02581	2188646-1	20 pos	6 pcs	HYB 20P CAP HSG(2R)	PC/PET
	2188645-1	20 pos	6 pcs	HYB 20P PLUG HSG(2R), P/M	
	2188647-2	20 pos	6 pcs	HYB 20P TPA HSG	PA66

1.5 Test Sequence

Test Item	Test Group (a)
	1
	Test Sequence(b)
Visual examination	1
Glow Wire Test	2
Sample Size	6pcs

Note: a). Test group defined per customer requirement.

b). Numbers indicate sequence in which tests are performed.

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

All specimens were visually examined for evidence of physical damage detrimental to product performance (visually inspected under a stereomicroscope, at a 10x magnification, with suitable illumination).

Test method: IEC 60512-1-1, Test 1a.

2.2. Glow wire Test

Thermal stabilization of specimens: 24 h at (15-35) °C and (45-75) %RH.

Test condition: The extremity of the wire is positioned horizontally and brought into contact with the sample with a force between 0.8N and 1.2N for a period of 30s. Test temperature: 750°C, Time of Glow tip application Ta: 30s

Requirements: No flame or $Te - Ti \leq 2s$.

Test Method: IEC 60335-1, 2013, and IEC 60695-2-11, 2014.

3. SUMMARY OF TESTING

3.1. Initial Examination of Product

All specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

3.2. Glow wire Test results

Glow wire test results see Tab.1-2

Test 1: 2188646-1 HYB 20P CAP HSG(2R)

Test samples	Number of data points	Condition	Point of glow tip application	Ti (sec)	Te (sec)	Flame Height (mm)	Drops (yes/no)	Light tissue paper burns (yes/no)	Judgment
2188646-1	6 pcs	Final (GWT 750°C)	A1	0	0	0	no	no	Meet spec
			A2	0	0	0	no	no	Meet spec
			A3	0	0	0	no	no	Meet spec
			B1	0	0	0	no	no	Meet spec
			B2	0	0	0	no	no	Meet spec
			B3	0	0	0	no	no	Meet spec

Tab.1

Test 2: 2188645-1 HYB 20P PLUG HSG(2R), P/M

Test samples	Number of data points	Condition	Point of glow tip application	Ti (sec)	Te (sec)	Flame Height (mm)	Drops (yes/no)	Light tissue paper burns (yes/no)	Judgment
2188645-1	6 pcs	Final (GWT 750°C)	A1	0	0	0	no	no	Meet spec
			A2	0	0	0	no	no	Meet spec
			A3	0	0	0	no	no	Meet spec
			B1	0	0	0	no	no	Meet spec
			B2	0	0	0	no	no	Meet spec
			B3	0	0	0	no	no	Meet spec

Tab.2

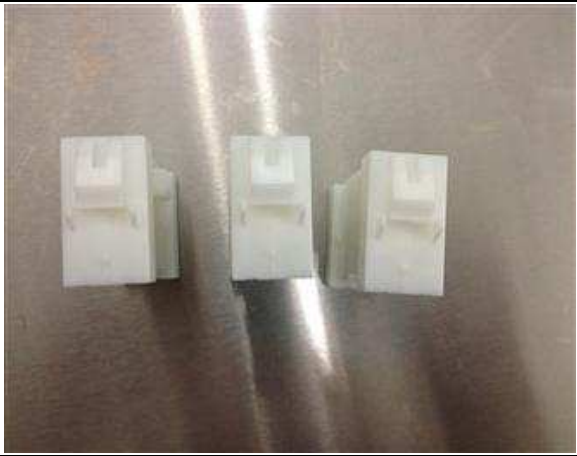
Test 3: 2186647-2 (HYB 20P TPA HSG)

Test samples	Number of data points	Condition	Point of glow tip application	Ti (sec)	Te (sec)	Flame Height (mm)	Drops (yes/no)	Light tissue paper burns (yes/no)	Judgment
2186647-2	6 pcs	Final (GWT 750°C)	A1	0	0	0	no	no	Meet spec
			A2	0	0	0	no	no	Meet spec
			A3	0	0	0	no	no	Meet spec
			A4	0	0	0	no	no	Meet spec
			A5	0	0	0	no	no	Meet spec
			A6	0	0	0	no	no	Meet spec

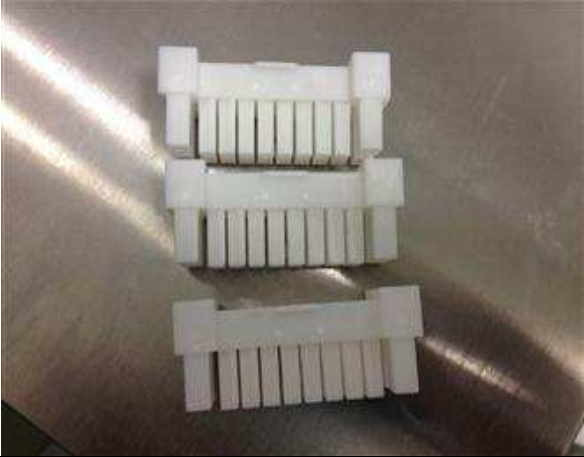
Tab.3

Sample pictures:

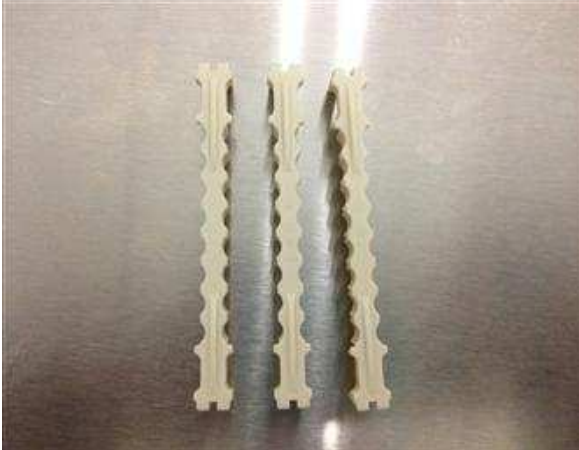
Test 1: 2188646-1 HYB 20P CAP HSG(2R)

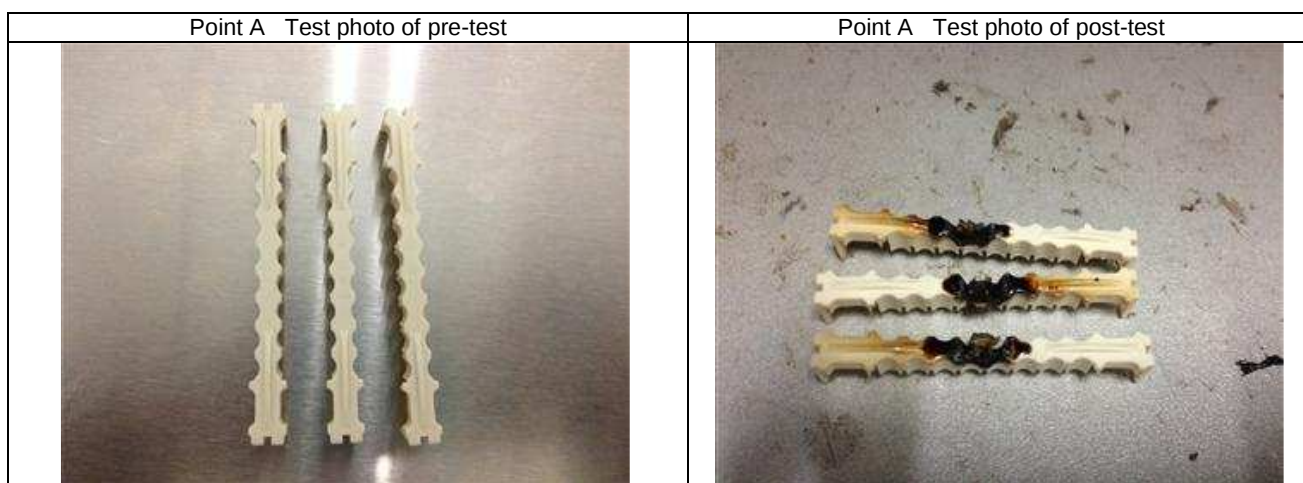
Description of pre-test: Normal		Description of post-test: Damage	
Point A Test photo of pre-test		Point A Test photo of post-test	
			
Point B Test photo of pre-test		Point B Test photo of post-test	
			

Test 2: 2188645-1 HYB 20P PLUG HSG(2R), P/M

Description of pre-test: Normal		Description of post-test: Damage	
Point A Test photo of pre-test		Point A Test photo of post-test	
			
Point B Test photo of pre-test		Point B Test photo of post-test	
			

Test 3: 2186647-2 (HYB 20P TPA HSG)

Description of pre-test: Normal		Description of post-test: Damage	
Point A Test photo of pre-test		Point A Test photo of post-test	
			



4. CALIBRATION

4.1 Calibration Statement

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

No.	Test Item	Equipment Code	Equipment application	Calibration Effective Period	Serial No.
1	Examination of Product	/	Visual observation	/	/
2	Glow Wire Test	GW-V	Glow wire Tester	2015-04-17	E-00118

5. VALIDATION

Requested by:

Kim, Sung Chul 2014 10 22
_____/_____/____

Project Manager Engineering
TE Italy

Prepared by:

Coco Xu 2017 04 12
_____/_____/____

Test Engineer
Shanghai Electrical Components Test Lab.

Approved by:

Robin Lu 2017 04 12
_____/_____/____

Test Manager
Shanghai Electrical Components Test Lab.