Qualification Test Report

REPORT No.: 501-115205

HCI 6.2mm Pitch wire to wire & wire to board Connectors

1. Introduction

1.1 Objective

Testing was performed on the HCI 6.2mm Pitch wire to wire & wire to board Connectors to determine if it meets the requirements of Product Specification 108-115190.

1.2 Scope

This report covers the Electrical, Mechanical, and Environmental performance requirements of HCI 6.2mm Pitch wire to wire & wire to board Connectors. The qualification testing was performed between 13-MAY-2022 and 28-APR-2023.

1.3 Conclusion

HCI 6.2mm Pitch wire to wire & wire to board Connectors meet the Electrical, Mechanical and Environmental performance requirements of Product Specification, 108-115190.

1.4 Product Description

Product Part No.	Description
X-2408780-X	Plug housing of HCI 6.2mm Pitch wire to wire & wire to board Connectors
X-2408818-X	Receptacle housing of HCI 6.2mm Pitch wire to wire Connectors
2408840-X	Socket contact of HCI 6.2mm Pitch wire to wire & wire to board Connectors
2408841-X	Pin contact of HCI 6.2mm Pitch wire to wire Connectors
X-2408753-X TBD	Header of HCI 6.2mm Pitch wire to board Connectors

Fig.1 Product Part No.

1.5 Test Specimens

Test specimens are representative of normal production lots.
Specimens identified with the following part numbers are used for test.

Test Group	Quantity	Part Number	Description
A, E, F, G, H, I, J, K, M, N	5 each	3-2408780-3 3-2408818-3 2408840-4 2408841-4	HCI 6.2mm Pitch wire to wire Connectors 3 position assembly
B	5 each	3-2408818-2&3&4 3-2408780-2&3&4 2408840-5 2408841-5	HCI 6.2mm Pitch wire to wire Connectors 2-4 position assembly
C	5 each	3-2408780-3 3-2408818-3	Plug housing & Receptacle housing of HCI 6.2mm Pitch
D	5 each	2408818-1 2408780-1 3-2408818-2&3&4 3-2408780-2&3&4 2408840-4&5 2408841-4&5	HCI 6.2mm Pitch wire to wire Connectors 1-4 position assembly
O	5 each	2408840-4 2408840-5	Socket contact of HCI 6.2mm Pitch with 12 ,14,16 AWG wire

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P	4 each	3-2408780-4 2408840-5 3-2408818-4 2408841-5	HCI 6.2mm Pitch wire to wire Connectors 4 position assembly

Fig.2 Test Specimens

TEST SEQUENCE

Test Examination	Test Group (a)														
	A	B	C	D	E	F	G	H	I	J	K	M	N	O	P
	Test Sequence (b)														
Examination of Product	1	1,7	1,3	1,3	1,9	1,5	1,9	1,9	1,9	1,5	1,5	1,5	1,5	1,3	1,5
Contact insertion force	2														
Contact Retention force	3														
Lock retention force			2												
Mating force		3													
Un-mating force		4													
Durability		5													
Insulation resistance					3,7		3,7	3,7	3,7						
Withstand Voltage					4,8		4,8	4,8	4,8						
Contact resistance		2,6			2,6	2,4	2,6	2,6	2,6	2,4	2,4	2,4	2,4		2,4
Temperature Rise				2											
Humidity					5										
Salt Spray						3									
Thermal Shock							5								
Temperature Life								5							
Cold Resistance									5						
Mechanical shock										3					
Vibration											3				
H2S												3			
Hammering Shock[1]													3		
Tensile Strength of Wire Termination														2	
Hammering Shock[2]															3

Fig.3 Test Sequence

SUMMARY OF TEST RESULTS

Group	Test Item	N	Condition	Test Result				Requirement	Conclusion
				Max	Min	Ave	Unit		
A	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Contact insertion force Plug	5	Initial	0.28 (2.79)	0.12 (1.22)	0.20 (1.98)	Kgf (N)	2kgf (19.6N) Max.	Meet Spec
	Contact insertion force Rec	5	Initial	0.94 (9.26)	0.75 (7.35)	0.85 (8.30)	Kgf (N)	2kgf (19.6N) Max.	Meet Spec
	Contact retention force Plug	5	Initial	17.19 (168.5)	9.31 (91.24)	14.02 (137.4)	Kgf (N)	3kgf (29.4N) Min.	Meet Spec
	Contact retention force Rec	5	Initial	13.25 (129.9)	10.50 (102.9)	11.61 (113.8)	Kgf (N)	3kgf (29.4N) Min.	Meet Spec
B	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet spec
	Low Level Contact Resistance(3pos)	5	Initial	1.88	1.67	1.79	mΩ	7m Ω Max.	Meet Spec
	Mating force(3pos)	5	Initial	2.14 (20.95)	2.06 (20.44)	2.11 (20.65)	Kgf (N)	1kgf (9.8N) Max. per pin	Meet Spec
	Un-mating force(3pos)	5	Initial	3.06 (29.97)	2.70 (26.42)	2.89 (28.29)	Kgf (N)	0.2kgf (1.96N) Min. per pin	Meet Spec
	Un-mating force(3pos)	5	10th	2.82 (27.60)	2.43 (23.82)	2.59 (25.38)	Kgf (N)	0.15kgf (1.47N) Min. per pin	Meet Spec
	Durability(3pos)	5	Initial	No abnormalities			N/A	No abnormalities	Meet spec
	Low Level Contact Resistance(3pos)	5	Final	2.94	1.85	2.22	mΩ	10m Ω Max.	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec

	Test Item	N	Condition	Test Result				Requirement	Conclusion
				Max	Min	Ave	Unit		
	Mating force(2pos)	5	Initial	1.68 (16.51)	1.33 (13.08)	1.50 (14.69)	Kgf (N)	1kgf (9.8N) Max. per pin	Meet Spec
	Un-mating force(2pos)	5	Initial	2.89 (28.26)	2.16 (21.21)	2.61 (25.55)	Kgf (N)	0.2kgf (1.96N) Min. per pin	Meet Spec
	Un-mating force(2pos)	5	10th	2.57 (25.18)	2.02 (19.79)	2.20 (21.59)	Kgf (N)	0.15kgf (1.47N) Min. per pin	Meet Spec
	Mating force(4pos)	5	Initial	3.55 (34.79)	2.80 (27.41)	3.15 (30.89)	Kgf (N)	1kgf (9.8N) Max. per pin	Meet Spec
	Un-mating force(4pos)	5	Initial	4.36 (42.71)	3.25 (31.84)	3.95 (38.78)	Kgf (N)	0.2kgf (1.96N) Min. per pin	Meet Spec
	Un-mating force(4pos)	5	10th	4.60 (45.08)	3.30 (32.33)	3.88 (38.05)	Kgf (N)	0.15kgf (1.47N) Min. per pin	Meet Spec
C	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Lock retention force	5	Initial	20.31 (199)	17.24 (169)	18.56 (182)	Kgf (N)	4kgf (39.2N) Min.	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
D	Examination of Product	3	Initial	No abnormalities			N/A	No abnormalities	Meet spec
	Temperature Rise (1pos,AWG12#)	3	Initial	21.0	18.4	19.3	°C	30°C Max.	Meet Spec
	Temperature Rise (1pos,AWG14#)	3	Initial	17.4	16.1	16.8	°C	30°C Max.	Meet Spec
	Temperature Rise (1pos,AWG16#)	3	Initial	19.4	18.0	18.7	°C	30°C Max.	Meet Spec
	Temperature Rise (2pos,AWG12#)	3	Initial	22.3	20.1	21.3	°C	30°C Max.	Meet Spec
	Temperature Rise (2pos,AWG14#)	3	Initial	19.8	17.7	19.0	°C	30°C Max.	Meet Spec
	Temperature Rise (2pos,AWG16#)	3	Initial	21.5	19.4	20.3	°C	30°C Max.	Meet Spec
	Temperature Rise (3pos,AWG12#)	3	Initial	23.4	21.4	22.1	°C	30°C Max.	Meet Spec
	Temperature Rise (3pos,AWG14#)	3	Initial	19.8	18.0	18.9	°C	30°C Max.	Meet Spec
	Temperature Rise (3pos,AWG16#)	3	Initial	20.4	18.7	19.6	°C	30°C Max.	Meet Spec
	Temperature Rise (4pos,AWG12#)	3	Initial	22.1	20.1	21.2	°C	30°C Max.	Meet Spec
	Temperature Rise (4pos,AWG14#)	3	Initial	19.2	16.7	17.7	°C	30°C Max.	Meet Spec
	Temperature Rise (4pos,AWG16#)	3	Initial	20.1	17.6	18.8	°C	30°C Max.	Meet Spec
	Examination of Product	3	Final	No abnormalities			N/A	No abnormalities	Meet Spec
E	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet spec
	Low Level Contact Resistance	5	Initial	2.15	1.61	1.72	mΩ	7mΩ Max.	Meet Spec
	Insulation resistance	5	Initial	Over range	Over range	Over range	MΩ	1000MΩ Min	Meet Spec
	Withstand Voltage	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Humidity	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Final	2.03	1.77	1.91	mΩ	10mΩ Max.	Meet Spec
	Insulation resistance	5	Final	Over range	Over range	Over range	MΩ	500MΩ Min.	Meet Spec
	Withstand Voltage	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec

	Test Item	N	Condition	Test Result				Requirement	Conclusion
				Max	Min	Ave	Unit		
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
F	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet spec
	Low Level Contact Resistance	5	Initial	2.11	1.85	1.92	mΩ	7m Ω Max.	Meet Spec
	Salt Spray	5	Initial	No abnormalities			N/A	No abnormalities	Meet spec
	Low Level Contact Resistance	5	Final	3.39	1.16	1.81	mΩ	10m Ω Max	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
G	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Initial	2.6	1.42	2.04	mΩ	7 mΩ Max.	Meet spec
	Insulation resistance	5	Initial	Over range	Over range	Over range	M Ω	1000M Ω Min	Meet spec
	Withstand Voltage	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Thermal Shock	5	Initial	No abnormalities			N/A	No abnormalities	Meet spec
	Low Level Contact Resistance	5	Final	2.86	1.37	2.41	mΩ	10m Ω Max.	Meet Spec
	Insulation resistance	5	Final	Over range	Over range	Over range	M Ω	500M Ω Min.	Meet spec
	Withstand Voltage	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
H	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Initial	2.28	1.86	2.01	mΩ	7 mΩ Max.	Meet spec
	Insulation resistance	5	Initial	Over range	Over range	Over range	M Ω	1000M Ω Min.	Meet spec
	Withstand Voltage	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Temperature Life	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Final	2.96	2.09	2.52	mΩ	10m Ω Max.	Meet Spec
	Insulation resistance	5	Final	Over range	Over range	Over range	M Ω	500M Ω Min.	Meet spec
	Withstand Voltage	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
I	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Initial	2.14	1.74	1.94	mΩ	7 mΩ Max.	Meet spec
	Insulation resistance	5	Initial	Over range	Over range	Over range	M Ω	1000M Ω Min	Meet spec
	Withstand Voltage	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Cold Resistance	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Final	2.46	1.89	2.07	mΩ	10 mΩ Max.	Meet spec
	Insulation resistance	5	Final	Over range	Over range	Over range	M Ω	500M Ω Min.	Meet spec
	Withstand Voltage	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec

	Test Item	N	Condition	Test Result				Requirement	Conclusion
				Max	Min	Ave	Unit		
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
J	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Initial	2.16	1.58	2.0	mΩ	7 mΩ Max.	Meet spec
	Mechanical shock	5	Initial	No discontinuity			μs	1 μs Max.	Meet Spec
	Low Level Contact Resistance	5	Final	2.93	2.08	2.43	mΩ	10mΩ Max.	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
K	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Initial	1.78	1.65	1.72	mΩ	7 mΩ Max.	Meet spec
	Vibration	5	Initial	No discontinuity			μs	1 μs Max.	Meet Spec
	Low Level Contact Resistance	5	Final	2.17	1.63	1.87	mΩ	10mΩ Max.	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
M	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Initial	1.88	1.68	1.8	mΩ	7 mΩ Max.	Meet spec
	H2S	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Final	2.29	1.75	2.06	mΩ	10mΩ Max.	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
N	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Initial	0.49	0.43	0.46	mΩ	7 mΩ Max.	Meet spec
	Hammering Shock[1]	5	Initial	Contact Resistance meet spec.			N/A	No abnormalities	Meet Spec
	Low Level Contact Resistance	5	Final	0.51	0.41	0.47	mΩ	10mΩ Max.	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
O	Examination of Product	5	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Tensile Strength of Wire Termination	5	Initial	22.30 (218.5)	18.45 (180.8)	20.18 (197.7)	Kgf (N)	AWG 12: 15.0kgf (147N) Min.	Meet Spec
		5	Initial	23.69 (232.2)	18.71 (183.4)	21.26 (208.4)	Kgf (N)	AWG 14: 15.0kgf (147N) Min.	Meet Spec
		5	Initial	14.42 (141.3)	11.98 (117.4)	13.06 (128)	Kgf (N)	AWG 16: 10.0kgf (98N) Min.	Meet Spec
	Examination of Product	5	Final	No abnormalities			N/A	No abnormalities	Meet Spec
P	Examination of Product	4	Initial	No abnormalities			N/A	No abnormalities	Meet Spec
	Hammering Shock[2]	4	Initial	6.50%			N/A	LLCR's variation rate 40% Max	Meet Spec
	Examination of Product	4	Final	No abnormalities			N/A	No abnormalities	Meet Spec

Fig.4 Summary of Test Results

Max. measuring resistance in IR machine is 10G ohm.
Then "Over Range" means measuring result are over 10G ohm.

ENVIRONMENTAL CONDITION

Unless otherwise stated, the following environmental conditions prevailed during testing:
Temperature:15°C to 35°C, Relative Humidity: 25% R.H to 75% R.H

---------- END OF REPORT ----------