

MHF® 4 / 4L Connector

Part No. MHF 4L Plug: 20565-001R-13, 20565-001R-13-P, 20572-001R-08

MHF 4 Receptacle: 20449-001E-**

Test Report

Product Specification no. PRS-1772

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Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

To evaluate the performance of MHF 4 / 4L Connector in accordance with PRS-1772.

2. Specimen

(1) MHF 4L PLUG (Part No: 20565-001R-13, 20565-001R-13-P)

Cable : AWG#32 coaxial cable (Jacket diameter 1.13mm)

(2) MHF 4L PLUG (Part No: 20572-001R-08)

Cable : AWG#36 coaxial cable (Jacket diameter 0.81mm)

(3) MHF 4 RECEPTACLE (Part No. 20449-001E-**))

3. Test Sequence

All the evaluations were performed in accordance with Table 1 Test Sequence.

4. Result

See Table 2, and graphs following Graph 1. For the details of the testing conditions and requirements, see PRS-1772. The “n” in the tables show the number of measurement points.

5. Conclusion

All the specimens met the requirements of PRS-1772.

Table 1 Test Sequence and Sample Quantity

Test Item		Group															
		A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R
Contact resistance							1,3		1,3	1,3	1,5	1,3	1,3	1,3	1,3		
Insulation resistance											2,6		2,6				
Dielectric withstanding voltage		1									3,7		3,7				
VSWR			1														
Mating force / Unmating force				1													
Cable retention force at 30 degree					1												
Cable retention force at 0 degree						1											
Durability							2										
Receptacle shearing strength								1									
Vibration									2								
Shock										2							
Thermal shock											4						
High temperature life												2					
Humidity(Steady state)													4				
Salt water spray														2			
H ₂ S gas															2		
Solder ability																1	
Soldering heat resistance																	1
Specimen Quantity (pcs.)	Plug	10	10	10	10	10	10	-	10	10	10	10	10	10	10	10	-
	Receptacle		5					12									10
																	10

※Numbers indicate sequence in which tests are performed.

Table 2-1 Test Result

Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement	
	Measurements									
A	Dielectric withstanding voltage									
	Pass criteria: No creeping discharge, flashover, no insulator breakdown shall occur.									
	Plug Part No. 20565-001R-13, 20565-001R-13-P									
	After testing	-	10	-	No abnormality				Pass	
	Plug Part No. 20572-001R-08									
	After testing	-	10	-	No abnormality				Pass	
B	VSWR									
	Plug Part No. 20565-001R-13, 20565-001R-13-P									
	0.1~3.0GHz	1.30 MAX.	10	-	1.094	1.10	1.08	0.008	Pass	
	3.0~6.0GHz	1.45 MAX.		-	1.264	1.29	1.25	0.012	Pass	
	6.0~9.0GHz	1.60 MAX.		-	1.409	1.45	1.38	0.021	Pass	
	9.0~12.0GHz	1.90 MAX.		-	1.567	1.62	1.51	0.030	Pass	
	Plug Part No. 20572-001R-08									
	0.1~3.0GHz	1.30 MAX.	10	-	1.183	1.20	1.17	0.011	Pass	
	3.0~6.0GHz	1.45 MAX.		-	1.326	1.36	1.29	0.018	Pass	
	6.0~9.0GHz	1.60 MAX.		-	1.367	1.40	1.33	0.019	Pass	
	9.0~12.0GHz	1.90 MAX.		-	1.410	1.47	1.34	0.031	Pass	
	Receptacle									
	0.1~3.0GHz	1.30 MAX.	5	-	1.067	1.08	1.06	0.007	Pass	
	3.0~6.0GHz	1.40 MAX.		-	1.176	1.19	1.16	0.010	Pass	
	6.0~9.0GHz	1.55 MAX.		-	1.465	1.50	1.43	0.021	Pass	
	C	Mating force								
		Plug Part No. 20565-001R-13, 20565-001R-13-P								
Initial		30 N MAX.	10	N	19.97	21.9	19.3	0.93	Pass	
After 30 cycles		30 N MAX.			8.28	9.4	7.2	0.78	Pass	
Plug Part No. 20572-001R-08										
Initial		30 N MAX.	10	N	23.40	26.1	20.4	1.69	Pass	
After 30 cycles		30 N MAX.			9.30	10.3	8.4	0.61	Pass	
Unmating force										
Plug Part No. 20565-001R-13, 20565-001R-13-P										
Initial		20 N MAX. 5 N MIN.	10	N	14.12	14.7	13.5	0.41	Pass	
After 30 cycles		20 N MAX. 3 N MIN.			8.95	9.3	8.0	0.40	Pass	
Plug Part No. 20572-001R-08										
Initial		20 N MAX. 5 N MIN.	10	N	15.10	16.1	14.3	0.60	Pass	
After 30 cycles		20 N MAX. 3 N MIN.			10.33	11.4	9.2	0.70	Pass	
D	Cable retention force at 30 degree									
	Plug Part No. 20565-001R-13, 20565-001R-13-P									
	Electrical discontinuity									
	Pass critria: No electrical discontinuity grater than 1μs shall occur.									
	-	-	10	-	No discontinity				Pass	
	Appearance									
	Pass criteria: No abnormality adversely affecting the performance shall occur									
	Initial	No abnormality	10	-	No abnormality				Pass	
	After testing	No abnormality			No abnormality				Pass	
	Plug Part No. 20572-001R-08									
	Electrical discontinuity									
	Pass critria: No electrical discontinuity grater than 1μs shall occur.									
	-	-	10	-	No discontinity				Pass	
	Appearance									
Initial	No abnormality	10	-	No abnormality				Pass		
After testing	No abnormality			No abnormality				Pass		

Table 2-2 Test Result

Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
	Measurements								
E	Cable retention force at 0 degree								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Electrical discontinuity								
	Pass critia: No electrical discontinuity grater than 1μs shall occur.								
	-	-	10	-	No discontinuity			Pass	
	Appearance								
	Initial	No abnormality	10	-	No abnormality			Pass	
	After testing	No abnormality			No abnormality			Pass	
	Plug Part No. 20572-001R-08								
	Electrical discontinuity								
	Pass critia: No electrical discontinuity grater than 1μs shall occur.								
	-	-	10	-	No discontinuity			Pass	
Appearance									
Pass criteria: No abnormality adversely affecting the performance shall occur									
Initial	No abnormality	10	-	No abnormality			Pass		
After testing	No abnormality			No abnormality			Pass		
F	Durability								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.46	10.0	8.7	0.48	Pass
	After testing	-			9.33	9.9	8.8	0.40	-
	ΔR	ΔR 20mΩ MAX.			-0.14	0.7	-0.8	0.54	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.82	7.2	6.4	0.26	Pass
	After testing	-			7.69	8.6	6.8	0.62	-
	ΔR	ΔR 20mΩ MAX.			0.88	2.0	-0.3	0.72	Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality			Pass	
	After testing				No abnormality			Pass	
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	8.05	11.0	6.2	1.39	Pass
	After testing	-			9.07	12.1	6.2	1.90	-
	ΔR	ΔR 20mΩ MAX.			1.03	3.3	-0.8	1.26	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.87	6.1	5.6	0.18	Pass
	After testing	-			6.19	7.0	5.5	0.47	-
	ΔR	ΔR 20mΩ MAX.			0.32	0.9	-0.5	0.48	Pass
	Appearance								
Pass criteria: No abnormality adversely affecting the performance shall occur									
Initial	No abnormality	10	-	No abnormality			Pass		
After testing	No abnormality			No abnormality			Pass		
G	Shearing strength								
	Direction①	20 N MIN.	3	N	33.83	37.7	30.1	-	Pass
	Direction②	20 N MIN.			27.83	30.8	25.2	-	Pass
	Direction③	20 N MIN.			27.60	28.6	25.8	-	Pass
	Direction④	20 N MIN.			27.47	29.8	25.8	-	Pass

Table 2-3 Test Result

Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
	Measurements								
H	Vibration								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.78	11.0	9.1	0.68	Pass
	After testing	-			11.14	12.3	9.3	0.96	-
	ΔR	ΔR 20mΩ MAX.			1.36	2.5	0.1	0.69	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.77	8.0	6.0	0.60	Pass
	After testing	-			7.14	7.7	6.6	0.31	-
	ΔR	ΔR 20mΩ MAX.			0.37	1.2	-1.0	0.61	Pass
	Electrical discontinuity								
	Pass criteria: No electrical discontinuity grater than 1μs shall occur.								
	After testing	-	10	-	No discontinuity				Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	10.97	11.9	10.2	0.61	Pass
	After testing	-			10.32	12.3	9.4	0.90	-
	ΔR	ΔR 20mΩ MAX.			-0.65	0.4	-2.1	0.81	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.04	6.4	5.8	0.19	Pass
	After testing	-			6.00	7.4	5.0	0.66	-
	ΔR	ΔR 20mΩ MAX.			-0.04	1.4	-1.2	0.74	Pass
	Electrical discontinuity								
	Pass criteria: No electrical discontinuity grater than 1μs shall occur.								
	After testing	-	10	-	No discontinuity				Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass

Table 2-4 Test Result

Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
	Measurements								
J	Shock								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	11.14	12.3	9.3	0.96	Pass
	After testing	-			10.55	12.7	9.2	1.11	-
	ΔR	ΔR 20mΩ MAX.			-0.59	0.8	-2.0	0.90	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	7.14	7.7	6.6	0.31	Pass
	After testing	-			7.13	8.2	6.5	0.57	-
	ΔR	ΔR 20mΩ MAX.			-0.01	0.9	-0.6	0.54	Pass
	Electrical discontinuity								
	Pass criteria: No electrical discontinuity grater than 1μs shall occur.								
	After testing	-	10	-	No discontinuity				Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	10.32	12.3	9.4	0.90	Pass
	After testing	-			10.71	12.7	9.0	1.31	-
	ΔR	ΔR 20mΩ MAX.			0.38	2.9	-0.6	1.22	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.00	7.4	5.0	0.66	Pass
	After testing	-			5.90	8.5	5.2	0.96	-
	ΔR	ΔR 20mΩ MAX.			-0.11	2.6	-2.0	1.21	Pass
Electrical discontinuity									
Pass criteria: No electrical discontinuity grater than 1μs shall occur.									
After testing	-	10	-	No discontinuity				Pass	
Appearance									
Pass criteria: No abnormality adversely affecting the performance shall occur									
Initial	No abnormality	10	-	No abnormality				Pass	
After testing	No abnormality			No abnormality				Pass	

Table 2-5 Test Result

Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
	Measurements								
K	Thermal shock								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	10.05	11.4	9.1	0.77	Pass
	After testing	-			11.63	12.9	9.8	0.95	-
	ΔR	ΔR 20mΩ MAX.			1.58	3.3	-0.1	1.09	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.89	7.7	6.5	0.43	Pass
	After testing	-			8.37	9.8	7.6	0.67	-
	ΔR	ΔR 20mΩ MAX.			1.49	3.3	0.4	0.87	Pass
	Insulation residence								
	Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass
	After testing	100MΩ MIN.			10,000MΩ MIN.				Pass
	Dielectric withstanding voltage								
	Pass criteria: No creeping discharge, flashover, no insulator breakdown shall occur.								
	After testing	-	10	-	No abnormality				Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	11.03	12.3	9.8	0.84	Pass
	After testing	-			10.99	12.5	8.8	1.17	-
	ΔR	ΔR 20mΩ MAX.			-0.04	1.6	-1.2	0.82	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.30	6.6	6.0	0.23	Pass
After testing	-	5.79			6.4	5.4	0.38	-	
ΔR	ΔR 20mΩ MAX.	-0.50			0.1	-1.2	0.35	Pass	
Insulation residence									
Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass	
After testing	100MΩ MIN.			10,000MΩ MIN.				Pass	
Dielectric withstanding voltage									
Pass criteria: No creeping discharge, flashover, no insulator breakdown shall occur.									
After testing	-	10	-	No abnormality				Pass	
Appearance									
Pass criteria: No abnormality adversely affecting the performance shall occur									
Initial	No abnormality	10	-	No abnormality				Pass	
After testing	No abnormality			No abnormality				Pass	

Table 2-6 Test Result

Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
	Measurements								
L	High Temperature Life								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.74	11.8	8.5	1.17	Pass
	After testing	-			9.14	10.4	7.7	1.07	-
	ΔR	ΔR 20mΩ MAX.			-0.61	1.0	-2.9	1.08	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.90	7.4	6.5	0.23	Pass
	After testing	-			7.25	9.0	6.4	0.72	-
	ΔR	ΔR 20mΩ MAX.			0.35	2.2	-0.4	0.74	Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	11.57	12.7	9.5	0.93	Pass
	After testing	-			12.12	12.9	11.0	0.54	-
	ΔR	ΔR 20mΩ MAX.			0.55	1.6	0.0	0.53	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.57	6.1	5.3	0.23	Pass
	After testing	-			7.31	8.0	6.6	0.40	-
	ΔR	ΔR 20mΩ MAX.			1.73	2.4	1.0	0.42	Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass

Table 2-7 Test Result

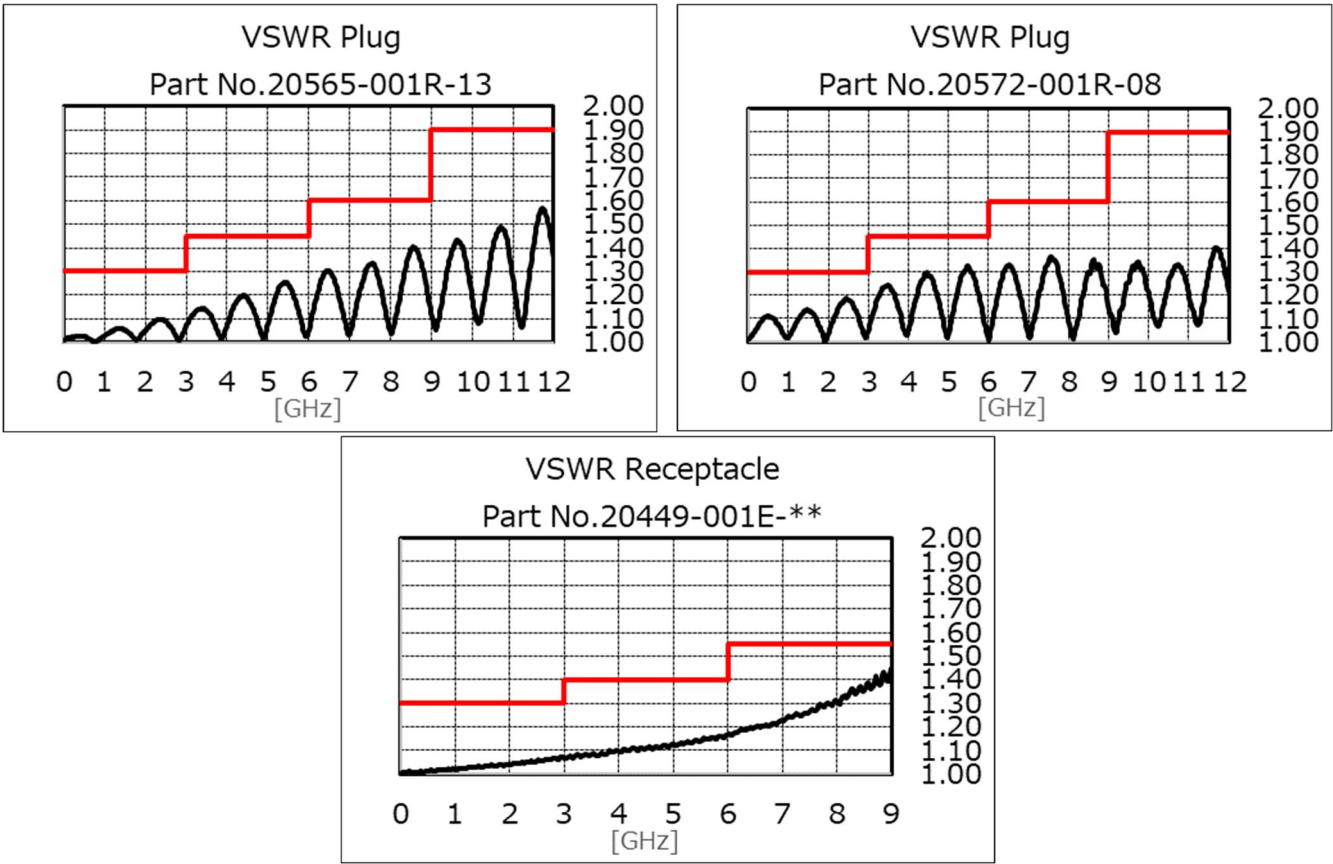
Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
	Measurements								
M	Humidity (Steady State)								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	10.72	15.4	9.1	2.00	Pass
	After testing	-			10.42	13.0	9.5	0.94	-
	ΔR	ΔR 20mΩ MAX.			-0.30	1.1	-2.5	1.26	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.84	7.5	6.4	0.29	Pass
	After testing	-			6.77	8.5	6.1	0.73	-
	ΔR	ΔR 20mΩ MAX.			-0.06	1.7	-0.9	0.76	Pass
	Insulation residence								
	Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass
	After testing	100MΩ MIN.			10,000MΩ MIN.				Pass
	Dielectric withstanding voltage								
	Pass criteria: No creeping discharge, flashover, no insulator breakdown shall occur.								
	After testing	-	10	-	No abnormality				Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	11.47	12.9	10.0	0.89	Pass
	After testing	-			11.34	12.8	9.6	1.23	-
	ΔR	ΔR 20mΩ MAX.			-0.13	1.4	-2.3	1.12	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.94	6.6	5.4	0.39	Pass
	After testing	-			5.10	6.0	4.5	0.43	-
	ΔR	ΔR 20mΩ MAX.			-0.84	-0.3	-1.6	0.42	Pass
	Insulation residence								
	Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass
	After testing	100MΩ MIN.			10,000MΩ MIN.				Pass
	Dielectric withstanding voltage								
	Pass criteria: No creeping discharge, flashover, no insulator breakdown shall occur.								
	After testing	-	10	-	No abnormality				Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass

Table 2-8 Test Result

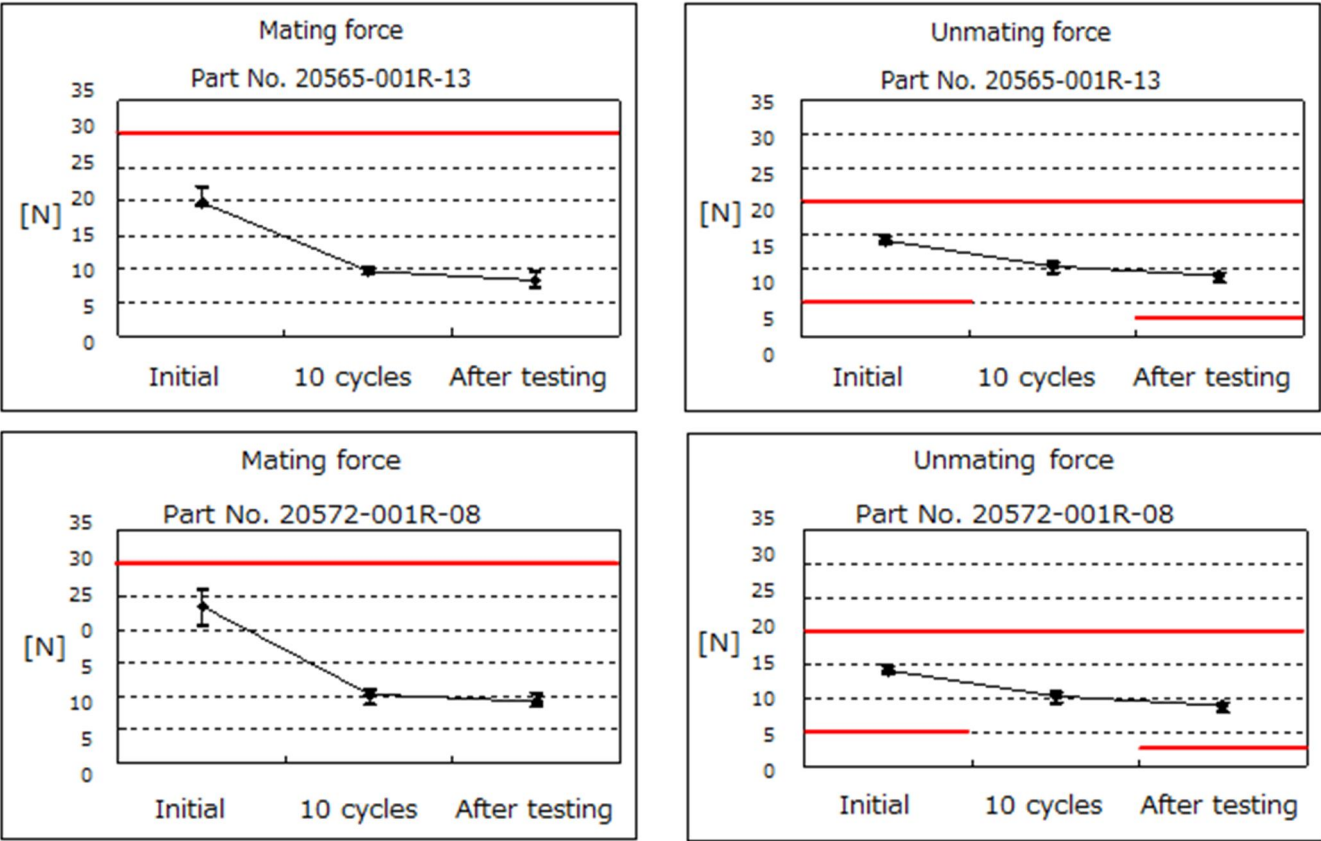
Group	Test items	Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
	Measurements								
N	Salt water spray								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	10.37	11.6	8.5	1.04	Pass
	After testing	-			10.02	12.7	9.2	1.02	-
	ΔR	ΔR 20mΩ MAX.			-0.35	1.1	-2.0	1.01	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.75	7.3	5.9	0.42	Pass
	After testing	-			6.96	7.7	6.5	0.46	-
	ΔR	ΔR 20mΩ MAX.			0.22	1.3	-0.6	0.63	Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	After testing	No abnormality	10	-	No abnormality				Pass
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	11.37	12.3	10.3	0.65	Pass
	After testing	-			10.76	12.7	9.8	1.03	-
	ΔR	ΔR 20mΩ MAX.			-0.61	1.6	-1.9	1.27	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.32	7.1	5.7	0.39	Pass
	After testing	-			6.08	7.6	5.6	0.57	-
	ΔR	ΔR 20mΩ MAX.			-0.23	1.2	-1.5	0.71	Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	After testing	No abnormality	10	-	No abnormality				Pass
P	H ₂ S Gas								
	Plug Part No. 20565-001R-13, 20565-001R-13-P								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	10.56	12.0	9.5	0.71	Pass
	After testing	-			11.60	12.4	10.8	0.52	-
	ΔR	ΔR 20mΩ MAX.			1.04	2.4	-0.3	0.79	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.56	8.0	6.1	0.56	Pass
	After testing	-			7.50	8.3	6.7	0.50	-
	ΔR	ΔR 20mΩ MAX.			0.94	2.0	-0.5	0.77	Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	After testing	No abnormality	10	-	No abnormality				Pass
	Plug Part No. 20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	11.33	12.7	10.0	0.93	Pass
	After testing	-			11.72	13.0	9.7	0.95	-
	ΔR	ΔR 20mΩ MAX.			0.38	1.8	-1.0	0.82	Pass
	Contact resistance of ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.87	6.1	5.6	0.18	Pass
	After testing	-			6.19	7.0	5.5	0.47	-
	ΔR	ΔR 20mΩ MAX.			0.32	0.9	-0.5	0.48	Pass
	Appearance								
	Pass criteria: No abnormality adversely affecting the performance shall occur								
	After testing	No abnormality	10	-	No abnormality				Pass

Table 2-9 Test Result

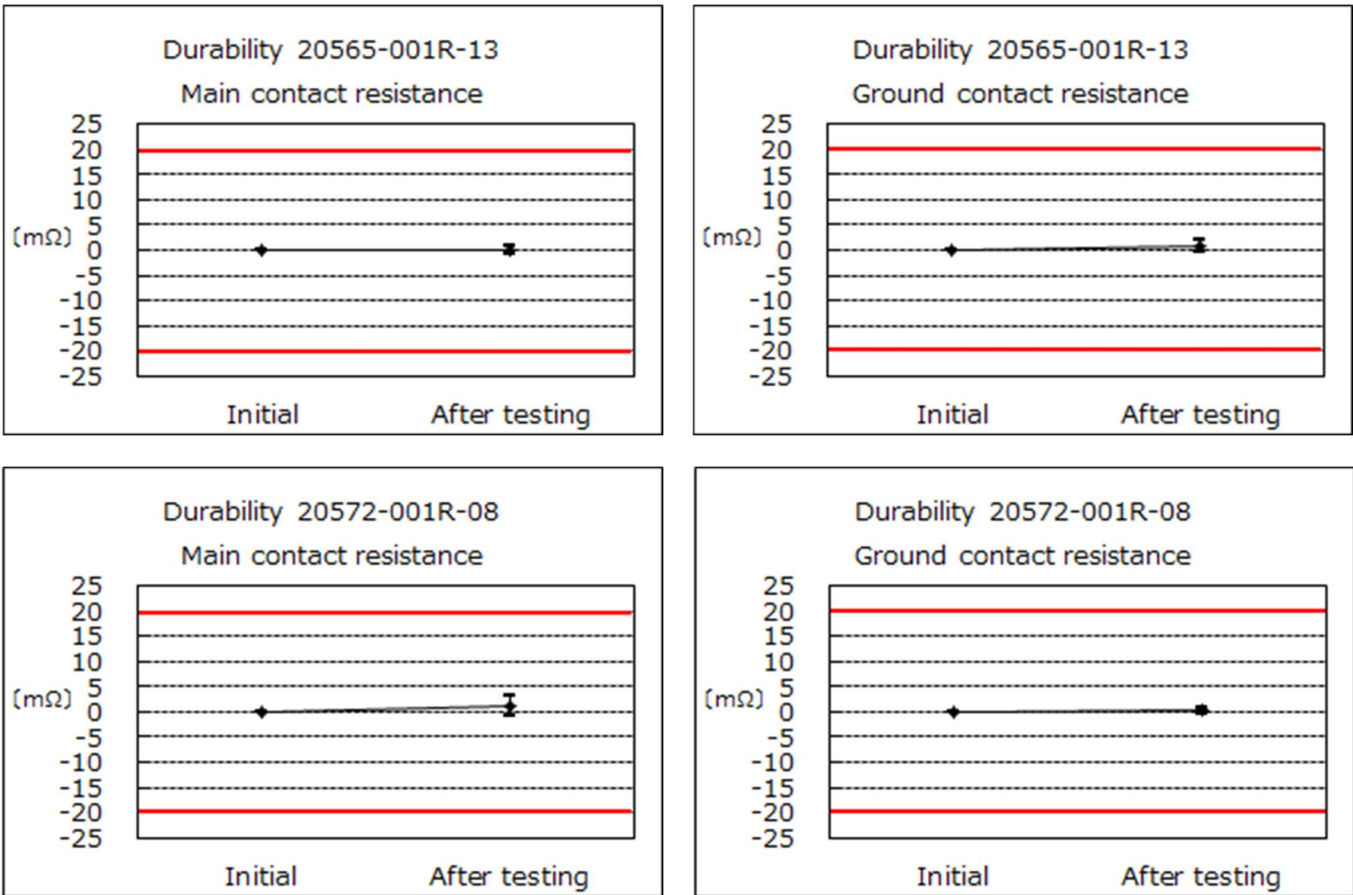
Group	Test items		Pass criteria	N	Unit	AVE.	MAX.	MIN.	S	Judgement
		Measurements								
Q	Solder ability									
	Pass criteria: More than 95% of the dipped surface becomes wet and the pinhole that should not gather at one point is less than 5%.									
	After testing	-	10	-	No abnormality				Pass	
R	Reflow soldering heat resistance									
	Appearance									
	Pass criteria: No abnormality adversely affecting the performance shall occur.									
	After testing	-	10	-	No abnormality				Pass	



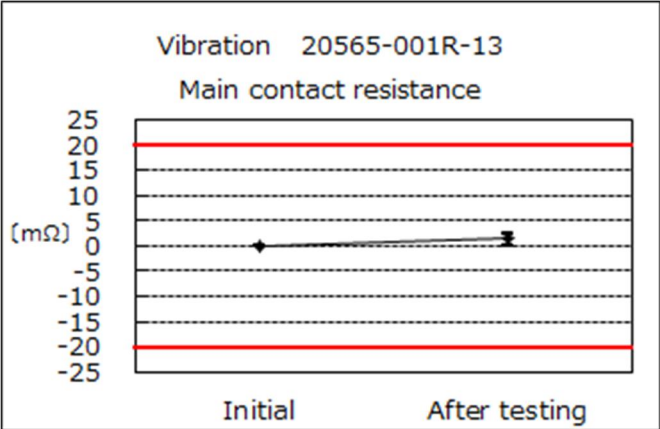
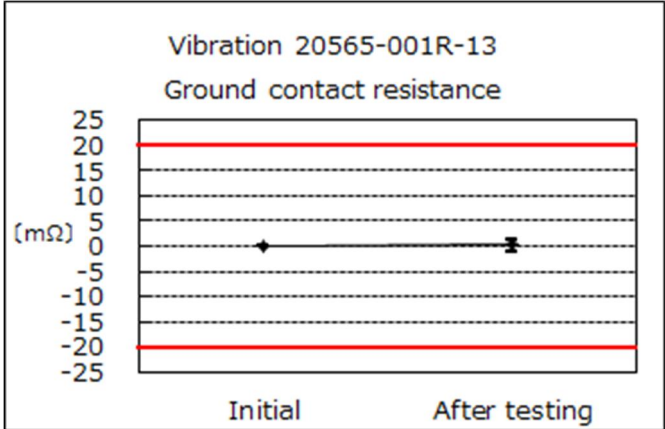
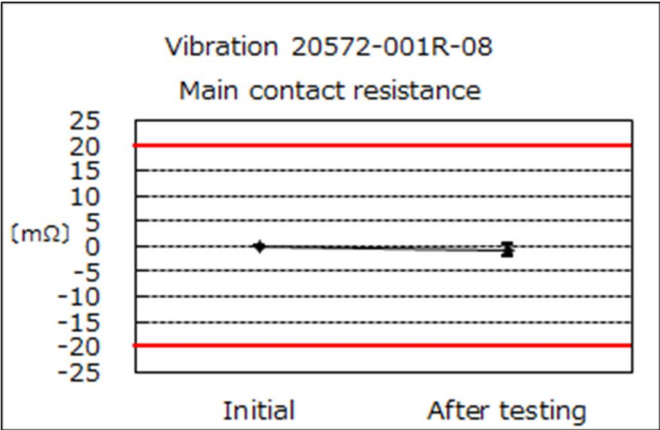
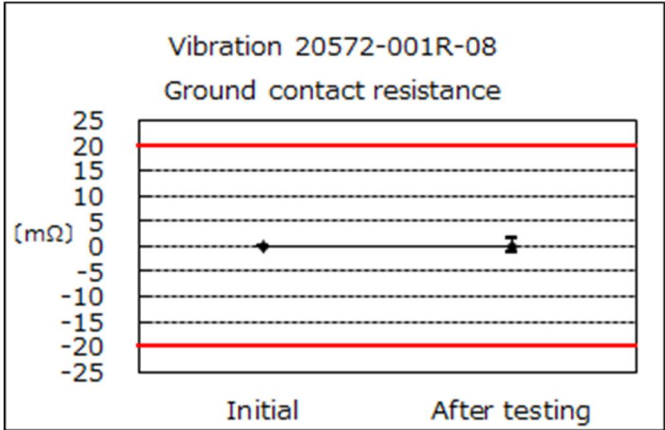
Graph 1 VSWR



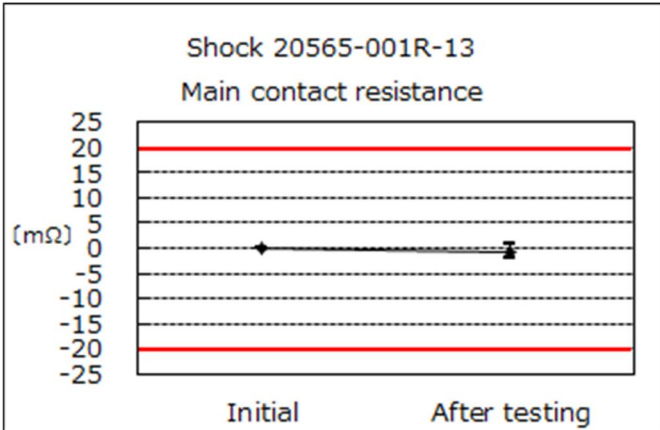
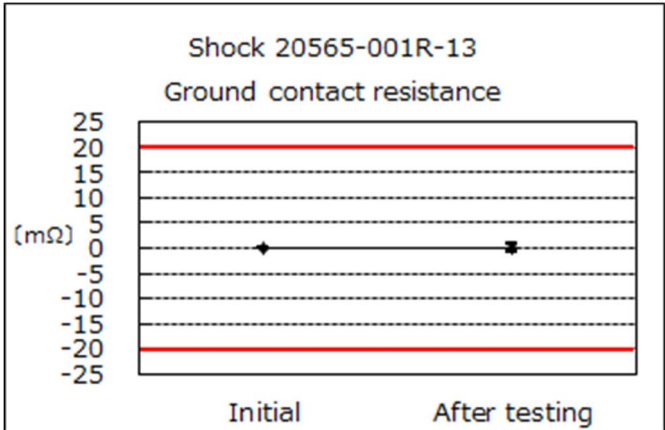
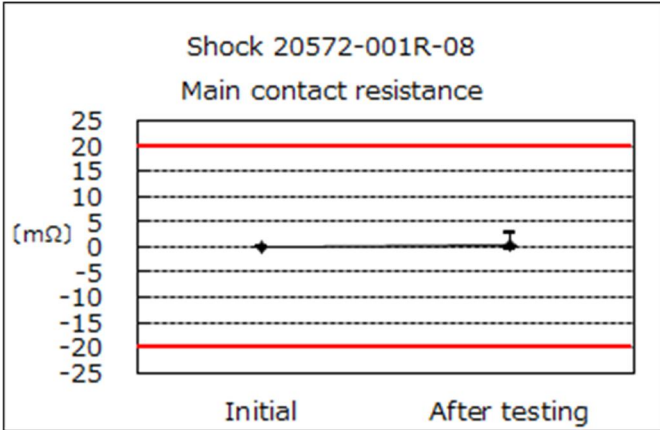
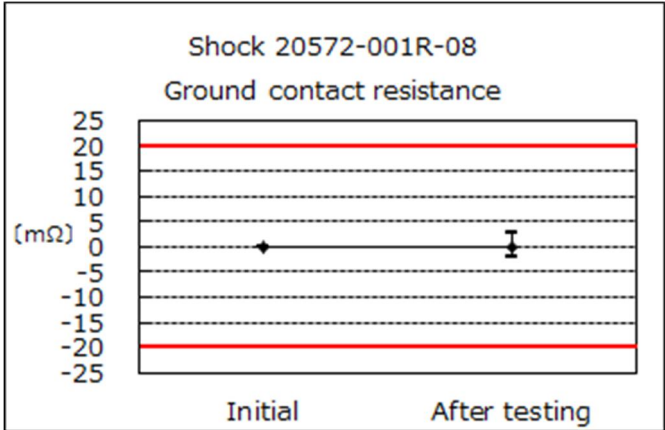
Graph 2 Mating Force and Unmating Force



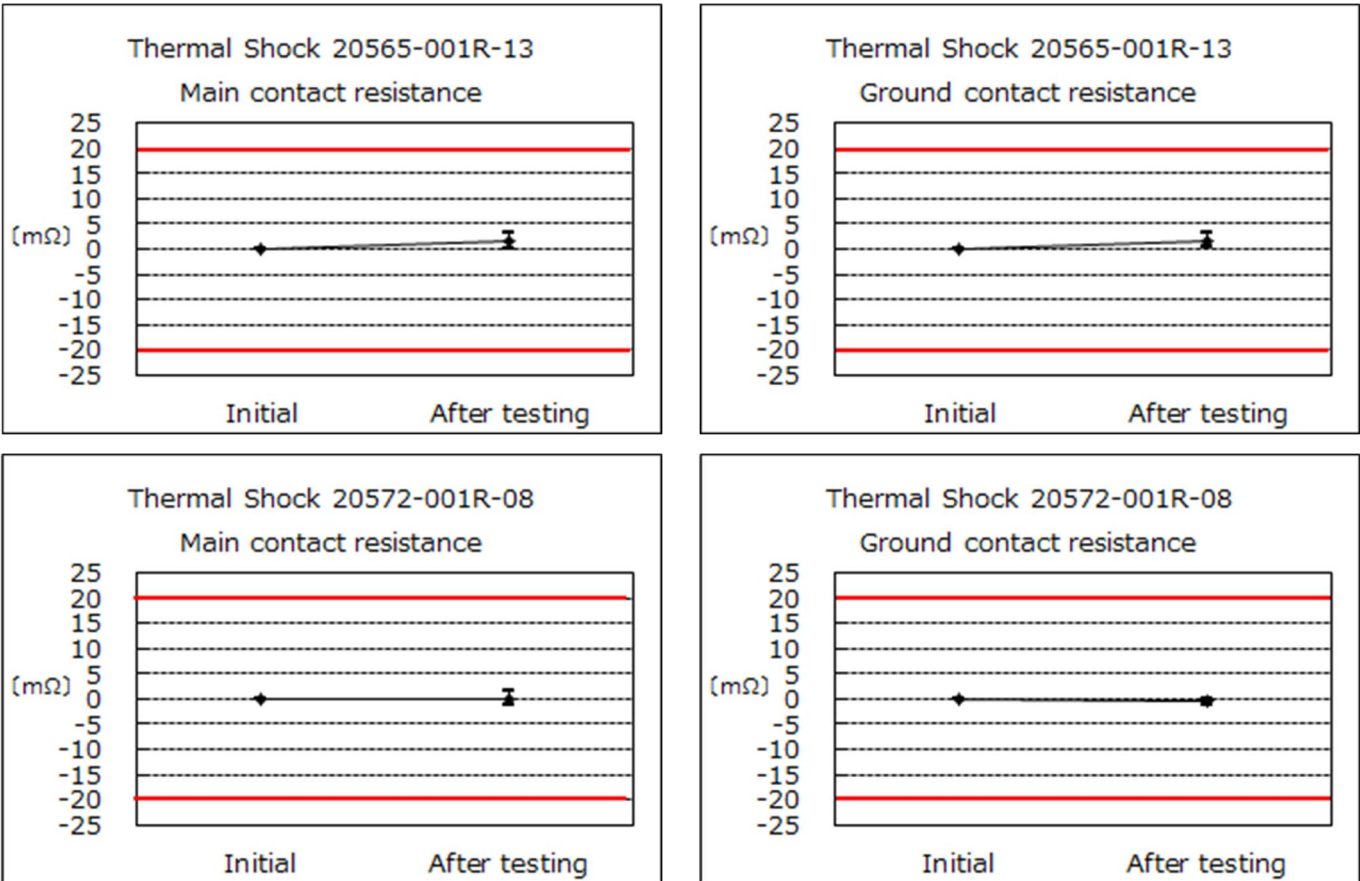
Graph 3 Durability



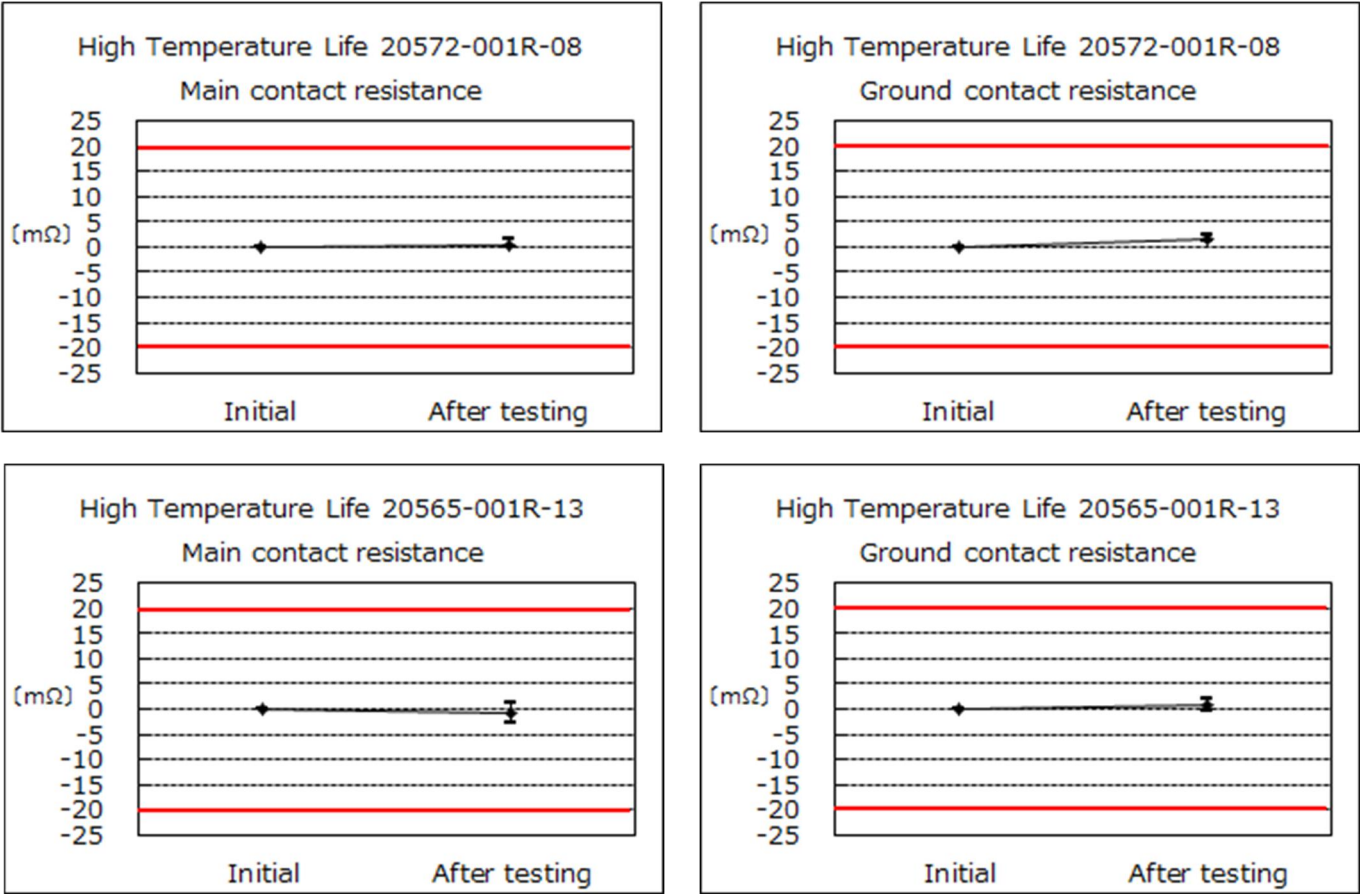
Graph 4 Vibration



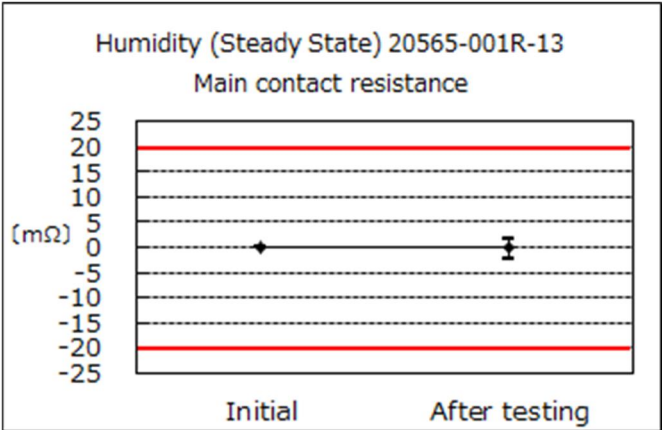
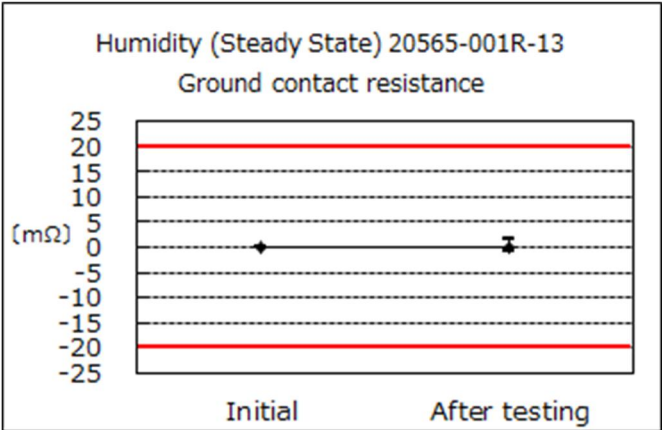
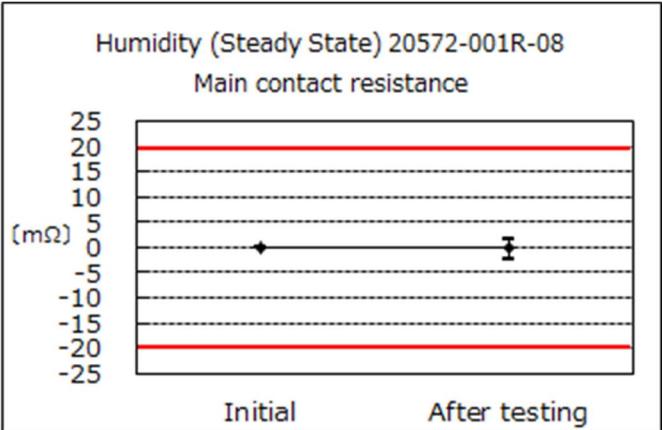
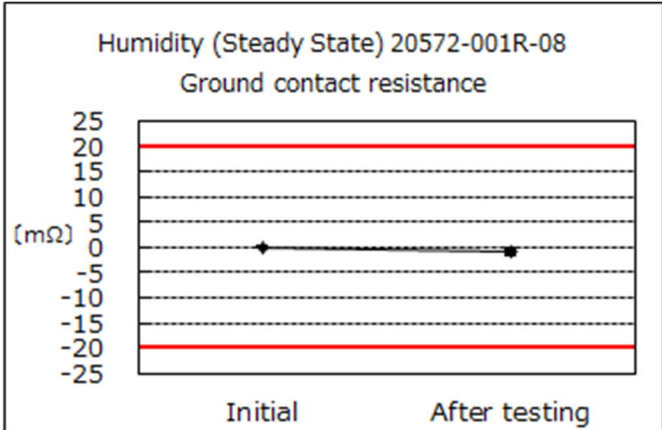
Graph 5 Shock



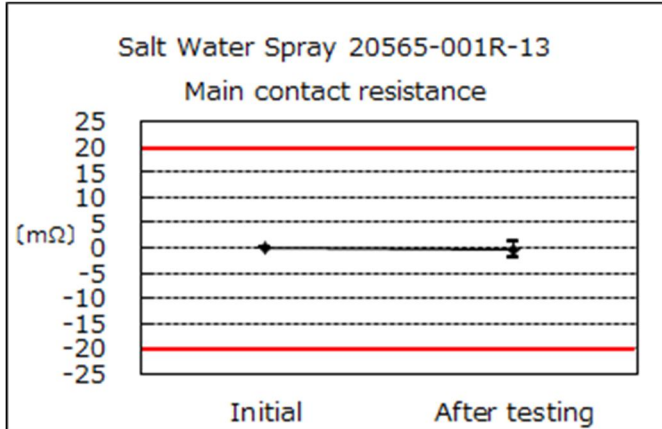
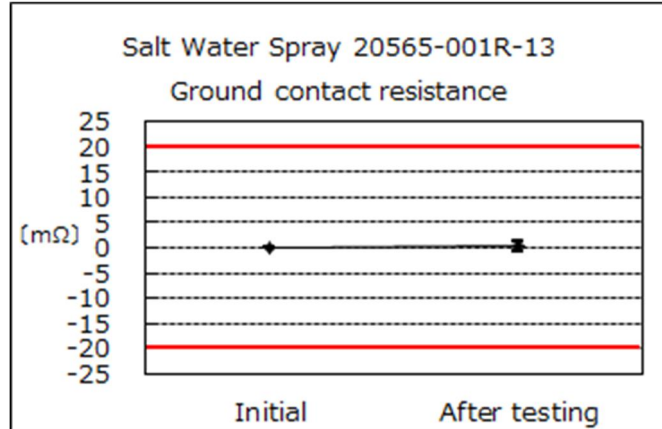
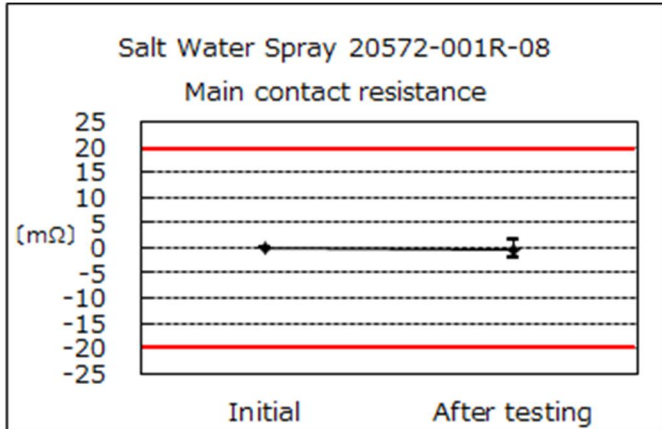
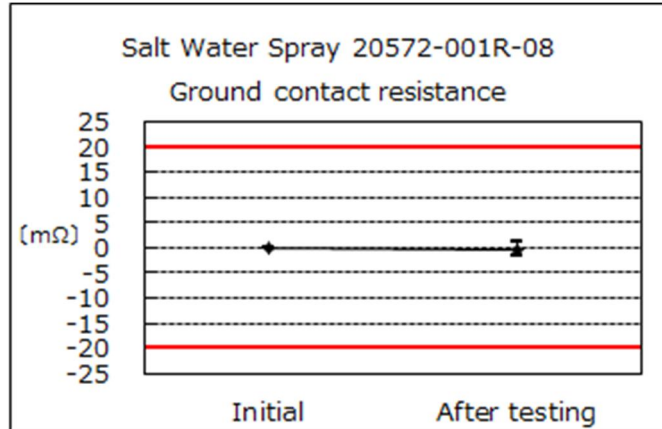
Graph 6 Thermal shock



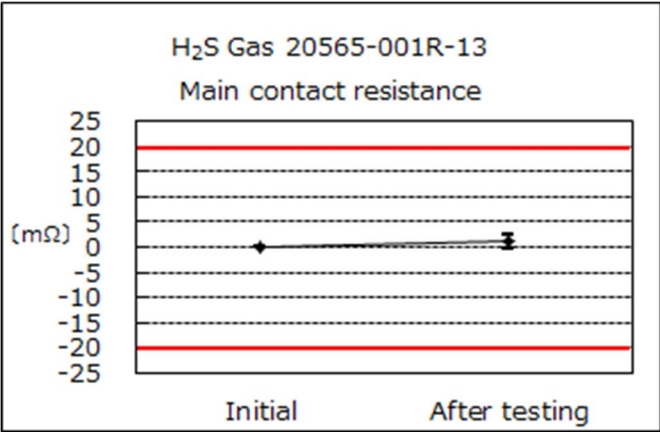
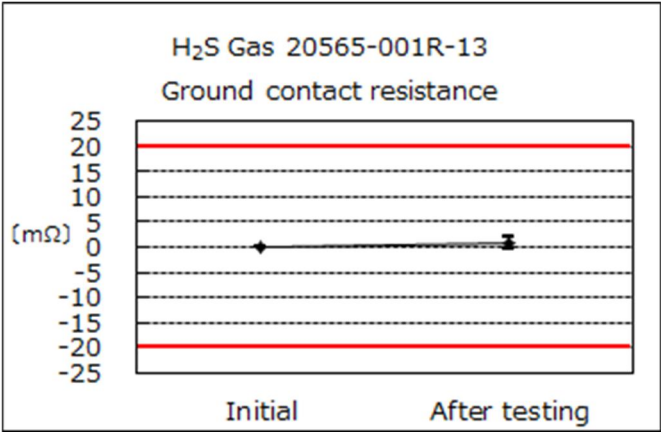
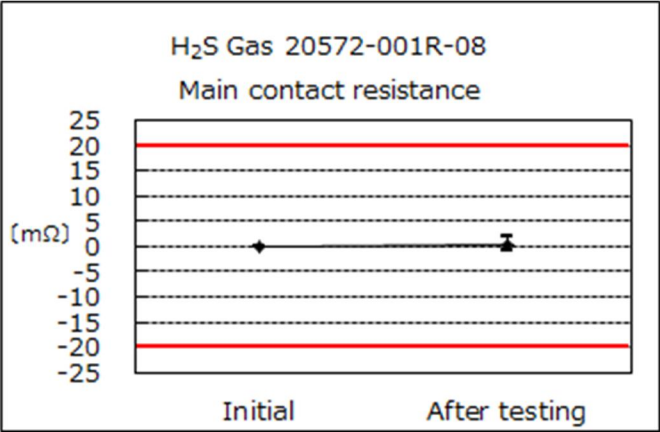
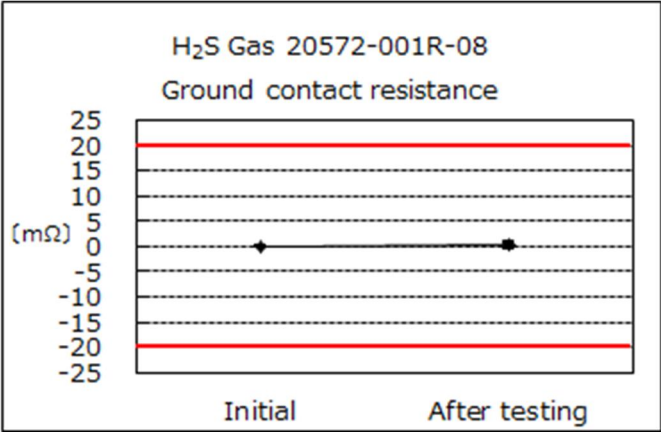
Graph 7 High temperature life



Graph 8 Humidity (Steady state)



Graph 9 Salt Water Spray



Graph 10 H₂S Gas