

MHF® 4L Connector

Plug Part No. 20565-001R-13

Receptacle Part No. 20449-001E-**

Test Report

Product Specification no. PRS-2051

2	T21103	October 27, 2021	K. Ikeshita		M. Takemoto
1	T21007	January 18, 2021	K. Ikeshita		M. Takemoto
0	T14184	December 24, 2014	S. Suzuki	K. Yotsutani	T. Takano
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

To evaluate the performance of MHF 4L Connector in accordance with PRS-2051.

2. Specimen

- (1) MHF 4L Plug Connector (Part No. 20565-001R-13)
- (2) MHF 4 Receptacle Connector (Part No. 20449-001E-**)

3. Test Sequence

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

4. Result

See Table 2, Graph 1 to 10. For the details of the testing conditions and requirements, see PRS-2051.
The "n" in the tables show the number of measurement points.

5. Conclusion

All the specimens met the requirements of PRS-2051.

Table 1 Test Sequence and Sample Quantity

Test Item	Group													
	A	B	C	D	E	F	G	H	J	K	L	M	N	P
Contact resistance					1,3	1,3	1,3	1,5	1,3	1,5	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											
Crimp strength				1										
Durability					2									
Vibration						2								
Shock							2							
Thermal shock								4						
High temperature life									2					
Humidity (Steady State)										4				
Saltwater spray											2			
H ₂ S gas												2		
Solder ability													1	
Soldering heat resistance														1
Specimen quantity.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.	10 pcs.

※Numbers indicate sequence in which tests are performed.

6. Result

Table 2-1

	Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge	
A	Dielectric withstanding voltage	Initial	Spec : No creeping discharge,flashover,nor insulator breakdown shall occur.							-----	
		20565-001R-13(ϕ 0.95)	-----	10	-----	Results : No abnormality			Pass		
B	VSWR										
	Plug Part No. 20565-001R-13(ϕ 0.95)										
		0.1~3.0GHz	1.3 MAX.	10	-----	1.043	1.05	1.03	0.005	Pass	
		3.0~6.0GHz	1.45 MAX.	10	-----	1.159	1.18	1.15	0.009	Pass	
		6.0~9.0GHz	1.6 MAX.	10	-----	1.259	1.30	1.23	0.017	Pass	
		9.0~12.0GHz	1.9 MAX.	10	-----	1.417	1.45	1.37	0.025	Pass	
	Receptacle										
		0.1~3.0GHz	1.3 MAX.	10	-----	1.114	1.15	1.08	0.027	Pass	
	3.0~6.0GHz	1.4 MAX.	10	-----	1.138	1.15	1.12	0.009	Pass		
	6.0~9.0GHz	1.5 MAX.	10	-----	1.356	1.41	1.31	0.038	Pass		
C	Mating force										
	Plug Part No. 20565-001R-13(ϕ 0.95)										
		Initial	30 MAX.	10	N	19.97	21.9	19.3	0.93	Pass	
		30 cycles		10	N	8.28	9.4	7.2	0.78	Pass	
	Unmating force										
	Plug Part No. 20565-001R-13(ϕ 0.95)										
	Initial	20 MAX. 5 MIN.	10	N	14.12	14.7	13.5	0.41	Pass		
	30 cycles	20 MAX. 3 MIN.	10	N	8.95	9.3	8.0	0.40	Pass		
D	Cable retention force										
		20565-001R-13(ϕ 0.95)	8 MIN.	10	N	13.37	14.6	12.6	0.62	Pass	
E	Durability										
	20565-001R-13 (ϕ 0.95)	Contact resistance of inner contact									
			Initial	20 MAX.	10	m Ω	11.88	13.1	10.1	0.99	Pass
			After testing	-----	10	m Ω	11.90	13.6	10.1	1.27	-----
			Δ R	20 MAX.	10	m Ω	0.02	2.4	-1.5	1.54	Pass
		Contact resistance of ground contact									
			Initial	20 MAX.	10	m Ω	6.56	7.0	5.9	0.39	Pass
			After testing	-----	10	m Ω	6.47	7.0	6.0	0.35	-----
			Δ R	20 MAX.	10	m Ω	-0.09	0.2	-0.4	0.24	Pass
		Appearance Spec:No abnormality adversely affecting the performance shall occur.									
		Initial	No abnormality	10	-----	No abnormality			Pass		
	After testing	No abnormality	10	-----	No abnormality			Pass			
F	Vibration										
	20565-001R-13 (ϕ 0.95)	Contact resistance of inner contact									
			Initial	20 MAX.	10	m Ω	10.88	12.0	10.5	0.43	Pass
			After testing	-----	10	m Ω	10.37	12.6	8.7	0.97	-----
			Δ R	20 MAX.	10	m Ω	-0.51	2.1	-2.1	1.15	Pass
		Contact resistance of ground contact									
			Initial	20 MAX.	10	m Ω	6.14	7.0	5.7	0.41	Pass
			After testing	-----	10	m Ω	5.30	6.9	4.1	0.86	-----
			Δ R	20 MAX.	10	m Ω	-0.84	0.5	-2.1	0.74	Pass
		Electrical discontinuity Spec. : No electrical discontinuity grater than 1 μ sec. shall occur.									
			-----	-----	10	-----	Results : No discontinuity			Pass	
		Appearance Spec:No abnormality adversely affecting the performance shall occur.									
			Initial	No abnormality	10	-----	No abnormality			Pass	
			After testing	No abnormality	10	-----	No abnormality			Pass	

Table 2-2

Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge
G Shock									
20565-001R-13 (φ0.95)	Contact resistance of inner contact								
	Initial	20 MAX.	10	mΩ	11.37	13.6	9.7	0.97	Pass
	After testing	-----	10	mΩ	11.47	13.0	10.2	0.98	-----
	ΔR	20 MAX.	10	mΩ	0.10	2.4	-3.0	1.41	Pass
	Contact resistance of ground contact								
	Initial	20 MAX.	10	mΩ	5.30	6.9	4.1	0.86	Pass
	After testing	-----	10	mΩ	5.40	7.0	4.3	0.91	-----
	ΔR	20 MAX.	10	mΩ	0.10	0.8	-0.4	0.35	Pass
	Electrical discontinuity								
	Spec. : No electrical discontinuity greater than 1μsec. shall occur.								

	10								
Results : No discontinuity									
Pass									
Appearance									
Spec.No abnormality adversely affecting the performance shall occur.									

Initial									
No abnormality									
10									

No abnormality									
Pass									
After testing									
No abnormality									
10									

No abnormality									
Pass									
H Thermal shock									
20565-001R-13 (φ0.95)	Contact resistance of inner contact								
	Initial	20 MAX.	10	mΩ	10.14	11.5	9.3	0.72	Pass
	After testing	-----	10	mΩ	10.23	12.9	9.3	1.07	-----
	ΔR	20 MAX.	10	mΩ	0.09	1.5	-1.8	0.82	Pass
	Contact resistance of ground contact								
	Initial	20 MAX.	10	mΩ	6.22	6.5	5.9	0.21	Pass
	After testing	-----	10	mΩ	6.77	8.4	5.9	0.82	-----
	ΔR	20 MAX.	10	mΩ	0.55	2.1	-0.6	0.79	Pass
	Insulation resistance								
	Initial	500 MIN.	10	MΩ	10,000 (minimum vale)				Pass
	After testing	100 MIN.	10	MΩ	10,000 (minimum vale)				Pass
	Dielectric withstanding voltage								
	Initial	No abnormality	10	-----	No abnormality				Pass
	After testing	No abnormality	10	-----	No abnormality				Pass
	Appearance								
	Spec.No abnormality adversely affecting the performance shall occur.								

	Initial								
No abnormality									
10									

No abnormality									
Pass									
After testing									
No abnormality									
10									

No abnormality									
Pass									
J High temperature life									
20565-001R-13 (φ0.95)	Contact resistance of inner contact								
	Initial	20 MAX.	10	mΩ	10.69	12.0	10.3	0.48	Pass
	After testing	-----	10	mΩ	11.19	13.5	10.5	0.89	-----
	ΔR	20 MAX.	10	mΩ	0.50	1.5	-0.1	0.47	Pass
	Contact resistance of ground contact								
	Initial	20 MAX.	10	mΩ	5.96	6.5	5.4	0.35	Pass
	After testing	-----	10	mΩ	8.55	9.9	6.9	1.12	-----
	ΔR	20 MAX.	10	mΩ	2.59	4.2	1.0	1.05	Pass
	Appearance								
	Spec.No abnormality adversely affecting the performance shall occur.								

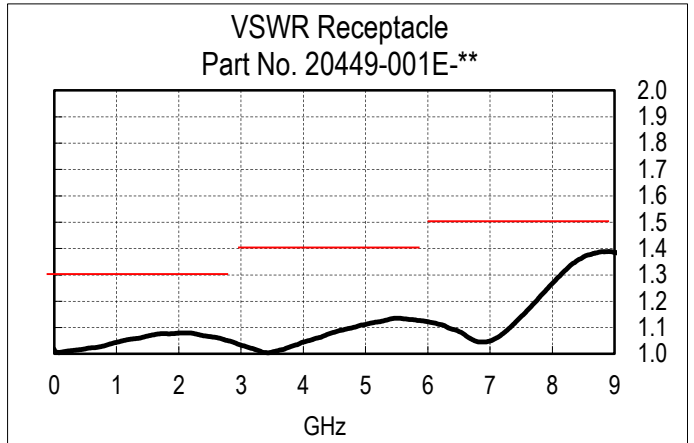
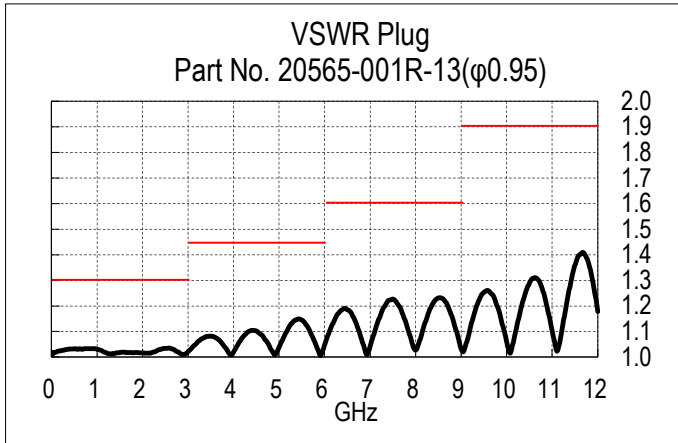
	Initial								
No abnormality									
10									

No abnormality									
Pass									
After testing									
No abnormality									
10									

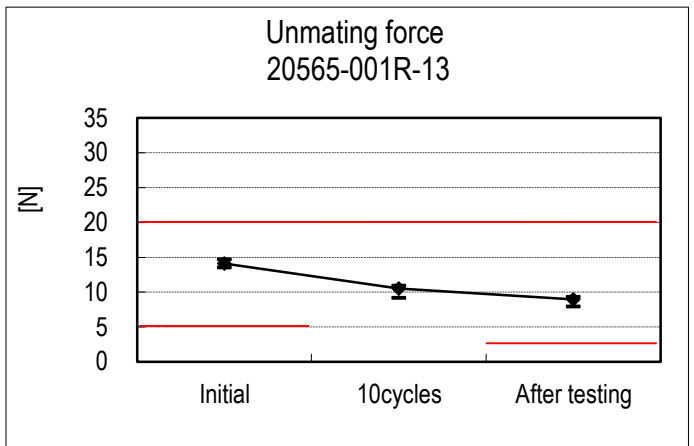
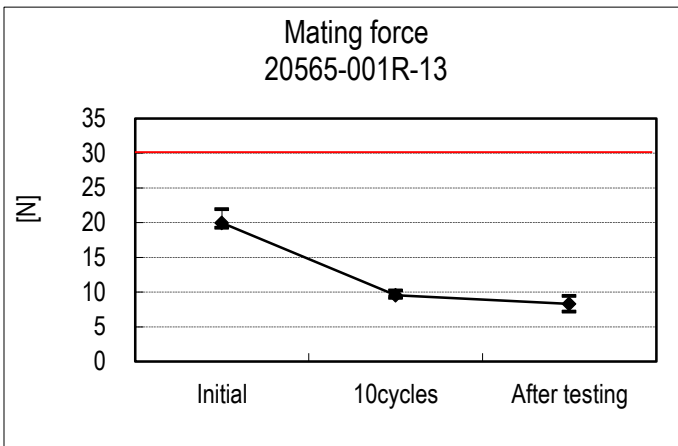
No abnormality									
Pass									

Table 2-3

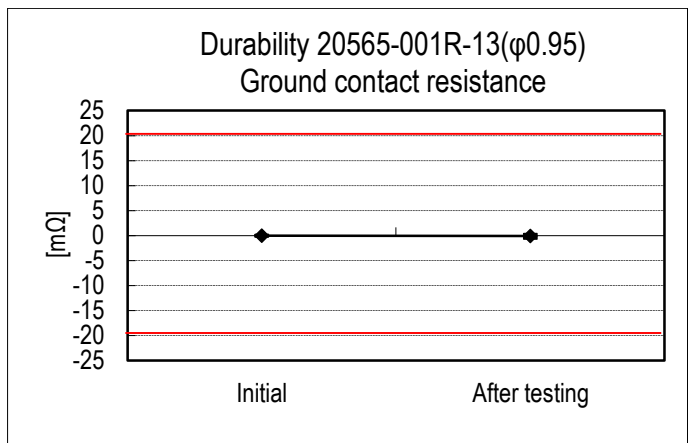
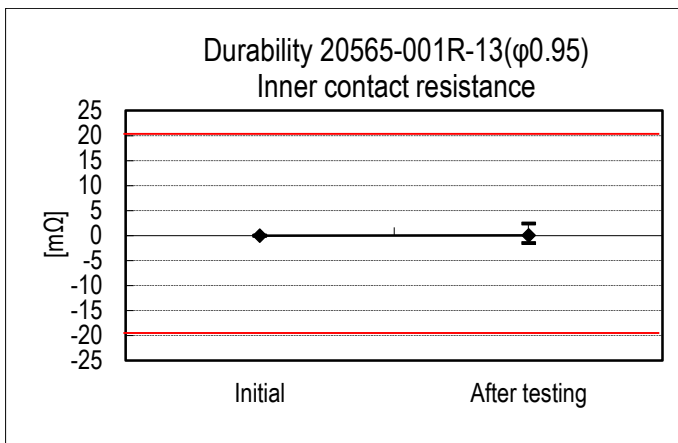
	Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge	
K	Humidity(Steady State)										
	20565-001R-13 (φ0.95)	Contact resistance of inner contact									
		Initial	20 MAX.		10	mΩ	11.24	12.2	10.7	0.48	Pass
		After testing	-----		10	mΩ	10.94	12.2	10.5	0.63	-----
		ΔR	20 MAX.		10	mΩ	-0.30	0.0	-1.0	0.33	Pass
		Contact resistance of ground contact									
		Initial	20 MAX.		10	mΩ	6.06	6.4	5.7	0.23	Pass
		After testing	-----		10	mΩ	7.50	8.6	6.3	0.79	-----
		ΔR	20 MAX.		10	mΩ	1.44	2.6	0.4	0.69	Pass
		Insulation resistance									
	Initial	500 MIN.		10	MΩ	10,000 (minimum vale)				Pass	
	After testing	100 MIN.		10	MΩ	10,000 (minimum vale)				Pass	
	Dielectric withstanding voltage										
	Initial	No abnormality		10	-----	No abnormality				Pass	
	After testing	No abnormality		10	-----	No abnormality				Pass	
Appearance Spec.:No abnormality adversely affecting the performance shall occur.											
Initial	No abnormality		10	-----	No abnormality				Pass		
After testing	No abnormality		10	-----	No abnormality				Pass		
L	Saltwater spray										
	20565-001R-13 (φ0.95)	Contact resistance of inner contact									
		Initial	20 MAX.		10	mΩ	11.31	13.0	10.3	0.96	Pass
		After testing	-----		10	mΩ	10.48	13.7	9.4	1.34	-----
		ΔR	20 MAX.		10	mΩ	-0.83	1.5	-3.1	1.37	Pass
		Contact resistance of ground contact									
		Initial	20 MAX.		10	mΩ	5.91	6.7	5.4	0.38	Pass
		After testing	-----		10	mΩ	7.38	9.0	6.4	0.89	-----
		ΔR	20 MAX.		10	mΩ	1.47	3.0	0.0	1.01	Pass
Appearance Spec.:No abnormality adversely affecting the performance shall occur.											
Initial	No abnormality		10	-----	No abnormality				Pass		
After testing	No abnormality		10	-----	No abnormality				Pass		
M	H ₂ S Gas										
	20565-001R-13 (φ0.95)	Contact resistance of inner contact									
		Initial	20 MAX.		10	mΩ	12.29	13.3	11.6	0.56	Pass
		After testing	-----		10	mΩ	11.54	12.8	10.7	0.83	-----
		ΔR	20 MAX.		10	mΩ	-0.75	0.7	-1.7	0.71	Pass
		Contact resistance of ground contact									
		Initial	20 MAX.		10	mΩ	6.22	6.7	6.0	0.23	Pass
		After testing	-----		10	mΩ	4.91	6.1	3.7	0.68	-----
		ΔR	20 MAX.		10	mΩ	-1.31	-0.4	-2.4	0.56	Pass
Appearance Spec.:No abnormality adversely affecting the performance shall occur.											
Initial	No abnormality		10	-----	No abnormality				Pass		
After testing	No abnormality		10	-----	No abnormality				Pass		
N	Solderability		Spec.:More than 95% of the dipped surface becomes wet and the pinhole that should not gather at one point is less than 5%.								
	-----			10	-----	No abnormality				Pass	
P	Reflow soldering heat resistance		Spec.:Abnormality adversely affecting the performance should not occur.								
	-----			10	-----	No abnormality				Pass	



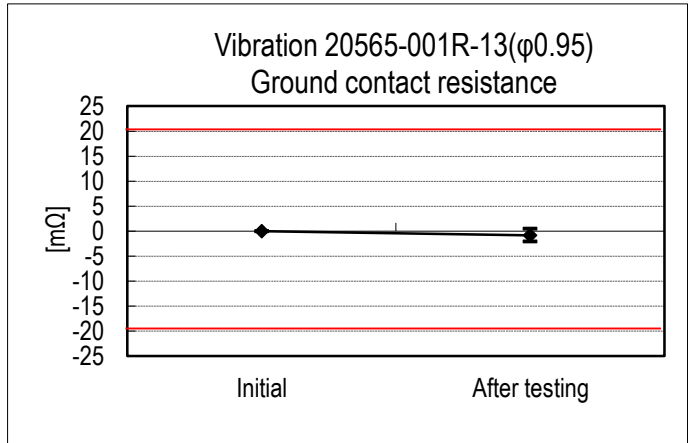
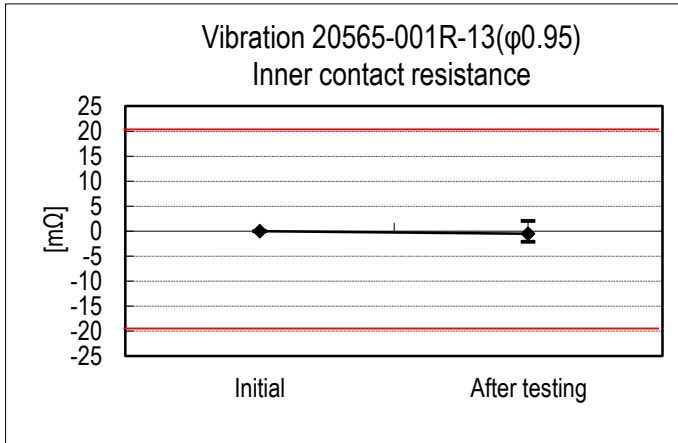
Graph 1 VSWR



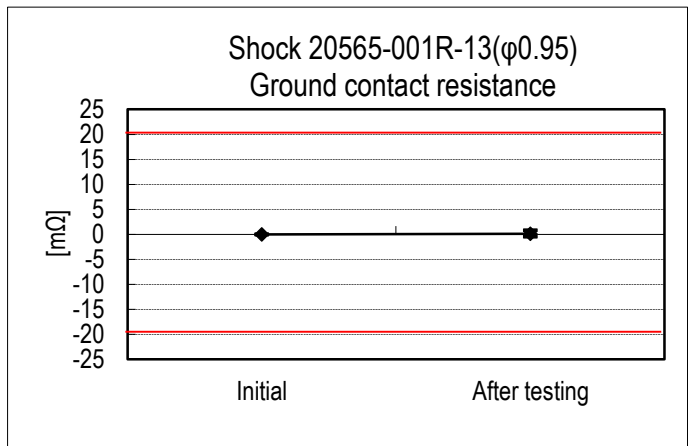
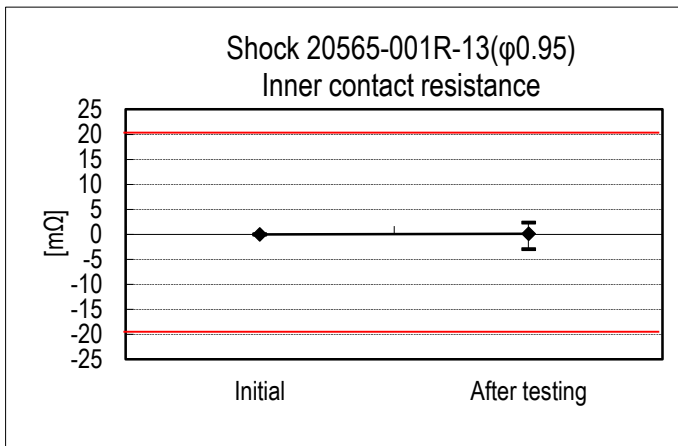
Graph 2 Mating force, Unmating force



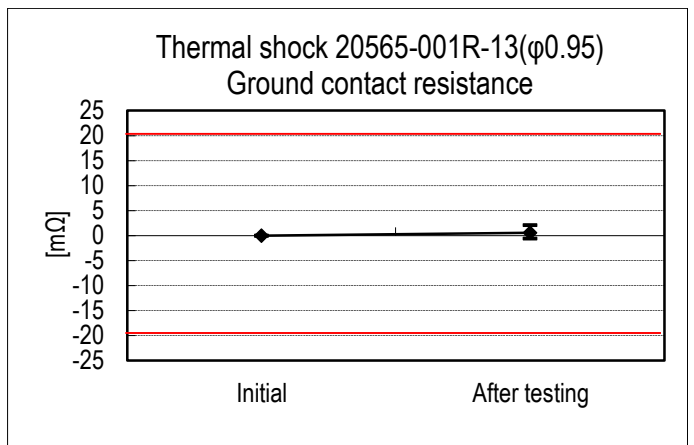
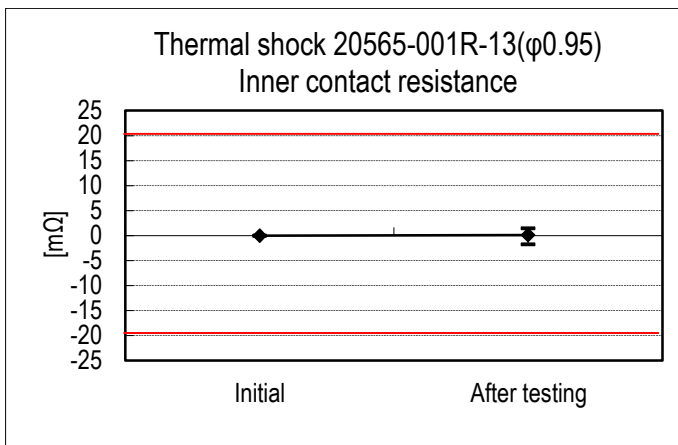
Graph 3 Durability



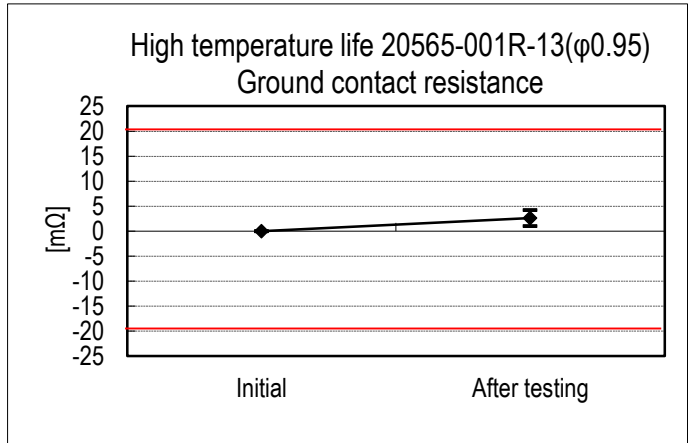
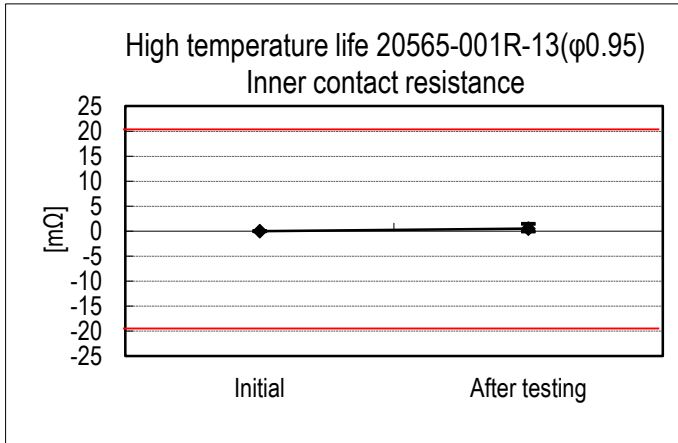
Graph 4 Vibration



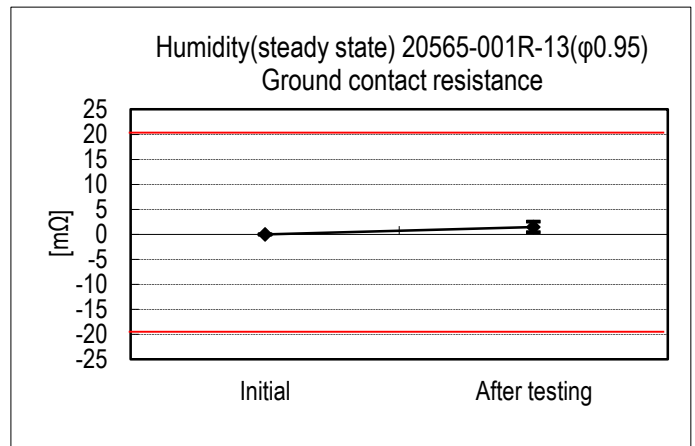
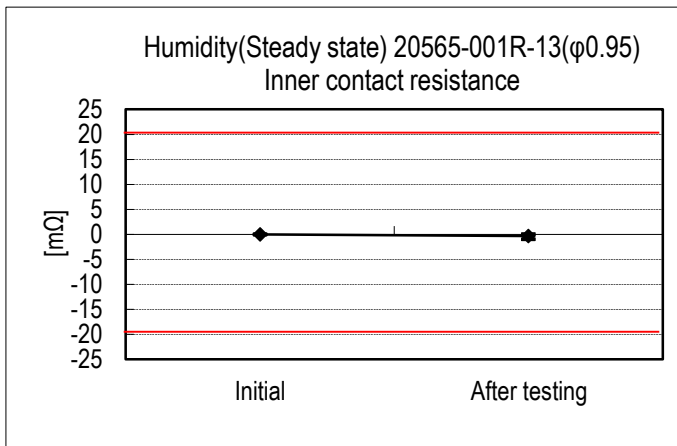
Graph 5 Shock



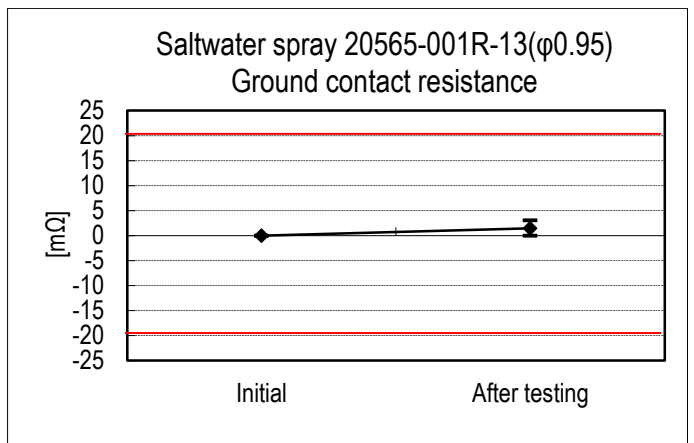
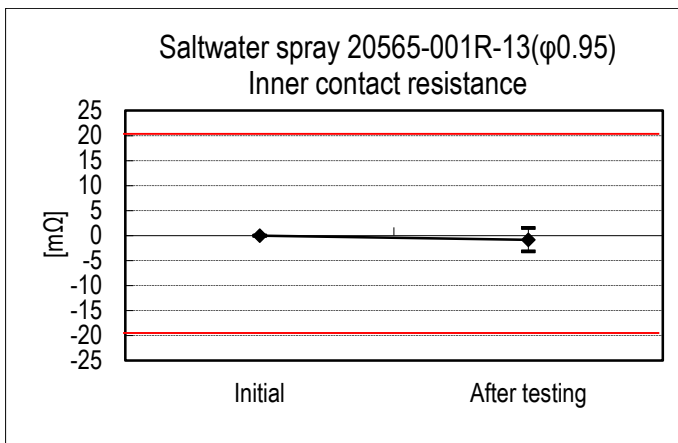
Graph 6 Thermal shock



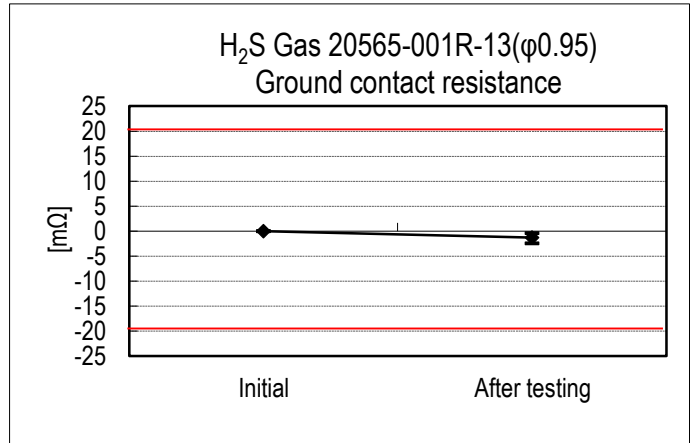
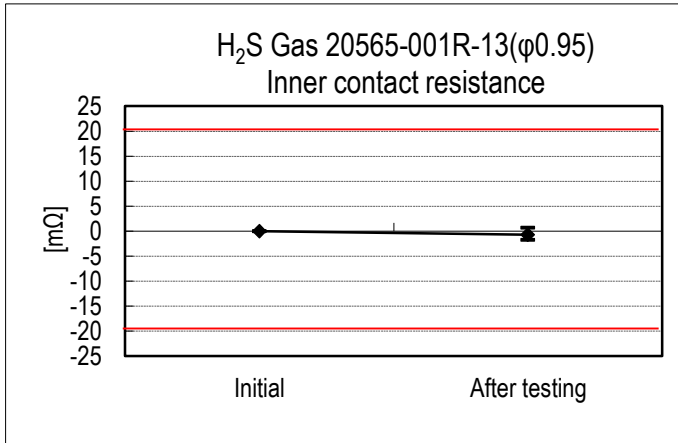
Graph 7 High temperature life



Graph 8 Humidity(Steady State)



Graph 9 Saltwater spray



Graph 10 H₂S Gas