

# MHF<sup>®</sup> 4 / 4L Connector

MHF 4L Plug Part No. 20565-001R-13  
 MHF 4 Receptacle Part No. 20449-001E-\*\*

## Test Report

Product Specification no. PRS-2051

3	T22081	June 1, 2022	Y. Imaji	K. Yufu	Y. Hashimoto
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 4 / 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 <sub>2</sub> 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	-	-
	Receptacle		5		-									10	10

※Numbers indicate sequence in which tests are performed.

## 6. Result

Table 2-1

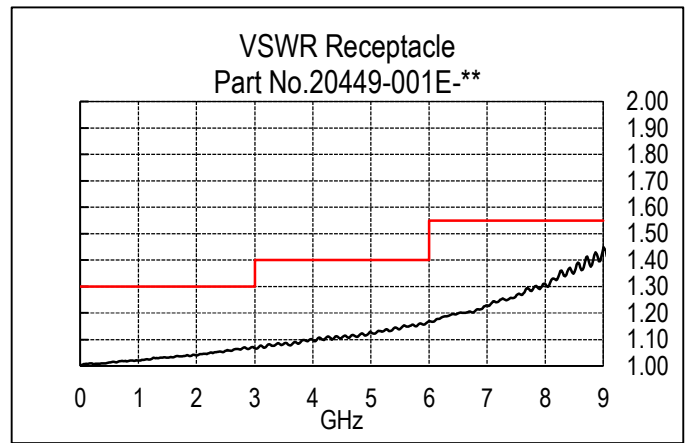
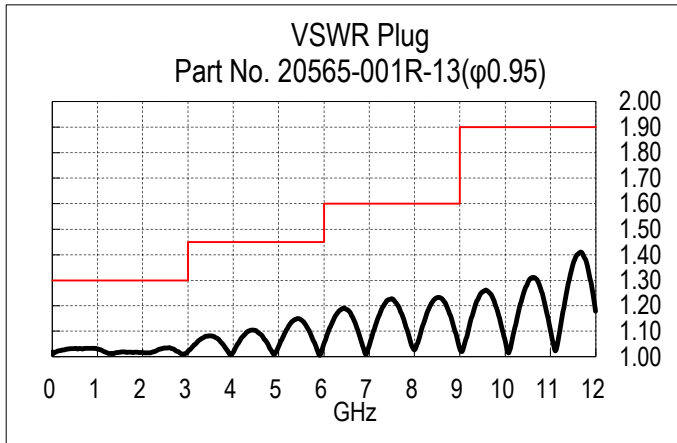
	Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge	
A	Dielectric withstanding voltage	Initial	Spec : No creeping discharge,flashover,nor insulator breakdown shall occur.							-----	
		20565-001R-13(φ0.95)	-----	10	-----	Results : No abnormality			Pass		
B	VSWR										
	Plug Part No. 20565-001R-13(φ0.95)										
		0.1~3GHz	1.30 MAX.	10	-----	1.043	1.05	1.03	0.005	Pass	
		3~6GHz	1.45 MAX.	10	-----	1.159	1.18	1.15	0.009	Pass	
		6~9GHz	1.60 MAX.	10	-----	1.259	1.30	1.23	0.017	Pass	
		9~12GHz	1.90 MAX.	10	-----	1.417	1.45	1.37	0.025	Pass	
	Receptacle 20449-001E-**										
	0.1~3GHz	1.30 MAX.	5	-----	1.067	1.08	1.06	0.007	Pass		
	3~6GHz	1.40 MAX.	5	-----	1.176	1.19	1.16	0.010	Pass		
	6~9GHz	1.55 MAX.	5	-----	1.465	1.50	1.43	0.021	Pass		
C	Mating force										
	Plug Part No. 20565-001R-13(φ0.95)										
		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(φ0.95)										
	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(φ0.95)	8 MIN.	10	N	13.37	14.6	12.6	0.62	Pass	
E	Durability										
	20565-001R-13 (φ0.95)	Contact resistance of inner contact									
			Initial	20 MAX.	10	mΩ	11.88	13.1	10.1	0.99	Pass
			After testing	-----	10	mΩ	11.90	13.6	10.1	1.27	-----
			ΔR	20 MAX.	10	mΩ	0.02	2.4	-1.5	1.54	Pass
		Contact resistance of ground contact									
			Initial	20 MAX.	10	mΩ	6.56	7.0	5.9	0.39	Pass
			After testing	-----	10	mΩ	6.47	7.0	6.0	0.35	-----
			ΔR	20 MAX.	10	mΩ	-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 (φ0.95)	Contact resistance of inner contact									
			Initial	20 MAX.	10	mΩ	10.88	12.0	10.5	0.43	Pass
			After testing	-----	10	mΩ	10.37	12.6	8.7	0.97	-----
			ΔR	20 MAX.	10	mΩ	-0.51	2.1	-2.1	1.15	Pass
		Contact resistance of ground contact									
			Initial	20 MAX.	10	mΩ	6.14	7.0	5.7	0.41	Pass
			After testing	-----	10	mΩ	5.30	6.9	4.1	0.86	-----
			ΔR	20 MAX.	10	mΩ	-0.84	0.5	-2.1	0.74	Pass
		Electrical discontinuity Spec. : No electrical discontinuity grater 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		

Table 2-2

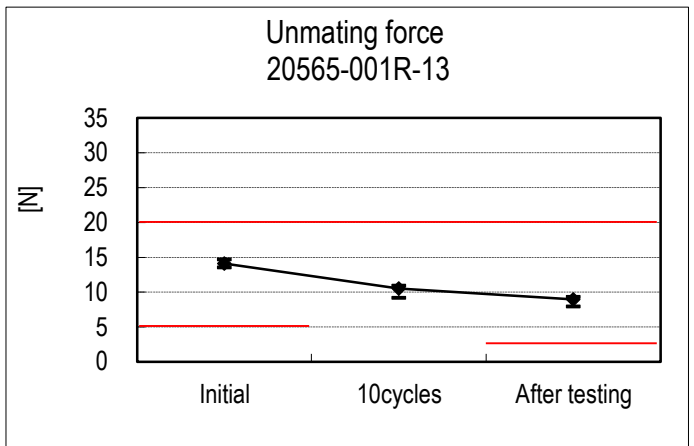
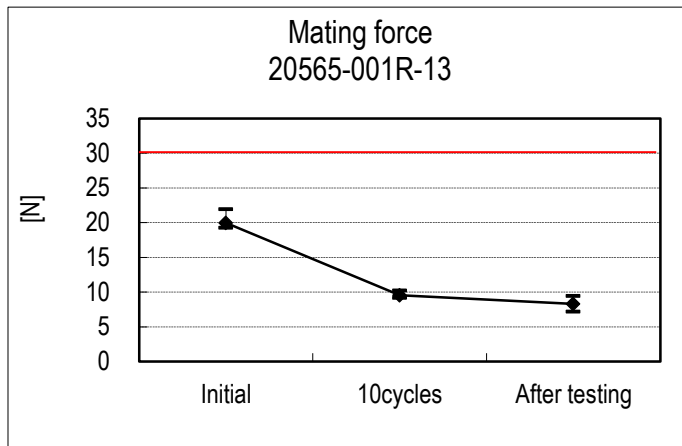
Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge
G Shock									
20565-001R-13 (φ0.95)	Contact resistance of inner contact								
	Initial	20 MAX.	10	mΩ	11.37	13.6	9.7	0.97	Pass
	After testing	-----	10	mΩ	11.47	13.0	10.2	0.98	-----
	ΔR	20 MAX.	10	mΩ	0.10	2.4	-3.0	1.41	Pass
	Contact resistance 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

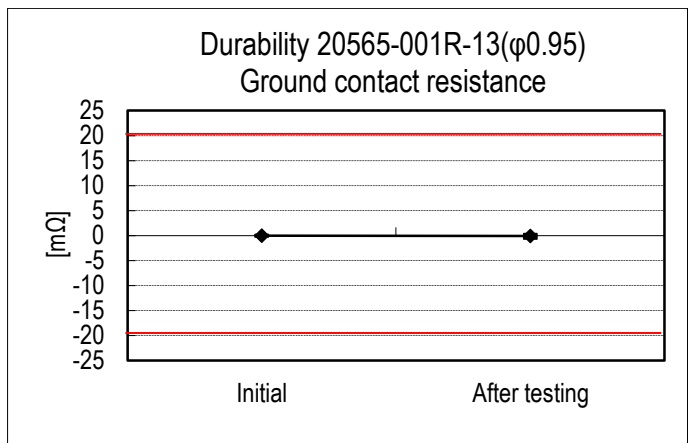
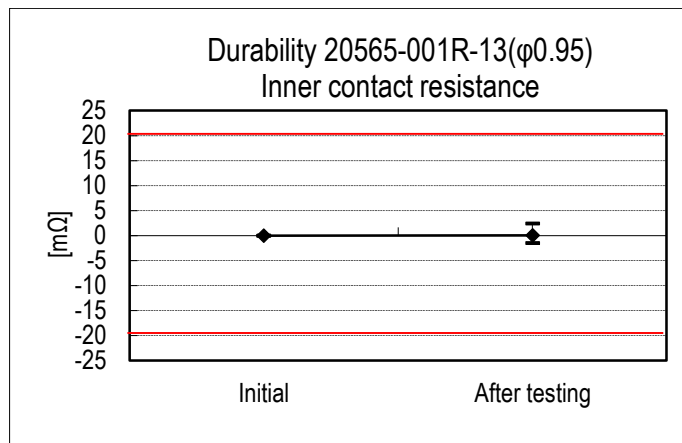
	Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge	
K	Humidity(Steady State)										
	20565-001R-13 (φ0.95)	Contact resistance of inner contact									
		Initial	20 MAX.		10	mΩ	11.24	12.2	10.7	0.48	Pass
		After testing	-----		10	mΩ	10.94	12.2	10.5	0.63	-----
		ΔR	20 MAX.		10	mΩ	-0.30	0.0	-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 <sub>2</sub> 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	



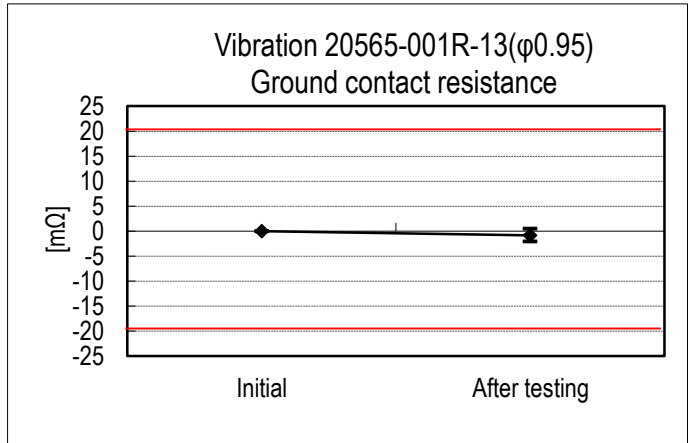
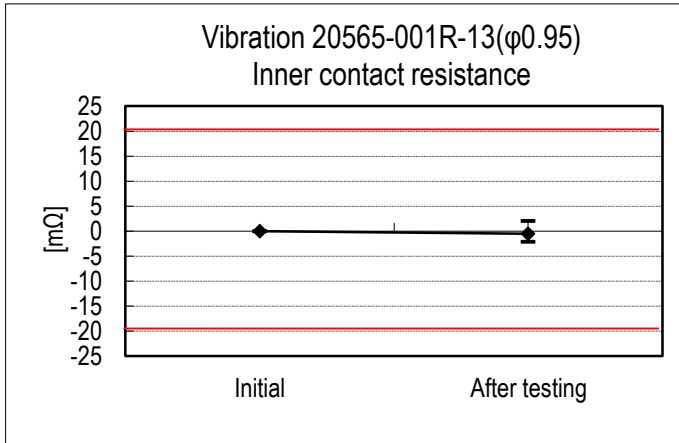
Graph 1 VSWR



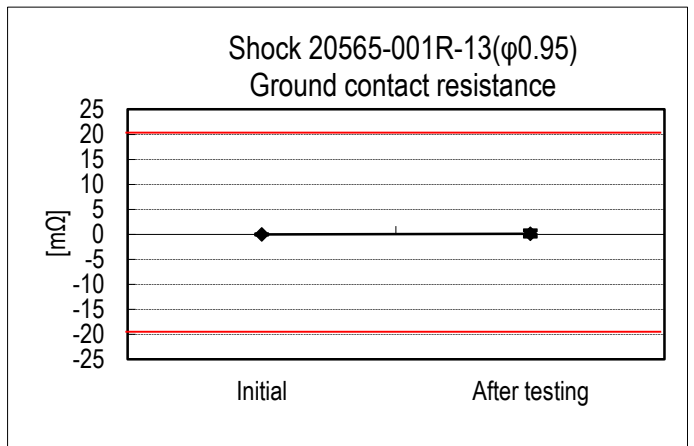
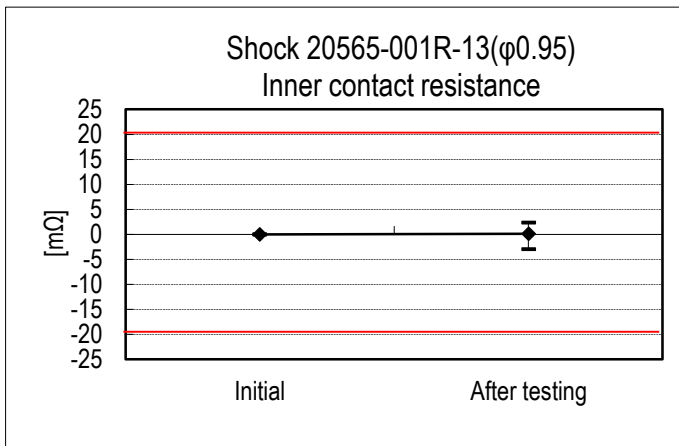
Graph 2 Mating force, Unmating force



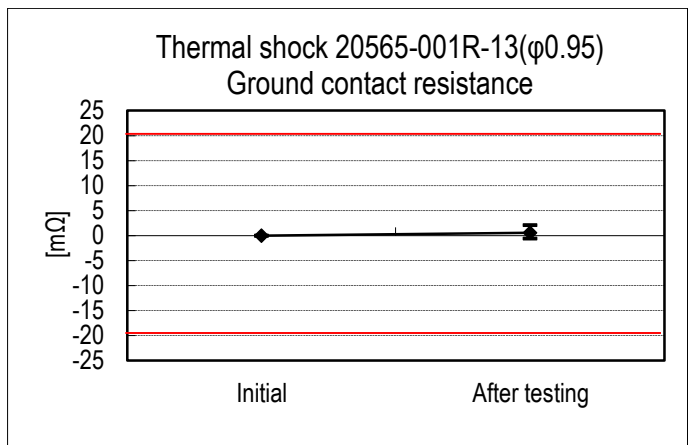
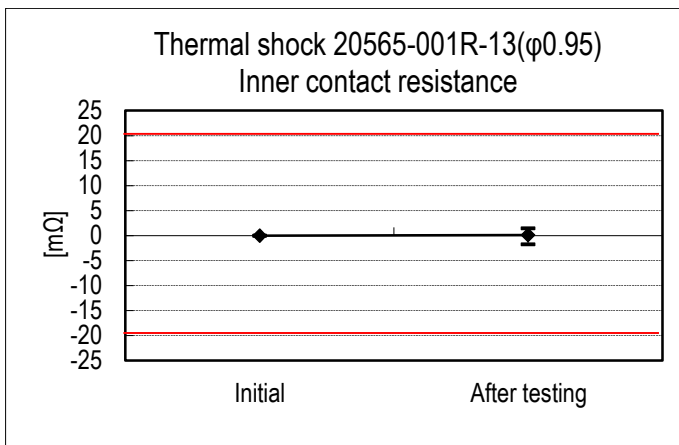
Graph 3 Durability



Graph 4 Vibration

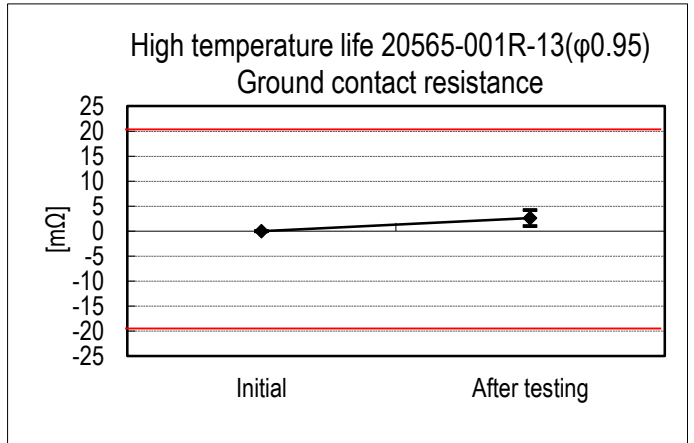
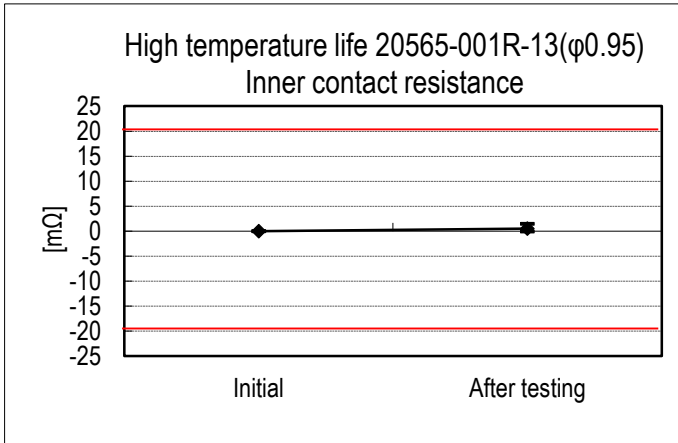


Graph 5 Shock

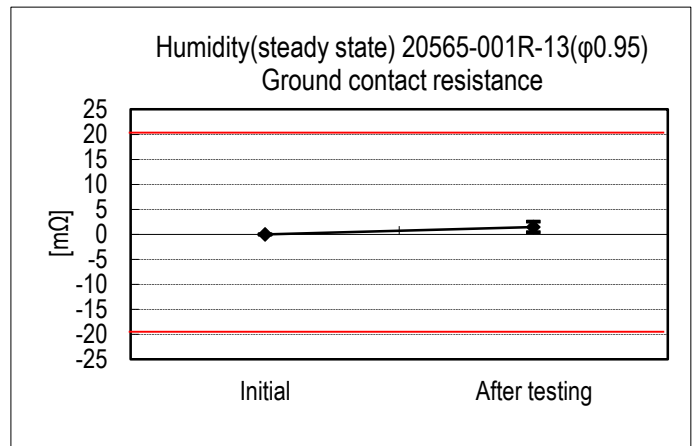
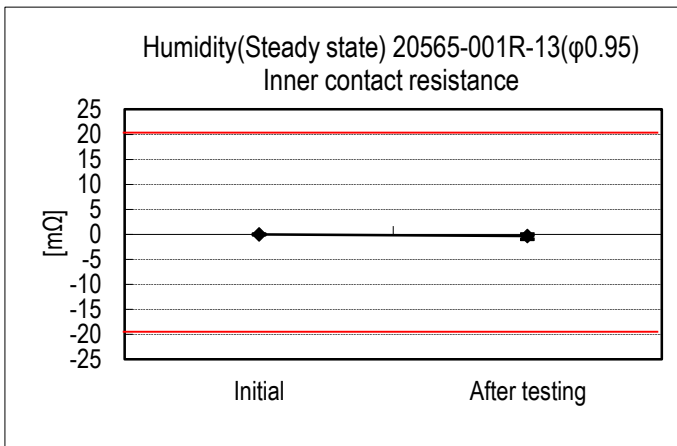


Graph 6 Thermal shock

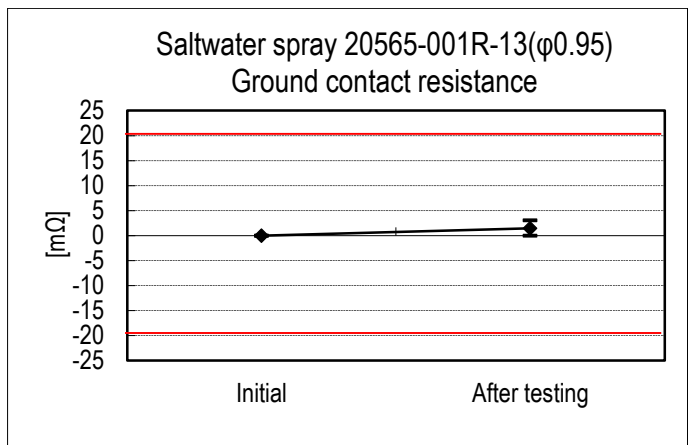
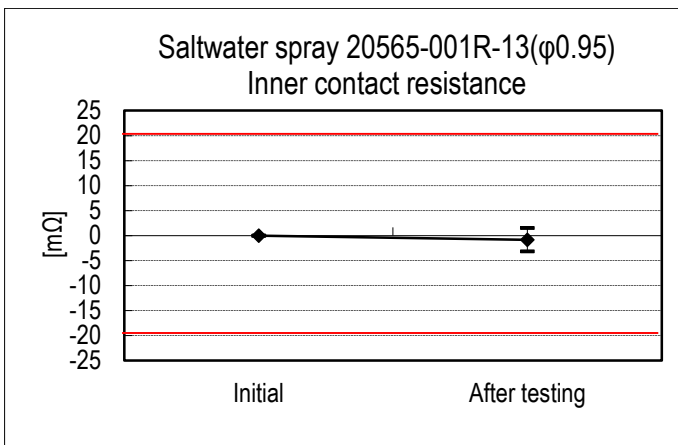




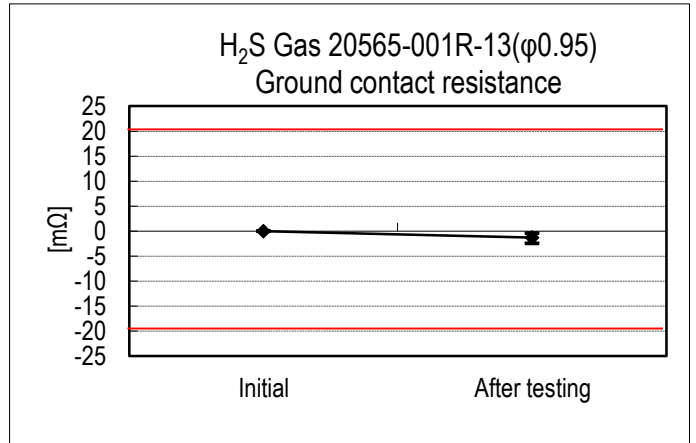
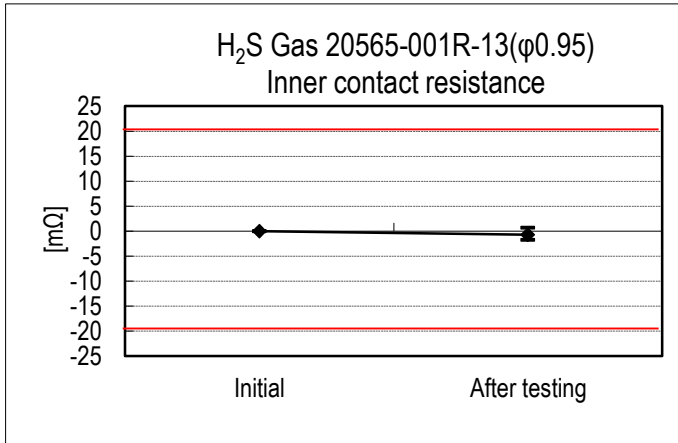
Graph 7 High temperature life



Graph 8 Humidity(Steady State)



Graph 9 Saltwater spray



Graph 10 H<sub>2</sub>S Gas