

MHF® 4L Connector

Plug Part No. 20565-001R-13

Receptacle Part No. 20449-001E-**

Test Report

Product Specification no. PRS-2051

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

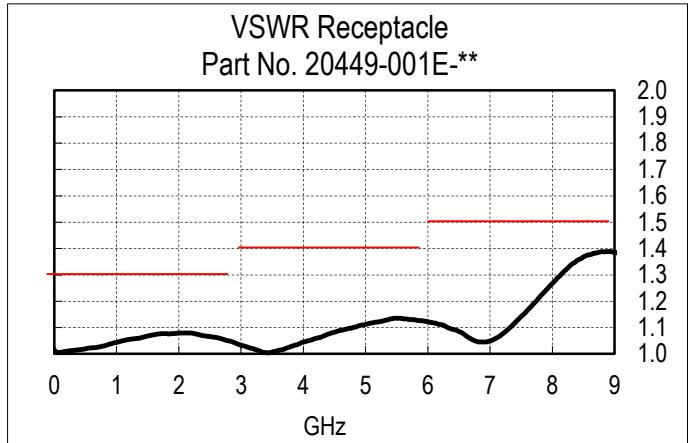
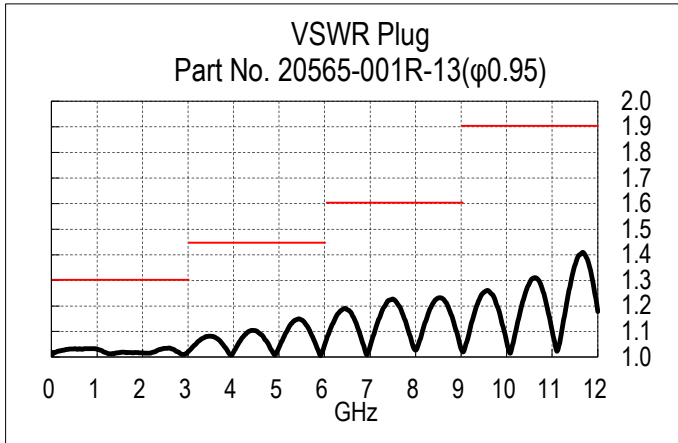
	Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge		
A	Dielectric withstanding voltage	Initial 20565-001R-13(ϕ 0.95)	Spec : No creeping discharge,flashover,nor insulator breakdown shall occur.							-----		
			-----	10	-----	Results : No abnormality			Pass			
B	VSWR											
	Plug Part No. 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									
		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										
	Initial	No abnormality	10	-----	No abnormality				Pass			
	After testing	No abnormality	10	-----	No abnormality				Pass			

Table 2-2

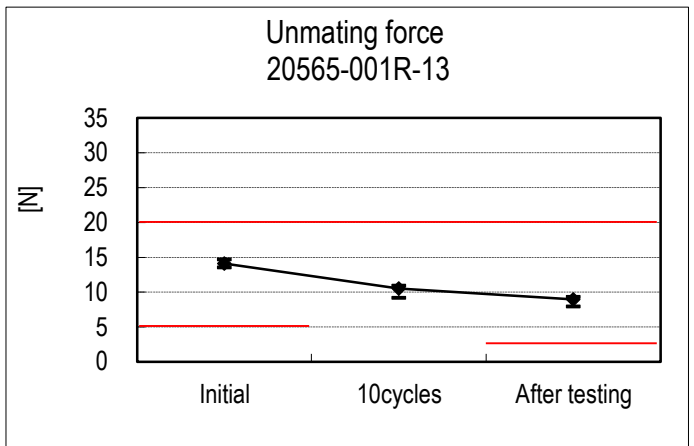
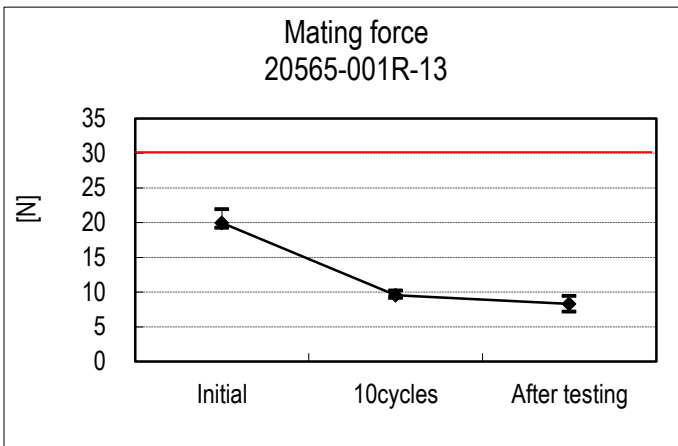
	Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge	
G	Shock										
	20565-001R-13 (φ0.95)	Contact resistance of inner contact									
		Initial	20 MAX.		10	mΩ	11.37	13.6	9.7	0.97	Pass
		After testing	-----		10	mΩ	11.47	13.0	10.2	0.98	-----
		ΔR	20 MAX.		10	mΩ	0.10	2.4	-3.0	1.41	Pass
		Contact 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 grater than 1μsec. shall occur.							
			-----		10	-----	Results : No discontinuity			Pass	
	Appearance	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	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	Initial	No abnormality		10	-----	No abnormality			Pass
	After testing		No abnormality		10	-----	No abnormality			Pass	

Table 2-3

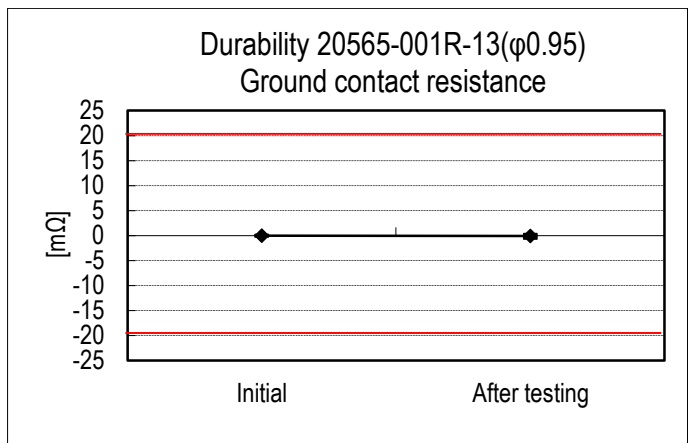
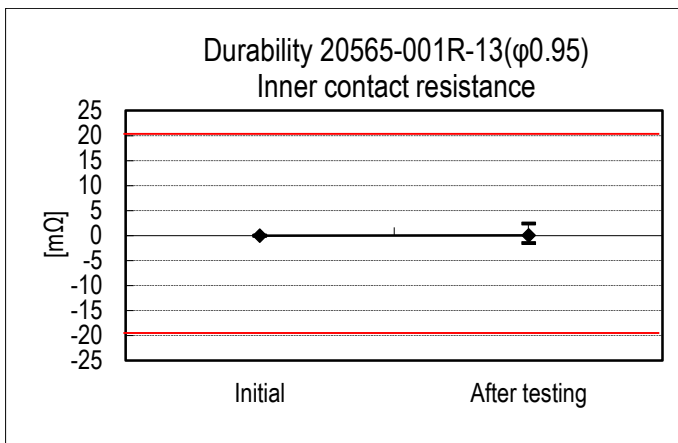
	Test items	Measurements	Spec.	n	Unit	AVE.	MAX.	MIN.	S	Judge	
K	Humidity(Steady State)										
	20565-001R-13 (φ0.95)	Contact resistance of inner contact									
		Initial	20 MAX.	10	mΩ	11.24	12.2	10.7	0.48	Pass	
		After testing	-----	10	mΩ	10.94	12.2	10.5	0.63	-----	
		ΔR	20 MAX.	10	mΩ	-0.30	0.0	-1.0	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	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	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	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		



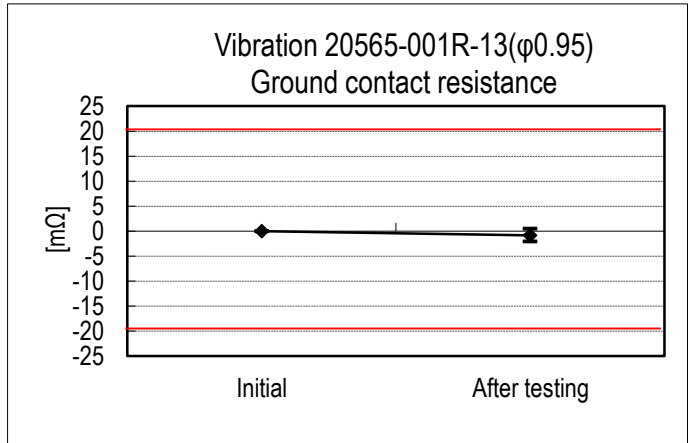
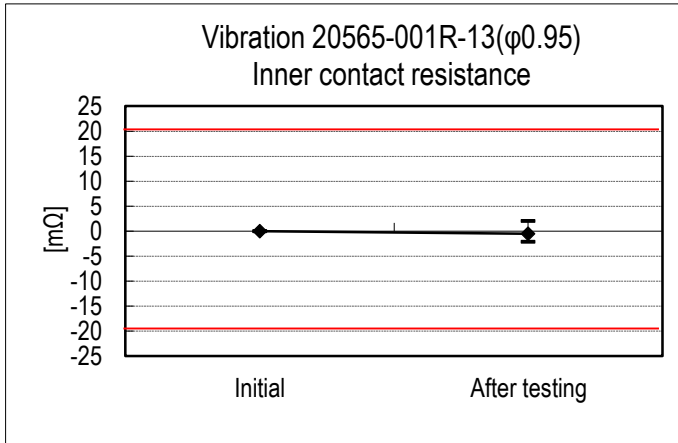
Graph 1 VSWR



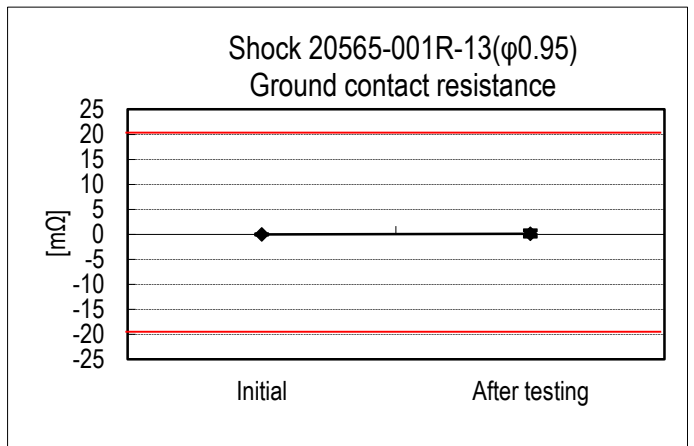
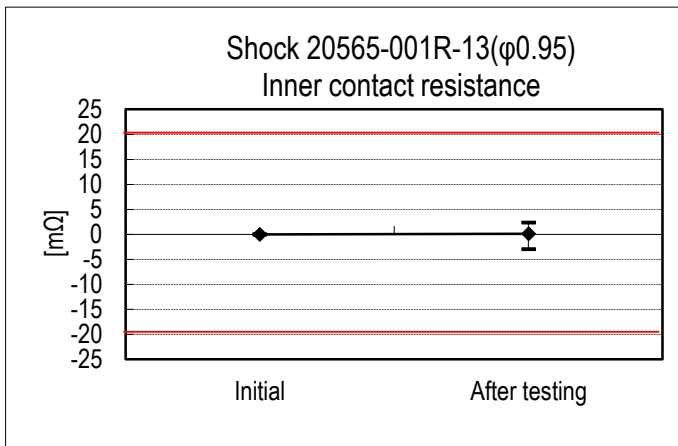
Graph 2 Mating force, Unmating force



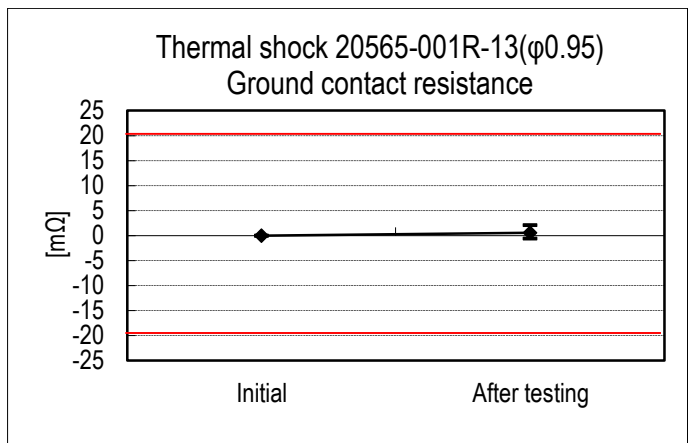
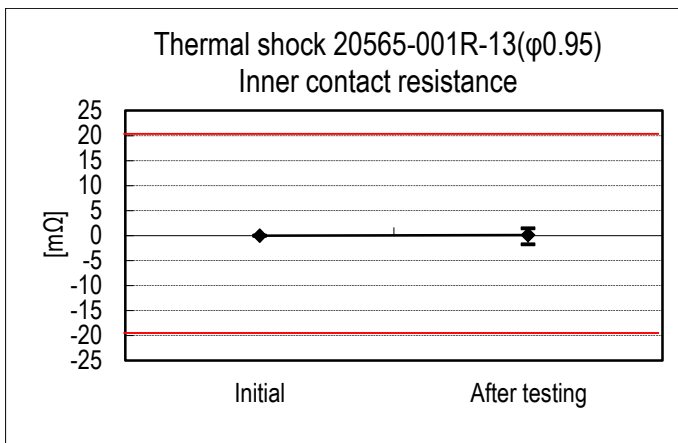
Graph 3 Durability



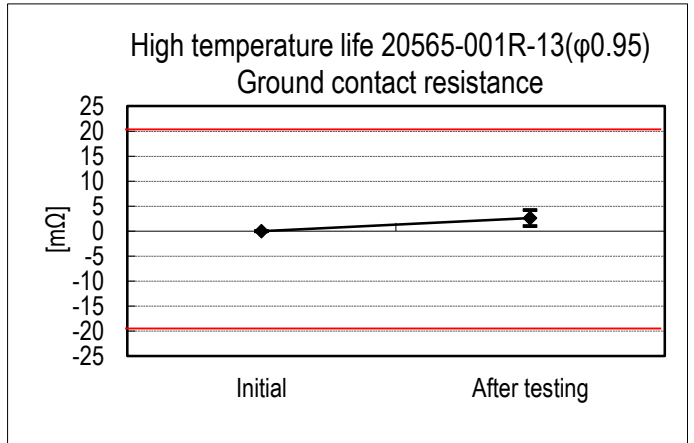
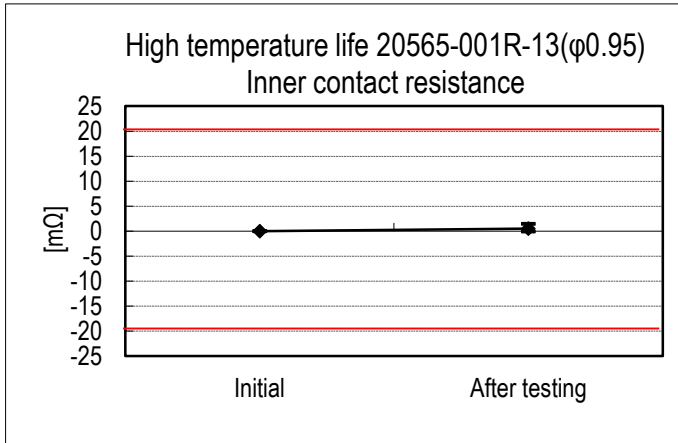
Graph 4 Vibration



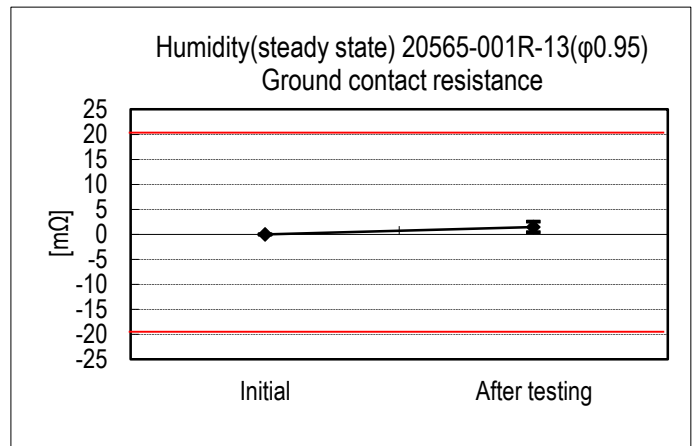
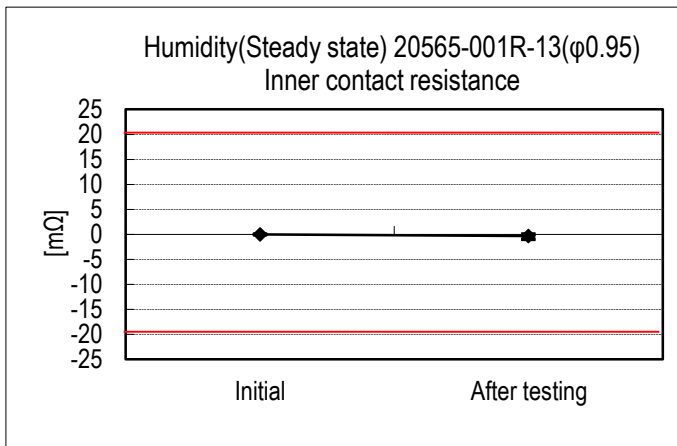
Graph 5 Shock



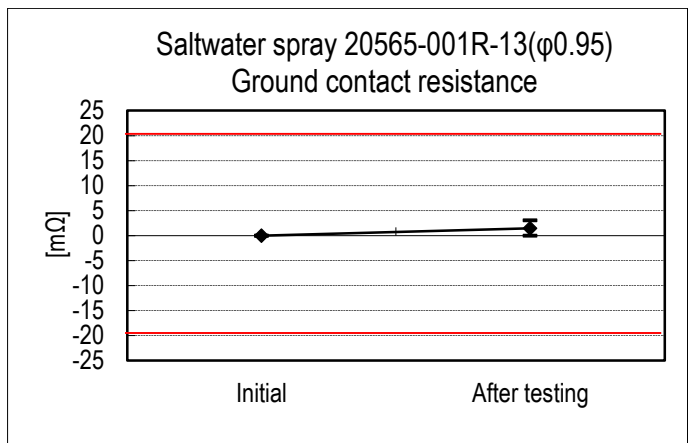
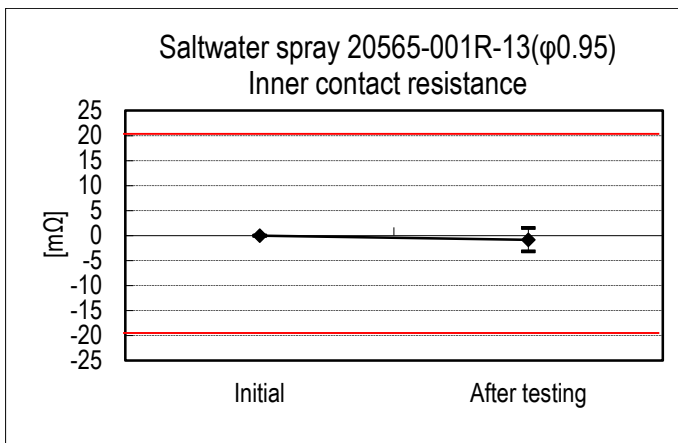
Graph 6 Thermal shock



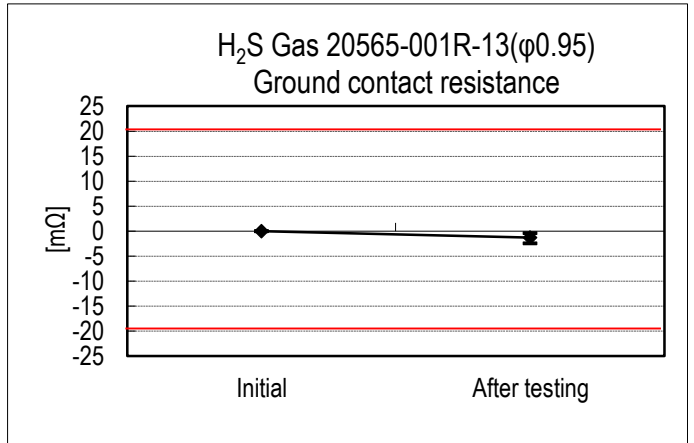
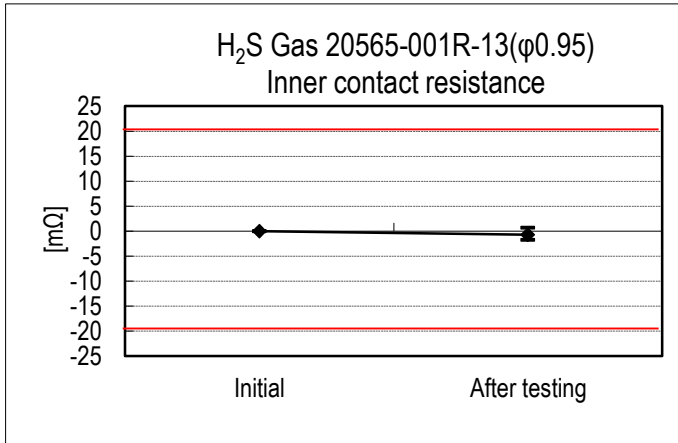
Graph 7 High temperature life



Graph 8 Humidity(Steady State)



Graph 9 Saltwater spray



Graph 10 H₂S Gas