MHF® 4L Connector

Plug Parts No. 20565-001R-13, 20572-001R-08

Receptacle Parts No. 20579-001E, 20579-001E-01

Test Report

Product Specification no. PRS-1907

Rev.	ECN	Date	Prepared by	Checked by	Approved by
6	T22108	June 24, 2022	H. Lu	Y. Shimizu	M. Takemoto
5	T22077	May 31, 2022	Y. Imaji	K. Yufu	Y. Hashimoto
4	T21094	October 22, 2021	K. Ikeshita		M. Takemoto
3	T21050	July 2, 2021	N.Miyashiro	K.Ikeshita	M.Takemoto

1. Purpose

To evaluate the performance of MHF 4L Connector in accordance with PRS-1907.

2. Specimen

(1) MHF 4L PLUG（Part No. 20565-001R-13, 20572-001R-08）
(2) MHF 4L RECEPTACLE（Part No. 20579-001E-01）
*Part No. 20579-001E, 20579-001E-01 are different in the packing style only, so we tested part No. 20579-001E-01 as representative.

3. Test Sequence

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

4. Result

See Table 2, Graph 1 to 20. For the details of the testing conditions and requirements, see PRS-1907.
The “n” in the tables show the number of measurement points.

5. Conclusion

All the specimens met the requirements of PRS-1907.

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	1,5	1,3	1,3		
Insulation resistance											2,6		2,6				
Dielectric withstanding voltage		1									3,7		3,7				
VSWR			1														
Mating force Un-mating force				1													
Cable retention force at 30 degree					1												
Cable retention force at 0 degree						1											
Durability							2										
Shearing strength								1									
Vibration									2								
Shock										2							
Thermal shock											4						
High temperature life												2					
Humidity (Steady State)													4				
Saltwater spray														2			
H_2S 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	-	-
	Receptacle		5					12								10	10

※Numbers indicate test sequences

Table 2-1

Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
A	Dielectric withstanding voltage								
	Spec: No creeping discharge, flashover, no insulator breakdown shall occur.								
	20565-001R-13	-	10	-	No abnormality				Pass
	20572-001R-08	-	10	-	No abnormality				Pass
B	VSWR								
	Plug 20565-001R-13								
	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
	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.		-	1.141	1.47	1.34	0.031	Pass
	Receptacle								
	0.1～3.0GHz	1.30 MAX.	5	-	1.050	1.06	1.04	0.005	Pass
	3.0～6.0GHz	1.40 MAX.		-	1.119	1.12	1.12	0.002	Pass
	6.0～9.0GHz	1.50 MAX.		-	1.301	1.32	1.28	0.013	Pass
	9.0～12.0GHz	1.65 MAX.		-	1.469	1.52	1.43	0.032	Pass
C	Mating force 20565-001R-13								
	Initial	30N MAX.	10	N	20.25	21.8	18.9	1.00	Pass
	After testing	30N MAX.			10.85	11.6	10.0	0.61	Pass
	20572-001R-08								
	Initial	30N MAX.	10	N	20.11	21.7	18.3	1.20	Pass
	After testing	30N MAX.			10.79	11.6	10.0	0.57	Pass
	Unmating force 20565-001R-13								
	Initial	20N MAX.,5N MIN.	10	N	12.90	14.7	11.0	0.98	Pass
	After testing	20N MAX.,3N MIN.			9.03	10.7	7.4	0.89	Pass
	20572-001R-08								
	Initial	20N MAX.,5N MIN.	10	N	14.05	16.2	13.0	0.95	Pass
	After testing	20N MAX.,3N MIN.			10.06	11.3	9.0	0.84	Pass
D	Cable retention force at 30 degree								
	20565-001R-13								
	Electrical discontinuity								
	Pass critria: No electrical discontinuity grater than 1μs shall occur.								
	-	-	10	-	No discontinity				Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass
	20572-001R-08								
	Electrical discontinuity								
	Pass critria: No electrical discontinuity grater than 1μs shall occur.								
	-	-	10	-	No discontinity				Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass

Table 2-2

Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
E	Cable retention force at 0 degree								
	20565-001R-13								
	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
	20572-001R-08								
	Electrical discontinuity								
	Pass critria: No electrical discontinuity grater than 1μs shall occur.								
	-	-	10	-	No discontinity				Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing	No abnormality			No abnormality				Pass
F	Durability								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	8.45	9.3	7.7	0.51	Pass
	After testing	-			9.07	9.8	8.2	0.55	-
	⊿R	⊿20mΩ MAX.			0.63	1.7	-0.2	0.63	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.84	6.9	5.2	0.49	Pass
	After testing	-			6.62	7.2	6.2	0.36	-
	⊿R	⊿20mΩ MAX.			0.78	1.5	-0.2	0.51	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	8.58	9.8	7.5	0.78	Pass
	After testing	-			9.86	12.0	8.3	1.06	-
	⊿R	⊿20mΩ MAX.			1.28	3.1	-0.2	1.22	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.45	5.9	4.2	0.52	Pass
	After testing	-			6.49	7.4	5.8	0.51	-
	⊿R	⊿20mΩ MAX.			1.04	2.1	0.2	0.58	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
G	Shearing strength								
	Direction①	20N MIN.	3	N	28.23	28.8	27.9	0.41	Pass
	Direction②		3	N	30.21	31.1	29.8	0.97	Pass
	Direction③		3	N	28.19	28.9	27.6	0.51	Pass
	Direction④		3	N	31.58	32.5	30.2	0.87	Pass

Table 2-3

Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
H	Vibration								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	8.34	9.70	7.27	0.80	Pass
	After testing	-			8.77	9.53	7.43	0.55	-
	⊿R	⊿20mΩ MAX.			0.43	1.42	-0.61	0.61	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.18	6.64	5.77	0.29	Pass
	After testing	-			6.43	6.96	5.53	0.44	-
	⊿R	⊿20mΩ MAX.			0.24	1.19	-0.67	0.57	Pass
	Electrical discontinuity								
	Spec: No electrical discontinuity grater than 1μs shall occur.								
	After testing	-	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				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.76	11.12	8.02	1.02	Pass
	After testing	-			10.08	10.94	8.23	0.76	-
	⊿R	⊿20mΩ MAX.			0.32	1.60	-0.89	0.90	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.19	6.16	4.69	0.45	Pass
	After testing	-			5.97	6.76	5.20	0.52	-
	⊿R	⊿20mΩ MAX.			0.78	1.44	-0.34	0.48	Pass
	Electrical discontinuity								
	Spec: No electrical discontinuity grater than 1μs shall occur.								
	After testing	-	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				Pass

Table 2-4

Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
J	Shock								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	7.87	8.7	7.1	0.61	Pass
	After testing	-			8.38	8.9	7.9	0.39	-
	⊿R	⊿20mΩ MAX.			0.51	0.9	-0.5	0.45	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.09	6.9	5.7	0.44	Pass
	After testing	-			6.64	6.9	6.5	0.17	-
	⊿R	⊿20mΩ MAX.			0.55	1.0	-0.1	0.40	Pass
	Electrical discontinuity								
	Spec: No electrical discontinuity grater than 1μs shall occur.								
	After testing	-	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				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.63	10.7	9.0	0.55	Pass
	After testing	-			10.10	10.7	9.3	0.54	-
	⊿R	⊿20mΩ MAX.			0.46	1.2	-0.1	0.41	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.98	7.0	5.2	0.47	Pass
	After testing	-			6.46	7.3	5.5	0.72	-
	⊿R	⊿20mΩ MAX.			0.48	2.1	-0.6	0.79	Pass
	Electrical discontinuity								
	Spec: No electrical discontinuity grater than 1μs shall occur.								
	After testing	-	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				Pass

Table 2-5

Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
K	Thermal shock								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	8.62	9.5	7.9	0.49	Pass
	After testing	-			8.21	9.1	6.9	0.72	-
	⊿R	⊿20mΩ MAX.			-0.41	0.4	-1.9	0.63	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.03	6.9	5.7	0.32	Pass
	After testing	-			6.42	6.9	6.1	0.25	-
	⊿R	⊿20mΩ MAX.			0.39	0.8	-0.2	0.31	Pass
	Insulation residence								
	Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass
	After testing	100MΩ MIN.			10,000MΩ MIN.				Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.18	10.3	8.2	0.63	Pass
	After testing	-			9.25	10.7	7.8	0.94	-
	⊿R	⊿20mΩ MAX.			0.06	2.5	-1.9	1.19	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.08	6.8	5.7	0.33	Pass
	After testing	-			6.74	7.3	6.0	0.42	-
	⊿R	⊿20mΩ MAX.			0.66	1.3	0.1	0.35	Pass
	Insulation residence								
	Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass
	After testing	100MΩ MIN.			10,000MΩ MIN.				Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass

Table 2-6

Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
L	High temperature life								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	8.06	9.0	7.2	0.66	Pass
	After testing	-			8.38	9.1	6.7	0.76	-
	⊿R	⊿20mΩ MAX.			0.32	1.4	-1.1	0.86	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.59	7.7	5.3	0.59	Pass
	After testing	-			6.73	7.6	6.2	0.37	-
	⊿R	⊿20mΩ MAX.			0.14	1.3	-0.3	0.46	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.35	11.4	8.4	0.89	Pass
	After testing	-			9.19	10.4	7.2	0.96	-
	⊿R	⊿20mΩ MAX.			-0.15	1.0	-2.3	1.07	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.83	6.7	5.4	0.37	Pass
	After testing	-			6.65	7.5	5.8	0.51	-
	⊿R	⊿20mΩ MAX.			0.83	1.7	0.2	0.53	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass

Table 2-7

Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
M	Humidity(Steady State)								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.00	10.0	7.6	0.80	Pass
	After testing	-			8.54	10.0	7.1	0.98	-
	⊿R	⊿20mΩ MAX.			-0.46	1.4	-2.1	1.04	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.73	7.3	6.4	0.30	Pass
	After testing	-			5.79	6.3	5.1	0.42	-
	⊿R	⊿20mΩ MAX.			-0.93	-0.3	-1.8	0.48	Pass
	Insulation residence								
	Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass
	After testing	100MΩ MIN.			10,000MΩ MIN.				Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.67	10.4	8.0	0.74	Pass
	After testing	-			9.58	11.1	8.6	0.96	-
	⊿R	⊿20mΩ MAX.			-0.10	0.9	-1.3	0.75	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.46	6.9	5.4	0.48	Pass
	After testing	-			4.79	6.6	3.7	0.89	-
	⊿R	⊿20mΩ MAX.			-1.68	-0.2	-3.1	0.88	Pass
	Insulation residence								
	Initial	500MΩ MIN.	10	MΩ	10,000MΩ MIN.				Pass
	After testing	100MΩ MIN.			10,000MΩ MIN.				Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass

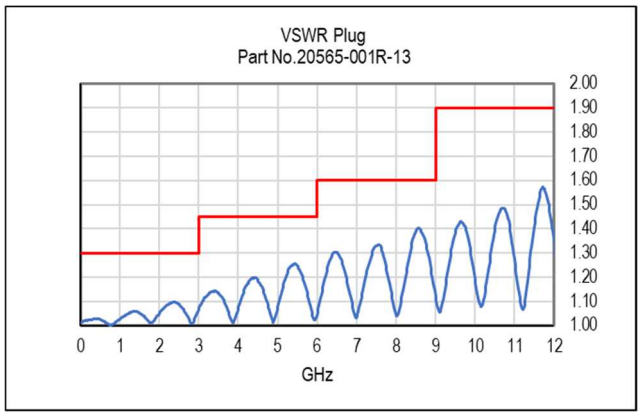
Table 2-8

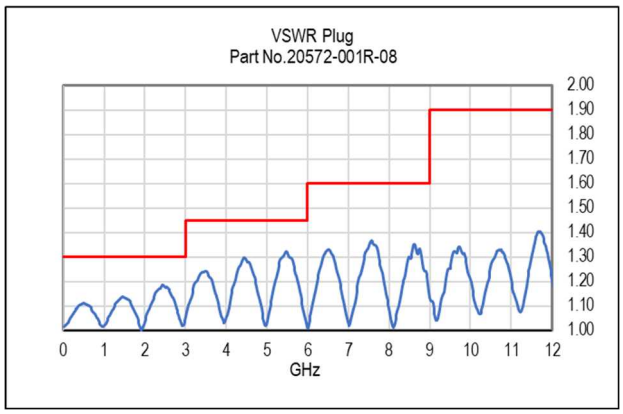
Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
N	Saltwater spray								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	7.64	8.0	7.3	0.25	Pass
	After testing	-			8.27	9.0	7.3	0.69	-
	⊿R	⊿20mΩ MAX.			0.63	1.4	-0.5	0.67	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.12	6.7	5.5	0.41	Pass
	After testing	-			6.47	7.0	5.2	0.47	-
	⊿R	⊿20mΩ MAX.			0.36	1.2	-0.6	0.62	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.46	10.9	8.5	0.87	Pass
	After testing	-			9.86	10.9	8.6	0.88	-
	⊿R	⊿20mΩ MAX.			0.39	2.4	-0.6	1.07	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.14	7.0	5.7	0.40	Pass
	After testing	-			6.85	7.4	6.2	0.42	-
	⊿R	⊿20mΩ MAX.			0.71	1.5	-0.7	0.65	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass

Table 2-9

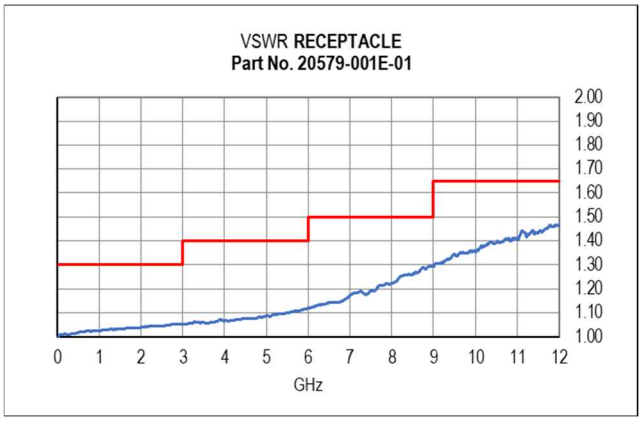
Group	Test items / Measurements	Specification	n	Unit	AVE.	MAX.	MIN.	S	Judgement
P	H2S gas								
	20565-001R-13								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	8.09	9.7	6.7	0.97	Pass
	After testing	-			8.52	9.6	7.5	0.77	-
	⊿R	⊿20mΩ MAX.			0.43	1.4	-0.7	0.66	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	6.15	7.0	5.5	0.39	Pass
	After testing	-			6.52	7.6	5.5	0.73	-
	⊿R	⊿20mΩ MAX.			0.37	2.0	-0.9	0.95	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
	20572-001R-08								
	Contact resistance of main contact								
	Initial	20mΩ MAX.	10	mΩ	9.34	10.0	8.3	0.62	Pass
	After testing	-			9.11	10.2	8.1	0.63	-
	⊿R	⊿20mΩ MAX.			-0.23	1.1	-1.8	0.88	Pass
	Contact resistance of Ground contact								
	Initial	20mΩ MAX.	10	mΩ	5.68	6.3	5.2	0.36	Pass
	After testing	-			5.78	6.4	5.4	0.26	-
	⊿R	⊿20mΩ MAX.			0.10	0.8	-0.6	0.46	Pass
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	Initial	No abnormality	10	-	No abnormality				Pass
	After testing				No abnormality				Pass
Q	Solder ability								
	Spec: More than 95% of the dipped surface shall be evenly wet.								
	After testing	-	10	-	No abnormality				Pass
R	Reflow soldering heat resistance								
	Appearance								
	Spec: No abnormality adversely affecting the performance shall occur.								
	After testing	-	10	-	No abnormality				Pass

Graph 1

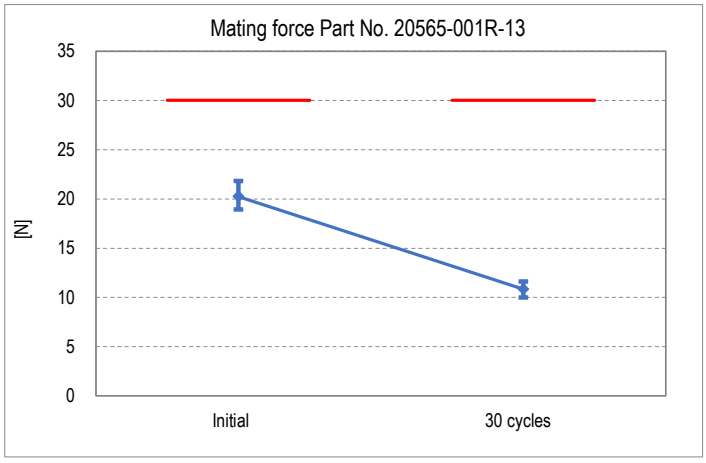


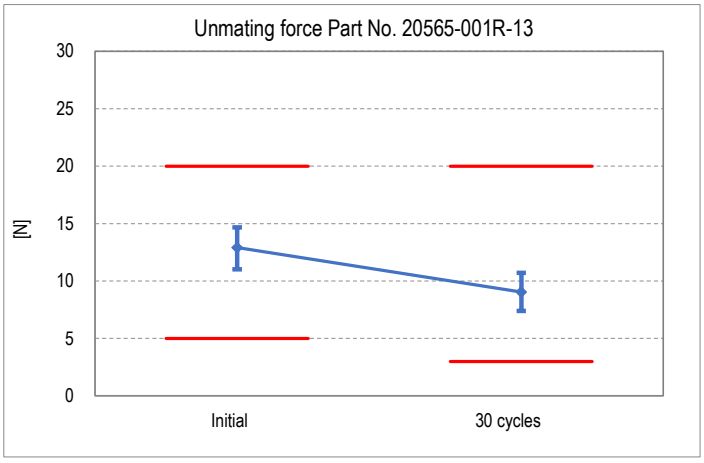


Graph 1

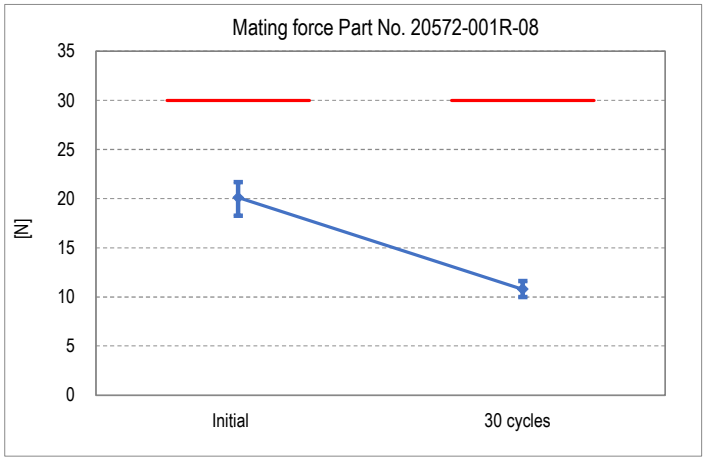


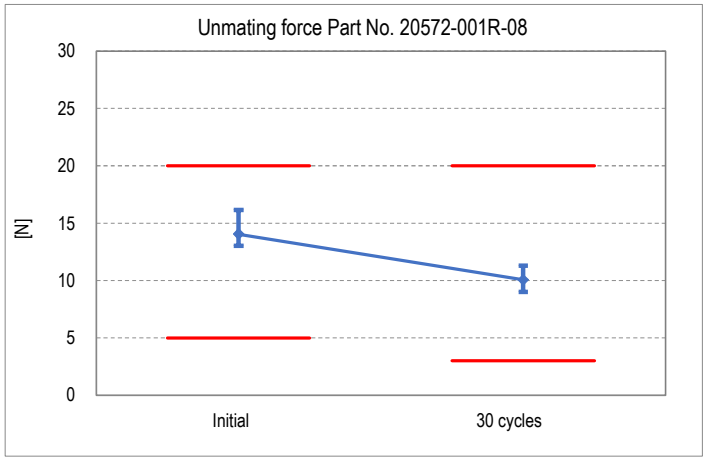
Graph 2



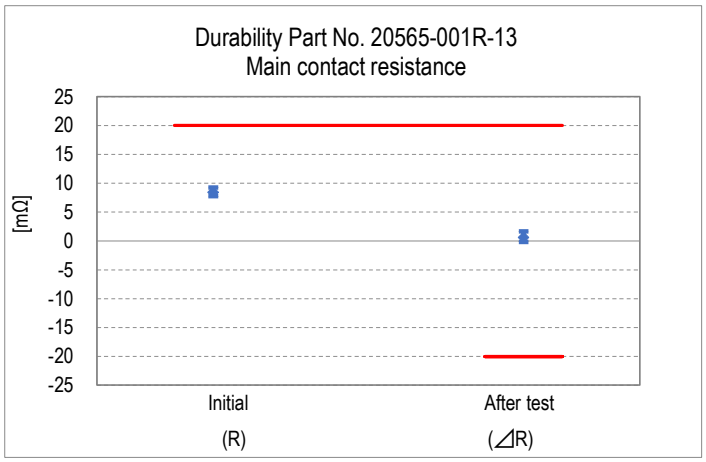


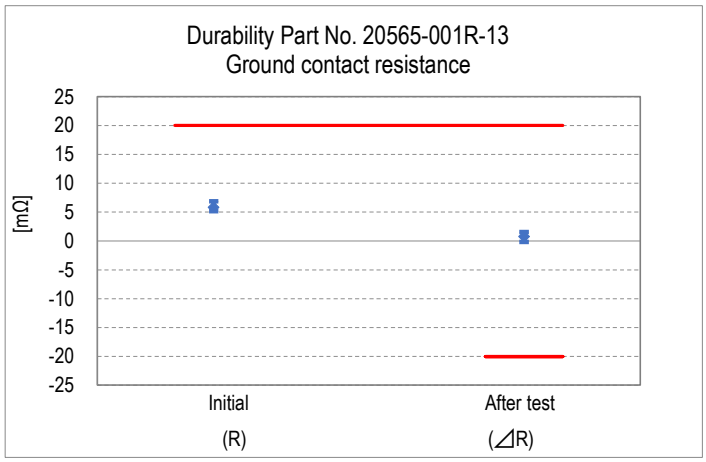
Graph 3



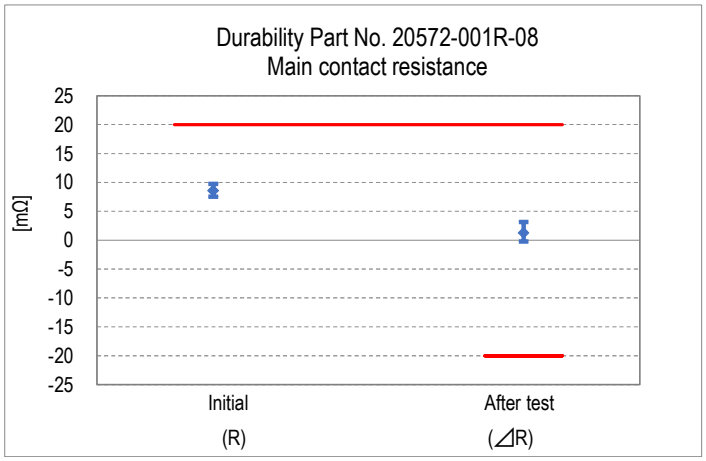


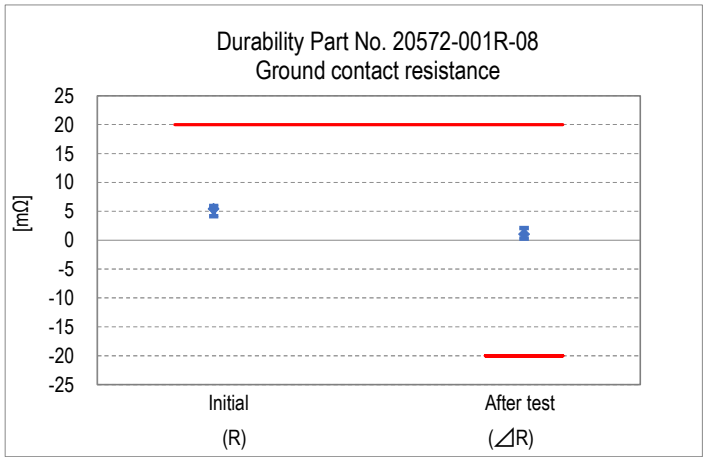
Graph 4



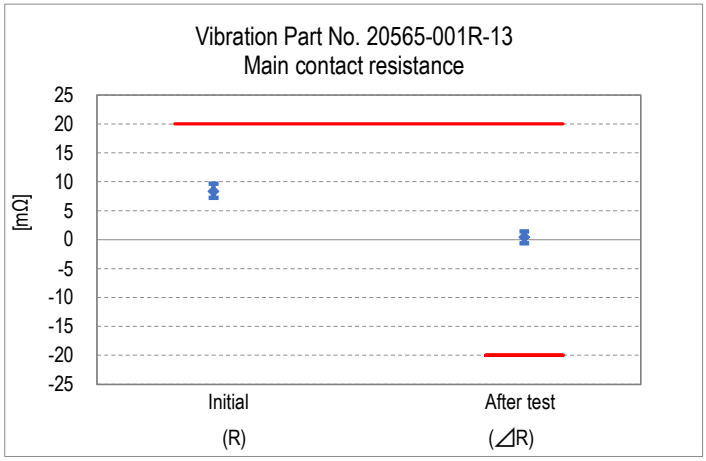


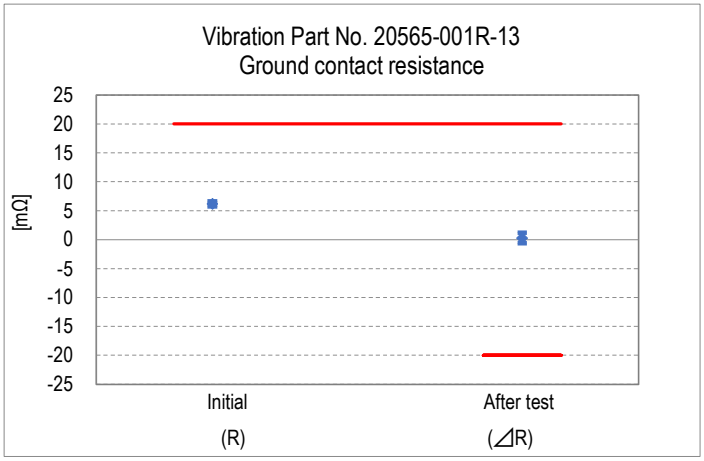
Graph 5



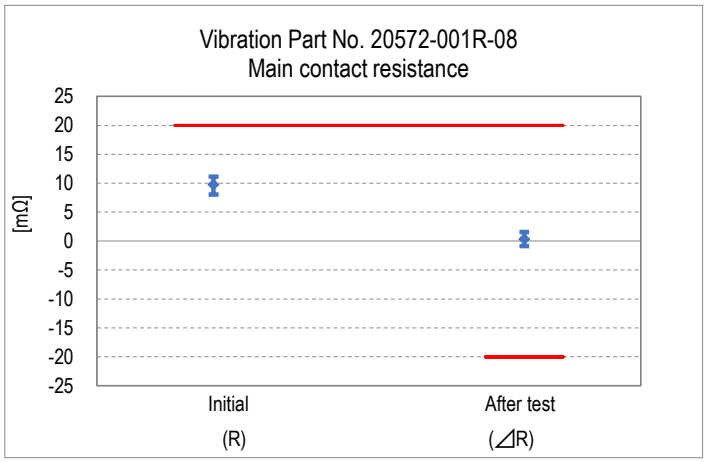


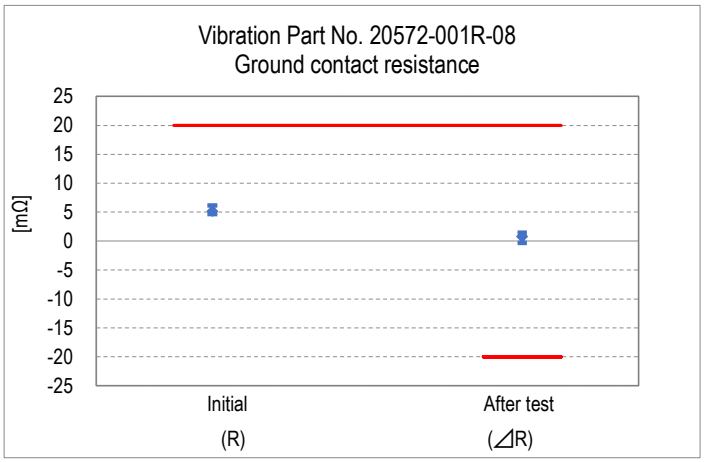
Graph 6



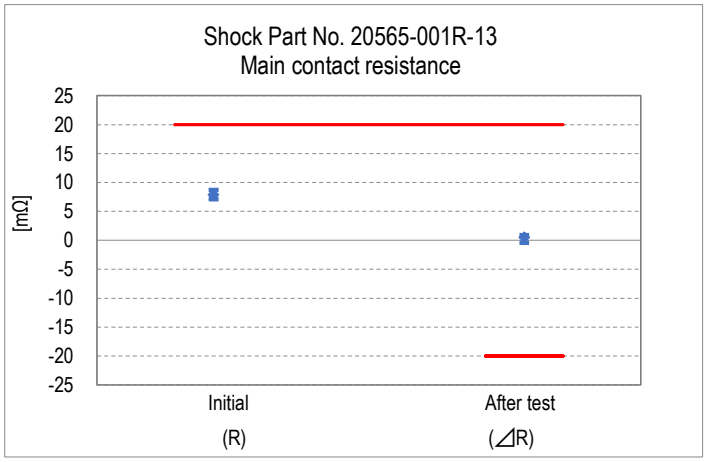


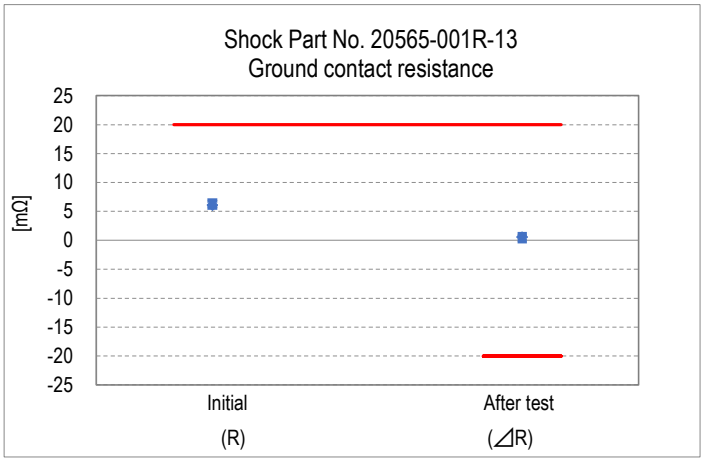
Graph 7



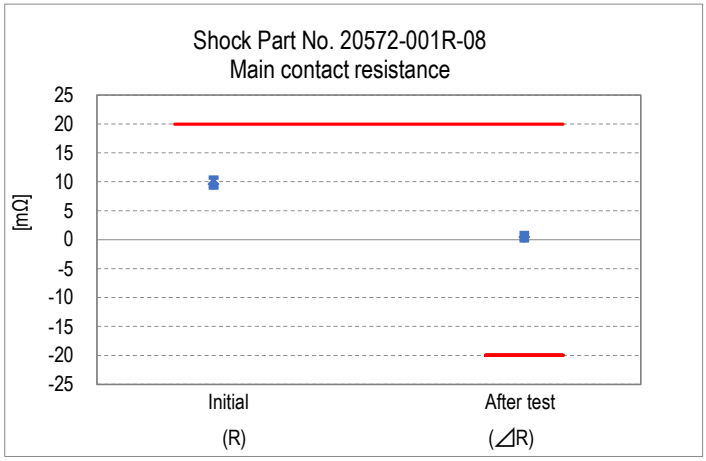


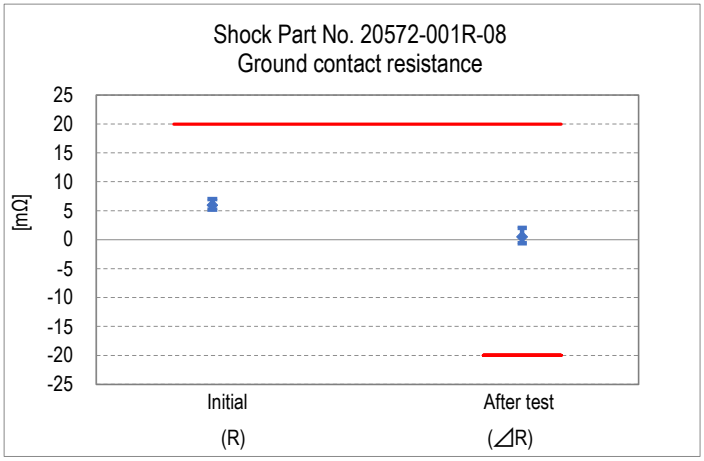
Graph 8



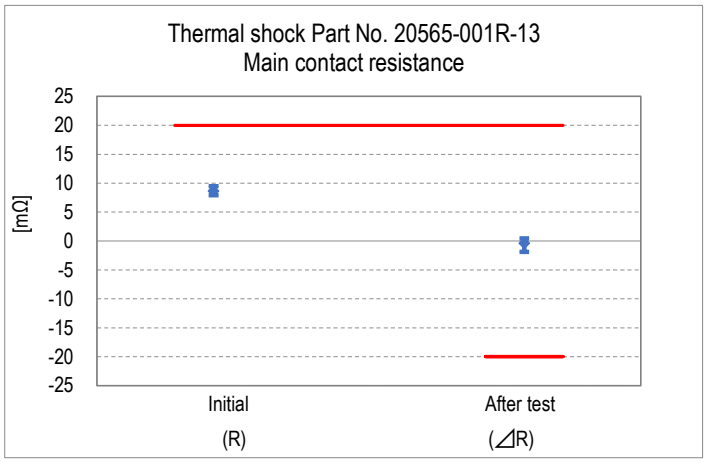


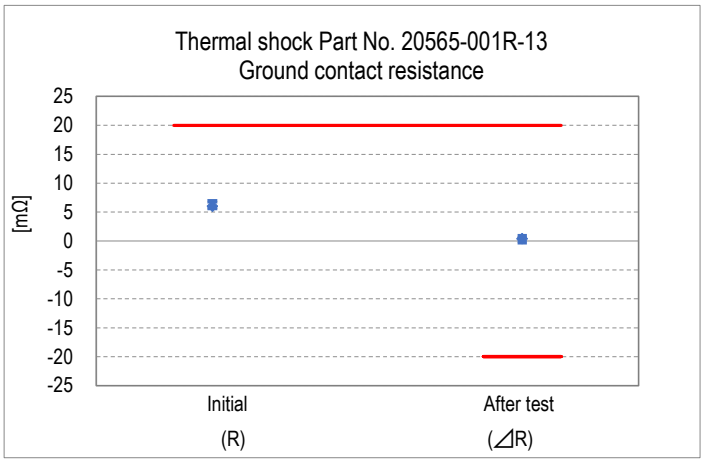
Graph 9



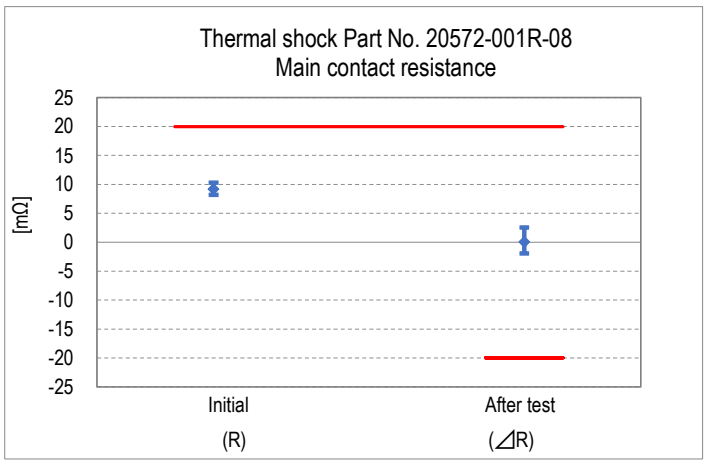


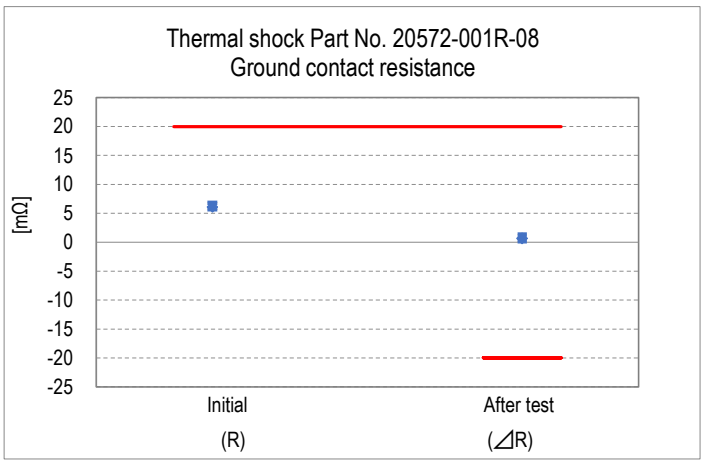
Graph 10



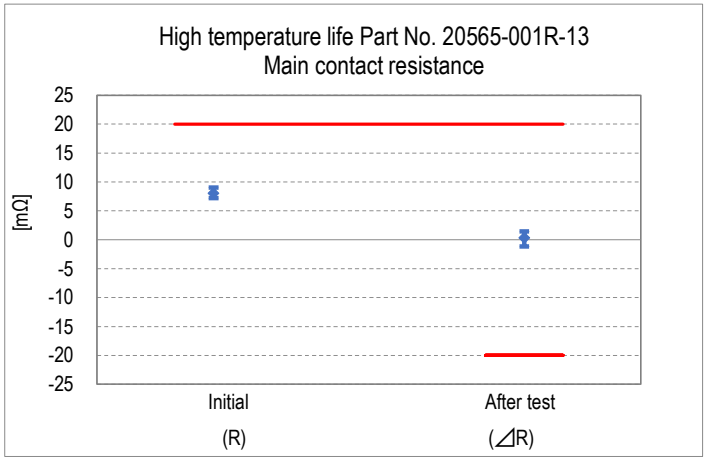


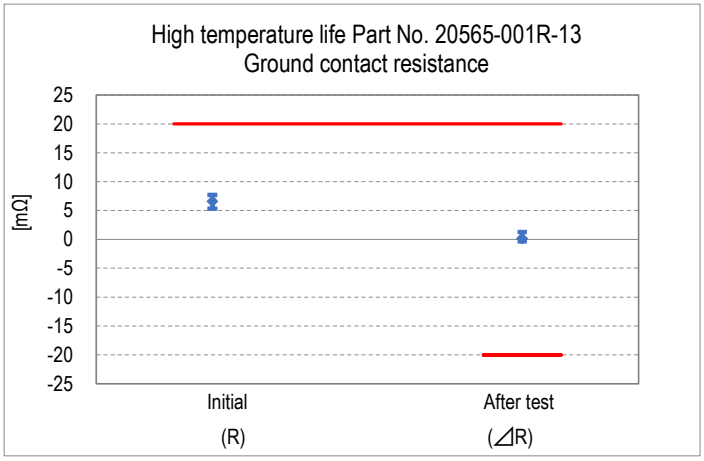
Graph 11



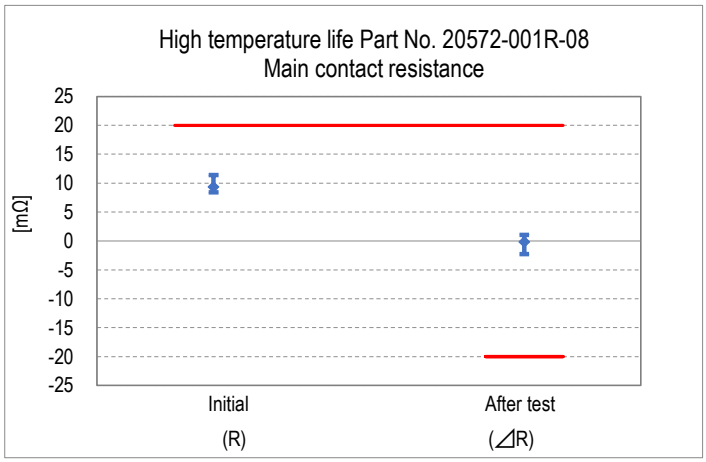


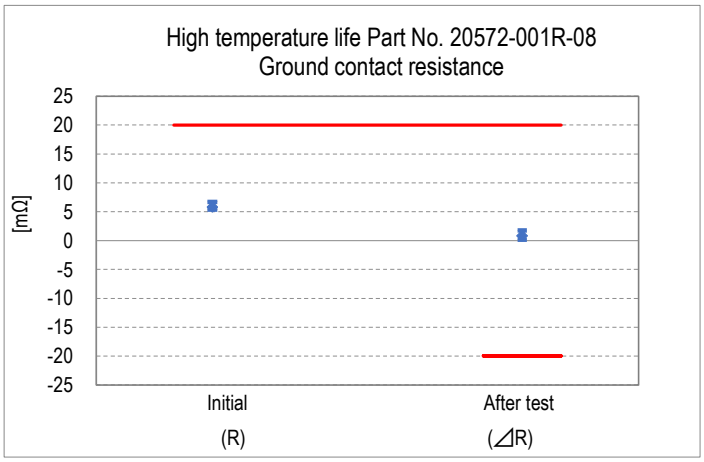
Graph 12



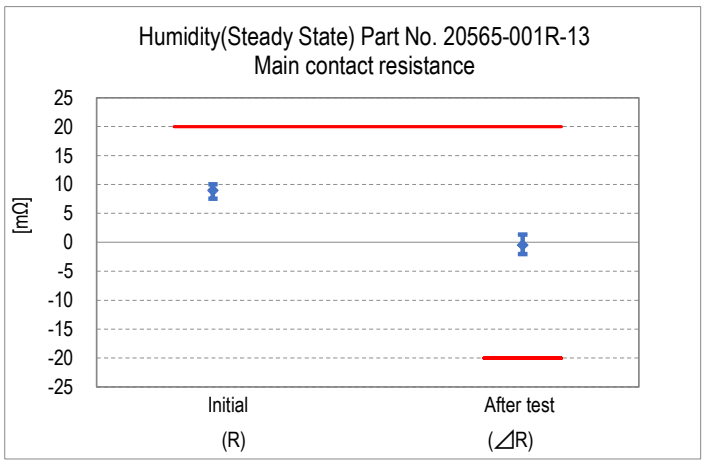


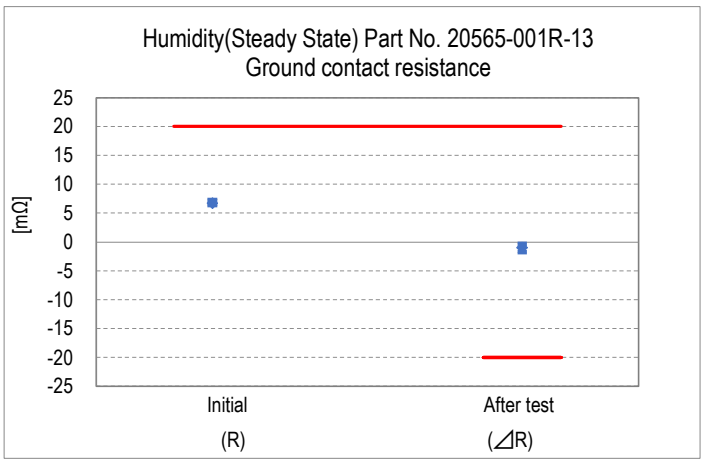
Graph 13



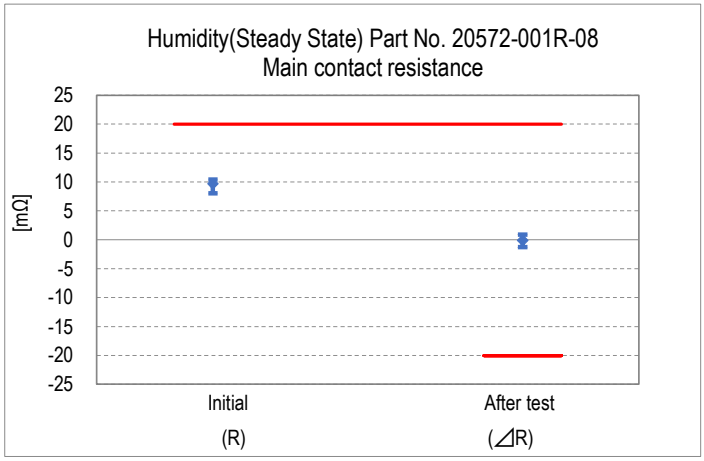


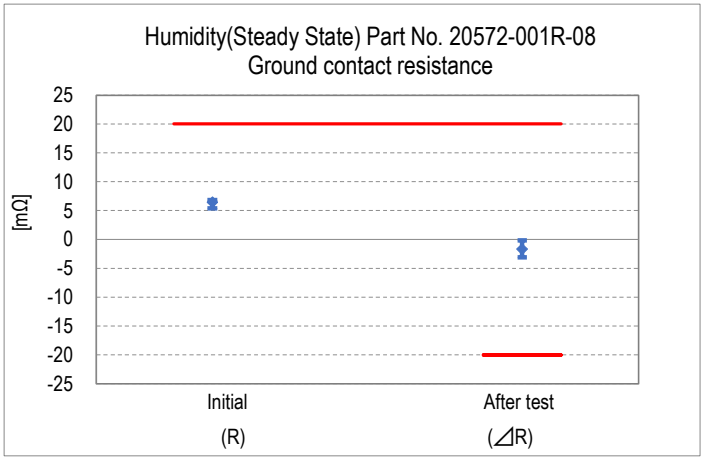
Graph 14



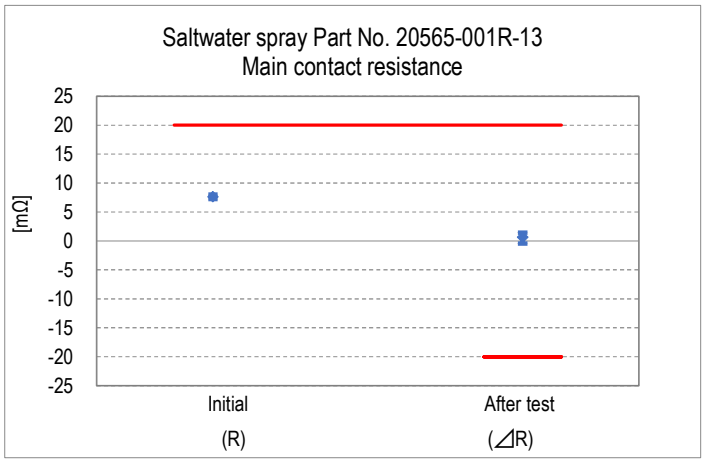


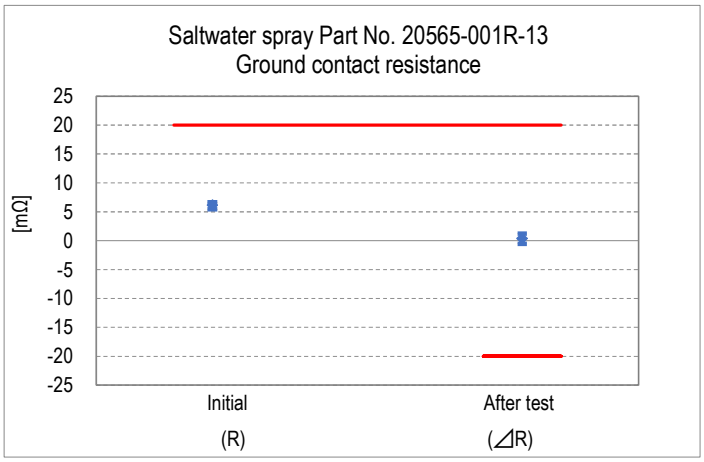
Graph 15



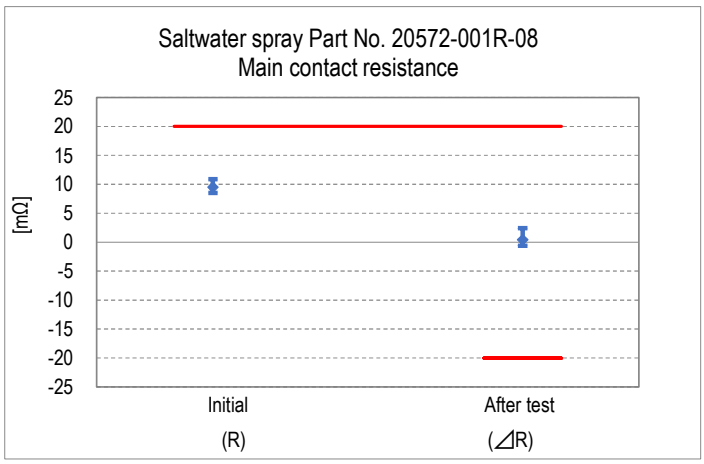


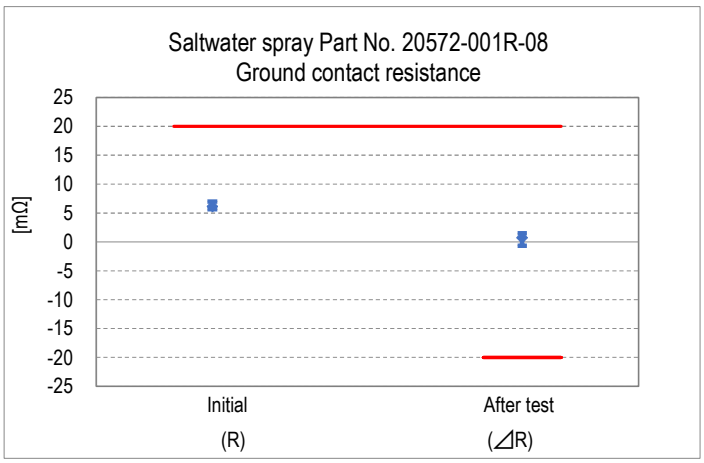
Graph 16



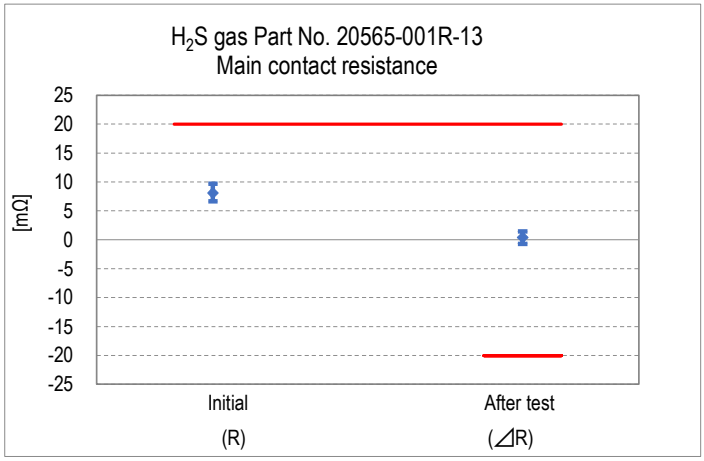


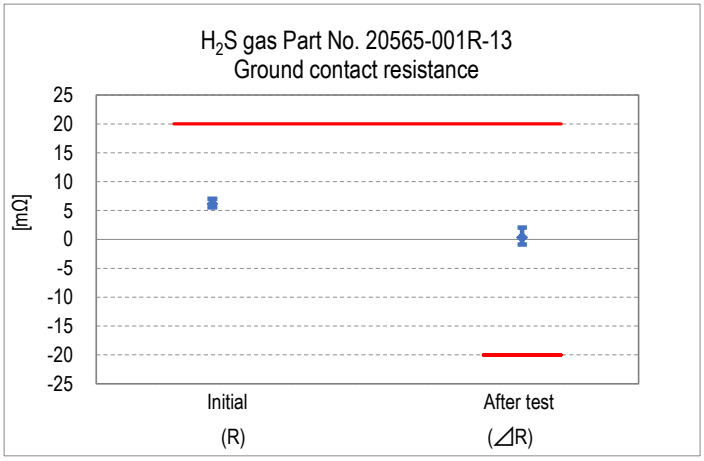
Graph 17



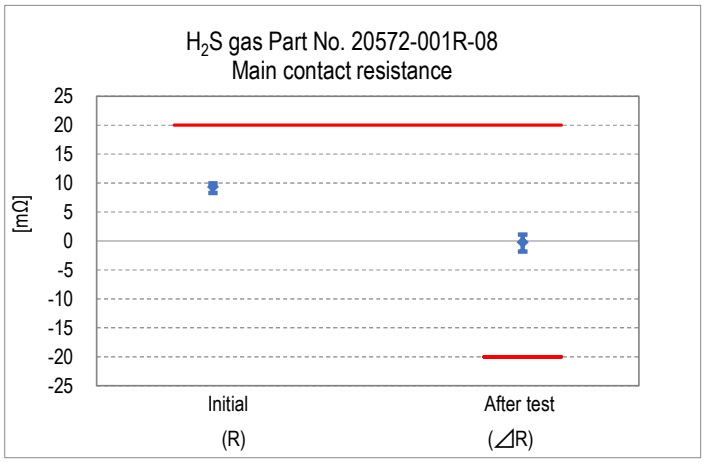


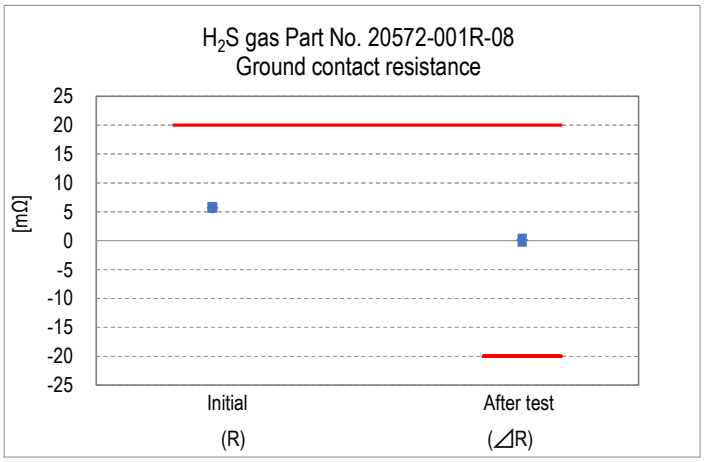
Graph 18





Graph 19





Graph 20