FPL™ II

Part No. Plug:20437-0**T-*1 Receptacle:20439-0**E-**

Test Report

Product Specification no. PRS-1383

Rev.	ECN	Date	Prepared by	Checked by	Approved by
7	T24035	June 10, 2024	E.Tanaka	M.Nakamura	T.Masunaga
6	T21123	October 28, 2021	T.Onishi	~~T.Masunaga~~	H.Ikari
5	T14078	June 19, 2014	H.A		E.K
4	T13028	April 1, 2013	H.I		E.K

1. Purpose

To evaluate the performance of FPL II Connector in accordance with PRS-1383.

2. Specimen

(1) FPL II Connector PLUG ASS'Y （Part No.20437-0**T-*1）
(2) FPL II Connector RECEPTACLE ASS'Y （Part No. 20439-0**E-**）

3. Test Sequence

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

4. Result

See Table 2-1 to 2-5, Graph 1 to 10. For the details of the testing conditions and requirements, see PRS-1383.
The “n” in the tables show the number of measurement points.

5. Conclusion

All the specimens met the requirements of PRS-1383.

Table 1 Test Sequence and Sample Quantity

Test Item	Group												
	A	B	C	D	E	F	G	H	J	K	L	M	N
Contact resistance		2,6		1,3,5	1,3	1,3	1,5	1,5,7	1,3	1,3			
Dielectric withstanding voltage							2,6	2,8					
Insulation resistance							3,7	3,9					
Temperature rising	1												
Mating force		1,5											
Unmating force		3,7											
Durability		4						4 (10cyc)					
Contact retention force			1,3										
Cable retention force		8											
Vibration				2									
Shock				4									
Thermal shock					2								
High temperature life			2			2							
Humidity (Steady State)							4						
Humidity (Cycling)								6					
Saltwater spray									2				
H_2S gas										2			
Solder ability											1		
Soldering heat resistance												1	
Differential Impedance													1
Specimen quantity.	5 pcs.	5 pcs.	20 pos.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	5 pcs.	10 pcs.	10 pcs.	5 pcs.

※Numbers indicate test sequences

Table 2-1 Test result

Test Item	Measurement			Spec.	Set	N	Data					Judge
							AVE.(X)	MAX.	MIN.	s	X±3s	
A Group Temp. rising	AWG#40 : 0.3A(40P)			ΔT=30K(30℃) MAX.	5	5	ΔT = MAX. 26.2K (26.2℃)					OK
	AWG#36 : 0.8A(8P)				5	5	ΔT = MAX. 27.5K (27.5℃)					OK
	AWG#32 : 1.0A(7P)				5	5	ΔT = MAX. 29.0K (29.0℃)					OK
B Group Durability	30P	Mating Force (N)	Initial	50 N MAX.	5	5	30.122	30.35	29.97	0.165	30.617	OK
			30th Cycles		5	5	22.180	23.17	20.79	1.038	25.294	OK
		Un-mating Force (N)	Initial	5.0 N MIN.	5	5	13.254	13.96	12.76	0.495	11.769	OK
			30th Cycles		5	5	14.558	16.46	13.37	1.146	11.120	OK
		Cable Retention Force (N)		30.0N MIN.	5	5	83.866	89.63	79.44	3.915	72.121	OK
	40P	Mating Force (N)	Initial	60 N MAX.	5	5	34.727	36.95	32.48	1.800	40.127	OK
			30th Cycles		5	5	26.026	26.99	24.54	0.968	28.930	OK
		Un-mating Force (N)	Initial	6.0 N MIN.	5	5	14.920	16.55	13.53	1.154	11.458	OK
			30th Cycles		5	5	15.660	17.72	14.78	1.174	12.138	OK
		Cable Retention Force (N)		30.0N MIN.	5	5	97.410	105.35	93.10	4.857	82.839	OK
	50P	Mating Force (N)	Initial	70 N MAX.	5	5	40.956	44.19	39.53	1.882	46.602	OK
			30th Cycles		5	5	31.938	33.83	30.21	1.509	36.465	OK
		Un-mating Force (N)	Initial	7.0 N MIN.	5	5	16.978	18.83	15.12	1.525	12.403	OK
			30th Cycles		5	5	18.198	19.50	17.13	0.901	15.495	OK
		Cable Retention Force (N)		30.0N MIN.	5	5	128.576	135.12	123.32	4.870	113.966	OK
	Contact Resistance (mΩ)		Initial	AWG#32 145mΩ MAX.	3	60	115.148	118.37	112.29	1.600	119.948	OK
				AWG#36 210mΩ MAX.	3	60	176.994	180.63	173.50	1.638	181.908	OK
				AWG#40 575mΩ MAX.	3	120	497.213	509.43	486.47	4.802	511.619	OK
				Ground 50mΩ MAX.	5	5	16.384	17.69	14.70	0.905	19.099	OK
			After Testing	AWG#32 ΔR=40mΩ MAX.	3	60	-0.056	1.15	-1.10	0.613	1.783	OK
				AWG#36 ΔR=40mΩ MAX.	3	60	-0.705	2.44	-3.35	1.702	4.401	OK
				AWG#40 ΔR=40mΩ MAX.	3	120	0.587	3.47	-0.88	1.016	3.635	OK
				Ground ΔR=40mΩ MAX.	5	5	0.284	0.83	-0.52	0.391	1.457	OK

*Temp. Rising Test is a result of when electrify the rating current between the neighboring contacts for the following pos.

AWG#32: 7pos., #36: 8pos., #40: 40pos.

Table 2-2. The Result

Test Item	Measurement		Spec.	Set	N	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
C Group High Temp. Life	(PLUG) C/T Retention Force (N)	Initial	1.0 N MIN.	3	60	1.527	1.87	1.30	0.144	1.095	OK
		After Testing	1.0 N MIN.	3	60	1.520	1.78	1.20	0.136	1.112	OK
	(RECE.) C/T Retention Force (N)	Initial	0.54 N MIN.	3	60	1.305	1.49	1.13	0.131	0.912	OK
		After Testing	0.54 N MIN.	3	60	1.385	1.76	1.15	0.211	0.752	OK
D Group Vibration/ Shock	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	115.241	120.17	111.32	2.419	122.498	OK
			AWG#36 210mΩ MAX.	3	60	176.908	180.32	173.82	1.599	181.705	OK
			AWG#40 575mΩ MAX.	3	120	502.465	514.90	485.59	7.727	525.646	OK
			Ground 50mΩ MAX.	5	5	15.840	18.80	13.31	1.728	21.024	OK
		After Vibration	AWG#32 ΔR=40mΩ MAX.	3	60	0.711	2.88	-1.07	0.972	3.627	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	0.984	2.41	-1.05	0.888	3.648	OK
			AWG#40 ΔR=40mΩ MAX.	3	120	1.506	3.78	-0.12	0.775	3.831	OK
			Ground ΔR=40mΩ MAX.	5	5	0.199	0.90	-0.62	0.390	1.369	OK
		After Shock	AWG#32 ΔR=40mΩ MAX.	3	60	0.386	2.48	-0.99	0.809	2.813	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	1.271	3.32	-0.63	1.076	4.499	OK
			AWG#40 ΔR=40mΩ MAX.	3	120	2.148	4.55	0.06	1.053	5.307	OK
			Ground ΔR=40mΩ MAX.	5	5	0.440	1.64	-0.81	0.660	2.420	OK
	Discontinuity	During Vibration	No electrical discontinuity greater than 1μs shall occur.	5	5	No electrical discontinuity greater than 1μs shall occur.					OK
		During Shock				No electrical discontinuity greater than 1μs shall occur.					OK
	Appearance	During Vibration	No abnormality adversely affecting the performance shall occur.	5	5	No abnormality adversely affecting the performance shall occur.					OK
		During Shock				No abnormality adversely affecting the performance shall occur.					OK

Table 2-3. The Result

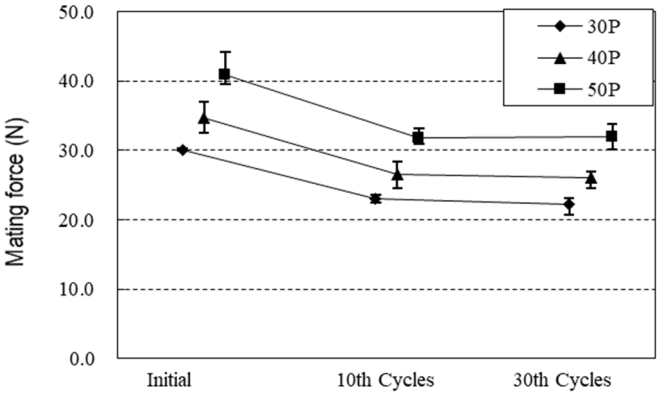
Test Item	Measurement		Spec.	Set	N	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
E Group Thermal Shock	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	114.760	118.58	112.34	1.396	118.948	OK
			AWG#36 210mΩ MAX.	3	60	176.636	184.69	170.23	2.753	184.895	OK
			AWG#40 575mΩ MAX.	3	120	500.115	512.90	483.25	7.759	523.392	OK
			Ground 50mΩ MAX.	5	5	16.523	18.88	15.09	0.985	19.478	OK
		After Testing	AWG#32 ΔR=40mΩ MAX.	3	60	0.933	3.86	-1.56	1.088	4.197	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	0.905	3.43	-0.91	1.082	4.151	OK
			AWG#40 ΔR=40mΩ MAX.	3	120	0.521	4.69	-2.46	1.569	5.228	OK
			Ground ΔR=40mΩ MAX.	5	5	0.350	1.45	-0.78	0.548	1.994	OK
F Group High Temp. Life	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	114.919	119.15	111.80	1.501	119.422	OK
			AWG#36 210mΩ MAX.	3	60	177.008	182.25	171.20	2.496	184.496	OK
			AWG#40 575mΩ MAX.	3	120	499.944	520.31	480.40	8.291	524.817	OK
			Ground 50mΩ MAX.	5	5	16.273	19.03	14.21	1.307	20.194	OK
		After Testing	AWG#32 ΔR=40mΩ MAX.	3	60	0.820	3.39	-1.43	0.949	3.667	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	1.712	4.51	-1.60	1.506	6.230	OK
			AWG#40 ΔR=40mΩ MAX	3	120	2.714	5.68	0.81	1.096	6.002	OK
			Ground ΔR=40mΩ MAX.	5	5	0.250	2.05	-2.47	1.038	3.364	OK
G Group Humidity (Steady State)	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	115.497	120.80	111.53	1.831	120.990	OK
			AWG#36 210mΩ MAX	3	60	177.480	184.15	171.54	2.527	185.061	OK
			AWG#40 575mΩ MAX.	3	120	498.915	515.11	477.19	8.069	523.122	OK
			Ground 50mΩ MAX.	5	5	17.123	18.60	15.68	0.758	19.397	OK
		After Testing	AWG#32 ΔR=40mΩMAX.	3	60	1.041	3.62	-1.87	1.321	5.004	OK
			AWG#36 ΔR=40mΩMAX.	3	60	1.337	3.83	-1.22	0.995	4.322	OK
			AWG#40 ΔR=40mΩMAX.	3	120	2.356	6.98	0.25	1.556	7.024	OK
			Ground ΔR=40mΩMAX.	5	5	0.339	1.92	-1.40	0.776	2.667	OK
	D.W. Voltage	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.	5	5	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.					OK
		After Testing				No abnormalities such as creeping discharge, flashover, insulator breakdown occur.					OK
	Insulation Resistance (MΩ)	Initial	1000MΩMIN.	5	5	10000MΩ MIN.					OK
		After Testing	500MΩ MIN.			10000MΩ MIN.					OK

Table 2-4. The Result

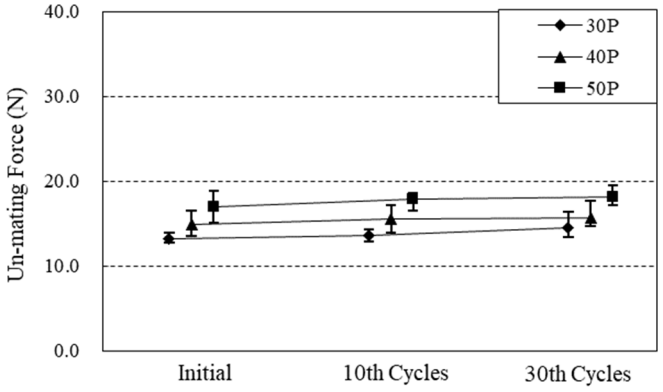
Test Item	Measurement		Spec.	Set	N	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
H Group Humidity (Cycling)	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	115.085	119.12	112.01	1.825	120.560	OK
			AWG#36 210mΩ MAX.	3	60	176.155	180.20	172.53	2.023	182.224	OK
			AWG#40 575mΩ MAX.	3	120	504.064	518.78	483.96	7.384	526.216	OK
			Ground 50mΩ MAX.	5	5	16.462	17.72	15.14	0.793	18.841	OK
		After 10th Cycles	AWG#32 ΔR=40mΩ MAX.	3	60	0.243	1.97	-1.92	1.179	3.780	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	0.202	2.34	-2.34	1.251	3.955	OK
			AWG#40 ΔR=40mΩ MAX.	3	120	0.688	3.75	-1.96	1.540	5.308	OK
			Ground ΔR=40mΩ MAX.	5	5	-0.172	1.86	-1.60	1.033	2.927	OK
		After Testing	AWG#32 ΔR=40mΩ MAX.	3	60	2.704	5.82	-0.84	2.117	9.055	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	3.403	7.67	-0.92	2.417	10.654	OK
			AWG#40 ΔR=40mΩ MAX.	3	120	3.366	8.81	-0.40	2.392	10.542	OK
			Ground ΔR=40mΩ MAX	5	5	1.296	2.94	-0.78	0.936	4.104	OK
	D.W. Voltage	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.	5	5	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.					OK
		After Testing				No abnormalities such as creeping discharge, flashover, insulator breakdown occur.					OK
	Insulation Resistance (MΩ)	Initial	1000MΩ MIN.	5	5	10000MΩ MIN.					OK
		After Testing	500MΩ MIN.			10000MΩ MIN.					OK
J Group Salt Water Spray	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	114.416	118.77	110.82	1.572	119.132	OK
			AWG#36 210mΩ MAX.	3	60	176.377	180.97	172.04	1.952	182.233	OK
			AWG#40 575mΩ MAX.	3	120	499.803	513.09	482.05	7.947	523.644	OK
			Ground 50mΩ MAX.	5	5	16.689	19.99	14.69	1.590	21.459	OK
		After Testing	AWG#32 ΔR=40mΩ MAX.	3	60	1.947	4.39	-1.00	1.585	6.702	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	2.059	5.53	0.19	1.186	5.617	OK
			AWG#40 ΔR=40mΩ MAX	3	120	3.077	6.87	-0.03	1.830	8.567	OK
			Ground ΔR=40mΩ MAX.	5	5	1.177	2.97	-0.20	0.889	3.844	OK

Table 2-5. The Result

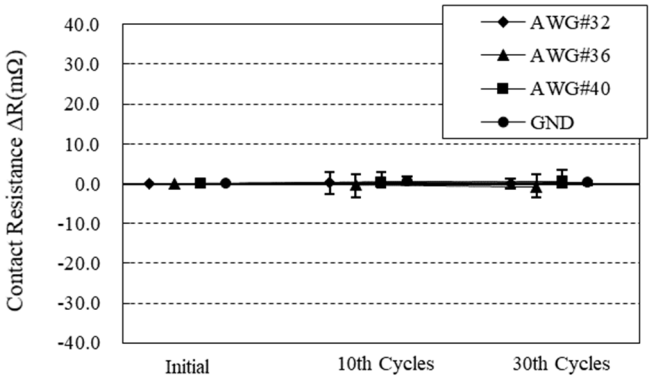
Test Item	Measurement		Spec.	Set	N	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
K Group Gas (H_2S)	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	115.776	119.35	111.34	1.953	121.635	OK
			AWG#36 210mΩ MAX.	3	60	177.254	179.95	173.58	1.550	181.904	OK
			AWG#40 575mΩ MAX.	3	120	500.896	523.67	481.92	8.329	525.883	OK
			Ground 50mΩ MAX.	5	5	16.943	19.00	14.33	1.125	20.318	OK
		After Testing	AWG#32 ΔR=40mΩ MAX.	3	60	0.673	1.95	-0.44	0.617	2.524	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	1.165	2.74	-0.05	0.714	3.307	OK
			AWG#40 ΔR=40mΩ MAX.	3	120	1.788	4.79	0.07	1.114	5.130	OK
			Ground ΔR=40mΩ MAX.	5	5	-0.031	2.19	-1.01	0.792	2.345	OK
L Group Soldering Heat Resist	Wetness 518K(245℃) / 5sec		95% MIN.	10	10	Wet 95% MIN.					OK
M Group Soldering Heat Resistance	Appearance		No abnormality adversely affecting the performance shall occur.	10	10	No abnormality adversely affecting the performance shall occur.					OK
N Group Differential impedance	Rise time for impedance measurement 260psec		100Ω±15	5	5	100.869	102.39	99.48	—	—	OK



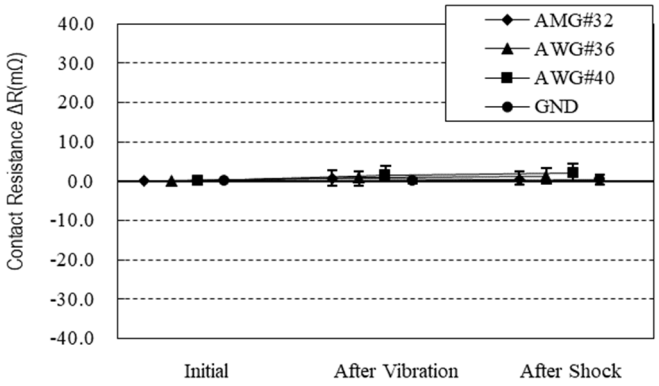
Graph1. A change of Mating Force



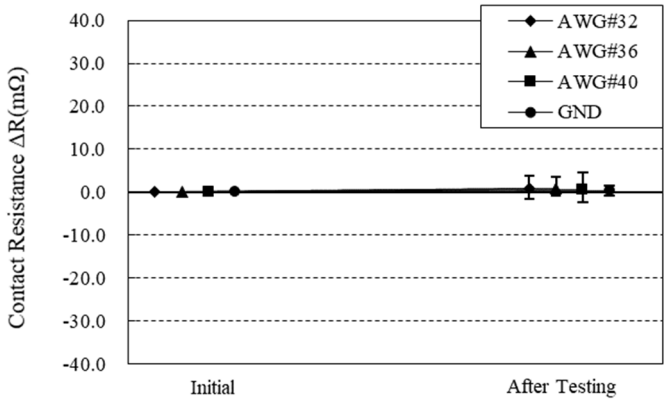
Graph2. A change of Unmating Force



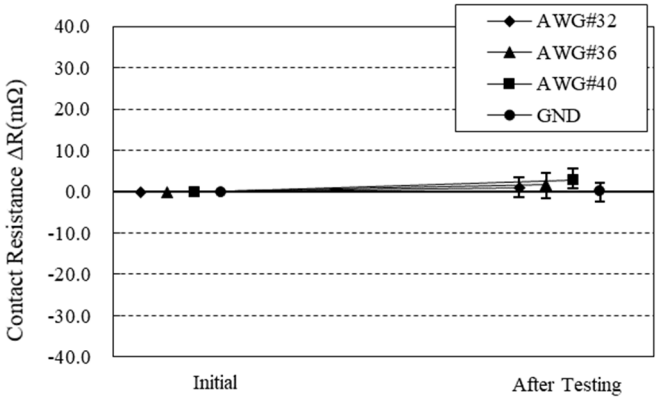
Graph3. Durability



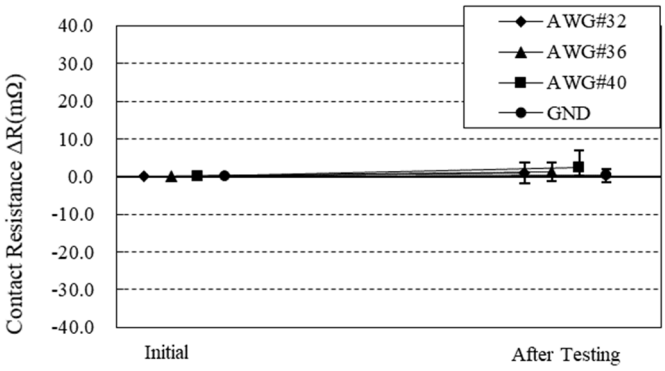
Graph4. Vibration, Shock



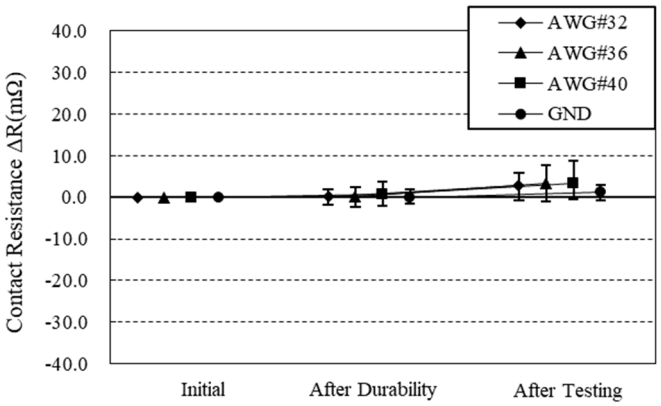
Graph5. Thermal Shock



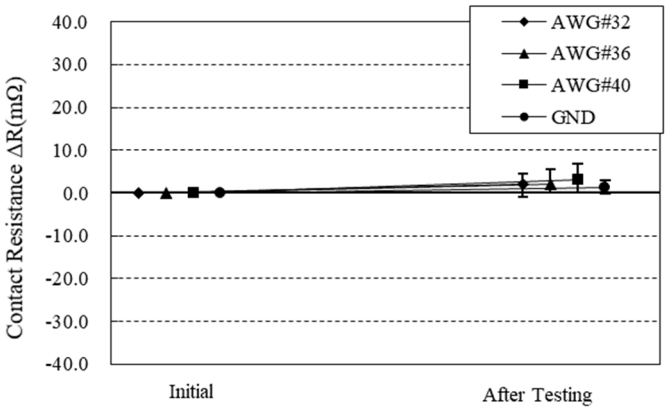
Graph6. High Temp. Life



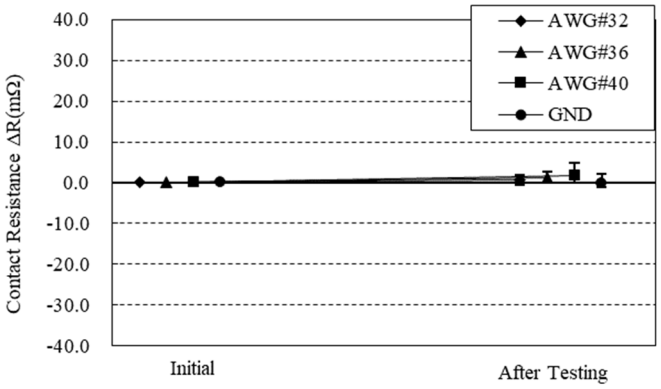
Graph7. Humidity (Steady State)



Graph.8 Humidity (Cycle)



Graph9. Salt Water Spray



Graph10. Gas (H_2S)