

FPL II Connector

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

Test Report

Product Specification no. PRS-1383

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
3	T12026	February 7, 2012	H.A		T.H
Rev.	ECN	Date	Prepared by	Checked by	Approved by

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 ₂ S 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	$\bar{X} \pm 3s$	
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

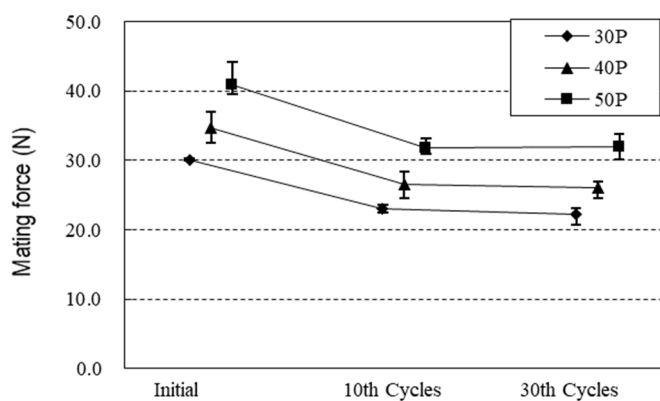
Test Item	Measurement		Spec.	Set	N	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
E Group Thermal Shock	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	114.760	118.58	112.34	1.396	118.948	OK
			AWG#36 210mΩ MAX.	3	60	176.636	184.69	170.23	2.753	184.895	OK
			AWG#40 575mΩ MAX.	3	120	500.115	512.90	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=40mΩ MAX.	3	60	1.041	3.62	-1.87	1.321	5.004	OK
			AWG#36 ΔR=40mΩ MAX.	3	60	1.337	3.83	-1.22	0.995	4.322	OK
			AWG#40 ΔR=40mΩ MAX.	3	120	2.356	6.98	0.25	1.556	7.024	OK
			Ground ΔR=40mΩ MAX.	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	1000MΩ MIN.	5	5	10000MΩ MIN.					OK
		After Testing	500MΩ MIN.			10000MΩ MIN.					OK

Table 2-4. The Result

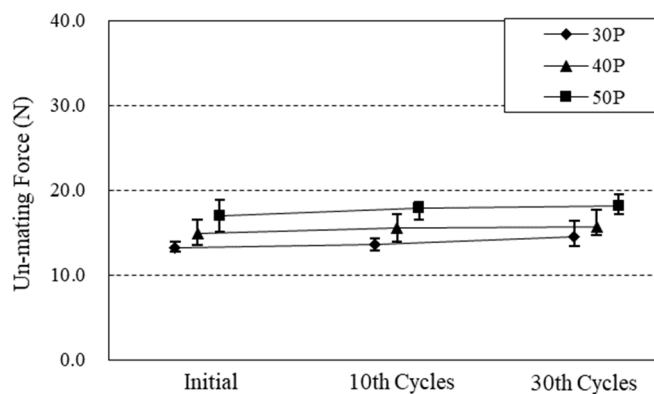
Test Item	Measurement		Spec.	Set	N	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
H Group Humidity (Cycling)	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	115.085	119.12	112.01	1.825	120.560	OK
			AWG#36 210mΩ MAX.	3	60	176.155	180.20	172.53	2.023	182.224	OK
			AWG#40 575mΩ MAX.	3	120	504.064	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,	5	5	No abnormalities such as creeping discharge, flashover, insulator breakdown occur.					OK
		After Testing	flashover, insulator breakdown occur.			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

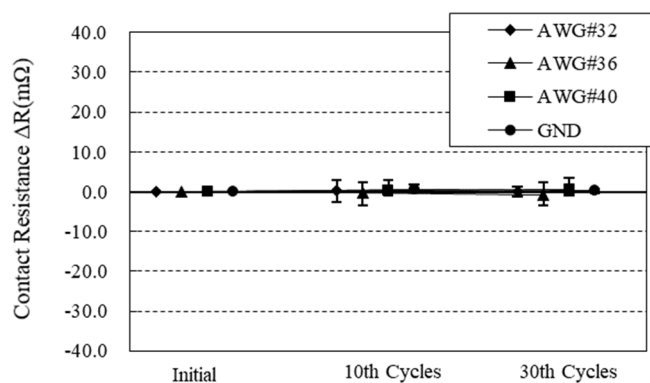
Test Item	Measurement		Spec.	Set	N	Data					Judge
						AVE.(X)	MAX.	MIN.	s	X±3s	
K Group Gas (H ₂ S)	Contact Resistance (mΩ)	Initial	AWG#32 145mΩ MAX.	3	60	115.776	119.35	111.34	1.953	121.635	OK
			AWG#36 210mΩ MAX.	3	60	177.254	179.95	173.58	1.550	181.904	OK
			AWG#40 575mΩ MAX.	3	120	500.896	523.67	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°C) / 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



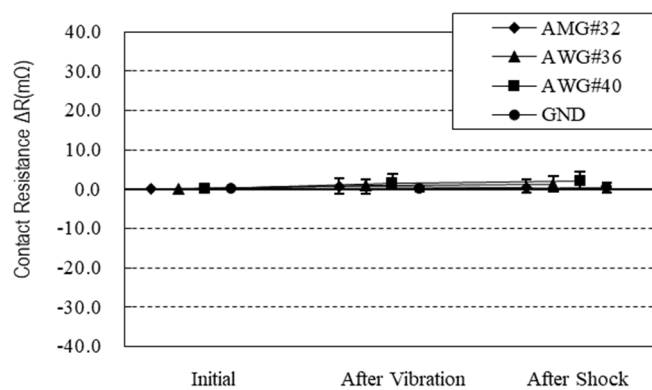
Graph1. A change of Mating Force



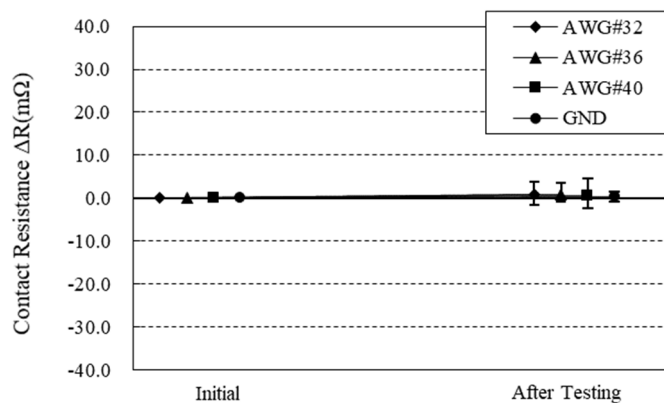
Graph2. A change of Unmating Force



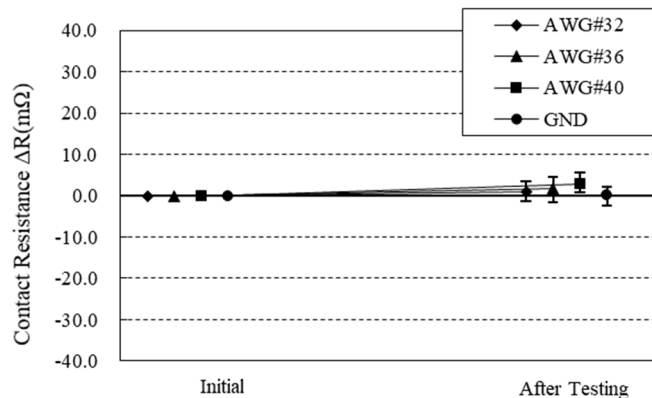
Graph3. Durability



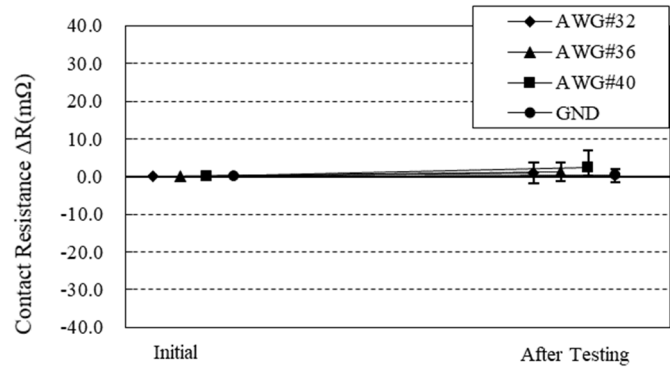
Graph4. Vibration, Shock



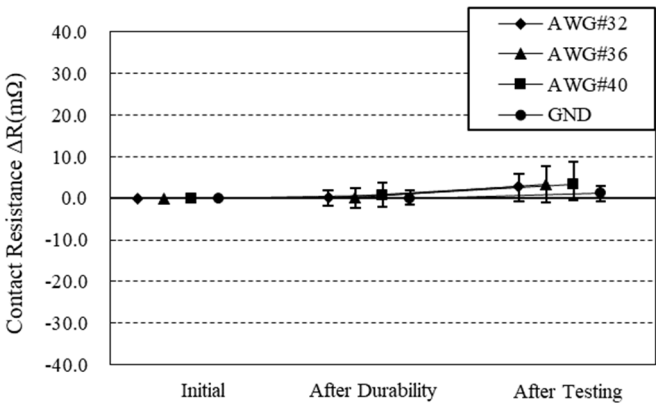
Graph5. Thermal Shock



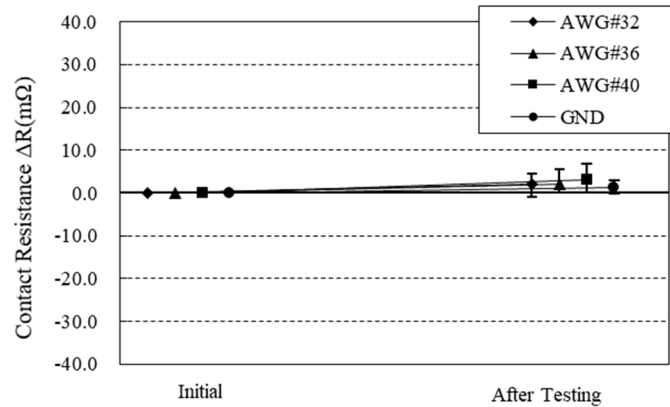
Graph6. High Temp. Life



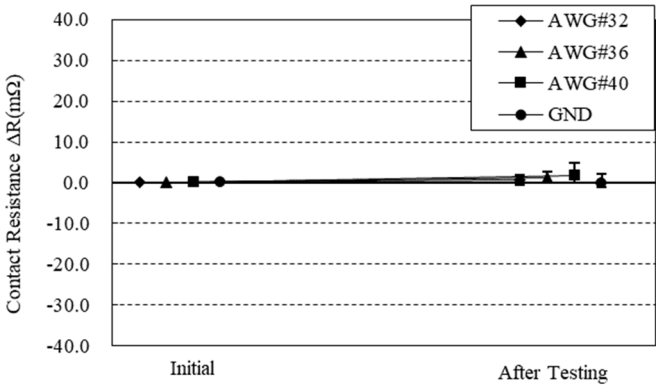
Graph7. Humidity (Steady State)



Graph.8 Humidity (Cycle)



Graph9. Salt Water Spray



Graph10. Gas (H₂S)