

EVAFLEX® 5-VS

Part No. 20535-0**E-02

Test Report

Product Specification no. PRS-1670

3	T21175	November 29, 2021	K.Hashimoto	M.Muro	H.Ikari
2	T14145	June 12, 2015	T.Tanigawa	-	E.Kawabe
1	T13100	January 21, 2015	K.Ozeki	-	E.Kawabe
0	T12163	June 7, 2012	T.Tanigawa	J.Tateishi	T.Harada
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

To evaluate the performance of EVAFLEX 5-VS CONNECTOR in accordance with PRS-1670

2. Conclusion

All specimens met the requirements.

3. Specimen

EVAFLEX 5-VS 10P ——— P/N : 20535-010E-02
 15P ——— P/N : 20535-015E-02
 20P ——— P/N : 20535-020E-02
 24P ——— P/N : 20535-024E-02
 30P ——— P/N : 20535-030E-02
 40P ——— P/N : 20535-040E-02

FFC ——— SHIELD FFC (Made by Sumitomo Electric Industries, Ltd)
 FFC Thickness : $t=0.33\pm 0.03\text{mm}$, (Actual measurement : 0.319~0.321mm)

4. Test Sequence

See Table-1.

5. Test Result

Please refer Table. 2~5, Graph 1~11.

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			2,6			1,3,5	1,3	1,3	1,5	1,5,7	1,3	1,3		
Insulation Resistance									2,6	2,8				
D. W. Voltage									3,7	3,9				
Temp. Life	1													
Differential Impedance		1												
Mating Force			1,5											
Un-mating Force			3,7											
Durability			4							4,10 cyc				
Contact Retention Force				1										
FFC Retention Force					1									
Vibration						2								
Shock						4								
Thermal Shock							2							
High Temperature Life								2						
Humidity (Steady State)									4					
Humidity (Cycling)										6				
Salt Water Spray											2			
H ₂ S Gas												2		
Solder ability													1	
Soldering Heat Resistance														1
Sample QTY.	5	5	5	20	5	5	5	5	5	5	5	5	10	10

※The number of group is test sequence.

Table 2. Test Result

Test Item	Measurements		Spec.	Set	n	Data					Judge	
						AVG (X)	MAX.	MIN.	s	X±3s		
A Group Temperature Rise	0.3A/Pin(30P)		$\Delta T=30K(^{\circ}C)$ MAX.	5	-	$\Delta T=11.1K(^{\circ}C)$ MAX.					○	
	0.5A/Pin(30P) (15A/CONN.)		$\Delta T=30K(^{\circ}C)$ MAX.	5	-	$\Delta T=28.2K(^{\circ}C)$ MAX.					○	
B Group Differential Impedance	MAX. Side		100±10Ω	5	-	98.800	99.26	98.34	0.356	99.868	○	
	MIN. Side					98.326	98.62	98.03	0.271	99.139	○	
C Group Durability	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.585	26.11	18.57	1.498	27.079	○	
		I/W 30cycles	$\Delta R=40m\Omega$ MAX.	5	150	0.212	3.43	-2.89	1.357	4.283	○	
	10P	Insertion Force (N)	Initial	6.0N MAX. (0.6N/Pos.×10P)	5	-	2.760	3.09	2.60	0.203	3.369	○
			I/W 30cycles		5	-	2.092	2.22	1.95	0.102	2.398	○
		Withdrawal Force (N)	Initial	1.0N MIN. (0.1N/Pos.×10P)	5	-	2.352	2.43	2.28	0.066	2.154	○
			I/W 30cycles		5	-	1.742	1.79	1.69	0.049	1.595	○
	15P	Insertion Force (N)	Initial	9.0N MAX. (0.6N/Pos.×15P)	5	-	4.056	4.18	3.94	0.086	4.314	○
			I/W 30cycles		5	-	3.128	3.32	2.94	0.163	3.617	○
		Withdrawal Force (N)	Initial	1.5N MIN. (0.1N/Pos.×15P)	5	-	3.538	3.78	3.16	0.272	2.722	○
			I/W 30cycles		5	-	2.694	3.08	2.45	0.234	1.992	○
	20P	Insertion Force (N)	Initial	12.0N MAX. (0.6N/Pos.×20P)	5	-	5.521	5.65	5.43	0.079	5.758	○
			I/W 30cycles		5	-	4.121	4.23	4.01	0.078	4.355	○
		Withdrawal Force (N)	Initial	2.0N MIN. (0.1N/Pos.×20P)	5	-	4.670	4.72	4.62	0.037	4.559	○
			I/W 30cycles		5	-	3.500	3.65	3.32	0.130	3.110	○
	24P	Insertion Force (N)	Initial	14.4N MAX. (0.6N/Pos.×24P)	5	-	6.856	6.97	6.73	0.105	7.171	○
			I/W 30cycles		5	-	5.066	5.40	4.86	0.206	5.684	○
		Withdrawal Force (N)	Initial	2.4N MIN. (0.1N/Pos.×24P)	5	-	5.890	6.02	5.71	0.136	5.482	○
			I/W 30cycles		5	-	4.320	4.49	4.21	0.114	3.978	○
	30P	Insertion Force (N)	Initial	18.0N MAX. (0.6N/Pos.×30P)	5	-	8.082	8.27	7.95	0.118	8.436	○
			I/W 30cycles		5	-	6.082	6.25	5.92	0.117	6.433	○
		Withdrawal Force (N)	Initial	3.0N MIN. (0.1N/Pos.×30P)	5	-	7.012	7.09	6.93	0.057	6.841	○
			I/W 30cycles		5	-	5.240	5.46	4.98	0.185	4.685	○
	40P	Insertion Force (N)	Initial	24.0N MAX. (0.6N/Pos.×40P)	5	-	11.316	11.45	11.14	0.123	11.685	○
			I/W 30cycles		5	-	8.204	8.28	8.09	0.074	8.426	○
Withdrawal Force (N)		Initial	4.0N MIN. (0.1N/Pos.×40P)	5	-	9.310	9.36	9.26	0.041	9.187	○	
		I/W 30cycles		5	-	7.210	7.39	6.96	0.172	6.694	○	
D Group Contact Retention Force			0.3N MIN.	-	20	1.098	1.61	0.74	0.186	0.540	○	

Table 3. Test Result

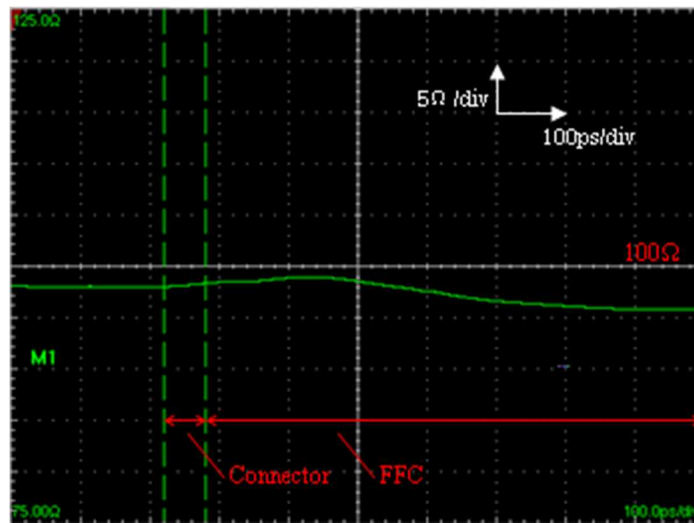
Test Item	Measurements		Spec.	Set	n	Data					Judge	
						AVG (X)	MAX.	MIN.	s	X±3s		
E Group FFC Retention Force	10P	FFC Retention Force	9.0N MIN. (0.3N/Pos.×10P+6.0N)	5	-	29.422	30.49	28.27	1.032	26.326	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
	15P	FFC Retention Force	10.5N MIN. (0.3N/Pos.×15P+6.0N)	5	-	30.476	31.48	29.41	0.891	27.803	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
	20P	FFC Retention Force	12.0N MIN. (0.3N/Pos.×20P+6.0N)	5	-	32.600	33.34	31.06	0.885	29.945	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
	24P	FFC Retention Force	13.2N MIN. (0.3N/Pos.×24P+6.0N)	5	-	33.682	34.23	32.46	0.717	31.531	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
	30P	FFC Retention Force	15.0N MIN. (0.3N/Pos.×30P+6.0N)	5	-	34.940	35.84	33.36	0.984	31.988	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
	40P	FFC Retention Force	18.0N MIN. (0.3N/Pos.×40P+6.0N)	5	-	36.792	37.92	36.05	0.776	34.464	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
	F Group Vibration ↓ Shock	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.357	27.1	18.73	1.685	27.412	○
			After Vibration	ΔR=40mΩMAX.	5	150	-0.525	4.050	-4.320	1.803	4.884	○
After Shock			5		150	-1.509	3.95	-4.91	1.948	4.335	○	
Discontinuity		During Vibration	1μs MAX.	5	-	No discontinuity					○	
		During Shock		5	-	No discontinuity					○	
Appearance		After Vibration	No abnormality adversely affecting the performance shall occur.	5	-	No abnormality					○	
		After Shock		5	-	No abnormality					○	

Table 4. Test Result

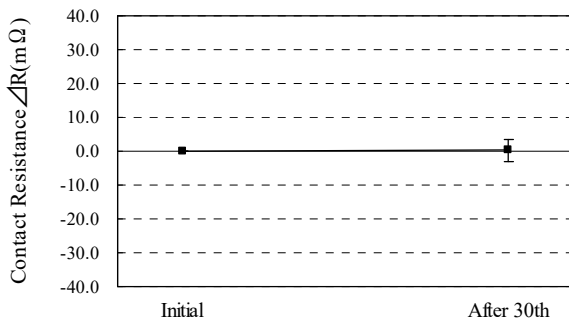
Test Item	Measurements		Spec.	Set	n	Data					Judge
						AVG (X)	MAX.	MIN.	s	X±3s	
G Group Thermal Shock	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.041	26.91	18.03	1.691	27.114	○
		After Testing	ΔR=40mΩMAX.	5	150	-0.873	2.440	-3.720	1.189	2.694	○
	Insulation Resistance C/T – C/T	Initial	100MΩ MIN.	5	5	6.0×10 ⁶ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	7.0×10 ⁶ MΩ MIN.					○
	Insulation Resistance C/T – Shell	Initial	100MΩ MIN.	5	5	6.0×10 ⁶ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	7.0×10 ⁶ MΩ MIN.					○
	Dielectric Strength C/T – C/T	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur	5	5	No abnormality					○
		After Testing		5	5	No abnormality					○
	Dielectric Strength C/T – Shell	Initial		5	5	No abnormality					○
		After Testing		5	5	No abnormality					○
Appearance		No abnormality adversely affecting the performance shall occur.	5	-	No abnormality					○	
H Group High Temperature Life	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.691	25.63	19.10	1.410	26.921	○
		After Testing	ΔR=40mΩMAX.	5	150	0.276	3.63	-2.73	1.231	3.969	○
	Appearance		No abnormality adversely affecting the performance shall occur.	5	-	No abnormality					○
J Group Humidity (Steady State)	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.197	27.07	18.01	1.628	27.081	○
		After Testing	ΔR=40mΩMAX.	5	150	-0.359	3.420	-3.550	1.643	4.57	○
	Insulation Resistance C/T – C/T	Initial	100MΩ MIN.	5	5	7.0×10 ⁶ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	3.0×10 ⁶ MΩ MIN.					○
	Insulation Resistance C/T Shell	Initial	100MΩ MIN.	5	5	7.0×10 ⁶ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	4.0×10 ⁶ MΩ MIN.					○
	Dielectric Strength C/T – C/T	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur	5	5	No abnormality					○
		After Testing		5	5	No abnormality					○
	Dielectric Strength C/T – Shell	Initial		5	5	No abnormality					○
		After Testing		5	5	No abnormality					○
Appearance		No abnormality adversely affecting the performance shall occur.	5	-	No abnormality					○	

Table 5. Test Result

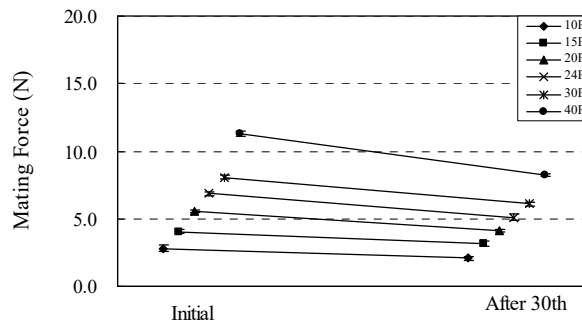
Test Item	Measurements		Spec.	Set	n	Data					Judge
						AVG (X)	MAX.	MIN.	s	X±3s	
K Group Humidity (Cycling)	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.684	27.72	17.9	1.725	27.859	○
		After Testing	ΔR=40mΩMAX.	5	150	0.481	3.240	-3.020	1.371	4.594	○
	Insulation Resistance C/T – C/T	Initial	100MΩ MIN.	5	5	4.0×10 ⁵ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	4.0×10 ⁴ MΩ MIN.					○
	Insulation Resistance C/T – Shell	Initial	100MΩ MIN.	5	5	6.0×10 ⁵ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	4.0×10 ⁵ MΩ MIN.					○
	Dielectric Strength C/T – C/T	Initial	No abnormalities such as creeping discharge, flashover, insulator breakdown occur	5	5	No abnormality					○
		After Testing		5	5	No abnormality					○
	Dielectric Strength C/T – Shell	Initial		5	5	No abnormality					○
		After Testing		5	5	No abnormality					○
Appearance		No abnormality adversely affecting the performance shall occur.	5	-	No abnormality					○	
L Group Salt Water Spray	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.212	27.29	18.46	1.761	27.495	○
		After Testing	ΔR=40mΩMAX.	5	150	0.97	4.06	-2.26	1.402	5.176	○
	Appearance		No abnormality adversely affecting the performance shall occur.	5	-	No abnormality					○
M Group H2S Gas	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	150	22.638	27.56	17.60	1.737	27.849	○
		After Testing	ΔR=40mΩMAX.	5	150	1.862	6.61	-3.20	1.747	7.103	○
	Appearance		No abnormality adversely affecting the performance shall occur.	5	-	No abnormality					○
N Group Solderability	Appearance		More than 95% of The dipped surface Shall be evenly wet.	10	-	100%					○
P Group Soldering Heat Resistance	Appearance		No abnormality adversely affecting the performance shall occur.	10	-	No abnormality					○



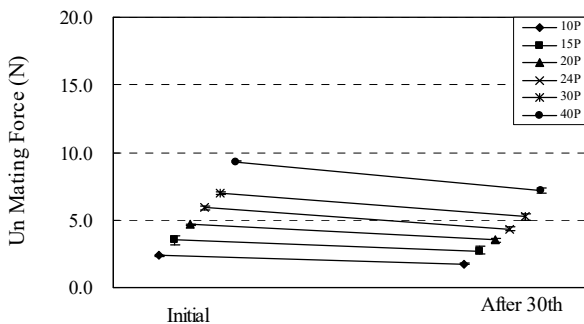
Graph.1 Differential Impedance



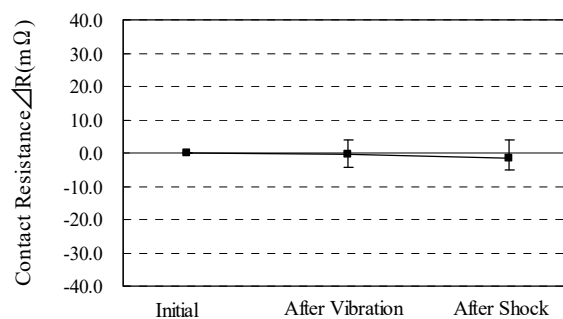
Graph.2 A change of contact resistance: Durability



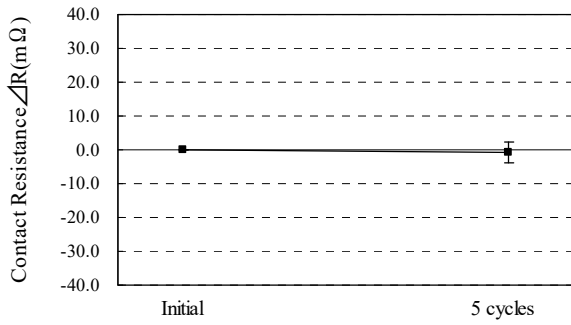
Graph.3 A change of mating force: Durability



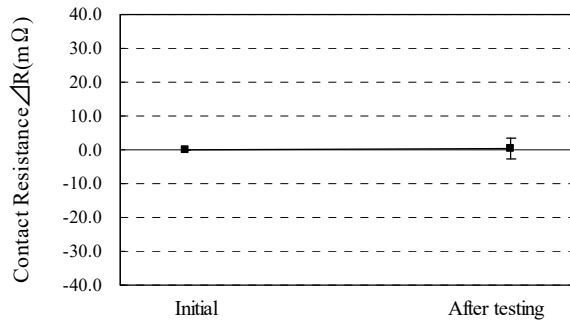
Graph.4 A change of un mating force: Durability



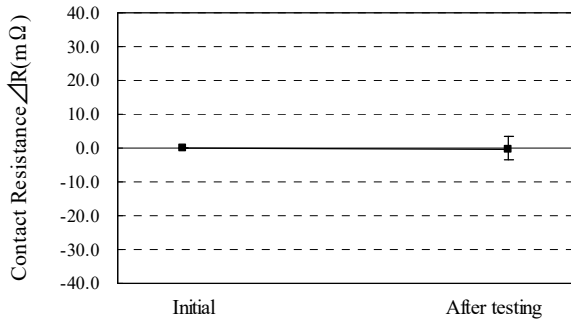
Graph.5 A change of contact resistance: Vibration and Shock



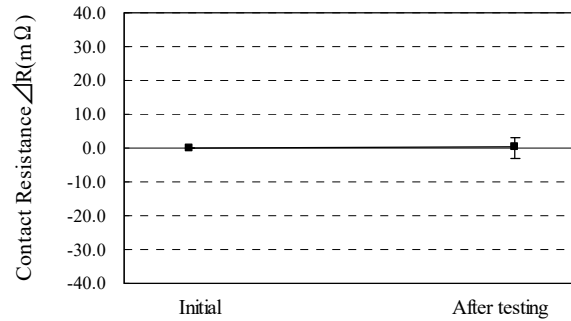
Graph.6 A change of contact resistance: Thermal Shock



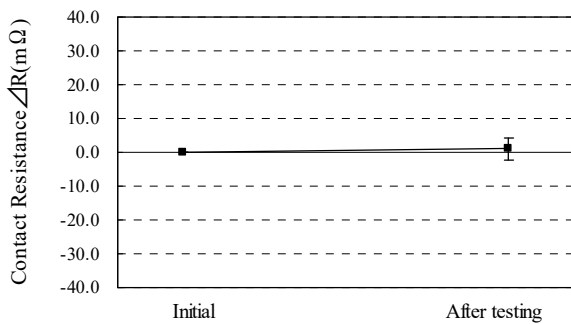
Graph.7 A change of contact resistance: High temperature life



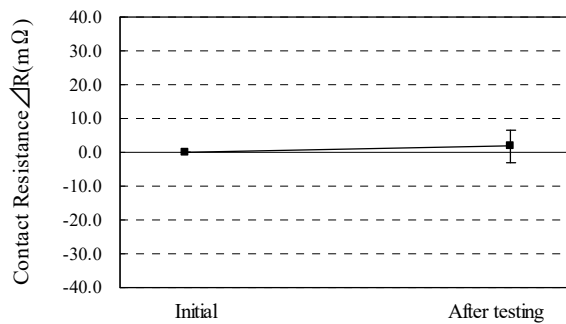
Graph.8 A change of contact resistance: Humidity(Steady State)



Graph.9 A change of contact resistance: Humidity(Cycle)



Graph.10 A change of contact resistance: Salt water Spray



Graph.11 A change of contact resistance: Gas (H₂S)