

EVAFLEX® 5-VS TYPE CH

[WITH SHIELD FFC]

Part No. 20720-0**E-02

Test Report

Product Specification no. PRS-2224

4	T23034	June 20, 2023	M. Muro	-	H. Ikari
3	T21176	December 2, 2021	K. Hashimoto	M. Muro	H. Ikari
2	T17034	February 21, 2017	H. Kaneko	-	J. Tateishi
1	T17007	January 25, 2017	H. Kaneko	-	Y. Shimada
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

To evaluate the performance of EVAFLEX 5-VS TYPE CH CONNECTOR in accordance with PRS-2224

2. Specimen

EVAFLEX 5-VS TYPE CH

10P ——— P/N : 20720-010E-02

15P ——— P/N : 20720-015E-02

20P ——— P/N : 20720-020E-02

24P ——— P/N : 20720-024E-02

30P ——— P/N : 20720-030E-02

40P ——— P/N : 20720-040E-02

FFC ——— SHIELD FFC, Made by BANDO DENSEN Co., Ltd.

FFC Thickness : $t=0.33\pm 0.03\text{mm}$, (Actual measurement : 0.351~0.354mm)

SHIELD FFC, Made by Sumitomo Electric Industries, Ltd. (Only G Group)

FFC Thickness : $t=0.33\pm 0.03\text{mm}$, (Actual measurement : 0.326~0.328mm)

3. Test Sequence

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

4. Test Result

See Table 2 to 5, Graph 1 to 12. For the details of the testing conditions and requirements, see PRS-2224.

The "n" in the tables show the number of measurement points.

5. Conclusion

All the specimens met the requirements of PRS-2224.

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
Contact Resistance			2,6			1,3,5	1,3,5,7	1,3	1,3	1,5	1,5	1,3	1,3		
Insulation Resistance										2,6	2,6				
D. W. Voltage										3,7	3,7				
Temp. Life	1														
Differential Impedance		1													
Mating Force			1,5												
Un-mating Force			3,7												
Durability			4				2 (10 cycles)								
Contact Retention Force				1											
FFC Retention Force					1										
Vibration (1)						2									
Shock (1)						4									
Vibration (2) & Shock (2)							4,6								
Thermal Shock								2							
High Temperature Life									2						
Humidity (Steady State)										4					
Humidity (Cycling)											4				
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	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)		ΔT=30K(°C) MAX.	5	-	ΔT=8.5K(°C) MAX.					○	
	0.5A/Pin(30P) (15A/CONN.)		ΔT=30K(°C) MAX.	5	-	ΔT=22.0K(°C) MAX.					○	
B Group Differential Impedance	MAX. Side		100±10Ω	5	-	95.838	96.33	95.44	0.365	96.933	○	
	MIN. Side				-	95.184	95.48	94.80	0.264	94.392	○	
C Group Durability	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.426	11.33	3.04	1.671	11.439	○	
		I/W 30cycles	ΔR=40mΩMAX.	5	200	0.156	3.77	-3.12	1.262	3.942	○	
	10P	Insertion Force (N)	Initial	6.0N MAX. (0.6N/Pos.×10P)	5	-	3.838	4.00	3.72	0.116	4.186	○
			I/W 30cycles		5	-	3.140	3.20	3.01	0.077	3.371	○
		Withdrawal Force (N)	Initial	1.0N MIN. (0.1N/Pos.×10P)	5	-	3.516	3.71	3.39	0.126	3.138	○
			I/W 30cycles		5	-	2.810	2.93	2.72	0.089	2.543	○
	15P	Insertion Force (N)	Initial	9.0N MAX. (0.6N/Pos.×15P)	5	-	5.481	5.57	5.37	0.097	5.772	○
			I/W 30cycles		5	-	4.445	4.61	4.34	0.110	4.775	○
		Withdrawal Force (N)	Initial	1.5N MIN. (0.1N/Pos.×15P)	5	-	4.980	5.11	4.76	0.142	4.554	○
			I/W 30cycles		5	-	3.887	3.96	3.84	0.048	3.743	○
	20P	Insertion Force (N)	Initial	12.0N MAX. (0.6N/Pos.×20P)	5	-	7.166	7.30	7.04	0.096	7.454	○
			I/W 30cycles		5	-	5.736	5.86	5.64	0.083	5.985	○
		Withdrawal Force (N)	Initial	2.0N MIN. (0.1N/Pos.×20P)	5	-	6.230	6.38	6.06	0.125	5.855	○
			I/W 30cycles		5	-	5.270	5.37	5.21	0.071	5.057	○
	24P	Insertion Force (N)	Initial	14.4N MAX. (0.6N/Pos.×24P)	5	-	8.366	8.49	8.28	0.108	8.690	○
			I/W 30cycles		5	-	6.944	7.14	6.62	0.200	7.544	○
		Withdrawal Force (N)	Initial	2.4N MIN. (0.1N/Pos.×24P)	5	-	7.650	7.69	7.57	0.051	7.497	○
			I/W 30cycles		5	-	6.280	6.37	6.18	0.083	6.031	○
	30P	Insertion Force (N)	Initial	18.0N MAX. (0.6N/Pos.×30P)	5	-	11.363	11.50	11.20	0.110	11.693	○
			I/W 30cycles		5	-	8.946	9.07	8.85	0.079	9.183	○
		Withdrawal Force (N)	Initial	3.0N MIN. (0.1N/Pos.×30P)	5	-	10.020	10.15	9.88	0.100	9.720	○
			I/W 30cycles		5	-	7.994	8.05	7.91	0.063	7.805	○
	40P	Insertion Force (N)	Initial	24.0N MAX. (0.6N/Pos.×40P)	5	-	15.196	15.38	15.04	0.144	15.628	○
			I/W 30cycles		5	-	11.929	12.07	11.83	0.101	12.232	○
Withdrawal Force (N)		Initial	4.0N MIN. (0.1N/Pos.×40P)	5	-	13.376	13.49	13.32	0.073	13.157	○	
		I/W 30cycles		5	-	10.782	10.84	10.73	0.049	10.635	○	

Table 3. Test Result

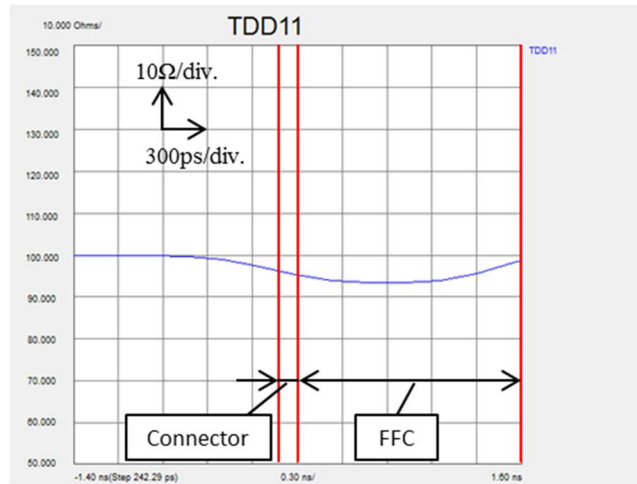
Test Item	Measurements		Spec.	Set	n	Data					Judge	
						AVG (X)	MAX.	MIN	s	X±3s		
D Group		Contact Retention Force		0.3N MIN.	-	20	1.098	1.61	0.74	0.186	0.540	○
E Group	10P	FFC Retention Force	9.0N MIN. (0.3N/Pos.×10P+6.0N)	5	-	30.752	31.82	28.97	1.141	27.329	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
	15P	FFC Retention Force	10.5N MIN. (0.3N/Pos.×15P+6.0N)	5	-	32.297	34.15	30.97	1.218	28.643	○	
		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	-	34.376	35.57	32.77	1.074	31.154	○	
		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	-	36.135	37.59	35.11	1.081	32.892	○	
		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	-	39.453	40.94	38.37	0.949	36.606	○	
		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	-	42.300	43.48	40.94	0.954	39.438	○	
		Appearance	No abnormality in the lock part appearance.	5	-	No abnormality					○	
F Group	Vibration (1) ↓ Shock (1)	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.337	11.00	3.04	1.558	11.011	○
			After Vibration	ΔR=40mΩMAX.	5	200	-0.438	3.77	-4.60	1.669	4.569	○
			After Shock		5	200	-0.486	4.19	-4.86	1.727	4.695	○
	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					○		
G Group	Vibration (2) ↓ Shock (2)	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	8.268	13.63	2.37	2.793	16.647	○
			After Durability	ΔR=40mΩMAX.	5	200	-0.194	5.58	-8.69	2.479	7.243	○
			After Vibration		5	200	0.047	7.79	-9.04	3.237	9.758	○
			After Shock		5	200	0.088	6.49	-7.72	2.990	9.058	○
	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

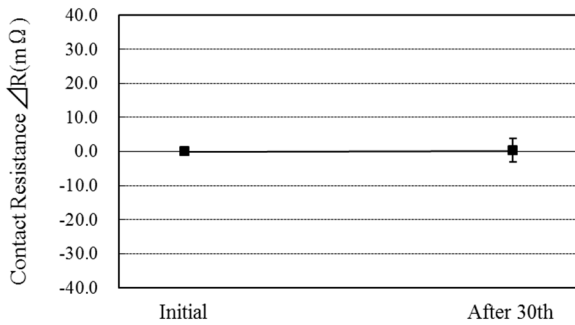
Test Item	Measurements		Spec.	Set	n	Data					Judge
						AVG (X)	MAX.	MIN	s	X±3s	
H Group Thermal Shock	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.682	11.10	3.06	1.479	11.119	○
		After Testing	ΔR=40mΩMAX.	5	200	2.475	9.96	-3.96	2.756	10.743	○
	Insulation Resistance C/T - C/T	Initial	100MΩ MIN.	5	5	1.0×10 ⁵ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	1.0×10 ⁵ MΩ MIN.					○
	Insulation Resistance C/T - Shell	Initial	100MΩ MIN.	5	5	6.5×10 ⁴ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	4.0×10 ⁴ 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					○	
J Group High Temperature Life	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.401	10.33	3.12	1.814	11.843	○
		After Testing	ΔR=40mΩMAX.	5	200	2.300	18.07	-3.83	5.322	18.266	○
	Appearance		No abnormality adversely affecting the performance shall occur	5	-	No abnormality					○
K Group Humidity (Steady State)	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.284	10.32	2.24	1.563	10.973	○
		After Testing	ΔR=40mΩMAX.	5	200	-0.120	4.32	-4.73	1.719	5.037	○
	Insulation Resistance C/T - C/T	Initial	100MΩ MIN.	5	5	1.0×10 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 ⁴ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	4.0×10 ⁴ 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

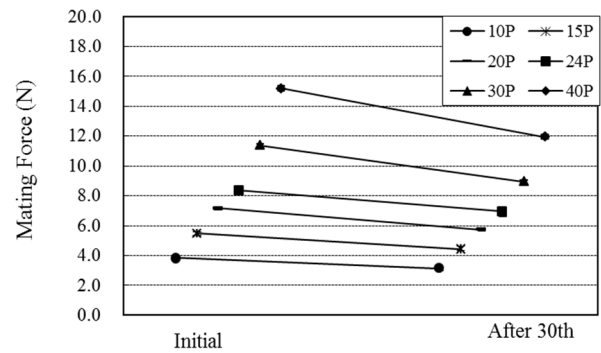
Test Item	Measurements		Spec.	Set	n	Data					Judge
						AVG (X)	MAX.	MIN	s	X±3s	
L Group Humidity (Cycling)	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.358	10.56	3.29	1.436	10.666	○
		After Testing	ΔR=40mΩMAX.	5	200	0.427	4.01	-3.46	1.330	4.417	○
	Insulation Resistance C/T - C/T	Initial	100MΩ MIN.	5	5	2.0×10 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	7.0×10 ⁴ MΩ MIN.					○
		After Testing	100MΩ MIN.	5	5	4.0×10 ⁴ 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					○	
M Group Salt Water Spray	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.656	10.23	3.18	1.495	11.141	○
		After Testing	ΔR=40mΩMAX.	5	200	0.928	4.43	-3.05	1.347	4.969	○
	Appearance		No abnormality adversely affecting the performance shall occur	5	-	No abnormality					○
N Group H ₂ S Gas	Contact Resistance (mΩ)	Initial	60mΩ MAX.	5	200	6.445	10.18	3.25	1.578	11.179	○
		After Testing	ΔR=40mΩMAX.	5	200	1.903	6.69	-2.27	1.712	7.039	○
	Appearance		No abnormality adversely affecting the performance shall occur	5	-	No abnormality					○
P Group Solderability	Appearance		More than 95% of the dipped surface shall be evenly wet.	10	-	100%					○
Q Group Soldering Heat Resistance	Appearance		No abnormality adversely affecting the performance shall occur	10	-	No abnormality					○



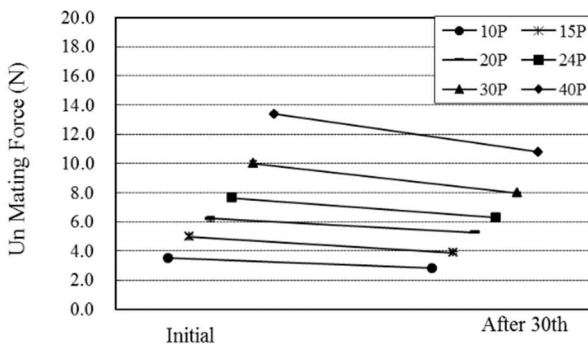
Graph.1 Differential Impedance



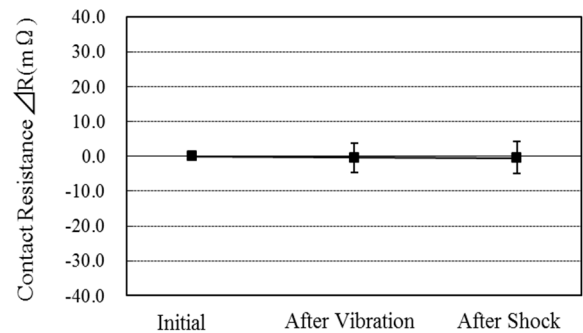
Graph.2 A change of contact resistance: Durability



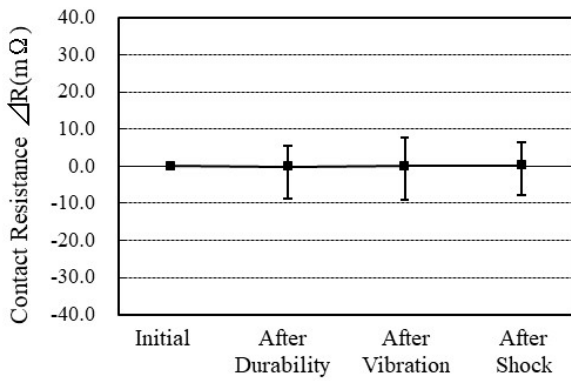
Graph.3 A change of mating force: Durability



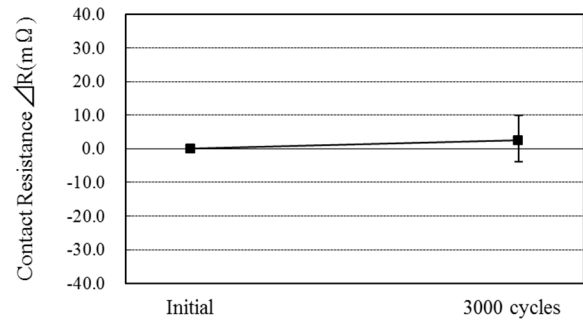
Graph.4 A change of un mating force: Durability



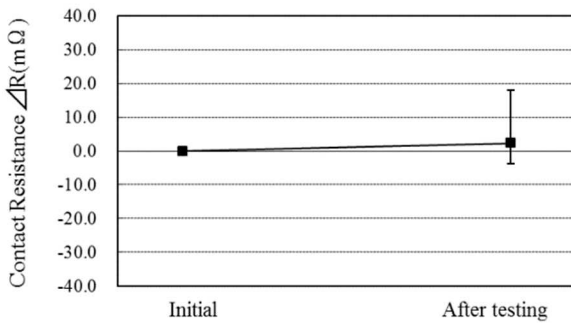
Graph.5 A change of contact resistance: Vibration (1) and Shock (1)



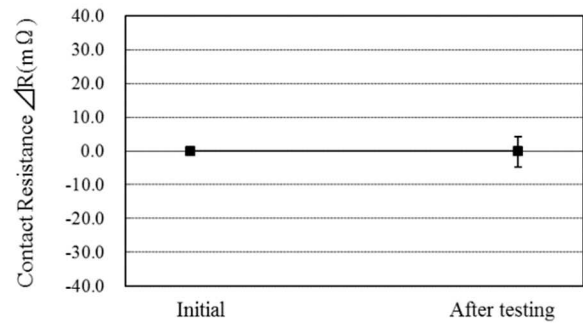
Graph.6 A change of contact resistance: Vibration (2) and Shock (2)



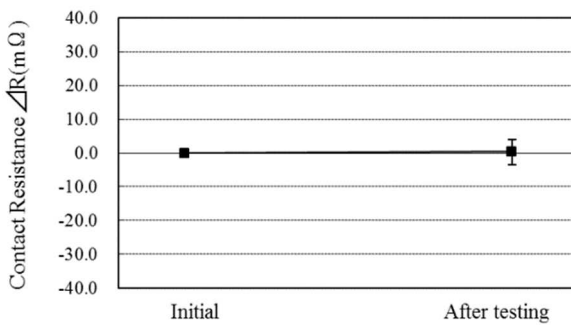
Graph.7 A change of contact resistance: Thermal Shock



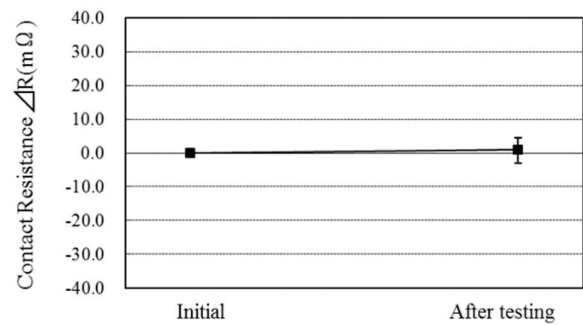
Graph.8 A change of contact resistance: High temperature life



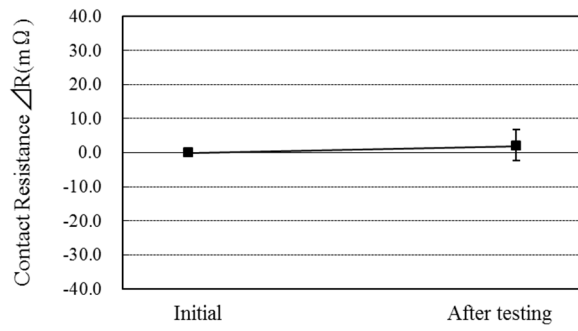
Graph.9 A change of contact resistance: Humidity(Steady State)



Graph.10 A change of contact resistance: Humidity(Cycle)



Graph.11 A change of contact resistance: Salt water Spray



Graph.12 A change of contact resistance: Gas (H_2S)