

IARPB[®] VERTICAL CONNECTOR

Test Report

Product Standard No. PSS-0041

0	RS1002	July 8, 2024	Y. Imae	H.Kurita	J.Tateishi
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

We will conduct a performance verification evaluation for the IARPB® VERTICAL CONNECTOR based on product standard PSS-0041.

(Regarding terminal evaluation and environmental resistance testing, performance will be confirmed representatively using the 7P.)

2. Conclusion

All evaluation items met the required performance standards.

3. Sample

Table 1 Product Specifications

Parts	Material	P/N	Remarks
Housing	Glass Filled PBT (UL94-HB)	V0145-91002-01 (2P) V0145-91004-01 (4P) V0145-91007-01 (7P)	Black
Terminal	Brass , Sn (Reflow)	V0145-71001-01	-
Applicable cable	-	BEAMEX SS-ER500	0.3mm ²
Applicable PCB	FR-4	-	-

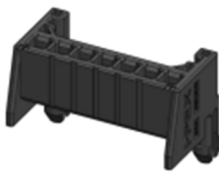


Fig. 1 Housing



Fig. 2 Terminal

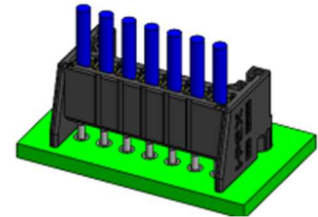


Fig. 3 Assembly

4. Test Results

Table 2-1 Initial characteristics Result list (2P, 4P, 7P)

Item	Test name	Requirements	Pole	n	Unit	Avg.	Max.	Min.	s	Avg.±3s	Judge.
1	Terminal and Housing appearance	No detrimental deformation	2P	8	-	No detrimental deformation					Pass
			4P	8	-	No detrimental deformation					Pass
			7P	4	-	No detrimental deformation					Pass
2	Terminal outer dimension	Satisfy drawing dimension	-	-	-	Satisfy drawing dimension					Pass
			2P	-	-	Satisfy drawing dimension					Pass
			4P	-	-	Satisfy drawing dimension					Pass
3	Housing outer dimension	Satisfy drawing dimension	7P	-	-	Satisfy drawing dimension					Pass
			2P	-	-	Satisfy drawing dimension					Pass
			4P	-	-	Satisfy drawing dimension					Pass
4	Terminal retention force	30N Min.	2P	40	N	54.88	57.8	51.8	1.46	50.50	Pass
			4P	40	N	55.50	58.8	52.5	1.52	50.94	Pass
			7P	28	N	53.65	60.1	49.0	2.53	46.06	Pass
5	Solderability	The land area on both sides of the PCB is wet all around and fillets are formed.	2P	5	-	The land area on both sides of the PCB is wet all around and fillets are formed.					Pass
			4P	5	-	The land area on both sides of the PCB is wet all around and fillets are formed.					Pass
			7P	5	-	The land area on both sides of the PCB is wet all around and fillets are formed.					Pass
6	Terminal crimp strength	50N Min.	-	5	N	73.54	75.3	70.0	2.09	67.27	Pass

Table 2-2 Initial characteristics Result list (2P, 4P, 7P)

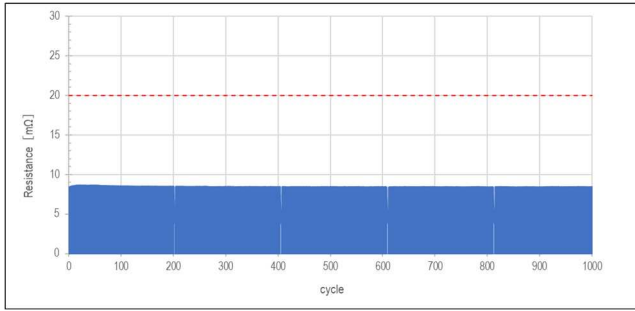
Item	Test name	Requirements	Pole	n	Unit	Avg.	Max.	Min.	s	Avg.±3s	Judge.	
7	Voltage drop	(a)1A	2mV/A Max.	7P	35	mV/A	0.252	0.72	0.11	0.121	0.615	Pass
		(b)3A	2mV/A Max.	7P	35	mV/A	0.353	0.82	0.13	0.158	0.827	Pass
8	Dry circuit resistance	(a)10mA	2mΩ Max.	7P	35	mΩ	0.461	0.71	0.37	0.065	0.656	Pass
		(b)1mA	2mΩ Max.	7P	35	mΩ	0.353	0.53	0.16	0.098	0.646	Pass
9	Insulation resistance	between (a) terminals	100MΩ Min.	2P	24	MΩ	100,000MΩ Min.					Pass
				4P	24	MΩ	100,000MΩ Min.					Pass
				7P	12	MΩ	100,000MΩ Min.					Pass
		between (b) terminal and earth	100MΩ Min.	2P	24	MΩ	100,000MΩ Min.					Pass
				4P	24	MΩ	100,000MΩ Min.					Pass
				7P	12	MΩ	100,000MΩ Min.					Pass
10	Dielectric withstanding voltage	between (a) terminals	No insulation breakdown or erosion	2P	12	-	No insulation breakdown or erosion					Pass
				4P	24	-	No insulation breakdown or erosion					Pass
				7P	24	-	No insulation breakdown or erosion					Pass
		between (b) terminal and earth	No insulation breakdown or erosion	2P	12	-	No insulation breakdown or erosion					Pass
				4P	24	-	No insulation breakdown or erosion					Pass
				7P	24	-	No insulation breakdown or erosion					Pass
11	Temperature rise	Single pole	ΔT=40℃ Max.	2P	5	℃	15.69	16.6	15.0	0.61	17.52	Pass
				4P	5	℃	14.33	15.0	13.8	0.51	15.86	Pass
				7P	5	℃	17.13	17.5	16.7	0.37	18.24	Pass
		All poles	ΔT=40℃ Max.	2P	5	℃	21.10	21.5	20.6	0.38	22.24	Pass
				4P	5	℃	20.94	22.3	18.2	1.68	25.98	Pass
				7P	5	℃	17.33	18.2	16.3	0.77	19.64	Pass
12	Leak current	3mA Max.	2P	5	mA	0.01mA Max.					Pass	
13	Short break monitor	Not exceed 1μs and 7Ω	4P	5	-	Not exceed 1μs and 7Ω					Pass	
14	Resistance variation	20mΩ Max.	7P	5	mΩ	1.306	1.43	1.26	0.071	1.519	Pass	
15	Insertion force of terminal to the housing	15N Max.	2P	40	N	2.42	3.3	2.0	0.28	3.26	Pass	
			4P	40	N	2.94	4.0	2.3	0.37	4.05	Pass	
			7P	28	N	2.95	3.6	2.3	0.43	4.24	Pass	
16	Terminal/Cavity polarization	Unable to insert terminal incorrectly at 49N	2P	10	-	Unable to insert terminal incorrectly at 49N					Pass	
			4P	20	-	Unable to insert terminal incorrectly at 49N					Pass	
			7P	35	-	Unable to insert terminal incorrectly at 49N					Pass	
17	PCB retention force	Direction ①	70N Min.	2P	24	N	144.55	154.8	135.1	5.25	128.80	Pass
				4P	24	N	279.71	296.8	254.6	10.05	249.56	Pass
				7P	12	N	480.77	487.4	474.1	3.95	468.92	Pass
		Direction ②	70N Min.	2P	24	N	89.45	101.5	81.9	6.10	71.15	Pass
				4P	24	N	96.65	111.2	80.0	8.42	71.39	Pass
				7P	12	N	103.14	114.1	96.7	4.44	89.82	Pass
		Direction ③	70N Min.	2P	24	N	135.74	152.1	107.6	15.91	88.01	Pass
				4P	24	N	224.73	288.1	185.9	28.39	139.56	Pass
				7P	12	N	324.81	366.8	225.7	37.04	213.69	Pass
		Direction ④	70N Min.	2P	24	N	100.62	119.3	88.5	8.61	74.79	Pass
				4P	24	N	251.97	296.4	137.9	30.98	159.03	Pass
				7P	12	N	436.23	506.1	385.5	39.19	318.66	Pass
18	PCB insertion force	50N Max.	2P	24	N	38.57	43.0	33.2	2.71	46.70	Pass	
			4P	24	N	37.94	42.5	33.2	2.35	44.99	Pass	
			7P	12	N	36.44	41.5	33.1	2.82	44.90	Pass	

Table 3-1 Environmental Performances Result list (7P)

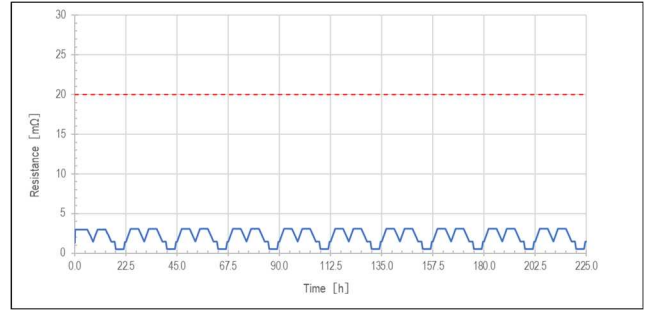
Item	Test name	Requirements	n	Unit	Avg.	Max.	Min.	s	Avg.±3s	Judge.	
1	Terminal and Housing appearance	No detrimental deformation	12	-	No detrimental deformation					Pass	
	Terminal retention force	30N Min.	28	N	51.05	57.4	44.5	3.42	40.79	Pass	
	Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.276	0.48	0.13	0.078	0.510	Pass
		(b)3A	3mV/A Max.	35	mV/A	0.286	0.49	0.12	0.106	0.604	Pass
	Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.250	0.38	0.14	0.066	0.448	Pass
		(b)1mA	3mΩ Max.	35	mΩ	0.336	0.55	0.11	0.129	0.723	Pass
	Temperature rise	Single pole	ΔT=40°C Max.	5	°C	18.93	19.4	18.6	0.32	19.89	Pass
All poles		ΔT=40°C Max.	5	°C	18.30	19.0	17.1	0.76	20.58	Pass	
2	Terminal and Housing appearance	No detrimental deformation	12	-	No detrimental deformation					Pass	
	Terminal retention force	30N Min.	28	N	51.94	58.8	47.3	2.91	43.21	Pass	
	Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.307	0.54	0.17	0.079	0.544	Pass
		(b)3A	3mV/A Max.	35	mV/A	0.217	0.45	0.11	0.087	0.478	Pass
	Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.212	0.34	0.11	0.064	0.404	Pass
		(b)1mA	3mΩ Max.	35	mΩ	0.294	0.57	0.11	0.117	0.645	Pass
	Temperature rise	Single pole	ΔT=40°C Max.	5	°C	18.55	19.4	17.6	0.73	20.74	Pass
All poles		ΔT=40°C Max.	5	°C	17.03	18.0	15.2	1.33	21.02	Pass	
3	Terminal and Housing appearance	No detrimental deformation	12	-	No detrimental deformation					Pass	
	Terminal retention force	30N Min.	28	N	53.32	60.5	49.6	2.5	45.82	Pass	
	Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.830	1.03	0.64	0.103	1.139	Pass
		(b)3A	3mV/A Max.	35	mV/A	0.721	0.95	0.54	0.107	1.042	Pass
	Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.606	0.98	0.19	0.192	1.182	Pass
		(b)1mA	3mΩ Max.	35	mΩ	0.648	1.11	0.26	0.193	1.227	Pass
	Temperature rise	Single pole	ΔT=40°C Max.	5	°C	18.88	20.2	18.0	0.89	21.55	Pass
All poles		ΔT=40°C Max.	5	°C	17.40	18.0	16.3	0.69	19.47	Pass	
4	Resistance variation	20mΩ Max.	5	mΩ	8.738	9.16	8.41	0.288	9.602	Pass	
	Terminal and Housing appearance	No detrimental deformation	12	-	No detrimental deformation					Pass	
	Terminal retention force	30N Min.	28	N	53.36	59.2	47.5	2.94	44.54	Pass	
	Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.649	1.02	0.49	0.127	1.030	Pass
		(b)3A	3mV/A Max.	35	mV/A	0.845	1.01	0.65	0.105	1.160	Pass
	Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.478	0.81	0.24	0.133	0.877	Pass
		(b)1mA	3mΩ Max.	35	mΩ	0.522	0.88	0.27	0.175	1.047	Pass
	Insulation resistance	between (a) terminals	100MΩ Min.	12	MΩ	237MΩ Min.					Pass
		between (b) terminal and earth	100MΩ Min.	12	MΩ	41,800MΩ Min.					Pass
	Dielectric withstanding voltage	between (a) terminals	No insulation breakdown or erosion	12	-	No insulation breakdown or erosion					Pass
		between (b) terminal and earth	No insulation breakdown or erosion	12	-	No insulation breakdown or erosion					Pass
	Leak current	3mA Max.	12	mA	0.01mA Max.					Pass	
	Resistance variation	20mΩ Max.	5	mΩ	3.133	3.35	2.95	0.152	3.589	Pass	
	5	Terminal and Housing appearance	No detrimental deformation	12	-	No detrimental deformation					Pass
Terminal retention force		30N Min.	28	N	52.52	56.6	48.0	2.14	46.10	Pass	
Voltage drop		(a)1A	3mV/A Max.	35	mV/A	0.859	1.07	0.67	0.108	1.183	Pass
		(b)3A	3mV/A Max.	35	mV/A	0.719	1.05	0.49	0.162	1.205	Pass
Dry circuit resistance		(a)10mA	3mΩ Max.	35	mΩ	0.864	1.11	0.65	0.116	1.212	Pass
		(b)1mA	3mΩ Max.	35	mΩ	0.870	1.07	0.70	0.093	1.149	Pass
Insulation resistance		between (a) terminals	100MΩ Min.	12	MΩ	100,000MΩ Min.					Pass
		between (b) terminal and earth	100MΩ Min.	12	MΩ	100,000MΩ Min.					Pass
Dielectric withstanding voltage		between (a) terminals	No insulation breakdown or erosion	12	-	No insulation breakdown or erosion					Pass
		between (b) terminal and earth	No insulation breakdown or erosion	12	-	No insulation breakdown or erosion					Pass
Leak current		3mA Max.	12	mA	0.01mA Max.					Pass	
Resistance variation		20mΩ Max.	5	mΩ	3.064	3.60	2.87	0.302	3.970	Pass	
6		Terminal and Housing appearance	No detrimental deformation	5	-	No detrimental deformation					Pass
		Terminal crimp strength	40N Min.	10	N	74.18	77.9	68.8	3.19	64.61	Pass
	Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.502	1.09	0.15	0.186	1.060	Pass
		(b)3A	3mV/A Max.	35	mV/A	0.485	1.12	0.28	0.198	1.079	Pass
	Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.521	0.91	0.32	0.157	0.992	Pass
		(b)1mA	3mΩ Max.	35	mΩ	0.521	0.95	0.32	0.171	1.034	Pass

Table 3-2 Environmental Performances Result list (7P)

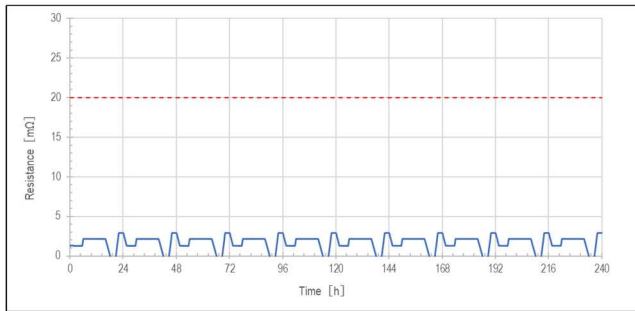
Item	Test name	Requirements	n	Unit	Avg.	Max.	Min.	s	Avg.±3s	Judge.		
7	Mechanical vibration I	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Voltage drop	(a)1A	3mV/A Max.	112	mV/A	0.500	0.87	0.11	0.233	1.199	Pass
			(b)3A	3mV/A Max.	112	mV/A	0.650	1.30	0.31	0.187	1.211	Pass
		Dry circuit resistance	(a)10mA	3mΩ Max.	112	mΩ	0.353	1.07	0.10	0.197	0.944	Pass
			(b)1mA	3mΩ Max.	112	mΩ	0.423	1.23	0.10	0.245	1.158	Pass
		Temperature rise	Single pole	ΔT=40°C Max.	5	°C	18.68	19.6	17.5	0.78	21.02	Pass
	All poles		ΔT=40°C Max.	5	°C	17.60	17.9	16.8	0.46	18.98	Pass	
	Mechanical vibration II	Short break monitor	Not exceed 1μs and 7Ω		Not exceed 1μs and 7Ω						Pass	
		Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Voltage drop	(a)1A	3mV/A Max.	56	mV/A	0.610	0.86	0.45	0.079	0.847	Pass
			(b)3A	3mV/A Max.	56	mV/A	0.498	0.73	0.40	0.071	0.711	Pass
		Dry circuit resistance	(a)10mA	3mΩ Max.	56	mΩ	0.783	0.94	0.59	0.066	0.981	Pass
(b)1mA			3mΩ Max.	56	mΩ	0.804	0.99	0.65	0.067	1.005	Pass	
Temperature rise	Single pole	ΔT=40°C Max.	5	°C	19.36	20.3	18.6	0.62	21.22	Pass		
	All poles	ΔT=40°C Max.	5	°C	16.47	17.4	15.2	0.87	19.08	Pass		
8	Mechanical shock I	Short break monitor	Not exceed 1μs and 7Ω		Not exceed 1μs and 7Ω						Pass	
		Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Voltage drop	(a)1A	3mV/A Max.	56	mV/A	0.522	0.81	0.31	0.140	0.942	Pass
	(b)3A		3mV/A Max.	56	mV/A	0.442	0.63	0.27	0.110	0.772	Pass	
	Mechanical shock II	Short break monitor	Not exceed 1μs and 7Ω		Not exceed 1μs and 7Ω						Pass	
		Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
Voltage drop		(a)1A	3mV/A Max.	56	mV/A	1.312	1.68	1.21	0.101	1.615	Pass	
	(b)3A	3mV/A Max.	56	mV/A	1.010	1.55	0.78	0.146	1.448	Pass		
9	Over current	Short break monitor	Not exceed 1μs and 7Ω		Not exceed 1μs and 7Ω						Pass	
		Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Voltage drop	(a)1A	3mV/A Max.	5	mV/A	0.484	0.59	0.41	0.078	0.718	Pass
			(b)3A	3mV/A Max.	5	mV/A	0.386	0.46	0.32	0.056	0.554	Pass
		Dry circuit resistance	(a)10mA	3mΩ Max.	5	mΩ	0.411	0.48	0.36	0.049	0.558	Pass
			(b)1mA	3mΩ Max.	5	mΩ	0.432	0.52	0.39	0.060	0.612	Pass
10	Vibration with temperature change	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Terminal retention force	30N Min.		35	N	53.07	64.4	46.8	4.21	40.44	Pass
		Voltage drop	(a)1A	3mV/A Max.	84	mV/A	1.012	1.24	0.74	0.090	1.282	Pass
			(b)3A	3mV/A Max.	84	mV/A	0.590	1.57	0.23	0.184	1.142	Pass
		Dry circuit resistance	(a)10mA	3mΩ Max.	84	mΩ	0.436	1.74	0.12	0.249	1.183	Pass
			(b)1mA	3mΩ Max.	84	mΩ	0.263	1.31	0.11	0.155	0.728	Pass
		Insulation resistance	between (a) terminals	100MΩ Min.		5	MΩ	100,000MΩ Min.				Pass
			between (b) terminal and earth	100MΩ Min.		5	MΩ	100,000MΩ Min.				Pass
		Dielectric withstanding voltage	between (a) terminals	No insulation breakdown or erosion		5	-	No insulation breakdown or erosion				Pass
			between (b) terminal and earth	No insulation breakdown or erosion		5	-	No insulation breakdown or erosion				Pass
		Temperature rise	Single pole	ΔT=40°C Max.	5	°C	15.91	16.5	15.3	0.5	17.41	Pass
			All poles	ΔT=40°C Max.	5	°C	17.32	17.9	16.9	0.47	18.73	Pass
Leak current	3mA Max.		5	mA	0.01mA Max.				Pass			
Short break monitor	Not exceed 1μs and 7Ω		5	-	Not exceed 1μs and 7Ω						Pass	
11	Condensation	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Insulation resistance	between (a) terminals	100MΩ Min.		12	MΩ	100,000MΩ Min.				Pass
			between (b) terminal and earth	100MΩ Min.		12	MΩ	100,000MΩ Min.				Pass
		Leak current	3mA Max.		12	mA	0.01mA Max.				Pass	
12	Rush current (a)	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.411	0.80	0.21	0.128	0.795	Pass
			(b)3A	3mV/A Max.	35	mV/A	0.392	1.09	0.11	0.192	0.968	Pass
		Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.293	0.70	0.19	0.130	0.683	Pass
			(b)1mA	3mΩ Max.	35	mΩ	0.332	0.69	0.20	0.132	0.728	Pass
		Temperature rise	Single pole	ΔT=40°C Max.	5	°C	17.81	19.8	14.9	2.37	24.92	Pass
	All poles		ΔT=40°C Max.	5	°C	18.44	20.1	16.7	1.36	22.52	Pass	
	Rush current (b)	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.348	0.84	0.23	0.132	0.744	Pass
			(b)3A	3mV/A Max.	35	mV/A	0.452	0.78	0.15	0.140	0.872	Pass
		Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.285	0.64	0.15	0.124	0.657	Pass
			(b)1mA	3mΩ Max.	35	mΩ	0.234	0.81	0.11	0.153	0.693	Pass
Temperature rise		Single pole	ΔT=40°C Max.	5	°C	18.44	21.1	16.5	1.88	24.08	Pass	
All poles	ΔT=40°C Max.	5	°C	18.50	19.3	17.5	0.77	20.81	Pass			
13	High temperature operability	Insert terminal into housing	No breaking, damage etc.		No breaking, damage etc.						Pass	
14	Resistance to stress corrosion	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Terminal crimp strength	40N Min.		5	N	69.76	75.3	63.9	4.75	55.51	Pass
15	Current cycle	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Terminal retention force	30N Min.		28	N	52.28	58.6	49.1	2.74	44.06	Pass
		Terminal crimp strength	40N Min.		10	N	73.64	77.1	70.4	2.48	66.20	Pass
		Voltage drop	(a)1A	3mV/A Max.	35	mV/A	0.849	1.06	0.73	0.065	1.044	Pass
			(b)3A	3mV/A Max.	35	mV/A	0.434	0.65	0.33	0.068	0.638	Pass
		Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.553	0.86	0.23	0.138	0.967	Pass
			(b)1mA	3mΩ Max.	35	mΩ	0.585	0.91	0.27	0.136	0.993	Pass
		Temperature rise	Single pole	ΔT=40°C Max.	5	°C	18.12	18.9	17.3	0.76	20.40	Pass
All poles	ΔT=40°C Max.		5	°C	15.99	16.8	14.9	0.76	18.27	Pass		
16	Sulfur dioxide gas	Terminal and Housing appearance	No detrimental deformation		No detrimental deformation						Pass	
		Dry circuit resistance	(a)10mA	3mΩ Max.	35	mΩ	0.593	0.91	0.48	0.094	0.875	Pass
(b)1mA	3mΩ Max.		35	mΩ	0.669	0.91	0.54	0.098	0.963	Pass		



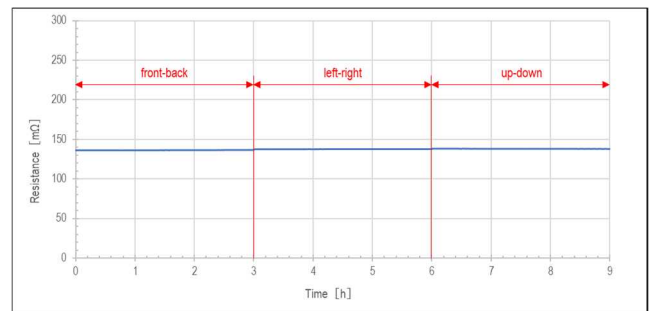
Graph 1 Thermal shock resistance variation



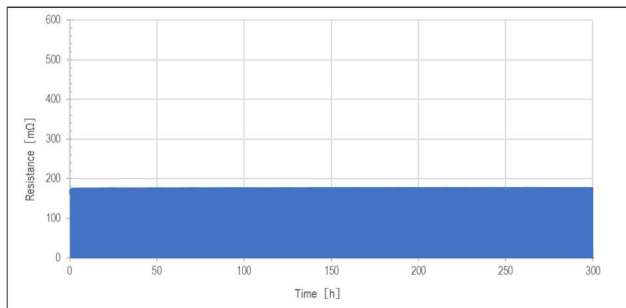
Graph 2 Temperature/humidity cycle I resistance variation



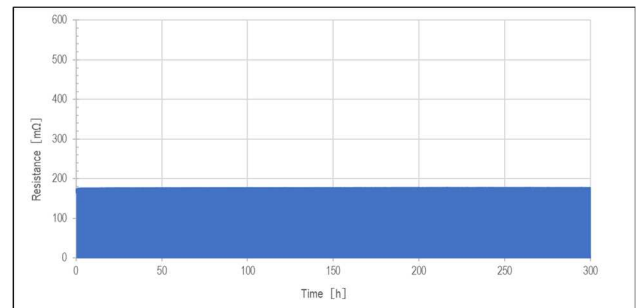
Graph 3 Temperature/humidity cycle II resistance variation



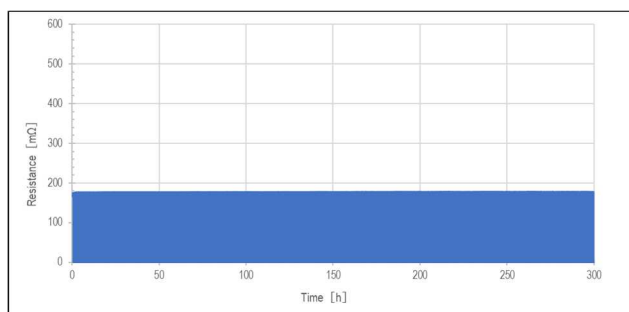
Graph 4 Mechanical vibration II resistance variation



Graph 5 Vibration with temperature change (front-back) resistance variation



Graph 6 Vibration with temperature change (left-right) resistance variation



Graph 7 Vibration with temperature change (up-down) resistance variation