ISH® CONNECTOR

ISH®V CONNECTOR

Evaluation of LV214

Test Report

0	RS0942	June 14, 2023	Y. Nishimura	J. Mukunoki	J. Tateishi
Rev.	ECN	Date	Prepared by	Checked by	Approved by

1. Purpose

Evaluation test is conducted to verify performance of ISH and ISHV Connector.

Test is in compliance with LV214.

2. Observation

All test items have satisfied the requirements.

※Tests are omitted for PG2,PG3,PG4,PG5,PG8,PG9,PG10,PG12,PG15,PG16,PG17,PG18,PG19,PG21and PG22 as these tests were conducted for 20P Connector.

3. Sample

Pole	TYPE	PARTS No.			
		MALE ASS'Y	FEMALE HOUSING	RETAINER	FEMALE TERMINAL
8P	Vertical	V0026-008E-002	V0027-91008-211	V0116-92008-01	VT009-01
10P		V0019-010E-002	V0020-91010-211	V0020-92010-211	
20P		V0019-020E-002	V0020-91020-211	V0020-92020-211	
26P		V0019-026E-002	V0020-91026-211	V0020-92026-211	
12P	Horizontal	V0025-012E-001	V0027-91012-211	V0027-92012-211	
16P		V0025-016E-001	V0027-91016-211	V0027-92016-211	

4. Test Result

See List of Results, Table 1 to 16, Graphs 1 to 26.

Table 1. ISH20P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG0	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	5	100	3.601	4.32	2.90	0.259	Pass
	E0.2.1	Contact resistance in contact area	10mΩMax	5	100	3.393	4.14	2.67	0.273	Pass
	E0.2.2	Contact resistance in line connection area	10mΩMax	5	100	0.208	0.43	0.08	0.071	Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	100MΩ Min				Pass
PG2	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E2.1	Material test of contact parts	—	1	1	See attachment 1				Pass
PG3	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E3.1	Material test of housing	—	1	1	See attachment 2				—
	E3.2	Markings on the surface	No abnormalities	1	1	No abnormalities				Pass
PG4	E4.1	Contact engagement length	Contact engagement length >1.00mm	1	1	See attachment 3				Pass
			clearance >0mm	1	1	See attachment 3				Pass
PG5	E0.1	Visual Inspection	No abnormalities	-	30	No abnormalities				Pass
	E5.1	Contact opening dimension in the unused condition	—	-	30	0.298	0.31	0.29	0.006	—
	B5.1	One half of all test batches is inserted and disconnected 5 time before further loading	—	-	30	0.302	0.31	0.29	0.006	—
	E5.2	Normal contact force	—	-	5	3.968	4.07	3.86	0.088	—
	B5.2	All DUTs of test are inserted	—	-	25	—				—
	B5.3	Aging in dry heat , inserted	—	-	25	—				—
	E0.1	Visual Inspection	No abnormalities	-	30	No abnormalities				Pass
	E5.1	Contact opening dimension 1H	—	-	5	0.310	0.32	0.30	0.007	—
		Contact opening dimension 100H	—	-	5	0.310	0.32	0.30	0.007	—
		Contact opening dimension 200H	—	-	5	0.312	0.32	0.31	0.004	—
		Contact opening dimension 500H	—	-	5	0.314	0.32	0.31	0.005	—
		Contact opening dimension 1000H	—	-	5	0.320	0.32	0.32	0.000	—
	E5.1 (after insert/ remove)	Contact opening dimension 1H	—	-	5	0.310	0.31	0.31	0.000	—
		Contact opening dimension 100H	—	-	5	0.310	0.32	0.30	0.007	—
		Contact opening dimension 200H	—	-	5	0.312	0.31	0.31	0.004	—

Table 2. ISH20P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG5	E5.1 (after insert/ remove)	Contact opening dimension 500H	—	-	5	0.306	0.31	0.30	0.005	—
		Contact opening dimension 1000H	—	-	5	0.316	0.31	0.30	0.005	—
	E5.2	Normal contact force 1H	—	-	5	3.266	3.73	3.05	0.277	—
		Normal contact force 100H	—	-	5	2.914	3.42	2.49	0.349	—
		Normal contact force 200H	—	-	5	2.656	3.32	2.33	0.394	—
		Normal contact force 500H	—	-	5	2.964	3.21	2.48	0.302	—
		Normal contact force 1000H	—	-	5	2.820	3.01	2.64	0.185	—
	E5.2 (after insert/ remove)	Normal contact force 1H	—	-	5	3.154	3.37	2.95	0.151	—
		Normal contact force 100H	—	-	5	2.836	3.16	2.46	0.274	—
		Normal contact force 200H	—	-	5	2.666	2.96	2.17	0.330	—
		Normal contact force 500H	—	-	5	3.246	3.53	2.80	0.326	—
		Normal contact force 1000H	—	-	5	2.642	2.79	2.39	0.156	—
PG6	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.2	Actuation forces for secondary lock	10N Min	5	40	No abnormalities				Pass
	E6.4	Actuation forces of secondary lock	10～50N	5	5	11.52	14.2	10.2	1.55	Pass
			50 Max	5	5	11.108	13.80	9.54	1.679	Pass
	E6.1	Drop Shock	No abnormalities	5	5	No abnormalities				Pass
PG7	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E7.2	Retention force of housing latch / lock Connector without contact 1mm change	—	5	5	33.99	43.3	23.0	7.82	Pass
		Retention force of housing latch /lock Connector without contact Max force	80N Min	5	5	147.53	150.3	142.2	2.28	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG8	E0.1	Visual Inspection	No abnormalities	2	2	No abnormalities				Pass
	E8.1	Determination of the Contact parts in the housing	15N Max	2	20	2.512	3.65	1.85	0.488	Pass
	E8.2	Contact removal force from the housing	30N Min	2	20	39.13	44.8	37.1	1.89	Pass
			60N Min	2	20	83.96	85.3	78.8	1.38	Pass
	E0.1	Visual Inspection	No abnormalities	2	2	No abnormalities				Pass
PG9	E9.2	Max. possible insertion inclination Direction X	—	1	1	See attachment 4				—
		Max. possible insertion inclination Direction Y	—	1	1	See attachment 4				—

Table 3. ISH20P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG9	E9.3	Examination of housing for scoop-proofing	—	1	1	See attachment 5				Pass
PG10	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E10.1	Conductor Pull-out strength	50N Min	-	10	79.92	82.2	78.1	1.30	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG11	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E11.1	Insertion and removal forces ,mating cycle frequency	Insertion force must be 25% or less of the initial value	5	5	25% Max				Pass
			Test Method	-	-	See Photo 1 and 2 for Test Method				—
			Iuitial insertion force	5	5	27.54	29.0	26.4	1.07	Pass
			After 20 cycles	5	5	33.12	34.8	31.3	1.40	Pass
			No damage to contact plating	5	5	No damage				Pass
PG12	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E12.1	Current excess temperature without housing	single pin: 30℃ Max	5	5	16.372	16.82	15.9	0.293	Pass
	E12.2	Derating without housing	—	5	5	See Graphs 1				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG13	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E13.1	Current excess temperature with housing	All pins: 30℃ Max	5	5	10.820	10.98	10.62	0.183	Pass
	E13.2	Derating with housing	—	5	5	See Graphs 2				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG14	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E14.1	Thermal time constant	—	5	5	When 100°C is attained at 2 times rated current See Graphs 3				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG15	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B15.1	The DUTs are inserted and disconnected 2 times	—	5	5	—				—
	E5.1	Contact opening dimension	—	5	100	0.300	0.30	0.30	0.000	Pass
	E0.2	Contact resistance	—	5	5	19.270	2.53	1.52	0.197	Pass
	E12.2	Derating	—	5	5	See Graphs 4				—
	E14.0	Continuous contact resistance during B15.2 with test current	—	5	5	See Graphs 5				Pass
	B15.2	Temperature cycle endurance test/ current cycle endurance test	—	5	5	—				—
	B15.3	Humid heat, cyclic	—	5	5	—				—
	E14.0	Continuous contact resistance during B15.2 with test current	—	5	5	See Graphs 6				Pass
	B15.2	Temperature cycle endurance test/ current cycle endurance test	—	5	5	—				—
	E0.2	Contact resistance	20mΩ Max	5	100	4.959	11.18	1.99	1.538	Pass
	E5.1	Contact opening dimension	—	5	100	0.316	0.32	0.30	0.006	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 4. ISH20P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG16	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E16.0	Contact resistance, continuous monitoring B16.1,recording, and storing	Verify no. of cycles to attain 300mΩ	5	5	See Graphs 7				Pass
	B16.1	Friction load	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG17	E0.1	Visual Inspection	No abnormalities	12	12	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	12	240	3.393	4.14	2.45	0.232	Pass
	E14.0	Continuous contact resistance during B17.2 with test current	—	12	12	See Graph 8				Pass
	B17.2	Dynamic load, broad-band random vibration	—	12	12	—				—
	E0.1	Visual Inspection	No abnormalities	12	12	No abnormalities				Pass
	E14.0	Continuous contact resistance during B17.3 with test current	—	12	12	See Graph 9				Pass
	B17.3	Endurance shock test	—	12	12	—				—
	E0.1	Visual Inspection	No abnormalities	12	12	No abnormalities				Pass
	E0.2	Contact resistance	20mΩ Max	12	240	5.923	8.35	3.63	1.076	Pass
	B17.4	Resonance frequency of the housing parts including contacts and lines under Sinusoidal vibration	—	12	12	See Graph 10				—
PG18A	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B18.1	The DUTs are inserted 2 times	—	5	5	—				—
	E0.2	Contact resistance	20mΩ Max	5	100	2.714	3.39	2.34	0.183	Pass
	B18.2	Salt spray,cyclic	—	5	5	—				—
	E0.2	Contact resistance	20mΩ Max	5	100	3.404	6.41	2.83	0.668	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG18C	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B18.1	The DUTs are inserted 2 times	—	5	5	—				—
	E0.2	Contact resistance	20mΩ Max	5	100	3.085	3.97	2.47	0.248	Pass
	B18.2	Salt spray,cyclic	—	5	5	—				—
	E0.2	Contact resistance	20mΩ Max	5	100	4.083	9.15	2.81	1.360	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG19	E0.1	Visual Inspection	No abnormalities	15	15	No abnormalities				Pass
	E0.2	Contact resistance Group 1	10mΩ Max	5	100	3.221	3.95	2.14	0.443	Pass
		Contact resistance Group 2	10mΩ Max	5	100	2.869	3.59	1.74	0.362	Pass
		Contact resistance Group 3	10mΩ Max	5	100	3.014	3.93	2.38	0.376	Pass

Table 5. ISH20P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG19	B19.0	Inserting and removing groups according to Table8	—	15	15	—				—
	E0.2	Contact resistance Group 1	20mΩ Max	5	100	7.357	8.49	6.19	0.703	Pass
		Contact resistance Group 2	20mΩ Max	5	100	7.015	7.91	5.65	0.615	Pass
		Contact resistance Group 3	20mΩ Max	5	100	7.258	8.57	6.36	0.622	Pass
	E14.0	Continuous contact resistance during B19.1 with test current	—	10	10	See Graph 11				Pass
	B19.1	Temperature shock	—	15	15	—				—
	E14.0	Continuous contact resistance during B19.2 with test current	—	10	10	See Graph 12				Pass
	B19.2	Temperature cycle	—	15	15	—				—
	E14.0	Continuous contact resistance during B19.3 with test current	—	10	10	See Graph 13				Pass
	B19.3	Aging in dry heat	—	15	15	—				—
	E0.1	Visual Inspection	No abnormalities	15	15	No abnormalities				Pass
	B19.4	Industrial climate	—	15	15	—				—
	E14.0	Continuous contact resistance during B19.5 with test current	—	10	10	See Graph 14				Pass
	B19.5	Humid heat, cyclic	—	15	15	—				—
	E0.1	Visual Inspection	No abnormalities	15	15	No abnormalities				Pass
	E14.0	Continuous contact resistance during B19.6 with test current	—	10	10	See Graph 15				Pass
	B19.6	Dynamic load	—	15	15	—				—
	E14.0	Continuous contact resistance during B19.7 with test current	—	10	10	See Graph 16				Pass
	B19.7	Mech. Shocks	—	15	15	—				—
	B19.8	One-time disconnection and insertion	—	15	15	—				—
	E0.2	Contact resistance Group 1	20mΩ Max	5	100	2.979	7.40	1.97	0.757	Pass
		Contact resistance Group 2	20mΩ Max	5	100	6.849	16.95	2.40	2.738	Pass
		Contact resistance Group 3	20mΩ Max	5	100	8.184	16.59	2.56	3.404	Pass
	E0.1	Visual Inspection	No abnormalities	15	15	No abnormalities				Pass

Table 6. ISH20P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG20	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	B20.1	Aging in dry heat	—	5	5	—				—
	B20.2	Humid heat, constant	—	5	5	—				—
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.3	Low-temperature aging	—	5	5	—				—
	B21.1	Removal and insertion at -20℃	Must be able to insert/remove	5	5	Able to insert/remove				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.5	Aging in dry heat	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.1	Drop test	No abnormalities	5	5	No abnormalities				Pass
PG21	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	5	100	3.166	3.39	2.85	0.126	Pass
	B21.1	Long-term aging in dry heat	—	5	5	—				—
	E0.2	Contact resistance	20mΩMax	5	100	4.461	6.46	3.60	0.577	Pass
	E21.1	Functional test with both groups	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.1	Drop test	No abnormalities	5	5	No abnormalities				Pass
PG22A	E0.1	Visual Inspection	No abnormalities	15	15	No abnormalities				Pass
	PG22A	Insulation resistance Interior Cleaner	100MΩ Min	5	5	1,000MΩ Min				Pass
		Insulation resistance Glass Cleaner	100MΩ Min	5	5	1,000MΩ Min				Pass
		Insulation resistance Contact Spray	100MΩ Min	5	5	1,000MΩ Min				Pass
PG28	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B28.1	Aging	—	5	5	—				—
	E28.1	Locking noise	70dB Min	5	5	74.30	75.7	72.8	1.31	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 7. ISH26P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG0	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	5	130	3.703	4.30	2.22	0.381	Pass
	E0.2.1	Contact resistance in contact area	10mΩMax	5	130	3.477	4.00	1.62	0.398	Pass
	E0.2.2	Contact resistance in line connection area	10mΩMax	5	130	0.227	0.38	0.11	0.066	Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	100MΩ Min				Pass
PG6	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.2	Actuation forces for secondary lock	10N Min	5	52	No abnormalities				Pass
	E6.4	Actuation forces of secondary lock	10～50N	5	5	10.61	10.8	10.1	0.30	Pass
			50 Max	5	5	9.296	10.59	8.49	0.855	Pass
	E6.1	Drop Shock	No abnormalities	5	5	No abnormalities				Pass
PG7	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E7.2	Retention force of housing latch / lock Connector without contact 1mm change	—	5	5	19.09	39.8	13.3	8.44	—
		Retention force of housing latch /lock Connector without contact Max force	80N Min	5	5	148.67	152.5	143.5	2.89	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG11	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E11.1	Insertion and removal forces ,mating cycle frequency	Insertion force must be 25% or less of the initial value	5	5	25% Max				Pass
			Test Method	—	—	See Photo 1 and 2 for Test Method				—
			Iuitial insertion force	5	5	34.20	35.0	33.6	0.52	Pass
			After 20 cycles	5	5	41.82	43.5	40.5	1.14	Pass
			No damage to contact plating	5	5	No damage				Pass
PG13	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E13.1	Current excess temperature with housing	All pins: 30℃ Max	5	5	2.43	2.7	2.3	0.23	Pass
	E13.2	Derating with housing	—	5	5	See Graphs 17				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG14	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E14.1	Thermal time constant	—	5	5	When 100°C is attained at 2 times rated current See Graphs 18				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 8. ISH26P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG20	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	B20.1	Aging in dry heat	—	5	5	—				—
	B20.2	Humid heat, constant	—	5	5	—				—
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.3	Low-temperature aging	—	5	5	—				—
	B21.1	Removal and insertion at -20℃	Must be able to insert/remove	5	5	Able to insert/remove				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.5	Aging in dry heat	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.1	Drop test	No abnormalities	5	5	No abnormalities				Pass
PG28	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B28.1	Aging	—	5	5	—				—
	E28.1	Locking noise	70dB Min	5	5	86.20	87.2	85.2	2.23	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 9. ISH10P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG0	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	5	50	3.493	4.08	2.38	0.349	Pass
	E0.2.1	Contact resistance in contact area	10mΩMax	5	50	0.175	0.37	0.10	0.071	Pass
	E0.2.2	Contact resistance in line connection area	10mΩMax	5	50	3.319	3.92	2.18	0.301	Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	100MΩ Min				Pass
PG6	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.2	Actuation forces for secondary lock	10N Min	5	20	No abnormalities				Pass
	E6.4	Actuation forces of secondary lock	10～50N	5	5	11.12	12.8	10.3	0.97	Pass
			50 Max	5	5	10.234	11.00	9.35	0.682	Pass
	E6.1	Drop Shock	No abnormalities	5	5	No abnormalities				Pass
PG7	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E7.2	Retention force of housing latch / lock Connector without contact 1mm change	—	5	5	31.23	41.1	25.6	4.43	Pass
		Retention force of housing latch /lock Connector without contact Max force	80N Min	5	5	105.36	108.1	103.4	1.60	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG11	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E11.1	Insertion and removal forces ,mating cycle frequency	Insertion force must be 25% or less of the initial value	5	5	25% Max				Pass
			Test Method	—	—	See Photo 1 and 2 for Test Method				—
			Iuitial insertion force	5	5	12.72	13.0	12.5	0.22	Pass
			After 20 cycles	5	5	14.93	15.5	14.6	0.38	Pass
			No damage to contact plating	5	5	No damage				Pass
PG13	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E13.1	Current excess temperature with housing	All pins: 30℃ Max	5	5	9.64	9.9	9.3	0.29	Pass
	E13.2	Derating with housing	—	5	5	See Graphs 19				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG14	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E14.1	Thermal time constant	—	5	5	When 100°C is attained at 2 times rated current See Graphs 20				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 10. ISH10P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG20	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	B20.1	Aging in dry heat	—	5	5	—				—
	B20.2	Humid heat, constant	—	5	5	—				—
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.3	Low-temperature aging	—	5	5	—				—
	B21.1	Removal and insertion at -20℃	Must be able to insert/remove	5	5	Able to insert/remove				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.5	Aging in dry heat	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.1	Drop test	No abnormalities	5	5	No abnormalities				Pass
PG28	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B28.1	Aging	—	5	5	—				—
	E28.1	Locking noise	70dB Min	5	5	72.22	74.2	70.2	1.85	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 11. ISHV16P H-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG0	E0.1	Visual Inspection	No abnormalities	3	3	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	3	48	2.745	3.44	2.39	0.217	Pass
	E0.2.1	Contact resistance in contact area	10mΩMax	3	48	2.650	3.32	1.84	0.234	Pass
	E0.2.2	Contact resistance in line connection area	10mΩMax	3	48	0.195	0.29	0.11	0.029	Pass
	E0.3	Insulation resistance	100MΩ Min	3	3	1,000MΩ Min				Pass
PG6	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.2	Actuation forces for secondary lock	10N Min	5	80	No abnormalities				Pass
	E6.4	Actuation forces of secondary lock	10～50N	5	5	13.18	13.6	12.9	0.35	Pass
			50 Max	5	5	11.57	12.4	10.9	0.78	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG7	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E7.2	Retention force of housing latch / lock Connector without contact 1mm change	—	5	5	103.82	108.9	99.9	4.14	—
		Retention force of housing latch /lock Connector without contact Max force	80N Min	10	10	117.88	124.8	112.9	4.00	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG11	E0.1	Visual Inspection	No abnormalities	10	10	No abnormalities				Pass
	E11.1	Insertion and removal forces ,mating cycle frequency	Insertion force must be 25% or less of the initial value	10	10	25% Max				Pass
			Removal force must be 25% or less of the initial value	10	10	25% Max				Pass
			Iuitial insertion force	10	10	26.95	27.9	25.9	0.71	—
			After 20 cycles	10	10	26.36	27.2	25.2	0.71	—
			No damage to contact plating	10	10	No damage				Pass
PG13	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E13.1	Current excess temperature with housing	All pins: 30℃ Max	5	5	12.01	12.6	11.7	0.34	—
	E13.2	Derating with housing	—	5	5	See Graphs 21				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG14	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E14.1	Thermal time constant	—	5	5	When 100°C is attained at 1 times rated current See Graph22				*2
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

*2 The rated current determined in 6.35A is used.

Table 12. ISHV16P H-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG20	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	B20.1	Aging in dry heat	—	5	5	—				—
	B20.2	Humid heat, constant	—	5	5	—				—
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.3	Low-temperature aging	—	5	5	—				—
	B21.1	Removal and insertion at -20℃	Must be able to insert/remove	5	5	Able to insert/remove				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.5	Aging in dry heat	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.1	Drop test	No abnormalities	5	5	No abnormalities				Pass
PG28	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B28.1	Aging	—	5	5	—				—
	E28.1	Locking noise	70dB Min	5	5	74.83	76.4	73.8	1.38	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 13. ISHV12P H-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG0	E0.1	Visual Inspection	No abnormalities	3	3	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	3	36	2.577	3.79	2.16	0.336	Pass
	E0.2.1	Contact resistance in contact area	10mΩMax	3	36	2.381	3.59	2.03	0.065	Pass
	E0.2.2	Contact resistance in line connection area	10mΩMax	3	36	0.195	0.29	0.11	0.029	Pass
	E0.3	Insulation resistance	100MΩ Min	3	3	1,000MΩ Min				Pass
PG6	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.2	Actuation forces for secondary lock	10N Min	5	60	No abnormalities				Pass
	E6.4	Actuation forces of secondary lock	10～50N	5	5	15.63	15.9	15.3	0.30	Pass
			50 Max	5	5	11.48	12.4	10.5	0.97	Pass
	E6.1	Drop Shock	No abnormalities	5	5	No abnormalities				Pass
PG7	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E7.2	Retention force of housing latch / lock Connector without contact 1mm change	—	5	5	78.46	94.7	65.8	8.78	—
		Retention force of housing latch /lock Connector without contact Max force	80N Min	10	10	111.57	116.5	107.5	2.80	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG11	E0.1	Visual Inspection	No abnormalities	10	10	No abnormalities				Pass
	E11.1	Insertion and removal forces ,mating cycle frequency	Insertion force must be 25% or less of the initial value	10	10	25% Max				Pass
			Removal force must be 25% or less of the initial value	10	10	25% Max				Pass
			Iuitial insertion force	10	10	19.89	20.8	19.3	0.47	—
			After 20 cycles	10	10	20.02	21.1	19.0	0.60	—
			No damage to contact plating	10	10	No damage				Pass
PG13	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E13.1	Current excess temperature with housing	All pins: 30℃ Max	5	5	13.89	14.9	12.9	0.75	—
	E13.2	Derating with housing	—	5	5	See Graphs 23				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG14	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E14.1	Thermal time constant	—	5	5	When 100°C is attained at 1 times rated current See Graph 24				*2
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

*2 The rated current determined in 6.35A is used.

Table 14. ISHV12P H-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG20	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	B20.1	Aging in dry heat	—	5	5	—				—
	B20.2	Humid heat, constant	—	5	5	—				—
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.3	Low-temperature aging	—	5	5	—				—
	B21.1	Removal and insertion at -20℃	Must be able to insert/remove	5	5	Able to insert/remove				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.5	Aging in dry heat	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.1	Drop test	No abnormalities	5	5	No abnormalities				Pass
PG28	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B28.1	Aging	—	5	5	—				—
	E28.1	Locking noise	70dB Min	5	5	72.20	73.9	71.0	1.51	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

Table 15. ISHV8P V-Type List of Results

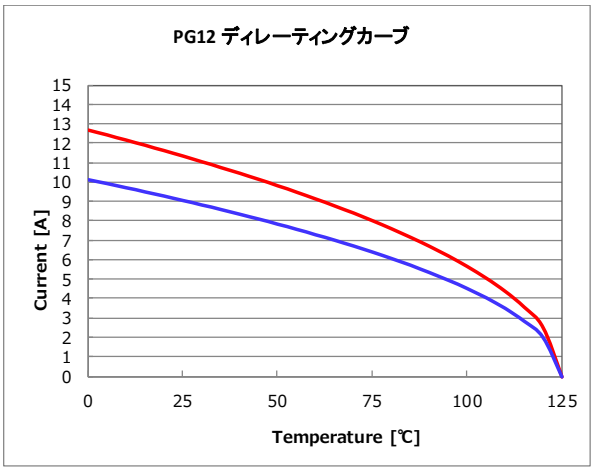
PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG0	E0.1	Visual Inspection	No abnormalities	3	3	No abnormalities				Pass
	E0.2	Contact resistance	10mΩ Max	3	24	2.907	3.21	2.56	0.154	Pass
	E0.2.1	Contact resistance in contact area	10mΩMax	3	24	2.650	3.32	1.84	0.234	Pass
	E0.2.2	Contact resistance in line connection area	10mΩMax	3	24	0.195	0.29	0.11	0.029	Pass
	E0.3	Insulation resistance	100MΩ Min	3	3	1,000MΩ Min				Pass
PG6	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.2	Actuation forces for secondary lock	10N Min	5	40	No abnormalities				Pass
	E6.4	Actuation forces of secondary lock	10～50N	5	5	11.98	12.7	10.6	1.17	Pass
			50 Max	5	5	6.654	7.13	6.09	0.527	Pass
	E6.1	Drop Shock	No abnormalities	5	5	No abnormalities				Pass
PG7	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E7.2	Retention force of housing latch / lock Connector without contact 1mm change	—	5	5	50.53	51.3	49.0	0.60	—
		Retention force of housing latch /lock Connector without contact Max force	80N Min	10	10	99.84	101.5	97.3	1.50	Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG11	E0.1	Visual Inspection	No abnormalities	10	10	No abnormalities				Pass
	E11.1	Insertion and removal forces ,mating cycle frequency	Insertion force must be 25% or less of the initial value	10	10	25% Max				Pass
			Removal force must be 25% or less of the initial value	10	10	25% Max				Pass
			Iuitial insertion force	10	10	16.16	16.7	15.5	0.36	—
			After 20 cycles	10	10	14.79	16.4	13.6	0.81	—
			No damage to contact plating	10	10	No damage				Pass
PG13	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E13.1	Current excess temperature with housing	All pins: 30℃ Max	5	5	19.07	20.0	18.4	0.67	—
	E13.2	Derating with housing	—	5	5	See Graphs 25				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
PG14	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E14.1	Thermal time constant	—	5	5	When 100°C is attained at 1 times rated current See Graph26				*2
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass

*2 The rated current determined in 6.39A is used.

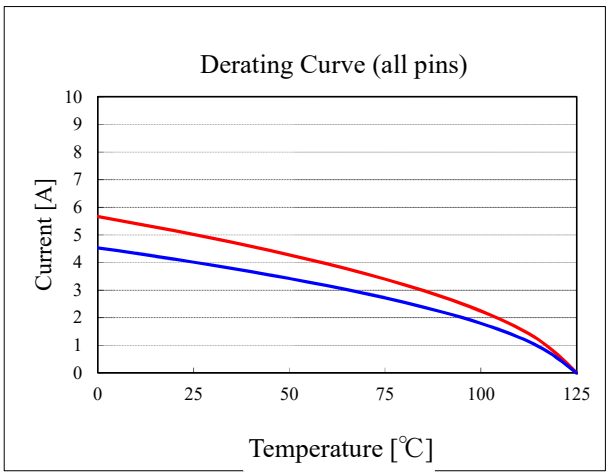
Table 16. ISHV8P V-Type List of Results

PG No.	Item		Requirements	Set	n	Data				Judge
						Ave.	Max.	Min.	σ	
PG20	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	B20.1	Aging in dry heat	—	5	5	—				—
	B20.2	Humid heat, constant	—	5	5	—				—
	E0.3	Insulation resistance	100MΩ Min	5	5	1,000MΩ Min				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.3	Low-temperature aging	—	5	5	—				—
	B21.1	Removal and insertion at -20℃	Must be able to insert/remove	5	5	Able to insert/remove				Pass
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B20.5	Aging in dry heat	—	5	5	—				—
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	E6.1	Drop test	No abnormalities	5	5	No abnormalities				Pass
PG28	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Pass
	B28.1	Aging	—	5	5	—				—
	E28.1	Locking noise	70dB Min	5	5	91.97	94.1	90.5	1.89	Psss
	E0.1	Visual Inspection	No abnormalities	5	5	No abnormalities				Psss

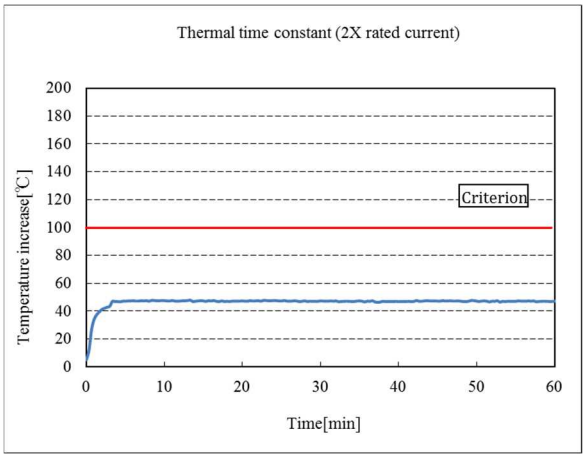
<ISH20P V-Type Monitoring Results of Evaluation Tests>



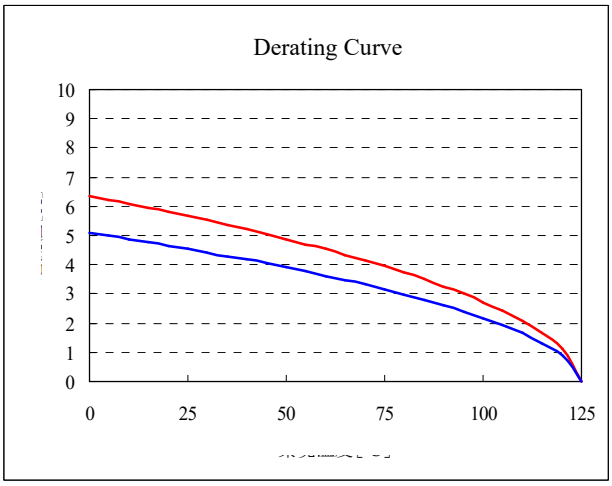
Graph 1. PG12 E12.1 Derating Curve without housing



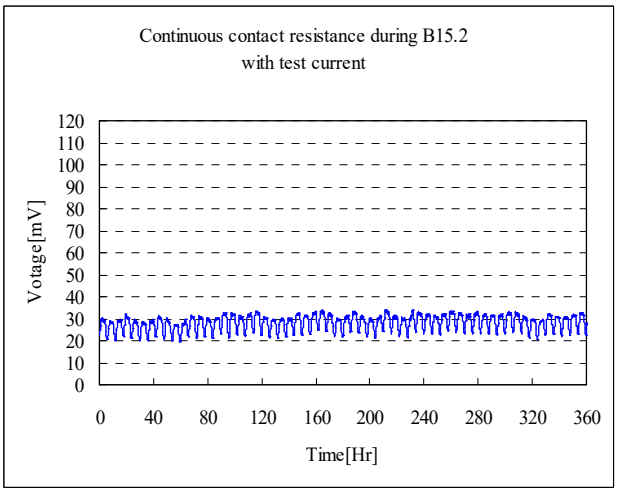
Graph 2. PG13 E13.2 Derating Curve with housing



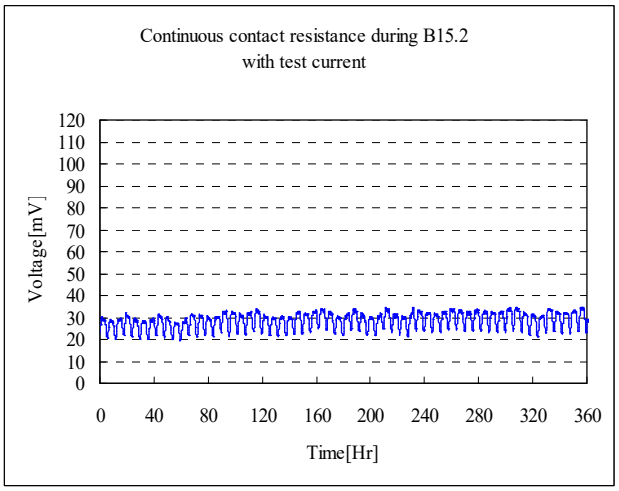
Graph 3. PG14 E14.1　Thermal time constant



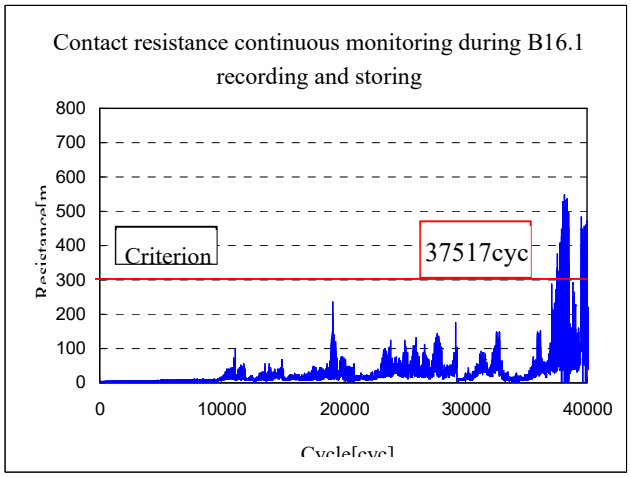
Graph 4. PG15 E12.2　Derating Curve



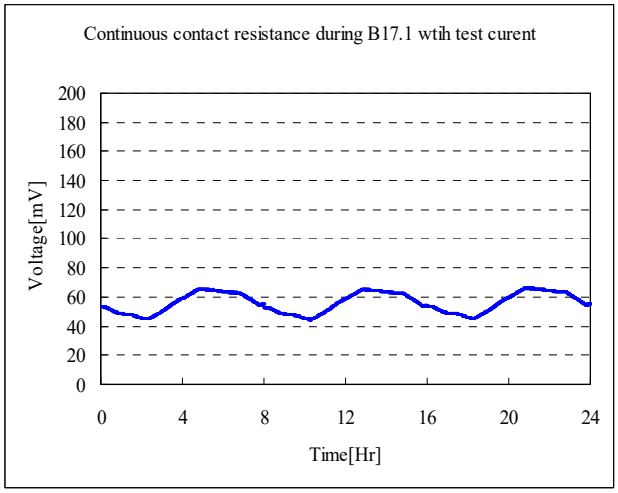
Graph 5. PG15 E14.0　Resistance Monitor



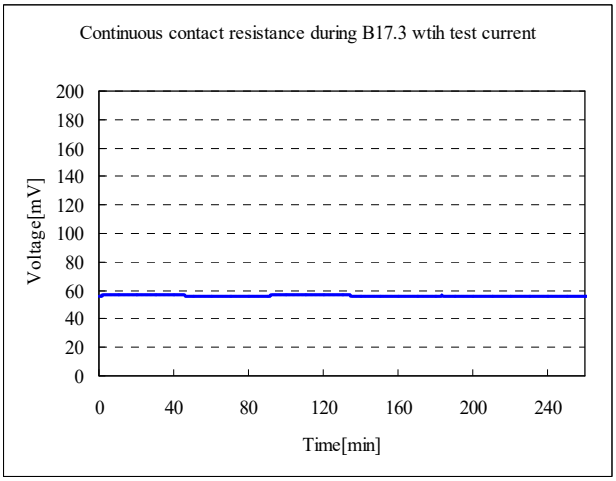
Graph 6. PG15 E14.0　Resistance Monitor



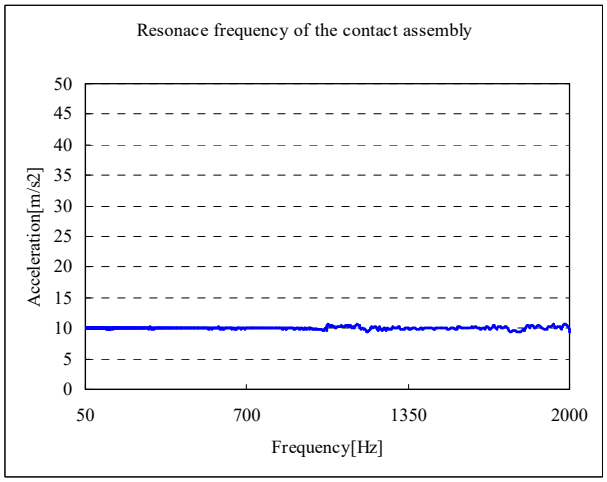
Graph 7. PG16 E16.0 Resistance Monitor



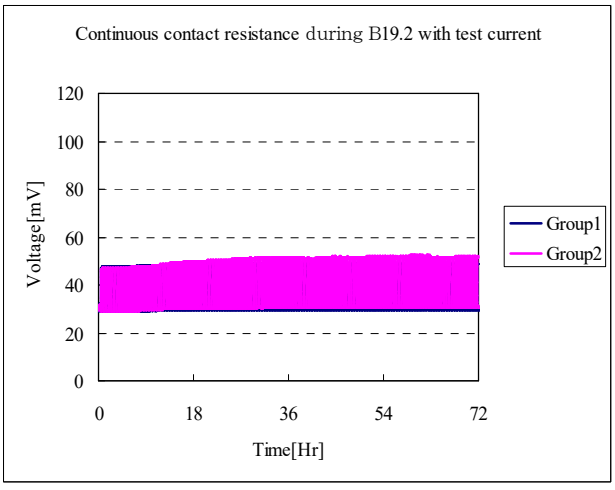
Graph 8. PG17 E14.0(B17.1) Resistance Monitor



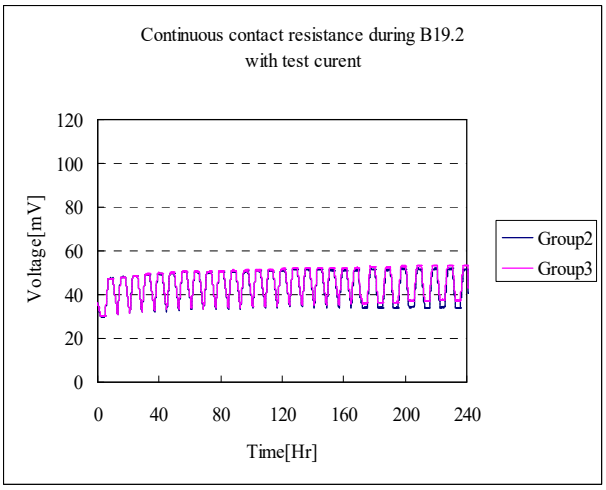
Graph 9. PG17 E14.0(B17.3) Resistance Monitor



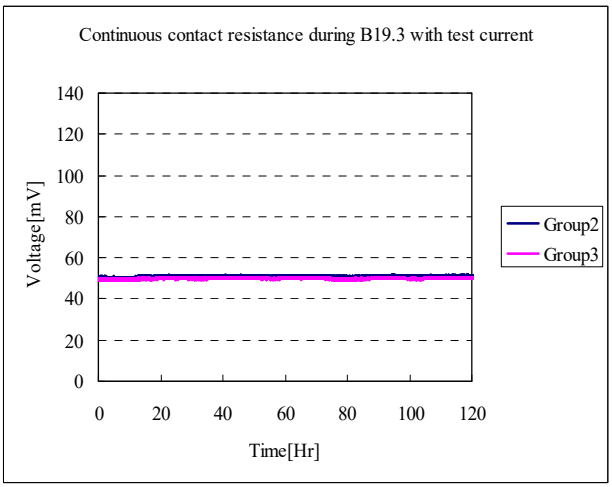
Graph 10. PG17 B17.4 Resistance Monitor



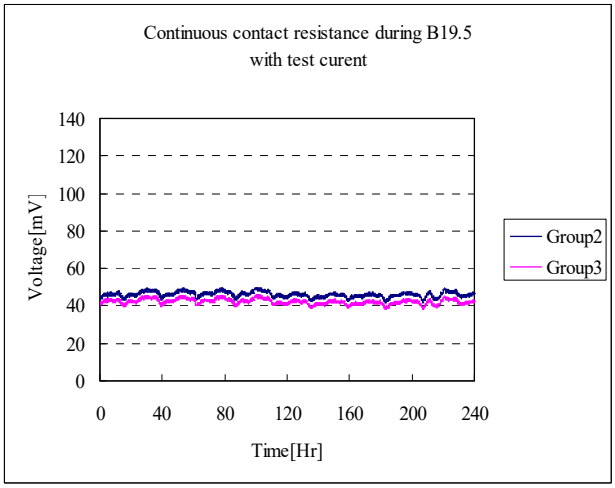
Graph 11. PG19 (E14.0) Resistance Monitor



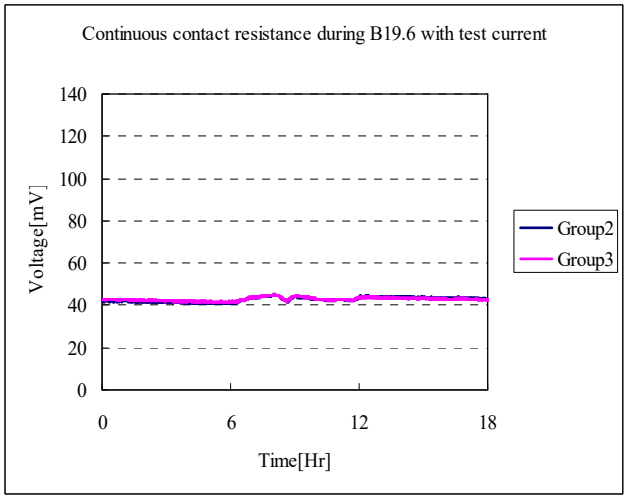
Graph 12. PG19 (E14.0) Resistance Monitor



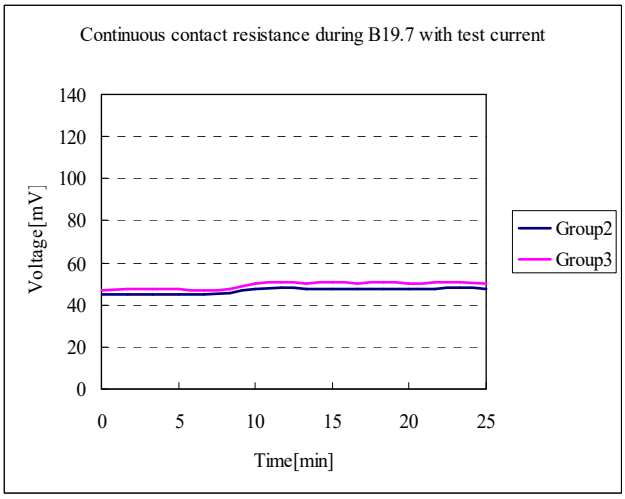
Graph 13. PG19 (E14.0)　Resistance Monitor



Graph 14. PG19 (E14.0)　Resistance Monitor

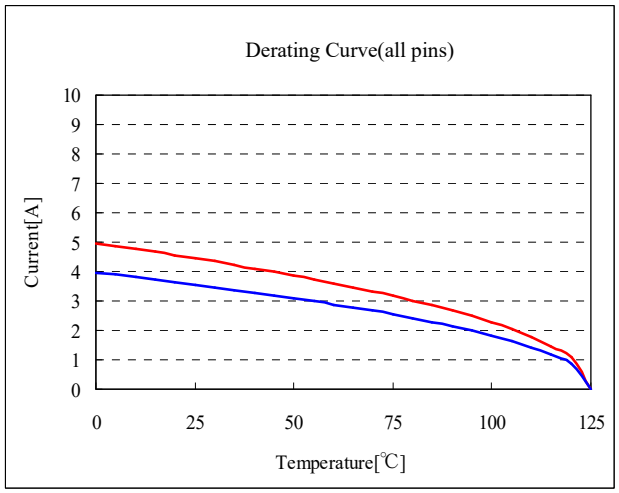


Graph 15. PG19 (E14.0)　Resistance Monitor

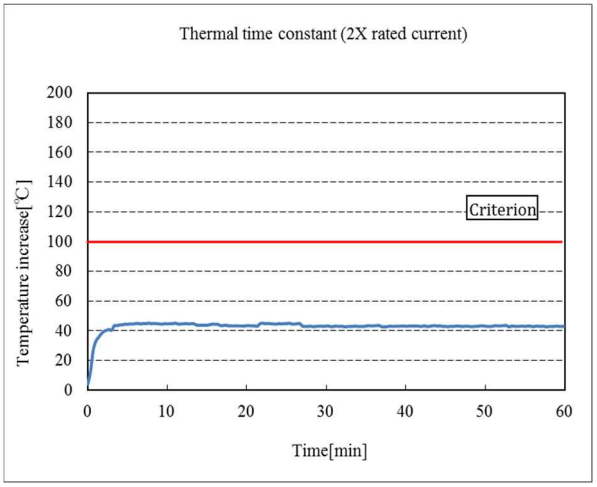


Graph 16. PG19 (E14.0)　Resistance Monitor

<ISH26P V-Type Monitoring Results of Evaluation Tests>



Graph 17. PG13 E13.2 Derating Curve



Graph 18. PG14 E14.1 Thermal time constant

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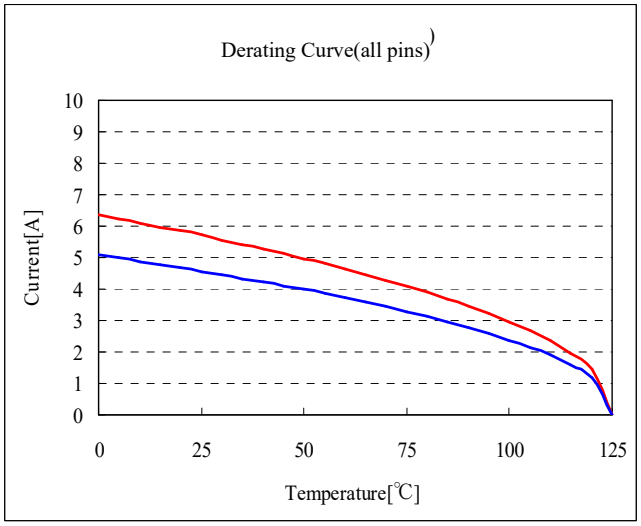
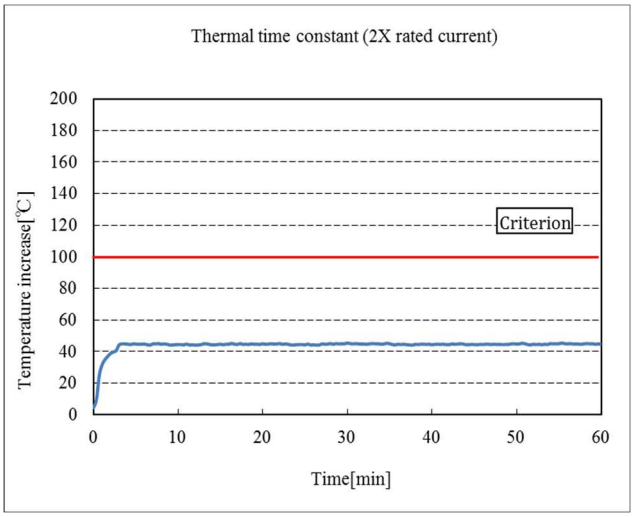


Graph 19. PG13 E13.2 Derating Curve



Graph 20. PG14 E14.1 Thermal time constant

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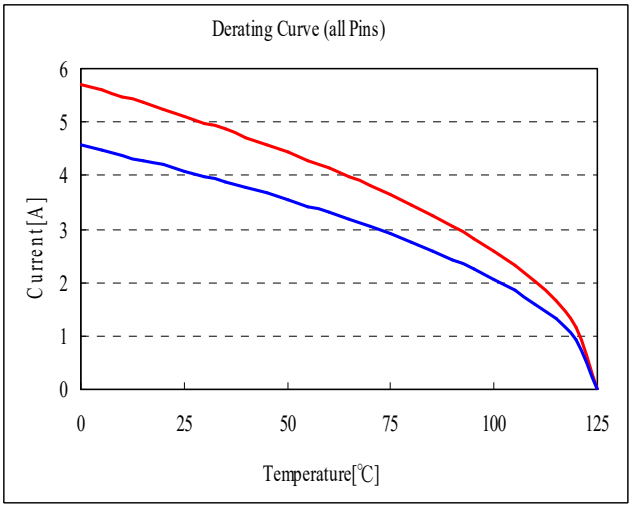
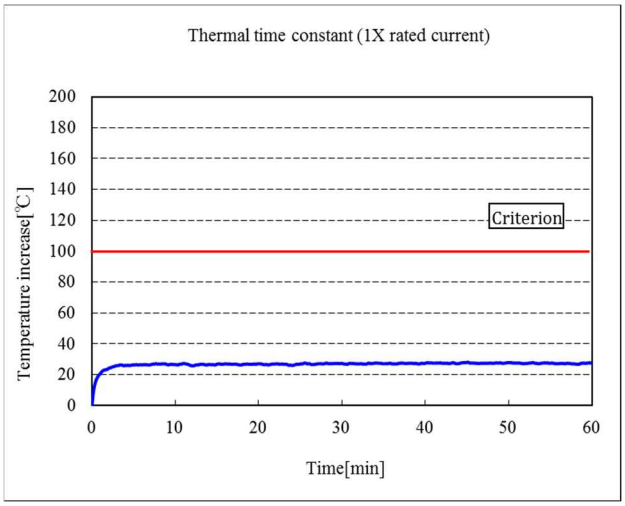


Graph 21. PG13 E13.2 Derating Curve



Graph 22. PG14 E14.1 Thermal time constant

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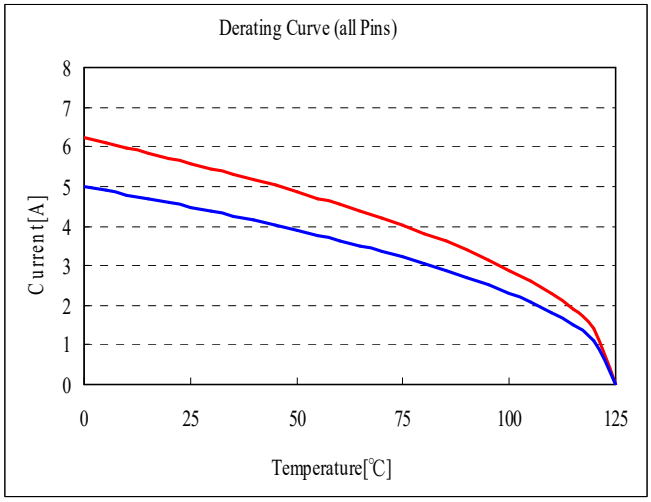
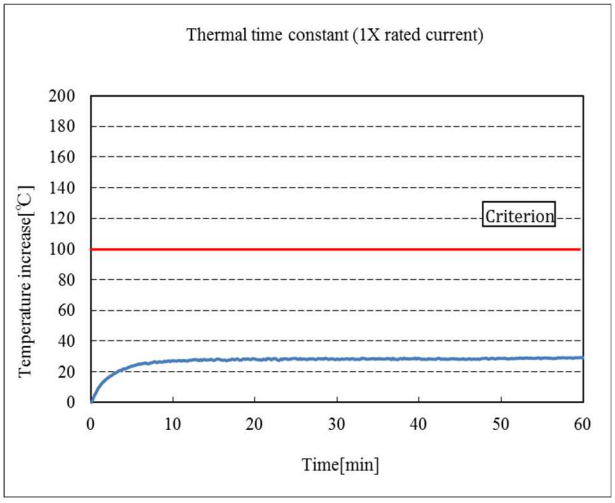
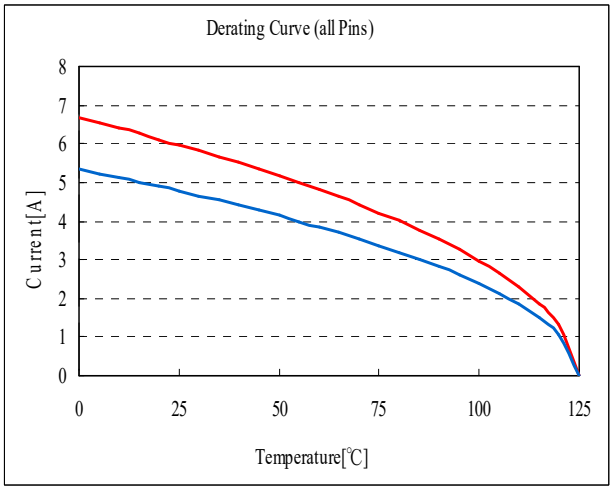


Graph 23. PG13 E13.2 Derating Curve

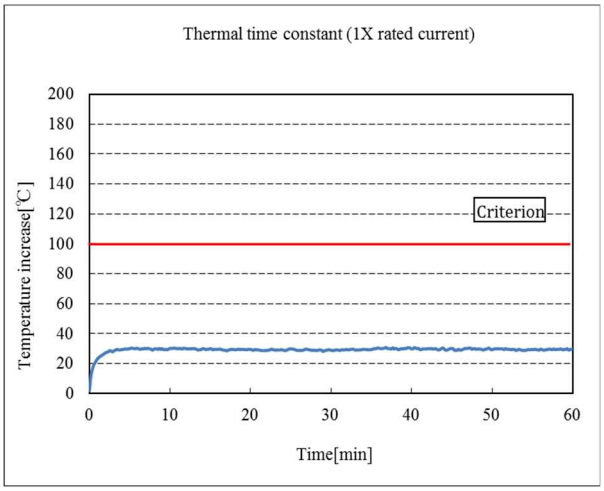


Graph 24. PG14 E14.1 Thermal time constant

<ISHV8P H-Type Monitoring Results of Evaluation Tests>



Graph 25. PG13 E13.2 Derating Curve



Graph 26. PG14 E14.1 Thermal time constant