



TEST REPORT		Issue No. R21-0613	Rev. 0
Customer:		Issue date: September 1, 2021	
Product Name: VH connector Header		Revision date:	

Purpose	As for adding the resin material of the wafer of the VH connector Header, the performance comparative evaluation between the current product and additional product (made of additional resin) shall be conducted.		
	Resin material manufacturer	Resin Part No.	
	Current product	Toray Industries, Inc.	CM3004V0
	Additional product	KINGFA	PA66-RNG00
Conclusion	As a result of comparative evaluation, it is judged that the performance of the additional product is equivalent to that of the current products.		

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1. SPECIMEN

Part Name		Part Number	Remak
Contact		SVH-21T-P1.1	—
Housing		VHR-*N	—
Header	Top entry type	B*P-VH (LF)(SN)	Current product Additional product
	Side entry type	S*P-VH (LF)(SN) B*PS-VH (LF)(SN)	Current product Additional product

Note₁: Number of circuits in one or two-digit figure is indicated in *.

2. TEST ITEMS

Test items	
4.1 Appearance	
4.2 Mechanical Performance Test	4.2.1 Insertion Force & Withdrawal Force
	4.2.2 Post Retention Force
4.3 Electrical Performance Test	4.3.1 Contact Resistance
	4.3.2 Current Continuity
	4.3.3 Insulation Resistance
	4.3.4 Dielectric Withstanding Voltage
4.4 Environmental Test	4.4.1 Durability
	4.4.2 Humidity
	4.4.3 Heat Aging
	4.4.4 Thermal Shock
	4.4.5 Hydrogen Sulfide Gas
	4.4.6 Salt Spray
	4.4.7 Vibration
4.5 Solder Test	4.5.1 Resistance to Soldering Heat

3. TEST CONDITION

- 1) Unless otherwise specified, tests shall be conducted under the following ambient conditions specified in JIS C 60068-1 (IEC 60068-1) [Basic Environmental Testing Procedures General and Guidance].

Temperature: 15 to 35°C
Relative humidity: 25 to 75%

- 2) For environmental tests, as a rule, the specimen assembled in the actual mounting state and the wire of UL 1007 AWG #18 shall be used.

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4. TEST METHODS & TEST RESULTS

4.1 Appearance

Test method: Visual inspection shall be conducted to check any defects such as crack, deformation, discoloration which may affect the performances.

Test result: No abnormalities were found.

4.2 Mechanical Performance Test

4.2.1 Insertion Force (I.F.) & Withdrawal Force (W.F.)

Test method: The housing with the crimped contacts, and header shall be mated and unmated on the same axis. Initial insertion and withdrawal forces, and withdrawal force at 50th shall be measured. (Testing speed: 1 to 5 mm/sec.)

Test result:

UNIT: N

No. of circuits	Specimens	Items	Measured values			Requirements
			Ave.	Max.	Min.	
3	Current product	Initial I.F.	18.8	21.5	16.1	29.4 max.
		Initial W.F.	10.7	12.1	10.0	5.9 min.
		W.F. at 50th	13.1	15.1	12.0	2.9 min.
	Additional product	Initial I.F.	18.3	22.6	16.3	29.4 max.
Initial W.F.		9.8	10.9	8.9	5.9 min.	
W.F. at 50th		14.1	15.1	12.6	2.9 min.	
5	Current product	Initial I.F.	29.8	31.3	27.9	44.1 max.
		Initial W.F.	33.8	38.1	30.5	9.8 min.
		W.F. at 50th	21.8	25.1	20.1	4.9 min.
	Additional product	Initial I.F.	33.1	35.3	30.0	44.1 max.
Initial W.F.		27.4	29.2	25.3	9.8 min.	
W.F. at 50th		23.5	25.7	22.0	4.9 min.	
7	Current product	Initial I.F.	41.6	47.0	37.9	58.8 max.
		Initial W.F.	34.6	38.3	28.3	15.7 min.
		W.F. at 50th	29.3	34.1	24.2	8.8 min.
	Additional product	Initial I.F.	40.6	42.6	36.5	58.8 max.
Initial W.F.		26.4	29.0	23.2	15.7 min.	
W.F. at 50th		29.0	31.6	26.9	8.8 min.	
10	Current product	Initial I.F.	62.4	68.4	54.6	78.4 max.
		Initial W.F.	57.5	63.2	53.0	24.5 min.
		W.F. at 50th	37.3	42.7	30.4	14.7 min.
	Additional product	Initial I.F.	62.6	67.7	54.6	78.4 max.
Initial W.F.		51.1	57.1	45.0	24.5 min.	
W.F. at 50th		38.5	42.9	32.7	14.7 min.	

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4.2.2 Post Retention Force

Test method: The end of the post shall be pushed perpendicularly. The load required to make the post start moving from the wafer shall be measured.
(Testing speed: 25 mm/min.)

Test result: UNIT: N

Specimens	Measured values			Requirement
	Ave.	Max.	Min.	
Current product	92.6	109.4	78.0	29.4 min.
Additional product	74.4	94.6	64.3	

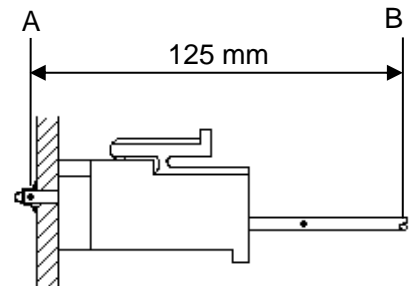
n=10

4.3 Electrical Performance Test

4.3.1 Contact Resistance

Test method: Contact resistance between points A and B of the specimen assembled in the actual mounting state as shown in the figure on the right side shall be measured under the following conditions.

Test current: 10 mA (DC)
Open voltage: 20 mV max.



Test result: See the section of each environmental test.

4.3.2 Current Continuity

Test method: Each circuit of the specimen assembled in the actual mounting state shall be connected in series and test current of 10 mA (DC) shall be applied. Current discontinuity longer than 1 μsec during the test shall be detected by continuity meter.

Test result: See the section of vibration test.

4.3.3 Insulation Resistance

Test method: 500 VDC shall be applied between adjacent contacts of the mated specimen to measure the insulation resistance. (The connector shall not be soldered to the PCB.)

Test result: UNIT: MΩ

Specimens	Items	Measured values	Requirements
Current product	Initial	1,000 min.	1,000 min.
	After humidity test	500 min.	500 min.
	After thermal shock test	500 min.	500 min.
Additional product	Initial	1,000 min.	1,000 min.
	After humidity test	500 min.	500 min.
	After thermal shock test	500 min.	500 min.

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4.3.4 Dielectric Withstanding Voltage

Test method: Testing voltage specified below shall be applied between adjacent contacts of the mated specimen for one minute. (The connector shall not be soldered to the PCB.)

Initial: 1,500 VAC
 After tests: 1,000 VAC (Humidity & Thermal shock tests)

Test result:

Specimens	Items	Measured values	Requirement
Current product	Initial	Good.	There shall be no breakdown or flashover.
	After humidity test	Good.	
	After thermal shock test	Good.	
Additional product	Initial	Good.	
	After humidity test	Good.	
	After thermal shock test	Good.	

n=10

4.4 Environmental Test

4.4.1 Durability

Test method: The housing with crimped contacts, and header shall be mated and unmated. After repeated 50 cycles, the contact resistance shall be measured.

Test result:

<Contact resistance>

UNIT: mΩ

Specimens	Items	Measured values			Requirements
		Ave.	Max.	Min.	
Current product	Initial	5.06	5.1	4.9	10 max.
	After the test	5.29	5.7	5.1	20 max.
Additional product	Initial	5.10	5.1	4.9	10 max.
	After the test	5.30	5.4	5.0	20 max.

n=20

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4.4.2 Humidity

Test method: The specimen shall be placed in a humidity chamber of the following conditions. After the test, the contact resistance, insulation resistance, and dielectric withstanding voltage shall be measured.

Temperature: 40 ± 2°C
 Relative humidity: 90 to 95%
 Period: 240 hours

Test result:

<Contact resistance> UNIT: mΩ

Specimens	Items	Measured values			Requirements
		Ave.	Max.	Min.	
Current product	Initial	5.00	5.2	4.9	10 max.
	After the test	5.14	5.4	4.9	20 max.
Additional product	Initial	5.04	5.1	4.9	10 max.
	After the test	5.16	5.3	4.9	20 max.

n=20

4.4.3 Heat Aging

Test method: The specimen shall be placed in a heat oven of the following conditions. After the test, the contact resistance shall be measured.

Temperature: 85 ± 2°C
 Period: 250 hours

Test result:

<Contact resistance> UNIT: mΩ

Specimens	Items	Measured values			Requirements
		Ave.	Max.	Min.	
Current product	Initial	5.01	5.1	4.8	10 max.
	After the test	5.11	5.2	5.0	20 max.
Additional product	Initial	5.09	5.2	5.0	10 max.
	After the test	5.14	5.4	5.0	20 max.

n=20

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4.4.4 Thermal Shock

Test method: The specimen shall be subjected to a thermal shock test of the following conditions. After the test, the contact resistance, insulation resistance, and dielectric withstanding voltage shall be measured.

1 cycle consists of:
 -55 ± 3°C for 30 minutes
 +85 ± 2°C for 30 minutes
 Total cycles: 25 cycles

Test result:

<Contact resistance> UNIT: mΩ

Specimens	Items	Measured values			Requirements
		Ave.	Max.	Min.	
Current product	Initial	4.85	4.9	4.8	10 max.
	After the test	4.85	4.9	4.8	20 max.
Additional product	Initial	4.89	5.0	4.8	10 max.
	After the test	4.93	5.1	4.9	20 max.

n=20

4.4.5 Hydrogen Sulfide Gas

Test method: The specimen shall be subjected to hydrogen sulfide gas of the following conditions. After the test, the contact resistance shall be measured.

Concentration: 3 ± 1 ppm
 Temperature: 40 ± 2°C
 Relative humidity: 80 ± 5%
 Period: 96 hours

Test result:

<Contact resistance> UNIT: mΩ

Specimens	Items	Measured values			Requirements
		Ave.	Max.	Min.	
Current product	Initial	5.14	5.2	5.1	10 max.
	After the test	5.16	5.3	5.2	20 max.
Additional product	Initial	5.05	5.2	4.9	10 max.
	After the test	5.20	5.3	5.1	20 max.

n=20

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4.4.6 Salt Spray

Test method: The specimen shall be subjected to a salt spray test of the following conditions. After the test, it shall be washed with running water and dried naturally before the measurement of contact resistance.

Temperature: 35 ± 2°C
 Concentration: 5% in weight
 Period: 48 hours

Test result:

<Contact resistance> UNIT: mΩ

Specimens	Items	Measured values			Requirements
		Ave.	Max.	Min.	
Current product	Initial	5.07	5.2	4.9	10 max.
	After the test	5.15	5.3	5.0	20 max.
Additional product	Initial	5.10	5.2	4.9	10 max.
	After the test	5.17	5.3	5.0	20 max.

n=20

4.4.7 Vibration

Test method: The specimen assembled in the actual mounting state shall be installed to the testing jig and subjected to a vibration test of the following conditions. During the test, the current continuity shall be checked. After the test, the contact resistance shall be measured.

Frequency: 10-55-10 Hz/minute
 Amplitude: 1.52 mm
 Direction: Each of X, Y, and Z-axis directions
 *Each axis shall be at right angles to others.
 Period: 2 hours for each direction

Test result:

<Contact resistance> UNIT: mΩ

Specimens	Items	Measured values			Requirements
		Ave.	Max.	Min.	
Current product	Initial	5.08	5.2	4.9	10 max.
	After the test	5.17	5.3	5.0	20 max.
Additional product	Initial	4.99	5.1	4.6	10 max.
	After the test	5.07	5.2	4.7	20 max.

n=20

<Current continuity>

Current product	There was no current discontinuity longer than 1 μsec.
Additional product	

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4.5 Solder Test

4.5.1 Resistance to Soldering Heat

Test method: The specimen shall be mounted on a PCB and subjected to a resistance to soldering heat test of the following conditions.

Solder:	Sn-3Ag-0.5Cu
Flux:	CF-110VH-2A made by Tamura Corporation
PCB to be used:	Material: Glass epoxy resin, Copper pattern on one side, t1.6 mm
Solder temperature:	260 ± 5°C
Immersion period:	5 ± 0.5 sec.

Test result:

There were no defects such as the post shifting from the original position in the additional product, and no differences from the current product were found.

n=10