TR636E-10164

QUALITY EVALUATION TEST REPORT IT3-25H

APPROVED	SO.KIMURA
CHECKED	HT.SAKATA.
CHARGED	YS.KANO

HIROSE ELECTRIC CO.,LTD.

[1] Objective:

To assess the performance and quality of the connectors, IT3-25H.

[2] Specimens:

IT3-300P-25H (03)

IT3M-300S-BGA (57)

IT3D-300S-BGA (57)

[Above test specimens were tested in the condition as it is received from the client.**]**

[3] Test period:

From: 2009-10-09

To: 2009-12-02

[4] Test temperature:

18 °C to 28 °C

[5] Test humidity:

25 %RH to 75 %RH

[6] Test item, Number of specimens, Page No.

Test item No.	Test item/ (Applicable standard)	Group					Number of Specimens	Page No.
		A	B	C	D	E		
1	Appearance, Construction (JIS C 5402 4.1 4.3)	○	○	○	○	○	25 sets	9
2	Low level contact resistance (EIA-364-23)	○	○	○	○	○	25 sets	10
3	Voltage proof (EIA-364-20)					○	5 sets	11
4	Dry heat (Condition a) (EIA-364-09 EIA-364-17, Method A EIA-364-1000.01, Table 8)	○					5 sets	12
5	Mechanical operation, 25 times (EIA-364-09)		○	○			10 sets	13
6	Thermal shock (EIA-364-32 Condition 1)		○				5 sets	14
7	Damp heat, cyclic (EIA-364-31 EIA-364-1000.01, Table 2)		○				5 sets	15
8	Dry heat (Condition b) (EIA-364-17, Method A EIA-364-1000.01, Table 9)			○			5 sets	16

9	Vibration (EIA-364-28 Condition V, Letter D)			○			5 sets	17
10	Flowing mixed gas corrosion (EIA-364-09 EIA-364-17, Method A EIA-364-1000.01, Table 9 EIA-364-65 CLASS IIA)				○		5 sets	19
11	Thermal disturbance (EIA-364-1000.01, Table 4)				○		5 sets	21
12	Mechanical operation, 3 times (EIA-364-09)	○	○		○		15 sets	22
13	Mechanical operation, 100 times (EIA-364-09)					○	5 sets	23

Note) In [Voltage proof] test, as mounting board is different from [Low level contact resistance], different specimens are used.

Table for each test measurement item

Test item No.	Test item	(1)	(2)	(3)	(4)
4	Dry heat (Condition a)	○	○		
5	Mechanical operation, 25 times	○	○		
6	Thermal shock	○	○		
7	Damp heat, cyclic	○	○		
8	Dry heat (Condition b)	○	○		
9	Vibration	○	○		○
10	Flowing mixed gas corrosion	○	○		
11	Thermal disturbance	○	○		
12	Mechanical operation, 3 times	○	○		
13	Mechanical operation, 100 times	○	○	○	

Remarks: (1) Appearance, Construction
(2) Low level contact resistance
(3) Voltage proof
(4) Electrical discontinuity

[7] Test results

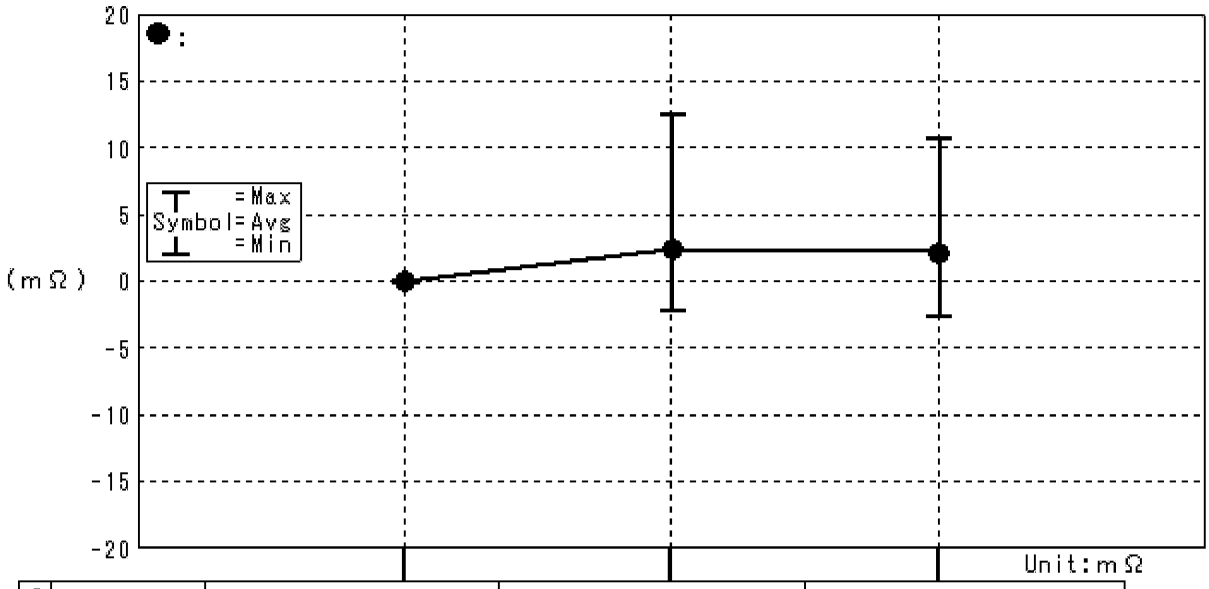
See the page which describes each test item.
See the page shown below for variation graph and result data.

Low Level Contact Resistance, graphs and result data.

See page 5 for Groups A and B.
See page 6 for Group C.
See page 7 for Group D.
See page 8 for Group E.

Group A
Low level contact resistance
[Variation from initial value]

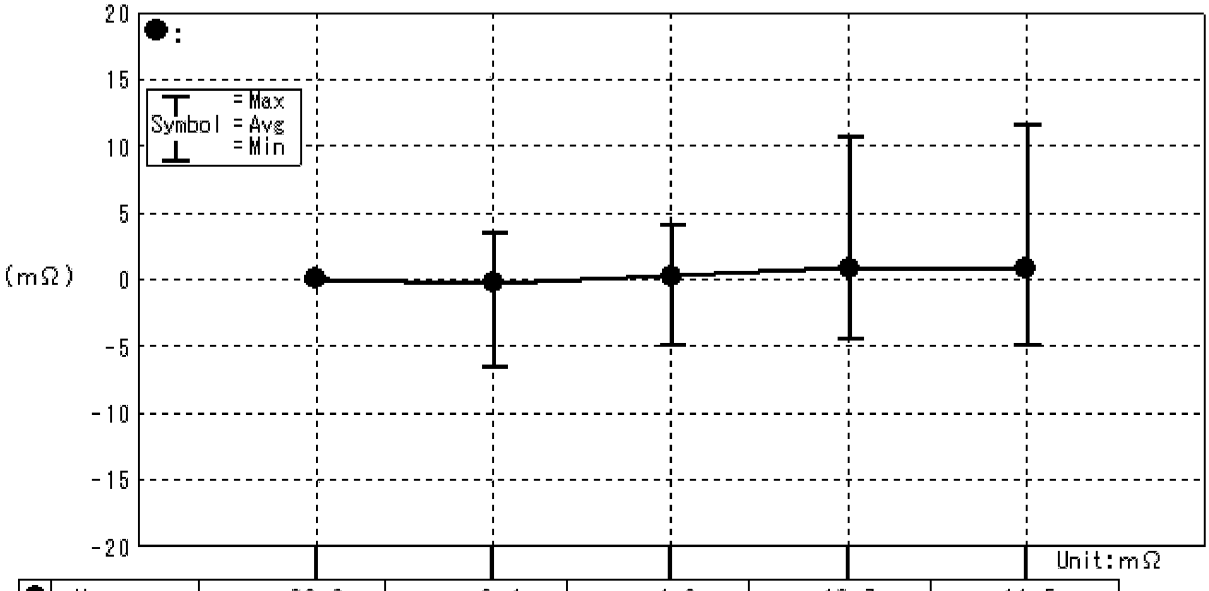
＜Requirement＞
Initial= 55 mΩ or less
After test=Contact resistance change : 20mΩ or less



●	Max	28.7	12.5	10.6
	Min	24.3	-2.1	-2.6
	Avg	25.93	2.47	2.22
	σ_{n-1}	0.83	2.04	2.06
	Step →	Initial (Measured value)	Dry heat (Condition a)	Mechanical operation, 3 times

Group B
Low level contact resistance
[Variation from initial value]

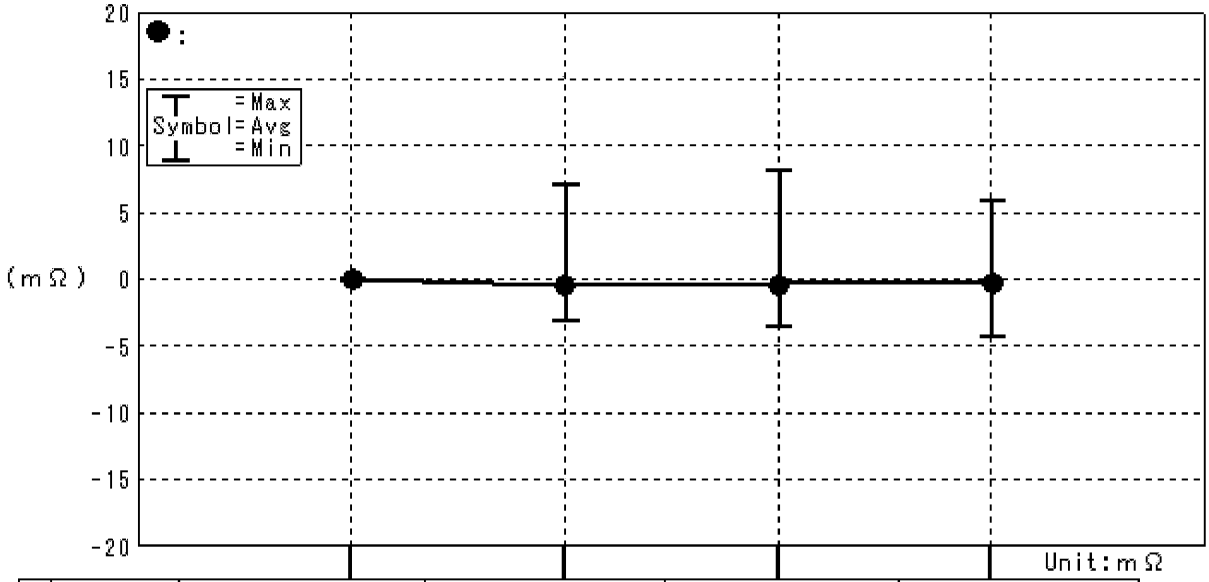
＜Requirement＞
Initial= 55 mΩ or less
After test=Contact resistance change : 20mΩ or less



●	Max	28.8	3.4	4.0	10.7	11.5
	Min	24.1	-6.5	-4.8	-4.4	-4.9
	Avg	26.02	-0.29	0.27	0.87	0.80
	σ_{n-1}	0.92	1.23	0.87	1.40	1.70
	Step →	Initial (Measured value)	Mechanical operation,25 times	Thermal shock	Damp heat,cyclic	Mechanical operation, 3 times

Group C
Low level contact resistance
[Variation from initial value]

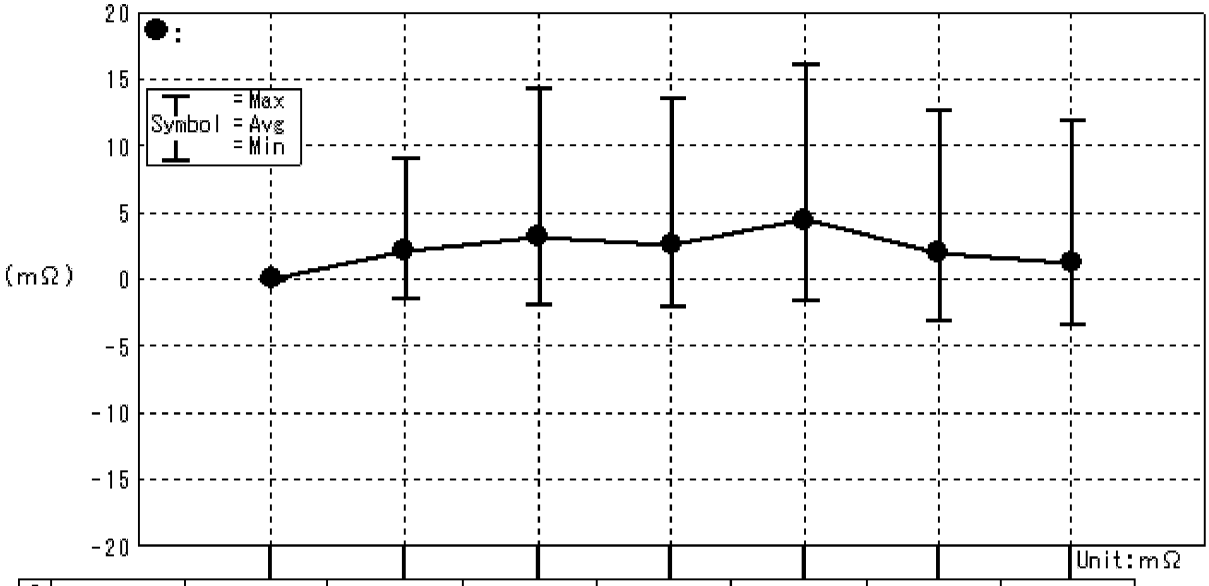
＜Requirement＞
Initial= 55 mΩ or less
After test=Contact resistance change : 20mΩ or less



●					
	Max	28.9	7.1	8.1	5.8
	Min	24.6	-3.1	-3.5	-4.2
	Avg	26.23	-0.41	-0.34	-0.32
	σ_{n-1}	0.72	0.98	1.13	1.21
	Step →	Initial (Measured value)	Mechanical operation ,25 times	Dry heat (Condition b)	Vibration

Group D
Low level contact resistance
[Variation from initial value]

＜Requirement＞
Initial= 55 mΩ or less
After test=Contact resistance change : 20mΩ or less



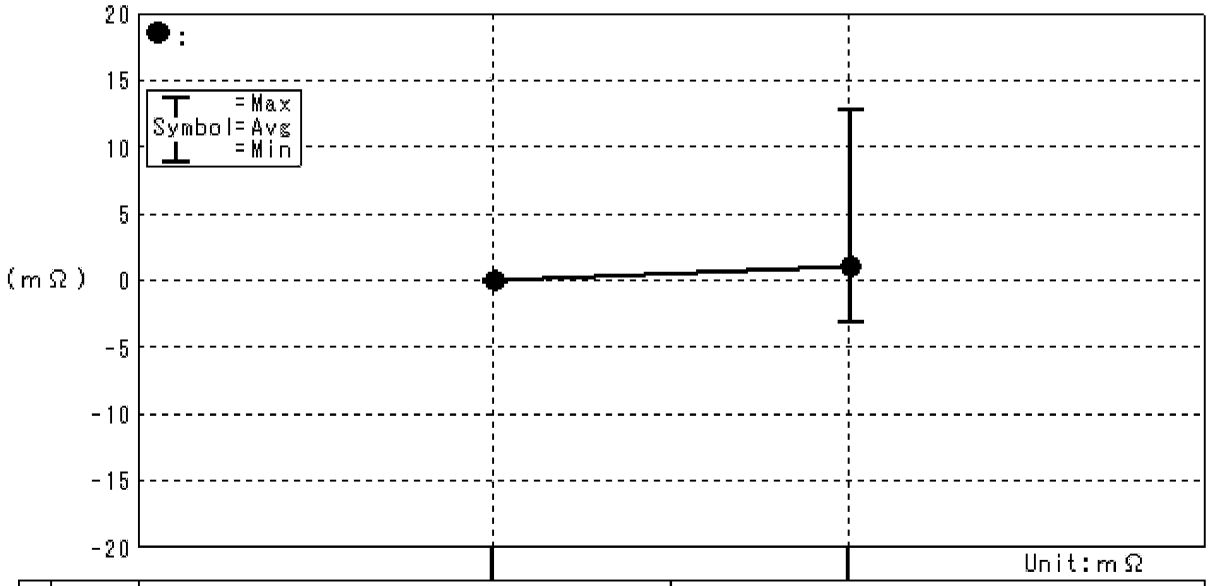
●	Max	29.8	9.0	14.2	13.5	16.0	12.6	11.9
	Min	24.3	-1.4	-1.9	-2.0	-1.6	-3.1	-3.3
	Avg	26.11	2.08	3.21	2.60	4.47	1.96	1.19
	σ_{n-1}	0.90	1.79	2.71	2.25	3.16	2.17	1.47
	Step →	Initial (Measured value)	Step 2	Step 3	Step 4	Step 5	Thermal disturbance	Mechanical operation, 3 times
			Flowing mixed gas corrosion					

<Detail of steps, Flowing mixed gas corrosion test>

Steps↓	
1	Mechanical operation, 25 times
2	Dry heat (after rest in mated)
3	Flowing mixed gas corrosion (after rest for 7 days in unmated)
4	Mechanical operation, 1 time
5	Flowing mixed gas corrosion (after rest for 7 days in mated)

Group E
Low level contact resistance
[Variation from initial value]

＜Requirement＞
Initial= 55 mΩ or less
After test=Contact resistance change : 20mΩ or less



●	Max	29.5	12.7
	Min	23.9	-3.1
	Avg	26.04	1.03
	σ_{n-1}	0.96	2.05
	Step →	Initial (Measured value)	Mechanical operation, 100 times

1. Appearance, Construction

1.1 Requirements

Appearance, Construction:	No defect such as breakage or crack on the component.
Intermateability:	No defect in mating.

1.2 Test method

Appearance, Construction:	Check visually with a magnifying glass for any defect such as breakage or crack.
Intermateability:	Check for any defect when specimens are mated with the applicable connector.

1.3 Test results

Appearance, Construction:	No defect.
Intermateability:	No defect.

2. Low level contact resistance

2.1 Requirements

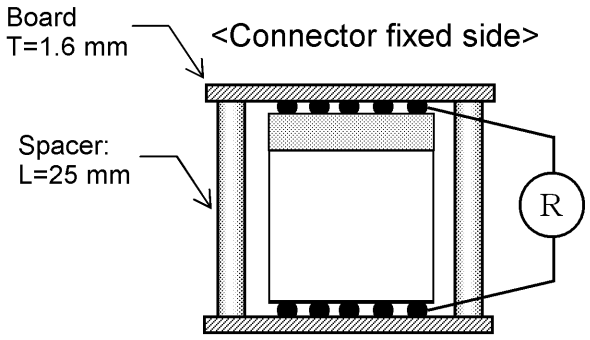
55 mΩ or less

2.2 Test method

The measurements are conducted according to the conditions specified in table below:

Open circuit voltage	20 mV a.c. or less, 1 kHz
Test current	1 mA a.c.

Measuring method: Measured by milliohm-meter at the points shown in the following figure.



As measuring over 100 contacts are impossible, 100 contacts out of 300 contacts only are measured.

Figure: Measuring points

2.3 Test equipment

Test equipment	Model	Manufacturer
Milliohm-meter	4338B	Agilent Technologies

2.4 Test results

Groups A to E

Unit: mΩ

Max	29.8
Min	23.9
Avg	26.07
σ_{n-1}	0.88

3. Voltage proof

3.1 Requirements

No defect such as dielectric breakdown or flashover.

3.2 Test method

Voltage proof is confirmed according to the conditions specified in table below:

Test voltage	150 V a.c.
Duration	For 60 s

Imposing method: Test voltage is raised in a rate of 500 V/s or less until it reaches the required value.

Leak current: Judged dielectric breakdown at 2 mA

Measuring point: Between adjacent signal contacts (Between Contact No. C14-D14 and Between Contact No. C14-C15)
Between signal contacts and ground (Between C14-ground contact)

Mated/Unmated: Mated

3.3 Test equipment

Test equipment	Model	Manufacturer
Voltage proof tester	TOS8750	Kikusui Electronics

3.4 Test results

Between adjacent signal contacts No defect.

Between signal contacts and ground No defect.

4. Dry heat (Condition a)

4.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Low level contact resistance: Contact resistance change : 20mΩ or less.

4.2 Test method

After 25 times of Mechanical operations for <insertion/withdrawing side of the connector> are conducted, the tests are conducted according to the conditions specified in table below:

Temperature	105 °C ± 2 °C
Duration	120 h

Mated/Unmated: Mated

Recovery: After the test, let the specimens rest in ambient temperature for 1 h to 2 h.

4.3 Test equipment

Test equipment	Model	Manufacturer
Constant high temperature chamber	STPS-212	Espec

4.4 Test results

Appearance, Construction: No defect.

Low level contact resistance: See page 5 for graph and result data.

5. Mechanical operation, 25 times

5.1 Requirements

Appearance, Construction: No defect such as remarkable abrasion, breakage or crack on the component.

Low level contact resistance: Contact resistance change : 20mΩ or less.

5.2 Test method

25 times of insertions and withdrawings are conducted at a speed of 300 times/h or less.

Note) Insertions and withdrawings are conducted for <insertion/withdrawing side of the connector> only.

5.3 Test results

Appearance, Construction:

Group B: No defect.

Group C: No defect.

Low level contact resistance:

Groups B and C

Variation from initial value

Unit: mΩ

Max	7.1
Min	-6.5
Avg	-0.36
σ_{n-1}	1.11

6. Thermal shock

6.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Low level contact resistance: Contact resistance change : 20mΩ or less.

6.2 Test method

The test is conducted according to the conditions specified in table below:

Step	1	2
Temperature (°C)	-55 ± 3	85 ± 2
Duration (min)	30	30

Note) Chamber transfer time is 2 min to 3 min.

Number of cycles: 10 cycles are conducted with the above condition as 1 cycle.

Mated/Unmated: Mated

Recovery: After the test, let the specimens rest in ambient temperature for 30 min.

6.3 Test equipment

Test equipment	Model	Manufacturer
Thermal shock test chamber	TSA-71H	Espec

6.4 Test results

Appearance, Construction: No defect.

Low level contact resistance: See page 5 for graph and result data.

7. Damp heat, cyclic

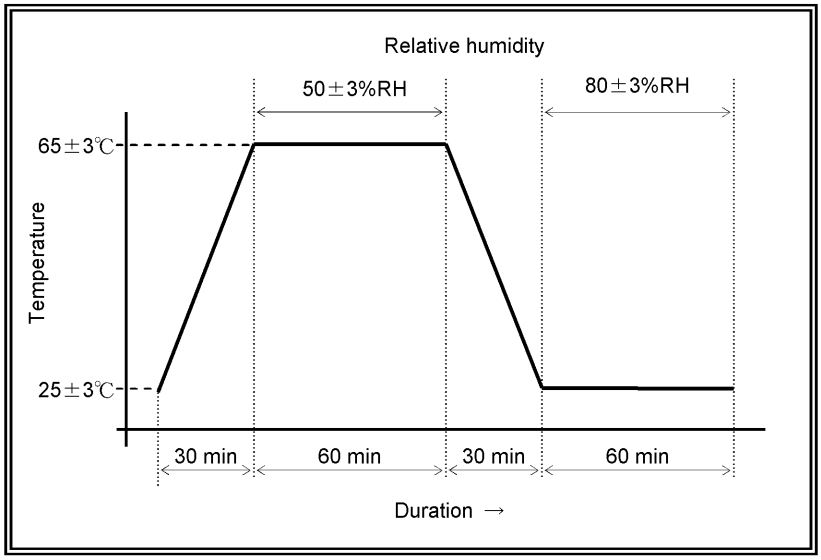
7.1 Requirements

Appearance, Construction: No defect such as breakage, crack or corrosion which impairs the function of the component.

Low level contact resistance: Contact resistance change : 20mΩ or less.

7.2 Test method

After let the specimens rest in standard pre-drying condition (50 °C) for 24 h, the test is conducted according to the conditions shown in drawing below:



Number of cycles: 24 cycles are conducted with the above condition as 1 cycle.

Mated/Unmated: Mated

Recovery: After the test, let the specimens rest in ambient temperature for 5 h.

7.3 Test equipment

Test equipment	Model	Manufacturer
Constant temperature chamber	ST-120B1	Espec
Constant temperature and humidity chamber	PSL-4KPH	Espec

7.4 Test results

Appearance, Construction: No defect.

Low level contact resistance: See page 5 for graph and result data.

8. Dry heat (Condition b)

8.1 Requirements

Appearance, Construction: No defect such as breakage or crack on the component.

Low level contact resistance: Contact resistance change : 20mΩ or less.

8.2 Test method

The test is conducted according to the conditions specified in table below:

Temperature	115 °C ± 2 °C
Duration	24 h

Mated/Unmated: Mated

Recovery: After the test, let the specimens rest in ambient temperature for 1 h to 2 h.

8.3 Test equipment

Test equipment	Model	Manufacturer
Constant low temperature chamber	MC-810	Espec

8.4 Test results

Appearance, Construction: No defect.

Low level contact resistance: See page 6 for graph and result data.

9. Vibration

9.1 Requirements

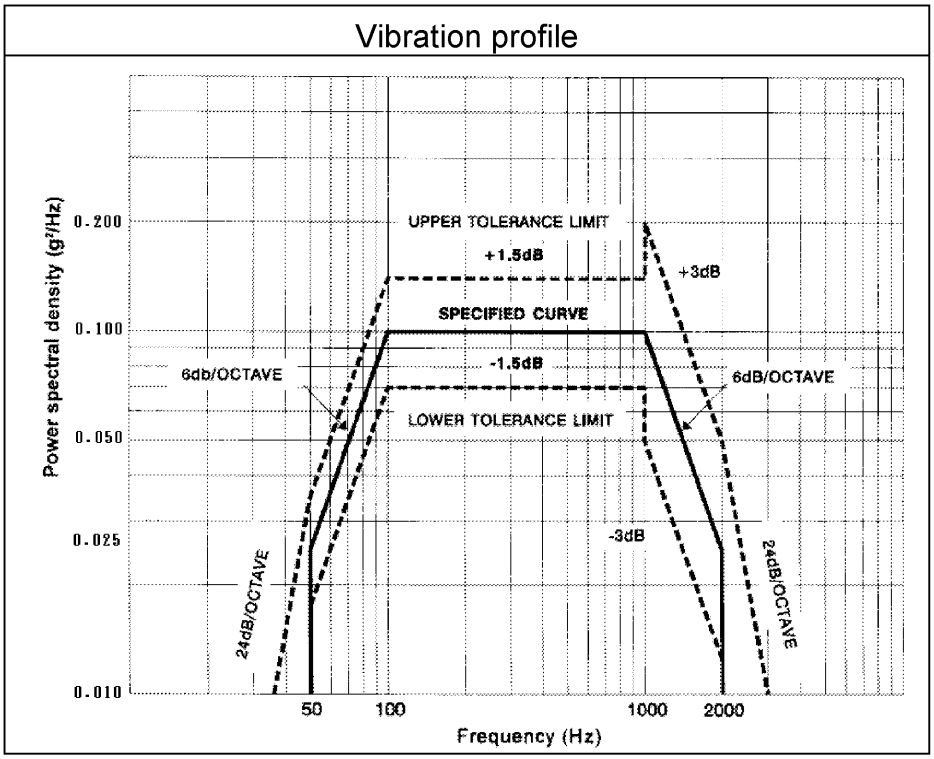
Appearance, Construction:	No defect such as breakage or crack on the component.
Low level contact resistance:	Contact resistance change : 20mΩ or less.
Electrical discontinuity:	No electrical discontinuity of 1 μs or more.

9.2 Test method

The test is conducted according to the conditions specified in table below:

Frequency range	100 Hz to 1000 Hz
Acceleration, spectrum density	9.617 $(m/s^2)^2$/Hz [0.1 g^2/Hz]
Initial inclination	6 dB/oct (50 Hz to 100 Hz)
Final inclination	-6 dB/oct (1000 Hz to 2000 Hz)
Duration	3 axial directions, 90 min each, 270 min in total

Vibration profile



Test voltage: 5 V d.c.

Test current: 100 mA d.c.

Note 1: [Electrical discontinuity] is checked continuously only on Contact No. 1 of each specimen during the test.

Note 2: Exclusive-use spacer is installed between boards and tests are conducted in the condition that P-side and S-side are completely fixed

9.3 Test equipment

Test equipment	Model	Manufacturer
Vibration testing machine	F-300BM/A-E78	Emic
Digital oscilloscope	9360	Lecroy
Variable constant dc volt and ampere generator	PAC35-3	Kikusui Electronics

9.4 Test results

Appearance, Construction: No defect.

Low level contact resistance: See page 6 for graph and result data.

Electrical discontinuity: No electrical discontinuity of 1 μs or more.

10. Flowing mixed gas corrosion

10.1 Requirements

Appearance, Construction: No defect such as corrosion which impairs the function of connector.

Low level contact resistance: Contact resistance change : 20mΩ or less.

10.2 Test method

The tests are conducted according to the steps specified in table below:

Steps↓	
1	Mechanical operation, 25 times
2	Dry heat (after rest in mated)
3	Flowing mixed gas corrosion (after rest for 7 days in unmated)
4	Mechanical operation, 1 time
5	Flowing mixed gas corrosion (after rest for 7 days in mated)

* In Steps 1 and 4, insertions and withdrawings are conducted at a rate of 300 times/h or less in <insertion/withdrawing side of the connector> only.

<<Dry heat testing condition>>

Temperature	115 °C ± 2 °C
Duration	24 h

Recovery: After the test, let the specimens rest in ambient temperature for 1 h to 2 h.

<<Mixed gas corrosion testing condition>>

Gas concentration	H_2S	10 ± 5 ppb
	NO_2	200 ± 50 ppb
	Cl_2	10 ± 3 ppb
	SO_2	100 ± 20 ppb
Temperature		30 °C ± 1 °C
Humidity		70 %RH ± 2 %RH

Recovery: After the test, let the specimens rest in ambient temperature for 2 h or more.

Intermediate measuring

After Steps 2 to 4, [Low level contact resistance] tests are conducted.

10.3 Test equipment

Test equipment	Model	Manufacturer
Constant high temperature chamber	PS-212	Espec
Constant flow type gas corrosion testing machine	GH-180MT	Yamazaki Seiki

10.4 Test results

Appearance, Construction: No defect.

Low level contact resistance: See page 7 for graph and result data.

11. Thermal disturbance

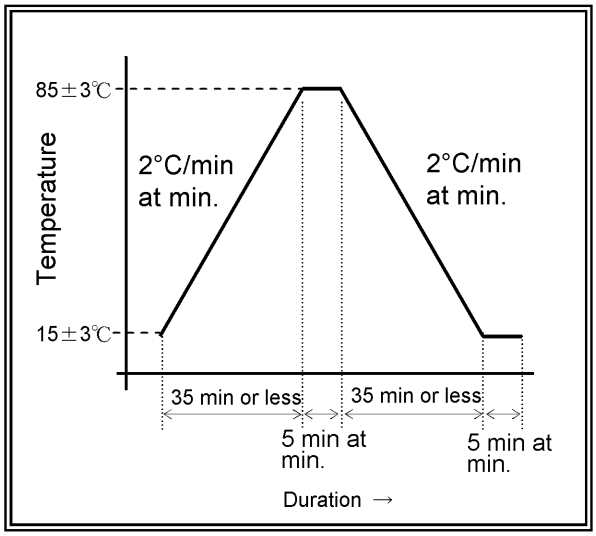
11.1 Requirements

Appearance, Construction: No defect such as breakage, crack or corrosion which impairs the function of the component.

Low level contact resistance: Contact resistance change : 20mΩ or less.

11.2 Test method

The tests are conducted according to the conditions specified in diagram below:



Number of cycles: 10 cycles are conducted with the above condition as 1 cycle.

Mated/Unmated: Mated

Recovery: After the test, let the specimens rest in ambient temperature for 1 h to 2 h.

11.3 Test equipment

Test equipment	Model	Manufacturer
Constant temperature and humidity chamber	PSL-4KPH	Espec

11.4 Test results

Appearance, Construction: No defect.

Low level contact resistance: See page 7 for graph and result data.

12. Mechanical operation, 3 times

12.1 Requirements

Appearance, Construction: No defect such as remarkable abrasion, breakage or crack on the component.

Low level contact resistance: Contact resistance change : 20mΩ or less.

12.2 Test method

3 times of insertions and withdrawings are conducted at a speed of 300 times/h or less.

Note) Insertions and withdrawings are conducted for <insertion/withdrawing side of the connector> only.

12.3 Test results

Appearance, Construction:

Group A: No defect.

Group B: No defect.

Group D: No defect.

Low level contact resistance: See page 7 for graph and result data.

13. Mechanical operation, 100 times

13.1 Requirements

Appearance, Construction:	No defect such as remarkable abrasion, breakage or crack on the component.
Low level contact resistance:	Contact resistance change : 20mΩ or less.
Voltage proof:	No defect such as dielectric breakdown or flashover.

13.2 Test method

100 times of insertions and withdrawings are conducted at a speed of 300 times/h or less.

Note) Insertions and withdrawings are conducted for <insertion/withdrawing side of the connector> only.

13.3 Test results

Appearance, Construction:	No defect.
Low level contact resistance:	See page 8 for graph and result data.
Voltage proof:	
Between adjacent signal contacts	No defect.
Between signal contacts and ground	No defect.