

ISH® HORIZONTAL 1.5mm 2P

Part No. V0169-002E-01,V0170-91002-01

Product Specification

Qualification Test Report No. TR-26047

|      |        |                |             |            |             |
|------|--------|----------------|-------------|------------|-------------|
|      |        |                |             |            |             |
|      |        |                |             |            |             |
|      |        |                |             |            |             |
| 0    | S26277 | August 7, 2026 | Ka.Tanaka   | K.Tsusu    | T.Takeda    |
| Rev. | ECN    | Date           | Prepared by | Checked by | Approved by |

## 1. Scope

This standard specifies the performance and test conditions for ISH HORIZONTAL 1.5mm 2P.

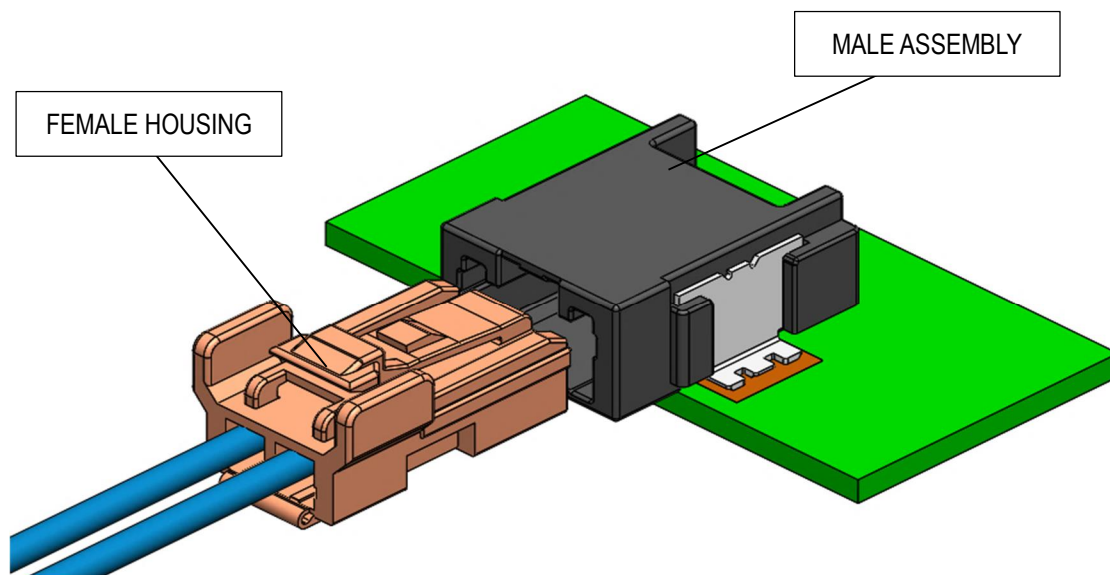
## 2. Product Name and Model Number

### 2.1 Product Name

ISH<sup>®</sup> HORIZONTAL 1.5mm 2P

### 2.2 Model Number

- MALE ASSEMBLY : V0169-020E-01
- FEMALE HOUSING: V0170-91002-01
- FEMALE TERMINAL 1.5mm : VT011-04



### 3. Ratings

#### 3.1 Applicable Cables

Applicable Cables for 1.5 mm Female Terminal

····VT011-04 ···Cross section : 1.25mm<sup>2</sup>

Outer diameter : Φ2.84mm MAX

#### 3.2 Operating Conditions

Temperature: 233~398K(-40°C~+125°C)

(including temperature rise due to current flow)

### 4. Construction, Materials and Finish

(1)MALE HSG·····Material : Glass-filled LCP, Flame retardance : UL94V-0, Color : BLACK

(2)MALE TERMINAL·····Material : BRASS, Plating : Sn(Reflow)

(3) Peg·····Material : BRASS, Plating : Sn(Reflow)

(4)FEMALE HOUSING·····Material : PBT, Flame retardance : UL94HB, Color : BLACK

(5)0.5mm FEMALE TERMINAL·····BOX Material : BRASS, Plating : Sn(Reflow)

Spring Material : Copper alloy, Plating : Sn(Reflow)

(6)1.5mm FEMALE TERMINAL·····BOX Material : BRASS, Plating : Sn(Reflow)

Spring Material : Copper alloy, Plating : Sn(Reflow)

### 5. CONSTRUCTION, MATERIALS AND FINISH

Terminal crimp specification is based on Handling Manual 【HDM-0020】

### 6. REFLOW TEMPERATURE PROFILE

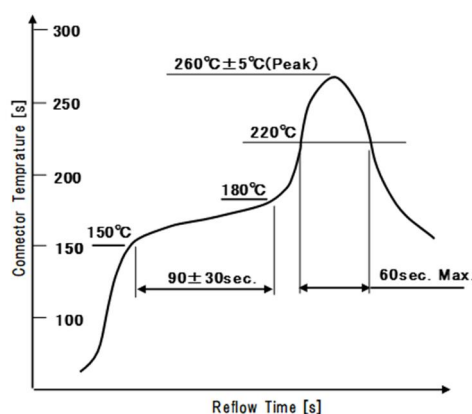


Fig.1.Reflow Temperature Profile

**7. Test Methods and Performances****7.1. Initial characteristics**

Table 1. Initial characteristics

| Item | Measurement                         | Requirements                       |                             |
|------|-------------------------------------|------------------------------------|-----------------------------|
| 1    | Terminal appearance                 | No detrimental deformation         |                             |
| 2    | Terminal outer dimension            | Satisfy drawing dimension          |                             |
| 3    | Housing appearance                  | No detrimental deformation         |                             |
| 4    | Housing outer dimension             | Satisfy drawing dimension          |                             |
| 5    | Feeling(insertion/removal)          | No discomfort                      |                             |
| 6    | Connector mating force              | 26N Max.                           |                             |
| 7    | Connector unmating force            | 26N Max.                           |                             |
| 8    | Connector retention force           | 100N Min.                          |                             |
| 9    | Insulation resistance               | 100MΩ Min.                         |                             |
| 10   | Withstanding voltage                | No insulation breakdown or erosion |                             |
| 11   | Temperature rise                    | $\Delta T=50^{\circ}\text{C}$ Max. |                             |
| 12   | Leak current                        | 1mA Max.                           |                             |
| 13   | Coplanarity                         | 0.1mm Max.                         |                             |
| 14   | Peg strength                        | 100N Min.                          |                             |
| 15   | Audible click                       | 60dB(A) Min.                       |                             |
| 16   | Terminal crimp strength             | 150N Min.                          |                             |
| 17   | Terminal insertion force            | 3.5N Min.~4.5N Max.                |                             |
| 18   | Terminal removal force              | 3.5N Min.~4.5N Max.                |                             |
| 19   | Terminal contact force              | 4N Min.                            |                             |
| 20   | Terminal bend strength              | a                                  | Must not bend more than 1mm |
|      |                                     | b                                  | Terminal bending 30°MAX     |
| 21   | Voltage drop                        | Initial                            | 10mV/A Max.                 |
|      |                                     | After test                         | 20mV/A Max.                 |
| 22   | Dry circuit resistance              | Initial                            | 10mΩ Max.                   |
|      |                                     | After test                         | 20mΩ Max.                   |
| 23   | Microcut monitoring                 | Not exceed 7Ωfor 1μs Min.          |                             |
| 24   | Terminal retention force            | With secondary lock                | 49N Min.                    |
|      |                                     | Without secondary lock             | 20N Min.                    |
| 25   | Terminal to housing insertion force | 10N Max.                           |                             |
| 26   | Hinge insertion/removal force       | Insertion force                    | 29.4N Max.                  |
|      |                                     | Removal force                      | 14.7N Min.                  |
| 27   | Sn whisker                          | 125μm Max.                         |                             |

**7.2. Environmental Performances**

Table 2. Environmental Performances

| Item | Test name              | Measurement                             |                        | Requirements                       |
|------|------------------------|-----------------------------------------|------------------------|------------------------------------|
| 1    | Thermal aging          | Housing appearance                      |                        | No detrimental deformation         |
|      |                        | Feeling(insettrion/removal)             |                        | No discomfort                      |
|      |                        | Connector retention force               | Direction 1            | 100N Min.                          |
|      |                        | Terminal crimp strength                 |                        | 130N Min.                          |
|      |                        | Dry circuit resistance                  | Initial                | 10mΩ Max.                          |
|      |                        |                                         | After test             | 20mΩ Max.                          |
|      |                        | Terminal retention force                | With secondary lock    | 49N Min.                           |
|      |                        |                                         | Without secondary lock | 20N Min.                           |
|      |                        | Housing lock strength without terminals |                        | 49N Min.                           |
| 2    | Low temperature aging  | Housing appearance                      |                        | No detrimental deformation         |
|      |                        | Feeling(insettrion/removal)             |                        | No discomfort                      |
|      |                        | Dry circuit resistance                  | Initial                | 10mΩ Max.                          |
|      |                        |                                         | After test             | 20mΩ Max.                          |
|      |                        | Terminal retention force                | With secondary lock    | 49N Min.                           |
|      |                        |                                         | Without secondary lock | 20N Min.                           |
|      |                        | Housing lock strength without terminals |                        | 49N Min.                           |
| 3    | Thermal shock          | Housing appearance                      |                        | No detrimental deformation         |
|      |                        | Feeling(insettrion/removal)             |                        | No discomfort                      |
|      |                        | Connector retention force               | Direction 1            | 100N Min.                          |
|      |                        | Terminal crimp strength                 |                        | 130N Min.                          |
|      |                        | Dry circuit resistance                  | Initial                | 10mΩ Max.                          |
|      |                        |                                         | After test             | 20mΩ Max.                          |
|      |                        | Terminal retention force                | With secondary lock    | 49N Min.                           |
|      |                        |                                         | Without secondary lock | 20N Min.                           |
| 4    | Resistance to humidity | Housing appearance                      |                        | No detrimental deformation         |
|      |                        | Connector retention force               | Direction 1            | 100N Min.                          |
|      |                        | Insulation resistance                   |                        | 100MΩ Min.                         |
|      |                        | Withstand voltage                       |                        | No insulation breakdown or erosion |
|      |                        | Leak current                            |                        | 1mA Max.                           |
|      |                        | Dry circuit resistance                  | Initial                | 10mΩ Max.                          |
|      |                        |                                         | After test             | 20mΩ Max.                          |
|      |                        | Terminal retention force                | With secondary lock    | 49N Min.                           |
|      |                        |                                         | Without secondary lock | 20N Min.                           |
| 5    | Corrosion gas          | Terminal appearance                     |                        | No detrimental deformation         |
|      |                        | Housing appearance                      |                        | No detrimental deformation         |
|      |                        | Terminal crimp strength                 |                        | 130N Min.                          |
|      |                        | Voltage drop                            | Initial                | 10mV/A Max.                        |
|      |                        |                                         | After test             | 20mV/A Max.                        |

## 8. Test method

### 8.1. Initial characteristics Test Method

(1) Terminal appearance

Test method Visual(e.g. magnifier) and tactile verification.

(2) Terminal outer dimensions

Test method Measure dimensions using caliper, micrometer, projector.

(3) Housing appearance

Test method Visual(e.g. magnifier) and tactile verification.

(4) Housing outer dimensions

Test method Measure dimensions using caliper, micrometer, projector.

(5) Feelingng (insertion/ extraction)

Test method Verification of feeling by insertion/ extraction of connector and single terminal.

(6) Connector mating force

Test method Measure the force required to mate female and male connectors at a rate of 100 mm/min. (terminals must be fully populated)

(7) Connector unmating Force

Test method Measure the force to pull the connectors apart at a rate of 100 mm/min. without the locking feature.

(8) Connector Retention Force

Test method Measure the maximum force to pull out female connector from mated state (Fig.2). Pull in directions at a speed of 50mm/min. (terminals must be fully populated)

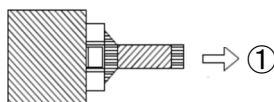


Fig 2.Measurement of connector retention force

## (9) Insulation resistance

Test method     Supply DC500V insulation resistance between (a) terminals (b) terminal and ground on mated connectors.

## (10) Withstanding voltage

Test method     Supply AC1000V between (a) terminals (b) terminal and ground on mated connectors for 1minute.  
Same connection as for insulation resistance test.

## (11) Temperature rise

Test method     For temperature rise testing, wrap the test sample with half-lap tape starting 30 to 50 mm from the connector terminals. Ensure that the test sample is not affected by drafts or artificial cooling (e.g., installation of a thermocouple), and measure the temperature at the terminal crimping area. Measurements shall be performed with all terminals fully assembled, applying the following test currents to all terminals. Temperature measurements shall be taken after the temperature rise has stabilized.  
0.5 mm terminals: 0.5 A per pole; 1.5 mm terminals: 13 A per pole

## (12) Leak current

Test method     Supply  $16 \pm 0.1$  V to mated connector terminals. Measure maximum leak current.

(13) Coplanarity

Test method    Measure coplanarity of male connector lead and peg at the reflow profile shown in Figure 3.

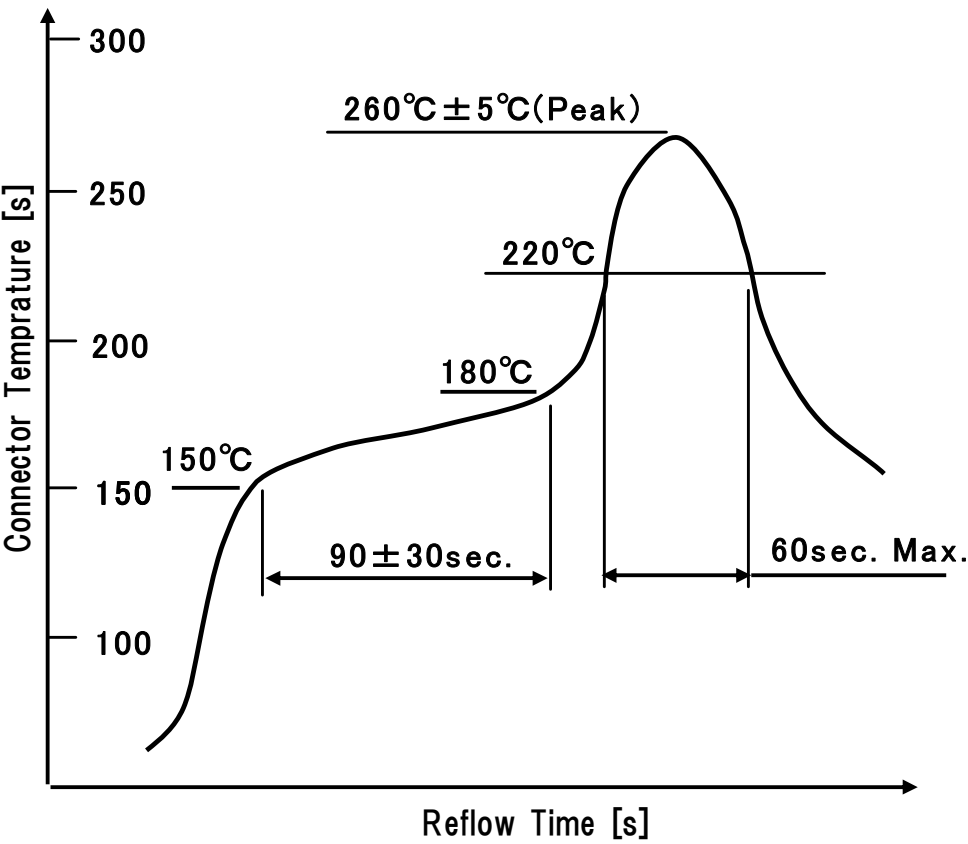
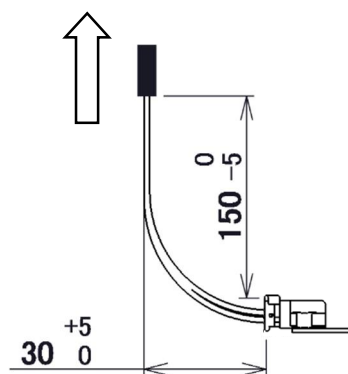


Fig 3.Coplanarity Measurement points

## (14) Peg strength

**Test method** Mate a wired female connector to the soldered male connector, and pull the wire at a rate of 100mm/min. Measure the force when the peg comes out from the PCB.  
If mating portion has some breakage, it is needed to reinforce them.  
Fix the connector in the following position, and pull towards the arrowed direction.



Position 1

Fig.4.Peg strength measuring method

## (15) Audible click

**Test method** Horizontally insert fully populated female connector to male connector which is soldered onto PCB.  
Measure by the sound with sound level meter, and analyze the frequency analyzer (FFT).  
Measurement range: 10kHz~20kHz  
Background noise: 5kHz MIN, Peak: 50dB MAX  
Measurement must be done in a room.  
Keep the position of the connector lock 600mm away from sound level meter.  
Fix PCB and measure the lock sound without any touches.

## (16) Terminal crimp strength

**Test method** Crimp wire of 100mm approx. to female terminal and pull the wire at the speed of 50-100mm/min. Measure the force when the wire breaks or the wire comes out from the terminal. Do not use insulation barrel.

## (17) Terminal insertion force

Test method     Measure the force to insert female terminal into fixed male connector at a speed of 100 mm/min.

## (18) Terminal removal force

Test method     Measure the force to pull out female terminal from male connector at a speed of 100 mm/min.

## (19) Terminal contact force

Test method     Calculate a contact force of female terminal and male terminal.  
Measure female terminal spring displacement-force characteristics, and calculate a contact force from displacement upon male terminal insertion.  
(accuracy 0.01mm MAX)

## (20) Terminal bend strength

Test method     (a) Push a male terminal to mating direction from housing entrance at a speed of 50mm/min with the load (maximum of connector insertion force).  
(b) Remove housing walls around male terminals. Push a terminals at a speed of 50mm/min to the perpendicular direction to mating axis (4 directions: up, down, left, right)with the force.  
1.5mm terminal : 12N (only up , down) , 0.5mm terminal : 3N (4 directions)  
applies a load.

## (21) Voltage drop

Test method Open: 12V, Short circuit: 1A

Measure the voltage drop between male connector lead and temp. measurement point after where is 75mm for from the crimp area of female terminal.

temperature reached saturation at 75mm from female terminal crimp.

Then, subtract voltage drops of wire and male connector lead

Wire resistance: Table 3 or actual measurement.

Table 3. Wire resistance (20°C, 75mm)

| Cable Size (mm <sup>2</sup> ) | Resistance (mΩ) |
|-------------------------------|-----------------|
| 0.3                           | 3.77            |
| 0.5(JIS)                      | 2.45            |
| 0.5(ISO)                      | 2.8             |
| 0.75                          | 1.77            |
| 1.0                           | 1.4             |
| 1.25                          | 1.07            |

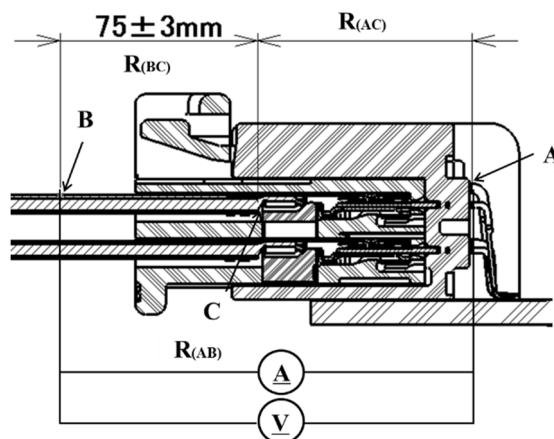


Fig 5. In-line Circuit Test Lead Location

## (22) Dry circuit resistance

Test method Open: 20±5mV, Short circuit: 10±0.5mA

Measure resistance of point where is 75mm for from the crimp area of female terminal and male connector lead.

Then, subtract resistance of wire and male connector lead.

Wire resistance: Table 7 or actual measurement

## (23) Microcut monitoring

Test method Measure dry circuit resistance.

## (24) Terminal retention force

Test method Measure the force to pull out female terminal from female connector housing at a speed of 100mm/min. Test with and without retainer.

(25) Terminal insertion force to housing

Test method Measure the force to fully insert female terminal into female connector housing at a speed of 100mm/min

(26) Hinge insertion/removal force

Test method After fully inserting the male terminals into all positions of the male connector housing, measure the insertion and withdrawal force at a speed of 100 mm/min along the retainer hinge insertion axis.

(27) Sn whisker

Test method Check the surface of connector's metal portions (terminals, lead) with microscope, etc. to find Sn whisker. Use microscope with magnification of X100 MIN.  
Check closely not to lose sight of whisker with different magnifications.

## 6.2. Environmental Performances Test Method

### (1) Thermal Aging

Test method Place mated connectors in thermal chamber at  $125\pm 3^{\circ}\text{C}$  for 120h.  
Remove the connectors from the chamber and leave it to ambient temperature to recover.

### (2) Low temperature aging

Test method Place mated connectors in thermal chamber at  $-40\pm 3^{\circ}\text{C}$  for 120h.  
Repeat insert/extraction for 5 times immediately after removing from the chamber,  
then leave it to ambient temperature to recover.

### (3) Thermal shock

Test method Place mated connectors in thermal chamber and subject them to heat /cold cycle  
( $100\pm 3^{\circ}\text{C}/-40\pm 3^{\circ}\text{C}$ ). No of cycles: 1000  
Duration (0.5h) may be shortened if sample's temperature reaches test temperature  
requirement early.  
Monitor resistance during test, open circuit  $20\pm 5\text{mV}$ , short circuit  $10\pm 0.5\text{mA}$ .

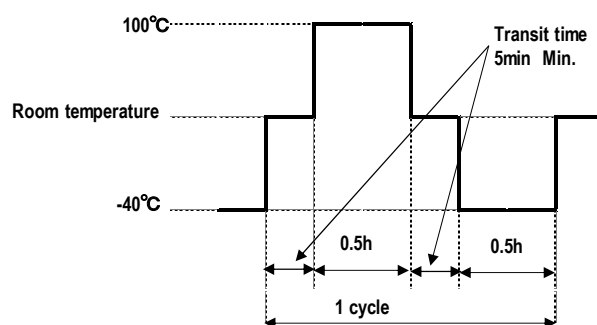


Fig.6 .Thermal shock

### (4) Resistance to humidity

Test method Place mated connectors in climatic chamber and subject them to  $60^{\circ}\text{C}\pm 5^{\circ}\text{C}$ ,  
 $90\sim 95\%\text{RH}$  for 96h.  
Hang connectors to prevent any drips the connectors

### (5) Corrosion gas

Test method Place male and female connectors (not mated) in  $25\pm 5\text{ppm}$ ,  $40\pm 2^{\circ}\text{C}$ ,  $90\sim 98\%\text{RH}$ ,  
 $\text{SO}_2$  gas for 96h.