

JST SFH SERIES WIRE-TO-BOARD CONNECTOR



Glossary

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**NEW JST SFH SERIES WIRE-TO-BOARD CONNECTOR FEATURES LOW PROFILE,
COMPACT SIZE IDEAL FOR LOW CURRENT ($\leq 4A$), HIGH VOLTAGE ($\leq 350V$) APPLICATIONS.**



The new SFH Series Wire-to-Board Crimp Style Connector, available from JST Corporation, Waukegan, Illinois, is a compact, low profile connector with both polarization and a secure friction locking to ensure reliable contact in low current, low voltage conditions. These super compact SMT connectors have a 1.8mm (0.071") pitch and side entry mated heights of only 3.0mm (0.118"). These versatile connectors balance limited space design needs with a highly reliable secure connection. Applications range from battery connections to LED lighting.

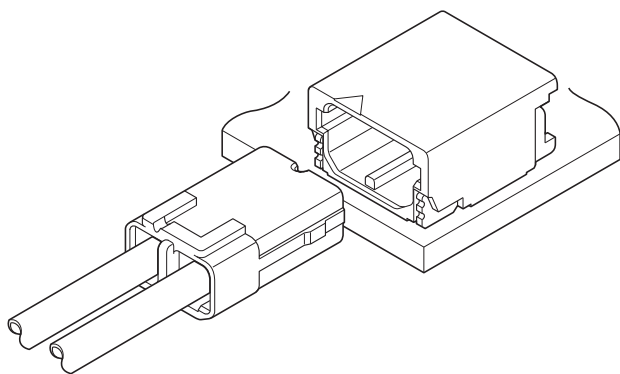
The SFH Series is currently available in a 2 circuit size. Contacts are tin-plated over a phosphor bronze base material and accommodate a wire range of 22AWG to 30AWG. Current is rated at 4A AC/DC (using 22 or 24 AWG) at 350 V AC/DC. Temperature range is - 25°C to +85°C (including temperature rise in applying electrical current). Socket housing is 94V-O rated thermoplastic resin material and is notched on one side for ease in locating the pin 1 position. Available in side-entry only (right-angle) mounting configuration, the RoHS complaint, fully shrouded headers feature insertion guides for easy and secure mating. SMT headers are provided on embossed tape for automatic insertion equipment.

SFH Part Numbers	In Sample Room	Stock
SSFH-001T-P0.5	X	X
SSFH-002T-P0.5	X	X
SFHR-02V-R	X	X
SFHR-02V-L	X	X
SM02B-SFHRS-TF	X	X
SM02B-SFHLS-TF	X	X



SFH CONNECTOR

1.8mm pitch/Disconnectable Crimp style connectors



This low profile type connector with height of 3.0mm is designed for connection to stroboscope flash and realized space saving.

- Contact lance
- Countermeasure for inverse insertion and locking feature

Specifications

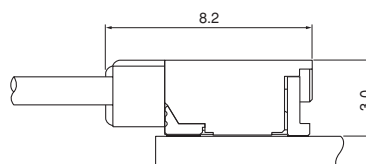
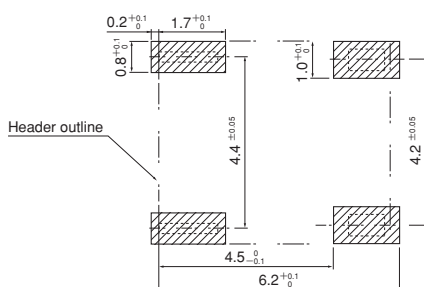
- Current rating: 4A AC, DC (AWG #22)
- Voltage rating: 350V AC, DC
- Temperature range: -25°C to +85°C
(including temperature rise in applying electrical current)
- Contact resistance: Initial value/10m Ω max.
After environmental testing/20m Ω max.
- Insulation resistance: 1,000M Ω min.
- Withstanding voltage: 1,700V AC/minute
- Applicable wire: Conductor size/AWG #30 to #22
Insulation O.D./0.7 to 1.3mm
- * Compliant with RoHS.
- * Refer to "General Instruction and Notice when using Terminals and Connectors" at the end of this catalog.
- * Contact JST for details.

Standards

Recognized E60389

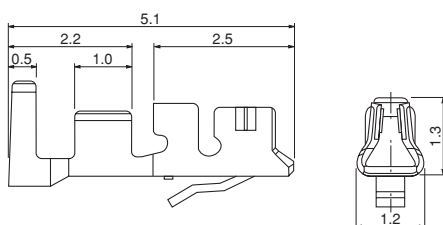
Certified LR20812

PC board layout (viewed from component side) and Assembly layout



Note: 1. Tolerances are non-cumulative: $\pm 0.05\text{mm}$ for all centers.
2. The dimensions above should serve as a guideline. Contact JST for details.

Contact



Model No.	Applicable wire			Q'ty / reel
	mm ²	AWG#	Insulation O.D. (mm)	
SSFH-001T-P0.5	0.13~0.33	26~22	0.95~1.3	15,000
SSFH-002T-P0.5	0.05~0.13	30~26	0.7 ~1.25	15,000

Material and Finish

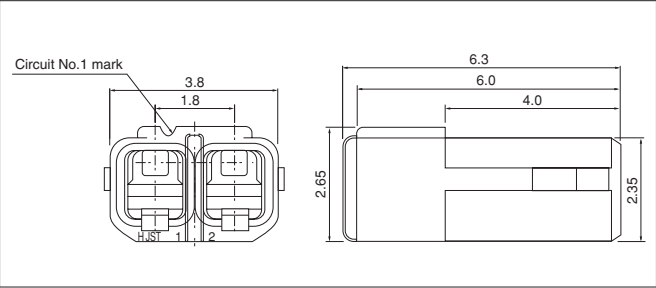
Copper alloy, tin-plated (reflow treatment)

RoHS compliance

Contact	Crimping machine	Applicator		
		Crimp applicator	Dies	Crimp applicator with dies
SSFH-001T-P0.5	AP-K2N	MKS-L	MK/SSFH-001-05	APLMK SSFH001-05
		—	—	—
SSFH-002T-P0.5	AP-K2N	MKS-L	MK/SSFH-002-05	APLMK SSFH002-05
		—	—	—

SFH CONNECTOR

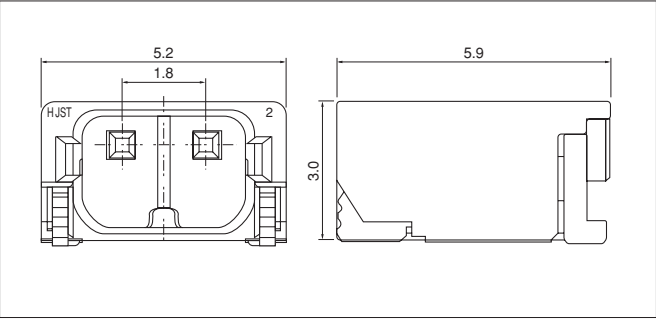
Housing



Circuits	Model No.	Q'ty / bag
2	SFHR-02V-R	1,000
Material		
Thermoplastic resin, UL94V-0		

RoHS compliance
<For reference> As the color identification, the following alphabet shall be put in the underlined part.
For availability, delivery and minimum order quantity, contact JST.
ex. **SFHR-02V-R**
R...red
L...lemon yellow

Shrouded header



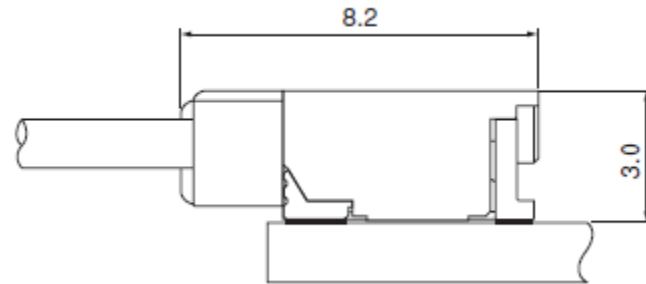
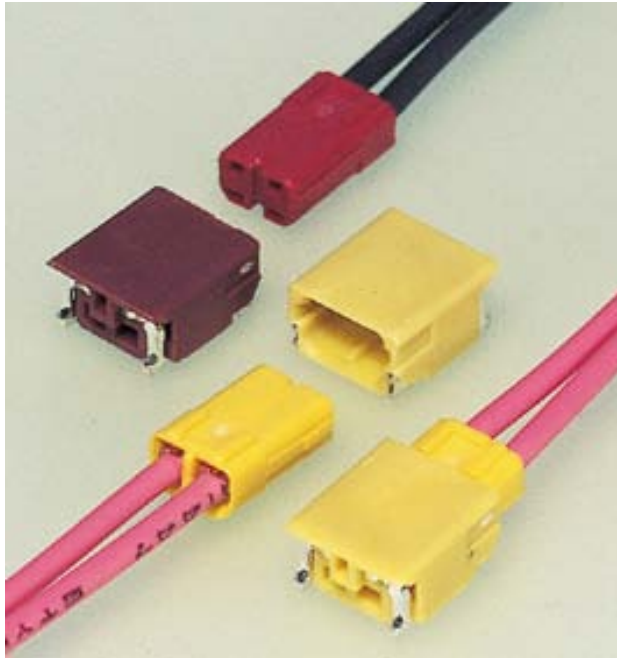
Circuits	Model No.	Q'ty / reel
2	SM02B-SFHRS-TF	2,000
Material and Finish		
Press pin: Copper alloy, copper-undercoated, tin-plated (reflow treatment) Wafer: Heat resisting resin, UL94V-0 Solder tab: Copper alloy, copper-undercoated, tin-plated (reflow treatment)		

RoHS compliance This product displays (LF)(SN) on a label.
<For reference> As the color identification, the following alphabet shall be put in the underlined part.
For availability, delivery and minimum order quantity, contact JST.
ex. **SM02B-SFHRS-TF**
R...red
L...lemon yellow

SFH Connector

To introduce the new SFH wire-to-board, crimp style connector series.

SFH Connector



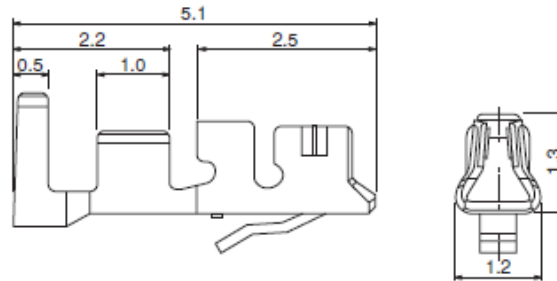
Many applications require a wire-to-board connector that is sub-miniature in size and offers engineers design flexibility.

The SFH Series wire-to-board, crimp-style connector is on a 1.8mm (.071") pitch, and is molded in a RoHS compliant 94V0 Polyamide (SMT headers) resin. The Series incorporates both polarization and friction lock features.

Rated at 4A AC/DC (using 22 or 24AWG) at 350VAC, these low profile connectors have a side-entry, mated height of only 3.0mm (.118"). The series has an operating temperature range of -25° to +85 °C including temperature rise when applying an electrical current. The series is offered in a 2 circuit size in both red and yellow.

SFH Connector

crimp style wire-to-board contact



Model No.	Applicable wire			Q'ty / reel
	mm ²	AWG#	Insulation O.D. (mm)	
SSFH-001T-P0.5	0.13~0.33	26~22	0.95~1.3	15,000
SSFH-002T-P0.5	0.05~0.13	30~26	0.7 ~1.25	15,000

Material and Finish

Copper alloy, tin-plated (reflow treatment)

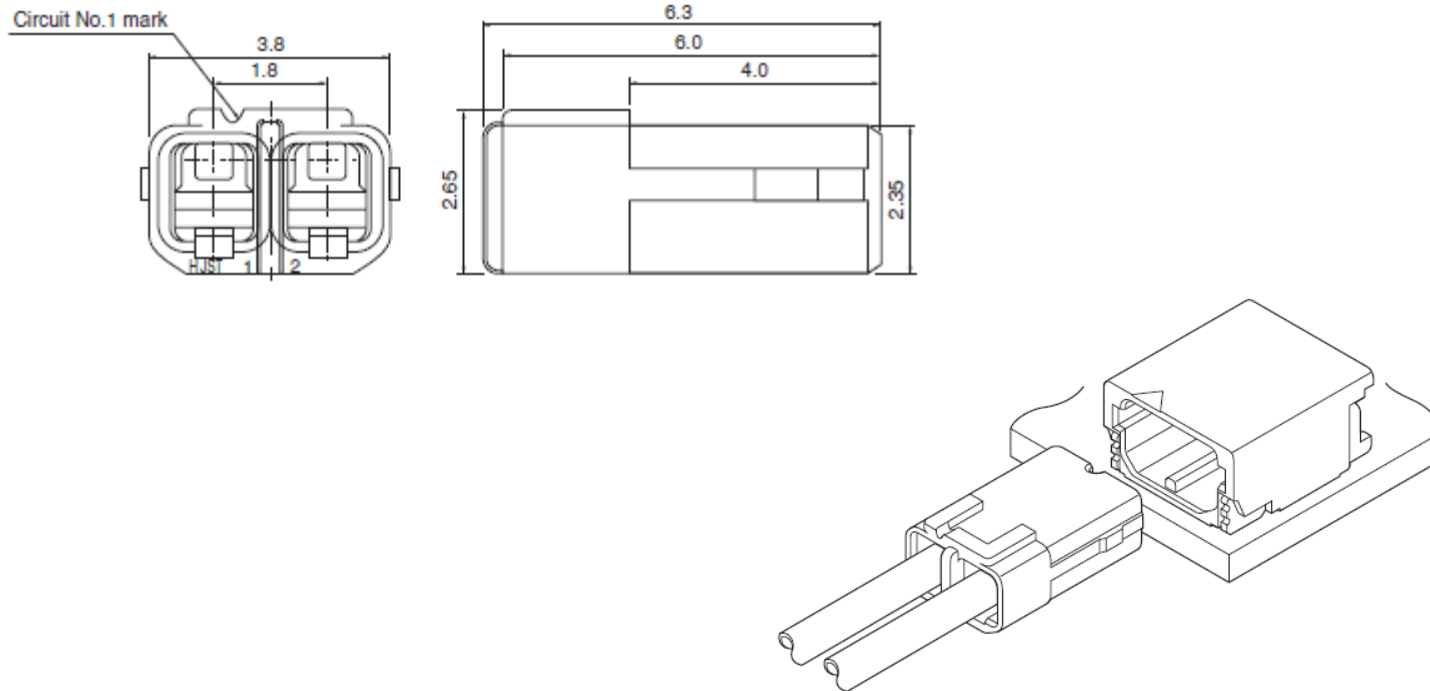
RoHS compliance

The SFH contacts, which are designed to accommodate a wire range of 22AWG to 30AWG are tin-plated over a phosphor bronze base material. The box construction ensures stable contact performance, redundant contact points, positive electrical contact and low contact resistance at all times even when subjected to vibration and distortion.

The suggested wire strip length is 1.7mm. Crimp heights vary by wire size - 0.56mm (30 AWG) to 0.78mm (22 AWG).

SFH Connector

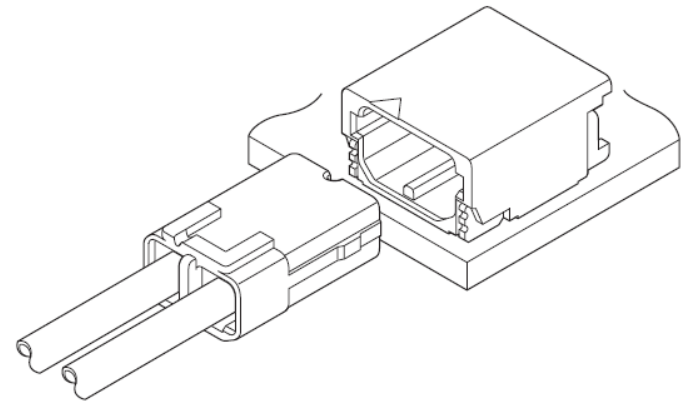
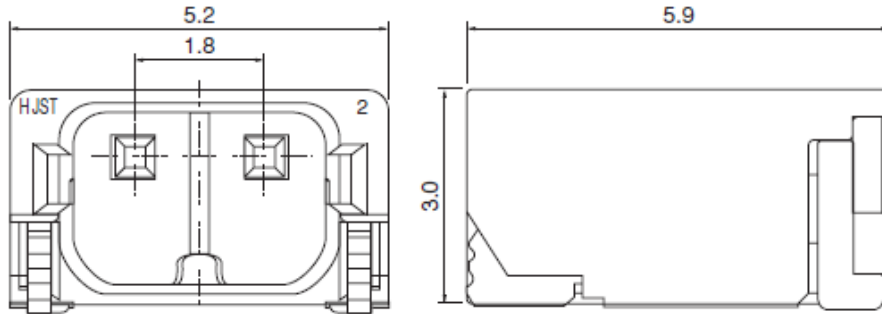
crimp style wire-to-board housing



Molded in a 94V-0 rated thermoplastic resin, the polarized SFHseries housings incorporate a friction locking feature helping to prevent accidental disconnection due to routing of wires or vibration. Available in 2 circuits only. The friction lock provides an audible click and is felt when mating the housing assembly with the mating header. The housing is notched on one side for ease of locating the pin 1 position.

SFH Connector

SMT headers



Side-entry

Available in side-entry (right angle) only mounting configuration, the RoHS compliant, fully shrouded headers are 94V-0 rated and feature insertion guides for easy and secure insertion of the mating SFH housings. The copper alloy posts are reflow treated tin-plating over copper-underplating and are designed to prevent accidental removal of the pins that might result from distorted mating. Copper alloy, copper-underplated tin-plated reinforcement tabs offer strength and stability to the mounted headers. The SMT headers are packaged in embossed tape for automated placement equipment.

THE SFH SERIES IS ENGINEERING & MANUFACTURING FREINDLY



**Bench press and
applicator for the
SFH series**



**Industry standard applicator for the
SFH Series**

CMKSL / CMKDPSSFH00105

CMKSL / CMKDPSSFH00205



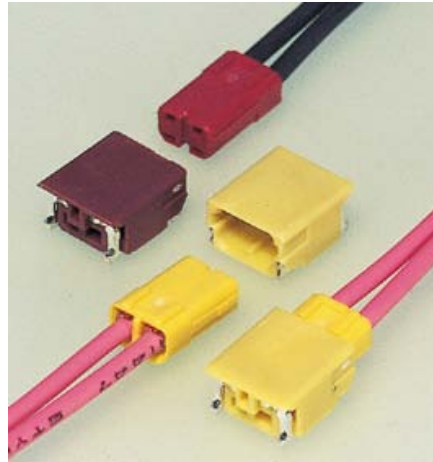
**Hand tools for the
SFH Series**

WC-SFH1

WC-SFH2

Applicators are available for semi-automatic and fully automatic termination equipment normally found in the manufacturing environment as well as standard hand tools. Standard reels (15,000 pieces) are used with semi-automatic and fully automatic assembly equipment are available for manufacturing. For prototyping and light production needs, hand tools are available.

THE SFH SERIES SUMMARY



The SFH wire-to-board connector is a low profile, compact connector system:

- **Compact size and pitch**
- **Reliable contact construction ideal for low current, low voltage conditions**
- **Available in 2 positions**
- **Applicable AWG #22 to 30**
- **Secure, friction locking**
- **RoHS compliant SMT product**
- **Supported with termination tooling for manufacturing requirements.**

PRODUCT SPECIFICATION

Customer: GENERAL	No. T-1-2173 (R-1-2173)	Date Issued: December 1, 2005
	Revised: C	Date Revised: October 20, 2009
Title Subject: SFH Connector (Lead-free product)		Issued by: Osaka Engineering Center

This product specification contains the results of performance tests for the SFH Connector (Lead-free product).

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Prepared by: <i>M. Veda</i>	Checked by: <i>K. Ichimi</i>	Reviewed by: <i>K. Wanaoka</i>	Approved by: <i>K. Shimizu</i>
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1. PART NAME & PART NUMBER

Part Name			Part Number
Header	Taping product		SM02B-SFH()S-TF (LF)(SN)
	Loose piece product		SM02B-SFH()S (LF)(SN)
Socket	Contact	002 type	SSFH-002T-P0.5
		001 type	SSFH-001T-P0.5
	Housing		SFHR-02V-()

Note₁: A character of an alphabet in color is indicated in ().

Note₂: (LF)(SN) as identification part number indicating pure tin-plated specification of lead-free product shall be displayed on a label until all products are shifted to the lead-free.

2. CONSTRUCTION, DIMENSIONS, MATERIAL & SURFACE FINISH

Construction and dimensions shall be in accordance with the referenced drawings.
Material and surface finish shall be as specified below.

Part Name			Material	Surface Finish, etc.
Taping part	Carrier tape		Polyester	
	Cover tape		Polyester	
	Reel	Flange	Polystyrene	
		Core	Polypropylene Polystyrene	
Header	Post		Copper alloy	Copper-underplated Tin-plated
	Wafer		Heat resisting resin	Color: Red, Lemon yellow Flammability: UL94V-0
	Solder tab		Copper alloy	Copper-underplated Tin-plated
Socket	Contact		Copper alloy	Tin-plated
	Housing		Thermoplastic resin	Color: Red, Lemon yellow Flammability: UL94V-0

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3. CHARACTERISTICS

Item		Rated Value	
Current rating		AWG#22: 4.0A (AC, DC)	
		AWG#24: 3.0A (AC, DC)	
		AWG#26: 2.0A (AC, DC)	
		AWG#28: 1.5A (AC, DC)	
		AWG#30: 1.0A (AC, DC)	
Voltage rating		350V (AC, DC)	(Note ₃)
Temperature range		-25°C to +85 °C	(Note ₄)
Applicable wire	Specification		Tin-plated annealed copper wire (stranded wire)
	002 type	Conductor size	AWG#30 to AWG#26
		Insulation O.D.	φ0.70 to φ1.25 mm
	001 type	Conductor size	AWG#26 to AWG#22
		Insulation O.D.	φ0.95 to φ1.30 mm

Note₃: Clearance between the connector and other metallic parts shall be longer than the length of the circuit pitch.

Note₄: Including temperature rise in applying an electrical current.

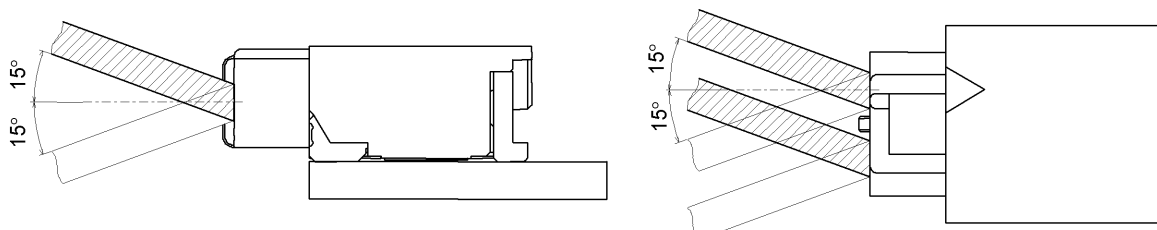
4. ABOUT WHISKER

Although the lead-free plating of this product has performed re-flow tin plating which ensures maximum effectiveness for retarding whisker growth, it is not possible to completely eliminate the whisker problem.

5. NOTICE

5.1 For handling wire

Make allowance so that the force of more than the tension by bending the wire should not apply to the connector when handling the wire. Mate and unmate the product while holding wires in a bundle on the mating axis. However, when withdrawal operation on mating axis is difficult, operate within 15 degrees against the mating axis.



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6. PACKAGING SPECIFICATION (EMBOSSSED-TAPING)

6.1 Packaging Quantity

Quantity to be wound shall be 2,000 pieces per reel as the standard quantity.

6.2 Packaging Method

- (1) Each header shall be put into the fixed position^{*1)} of the embossed carrier tape individually. The tape shall be sealed with cover tape by heat treatment.
- (2) After sealed, the carrier tape shall be wound^{*2)} to reel to be specified quantity and the end of cover tape^{*3)} shall be fixed by adhesive tape.
- (3) The wound reel shall be packaged in a corrugated cardboard box for shipment.

Notes *1: See the attached drawing.

*2: The direction to be wound: See the attached drawing.

*3: Corresponding to leader part in taking out the tape.
The treatment of the end of tape; see the attached drawing.

6.3 Marking

The label marked the following items shall be attached to the flange part of the reel.

- | | |
|------------------------------|--------------------------------------|
| (1) Part number | (4) Company name or its abbreviation |
| (2) Quantity | (5) Other necessary items |
| (3) Manufacturing lot number | |

6.4 Storage

Store the products in a clean room of the following conditions under the JST original packaging condition.

Temperature: 5 to 35 °C

Humidity: 60% max.

7. SPECIMEN

Part Name			Part Number
Header	Taping product		SM02B-SFHRS-TF (LF)(SN)
	Loose piece product		SM02B-SFHRS (LF)(SN)
Socket	Contact	002 type	SSFH-002T-P0.5
		001 type	SSFH-001T-P0.5
	Housing		SFHR-02V-R

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8. TEST CONDITIONS

- 1) When tested in accordance with the test conditions and methods specified in each item, each requirement shall be met.
- 2) 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 %

- 3) For environmental tests, as a rule, the specimen that a header and a socket are assembled for actual use and the wire of UL1061 style (AWG#26) shall be used.

9. REQUIREMENTS, TEST METHODS & TEST RESULTS

9.1 Taping Part

9.1.1 Appearance

- Requirement: (1) Sprocket hole shall not be covered with cover tape.
 (2) Cover tape shall not run out of carrier tape.
 (3) Cover tape shall not be peeled.
 (4) There shall be no other defects.

Test method: Visual inspection.

Test result: Good.

9.1.2 Tensile Strength of Tape

Requirement: There shall be no defects such as breakage.

Test method: Pulling load of 10N shall be applied to each of carrier tape and cover tape. Pulling direction shall be its pulling-out direction. After that, defects such as breakage shall be checked.

Test result: There was no defect.

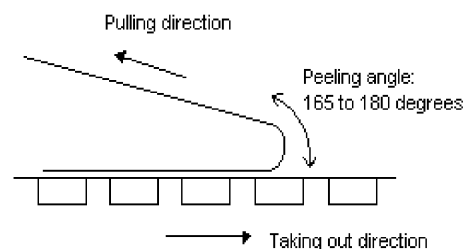
9.1.3 Peel Strength of Cover Tape

Requirement: 0.1 to 1 N

Test method: Cover tape shall be pulled as shown in the figure on the right side. (Peeling speed: 300mm/min.)

Test result:

0.2 to 0.5 N



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9.2 Connector part

9.2.1 Appearance

Requirement: There shall be no crack, no deformation or discoloration which may affect the performance specified in this specification.

Test method: Visual inspection.

Test result: Good.

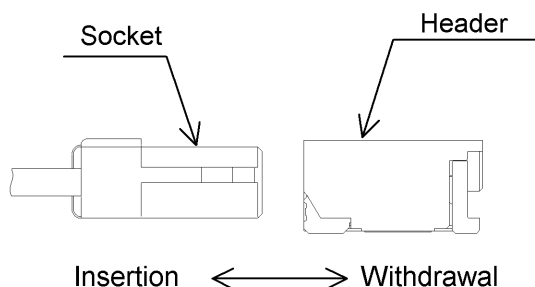
9.2.2 Mechanical Performance Test

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

Requirement:

No. of circuits	At initial		At 30th
	I.F. (N max.)	W.F. (N min.)	W.F. (N min.)
2	20	4	2

Test method: A housing with crimped contacts and a header shall be mated and unmated on the mating axis. Initial insertion and withdrawal forces and also withdrawal force at 30th shall be measured.
(Testing speed: 1 to 5mm/sec.)



Test result:

UNIT: N				
No. of circuits	Items	Ave.	Max.	Min.
2	Initial I.F.	7.5	8.4	6.2
	Initial W.F.	6.2	7.0	5.5
	W.F. at 30th	4.9	6.1	4.1

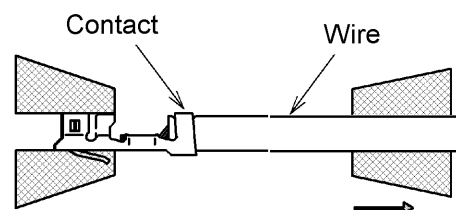
n=10

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9.2.2.2 Crimp Tensile Strength

Requirement:

Wire to be used		Requirements N min.
002 type	AWG#30	5
	AWG#28	10
	AWG#26	20
001 type	AWG#26	20
	AWG#24	30
	AWG#22	50



Test method: Pulling load shall be applied to a correctly crimped contact and a wire. The load to pull the wire out of the contact or break the wire shall be measured. (Testing speed: Approx. 25mm/min.)

Test result:

Wire size		UNIT: N		
		Ave.	Max.	Min.
002 type	UL1571 AWG#30(7/0.102)	12.5	12.9	12.3
	UL3595 AWG#28(7/0.127)	23.7	23.8	23.6
	UL1061 AWG#26(7/0.16)	34.9	36.6	34.2
001 type	UL1061 AWG#26(7/0.16)	31.6	33.6	30.0
	UL1061 AWG#24(7/0.203)	56.4	59.0	53.7
	UL1061 AWG#22(7/0.16)	74.6	76.5	72.9

n=10

9.2.2.3 Contact Retention Force

Requirement: 10N min.

Test method: A crimped contact shall be mounted in a housing and pulled on the mating axis. The load to pull the contact out of the housing shall be measured.

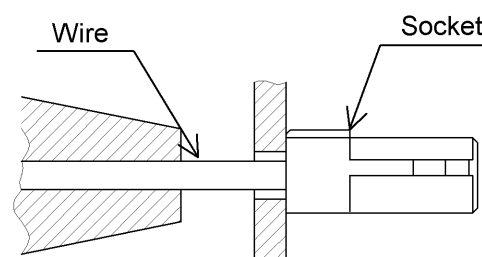
(Testing speed: 1 to 5mm/sec.)

Wire to be used: AWG#26

Test result:

UNIT: N		
Ave.	Max.	Min.
24.2	25.3	20.3

n=10



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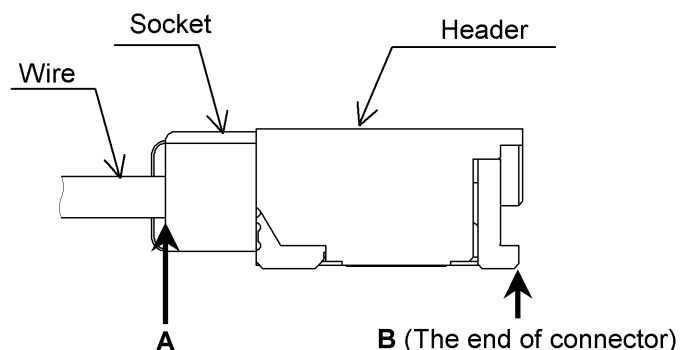
9.2.3 Electrical Performance Test

9.2.3.1 Contact Resistance

Requirement: Initial: 10mΩ max.
After tests: 20mΩ max.

Test method: Contact resistance between points A and B of a specimen assembled for actual use as shown in the figure below shall be measured under the following conditions.

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



Test result: See each environmental test item.

9.2.3.2 Current Continuity

Requirement: There shall be no current discontinuity longer than 1 microsecond during a vibration test.

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

Test result: See vibration test item.

9.2.3.3 Insulation Resistance

Requirement: Initial: 1,000MΩ min.
After tests: 500MΩ min. (Humidity & thermal shock tests)

Test method: 500V DC shall be applied between adjacent contacts of a mated specimen to measure insulation resistance. (The header shall not be soldered.)

Test result:

UNIT: MΩ	
Items	Measured values
Initial	1,000 min.
After humidity test	1,000 min.
After thermal shock test	1,000 min.

n=10

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9.2.3.4 Dielectric Withstanding Voltage

Requirement: There shall be no breakdown or flashover.

Test method: Testing voltage specified below at frequency of 50Hz or 60Hz shall be applied between adjacent contacts of a mated specimen for one minute. (The header shall not be soldered.)

Initial: 1,700V AC
After tests: 1,700V AC (Humidity & thermal shock tests)

Test result:

Initial	Good
After humidity test	Good
After thermal shock test	Good

n=10

9.2.4 Environmental Test

9.2.4.1 Durability

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: A housing with crimped contacts and a header shall be mated and unmated. After repeated 30 cycles, contact resistance shall be measured.

Test result:

UNIT: mΩ

	Initial			After the test		
Contact resistance	Ave.	Max.	Min.	Ave.	Max.	Min.
	3.0	3.1	2.9	3.4	3.8	3.2

n=10

Title Subject:	SFH Connector (Lead-free product)	No. T-1-2173 (R-1-2173)	Revised: C
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9.2.4.2 Humidity

Requirement: Contact resistance shall be 20mΩ max. after the test.
 Insulation resistance shall be 500MΩ min. after the test.
 There shall be no breakdown or flashover on the dielectric withstanding voltage test.

Test method: A specimen assembled for actual use shall be placed in a humidity chamber of the following conditions. After the test, 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:

UNIT: mΩ

	Initial			After the test		
Contact resistance	Ave.	Max.	Min.	Ave.	Max.	Min.
	2.9	3.0	2.8	2.9	3.0	2.9

n=10

9.2.4.3 Heat Aging

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: A specimen assembled for actual use shall be placed in a heat oven of the following conditions. After the test, contact resistance shall be measured.

Temperature: 85 ± 2 °C
 Period: 250 hours

Test result:

UNIT: mΩ

	Initial			After the test		
Contact resistance	Ave.	Max.	Min.	Ave.	Max.	Min.
	2.9	3.0	2.8	3.1	3.3	3.0

n=10

Title Subject:	SFH Connector (Lead-free product)	No. T-1-2173 (R-1-2173)	Revised: C
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9.2.4.4 Thermal Shock

Requirement: Contact resistance shall be 20mΩ max. after the test.
 Insulation resistance shall be 500MΩ min. after the test.
 There shall be no breakdown or flashover on the dielectric withstanding voltage test.

Test method: A specimen assembled for actual use shall be subjected to a thermal shock test of the following conditions. After the test, 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:

UNIT: mΩ

	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	2.9	2.9	2.8	3.0	3.1	2.9

n=10

9.2.4.5 Hydrogen Sulfide Gas

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: A specimen assembled for actual use shall be subjected to a hydrogen sulfide gas of the following conditions. After the test, contact resistance shall be measured.

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

Test result:

UNIT: mΩ

	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	2.9	3.0	2.8	3.2	3.4	3.0

n=10

Title Subject:	SFH Connector (Lead-free product)	No. T-1-2173 (R-1-2173)	Revised: C
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9.2.4.6 Salt Spray

Requirement: Contact resistance shall be 20mΩ max. after the test.

Test method: A specimen assembled for actual use 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:

UNIT: mΩ

	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	2.9	2.9	2.8	3.2	3.3	2.9

n=10

9.2.4.7 Vibration

Requirement: Contact resistance shall be 20mΩ max. after the test.
 There shall be no current discontinuity longer than 1 microsecond during the test.

Test method: A specimen shall be mounted on a printed circuit board (PCB) and subjected to a vibration test of the following conditions. During the test, current continuity shall be checked. After the test, contact resistance shall be measured.

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

Test result:

UNIT: mΩ

	Initial			After the test		
	Ave.	Max.	Min.	Ave.	Max.	Min.
Contact resistance	2.7	2.9	2.7	2.9	3.0	2.7

Current continuity	There was no current discontinuity longer than 1 microsecond.
--------------------	---

n=10

Title Subject:	SFH Connector (Lead-free product)	No. T-1-2173 (R-1-2173)	Revised: C
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9.2.4.8 Ammonia Gas

Requirement: There shall be no stress corrosion cracking.

Test method: A mated specimen shall be subjected to an ammonia gas test of the following conditions. (The connector shall not be soldered.)
After the test, stress corrosion cracking shall be checked.

Ammonia solution: 3 % in weight
Solution volume: 25ml per liter of volume
Period: 7 hours

Test result:

There was no stress corrosion cracking.

n=10

9.2.5 Solder Test

9.2.5.1 Solderability

Requirement: Plating surface of solder-dipping section of a specimen shall be covered with smooth solder.

Test method: Fluxed soldering section of a specimen shall be dipped in solder of the following conditions.

Solder: Sn-3Ag-0.5Cu
Flux: Activation flux
(CF-110VH-2A made by Tamura Kaken Corporation)
Solder temperature: 245 ± 5 °C
Immersion period: 3 ± 0.5 seconds

Test result:

Good.

n=10

Title Subject:	SFH Connector (Lead-free product)	No. T-1-2173 (R-1-2173)	Revised: C
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9.2.5.2 Resistance to Soldering Heat

Requirement: There shall be no deformation or damage which may affect the performance.

Test method:

[By soldering iron]

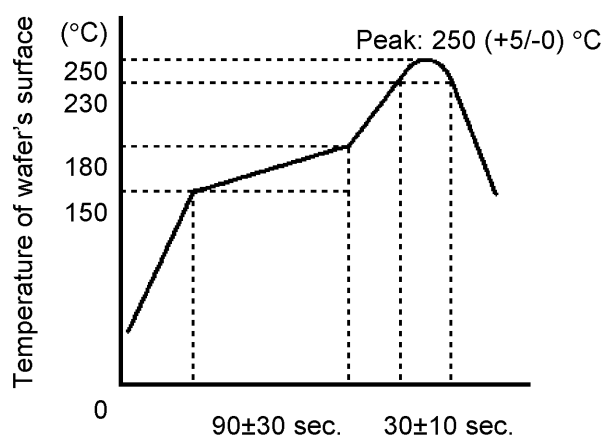
A specimen shall be mounted on a PCB and soldered by soldering iron of the following conditions. No abnormal load such as lateral load shall be applied to the specimen during the test.

Solder:	Sn-3Ag-0.5Cu
Temperature of the tip:	350 °C
Period of soldering:	3 seconds

[By reflow soldering]

A specimen shall be subjected to a reflow soldering of the condition shown in the graph below. After the test, the appearance shall be observed.

Material of testing PCB shall be glass based epoxy resin and its thickness shall be 0.8mm.



Temperature Profile for Reflow Soldering

Test result:

There was no deformation or damage which may affect the performance.

n=10

1

2

3

4

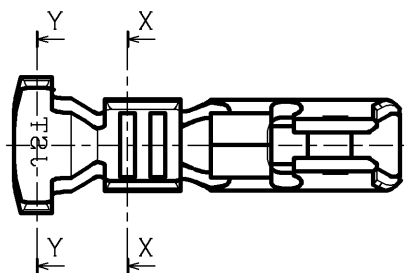
REV.	DESCRIPTION	DATE	DESIGNED
△			

A

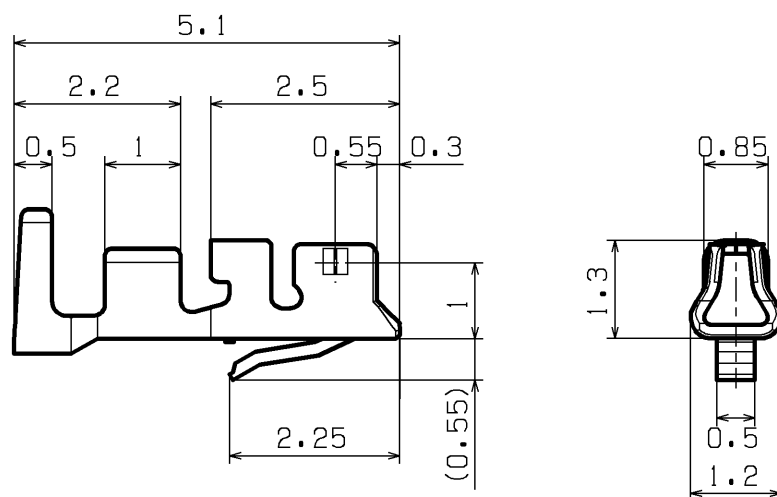
NOTE

1. Unless otherwise specified,
tolerances are ± 0.3 .

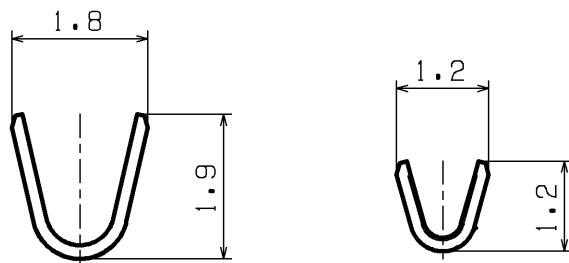
B



C



D





E

INSULATION BARREL
(Y-Y sec.)

WIRE BARREL
(X-X sec.)

F

	SOCKET CONTACT		COPPER ALLOY		TIN-PLATED	
					t0.2	
No.	PART NAME		MATERIAL		SURFACE FINISH	
					REMARKS	
SIZE	UNIT	SCALE	PROJECTION	DATE	CUSTOMER	
A4	METRIC	10:1		FEB.20.2006		
APPROVED		CHECKED	DESIGNED	DRAWN	SERIES NAME	
M.H		Y.U	K.M	H.K	SFH CONNECTOR	
 J.S.T.MFG.CO., LTD.					PART No.	
					SSFH-002T-P0.5	
					DRAWING No.	KRD-36009-1

THIS DRAWING CONTAINS INFORMATION THAT IS PROPRIETARY TO J.S.T.
AND SHOULD NOT BE USED WITHOUT WRITTEN PERMISSION.

EC4118-1

1

2

3

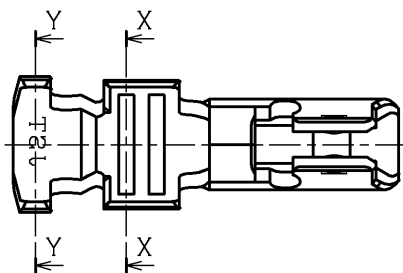
4

REV.	DESCRIPTION	DATE	DESIGNED
△			

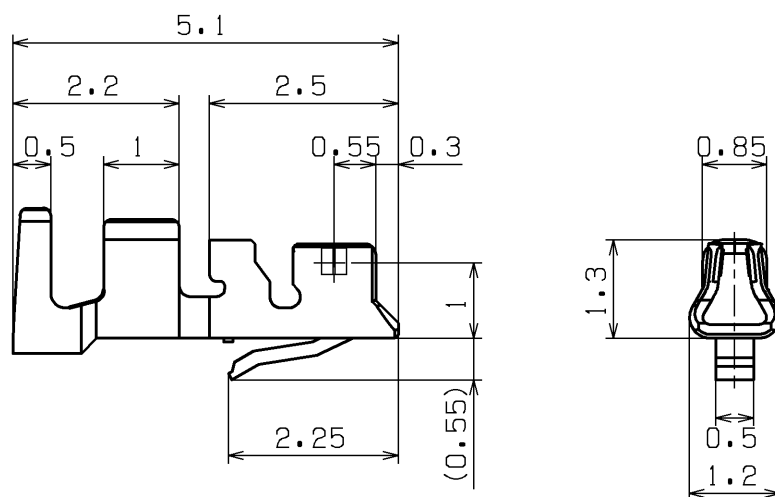
A

NOTE

1. Unless otherwise specified,
tolerances are ± 0.3 .

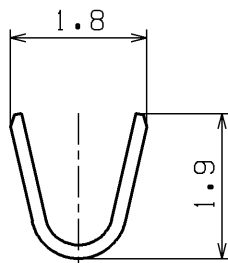


B

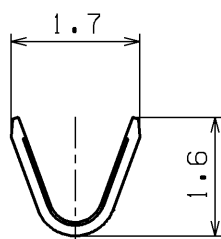


C

D



INSULATION BARREL
(Y-Y sec.)

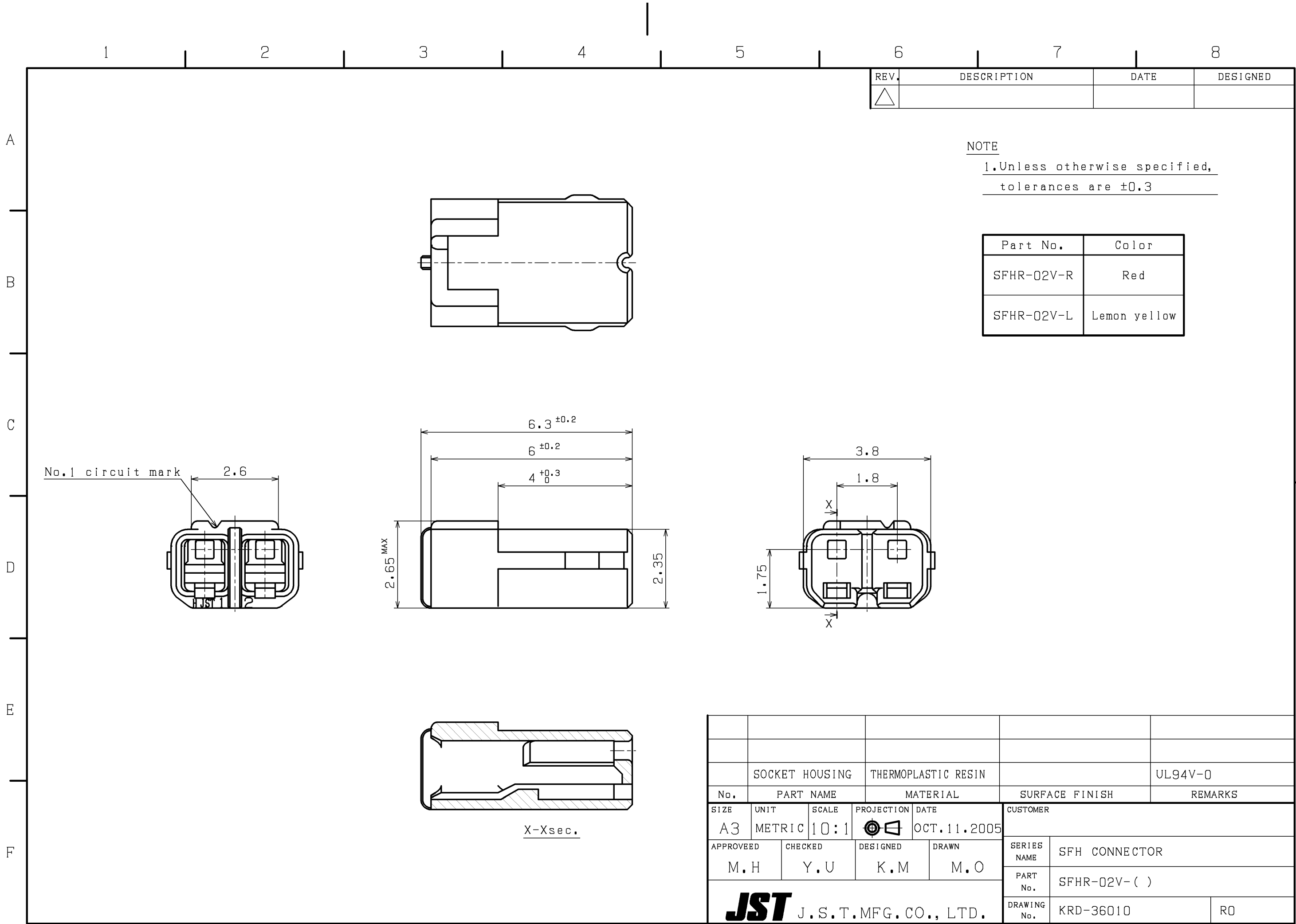


WIRE BARREL
(X-X sec.)

E

	SOCKET CONTACT	COPPER ALLOY	TIN-PLATED	t0.2	
No.	PART NAME	MATERIAL	SURFACE FINISH	REMARKS	
SIZE	UNIT	SCALE	PROJECTION	DATE	CUSTOMER
A4	METRIC	10:1		NOV.10.2006	
APPROVED	CHECKED	DESIGNED	DRAWN	SERIES NAME	SFH CONNECTOR
M.H	Y.U	K.M	M.Y	PART No.	
JST J.S.T.MFG.CO., LTD.				DRAWING No.	KRD-38907
					RO

F



No. CHM-1-2154	Date issued: December 14, 2005
Title of Document: HANDLING MANUAL	Revision No. R1
Title Subject: SFH Connector	Date revised: August 11, 2006
	Issued by: Osaka Engineering Center

This handling manual describes operation points of crimping and handling of SFH connector contact. Be sure to read this manual thoroughly before conducting crimping operation and keep this manual near the machine to use for reference when required.

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Prepared by: <i>T.Sawano</i>	Checked by: <i>H.Yanagida</i>	Reviewed by: <i>K.Ichimi</i>	Approved by: <i>M.Hara</i>
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Title: HANDLING MANUAL SFH Connector	No. CHM-1-2154	Rev. No. R1
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1. Part Name and Model Number

Part name		Model No.
SFH connector	Contact	002 type
		001 type
	Socket housing	
	Applicable header	

Note 1: Color is indicated in parenthesis by an alphabet.

2. Applicable Wire

	SSFH-002T-P0.5	SSFH-001T-P0.5
Applicable wire size	AWG #26 (7/0.160)	AWG #22 (7/0.254)
	AWG #26 (30/0.08)	
	AWG #28 (7/0.127)	AWG #24 (7/0.203)
	AWG #30 (7/0.1)	AWG #26 (7/0.160)
Wire insulation outer diameter (mm)	φ 0.70 ~ φ 1.25 mm	φ 0.95 ~ φ 1.30 mm
Conductor	Annealed copper stranded tin-plated wire	

3. Crimping Tool

Product name	Model No.	
	SSFH-002T-P0.5	SSFH-001T-P0.5
Semi-automatic press	AP-K2*	
Crimping applicator	MKS-L	
Die set (003 type)	MK/SSFH-002-05	MK/SSFH-001-05
Applicator and die set	APLMK SSFH002-05	APLMK SSFH001-05

Note: When crimping operation is conducted by using other than above applicator and die set, JST cannot guarantee the performance of connector.

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4. Check Points of Crimping Operation and Harness Assembly

Operation of crimping and assembly affects reliability of connector.

It is recommended that operation of crimping and assembly and finished products are controlled concentrating upon the following check points.

Process	Check point	Description
Crimping	Appearance	① Check that model Nos. of contact and applicator are adequate for wire to be used. ② Check that wire is crimped at normal position. ③ Check that crimp configuration is normal and excessive burr does not appear. ④ Check that uncrimped wire is not left behind. ⑤ Check that contact is not bent, deflected or deformed. ⑥ Check that contact is free from dirt, scratches, stains or discoloration.
	Tensile strength	① Check that crimp height and tensile strength are adequate.
Harness assembly	Appearance	① Check that contact is properly inserted into housing. ② Check that contact is securely locked with housing. ③ Check that housing is free from dirt and foreign matters.
Finished product (Harness)	Appearance	① Follow all descriptions stated above in "Appearance."

SFH connector contact is designed to be thin and compact to meet the demand for narrow pitch and space-saving.

It is recommended that appearance inspection be conducted by microscope or loupe.

5. Example of Defective Crimping and Points of Adjustment of Machine

Following defective crimping may lead to serious performance defect such as defective contacting. Before crimping operation, be sure to check that product appearance is free from abnormality.

5-1 Abrasion of crimping die

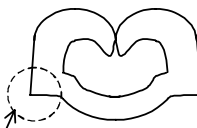
Regarding a crack caused by abrasion of crimping die, check the appearance of crimping part of contact and replace die with a new one occasionally in order to prevent discontinuity.

- Replacement timing of crimping die
 - ① When the number of proper crimping exceeds 300,000 crimping.
 - ② When excessive roughness of crimped contact surface is appeared. (Gloss of contact surface is disappeared.)
 - ③ When opening of seam of crimped part is appeared. (See figure below.)

Note: In the case that crimping is conducted beyond the reference timing, crack may appear on contact as below.

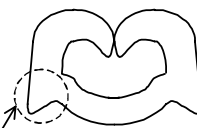
- Mechanism of occurrence of crack (Cross section at wire conductor part)

Initial condition of die



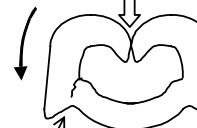
Flat part of contact is visible.

Worn-out die



Flat part is reduced due to wearing out of crimper anvil.

Opening of seam may occur.



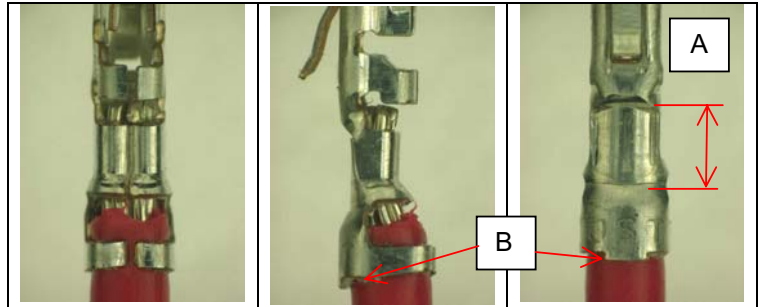
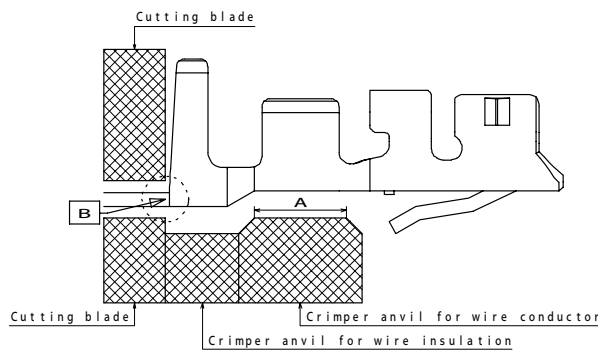
Shear stress shown by the arrow is applied to the edge of inside of contact, so that crack occurs.

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5-2 Deviation of crimping position

When crimping position is not adjusted properly, deformation of contact may occur.

• Proper crimping position



A: Position of crimping range of wire conductor

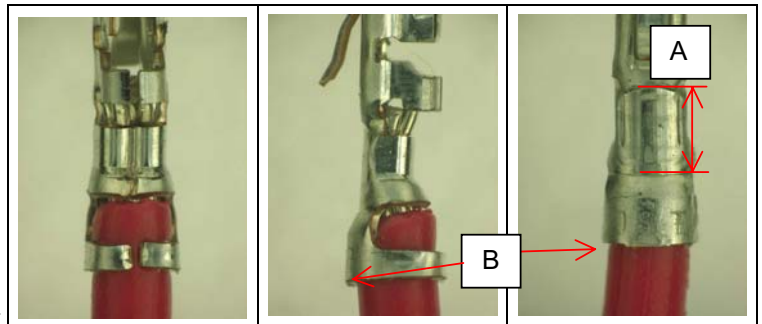
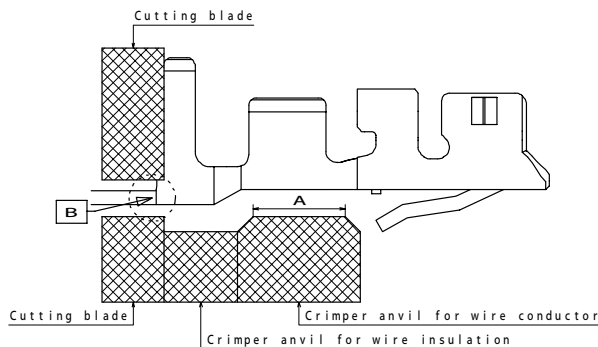
Crimping range "A" (crimping mark of crimper anvil) is within the range of crimping part side as shown in photo.

B: Cut-off tab

Cut-off tab must be visible. (Approx. 0.1 mm)

• Improper crimping position

① In the case that contact deviates from its normal position to insulation crimping side.



A: Position of crimping range of wire conductor

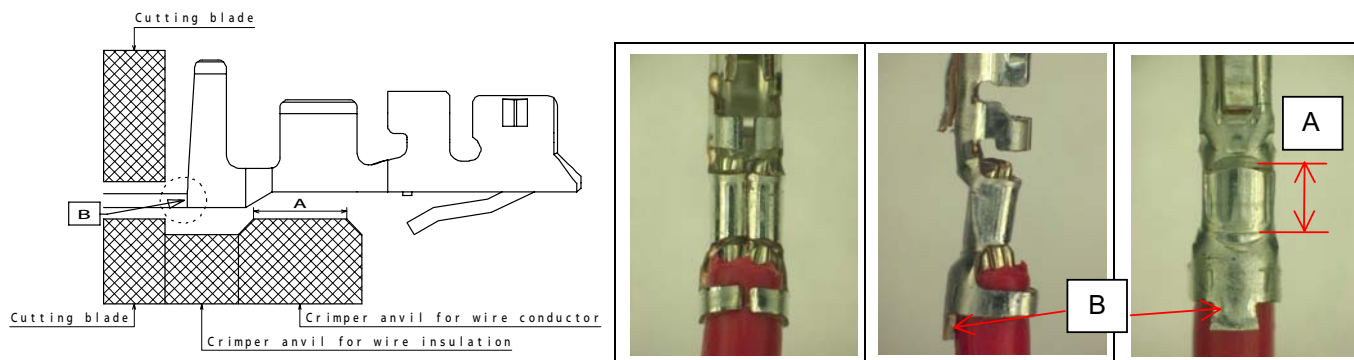
Crimping range "A" deviates excessively from its normal position to mating part side. In this case, crimper anvil for wire conductor comes in contact with mating part side of contact, so that the tip part of contact may be deformed.

B: Cut-off tab

Cut-off tab cannot be visible. In this case, wire insulation barrel comes in contacts with cutting blade, so that contact feeding defect and deformation may occur.

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② In the case that contact deviates from its normal position to wire crimping side.



A: Position of crimping range of wire conductor

Bell-mouth at insulation side cannot be visible. Bell-mouth can be visible at crimping side.

B: Cut-off tab

Cut-off tab is too long. (0.3mm or more)

In this case, cut-off tab protrudes from housing when inserting contact into housing, so that it may come in contact with other parts.

6. Crimping Operation

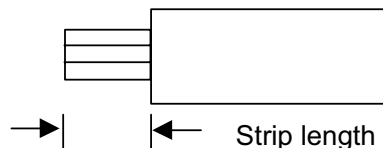
Before crimping operation, be sure to check that combination of contact, wire to be used, and crimping die are correct.

6-1 Wire strip length

Referring to reference value of wire strip length stated below, conduct wire stripping.

As wire strip length differs depending on type of wire and crimping method, decide the best wire strip length considering processing condition. When wire is stripped, do not damage or cut off wire conductors.

Reference value of wire strip length: 1.7 mm



6-2 Crimp height

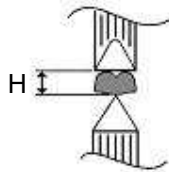
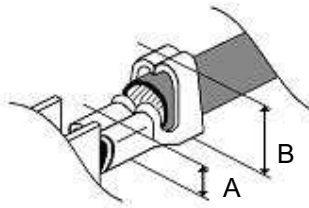
According to wire to be used, adjust dials of applicator to a proper crimp height as listed below.

	Wire		Crimp height (mm)	
	Size	Insulation O. D. (Ref. value)	Conductor part	Insulation part (Reference value)
SSFH-002T-P0.5	AWG #26 (30/0.08)	φ 1.09 mm	0.61 ~ 0.66	1.30
	AWG #26 (7/0.160)	φ 0.98 mm		
	AWG #28 (7/0.127)	φ 1.04 mm	0.56 ~ 0.60	1.30
	AWG #30 (7/0.1)	φ 0.70 mm		
SSFH-001T-P0.5	AWG #22 (7/0.254)	φ 1.26 mm	0.75 ~ 0.80	1.50
	AWG #24 (7/0.203)	φ 1.10 mm	0.68 ~ 0.73	1.45
	AWG #26 (7/0.160)	φ 0.98 mm	0.62 ~ 0.67	1.40

Note: Crimp height at insulation part is a reference value. Be sure to check the crimping condition of the insulation part before crimping operation.

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6-2-1 Measurement of crimp height

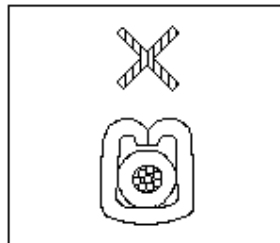


- A: Crimp height at wire barrel should be set to pre-determined dimensions.
- B: Adjust crimp height at wire insulation barrel to the extent that wire insulation is slightly pressed, and set it so that crimping is not excessively.
- H: Measure crimp height at the center of barrel using specified micrometer.

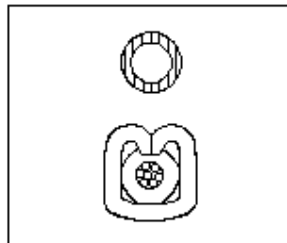
6-2-2 Measurement timing of crimp height

- ① When operation starts at morning and afternoon, starts after pausing and finishes.
- ② When contact reel is exchanged.
- ③ When applicator is adjusted. (after trouble-shooting, etc.)
- ④ When crimping dies are exchanged.

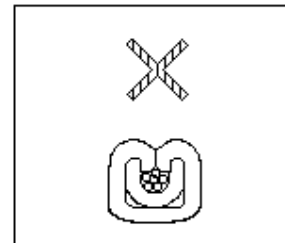
6-2-3 Crimping condition at insulation barrel



Insufficient crimping
(pressed weak)
When tension is applied
to wire, wire insulation
easily comes off contact.



Good

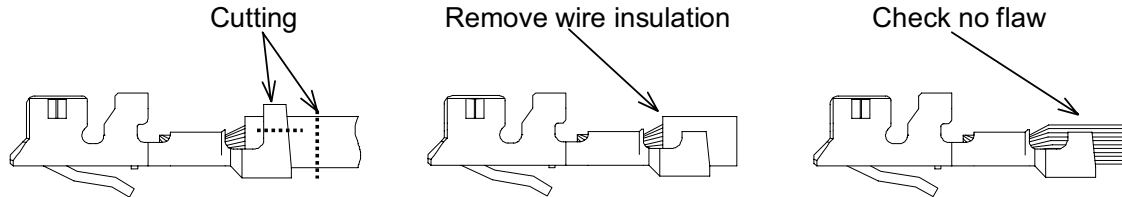


Excessive crimping
(pressed excessively)
Barrel bites wire too
much and may damage
wire conductors.

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6-2-4 Check of crimping condition at insulation barrel

Cut only wire insulation barrel, remove wire insulation and check if wire conductors are not damaged as below.



6-3 Tensile strength at crimped part

After adjusting crimp height, check tensile strength using test samples, and then, start continuous crimping operation. In case tensile strength greatly differs from normal tensile strength (actual value), check if there is a defect.

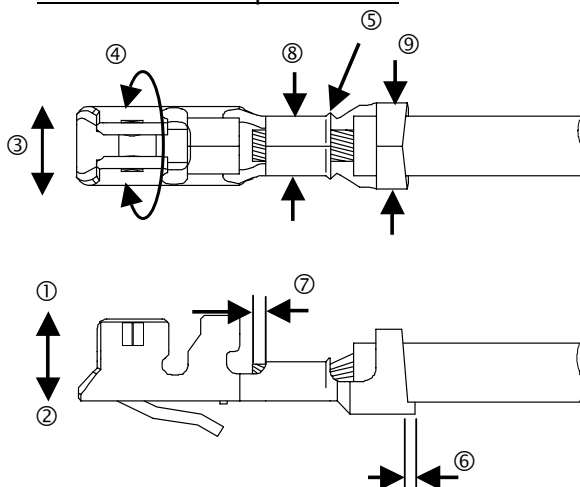
Unit: N

Contact	Wire size	Actual value	Requirement
SSFH-002T-P0.5	AWG #26 (30/0.08)	35.5 ~ 39.8	20 min.
	AWG #26 (7/0.160)	34.7 ~ 36.6	
	AWG #28 (7/0.127)	23.6 ~ 23.8	10 min.
	AWG #30 (7/0.1)	12.3 ~ 12.9	5 min.
SSFH-001T-P0.5	AWG #22 (7/0.254)	72.9 ~ 78.7	50 min.
	AWG #24 (7/0.203)	51.0 ~ 61.1	30 min.
	AWG #26 (7/0.160)	30.0 ~ 35.2	20 min.

6-4 Crimping appearance

Check crimping appearance visually for correct crimping with equipment such as a microscope or loupe.

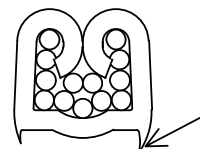
Part name of crimped contact



Check item	Reference value
① Bending up	5° max.
② Bending down	5° max.
③ Twisting	5° max.
④ Rolling	5° max.
⑤ Bell-mouth	0.05 ~ 0.30 mm
⑥ Cut-off length	0 ~ 0.25 mm
⑦ Wire conductor protruding length	0.10 ~ 0.40 mm
⑧ Crimp width at wire conductor part	approx. 0.93 mm
⑨ Crimp width at wire insulation part	approx. 1.40 mm

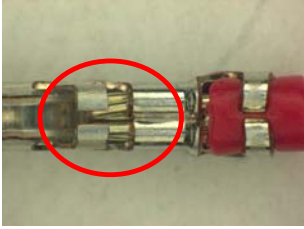
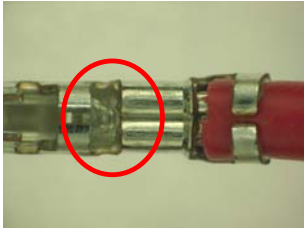
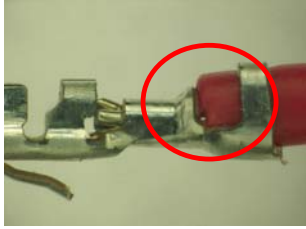
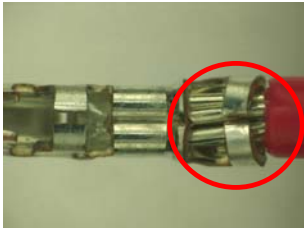
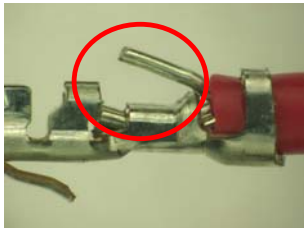
Remarks: As far as crimped contact can be inserted into housing, bending up of contact may be allowed.

6-4-1 There must not be large burr or one-sided burr.



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6-4-2 Examples of defective crimping

Wire conductor protruding length is long.	Wire conductor protruding length is short.	Wire barrel bites wire insulation.
		
Wire insulation is not crimped sufficiently.	Wire conductor comes off.	
		

6-5 Precautions for crimping operation

- ① Conduct crimping operation properly and inspect crimping appearance of crimped product with microscope or loupe.
- ② Do not conduct empty crimping and crimping twice, because they may cause outstanding burr at crimped part and may lead to abrasion of crimping die quickly.
- ③ As cutting residue (powder), etc. adhered to crimping die part affects life of dies, clean crimping part occasionally and conduct appropriate crimping.
- ④ As abrasion of crimping die and insufficient adjustment of applicator may cause defective crimping appearance, do not fail to conduct daily inspection.

6-6 Precautions for storage and handling of crimped contact

As crimped contact before inserting into housing is subject to deformation, etc. by external forces, pay careful attention to the following 4 points for storage and handling.

- ① Protect contacts by wrapping with thick paper to prevent from deformation of mating part and adhesion of foreign matter, and keep them in an adequate box.
- ② Do not place contacts in humid area, under direct sunshine and directly on the floor. Store them in a clean room with ordinary temperature and humidity.
- ③ Do not stack too much quantity of crimped contacts nor place anything on them, because weight of themselves may cause deformation of contact and troubles such as defective contacting.
- ④ When a crimped contact is taken out of bundle, do not pull wire but hold wire near crimped section and take it out.

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7. Harness Assembly Operation

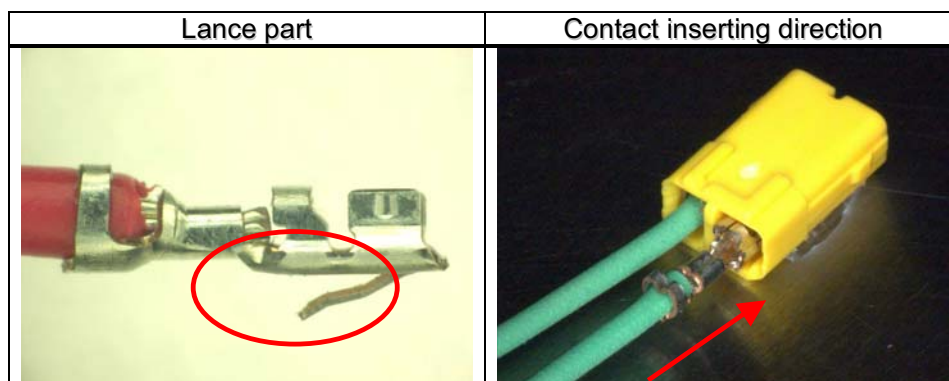
Harness assembly operation is a very important process to decide connector performance and harness quality. Careful operation is required for harness assembly as well as the said crimping operation.

7-1 Precautions before inserting crimped contact into housing

- ① Do not place other things on or near working table and do not conduct any other work on same working table to prevent from operation mistake.
- ② Do not stain contact with household goods such as oils, detergent, seasoning, fruit juice, etc. If stained, never use stained contact.
- ③ Do not use improperly crimped contact and deformed contact.
- ④ Rough handling of crimped contacts at bundling may cause deformation.
- ⑤ When a bundle of crimped contacts is loosened, do not pull crimped contacts forcibly even if they get entangled.

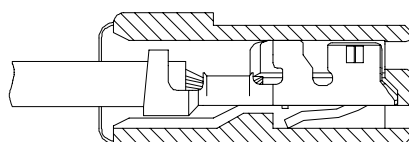
7-2 Inserting crimped contact into housing

- ① Hold contact with lance part down, and insert contact into housing straight.
(Do not pry or slant to insert.)

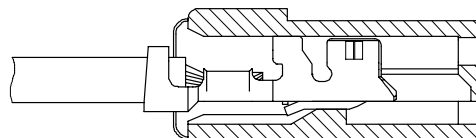


- ② Insert contact into housing without stopping to innermost.
When contact is fully inserted into housing, housing lance clicks and there is feeling of response.
- ③ Check secure locking per each insertion by pulling wire softly in order to check that contact does not come off housing.

SFH connector



Good



Incomplete insertion

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7-3 How to extract crimped contact from housing in case of mis-insertion


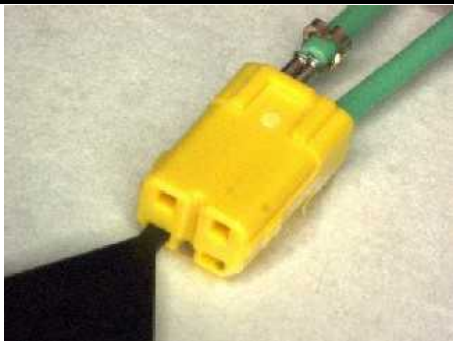
When contact is inserted into improper circuit hole, conduct the following points.

- ① Insert the exclusive extraction tool (EJ-SFH) into the housing lance releasing hole up to the backmost.
- ② Pull wire softly and extract contact from housing.

Note: Do not reuse once used housing, but use a new one. Do not reuse extracted contact in principle, but use a new one. When extracted contact is reused in some reason, contact reuse should be once, and check that extracted contact is free from damage.

- ② When improperly inserted contact is extracted from housing and the housing is reused.
 - Only specified person conducts the operation.
 - Do not lift housing lance over the proper position to modify because such handling may cause the breakage.
 - Housing reuse should be once.

SFH connector

Extraction tool (EJ-SFH)	Example of the use of the tool
	

8. Inspection of Finished Product (Continuity Check)

8-1 Simple wiring inspection using a tester

- Do not insert a tester stick into mating part.
Inadequate diameter of a tester stick and prying a tester stick may deform mating part.
- Contact a tester stick with wire insulation side inserting it from connector contact entrance of housing, and conduct inspection.

8-2 Wiring inspection using an inspection jig

Note the following points.

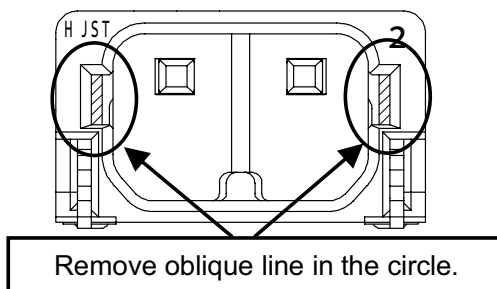
- Use header applicable to housing for inspection. (Refer to the table below.)

Contact to be used	Housing to be used	Applicable header
SSFH-002T-P0.5 SSFH-001T-P0.5	SFHR-02V-()-()	SM02B-SFH()S (LF)(SN)

Note 1: Color is indicated in parenthesis by an alphabet.

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It is recommended that locking part is removed from header and header without locking part mounted PC board is used in wiring inspection of socket.



- Use header and press pin free from deformation, damage and stains. When they are found, replace with a new one at once. Periodical replacement of header should be conducted as well after approx. 100 mating and unmating operations.
- Carefully conduct mating and unmating connector, holding housing without prying. When inspection board is used, design it considering that mating and unmating works are not difficult.

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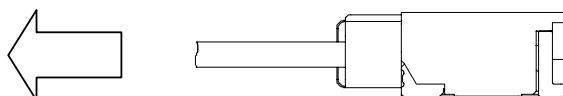
9. Handling Precautions

9-1 Mating connector

Hold receptacle housing securely and insert it into header straight against to header post until click sounds.

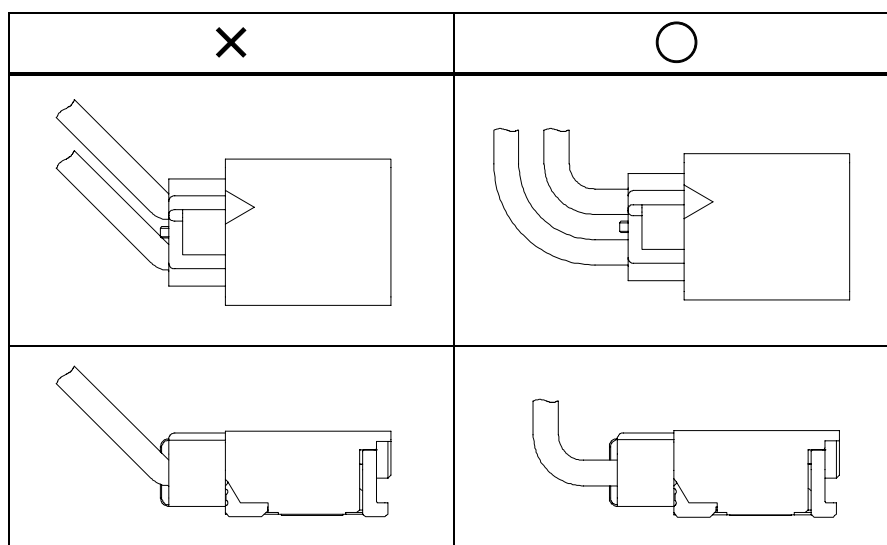
9-2 Unmating connector

Hold receptacle housing securely and withdraw it on the mating axis.



9-3 Routing of wire

Route wire so as not to apply external force to connector, considering an enough length to route and fixing of wire because contacting part of contact and connecting part with wire may be damaged, and it may cause defective contacting.



9-4 Prying of connector

As prying withdrawal may deform header post and damage receptacle housing, do not conduct prying withdrawal. When withdrawal operation on mating axis is difficult, conduct prying withdrawal within 15 degrees against the mating axis.

