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	REPORT	Issue No.	Page1/16asue No.Rev.CHM-1-23443asue date:May 19, 2010Revision date:September 8, 2021
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Customor	CENERAL	Issue date:	
Customer.	GENERAL	May 19, 2010	
Title subject:	LEA Connector	Revision date:	
The subject.	EEA Connector	September 8, 2021	1

This handling manual describes points to check for smooth crimping operation of the LEA connector.

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1. Part Name and Model Number

Part name			Model No.
Socket	Contact	Type 002	SSFH-002T-P0.5
	Contact	Type 001	SSFH-001T-P0.5
	Hou	sing	LEAR-()V-S
Header			SM()B-LEASS (LF)(SN)

Note₁: 2-digit figures in "()" denotes the circuit number.

The Identification marking "(LF)(SN)" on the product label stands for lead-free product. Note₂:

2. Storage

2-1 Storing the connector

Recommended storage condition: Temperature: 5 – 35 °C, Relative humidity 60 % or less (Under packaging like the state of JST shipment)

Keep off direct sunlight, places exposing to such corrosive gas as industrial gas (generate from a stove and whatnot) and ammonia gas (generate from a toilet and whatnot), dusty place and condensation.

Note that the resin molding part may break due to transportation and handling, such as processing and mating, under dry or low temperature condition.

After unpacking, return products in the original package to store.

2-2 Storing the crimped contacts

Not leaving the crimped contact to stand in a place exposed to high humidity and direct sunshine, and not placing them directly on the ground, keep them in a clean storage room.

Applicable Wire 3.

Type 002 (Model No.: SSFH-002T-P0.5)

Conductor size	AWG#30 ~ #26
Wire insulation outer diameter	φ0.70 ~ φ1.25 mm
Conductor spec.	Annealed copper stranded tin-plated wire

Type 001 (Model No.: SSFH-001T-P0.5)

Conductor size	AWG#26 ~ #22
Wire insulation outer diameter	φ0.95 ~ φ1.30 mm
Conductor spec.	Annealed copper stranded tin-plated wire

Special wires such as bare one, solid one, tin-coated one, shielded one and other than Note₃: above wires cannot be used in principle. When using such special wires, contact JST.

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4. Crimping Tool

Part name		Model No.		
Semi-automatic press		AP-K2()		
Applicator		MKS-L		
Dia	Type 002	MK/SSFH-002-05		
Die	Type 001	MK/SSFH-001-05		
Applicator and dia act	Type 002	APLMK SSFH002-05		
Applicator and die set	Type 001	APLMK SSFH001-05		

Note₄: When crimping operation is conducted by using other than the above applicator and die set, JST cannot guarantee the performance of the connector.

5. Check Points of Crimping Operation and Harness Assembly

The operations of crimping and assembly affect the reliability of the connector. It is recommended that the operations of crimping and assembly and the finished products be controlled concentrating upon the following check points:

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

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

We recommend using microscope or loupe at the appearance inspection.

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6. Crimping Operation

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

6-1 Wire strip length

Referring to the reference value of the wire strip length stated below, conduct wire stripping. As the wire strip length differs depending on type of wire and crimping method, decide the best wire strip length considering the processing condition. When a wire is stripped, do not damage or cut off wire conductors.



6-2 Crimping

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

Table of crimp height

	W	′ire	Crimp height (mm)		
	Conductor size	Insulation O. D. (mm)	Conductor part	Insulation part	
	AWG#30 (7/0.1)	φ0.70	0.54 ~ 0.58	1.20	
Turne 002	AWG#28 (7/0.127)	φ1.04	0.56 ~ 0.60	1.30	
Type 002	AWG#26 (7/0.160)	φ0.98 ¢1.00	0.61 ~ 0.66	1.30	
Type 001	AWG#26 (30/0.08) AWG#26 (7/0.160)	φ0.98	0.62 ~ 0.67	1.40	
	AWG#24 (7/0.203)	φ1.10	0.68 ~ 0.73	1.45	
	AWG#22 (7/0.254)	φ1.26	0.75 ~ 0.80	1.50	

Note₅: The crimp height at the insulation part is a reference value. Be sure to check the crimping condition at the insulation part, and conduct the operation.

6-2-1 Measurement of crimp height

According to a wire to be used, adjust the dials of the applicator to a proper crimp height.



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

6-2-2 Measurement timing of crimp height

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

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6-2-3 Crimping condition at insulation barrel







Good



Excessive crimping (pressed excessively) The barrel bites a wire, which may damage the wire conductors.

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

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



6-3 Tensile strength at crimped part

After adjusting the crimp height, check the tensile strength using the test samples, and then, start continuous crimping operation. In case the tensile strength greatly differs from the normal tensile strength (actual value), check if there is a defect. Tensile strength may be different even in the same wire size due to the difference in strength of wire itself.

			Unit: N
	Wire size	Actual value	Requirement
Type 002	AWG#30 (7/0.1)	12.3 ~ 12.9	5 min.
	AWG#28 (7/0.127)	23.6 ~ 23.8	10 min.
	AWG#26 (7/0.160)	34.7 ~ 36.6	30 min
	AWG#26 (30/0.08)	35.5 ~ 39.8	20 11111.
Type 001	AWG#26 (7/0.160)	30.0 ~ 35.2	20 min.
	AWG#24 (7/0.203)	51.0 ~ 61.1	30 min.
	AWG#22 (7/0.254)	72.9 ~ 78.7	50 min.

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6-4 Crimping appearance

Check the crimping appearance visually for correct crimping with equipment such as loupe.

6-4-1 Bending up/down, twisting and rolling



	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
Ø	Wire conductor protruding length	0.10 ~ 0.40 mm
8	Crimp width at conductor part	Approx. 0.93 mm
9	Crimp width at insulation part	Approx.1.40 mm

6-4-2 There must not be large burr or one-sided burr.



Abrasion of crimping die

As the cause of burrs, the abrasion of the crimping die is considered. When the burrs become large, electrical discontinuity may be caused due to cracks on the crimping part. Check the appearance of the crimping part of the contact and replace the die with a new one occasionally.

Replacement timing of crimping die

- When the number of proper crimping exceeds 300,000 crimping.
- When excessive roughness of the crimped contact surface appears. (Gloss of the contact surface disappears.)
- When the opening of the seam of the crimped part appears. (See figure below.) Note₆: In the case that crimping is conducted beyond the reference timing, a crack may appear on the contact as shown below.

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

Initial condition of die

Worn-out die



The flat part of the contact is visible.



due to wearing out of. the crimper anvil

Opening of seam may occur.



Shear stress shown by the arrow applies to the edge inside the contact, so that a crack occurs.

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6-4-3 Deviation of crimping position

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





- A: Position of crimping range of wire conductor Crimping range "A" (crimping mark of crimper anvil) is within the range of the 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 the contact deviates from its normal position to the insulation side.

A: Position of crimping range of wire conductor

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

B: Cut-off tab

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

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 $\ensuremath{\mathbb Q}$ In the case that the contact deviates from its normal position toward the mating side.



- A: Position of crimping range of wire conductor Bell-mouth at the insulation side cannot be visible. Bell-mouth can be visible at the mating side.
- B: Cut-off tab

Cut-off tab is too long. (0.3mm or more) In this case, cut-off tab protrudes from the housing when inserting the contact into the housing, so that it may come in contact with other parts.

6-4-4 Examples of defective crimping

Long protruded wire brush	Short protruded wire brush	Wire insulation bitten with wire barrel
Poor crimping on wire insulation	Stray wire conductors	

6-5 Precautions for crimping operation

- ① Conduct crimping operation properly and inspect the crimping appearance of the crimped product with microscope, loupe, etc.
- ② Do not crimp with no contacts and twice, because they may cause outstanding burrs at the crimped part and may lead to abrasion of the crimping die quickly.
- ③ As cutting residues (powder), etc. adhered to the crimping die part affects the life of the dies, clean the crimping part occasionally and conduct appropriate crimping.
- ④ As abrasion of the crimping die and insufficient adjustment of the applicator may cause defective crimping appearance, do not fail to conduct daily inspection.

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6-6 Control of crimping operation

To conduct secure crimping operation, record the following items for the semi-automatic press and the crimping applicator.

- ① Model No. or control No. of semi-automatic press and applicator
- ② Contact lot No.
- ③ The number of crimping and cumulative total
- ④ Crimp height
- S Wire retention force
- © Crimping appearance and record of adjustment and replacement of crimping die
- 6-7 Precautions for handling the crimped contact

As the crimped contact before inserting into the housing is subject to the deformation by external force, pay careful attention to the following points for the handling.

- O Protect the contacts by wrapping with thick paper to prevent from deformation of the mating part and adhesion of foreign substances, and keep them in an adequate box.
- ② Do not place the 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 the crimped contacts nor place anything on them, because the weight of themselves may cause deformation of the contact and troubles such as defective contacting other defects.
- ⑤ Do not use the contact improperly crimped and deformed.
- When the crimped contact is taken out of the bundle, do not pull wires but hold them near the crimped section and take it out.

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7. Harness Assembly Operation

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

7-1 Precautions before inserting the crimped contact into the housing

Before inserting the contact into the housing, check below points:

- ① Check that the combination of the housing and the contact is proper.
- ② Do not place other things on or near working table and do not conduct any other works on the same working table to prevent from operation mistake.
- ③ Do not use the contact (including the contact lance and the mating part) improperly crimped and deformed.
- ④ Do not conduct rough handling that shock, such as throwing and dropping, applies to the connector at bundling the harness. Rough handling may cause deformation and breakage of the connector. When the bundle of the crimped contacts is loosened, do not pull the crimped contacts forcibly even if they get entangled.
- 7-2 Inserting the crimped contact into the housing
 - ① <u>Turn the contact lance to the contact lance guide of the housing as shown below</u> and insert the contact straightly into the entrance hole of the housing along the guide. (Do not pry it in or insert it diagonally.)



- Insert the contact into the housing without stopping to the innermost. When the contact is fully inserted into the housing, the housing lance clicks and there is feeling of response.
 - ③ Do not use a pin such an insertion jig, because the tip of the pin accidentally reaches the contact mating part, leading to defective contacting or deformation of the contact.
 - ④ Check secure locking per each insertion by pulling a wire softly with force of approx. 5N in order to check that the contact does not come off the housing. Besides, check whether there is the backlash in the direction of the insertion axis.

(When a wire is pulled with too much force, the contact lance may be deformed and the contact may come off the housing.)



Good insertion



Insufficient insertion

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8. How to Extract Crimped Contact from Housing in Case of Mis-Insertion

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

- Do not reuse the housing and the contact that have been used once but use new ones. (The method of extracting the contact from the housing is as below.)
- When the contact inserted in an improper circuit is extracted from the housing by some reasons and reused:
 - Only a specified person conducts the operation.
 - In case that the contact is reused by some reasons, the reuse should be once.
 From twice, use a new contact.
 (If such an abnormality as damage and deformation is found on the contact, replace it with a new one at once.)
 Never reuse the housing.
 - After modification completes, be sure to check secure locking as shown in item 7-2.

How to extract the contact

- ① Insert the extraction tool for the LEA connector (EJ-SFH) into the lance release window up to the utmost.
- ② Pull a wire softly and extract the contact from the housing.



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9. Header

9-1 Recommended PC board pattern



Recommended metal mask thickness: 150µm

9-2 Reflow soldering method

We recommend reflow soldering at lower temperature than the temperature profile of reflow soldering described below.

As the recommended reflow temperature condition varies depends on the materials, such as solder paste, solder the connector according to the condition of the material.

We recommend using a metal mask about 0.15 mm in thickness which the blanking part has the same area as a PC board land area.

In case that the metal mask thickness is more than 0.15 mm, adjust the amount (area) of soldering coat by making the opening area smaller than the PC board pad area.

Considering the handling of this connector in mating operation, the tenacious heat-resistant resin is used for this connector. But 'blister' may generate on the outer surface of the housing during the process of reflow soldering, depending on the condition of moisture absorption of the housing and the condition of reflow soldering.

This "blister" does not cause the physical property change of PA resin. If the appearance is a concern, blister can be inhibited when pre-drying is carried out under the following conditions before use (reflow soldering).

Dry conditions: 50°C to 55°C, More than 20 hours (With embossed-reel)

*Product after such processing, please use it as soon as possible.

9-3 Solder iron method

Solder the connector inserted in a PC board by using a soldering iron of 350°C quickly within 3 seconds. When soldering, do not press the soldering iron's tip on the connector contact lead part nor apply abnormal force such as lateral load. If such an abnormal load applied, dismount and change the connector, and conduct soldering again.

Do not reuse the dismounted connector.

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10. Mating and Unmating Connector

- 10-1 Mating the connector
 - ① Check the direction of the socket toward the header.

The appearance of the properly directed socket and header



The No.1 circuit mark of the socket is on the same surface as that of the header.

② Holding the socket and all wires together, <u>insert the socket straightly into the header until clicking</u>. After inserting the connector, check secure locking whether there is a backlash to the fore-and-aft of the mating direction and the contact does not come off the housing by pulling a wire softly (approx.5N). (If there is no clicks, the insertion may incomplete, so try again the contact insertion. The redo operation should be kept to minimum.)



When the connector insertion complete



With the lock releasing part displaced

When the connector insertion is incomplete

Note₇: When the insertion operation on the mating axis is difficult, insert the connector <u>within 15 degrees</u> <u>against the mating axis</u>.

(The insertion operation over 15 degrees may damage the connector such as the expansion of the mating part.)



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10-2 Unmating connector

Push the both-sided lock release parts by the cushion of finger to release the lock completely. Holding all wires together, <u>pull out the socket straightly from the header on the mating axis.</u> Do not pull the connector out by force without releasing the lock, because some troubles such as breakage of the lock may arise.





Note₈: When the withdrawal operation on the mating axis is difficult, <u>withdraw the connector within 15</u> <u>degrees against the mating axis.</u>

(The withdrawal operation over 15 degrees may damage the connector such as the expansion of the mating part.)



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10-3 Handling of wires

As the LEA connector is secure locking type connector, breakage of the connector itself such as the soldering part and the lock part, and breakage of the PC board may occur due to the handling direction of the harness after mating the connector or tensile strength.

In order to prevent such troubles and to bring out fully the connector performance, here are the things you keep in handling the wire harness:

- Do not always apply external force to the connector other than tension or a load generated in normal wire harness operation.
- Provide moderate slack for a wire to make the mating and unmating of the connector easy, and conduct the operation on the mating axis.
- Such a consideration as keeping enough length and fixing wires is necessary in handling wires so as not to apply a larger external load than wire bucking level to the connector.
- Do not use the LEA connector at the movable part to the utmost. Fasten wires not to conduct directly the movement and the vibration of the wire to the connector contacting part as shown below.



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11. Handling Precautions

Considering the mating feeling, PBT resin that the dimensional change rate is low in absorbing moisture is adopted in this connector. As the resistance to shock of PBT resin is lower than that of PA resin, troubles such as the breakage and the deformation of the housing and the breakage of the lock part and the lance part may be caused when shock is applied to the connector due to harness handling during the operation and transportation, etc.

In order to prevent such a trouble and to bring out fully the connector performance, here are things you should remember:

- ① In handling the harness, do not apply an irregular load to the housing lock part.
- Careful operation is required for the storage and the transportation of the housing and the harness in a stacking condition. Stacking allowance in storage is up to 5 stacks of carton box for the housing, and storage and transport the harnessed product with as little load as possible.
- ^③ Fasten the tip of the remaining chain contact in the reel with wire, string, etc. to the reel so as not to unravel, and store it in a carton box.
- ④ Do not mate the socket contact without inserting it into the socket housing in order to prevent the deformation of the contact part.
- ⑤ Use the connector counterpart (header) for electrical continuity inspection of the connector assembly. Never use a different circuit pin including tester pins, because the contact part may be deformed.
- © Carefully check that the connector for electrical continuity is free from deformation, damage and stains. When they are found, replace with a new one at once. Periodical replacement of the header should be conducted as well.

Carefully conduct the mating and unmating operation of the connector, holding the housing without prying.

When an inspection board is used, design it considering that that mating and unmating works are not difficult.

- Do not stain the contact with household goods such as oils, detergent, seasoning and fruit juice.
 If stained, never use the stained contact.
- In the spray fumy insecticide in the place where the connector and the harnessed product are stored, or harness operation is conducted, because such spray may rust the metal part.
- Onduct the assembly and the mating operation of the connector in an ambient temperature (5 ~ 35°C) as much as possible.