DF40 Series Guideline

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ETAD-H1015-00

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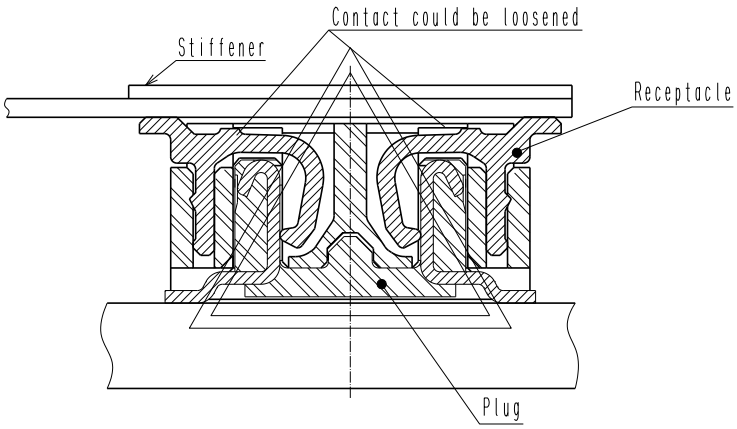
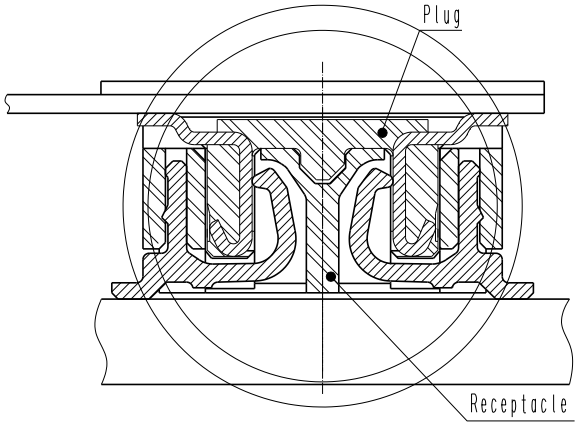
1 Design requirements

1.1 Mechanical requirements

1.1.1 FPC mounting

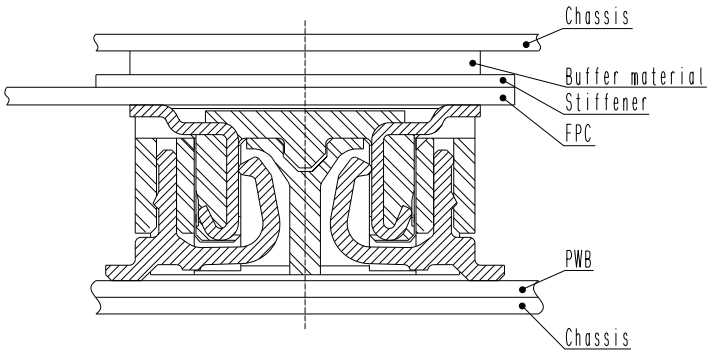
Attachment of a stiffener larger than the connector outline is recommended to the reverse face of the connector mounted area. Solder crack and contact looseness could occur due to the possible mechanical stress applied to contacts during un-mating process when this product is mounted onto low-rigidity or thin FPC. Under the circumstances, mount plug connector of which retention force is higher than the other to the FPC. 0.3 mm or thicker glass epoxy stiffener (up to 50 pin), and 0.5mm or thicker glass epoxy stiffener (over 60 pin) is recommended.





1.1.2 Unexpected disengaging prevention

Connector could be disengaged if momentary impact, caused by dropping etc., is applied to the connectors in use. In order to prevent connectors from disengaging, make sure to place a buffer material such as sponge to press down the connectors in mating direction.



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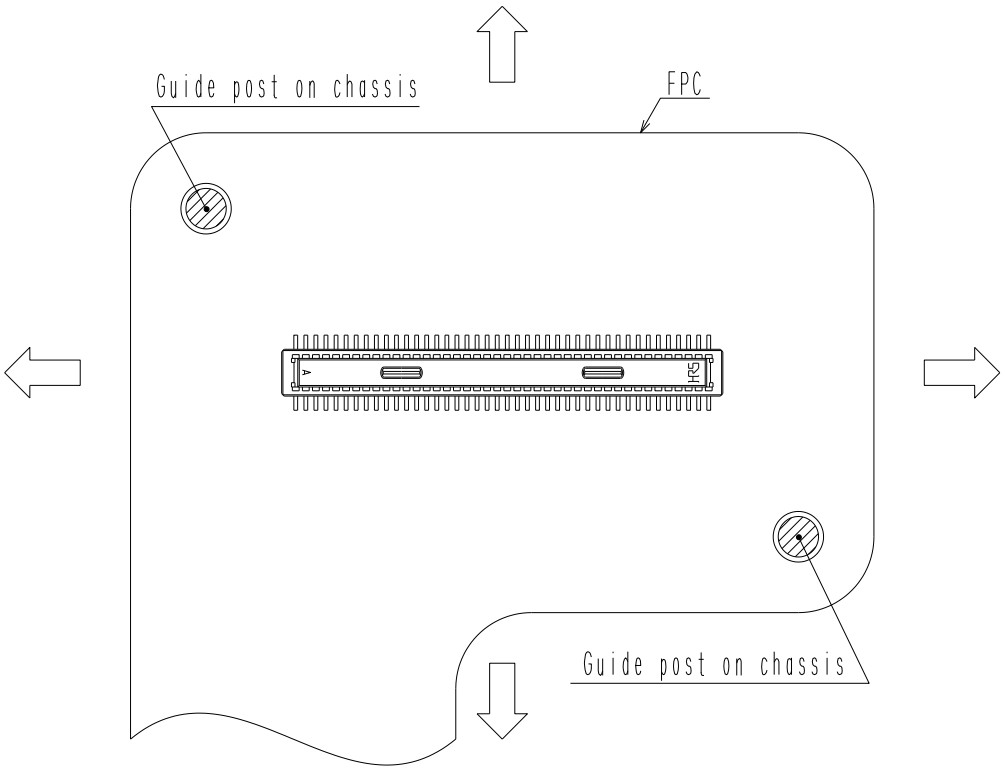
1.1.3 FPC fixing

For FPC alignment by guide posts, do not disturb FPC flexibility. Design without flexibility of FPC could apply direct stress to the connector by drop impact etc.



EX) Inflexible FPC positioning with guide posts on chassis as shown above disturbs flexibility to the directions indicated by arrows.

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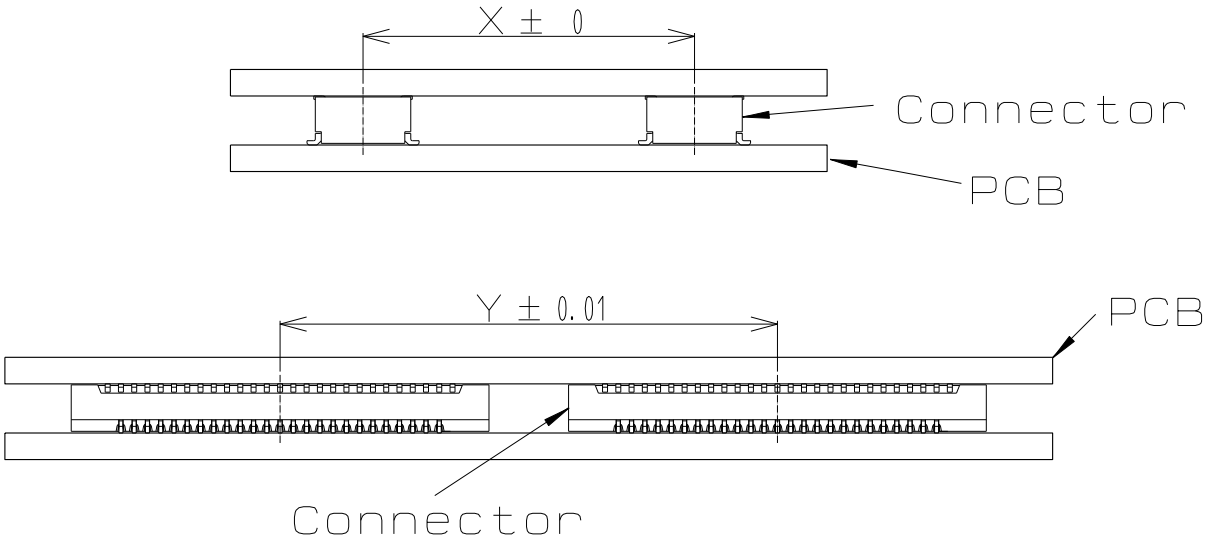
1.1.4 When using two sets connectors

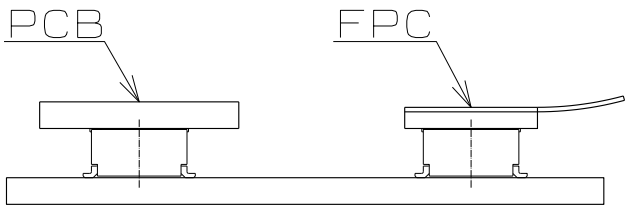
When using two sets of connectors on one board receptacle and plug, the following mounting accuracy is required.



As mentioned above, very tight tolerances are required.

It is impossible to satisfy this tolerance in consideration of the board and mounting accuracy.

Therefore, please avoid the use of more than one set of connector receptacle and plug on single board. When using two sets or more of connectors, please use the divided board for the one side.



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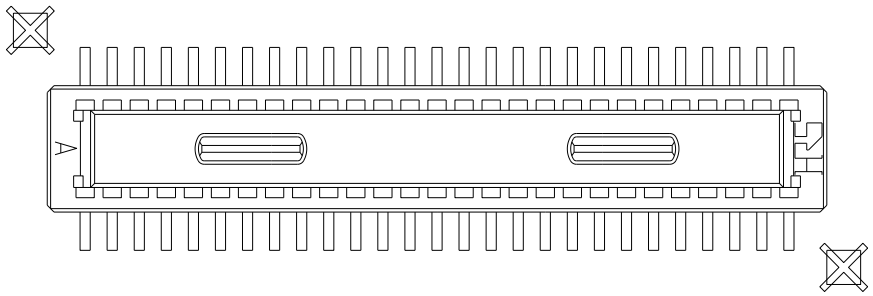
1.1.5 Allocation of other components around the connector

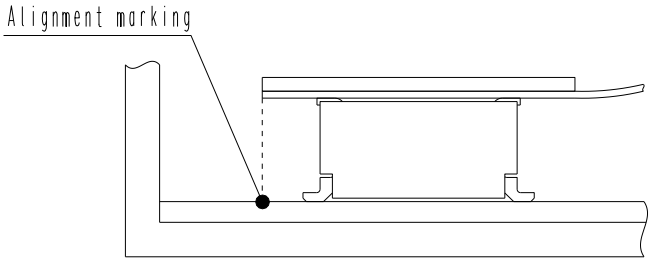
Do not locate any other components which may affect on connector mating around the connectors.



Not recommended

1.1.6 FPC alignment marking for mating

Marking onto the opposite PWB from the FPC side for indicating the exact mating position is recommended to support mating without misalignment during mating operation of FPC side to the PWB side.



Recommended

1.1.7 Precautions for PWB to PWB connection

In order to connect PWB to PWB, precision of necessary components and mounter or screw fitting is required, and direct stress to the connector is avoidable. Avoid fixing PWBs with connecters only, and stabilize them with other tools.

Keep connector warpage within 0.02 mm in connector longitudinal direction.

1.1.8 Selection of connector mounting machine and notice for mounting

Pay attention to the vacuum pick up area and position precision. For chucking pick and place, prior confirmation is necessary to avoid connector deformation caused by excessive chucking force. Confirmation prior to your manufacturing is necessary.

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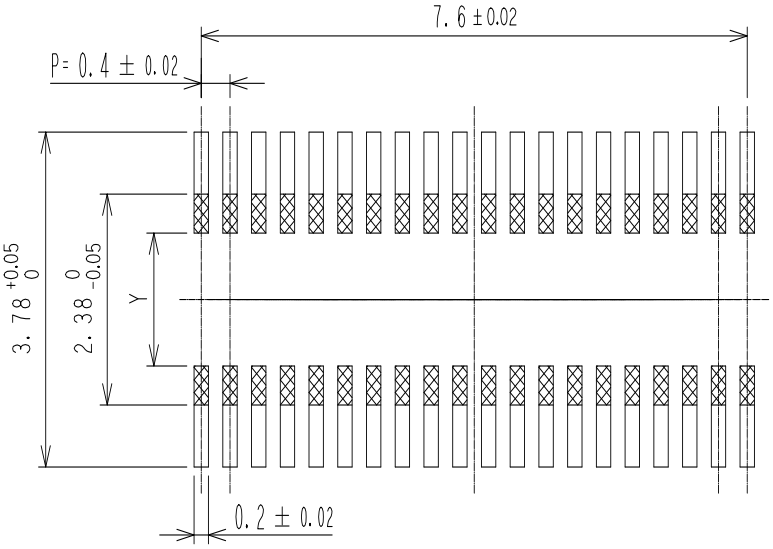
1.2 PWB requirements

1.2.1 Recommended PWB pattern

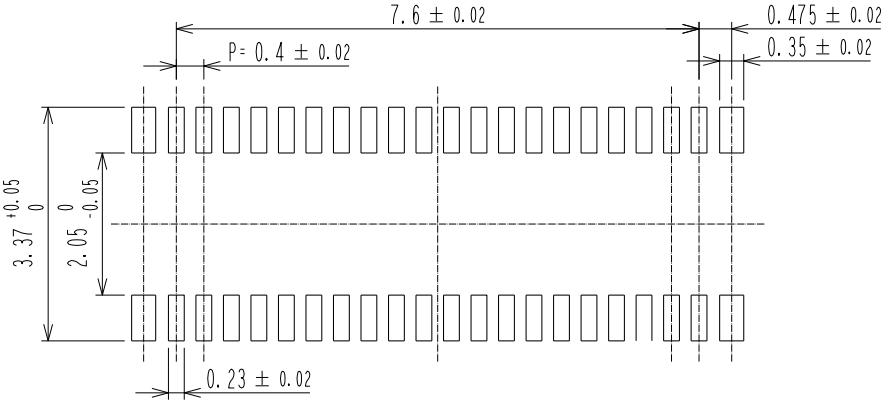
Recommended PWB pad layout for receptacle (ex. 40 pos.)



Y dimension
H=1.5, 2.0mm: 1.5mmMAX
H=2.5~4.0mm: 0.92mmMAX

Patterning of different signals is unacceptable on the area indicated by "▨".

Recommended PWB pad layout for plug (ex. 40 pos.)



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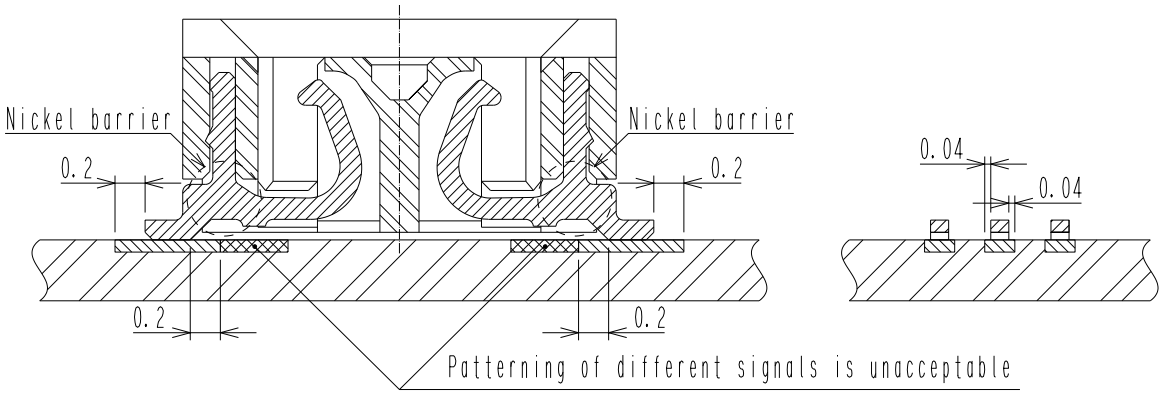
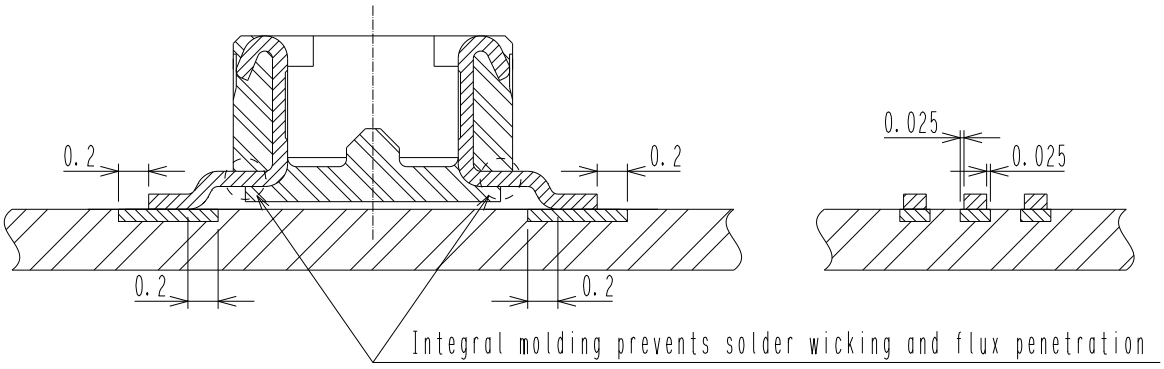
1.2.2 PWB pad layout and connector location

Pad layout and connector position for receptacle



Pad layout and connector position for plug



1.2.3 PWB designing

- Design PWB layout properly so that front, back and side fillets are formed.

By applying the recommended PWB layout, optimum retention force can be obtained between connector and PWB.

- Solder wicking and flux penetration could occur by applying different PWB layout from the recommended. Please contact us for the different PWB pattern from the recommended PWB layout.

- Although standoff is provided, interference to the connector body by pattern, via hole and solder resist beneath the connector may cause solder defects and poor fillet formation.

1.2.4 FPC designing

Diversity of coefficient thermal expansion in FPC and stiffener materials may cause FPC warpage and mounting failure. Confirmation prior to your manufacturing is necessary.

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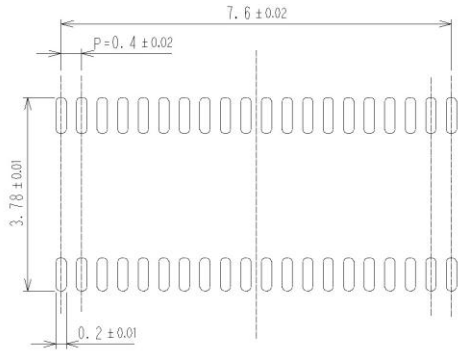
2 Mounting requirements

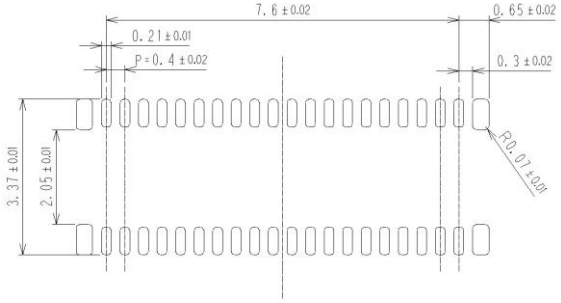
2.1 Metal mask design

Recommended metal mask dimensions for receptacle (ex. 40 pos.)



Recommended soldering paste amount: 0.0135 mm^3 (Per 1 Pad)

Recommended metal mask dimensions for plug (ex. 40 pos.)



Recommended soldering paste amount: 0.0121 mm^3 (Per 1 Pad)

Recommended metal mask thickness and open ratio

Open ratio: 80 % (of the recommended PWB layout)

Metal mask thickness: 0.12 mm

NOTE: Solder paste amount beyond the recommendation may cause solder wicking and flux penetration. Please contact us when the soldering condition needs to be different from the recommended condition.

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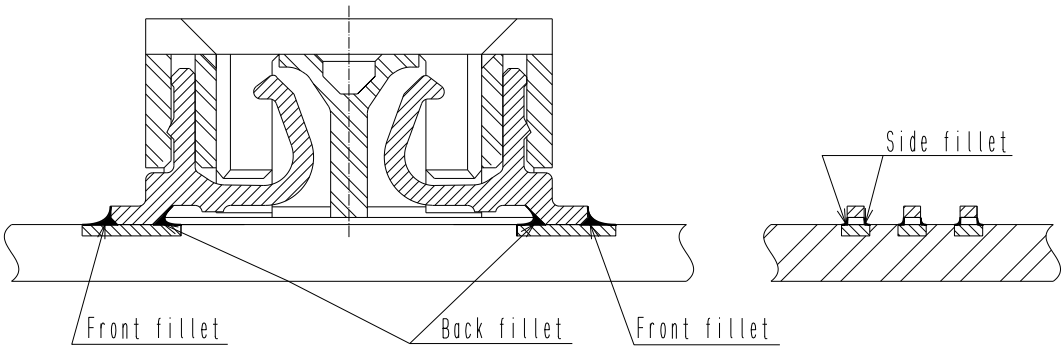
2.2 Fillet forming

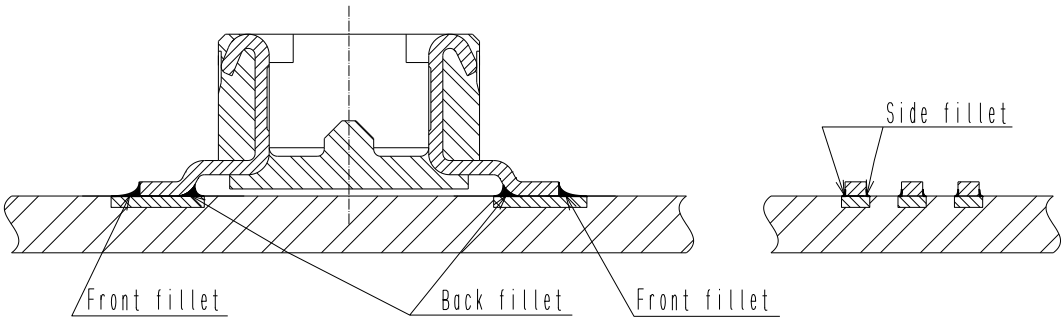
For the judgment of fillet forming quality, check side fillet forming as an indication.

Fillet forming on receptacle



Recommended condition is that fillet thickness is one third of contact thickness (0.13 mm) or more, and solder is wetted completely.

Fillet forming on plug



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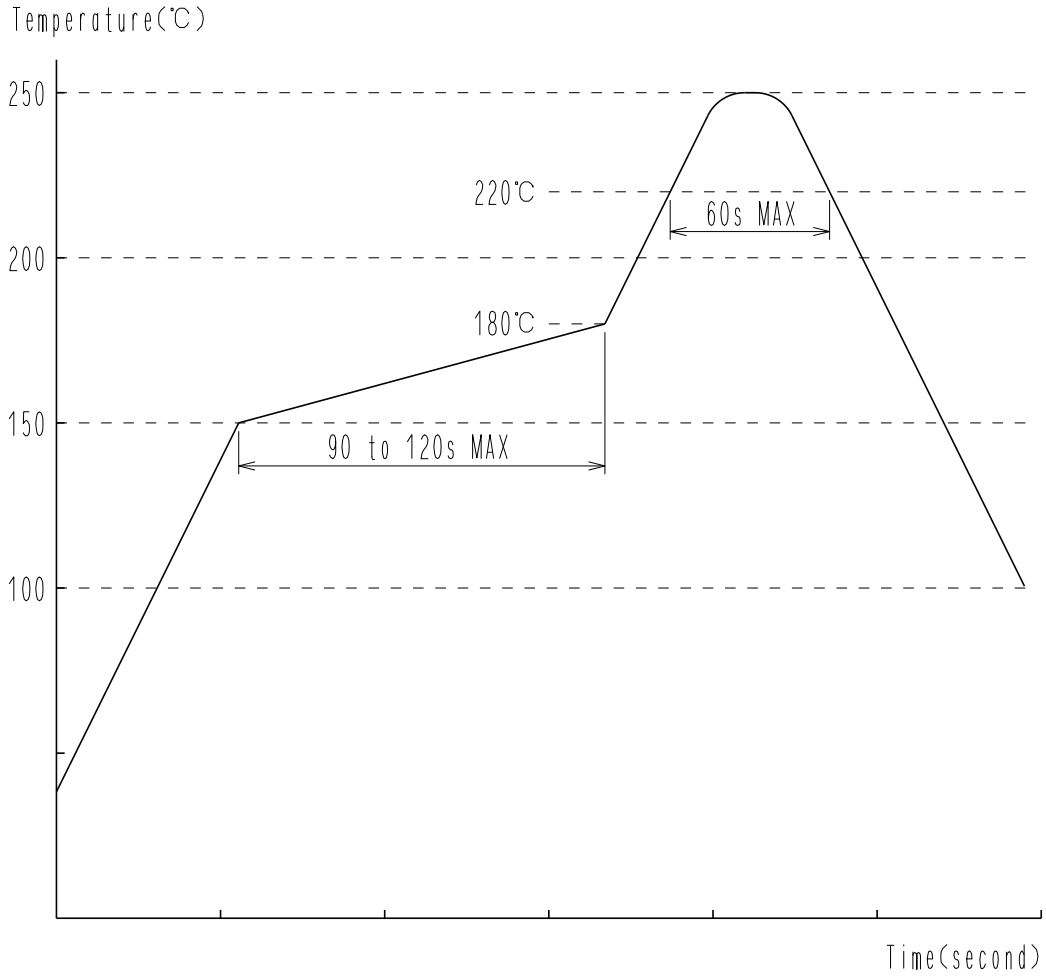
2.3 Reflow profile



1) Temperature measuring point

The temperature indicates the PWB surface temperature at the connector lead area.

2) Reflow cycles

Up to 2 cycles of reflow soldering are acceptable under the recommended reflow profile of DF40 Series.

3) Reflow heating method and condition

Far-infrared heater and hot convective blowers used in combination, normal atmosphere, or nitrogen atmosphere.

Please contact us for oxygen density in nitrogen atmosphere reflow.

4) For the printing of soldering paste, screen printing method is recommended.

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2.4 Repairing (hand soldering)

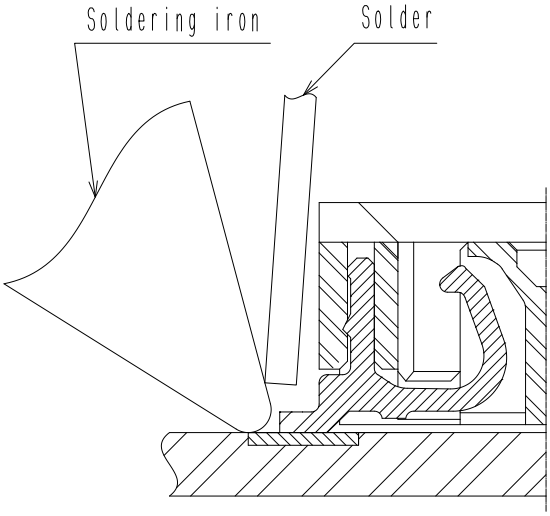
Receptacle

Repairing condition:

- Soldering iron 350 °C, 3 seconds MAX.

Notice:

- Do not apply stress to the terminals.
- Avoid touching housing with a soldering iron.



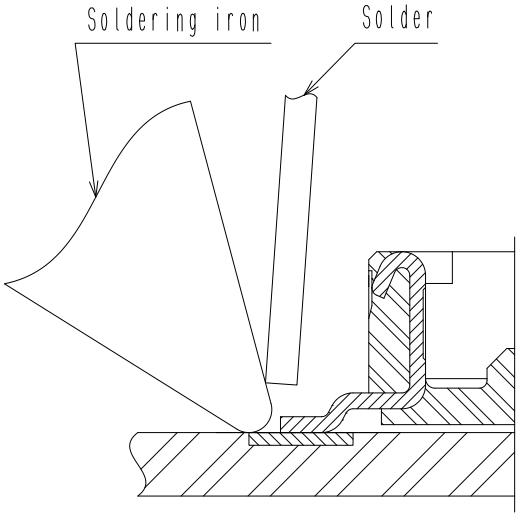
Plug

Repairing condition:

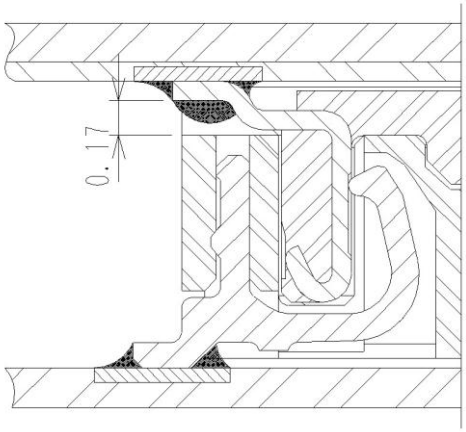
- Soldering iron 350 °C, 3 seconds MAX.

Notice:

- Do not apply stress to the terminals.
- Avoid touching housing with a soldering iron.



Raise of solder paste



It may affect on mating that the soldering paste height is 0.17 mm of more from the upper surface of the plug contact.

Excessive solder paste or wire solder for repairing may cause raise of solder paste on the plug contact lead. The raise of solder paste may affect on distance of PWBs or performance of spring contact of the receptacle.

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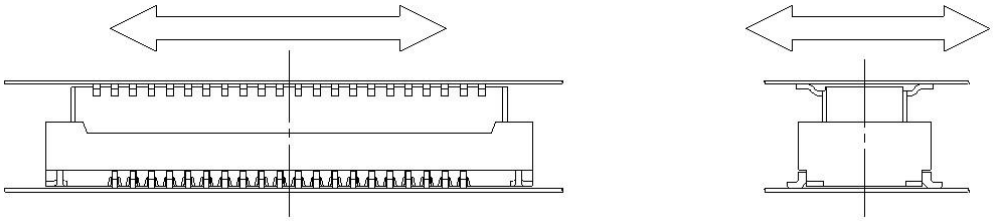
3 Connector handling requirements

3.1 Connector mating operation

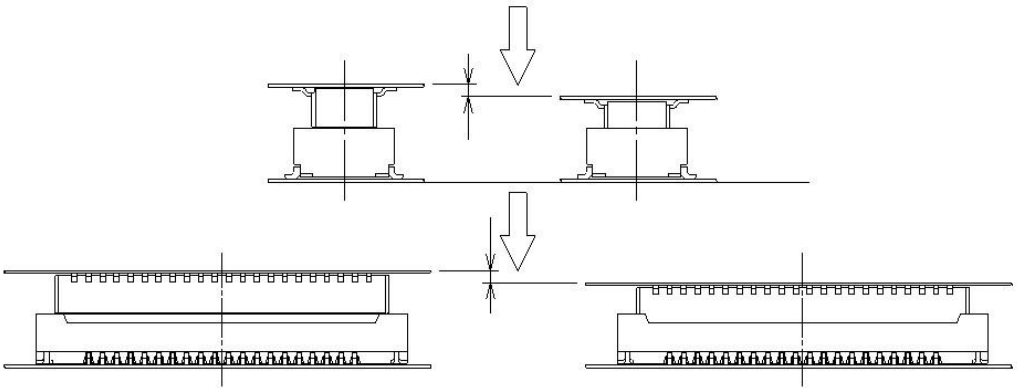
Make sure to mate DF40 Series connectors by hands.

Mating procedures

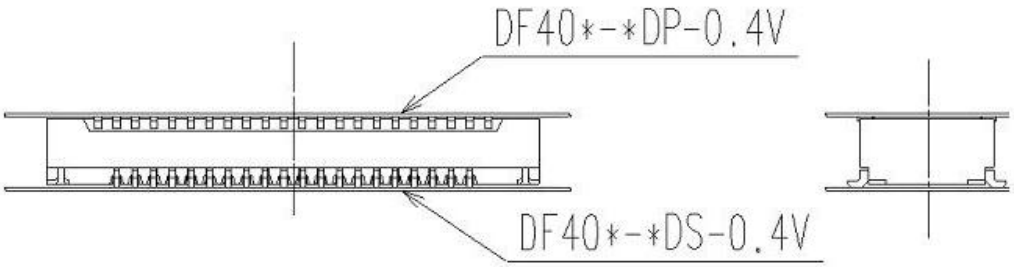
1) Feel for the mating guide with hands to locate the connectors in the appropriate mating position.



2) When positioned, the connector is led into the mating pair by self alignment function.



3) Once aligned, the connector pair does not move back and forth and around as they are located in a parallel position. Mate the connectors completely by applying force in this condition.
We recommend to push the connector with two fingers for 50 pins or more to press down the whole connector evenly. One end might not be inserted enough to result in half mating for high pin counts.



4) Make sure that the connectors are mated completely. When the PWBs are not parallel, unmate the connector, and then mate them again according to the above procedures from the beginning.

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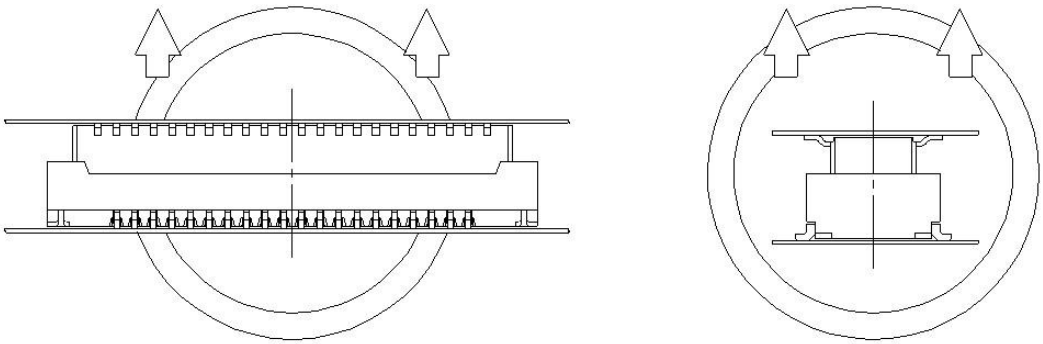
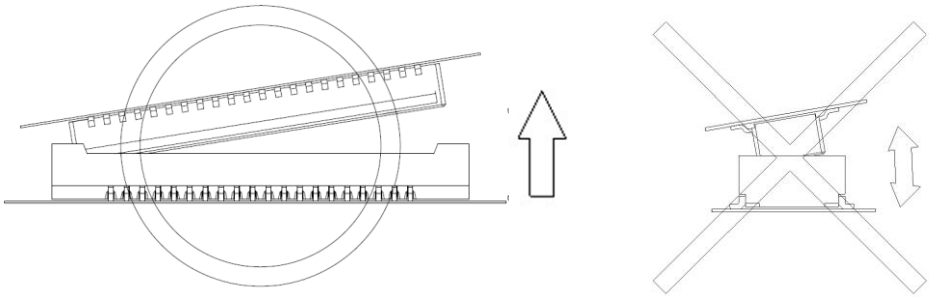
3.2 Connector unmating operation

1) It is desirable to unmate the connector vertically to the mounted surface. However, in the PWB to FPC connection, the higher the pin counts, and the thinner the FPC is, the more difficult to unmate the connector in vertical direction.



2) When vertical removal is difficult, lift up either side of longitudinal, contact pitch direction. Do not unmate the connector in connector width direction otherwise the contacts could receive great stress.



If removing in the width direction, the side wall of the header side will be damaged. Or the case of the receptacle side comes off the contact-pin. Therefore, please avoid removing the connector in the width direction.

The next page shows an example of a problem that occurred when the connector was removed in the width direction.

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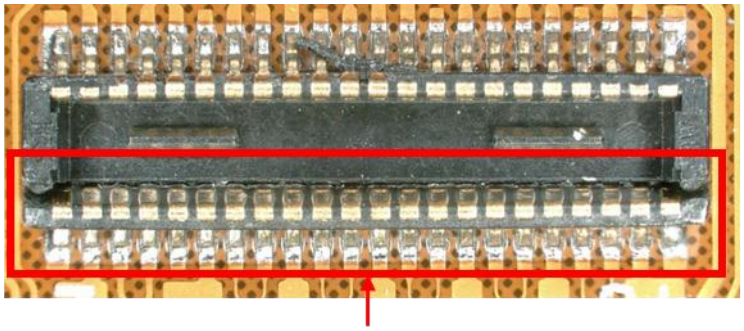
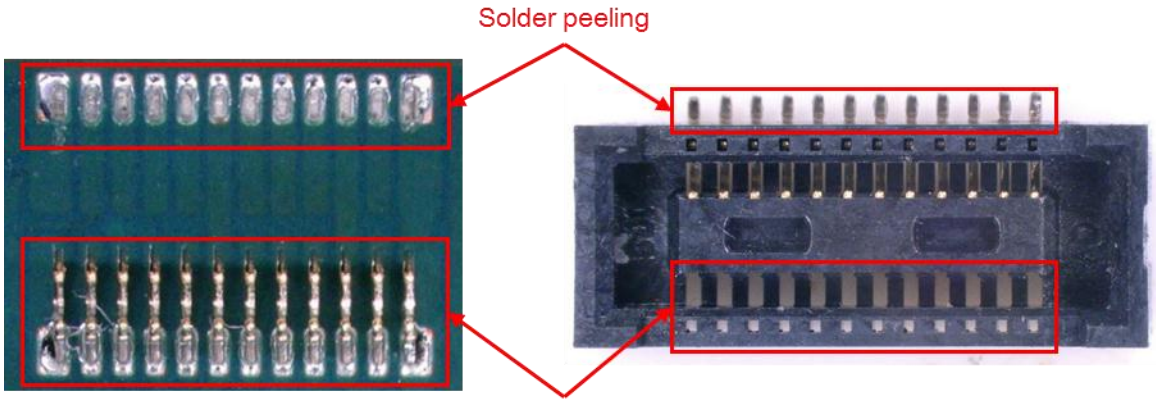
Failure caused by removing the connector in the width direction



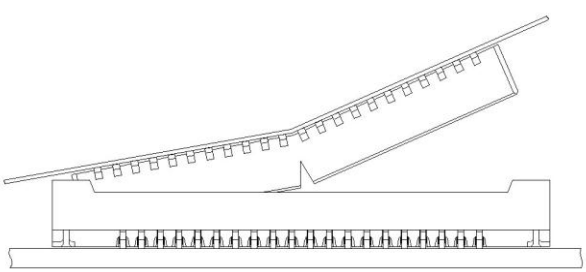
Removal in the width direction breaks the header side wall

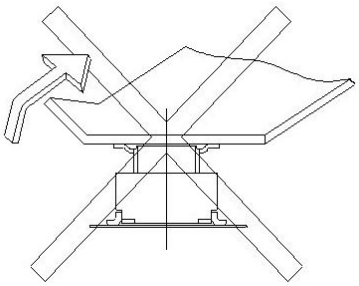


The contact-pin comes off from the case

Receptacle side damaged due to removal in the width direction

3) Check the rigidity of the FPC for unmating operation prior to your production, otherwise solder breakage and/or connector breakage may occur during unmating process. Lift up the corner of the FPC could apply over stress to the contacts.





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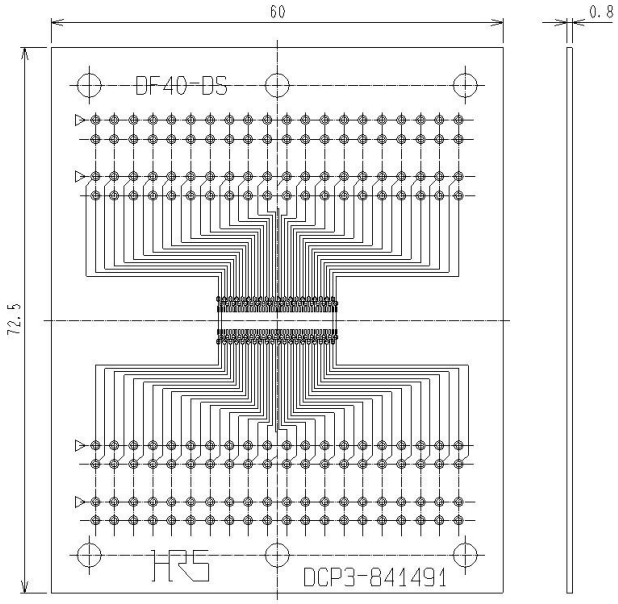
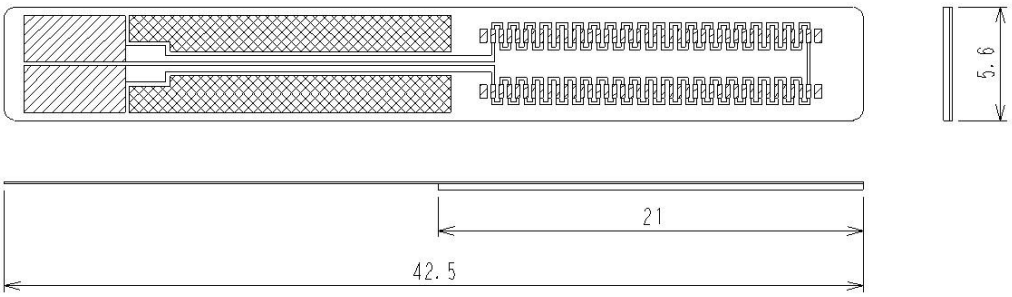
4 PWB and solder paste applied for evaluation test

4.1 PWB applied for evaluation test

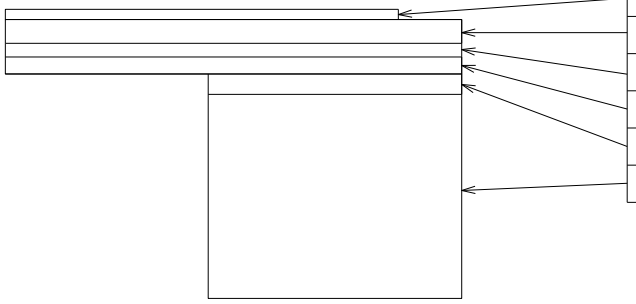
Glass epoxy board for receptacle



FPC for plug



FPC material configuration



LAYER	MATERIAL	THICKNESS(μm)
RESIST	INK	15
COPPER FOIL		35
BASE ADHESIVE		20
BASE FILM	POLYIMIDE	25
STIFFENER ADHESIVE	THERMOSET ADHESIVE	30 to 40
STIFFENER	FR-4	300
	TOTAL	425 to 435

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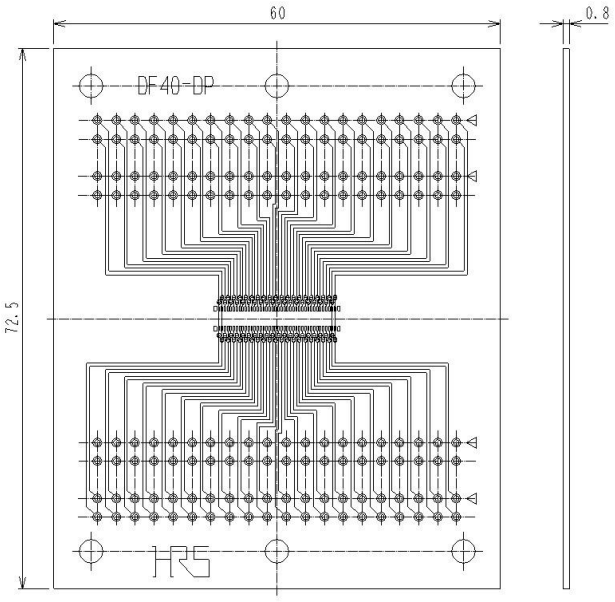
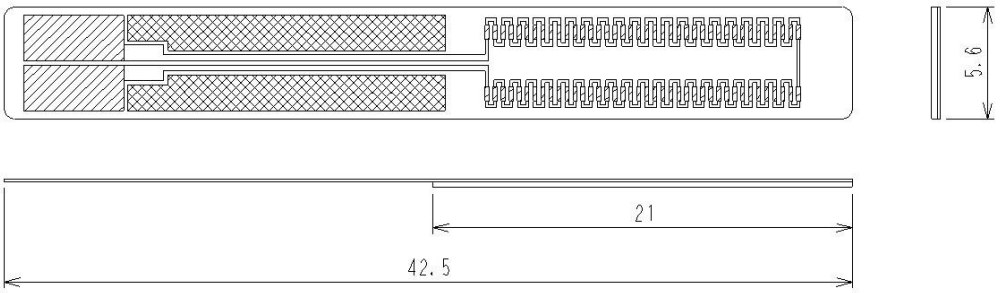
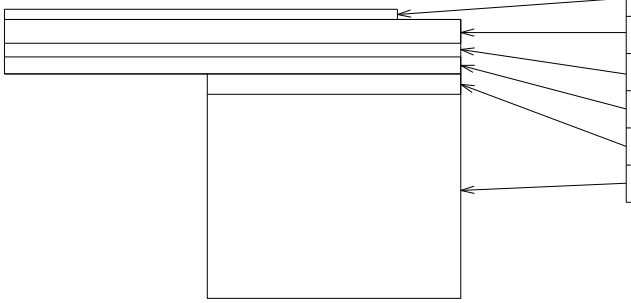
Glass epoxy board for plug



FPC for receptacle



FPC material configuration



LAYER	MATERIAL	THICKNESS(μm)
RESIST	INK	15
COPPER FOIL		35
BASE ADHESIVE		20
BASE FILM	POLYIMIDE	25
STIFFENER ADHESIVE	THERMOSET ADHESIVE	30 to 40
STIFFENER	FR-4	300
	TOTAL	425 to 435

4.2 Solder paste applied for evaluation test

Lead-free solder paste manufactured by Senju Metal Industry Co., Ltd.
M705-GRN360-K2-V

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5 Additional information

5.1 PWB cleaning

1) Control the cleaning liquid in order not to contaminate the connector contact area by cleaning liquid.
2) Some cleaning liquid is too strong and may dissolve connectors. Cleaning liquid made from pure water is recommended. Before using other cleaning liquid, please contact us.
3) Alcohol cleaning could make the connector housing white.

5.2 PWB handling

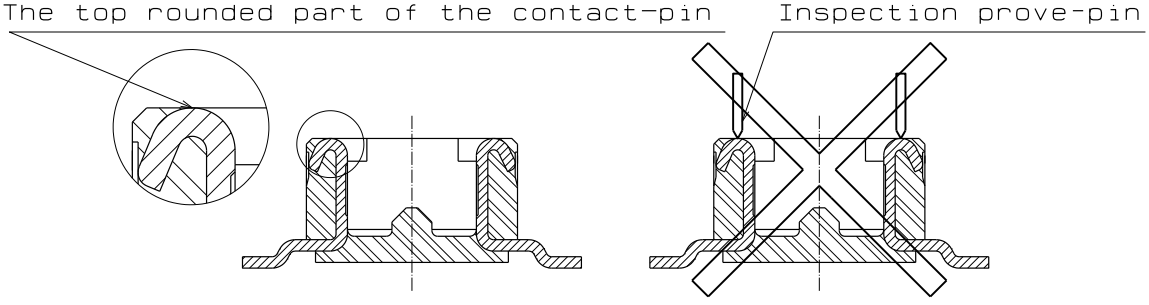
In the operation which could give stress to the mounted connector, including cutting or bending PWB, keep soldering area from mechanical stress.

5.3 Connector storage

1) Void could be occurred on the housing surface due to high heat during reflow. In order to prevent this problem, avoid storing connectors under humid condition. For long term storage, keep them at humidity manageable place.
2) Depending on the production LOT of the connector, its housing color could be varied, or ultraviolet during storage changes connector surface color. However, these color differences do not affect the connector performance.
3) During PWB assembly and module assembly, make sure not to apply excessive stress to the stored connectors.
4) Avoid storing connectors in dusty area, or it could cause contact failure.

5.4 Connector continuity test

Please use our inspection connector DF40J series for the continuity inspection of the connector. The top rounded part of the contact-pin on the header side might be covered with resin for manufacturing reasons. Therefore, please do not apply the inspection prove-pin to the contact-pin top rounded part.



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