



<b>TITLE:</b>	BM46 Series Guideline	ETAD-H1012-00
<b>PRODUCT:</b>	MULTI RF BOARD TO FPC CONNECTOR Pitch:0.35mm, Width:2.0mm Stacking height:0.6mm, Frequency: 12GHz	PAGE: 1 OF 18

## BM46 Series Guideline

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			<b>ETAD-H1012-00</b>	
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<b>REVISIONS</b>			RevNo	<b>0</b>
	Designer	Checker	Approver	DATE

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# 1. Notice for Device Handling

## 1.1 Notice for mechanical designing

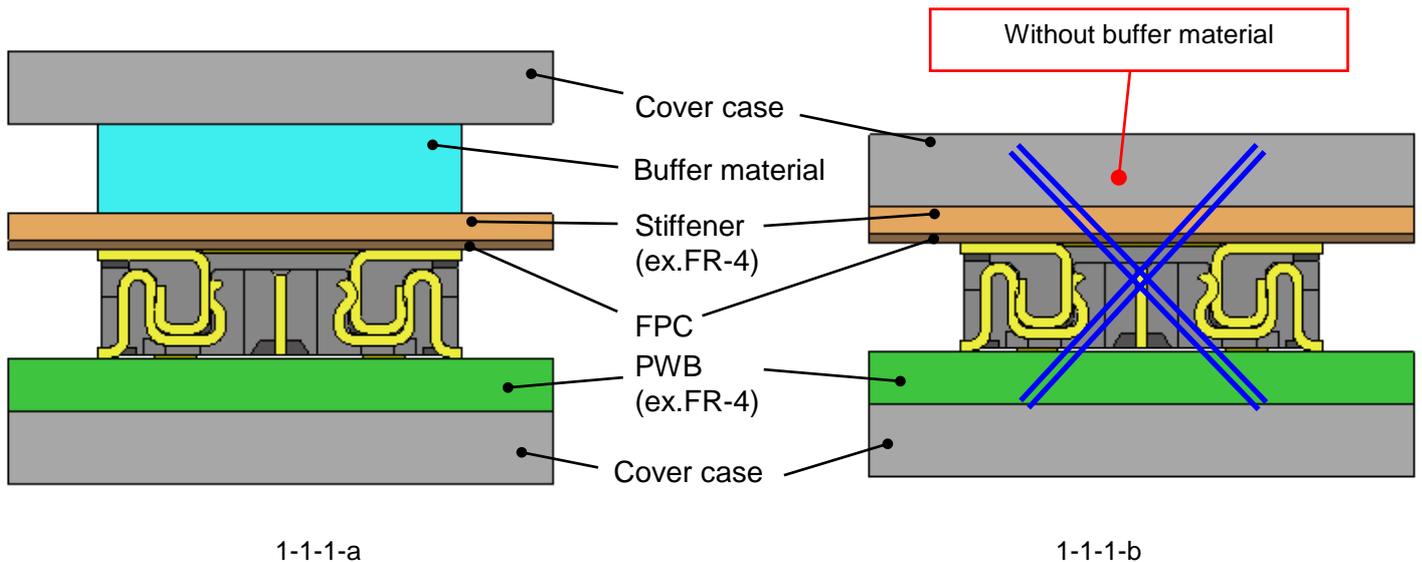
### 1.1.1 Disengaging prevention

There is still a possibility that connectors may become disengaged if strong impact, such as dropping occurs. In order to prevent connectors from disengaging, make sure to put buffer material between a connector and a cover case to hold the connector pair down to the mating direction.

(Refer to Figure 1-1-1-a)

If a connector is pressed directly down by a cover case, there is a possibility that the cover case will bend. This may cause connector disengagement when the device is dropped. Avoid designs where the connector is directly pressed by the cover case. Instead, use put the buffer material to press down on the connector.

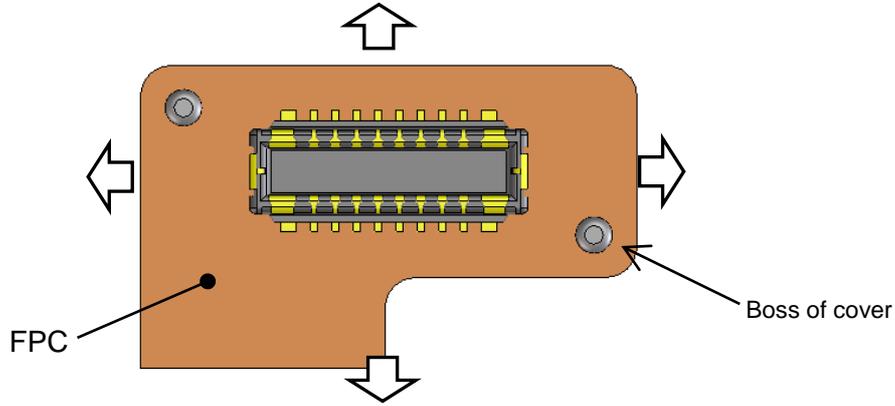
The buffer material must be sized to cover all over the connector mounting area.



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**1.1.2 FPC fixing**

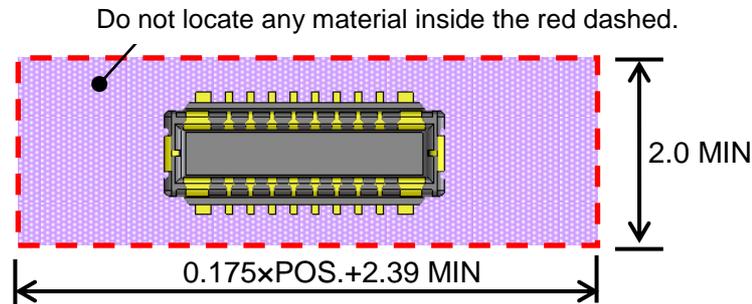
If FPC position is fixed, the connector will experience direct stress from the drop impact. Do not design FPC positioning bosses which prevent flexibility of FPC. (Refer to figure 1-1-2)



1-1-2: If FPC is fixed by boss of a cover case, there will be no flexibility for 4 dimensions indicated by arrows.

**1.1.3 Allocation of other components around connector**

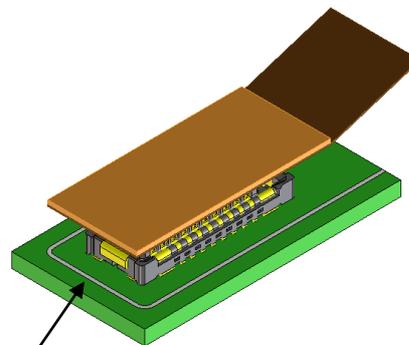
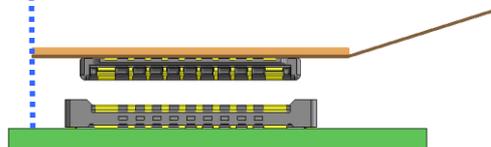
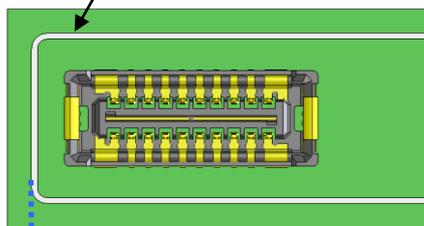
Do not locate any material around the connector that may affect mating.



**1.1.4 Marking for mating position**

When mating a connector on the FPC side, in order to mate in the appropriate position without misalignment, put a marking to indicate the exact mating position on the PWB.

Marking on PWB to indicate appropriate



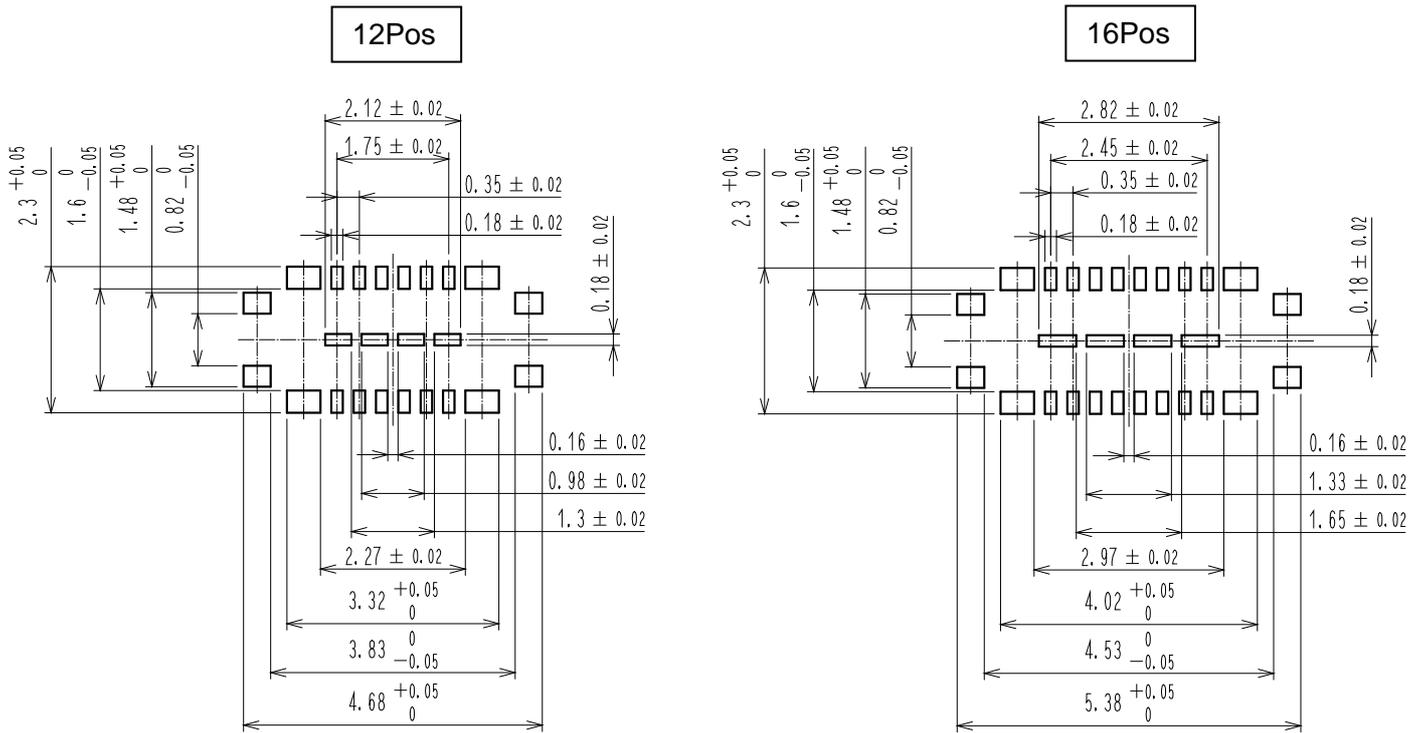
\*For better mating operation, it is recommended that the marking is done along the FPC outline.

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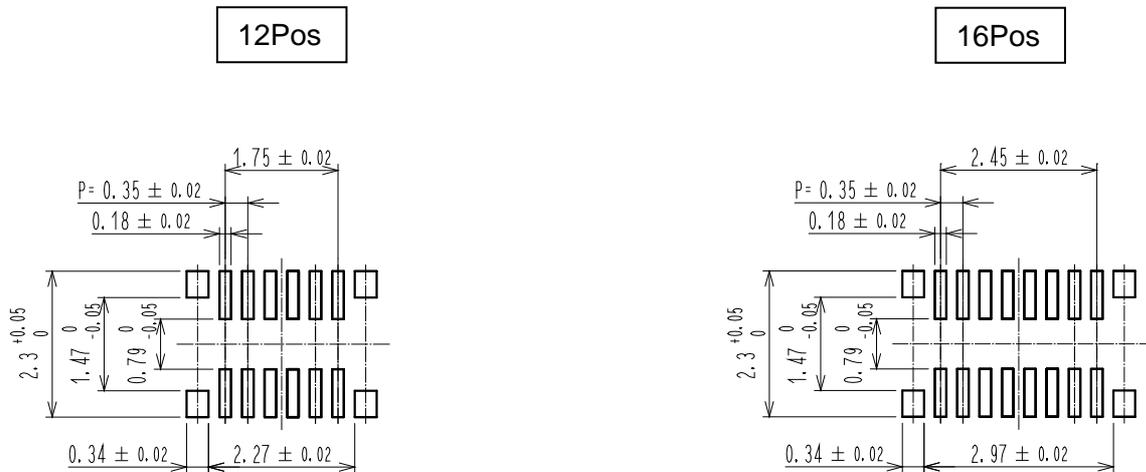
## 1.2 Notice for PWB designing

### 1.2.1 Recommended PWB pattern

Recommended PWB pattern for receptacle (Pos: pin count)

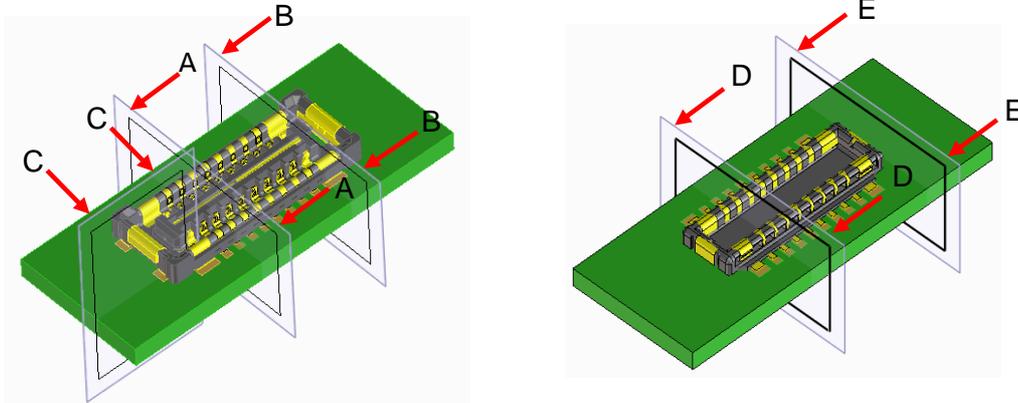


Recommended PWB pattern for plug (Pos: pin count)

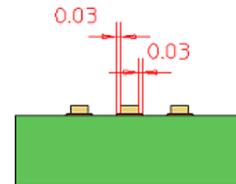
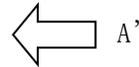
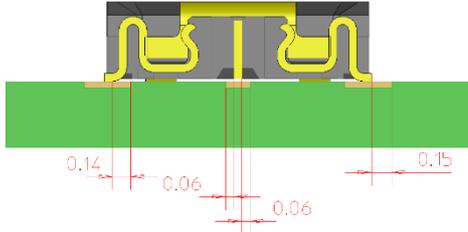


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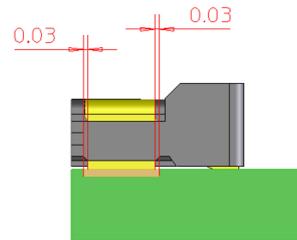
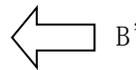
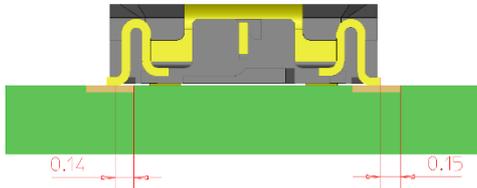
**1.2.2 PWB pad layout and connector location**



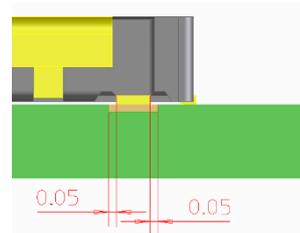
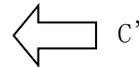
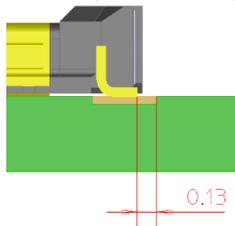
Pad layout and contact position for receptacle (A-A), A'



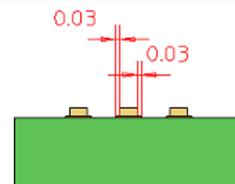
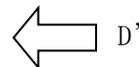
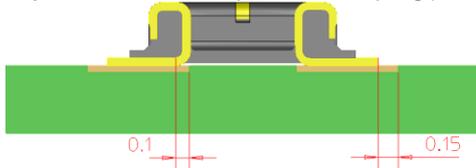
Pad layout and metal fitting position for Receptacle (B-B), B'



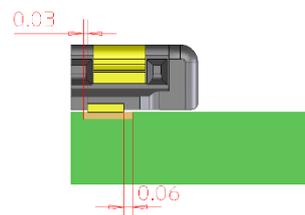
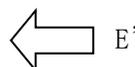
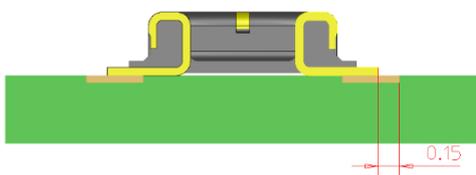
Pad layout and contact position for plug(C-C), C'



Pad layout and contact position for plug(D-D), D'



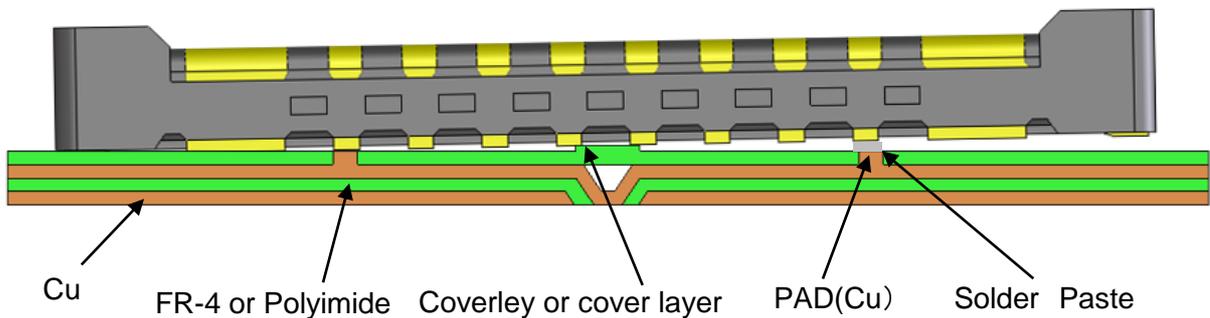
Pad layout and metal fitting position for plug (E-E), E'



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### 1.2.3 PWB designing

- Please design PWB layout properly so that front fillet, back fillet and side fillet are formed. The recommended PWB layout is designed so that the connector can be soldered to the PWB appropriately.
- If that the pad layout is narrower than the recommendation, there is a possibility that solder wicking or flux splashing may occur. Contact Hirose if the PWB layout is different from the recommended PWB layout.
- If there is not enough clearance on the inner side of PWB pattern, there is a possibility that the connector may be pushed up by solder paste.
- If patterns are designed under a connector, there is a possibility to cause solder failure if there is physical height. Especially, in the following case, please conduct mounting test.



### 1.2.4 FPC designing

- FPC can be bent due to the diversity of coefficient thermal expansion of polyimide and copper foil. Mount the connector in consideration of bending by heating.
- Make sure to use a stiffener on the backside of the FPC. If polyimide is used as material, it is preferable to be as thick as possible. Glass epoxy material with the thickness of 0.3mm MIN is recommended, or a stainless material with the thickness of 0.2mm MIN.

Consult HRS when using a thinner stiffer than recommended. In addition, insertion feeling is tends to be hard when a thinner stiffener is used.

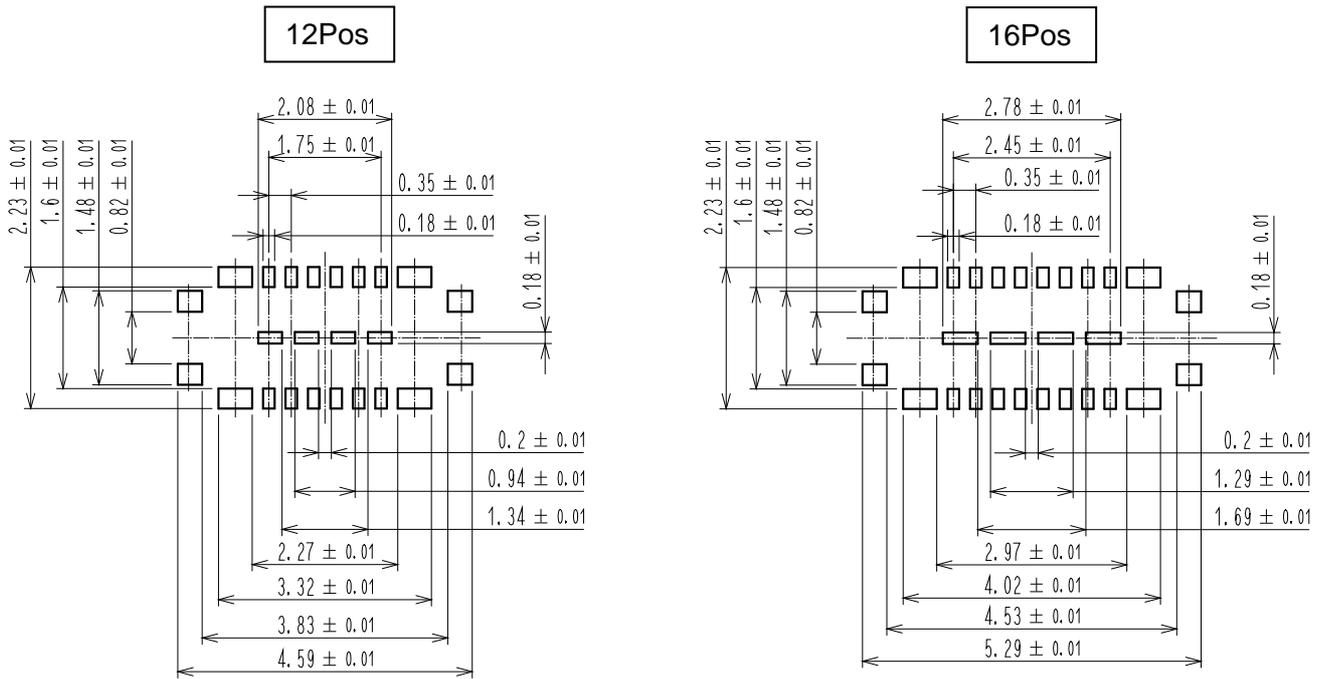
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## 2. Notice for Mounting

### 2.1 Metal mask design

Recommended metal mask dimension for receptacle (Pos: pin count)

Recommended metal mask thickness: 0.08mm



Open ratio of contacts areas are 90%, and shield areas are 90% against the Recommended PWB pad layout.

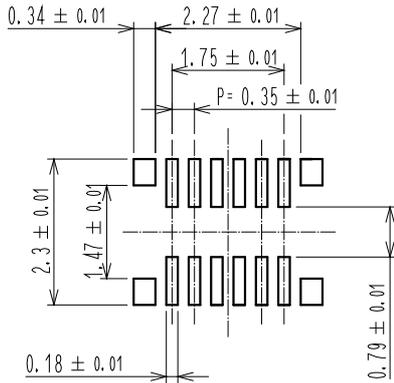
Notice: If the soldering paste exceeds the recommended amount, there is a possibility of flux wicking.  
If the soldering condition needs to be different from the recommended condition, please contact Hirose.

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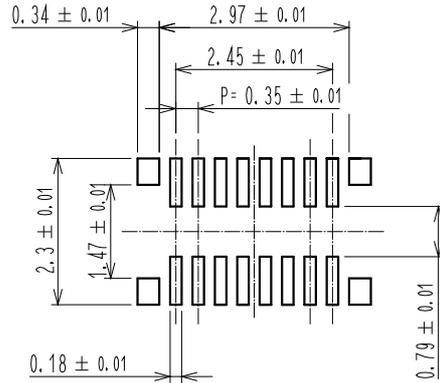
Recommended metal mask dimension for plug ( POS: Pin count )

Recommended metal mask thickness: : 0.08mm

12Pos



16Pos

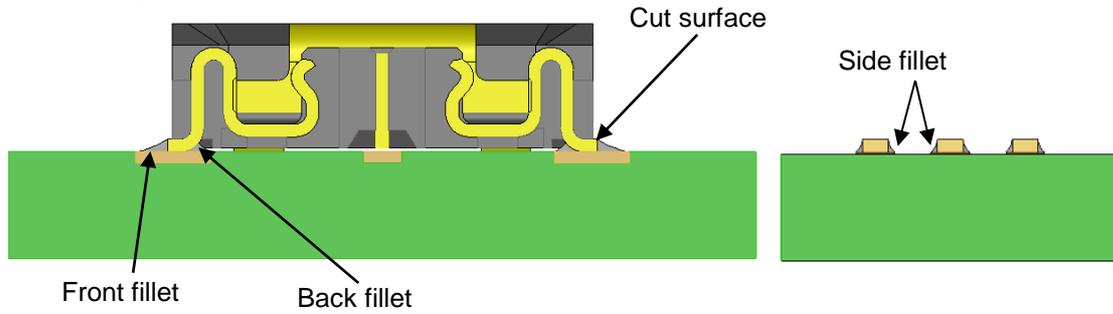


Open ratio of contacts areas are 100%, and shield areas are 100% against the Recommended PWB pad layout.  
 Notice: If the soldering paste exceeds the recommended amount, there is a possibility of solder swelling.  
 If the soldering condition needs to be different from the recommend, please contact Hirose.

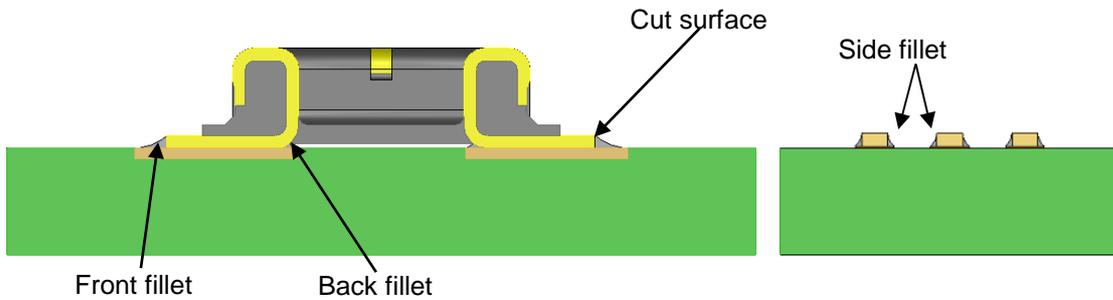
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## 2.2 Fillet forming

Fillet forming on receptacle



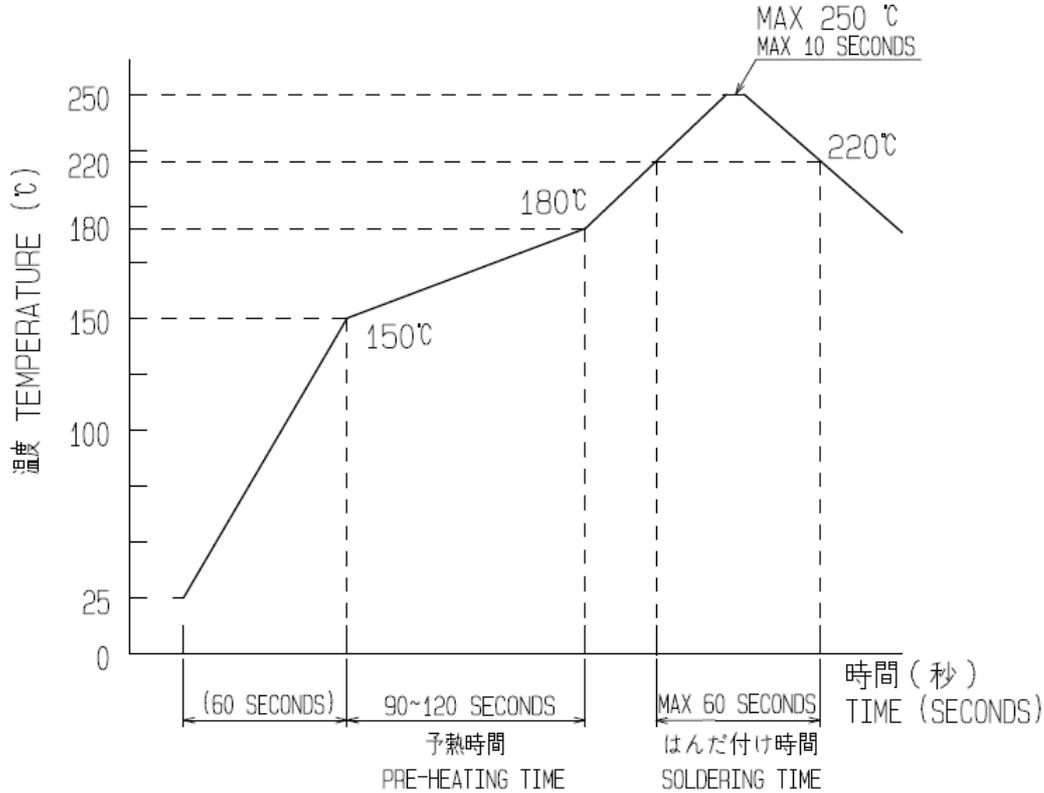
Fillet forming on plug



The receptacle contact leading edge where the "front fillet" is formed has a metal cut surface. Therefore, phosphor bronze is exposed. The exposed area easily develops thermal oxidation from reflow heating, so it may be difficult for soldering paste to get wet and be spread over the area. If the fillet formation needs to be judged defective/not defective, please judge by the "side fillet" formation.

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### 2.3 Reflow Profile



#### Profile measuring point

The temperature profile indicates the board surface temperature at the point of contact with the connector terminals.

- Reflow cycles

Up to 2 cycles of reflow soldering are possible under the same conditions.

\*Temperature between 1st and 2nd reflow must be cooled down to room temperature.

- Reflow heating method and condition

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

#### Notifications for N<sub>2</sub> reflow

Set O<sub>2</sub> concentration more than 1000[ppm] (HRS recommendation) in SMT. Please feel free to contact Hirose when it is less than 1000[ppm].



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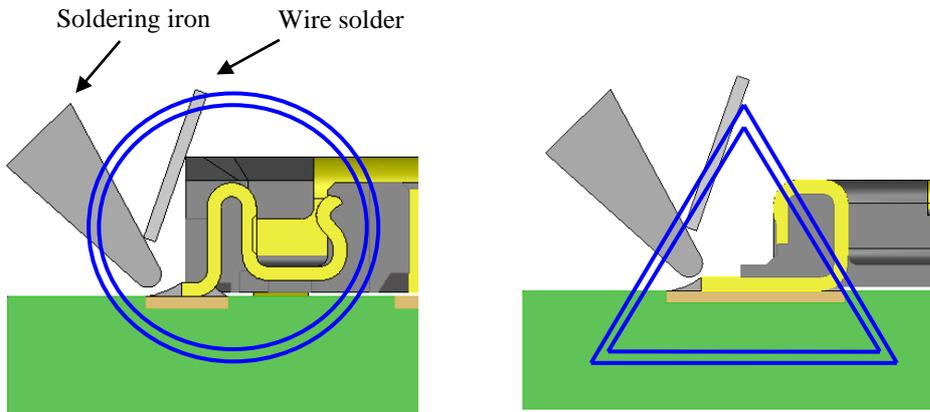
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## 2.4 Repairing (hand soldering)

Receptacle / Plug

Repair Condition :

- Soldering iron 350°C 3 seconds Max Notice :
- Do not put stress on contacts
- Do not touch housing with a soldering iron
- Protect contact from flux or soldering paste splashing (ex. set a cover over the contact area.)





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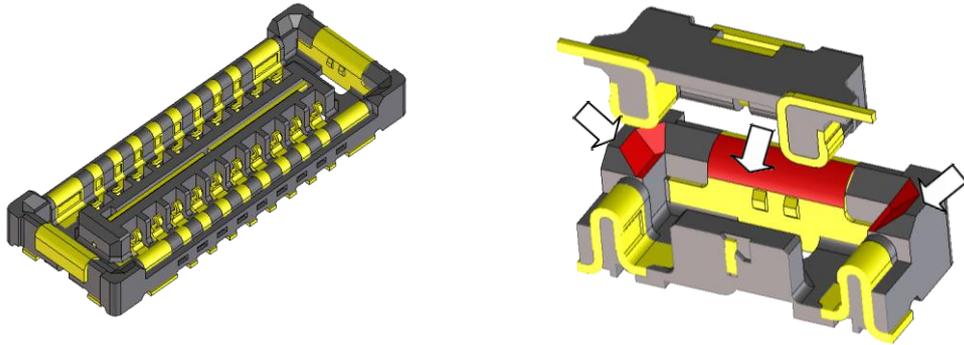
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### 3. Operation Methods of Connectors

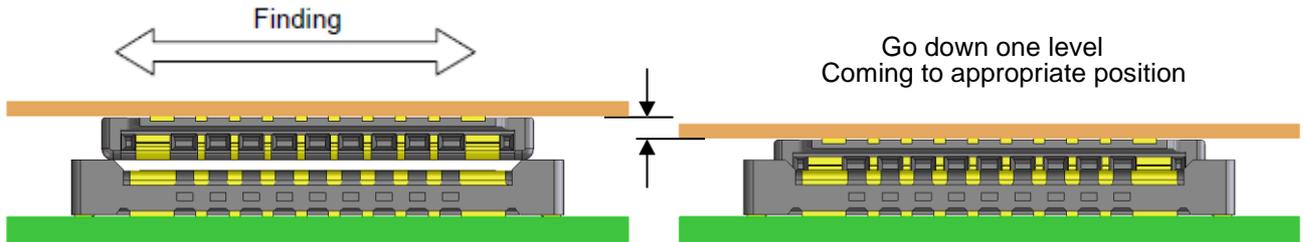
#### 3.1 Insertion methods

Mate this connector by hand.

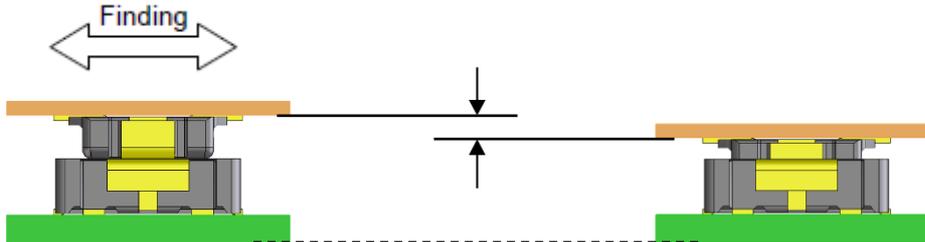
- 1) Find the alignment area to locate the connector in the appropriate mating position. This connector has an alignment chamber (guidance ribs) on receptacle side and "R" on plug side, so that the connector will be self-aligned.



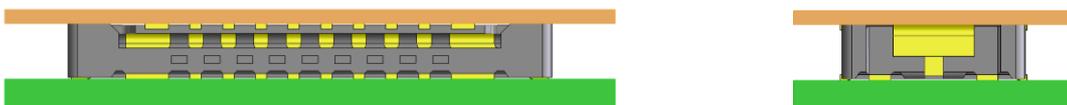
- 2) When the connector comes to the appropriate position, the connector goes into the aligned position. When aligned, it can be felt by hand.



- 3) When guiding, the connectors are aligned parallel to each other, with longitudinal and lateral movements restricted. Mate them properly by applying force in this condition.



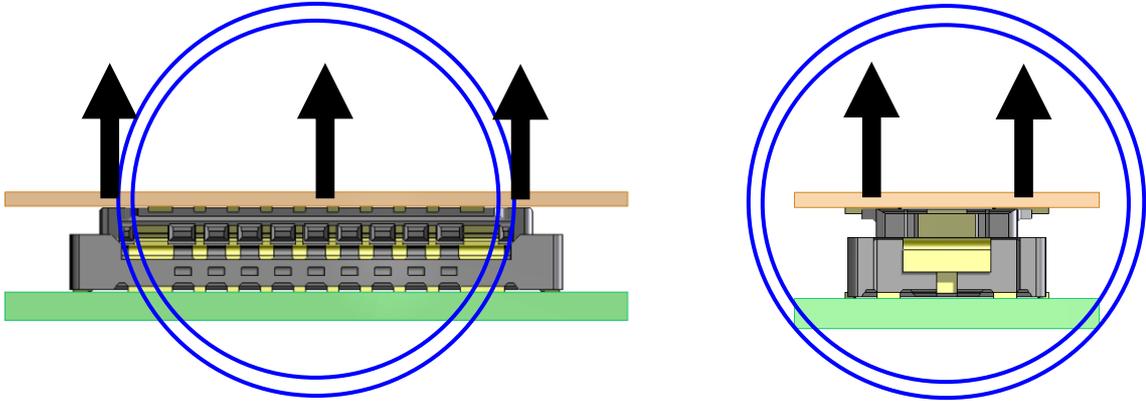
- 4) Make sure the connectors are mated correctly. If one side is floating or the connectors are mated in one direction, un-mate them once, and then mate them again, following the procedures above from the beginning.



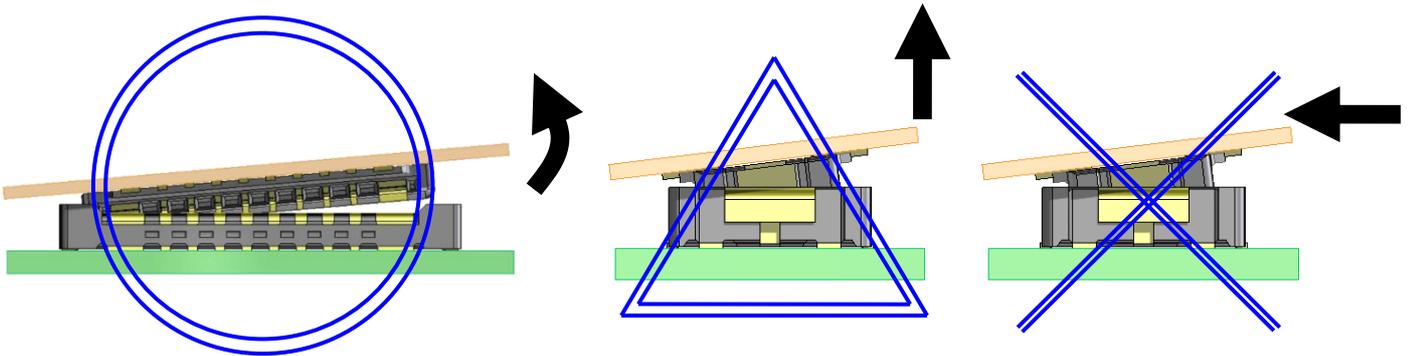
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### 3.2 Un-mating methods

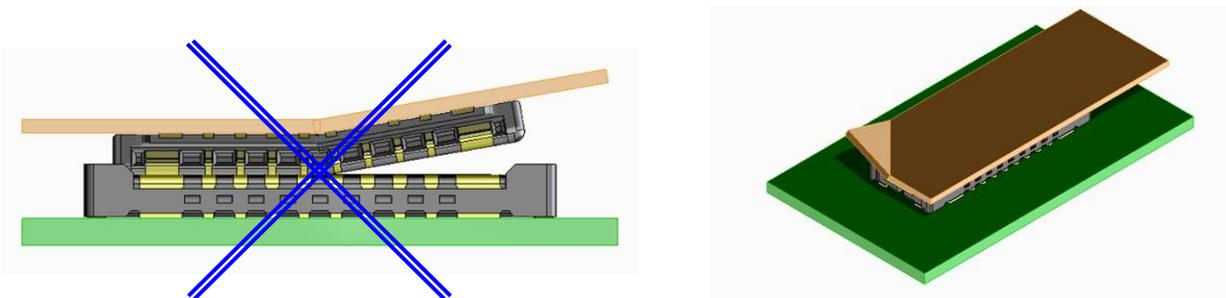
- 1) Un-mate the connectors parallel to each other. However, if the connectors have high pin counts or thinner FPC and stiffener, it becomes more difficult to do so.



- 2) If the connector cannot be un-mated parallel it can be removed diagonally from the pitch direction. Be careful to do so since this action applies stress on the contact.



- 3) If the FPC is not rigid, the connector can be broken. Please check the action of the FPC to be used repeatedly at the time of trial production. Be careful to un-mate them from the pitch direction, pulling it from the corner can also risk to putting stress on contacts.

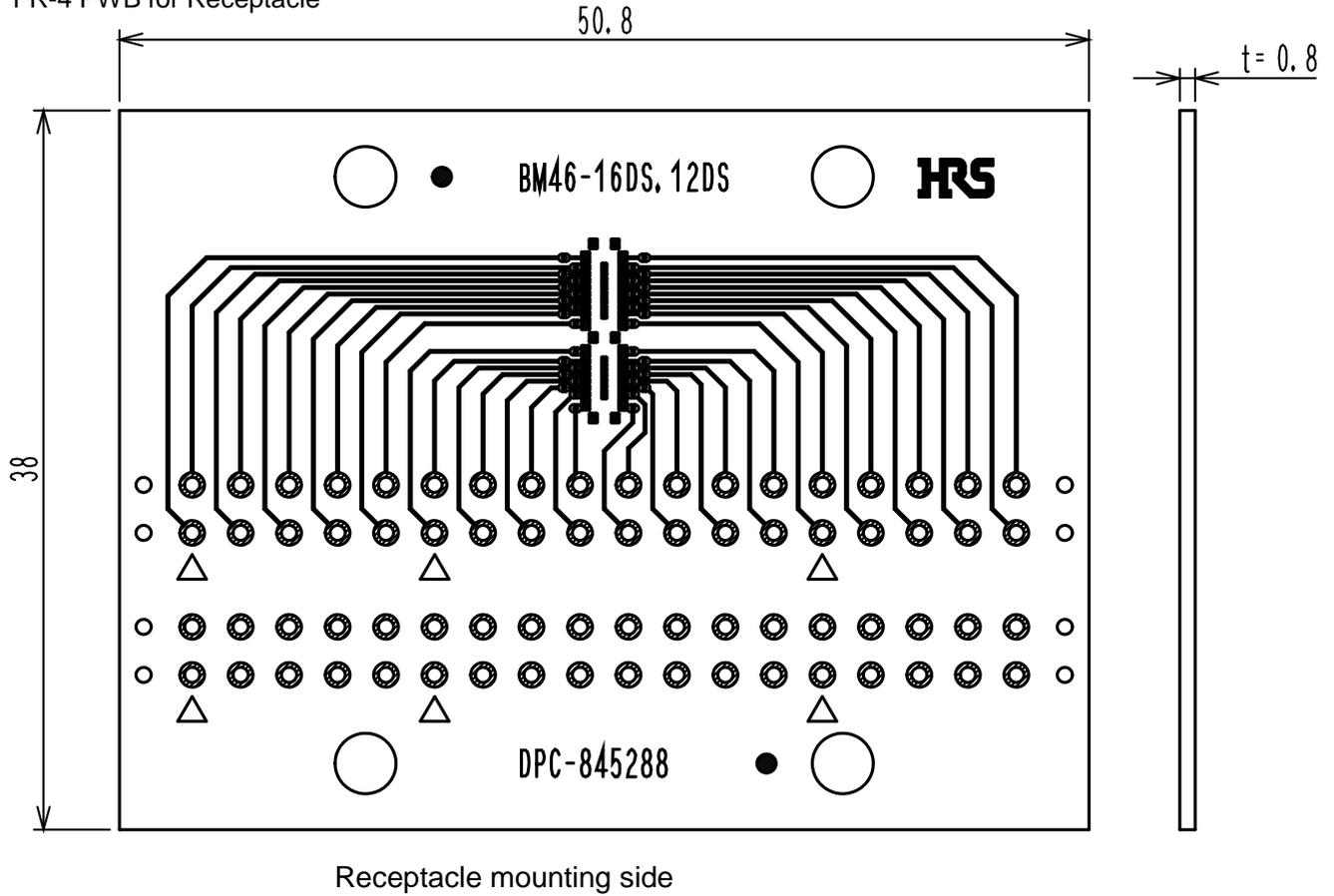


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## 4. PWB and Solder Paste for Evaluation Test

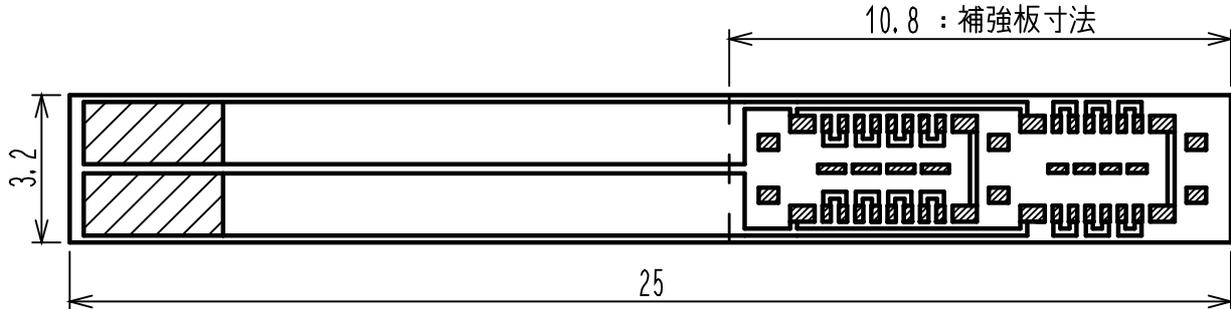
### 4.1 PWB for evaluation test

FR-4 PWB for Receptacle

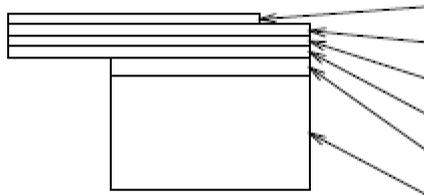


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FPC for Plug



FPC material configuration



Layer	Material	Thickness (um)
Resist	Inc	15
Cu		35
Base adhesive		20
Base film	Polyimide	25
Stiffener adhesive	Adhesive	30~40
Stiffener	FR-4	300
	Total	425~435

\* In the case of stainless: 200um

## 4.2 Solder paste for evaluation test

Lead-free Solder Paste

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## 5. RF Evaluation Board Design Information

### 5.1 Examples of board layers, patterns, and cutout dimensions

The followings are the examples of board layers, patterns, and cutout dimensions. For the recommended PWD pattern, please see the 1.2.1 Recommended PWB pattern.

Please use the thickness' information of the each layers as a reference, and please modify/control the impedance of this product at  $50\Omega \pm 10\%$ .

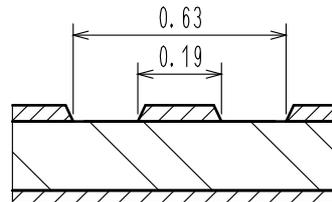
Recommendation for the coaxial connector part is a Hirose's product: HK-LR-SR2 (K connector: 2.92mm).

Please optimize the BM46 and the coaxial(HK-LR-SR2) part by cutting out the L2 layer.

Example: Board Layers

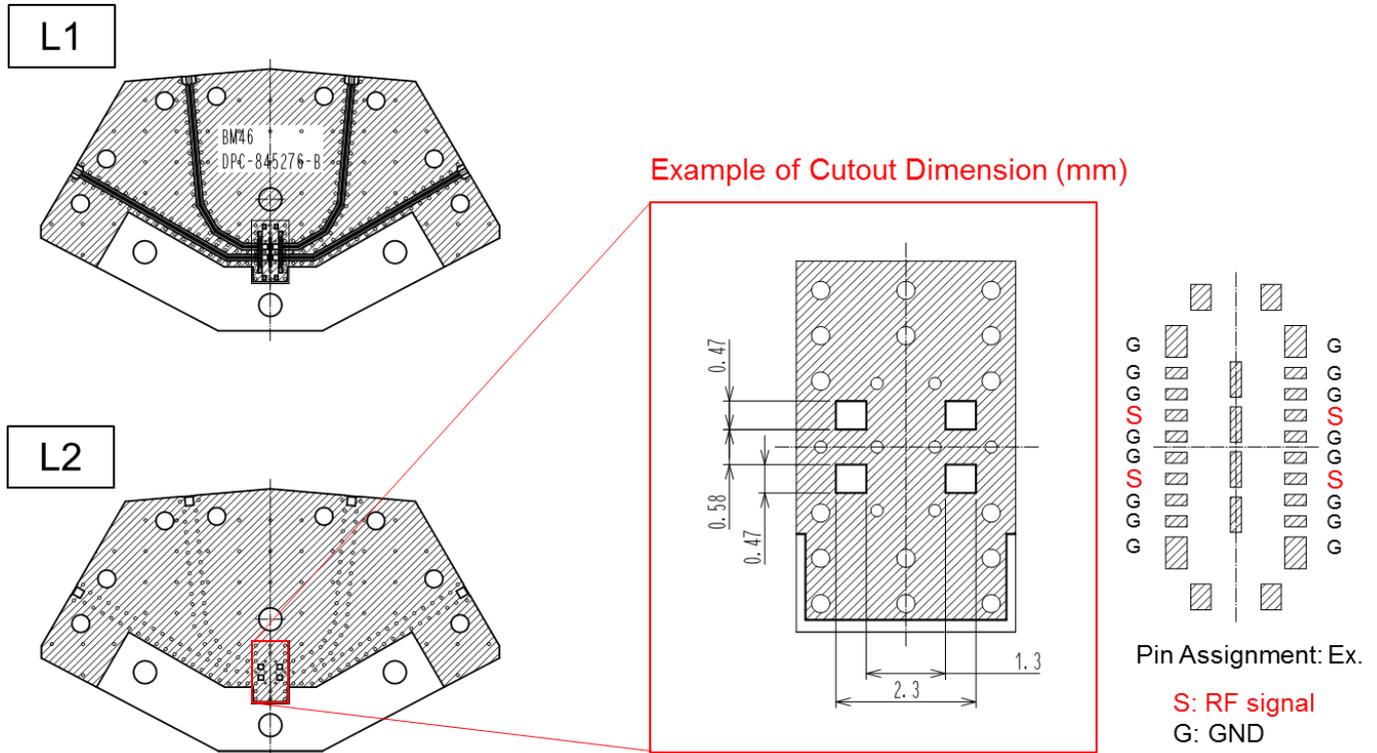
	20 $\mu\text{m}$ (Cu+Ni+Au)
L1	18 $\mu\text{m}$ (Copper)
	0.1mm (Prepreg, $\epsilon = 3.6$ )
L2	18 $\mu\text{m}$ (Copper)
	0.1mm (Prepreg, $\epsilon = 3.6$ )
	1mm (Thickness adj. \ High-Tg material)
L3	18 $\mu\text{m}$ (Copper)
	20 $\mu\text{m}$ (Cu+Ni+Au)

Example: Pattern Width (mm)

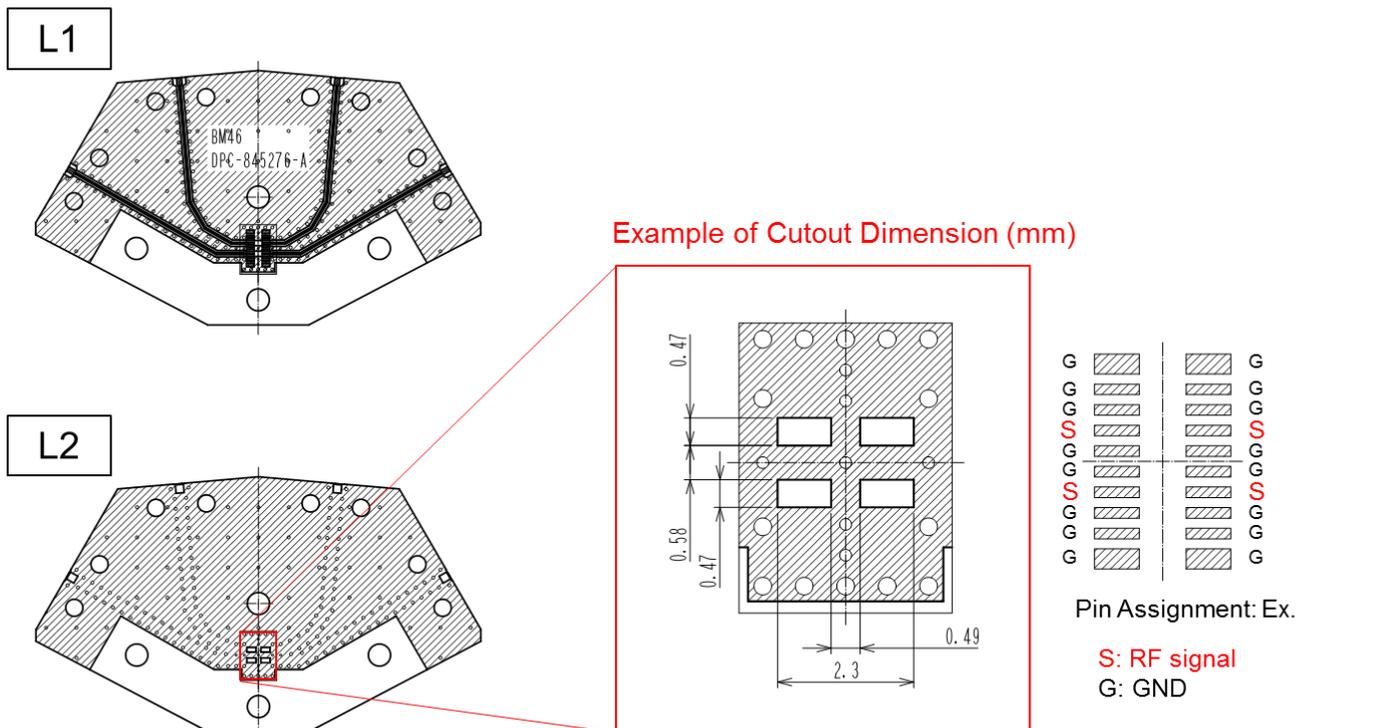


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**Receptacle RF Evaluation Board: Example of the cutout dimension**



**Plug RF Evaluation Board: Example of the cutout dimension**



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