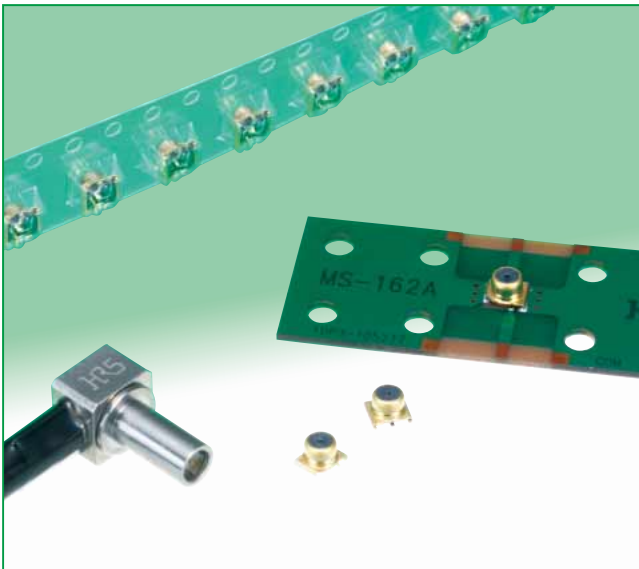


# Miniature Interface Coaxial Switch, DC to 10 GHz

## MS-162B Series



### Overview

Designed to be used as the interface antenna connection for portable terminal devices as well as circuit testing on microwave boards (DC to 10GHz) the coaxial switch offers high performance, low loss, extremely high durability and reliability, in a small and lightweight package.

Normally closed, the circuit is re-directed to the plug side by the mating of the plug with the receptacle.

### Features

#### 1. Wide frequency range

Applicable frequencies range from DC to 10 GHz.

#### 2. Low insertion loss

0.15 dB MAX (DC to 2 GHz)  
 0.2 dB MAX (2 GHz to 3 GHz)  
 0.4 dB MAX (3 GHz to 6 GHz)  
 0.7 dB MAX (6 GHz to 10 GHz)  
 (NORMALLY CLOSED)

#### 3. Space-saving design

3.5 mm x 3.1 mm occupied board space.

#### 4. Low profile

2.5 mm max. protrusion above the board.

#### 5. Lightweight

0.043 g. total weight

#### 6. Durability

12,000 mating/unmating cycles, with corresponding plug.

#### 7. Board placement with automatic equipment.

Packaged on tape-and-reel.

#### 8. Self alignment

When mating, plug and receptacle will self align in horizontal axis within 0.5mm.

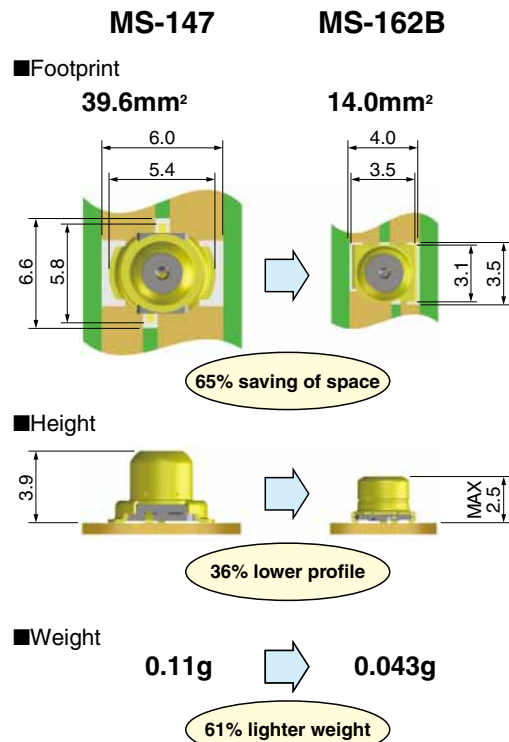
#### 9. Beryllium, Halogen-free\*

All materials and substances used to produce this product comply with Halogen and Beryllium-free standards.

\*As defined by IEC61249-2-21

Br-900 ppm maximum, Cl-900 ppm maximum,  
 Cl+Br combined-1,500 ppm maximum.

### Comparison with the existing MS-147



#### ●Plugs



MS-162-C(LP)-1

#### ●SMA conversion adapter



MS-162-HRMJ-1  
 MS-162-HRMJ-H1

## Product Specifications

|                             | NORMALLY CLOSED (N.C)  | NORMALLY OPEN (N.O)<br>*Plug: MS-162-HRMJ-1   |
|-----------------------------|--|---|
| Operating temperature range | -40°C to +85°C   |   |
| Rated power                 | 4W   |   |
| Frequency range             | DC to 10GHz  |   |
| V.S.W.R.                    | 1.2 max. (DC to 3GHz)<br>1.5 max. (3GHz to 6GHz)<br>1.7 max. (6GHz to 10GHz)                                     | 1.2 max. (DC to 3GHz)<br>1.6 max. (3GHz to 6GHz)<br>1.7 max. (6GHz to 10GHz)                                    |
| Insertion loss              | 0.15 dBmax. (DC to 2GHz)<br>0.2 dBmax. (2GHz to 3GHz)<br>0.4 dBmax. (3GHz to 6GHz)<br>0.7 dBmax. (6GHz to 10GHz) | 0.2 dBmax. (DC to 2GHz)<br>0.3 dBmax. (2GHz to 3GHz)<br>0.5 dBmax. (3GHz to 6GHz)<br>0.7 dBmax. (6GHz to 10GHz) |
| Isolation                   | —————  | 25 dBmin. (DC to 1GHz)<br>20 dBmin. (1GHz to 3GHz)<br>14 dBmin. (3GHz to 6GHz)<br>12 dBmin. (6GHz to 10GHz)     |

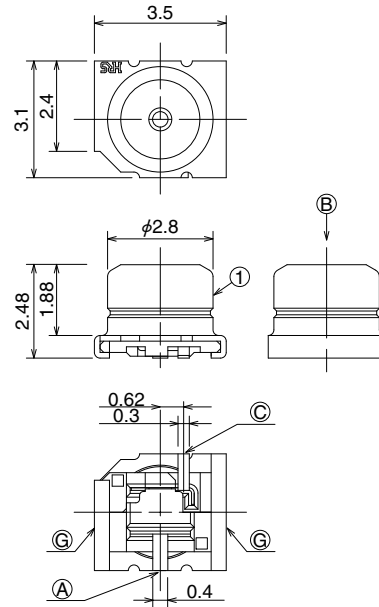
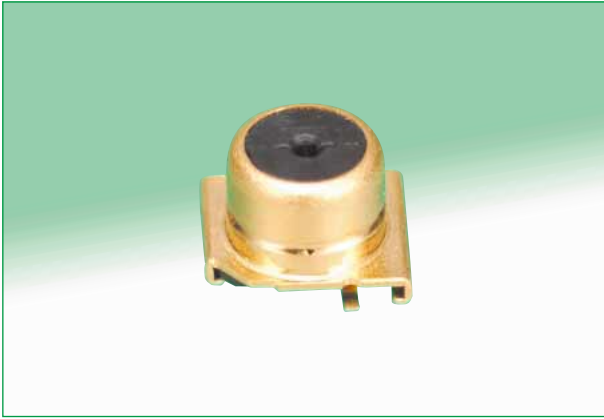
| Item  | Specification  | Conditions  |
|---|--|---|
| 1. Contact resistance   | 100 mΩ max.  | 100 mA  |
| 2. Insulation resistance                                      | 1000 MΩ min.   | 100 V DC  |
| 3. Withstanding voltage                                       | No flashover or insulation breakdown                                 | 100 V AC / 1 minute   |
| 4. Vibration  | No electrical discontinuity of 1 μs or more                          | Frequency 10 to 55 Hz<br>Single amplitude 0.75mm or 98 m/s <sup>2</sup> , 1 octave/min,<br>10 cycles for each 3 directions. |
| 5. Shock  | No electrical discontinuity of 1 μs or more                          | 490 m/s <sup>2</sup> at 3 times for 3 directions.   |
| 6. Thermal shock  | Contact resistance: 100 mΩ max.<br>Insulation resistance: 10 MΩ min. | Temperature: -55°C → +15°C to +35°C → +85°C → +15°C to +35°C<br>Time: 30 → 2-3 → 30 → 2-3 (Minutes) Under 100 cycles        |
| 7. High temperature exposure                                  | Contact resistance: 100 mΩ max.<br>Insulation resistance: 10 MΩ min. | 96 hours at 85°C  |
| 8. Low temperature exposure                                   | Contact resistance: 100 mΩ max.<br>Insulation resistance: 10 MΩ min. | 96 hours at -55°C   |
| 9. Humidity   | Contact resistance: 100 mΩ max.<br>Insulation resistance: 10 MΩ min. | 96 hours at of 40°C, RH of 90% to 95%   |
| 10. Durability<br>(mating/un-mating, with corresponding plug) | Contact resistance: 100 mΩ max.                                      | 12, 000 cycles  |

## Materials

| Part             | Material        | Finish                | Remarks |
|------------------|-----------------|-----------------------|---------|
| Shell            | Brass           | Gold plated           | —————   |
| Insulators       | LCP             | —————                 | UL94V-0 |
| Common terminal  | Copper alloy    | Partially gold plated | —————   |
| Antenna terminal | Phosphor bronze | Partially gold plated | —————   |

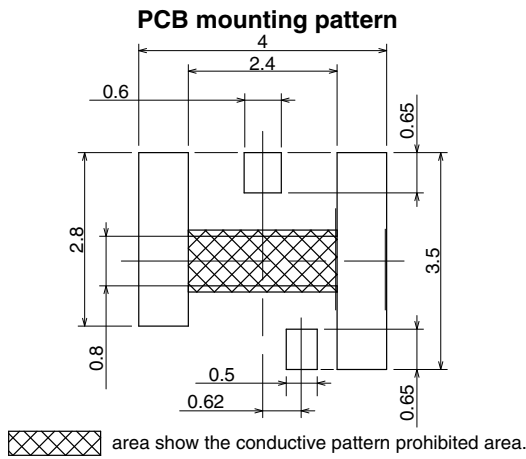
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## ■ Receptacle

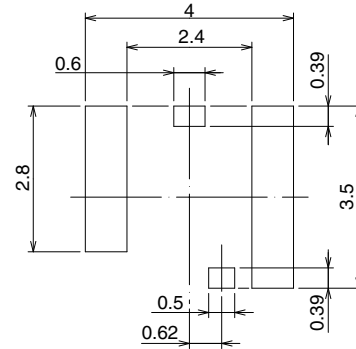


| Part No. | HRS No.    | Packaging      |
|----------|------------|----------------|
| MS-162B  | 358-0343-9 | 3,000 pcs/reel |

## ◆ PCB mounting pattern and metal mask dimensions

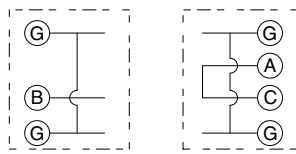


Metal mask dimensions (t=0.12mm)



## ◆ Circuit diagram

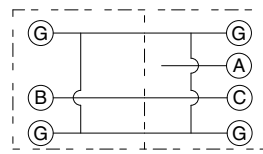
NORMALLY CLOSED (N.C)



Plug

MS-162B

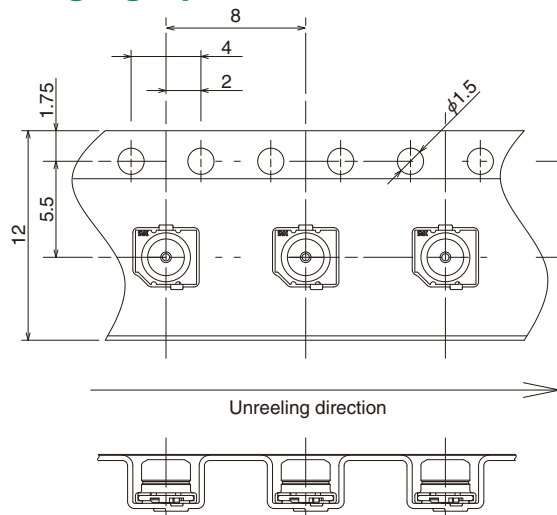
NORMALLY OPEN (N.O)



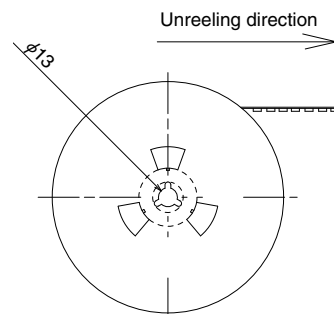
Plug

MS-162B

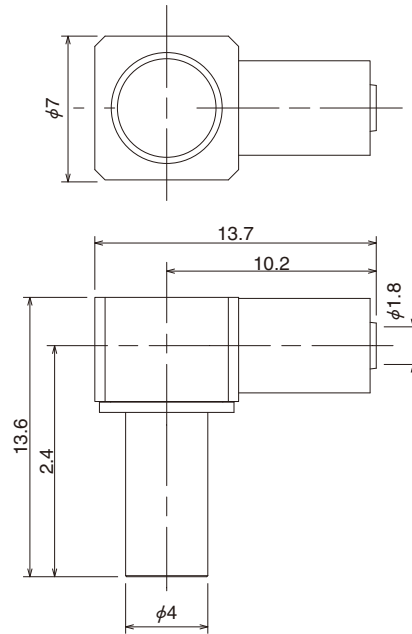
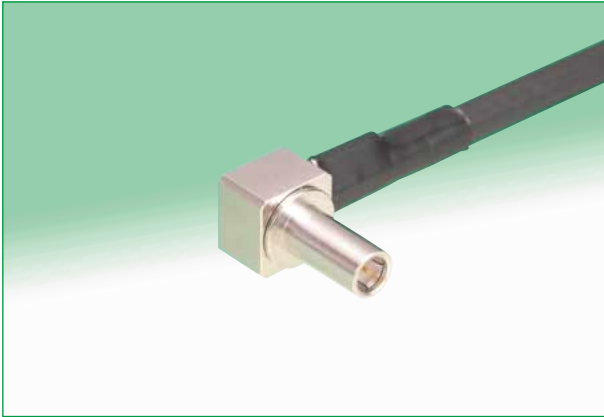
## ◆ Packaging Specifications



## ● Reel dimensions



### ■ Plug

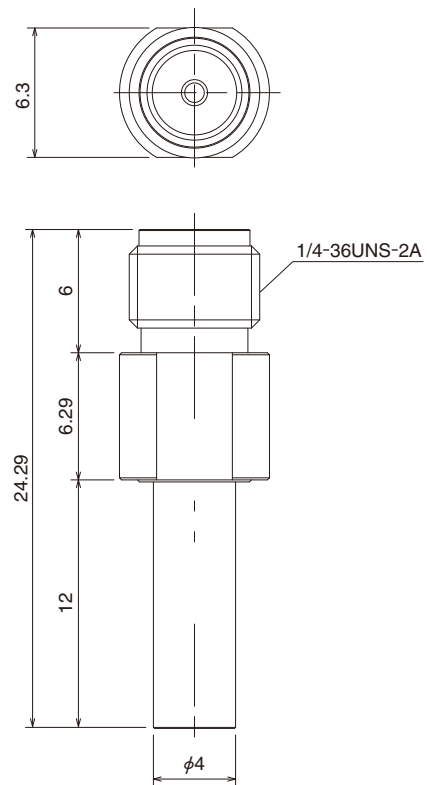


| Part No.       | HRS No.    |
|----------------|------------|
| MS-162-C(LP)-1 | 358-0222-4 |

Applicable cable: 1.5D-HQEW, 1.5D-QEW (Fujikura Ltd.)

Cable termination tool : Outer conductor HT303/PO-P-2-T(substitute for PO-P-2-T), Cover setting tool UM-T-1

### ■ SMA conversion adapter

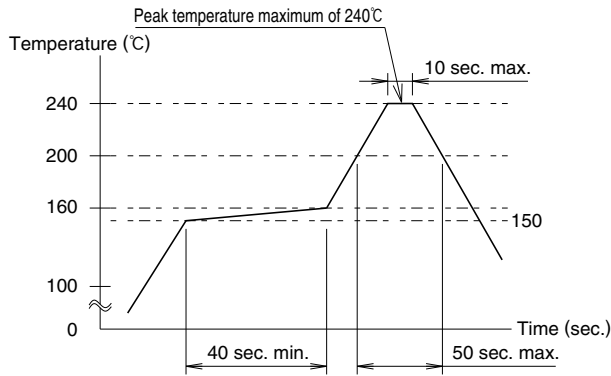


| Part No.       | HRS No.    | Simplified lock |
|----------------|------------|-----------------|
| MS-162-HRMJ-1  | 358-0210-5 | -               |
| MS-162-HRMJ-H1 | 358-0221-1 | YES             |

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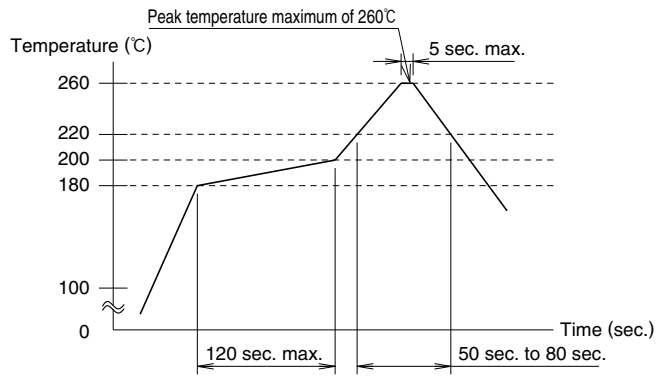
## ◆ Recommended Temperature profile

### ● Typical Solder Paste



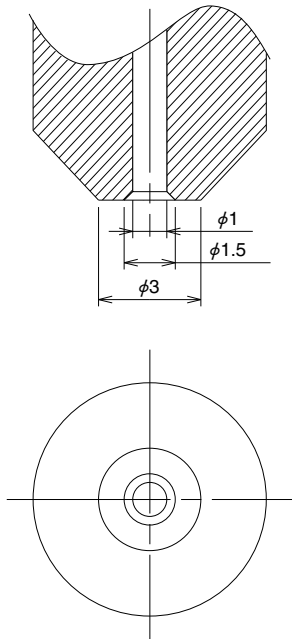
|   |                       |                  |
|---|-----------------------|------------------|
| ① | Maximum temperature   | : 240°C          |
| ② | Peak temperature      | : 200°C to 240°C |
| ③ | Peak temperature time | : 10 sec. max.   |
| ④ | 200°C min.            | : 50 sec. max.   |
| ⑤ | 150°C to 160°C        | : 40 sec. min.   |

### ● Typical Lead-free Solder Paste



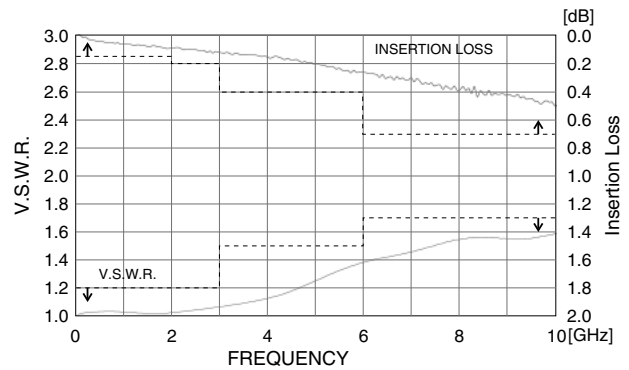
|   |                       |                      |
|---|-----------------------|----------------------|
| ① | Maximum temperature   | : 260°C              |
| ② | Peak temperature      | : 240°C to 260°C     |
| ③ | Peak temperature time | : 5 sec. max.        |
| ④ | 220°C min.            | : 50 sec. to 80 sec. |
| ⑤ | 180°C to 200°C        | : 120 sec. max       |

## ◆ Recommended Nozzle Dimensions

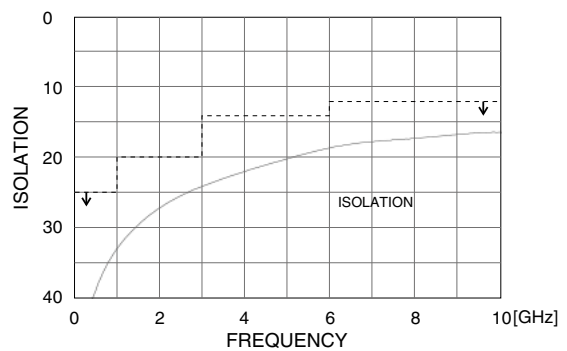
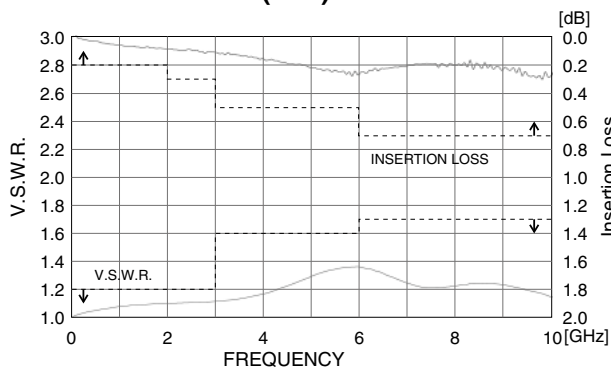


## ◆ High Frequency Characteristics (Typical)

### ● NORMALLY CLOSED(N.C)

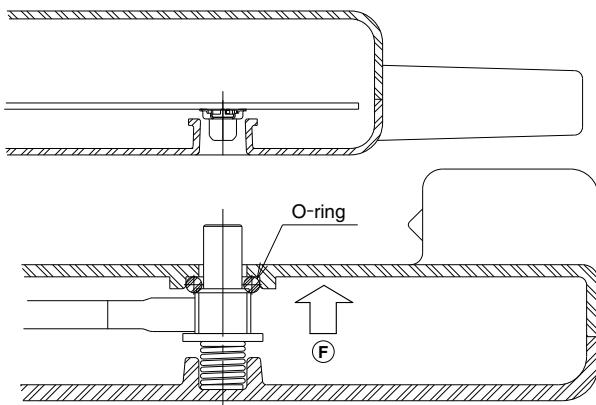


### ● NORMALLY OPEN(N.O)



## ◆ Example of Application

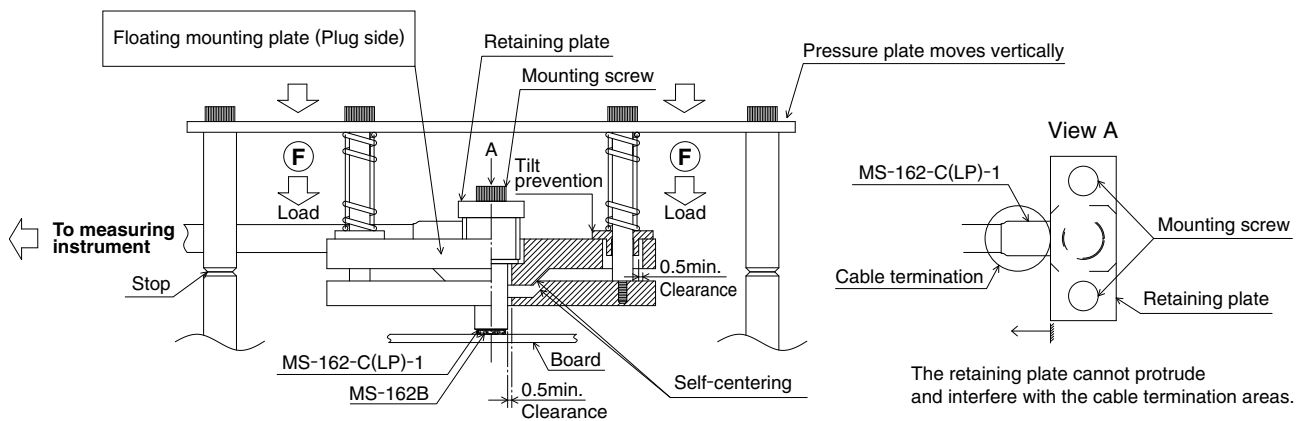
### Installed in portable devices



Note 1: When mounting the MS-162-C(LP)-1 make sure that the recommended self alignment distances and angle can be maintained.

Note 2: When fully mated the spring force (F) must be 10N to 15N.

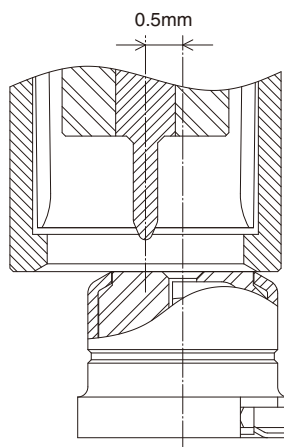
### Installed in test fixture



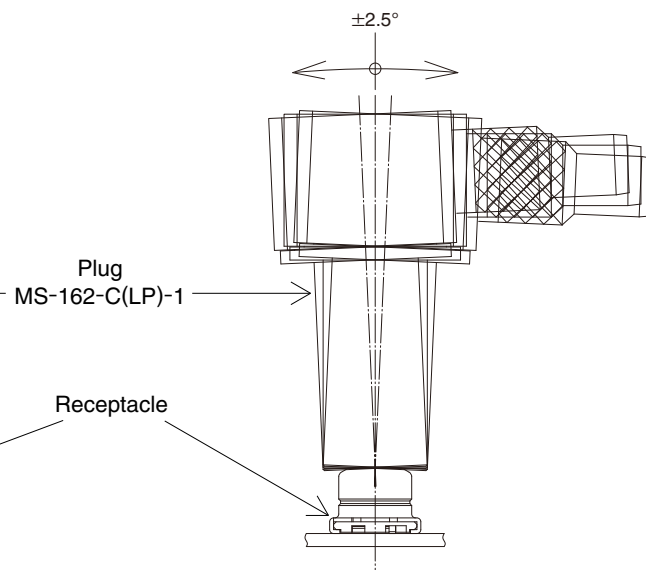
Note 1: When mounting the MS-162-C(LP)-1 make sure that the recommended self alignment distances and angle can be maintained.

Note 2: When fully mated the spring force (F) must be 10N to 15N.

### Axial misalignment distance



### Allowable angular misalignment for mating

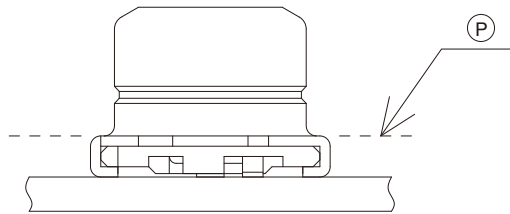


This value is the allowable amount of angle deviation at which the plug can be inserted until it is guided by the receptacle and the tapered portion of the plug.

In the mating process, the plug must be pressed perpendicularly with springs through a floating mechanism.

## ◆ Precautions

1. This product does not support washing process.
2. When designing your device, considerations should be made to protect this part from the mechanical stress when the device is dropped.
3. Do not hand-solder the receptacles. This process may lead to solder and flux wicking into the contact areas.
4. When using a heat gun, hot plate, or similar methods, limit the temperature to 260°C applied for 10 seconds max. Exceeding these conditions might melt the resin and deform the connector.
5. When mounting to the PCB, please use the recommended mounting pattern and metal mask dimensions. Not doing so may cause solder and flux wicking that will cause failures in the connector.
6. Please refrain from using the product in environments specifically affected by dust, high humidity, gases, very high temperatures and very low temperatures.
7. When used as an RF interface of a portable terminal, consider using a rubber cap or other means of protection against intrusion of dust, dirt or other harmful elements.
8. When using, assure that the plug is fully inserted to the surface (P), as shown below.



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