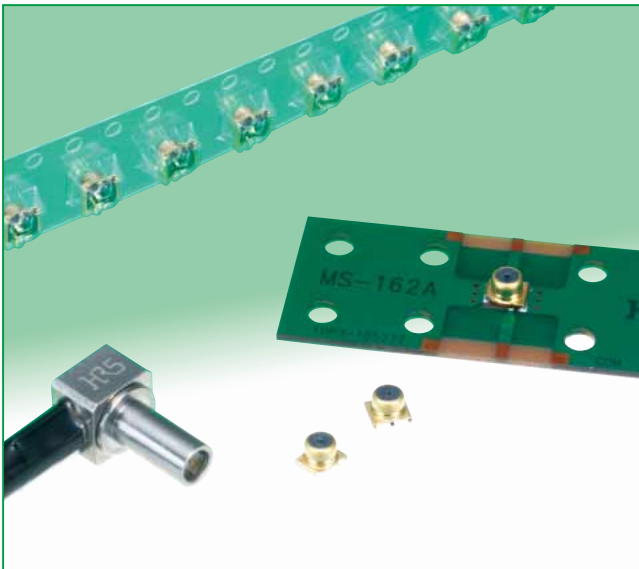


# Miniature Interface Coaxial Switch, DC to 10 GHz

## 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.

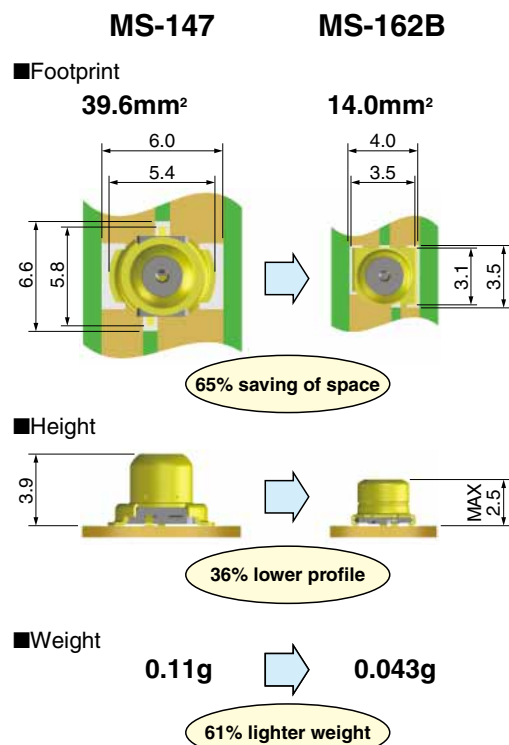
#### 9. Beryllium, Halogen-free\*

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

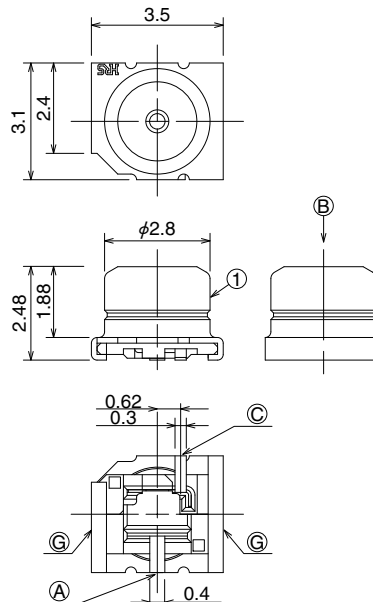
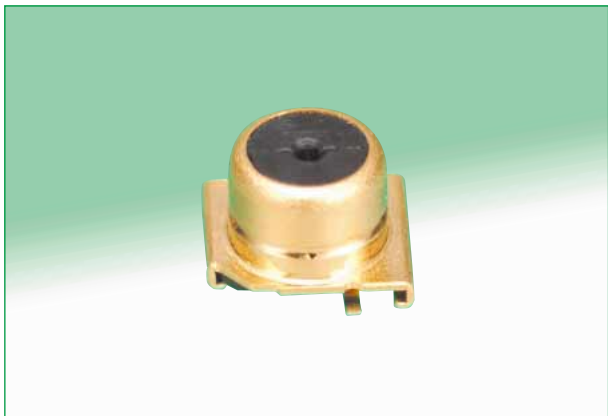
	NORMALLY CLOSED (N.C)	NORMALLY OPEN (N.O) *Plug: MS-162-HRMJ-1
Operating temperature range	-40°C to +85°C	
Rated power	4W	
Frequency range	DC to 10GHz	
V.S.W.R.	1.2 max. (DC to 3GHz) 1.5 max. (3GHz to 6GHz) 1.7 max. (6GHz to 10GHz)	1.2 max. (DC to 3GHz) 1.6 max. (3GHz to 6GHz) 1.7 max. (6GHz to 10GHz)
Insertion loss	0.15 dBmax. (DC to 2GHz) 0.2 dBmax. (2GHz to 3GHz) 0.4 dBmax. (3GHz to 6GHz) 0.7 dBmax. (6GHz to 10GHz)	0.2 dBmax. (DC to 2GHz) 0.3 dBmax. (2GHz to 3GHz) 0.5 dBmax. (3GHz to 6GHz) 0.7 dBmax. (6GHz to 10GHz)
Isolation	—————	25 dBmin. (DC to 1GHz) 20 dBmin. (1GHz to 3GHz) 14 dBmin. (3GHz to 6GHz) 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 Single amplitude 0.75mm or 98 m/s <sup>2</sup> , 1 octave/min, 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. Insulation resistance: 10 MΩ min.	Temperature: -55°C → +15°C to +35°C → +85°C → +15°C to +35°C Time: 30 → 2-3 → 30 → 2-3 (Minutes) Under 100 cycles
7. High temperature exposure	Contact resistance: 100 mΩ max. Insulation resistance: 10 MΩ min.	96 hours at 85°C
8. Low temperature exposure	Contact resistance: 100 mΩ max. Insulation resistance: 10 MΩ min.	96 hours at -55°C
9. Humidity	Contact resistance: 100 mΩ max. Insulation resistance: 10 MΩ min.	96 hours at of 40°C, RH of 90% to 95%
10. Durability (mating/un-mating, with corresponding plug)	Contact resistance: 100 mΩ max.	12, 000 cycles

## Materials

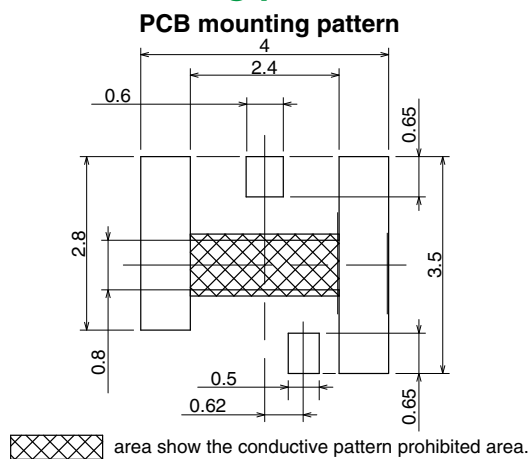
Part	Material	Finish	Remarks
Shell	Brass	Gold plated	—————
Insulators	LCP	—————	UL94V-0
Common terminal	Copper alloy	Partially gold plated	—————
Antenna terminal	Phosphor bronze	Partially gold plated	—————

## ■ Receptacle

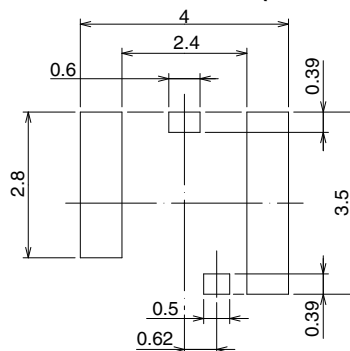


Part No.	HRS No.	Packaging
MS-162B	358-0343-9	3,000 pcs/reel

## ◆ PCB mounting pattern and metal mask dimensions

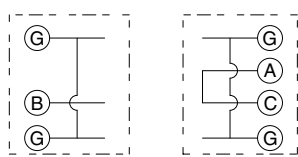


Metal mask dimensions (t=0.12mm)



## ◆ Circuit diagram

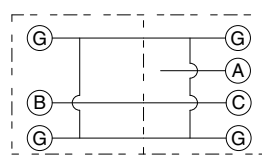
NORMALLY CLOSED (N.C)



Plug

MS-162B

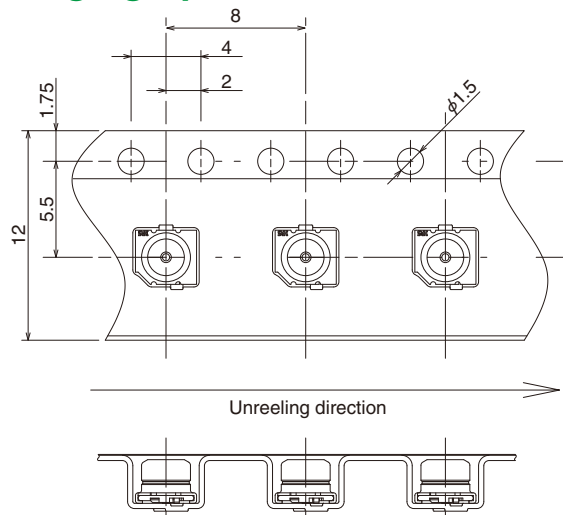
NORMALLY OPEN (N.O)



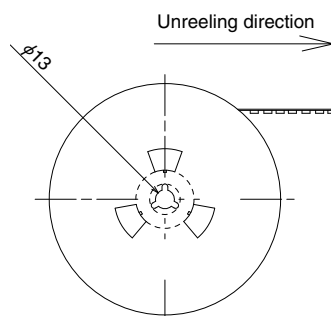
Plug

MS-162B

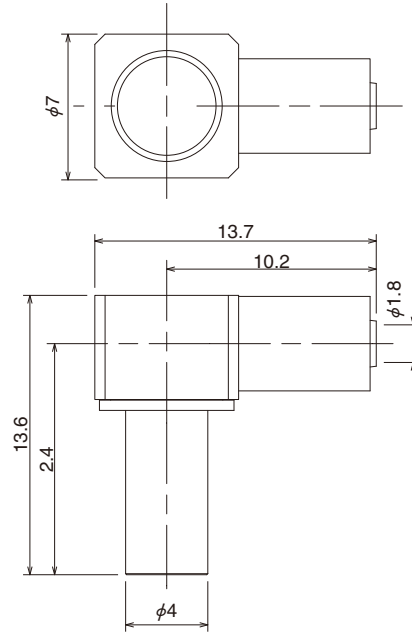
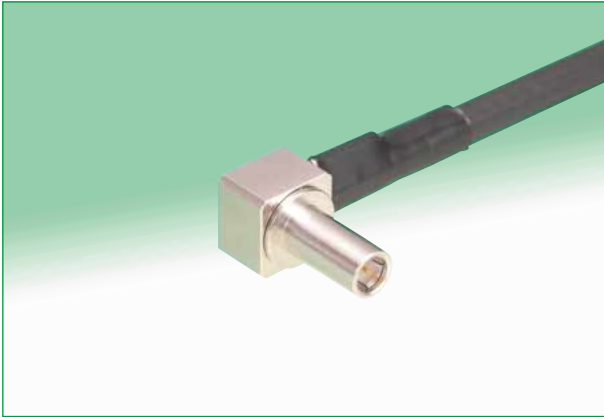
## ◆ Packaging Specifications



## ● Reel dimensions



### ■ Plug

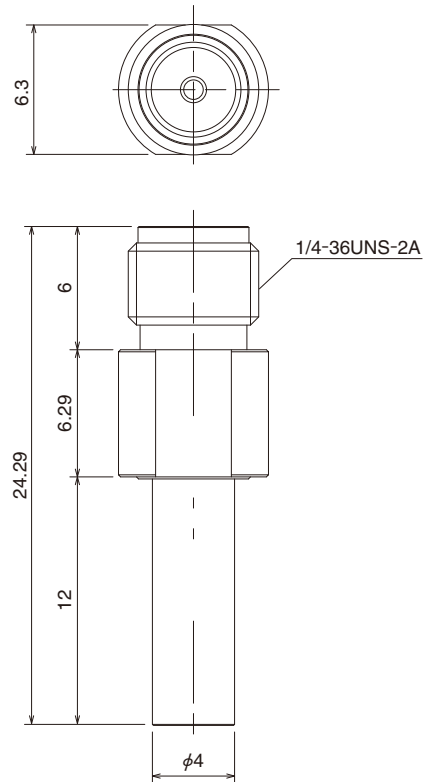


Part No.	HRS No.
MS-162-C(LP)-1	358-0222-4

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

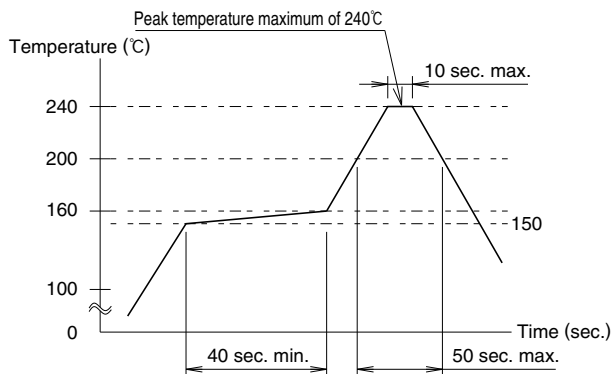
### ■ SMA conversion adapter



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

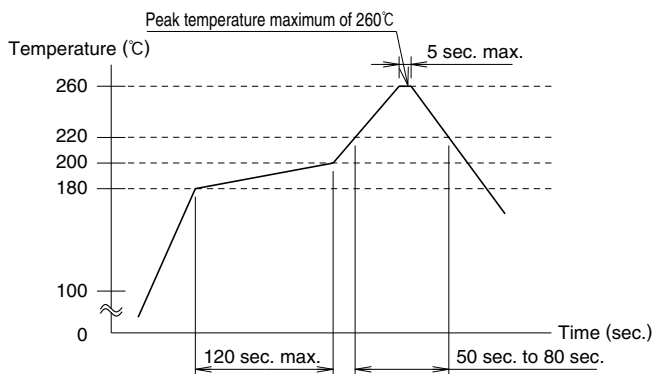
## ◆ Recommended Temperature profile

### ● Typical Solder Paste



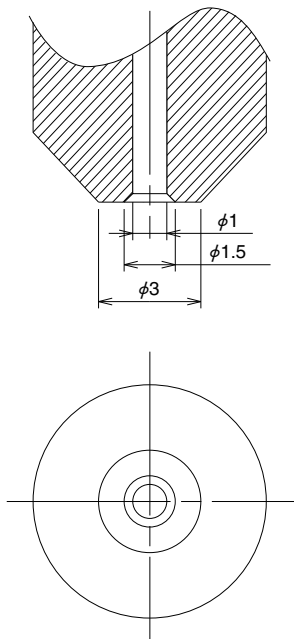
①	Maximum temperature	: 240°C
②	Peak temperature	: 200°C to 240°C
③	Peak temperature time	: 10 sec. max.
④	200°C min.	: 50 sec. max.
⑤	150°C to 160°C	: 40 sec. min.

### ● Typical Lead-free Solder Paste



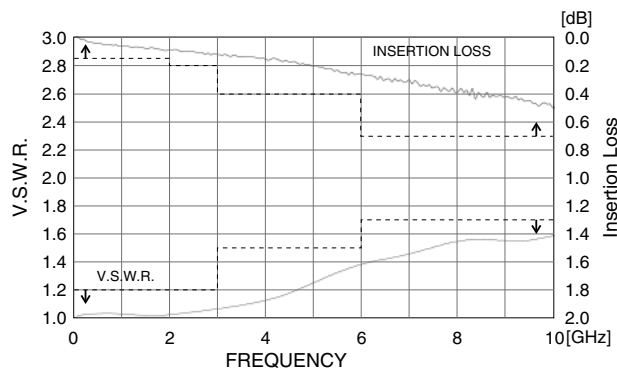
①	Maximum temperature	: 260°C
②	Peak temperature	: 240°C to 260°C
③	Peak temperature time	: 5 sec. max.
④	220°C min.	: 50 sec. to 80 sec.
⑤	180°C to 200°C	: 120 sec. max

## ◆ Recommended Nozzle Dimensions

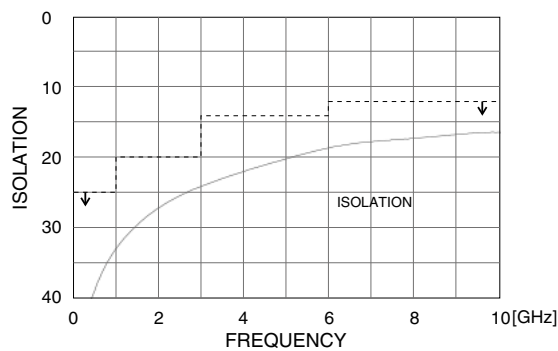
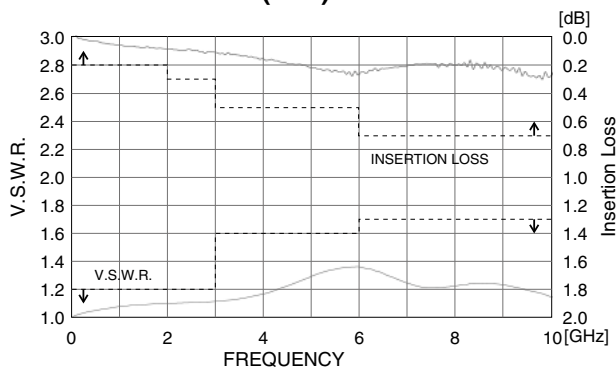


## ◆ High Frequency Characteristics (Typical)

### ● NORMALLY CLOSED(N.C)

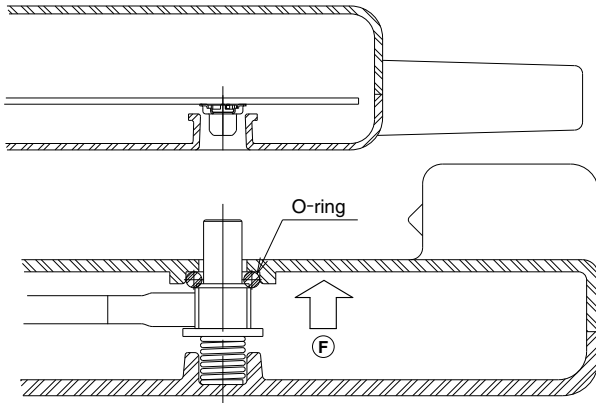


### ● NORMALLY OPEN(N.O)



## ◆ Example of Application

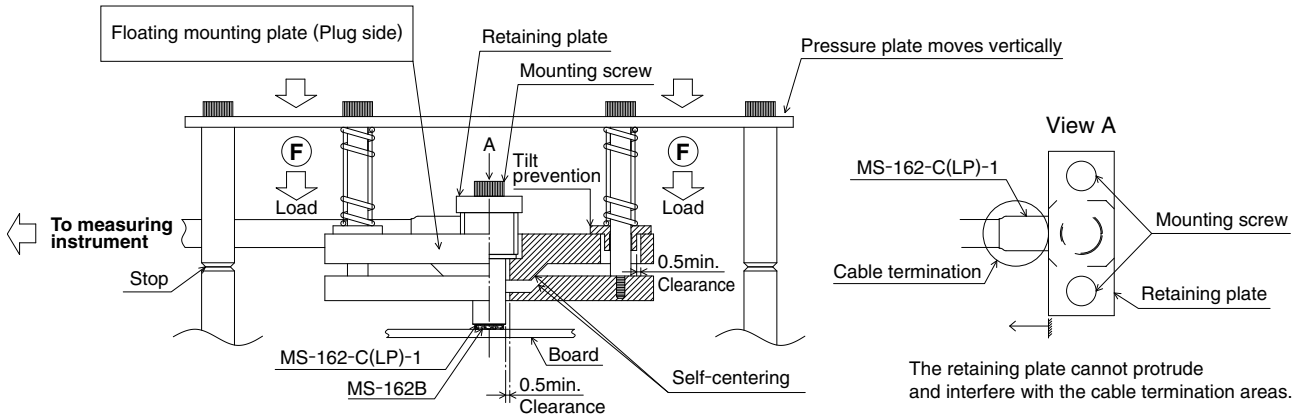
### Installed in portable devices



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.

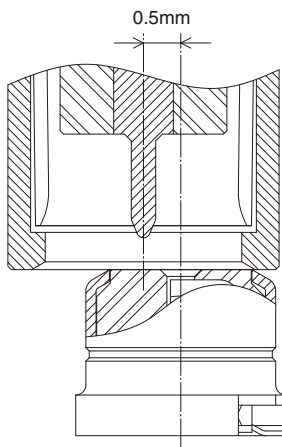
### Installed in test fixture



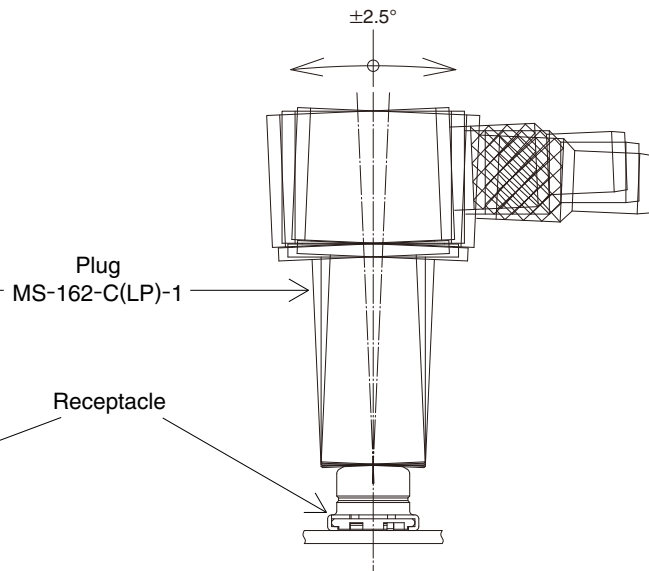
Note 1: When mounting the MS-162-C(LP)-1 make sure that the recommended self alignment distances and angle can be maintained.

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

### Axial misalignment distance



### Allowable angular misalignment for mating

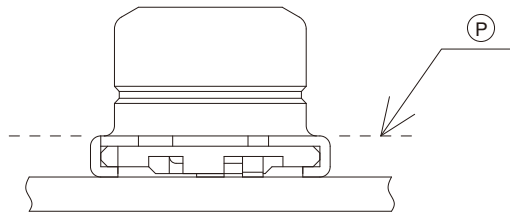


This value is the allowable amount of angle deviation at which the plug can be inserted until it is guided by the receptacle and the tapered portion of the plug.

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.



**USA:**

**HIROSE ELECTRIC (U.S.A.), INC. HEADQUARTERS**  
 2688 Westhills Court, Simi Valley, CA 93065-6235  
 Phone : +1-805-522-7958  
 Fax : +1-805-522-3217  
<http://www.hirose.com/us/>

**USA:**

**HIROSE ELECTRIC (U.S.A.), INC. SAN JOSE OFFICE**  
 3255 Scott Boulevard, Building 7, Suite 101  
 Santa Clara, CA 95054  
 Phone : +1-408-253-9640  
 Fax : +1-408-253-9641  
<http://www.hirose.com/us/>

**USA:**

**HIROSE ELECTRIC (U.S.A.), INC. CHICAGO OFFICE**  
 580 Waters Edge Lane, Suite 205 Lombard IL  
 60148  
 Phone : +1-630-282-6706  
 Mail : [inquiries@hirose.com](mailto:inquiries@hirose.com)  
<http://www.hirose.com/us/>

**USA:**

**HIROSE ELECTRIC (U.S.A.), INC. DETROIT OFFICE (AUTOMOTIVE)**  
 37677 Professional Center Drive, Suite #100C  
 Livonia, MI 48154  
 Phone : +1-734-542-9963  
 Fax : +1-734-542-9964  
<http://www.hirose.com/us/>

**THE NETHERLANDS:**

**HIROSE ELECTRIC EUROPE B.V.**  
 Hogehillweg #8 1101 CC Amsterdam Z-0  
 Phone : +31-20-6557460  
 Fax : +31-20-6557469  
<http://www.hirose.com/eu/>

**GERMANY:**

**HIROSE ELECTRIC EUROPE B.V. GERMAN BRANCH**  
 Herzog-Carl-Strasse 4 D-73760 Ostfildern  
 (Scharnhäuser Park)  
 Phone : +49-711-4560-02-1  
 Fax : +49-711-4560-02-299  
<http://www.hirose.com/eu/>

**GERMANY:**

**HIROSE ELECTRIC EUROPE B.V. NUERNBERG OFFICE**  
 Muggenhofer Str. 136 90429 Nuernberg  
 Phone : +49-911 32 68 89 63  
 Fax : +49-911 32 68 89 69  
<http://www.hirose.com/eu/>

**UNITED KINGDOM:**

**HIROSE ELECTRIC EUROPE BV (UK BRANCH)**  
 4 Newton Court, Kelvin Drive, Knowlhill,  
 Milton Keynes, MK5 8NH  
 Phone : +44-1908 202050  
 Fax : +44-1908 202058  
<http://www.hirose.com/eu/>

**CHINA:**

**HIROSE ELECTRIC (SHANGHAI) CO., LTD.**  
 1601, Henderson Metropolitan, NO.300, East Nanjing  
 Road, Huangpu District, Shanghai, China 200001  
 Phone : +86-21-6391-3355  
 Fax : +86-21-6391-3335  
<http://www.hirose.com/cn/>

**CHINA:**

**HIROSE ELECTRIC (SHANGHAI) CO.,LTD. BEIJING BRANCH**  
 A1001, Ocean International Center, Building 56# East 4th  
 Ring Middle Road, ChaoYang District, Beijing, 100025  
 Phone : +86-10-5165-9332  
 Fax : +86-10-5908-1381  
<http://www.hirose.com/cn/>

**CHINA:**

**HIROSE ELECTRIC TECHNOLOGIES (SHENZHEN) CO., LTD.**  
 Room 09-13, 19/F, Office Tower Shun Hing Square, Di Wang Commercial Centre,  
 5002 Shen Nan Dong Road, Shenzhen City, Guangdong Province, 518008  
 Phone : +86-755-8207-0851  
 Fax : +86-755-8207-0873  
<http://www.hirose.com/cn/>

**HONG KONG:**

**HIROSE ELECTRIC HONGKONG TRADING CO., LTD.**  
 Room 1001, West Wing, Tsim Sha Tsui Centre, 66  
 Mody Road, Tsim Sha Tsui East, Kowloon, Hong Kong  
 Phone : +852-2803-5338  
 Fax : +852-2591-6560  
<http://www.hirose.com/hk/>

**TAIWAN:**

**HIROSE ELECTRIC TAIWAN CO., LTD.**  
 103 8F, No.87, Zhengzhou Rd., Taipei  
 Phone : +886-2-2555-7377  
 Fax : +886-2-2555-7350  
<http://www.hirose.com/cn/>

**KOREA:**

**HIROSE KOREA CO., LTD.**  
 1261-10, Jeoungwhang-Dong, Shihung-City,  
 Kyunggi-Do 429-450  
 Phone : +82-31-496-7000,7124  
 Fax : +82-31-496-7100  
<http://www.hirose.co.kr/>

**SINGAPORE:**

**HIROSE ELECTRIC SINGAPORE PTE. LTD.**  
 10 Anson Road #26-1, International Plaza  
 079903, Singapore  
 Phone : +65-6324-6113  
 Fax : +65-6324-6123  
<http://www.hirose.com/sg/>

**INDIA:**

**HIROSE ELECTRIC SINGAPORE PTE. LTD. DELHI LIAISON OFFICE**  
 Office NO.519, Regus-Green Boulevard, Level5, Tower C,  
 Sec62, Plot B-9A, Block B, Noida, 201301, Uttar Pradesh, India  
 Phone : +91-12-660-8018  
 Fax : +91-120-4804949  
<http://www.hirose.com/sg/>

**INDIA:**

**HIROSE ELECTRIC SINGAPORE PTE. LTD. BANGALORE LIAISON OFFICE**  
 Unit No.03, Ground Floor, Explorer Building International Tech  
 Park Whitefield Road, Bangalore 560066 Karnataka, India  
 Phone : +91-80-4120 1907  
 Fax : +91-80-4120 9908  
<http://www.hirose.com/sg/>

**MALAYSIA:**

**HIROSE ELECTRIC SINGAPORE PTE. LTD. (REPRESENTATIVE OFFICE)**  
 1-10-07, Suntech @ Penang Cybercity (1164),Lintang  
 Mayang Pasir 3,11950, Bayan Baru, Penang, Malaysia.  
 Phone : +604-619-2564  
 Fax : +604-619-2574  
<http://www.hirose.com/sg/>



**HIROSE ELECTRIC CO.,LTD.**

2-6-3,Nakagawa Chuoh,Tsuzuki-Ku,Yokohama-Shi 224-8540,JAPAN  
 TEL: +81-45-620-3526 Fax: +81-45-591-3726  
<http://www.hirose.com>  
<http://www.hirose-connectors.com>