# Microwave Coaxial Connectors

Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.O30E-8

**for EU RoHS Compliant**

・All the products on this catalog are complied with EU RoHS.
・EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
・For more details, please refer to our website 'Murata's Approach for EU RoHS' (http://www.murata.com/info/rohs.html).

# CONTENTS

## ● Part Numbering

### Coaxial Connectors (Chip Type Receptacle)

(Part Number) **MM** **7329** **-27** **00** **R** **A1**
❶ ❷ ❸ ❹ ❺ ❻

❶Product ID

| Product ID | |
|---|---|
| **MM** | Microwave Coaxial Connectors (Chip Type Receptacle) |

❷Series

| Code | Series |
|---|---|
| **4829** | HSC Type |
| **7329** | FSC Type |
| **8130** | SWF Type |
| **8430** | SWD Type |
| **9329** | GSC Type |

❸Individual Specification Code (1)

| Code | Individual Specification Code (1) |
|---|---|
| **-26** | Switch Connector SMD Type |
| **-27** | Connector SMD Type |

❹Individual Specification Code (2)

| Code | Individual Specification Code (2) |
|---|---|
| **00** | Serial |

❺Package Product ID

| Code | Package Product ID |
|---|---|
| **B** | Bulk |
| **R** | Reel |

❻Package Detail

| Code | Package Detail |
|---|---|
| **A1** | FSC, SWD, GSC Type 1000pcs. /Reel (ø178mm) |
| **A4** | HSC Type, 4000pcs. /Reel (ø178mm) |
| **B0** | HSC Type, 10000pcs. /Reel (ø330mm) |
| **B3** | SWD Type, 3000pcs. /Reel (ø330mm) |
| **B4** | FSC Type, 4000pcs. /Reel (ø330mm) |
| **B5** | GSC Type, 5000pcs. /Reel (ø330mm) |
| **B8** | SWF Type, 8000pcs. /Reel (ø330mm) |

### Coaxial Connectors (with Cable)

(Part Number) **MX** **FG** **76** ☐ ☐ ☐
❶ ❷ ❸ ❹ ❺ ❻

❶Product ID

| Product ID | |
|---|---|
| **MX** | Coaxial Connectors (with Cable) |

❷Connector (1)

| Code | Connector (1) |
|---|---|
| **FG** | FSC Type for 76 Cable |
| **FK** | FSC Type for 81 Cable |
| **HP** | HSC Type |
| **TK** | GSC Type |

❸Cable

| Code | Cable |
|---|---|
| **32** | 0.4D, PFA, Single Shield Line, Spiral |
| **76** | 0.8D, FEP, Single Shield Line |
| **81** | 0.4D, FEP, Single Shield Line |
| **88** | 0.4D, PFA, Single Shield Line, Single Line |
| **92** | 0.4D, PFA, Single Shield Line, Spiral |

❹Connector (2)

| Code | Connector (2) |
|---|---|
| **FG** | FSC Type for 76 Cable |
| **FK** | FSC Type for 81 Cable |
| **HP** | HSC Type |
| **TK** | GSC Type |
| **XX** | None Connector |

❺Length

Expressed by four figures. The unit is mm. From first to third figures are significant, and the fourth figure expresses the number of zeros which follow the three figures.

Ex.)

| Code | Length |
|---|---|
| **5000** | 500mm = 500 x $10^0$ |
| **1001** | 1000mm = 100 x $10^1$ |

❻Individual Specification Code

Expressed by two sign.

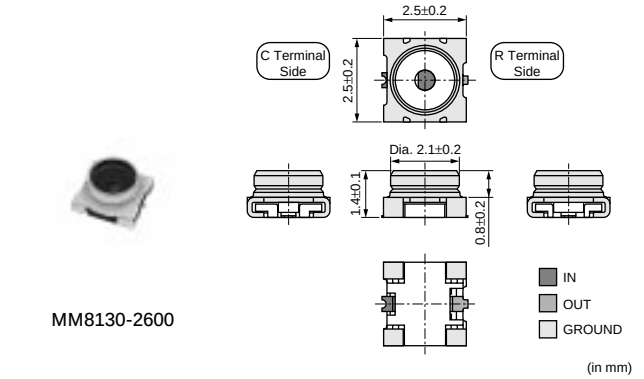
# Microwave Coaxial Connectors



## Microwave Coaxial Connectors with Switch SWF Type

### ■ Features

1. The coaxial connector with switch is very useful for characteristic measurement Cellular phone and microwave circuit.
2. It is possible to switch the line connection and disconnection easily by special probe.
3. Small size, low profile, size 2.5x2.5x1.4mm (LxWxH)
4. Excellent characteristics, low IL 0.2dB max. V.S.W.R. 1.3 max. Isolation 15dB min. (DC to 6GHz)
5. Surface mountable and reflow solderable
6. Tape package available




MM8130-2600

(in mm)

### ■ Applications

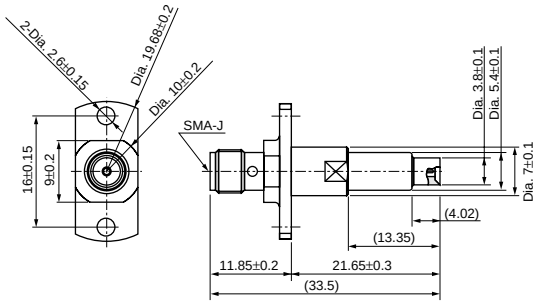
Cellular phone, W-LAN, Other wireless and measurement equipment

| Part Number | Rated Voltage (Vrms) | Contact Resistance (max.) (ohm) | Withstand Voltage (Vrms) | Insulation Resistance (M ohm) | Durability (cycles) | Frequency Rating | Temperature Range (degree C) | VSWR | Insertion Loss (On) (dB) | Isolation (Off) (dB) | Inner Electrode (C) | Inner Electrode (R) (material) | Outer Electrode (material) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MM8130-2600** | 250 | 0.07 | 300 (AC) | 500 | 100 | to 6GHz | -40 to +85 | 1.2 max. (DC to 3GHz) | 0.1 max. (DC to 3GHz) | 20 min. (DC to 3GHz) | Stainless Steel Gold plated | Stainless Steel Gold plated | Copper Alloy Gold plated |

Impedance: 50ohm

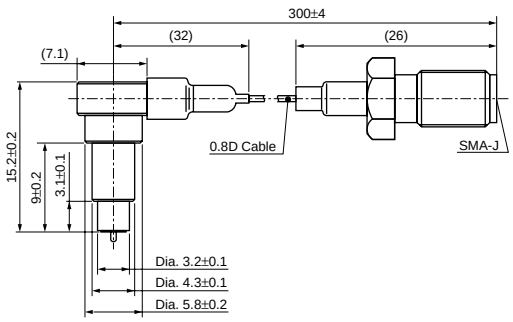
### ■ Measurement Probe Dimensions

MM126036




(in mm)

MXHS83QE3000




(in mm)

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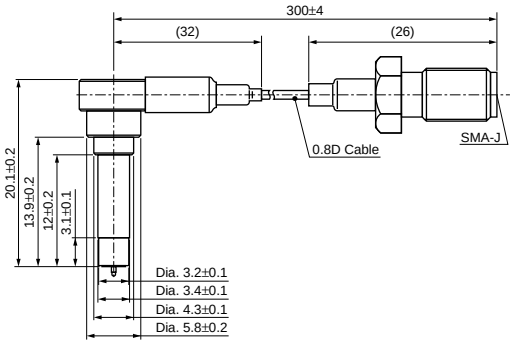
1

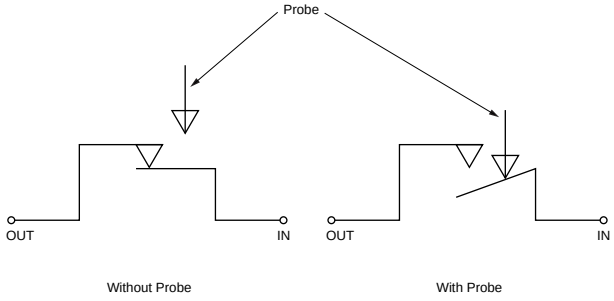
## ■ Measurement Probe Dimensions

MXHS83QH3000




(in mm)

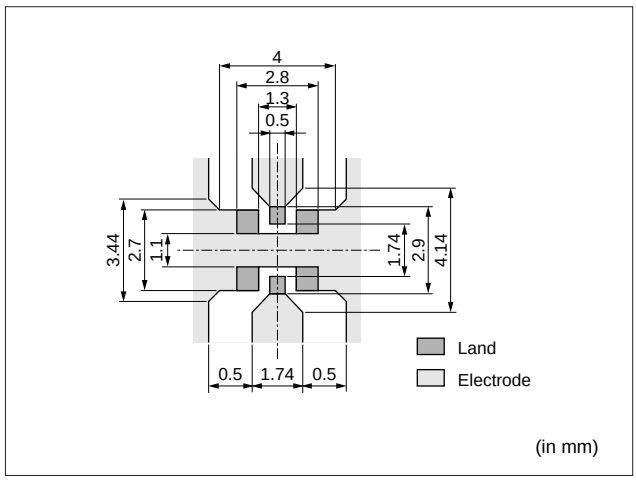
## ■ Structure




## ■ Standard Land Dimensions

### 1. Standard Pattern Dimensions

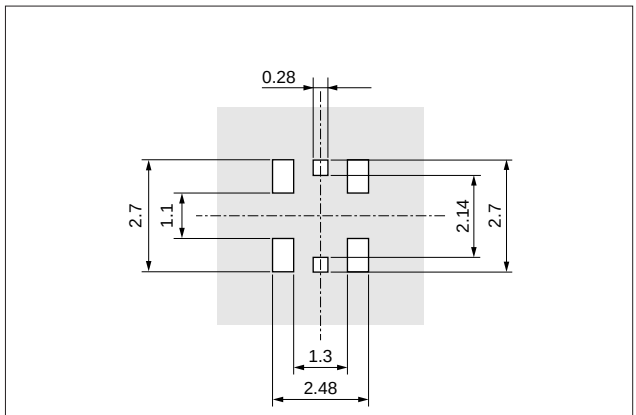
- I/O pattern should be designed to match 50 ohm impedance circuit.
- Typical PCB material is glass epoxy (εr=4.8). Thickness is 1.0mm.
- The solder resist should be printed except for the land pattern on the PCB.




(in mm)

### 2. Standard Solder Stencil Mask Pattern

Follow standard solder stencil mask pattern to avoid the possibility of solder being trapped under connector.




Standard Solder Stencil Mask Pattern
(Mask thickness 0.12mm)

(in mm)

## ■ Notice (Storage and Operating Condition)

1. Environment Conditions

(1) This product is designed for use in electrical equipment in the environment (temperature, humidity, atmospheric pressure, etc.) specified in this approval drawing. It may not be used in the following environments or under the following conditions:

(a) Ambient air containing corrosive gas (Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)

(b) Ambient air containing volatile or combustible gas

(c) In liquid (water, oil, chemical solution, organic solvents, etc.)

(d) In environments with a high concentration of airborne particles

(e) In direct sunlight

(f) Dusty conditions

(g) In freezing

(h) Other environments similar to the above conditions

(2) Contact the manufacturer before using the product in any of the above environments or under any of the above conditions.

2. Storage

Store in manufacturer's package or tightly re-closed box with the following conditions. Use this product within 6 months after receipt. Check the terminal solderability before use if the product has been stored for more than 6 months.

Temperature: -10 to +40 degree C

Humidity: 15 to 85% RH

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# Notice

## ■ Notice (Soldering and Mounting)

1. Reflow soldering

Soldering must be carried out without exceeding the allowable soldering temperature and time shown within the shaded area of Figure "Allowable Temperature and Time of Reflow Soldering".

In case the soldering is repeated, the maximum time in Figure "Allowable Temperature and Time of Reflow Soldering" should be accumulated time. The standard soldering conditions are shown in Figure "Reflow Soldering Standard Conditions".

Follow standard solder stencil mask pattern to avoid the possibility of solder being trapped under connector.

2. Soldering by soldering iron

Soldering by soldering iron should be carried out in accordance to the following conditions.

| | | |
|---|---|---|
| Pre-heating | Temperature | 150℃ |
| | Time | 60 to 120 s. |
| Soldering | Temperature (at the tip of the soldering iron) less than 350℃ | |
| | Time | less than 3 s. |

3. We cannot warrant against mishaps caused by any use of this product that deviates from allowable temperature and time of reflow soldering.

4. In soldering, do not apply excessive mechanical force to terminals or leads greater than specified in the drawing.

5. Please note the following in case of soldering terminals or leads of the product.

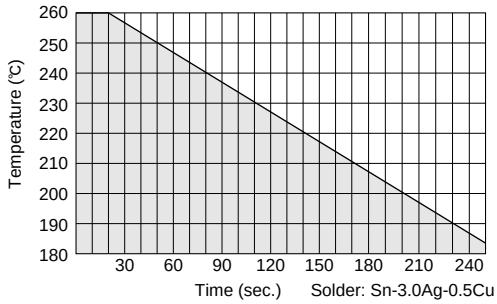
(1) Use Rosin based flux, but not with strong acid flux (Chlorine content should be less than 0.20wt%).

(2) Flux should be thoroughly cleaned from connector to prevent possible deterioration of electrical characteristics.

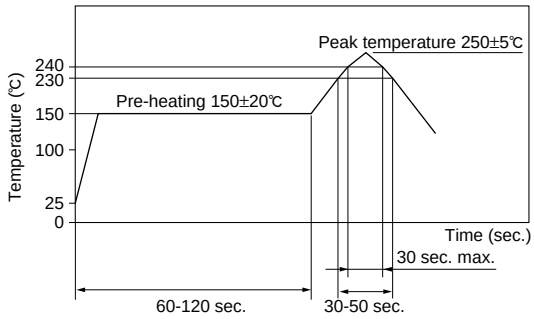
6. Please mount this product at the position so that stress by wrap and/or bend of the PCB may not apply to it.

7. Please avoid the cleaning of this product.

Allowable Temperature and Time of Reflow Soldering




Reflow Soldering Standard Conditions




Measuring point of temperature: In-Out Terminals of the Device
Reflow Soldering: Both Convection and Infrared Rays
: Hot Air
: Hot Plate

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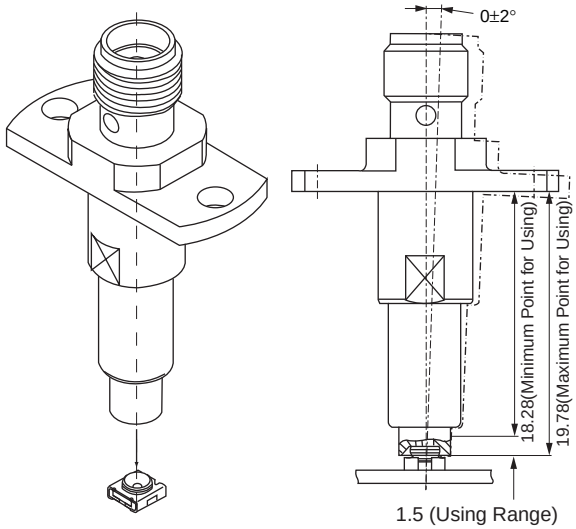
## ■ Notice(Handling)

1. Automatic Measurement Probe (MM126036)

- Automatic measurement probe (MM126036) should be used on the condition in Fig. 1 for good connection without any damages.
- The engagement strokes from the flange to the tip of probe is 18.28mm to 19.78mm with vertical (0+/-2 degree) direction.

Fig. 1 Insertion the Automatic Measurement Probe (MM126036) in Receptacle (MM8130-2600)

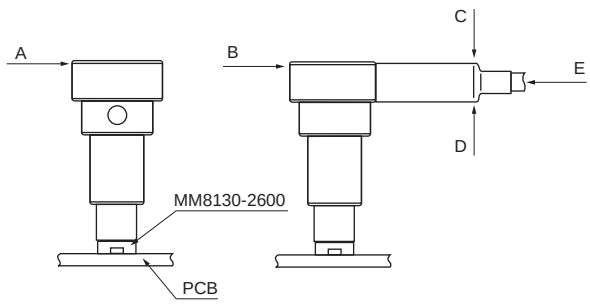



(in mm)

2. L Type Probe with Locking Function (MXHS83QE3000, MXHS83QH3000)

- Do not try to pull the cable, when a connector with a coaxial cable is handled.
- Do not give a twisted torque to the cable and connector.
- Mechanical stress:
  The stress to the connector should be limited as figure shown right.
  (1) Stress to the housing.
  Stress A and B: 0.5N max.
  (2) Stress to the outer sleeve.
  Stress C: 0.6N max.
  Stress D: 0.6N max.
  (3) Cable pull strength.
  Stress E: 0.5N max.

Mechanical Stress after Engagement




3. Usage Condition

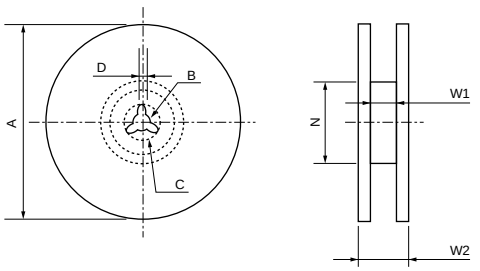
(1) Do not apply electrical voltage greater than specified in the catalog. It might cause degradation or destruction of the product. Even if it endures during a short time, long time qualification is not guaranteed.
(2) Confirm that product perfomance is not influenced with any other components or materials which directly contact products.

4. Handling

Do not apply excessive shock or load to subassembly products such as soldered printed circuit board in case handling or transporting.

# 1 Package

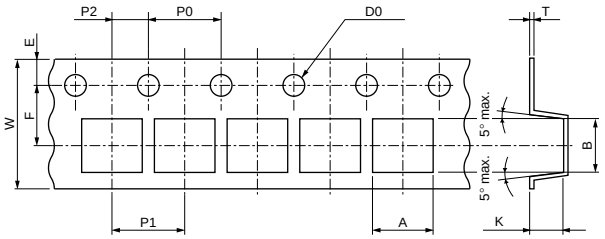
## ■ Dimensions of Reel




| Part Number | A | B | C | D | N (min.) | W1 | W2 (max.) |
|---|---|---|---|---|---|---|---|
| **MM8130-2600RB8** | 330 | 13 | 21 | 2 | Dia. 100 | 9.4 | 13.4 |
| Tolerance | ±2.0 | ±0.5 | ±0.8 | ±0.5 | ±1.0 | ±1.0 | ±1.0 |

(in mm)

## ■ Dimensions of Taping




| A | B | W | D0 | E | F | K |
|---|---|---|---|---|---|---|
| 2.8±0.1 | 2.8±0.1 | 8±0.2 | Dia.1.5+0.1 | 1.75±0.1 | 3.5±0.1 | 1.6±0.1 |

| P0 | P1 | P2 | T |
|---|---|---|---|
| 4±0.1 | 4±0.1 | 2±0.1 | 0.25±0.05 |

(in mm)

## ■ Minimum Quantity

MM8130-2600RB8: 330 mm dia.reel/8000 pcs.

MM8130-2600B: Bulk/free

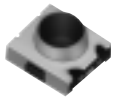
# Microwave Coaxial Connectors

## Microwave Coaxial Connectors with Switch SWD Type

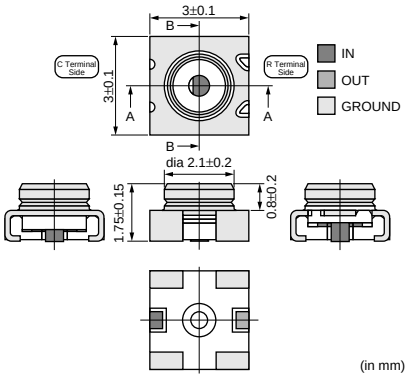


### ■ Features

1. The coaxial connector with switch is very useful for characteristic measurement of hand held phone and microwave circuit.
2. It is possible to switch the line connection and disconnection easily by special probe.
3. Small size, low profile, size 3x3x1.75mm (LxWxH)
4. Excellent characteristics, low IL 0.2dB max. V.S.W.R. 1.3 max. Isolation 15dB min. (DC to 6GHz)
5. Surface mountable and reflow solderable
6. Tape package available



MM8430-2610




(in mm)

### ■ Applications

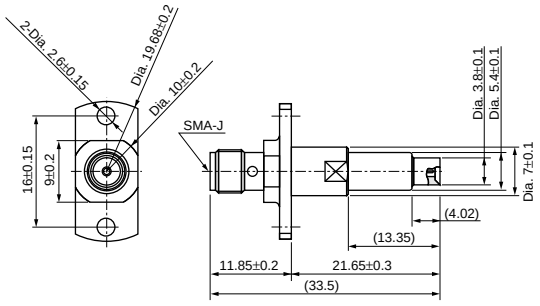
Cellular phone, W-LAN, Other wireless and measurement equipment

| Part Number | Rated Voltage (Vrms) | Contact Resistance (max.) (ohm) | Withstand Voltage (Vrms) | Insulation Resistance (M ohm) | Durability (cycles) | Frequency Rating | Temperature Range (degree C) | VSWR | Insertion Loss (On) (dB) | Isolation (Off) (dB) | Inner Electrode (C) | Inner Electrode (R) (material) | Outer Electrode (material) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MM8430-2610** | 250 | 0.05 | 300 (AC) | 500 | 500 | to 6GHz | -40 to +85 | 1.2 max. (DC to 3GHz) | 0.1 max. (DC to 3GHz) | 20 min. (DC to 3GHz) | Stainless Steel Gold plated | Copper Alloy Gold plated | Copper Alloy Silver plated |

Impedance: 50ohm

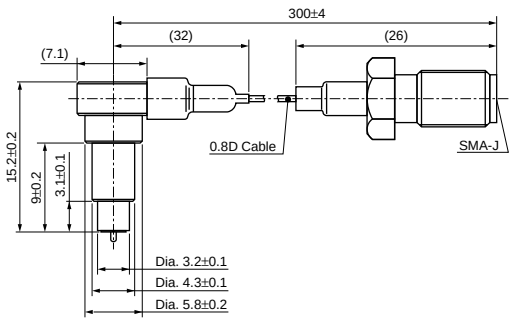
### ■ Measurement Probe Dimensions

MM126036




(in mm)

MXHS83QE3000




(in mm)

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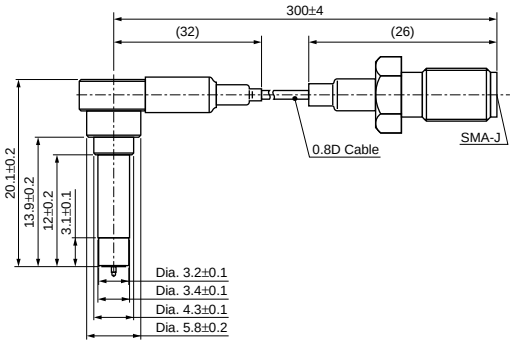
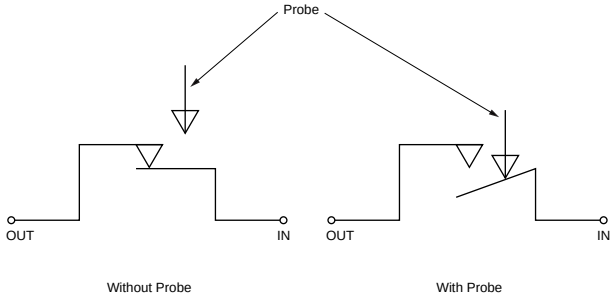
## ■ Measurement Probe Dimensions

MXHS83QH3000




(in mm)

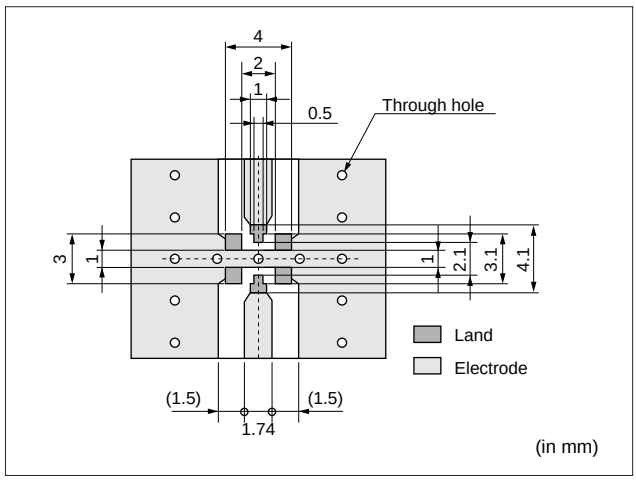
## ■ Structure




## ■ Standard Land Dimensions

### 1. Standard pattern dimensions

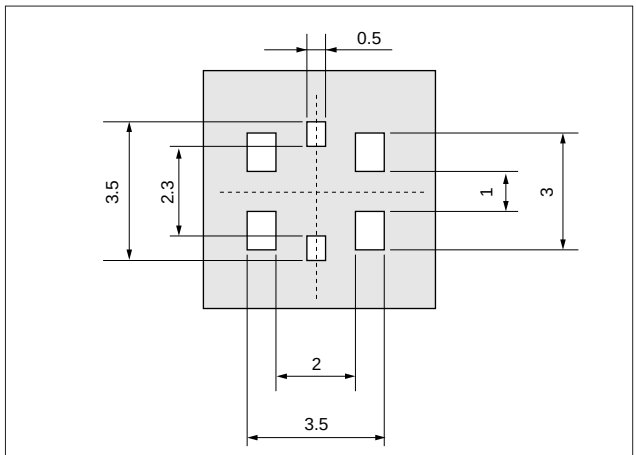
- I/O pattern should be designed to match 50 ohm impedance circuit.
- Typical PCB material is glass epoxy (εr=4.8). Thickness is 1.0mm.
- The solder resist should be printed except for the land pattern on the PCB.




(in mm)

### 2. Standard solder stencil mask pattern

Follow Standard solder stencil mask pattern to avoid the possibility of solder being trapped under connector.




The Standard solder stencil mask pattern
(Mask thickness 0.15mm)

(in mm)

# Notice

## ■ Notice (Storage and Operating Condition)

1. Environment Conditions

(1) This product is designed for use in electrical equipment in the environment (temperature, humidity, atmospheric pressure, etc.) specified in this approval drawing. It may not be used in the following environments or under the following conditions:

(a) Ambient air containing corrosive gas (Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)

(b) Ambient air containing volatile or combustible gas

(c) In liquid (water, oil, chemical solution, organic solvents, etc.)

(d) In environments with a high concentration of airborne particles

(e) In direct sunlight

(f) Dusty conditions

(g) In freezing

(h) Other environments similar to the above conditions

(2) Contact the manufacturer before using the product in any of the above environments or under any of the above conditions.

2. Storage

Store in manufacturer's package or tightly re-closed box with the following conditions. Use this product within 6 months after receipt. Check the terminal solderability before use if the product has been stored for more than 6 months.

Temperature: -10 to +40 degree C

Humidity: 15 to 85% RH

# Notice



## ■ Notice (Soldering and Mounting)

1. Reflow soldering

Soldering must be carried out without exceeding the allowable soldering temperature and time shown within the shaded area of Figure "Allowable Temperature and Time of Reflow Soldering".

In case the soldering is repeated, the maximum time in Figure "Allowable Temperature and Time of Reflow Soldering" should be accumulated time. The standard soldering conditions are shown in Figure "Reflow Soldering Standard Conditions".

Follow standard solder stencil mask pattern to avoid the possibility of solder being trapped under connector.

2. Soldering by soldering iron

Soldering by soldering iron should be carried out in accordance to the following conditions.

| | | |
|---|---|---|
| Pre-heating | Temperature | 150℃ |
| | Time | 60 to 120 s. |
| Soldering | Temperature (at the tip of the soldering iron) less than 350℃ | |
| | Time | less than 3 s. |

3. We cannot warrant against mishaps caused by any use of this product that deviates from allowable temperature and time of reflow soldering.

4. In soldering, do not apply excessive mechanical force to terminals or leads greater than specified in the drawing.

5. Please note the following in case of soldering terminals or leads of the product.

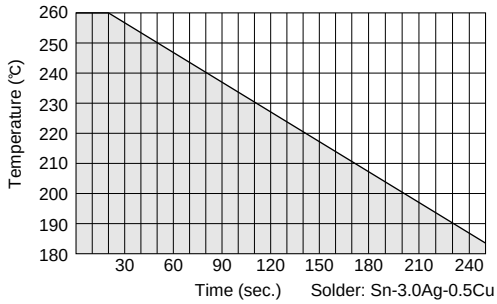
(1) Use Rosin based flux, but not with strong acid flux (Chlorine content should be less than 0.20wt%).

(2) Flux should be thoroughly cleaned from connector to prevent possible deterioration of electrical characteristics.

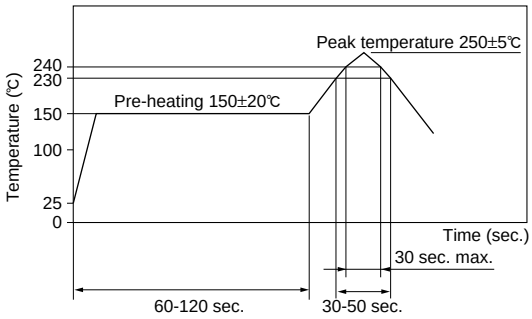
6. Please mount this product at the position so that stress by wrap and/or bend of the PCB may not apply to it.

7. Please avoid the cleaning of this product.

Allowable Temperature and Time of Reflow Soldering




Reflow Soldering Standard Conditions




Measuring point of temperature: In-Out Terminals of the Device
Reflow Soldering: Both Convection and Infrared Rays
: Hot Air
: Hot Plate

Continued on the following page.

# Notice

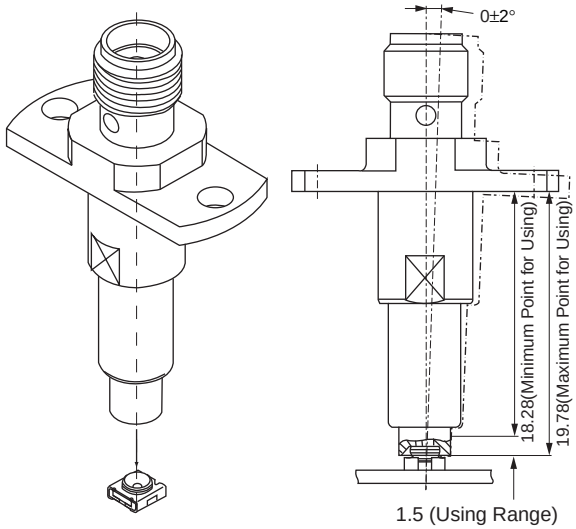
Continued from the preceding page.

## ■ Notice (Handling)

1. Automatic Measurement Probe (MM126036)

- Automatic measurement probe (MM126036) should be used under conditions in Fig. 1 for good connection without any damages.
- The engagement strokes from the flange to the tip of probe is 18.28mm to 19.78mm with vertical (0±2°) direction.

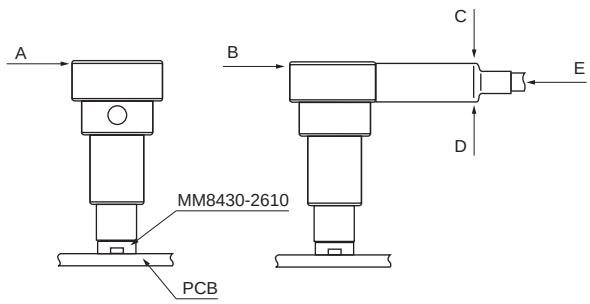
Fig. 1 Insertion the Automatic Measurement Probe (MM126036) in Receptacle (MM8430-2610)




2. L Type Probe with Locking Function (MXHS83QE3000, MXHS83QH3000)

- Avoid pulling cable when probe is locked into connector.
- Avoid twisting probe or cable when engaging or disengaging from connector.
- Mechanical stress:
  The stress to the connector should be limited as figure shown right.
  (1) Stress to the housing.
  Stress A and B: 0.5N max.
  (2) Stress to the outer sleeve.
  Stress C: 0.6N max.
  Stress D: 0.6N max.
  (3) Cable pull strength.
  Stress E: 0.5N max.

Mechanical stress after engagement




3. Usage Condition

(1) Do not apply electrical voltage greater than specified in the catalog. It might cause degradation or destruction of the product. Even if it endures during a short time, long time qualification is not guaranteed.

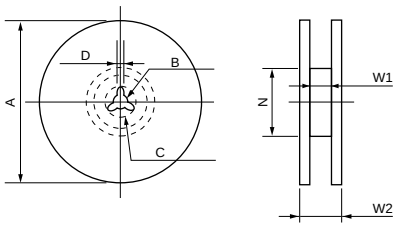
(2) Confirm that product performance is not influenced with any other components or materials which directly contact products.

4. Handling

Avoid excessive stress when handling and transporting printed circuit board after connector and/or assembly has been secured to PCB.

# Package

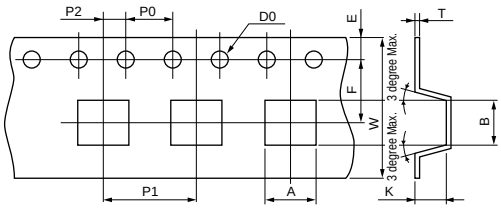
## ■ Dimensions of Reel




(in mm)

| Murata Part Number | A | B | C | D | N (min.) | W1 | W2 (max.) |
|---|---|---|---|---|---|---|---|
| MM8430-2610RA1 | 178 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| MM8430-2610RB3 | 330 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| TOLERANCE | ±2.0 | ±0.5 | ±0.8 | ±0.5 | – | ±1.5 | – |

## ■ Dimensions of Taping




(in mm)

| A | B | W | D0 | E | F | K |
|---|---|---|---|---|---|---|
| 3.4±0.1 | 3.4±0.1 | 12±0.2 | Dia.1.5+0.1 | 1.75±0.1 | 5.5±0.1 | 2.0±0.15 |

| P0 | P1 | P2 | T |
|---|---|---|---|
| 4±0.1 | 8±0.1 | 2±0.1 | 0.3±0.05 |

## ■ Minimum Quantity

MM8430-2610RA1: dia.180 mm reel/1000 pcs.
MM8430-2610RB3: dia.330 mm reel/3000 pcs.
MM8430-2610B: Bulk/free

# Microwave Coaxial Connectors

## Ultra Miniature SMT HSC Type

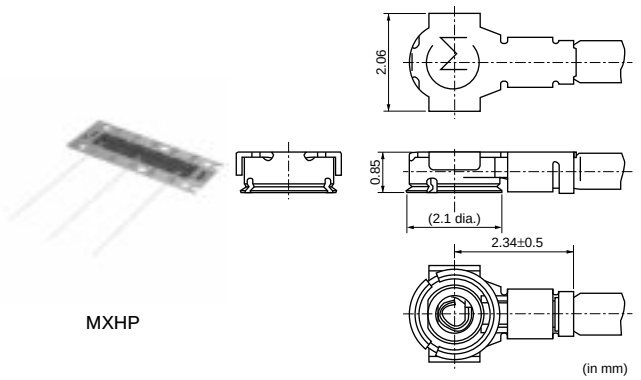


### ■ Features

1. The mating height is only 1.2mm maximum by new mechanical design. Suitable for low profile design.
2. New mating mechanical desigh makes stable feeling connection.
3. Soft and ultra thin 0.81mm diameter flexible coaxial cables is available.
4. High performance with wide frequency range(DC to 6GHz). VSWR at 3GHz to 6GHz is 1.45 maximum.

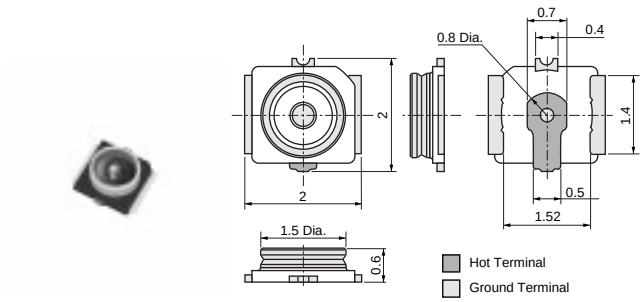
### ■ Applications

Portable telephone, cordless telephone(analog and digital), GPS, and other microwave radio and measurement equipment.




MXHP

(in mm)




MM4829-2702

Tolerances Unless Otherwise Specified: ±0.2

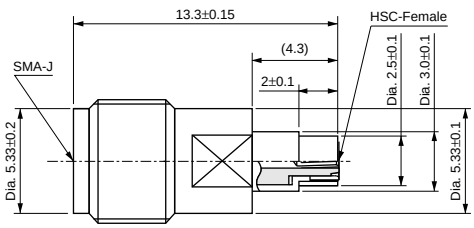
(in mm)

| Part Number | Rated Voltage (V) | Contact Resistance (max.) (ohm) | Withstanding Voltage (rms) | Insulation Resistance (min.) (M ohm) | Durability (cycles) | Frequency Rating (GHz) | Temperature Range (degree C) | VSWR | Center Contact | Outer Contact | Insulator |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MM4829-2702** | 250 | 0.020 | 300 (AC) | 500 | 30 | to 6.0 | -40 to +85 | 1.3 max. (DC to 3GHz) | Copper Alloy Gold plated | Copper Alloy Silver plated | Engineering plastic |

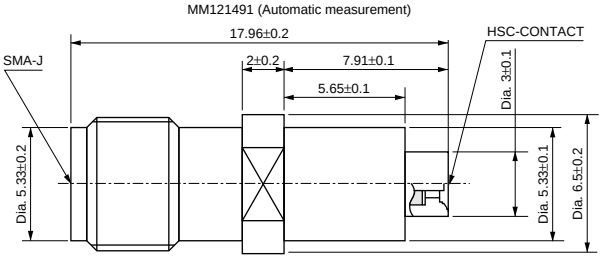
Impedance: 50ohm

### ■ Measurement Adapter Dimensions (for Receptacle)

MM121490 (Hand measurement)



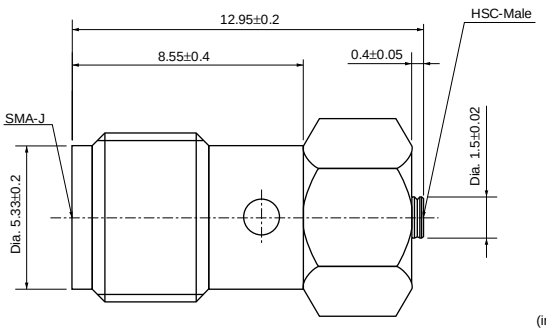

MM121491 (Automatic measurement)




(in mm)

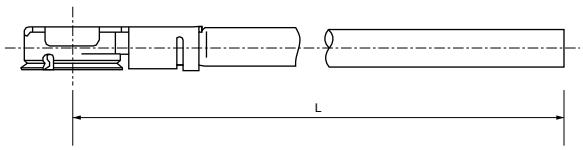
## ■ Measurement Adapter Dimensions (for Cable Assembly)

MM121500 (Hand measurement)



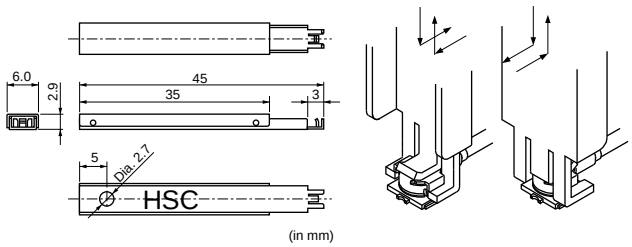

(in mm)

## ■ Cable Length Tolerance



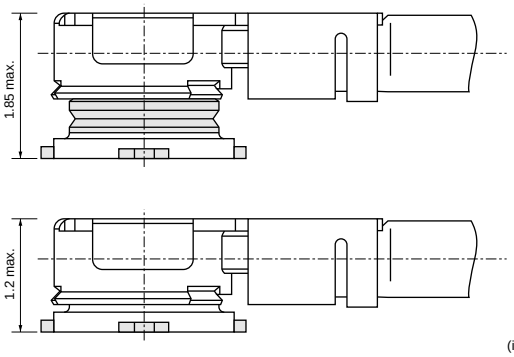

| Cable Length L (mm) | | Dimensional Tolerance (mm) |
|---|---|---|
| Over | Less than | |
| 20 | 100 | ±3 |
| 100 | 500 | ±4 |
| 500 | 1000 | ±10 |
| 1000 | – | +2% of L<br>–0% of L |

## ■ Disengagement Tool (Part Number: M19100)




(in mm)

## ■ Profile Dimensions




(in mm)

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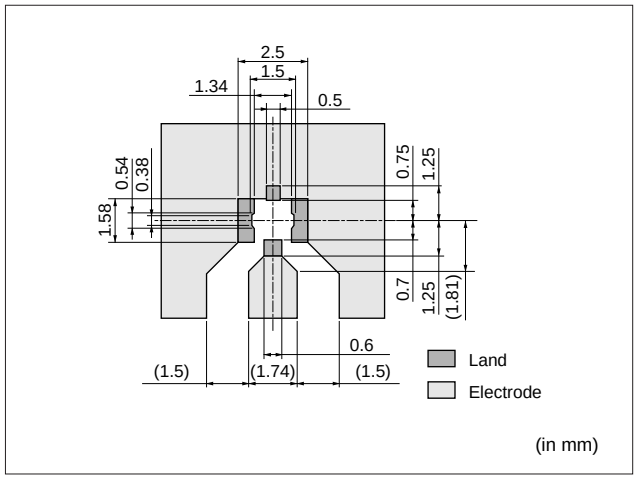
## ■ Land Pattern Dimensions

### 1. Standard pattern dimensions

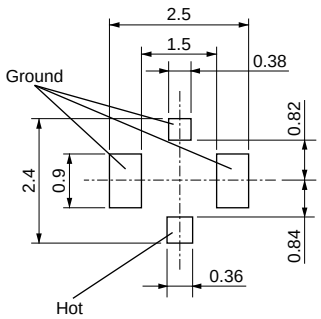
- I/O pattern should be designed to match 50 ohm impedance circuit.
- Typical PCB material is glass epoxy (εr=4.8). Thickness is 1.0mm.
- The solder resist should be printed except for the land pattern on the PCB.




(in mm)

### 2. Standard solder stencil mask pattern

Follow Standard solder stencil mask pattern to avoid the possibility of solder being trapped under connector.




The standard solder stencil mask drawing
(Mask thickness 0.12mm)

(in mm)

3

# Notice

## ■ Notice (Storage and Operation Condition)

1. Environment Conditions

(1) This product is designed for use in electrical equipment in the environment (temperature, humidity, atmospheric pressure, etc.) specified in this approval drawing. It may not be used in the following environments or under the following conditions:

(a) Ambient air containing corrosive gas (Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)

(b) Ambient air containing volatile or combustible gas

(c) In liquid (water, oil, chemical solution, organic solvents, etc.)

(d) In environments with a high concentration of airborne particles

(e) In direct sunlight

(f) Dusty conditions

(g) In freezing

(h) Other environments similar to the above conditions

(2) Contact the manufacturer before using the product in any of the above environments or under any of the above conditions.

2. Storage

Store in manufacturer's package or tightly re-closed box with the following conditions. Use this product within 6 months after receipt. Check the terminal solderability before use if the product has been stored for more than 6 months.

Temperature: -10 to +40 degree C

Humidity: 15 to 85% RH

# Notice

## ■ Notice (Soldering and Mounting)

1. Reflow soldering

Soldering must be carried out without exceeding the allowable soldering temperature and time shown within the shaded area of Figure "Allowable Temperature and Time of Reflow Soldering".

In case the soldering is repeated, the maximum time in Figure "Allowable Temperature and Time of Reflow Soldering" should be accumulated time. The standard soldering conditions are shown in Figure "Reflow Soldering Standard Conditions".

Use the Pattern and Metal mask pattern is illustrated in details.

Follow standard solder stencil mask pattern to avoid the possibility of solder being trapped under connector.

2. Soldering by soldering iron

Soldering by soldering iron should be carried out in accordance to the following conditions.

| | | |
|---|---|---|
| Pre-heating | Temperature | 150℃ |
| | Time | 60 to 120 s. |
| Soldering | Temperature (at the tip of the soldering iron) less than 350℃ | |
| | Time | less than 3 s. |

3. We cannot warrant against mishaps caused by any use of this product that deviates from allowable temperature and time of reflow soldering.

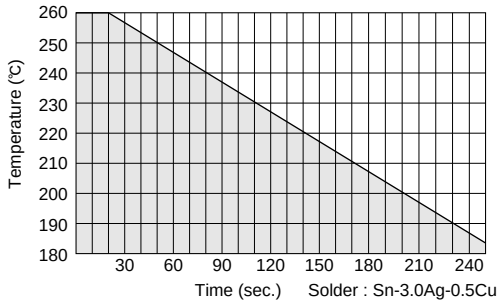
4. In soldering, do not apply excessive mechanical force to terminals or leads greater than specified in the drawing.

5. Please note the following in case of soldering terminals or leads of the product.
   (1) Use Rosin based flux, but not with strong acid flux (Chlorine content should be less than 0.20wt%).
   (2) Flux should be thoroughly cleaned from connector to prevent possible deterioration of electrical characteristics.

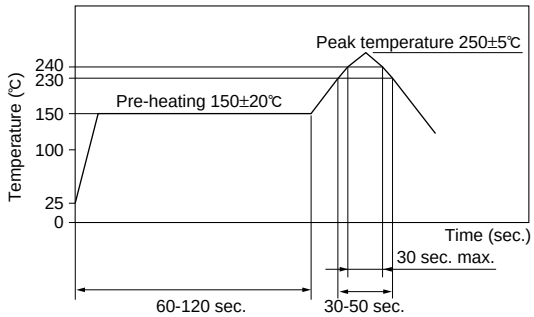
6. Please mount this product at the position so that stress by wrap and/or bend of the PCB may not apply to it.

7. Please dry out this product immediately after soldering and cleaning.

Allowable Temperature and Time of Reflow Soldering




Reflow Soldering Standard Conditions




Measuring point of temperature : In-Out Terminals of the Device
Reflow Soldering : Both Convection and Infrared Rays
: Hot Air
: Hot Plate

Continued on the following page.

# Notice

Continued from the preceding page.

## ■ Notice (Handling)

1. Usage Condition

(1) Do not apply electrical voltage greater than specified in the drawing. It might cause degradation or destruction of the product. Even if it endures during a short time, long time qualification is not guaranteed.

(2) Confirm product's performance is not influenced by contact of other components.

(3) Please contact the manufacturer beforehand, if the product is to be used in frequently bent position.



2. Handling

(1) Avoid excessive stress when handling and transporting printed circuit board after connector and/or assembly has been secured to PCB.

(2) Do not try to pull the cable, when a connector with a coaxial cable is handled.

(3) Disregarding the following notes could cause mechanical damage and/or poor electrical performance.

3. Handling Instructions

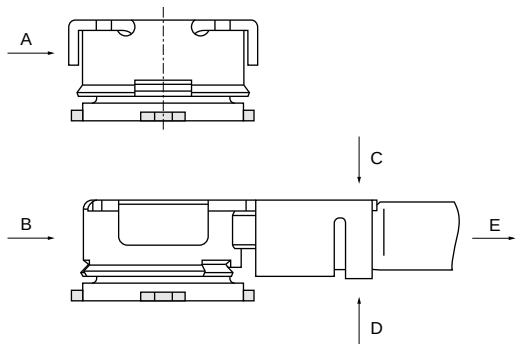
(1) Cable is designed to fit only with MM4829-2702 receptacle. Any other receptacle cannot be used with this cable.

(2) Disengagement:
Use tool P/N M19100 to insert or remove cable in a vertical direction from receptacle. Avoid pulling only the cable to prevent cable damage.

(3) Avoid twisting probe or cable when engaging or disengaging from connector.

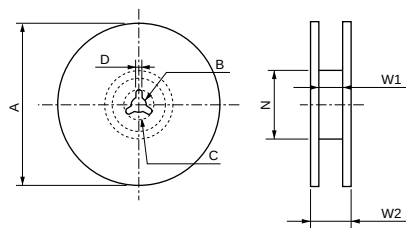
(4) Mechanical stress:
The stress to the connector should be limited as shown in Figure 1.
(a) Stress to the housing.
Stress A and B: 5.0N max.
(b) Stress to the outer sleeve.
Stress C: 1.0N max.
Stress D: 1.0N max.
(c) Cable pull strength.
Stress E: 5.0N max.

Figure 1. Mechanical stress after engagement



# Package

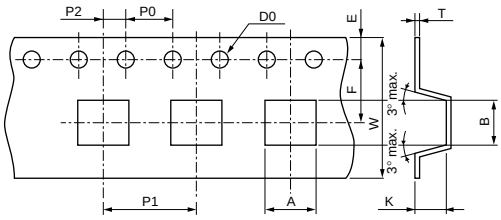
## ■ Dimensions of Reel




(in mm)

| Murata Part Number | A | B | C | D | N (min.) | W1 | W2 (max.) |
|---|---|---|---|---|---|---|---|
| MM4829-2702RA4 | 180 +0/-3 | 13 | 21 | 2 | Dia. 60 +1/0 | 9 ±0.3 | 11.4 |
| MM4829-2702RB0 | 330 | 13 | 21 | 2 | Dia. 100 | 9.4 | 13.4 |
| TOLERANCE | ±2.0 | ±0.2 | ±0.8 | ±0.5 | ±1.0 | ±1.0 | ±1.0 |

## ■ Dimensions of Taping




(in mm)

| A | B | W | D0 | E | F | K |
|---|---|---|---|---|---|---|
| 2.35±0.1 | 2.35±0.1 | 8±0.2 | Dia.1.5 $^{+0.1}_{-0}$ | 1.75±0.1 | 3.5±0.1 | 0.75±0.15 |

| P0 | P1 | P2 | T |
|---|---|---|---|
| 4±0.1 | 4±0.1 | 2±0.1 | 0.25±0.05 |

## ■ Minimum Quantity

MM4829-2702RA4: 180 mm dia. reel/4000 pcs.
MM4829-2702RB0: 330 mm dia. reel/10000 pcs.
MM4829-2702B: Bulk/free

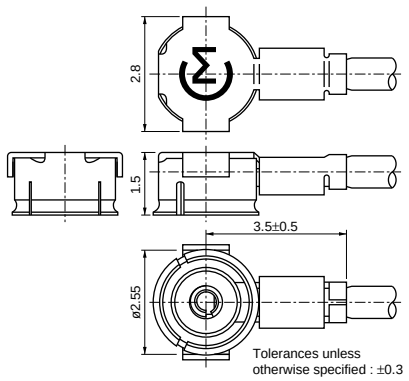
# Microwave Coaxial Connectors

## Miniature SMT GSC Type

### ■ Features

1. The mating height is only 2mm maximum by new mechanical design. Suitable for low profile design.
2. New mating mechanical desigh makes stable feeling connection.
3. Soft and ultra thin 0.8mm diameter flexible coaxial cables is available.
4. High performance with wide frequency range(DC to 6GHz). VSWR at DC to 3GHz is 1.2 maximum. VSWR at 3GHz to 6GHz is 1.3 maximum.

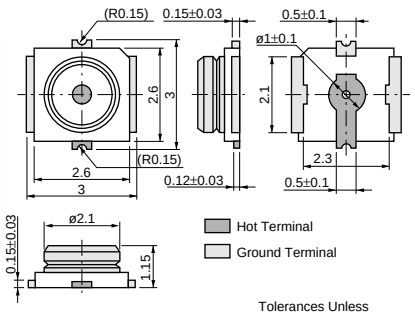
MXTK




### ■ Applications

Portable telephone, cordless telephone(analog and digital), GPS, and other microwave radio and measurement equipment.

MM9329-2700

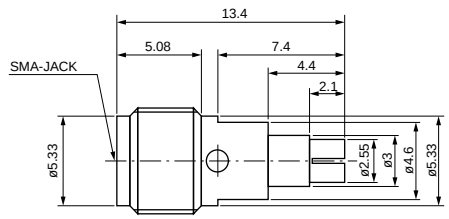



| Part Number | Rated Voltage (V) | Contact Resistance (max.) (ohm) | Withstanding Voltage (rms) | Insulation Resistance (min.) (M ohm) | Durability (cycles) | Frequency Rating (GHz) | Temperature Range (degree C) | VSWR | Center Contact | Outer Contact | Insulator |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MM9329-2700** | 250 | 0.015 | 300 (AC) | 500 | 100 | to 6.0 | -40 to +90 | 1.2 max. (DC to 3GHz) | Copper Alloy Gold plated | Copper Alloy Silver plated | Engineering plastic |

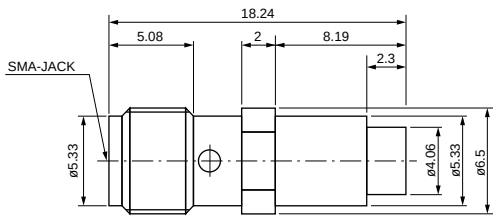
Impedance: 50ohm

### ■ Measurement Adapter Dimensions (for Receptacle)

MM121470 (Hand measurement)




MM121471 (Automatic measurement)




(in mm)

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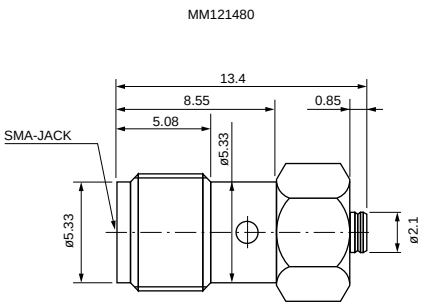
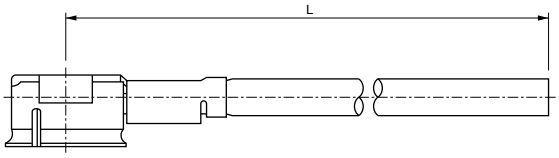
## ■ Measurement Adapter Dimensions (for Cable Assembly)




(in mm)

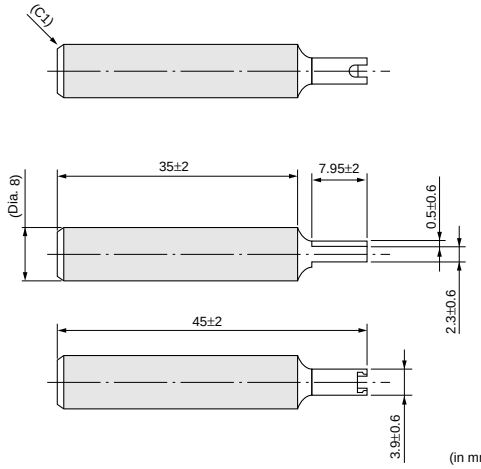
## ■ Cable Length Tolerance



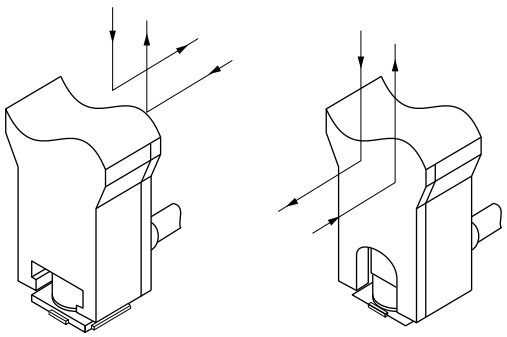

| Cable Length L (mm) (∗) | | Dimensional tolerance (mm) |
|---|---|---|
| Over | Till | |
| 40 | 100 | ±3 |
| 100 | 500 | ±4 |
| 500 | 1000 | ±10 |
| 1000 | – | +2% of L<br>–0% of L |

∗L must be 20mm Min.

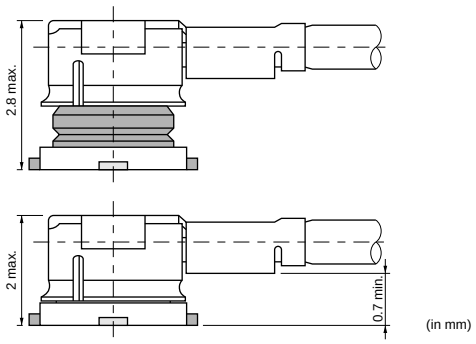
## ■ Disengagement Tool (Part Number: M22001)




(in mm)



## ■ Profile Dimensions




(in mm)

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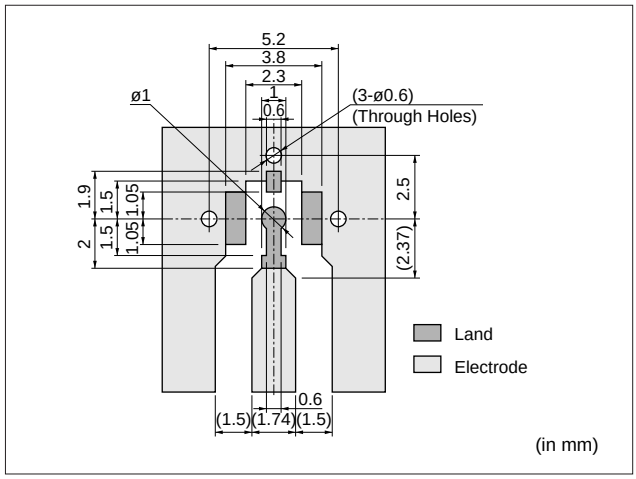
## ■ Land Pattern Dimensions

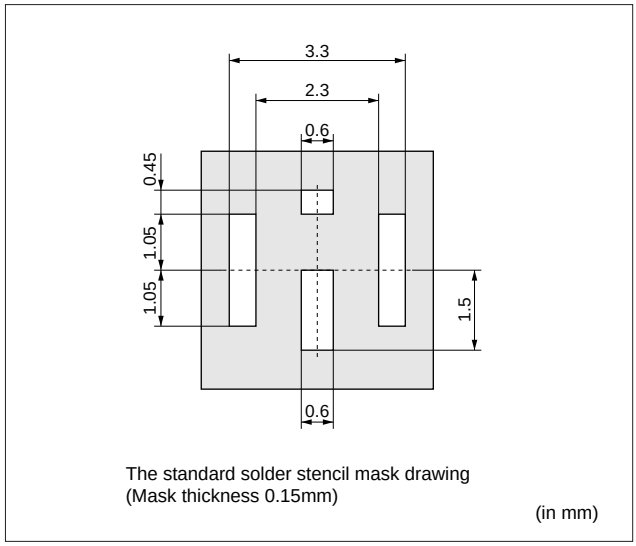
### 1. Standard pattern dimensions

- I/O pattern should be designed to match 50 ohm impedance circuit.
- Typical PCB material is glass epoxy (εr=4.8). Thickness is 1.0mm
- The solder resist should be printed except for the land pattern on the PCB.




### 2. Standard solder stencil mask pattern

Follow Standard solder stencil mask pattern to avoid the possibility of solder being trapped under connector.




4

# Notice

## ■ Notice (Storage and Operation Condition)

1. Environment Conditions

(1) This product is designed for use in electrical equipment in the environment (temperature, humidity, atmospheric pressure, etc.) specified in this approval drawing. It may not be used in the following environments or under the following conditions:

(a) Ambient air containing corrosive gas (Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)

(b) Ambient air containing volatile or combustible gas

(c) In liquid (water, oil, chemical solution, organic solvents, etc.)

(d) In environments with a high concentration of airborne particles

(e) In direct sunlight

(f) Dusty conditions

(g) In freezing

(h) Other environments similar to the above conditions

(2) Contact the manufacturer before using the product in any of the above environments or under any of the above conditions.

2. Storage

Store in manufacturer's package or tightly re-closed box with the following conditions. Use this product within 6 months after receipt. Check the terminal solderability before use if the product has been stored for more than 6 months.

Temperature: -10 to +40 degree C

Humidity: 15 to 85% RH

# Notice

## ■ Notice (Soldering and Mounting)

1. Reflow soldering

Soldering must be carried out without exceeding the allowable soldering temperature and time shown within the shaded area of Figure "Allowable Temperature and Time of Reflow Soldering".

In case the soldering is repeated, the maximum time in Figure "Allowable Temperature and Time of Reflow Soldering" should be accumulated time. The standard soldering conditions are shown in Figure "Reflow Soldering Standard Conditions".

Follow recommended solder stencil mask pattern to avoid the possibility of solder being trapped under connector.

2. Soldering by soldering iron

Soldering by soldering iron should be carried out in accordance to the following conditions.

| | | |
|---|---|---|
| Pre-heating | Temperature | 150℃ |
| | Time | 60 to 120 s. |
| Soldering | Temperature (at the tip of the soldering iron) less than 350℃ | |
| | Time | less than 3 s. |

3. We cannot warrant against mishaps caused by any use of this product that deviates from allowable temperature and time of reflow soldering.

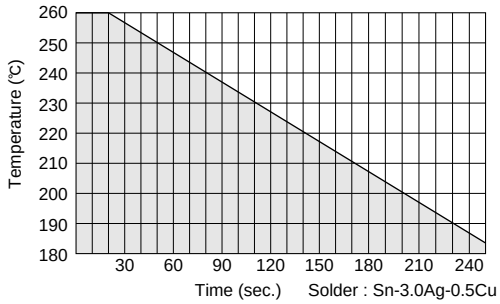
4. In soldering, do not apply excessive mechanical force to terminals or leads greater than specified in the drawing.

5. Please note the following in case of soldering terminals or leads of the product.
   (1) Use Rosin based flux, but not with strong acid flux (Chlorine content should be less than 0.20wt%).
   (2) Flux should be thoroughly cleaned from connector to prevent possible deterioration of electrical characteristics.

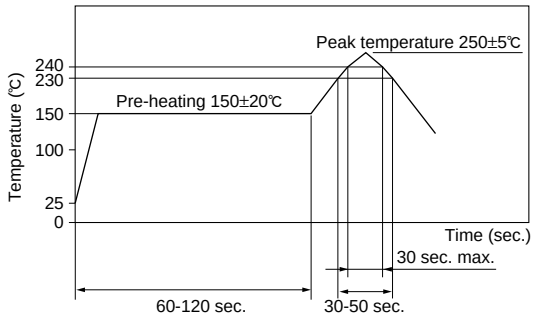
6. Please mount this product at the position so that stress by wrap and/or bend of the PCB may not apply to it.

7. Please dry out this product immediately after soldering and cleaning.

Allowable Temperature and Time of Reflow Soldering




Reflow Soldering Standard Conditions




Measuring point of temperature : In-Out Terminals of the Device
Reflow Soldering : Both Convection and Infrared Rays
: Hot Air
: Hot Plate

Continued on the following page.

# Notice

Continued from the preceding page.

## ■ Notice (Handling)

1. Usage Condition

(1) Do not apply electrical voltage greater than specified in the drawing. It might cause degradation or destruction of the product. Even if it endures during a short time, long time qualification is not guaranteed.
(2) Confirm product's performance is not influenced by contact of other components.
(3) Please contact the manufacturer beforehand, if the product is to be used in frequently bent position.

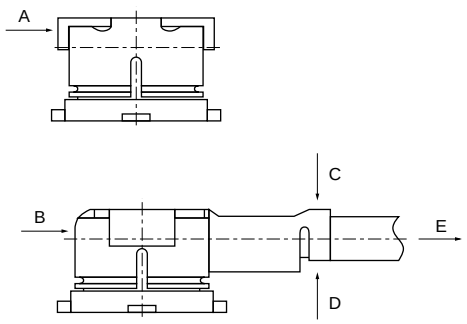
2. Handling

(1) Avoid excessive stress when handling and transporting printed circuit board after connector and/or assembly has been secured to PCB.
(2) Do not try to pull the cable, when a connector with a coaxial cable is handled.
(3) Disregarding the following notes could cause mechanical damage and/or poor electrical performance.

3. Handling Instructions

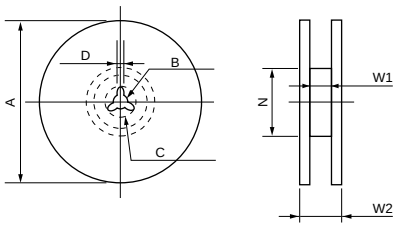
(1) Cable is designed to fit only with MM9329-2700 receptacle. Any other receptacle cannot be used with this cable.
(2) Disengagement:
Use tool P/N M22001 to insert or remove cable in a vertical direction from receptacle. Avoid pulling only the cable to prevent cable damage.
(3) Avoid twisting probe or cable when engaging or disengaging from connector.
(4) Mechanical stress:
The stress to the connector should be limited as shown in Figure 1.
(a) Stress to the housing.
Stress A and B: 5.0N max.
(b) Stress to the outer sleeve.
Stress C: 3.0N max.
Stress D: 2.0N max.
(c) Cable pull strength.
Stress E: 5.0N max.

Figure 1. Mechanical Stress after Engagement



# Package

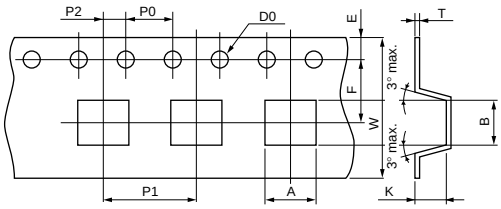
## ■ Dimensions of Reel




(in mm)

| Murata Part Number | A | B | C | D | N (min.) | W1 | W2 (max.) |
|---|---|---|---|---|---|---|---|
| MM9329-2700RA1 | 178 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| MM9329-2700RB5 | 330 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| TOLERANCE | ±2.0 | ±0.5 | ±0.8 | ±0.5 | – | ±1.5 | – |

## ■ Dimensions of Taping




(in mm)

| A | B | W | D0 | E | F | K |
|---|---|---|---|---|---|---|
| 3.4±0.1 | 3.4±0.1 | 12±0.2 | Dia.1.5 $^{+0.1}_{-0}$ | 1.75±0.1 | 5.5±0.1 | 1.25±0.15 |

| P0 | P1 | P2 | T |
|---|---|---|---|
| 4±0.1 | 8±0.1 | 2±0.1 | 0.3±0.05 |

## ■ Minimum Quantity

MM9329-2700RA1: dia.180 mm reel/1000 pcs.
MM9329-2700RB5: dia.330 mm reel/5000 pcs.
MM9329-2700B: Bulk/free

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# Microwave Coaxial Connectors

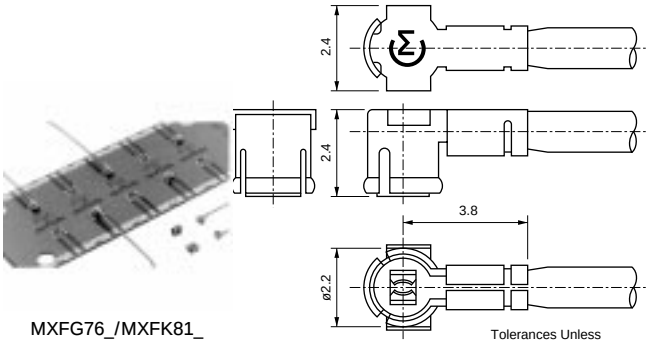
## SMT FSC Type

### ■ Features

1. High engagement
2. Miniature (LxWxH: 3.4x3.4x1.5mm) for High density mounting
3. Low profile (3.0mm max.)
4. SMD and reflow soldering applicable
5. Taping package applicable
6. Mountable by automatic placer
7. High performance (V.S.W.R. 1.3 max. at 3GHz)
8. Matched with ultra-thin FEP coaxial cables (0.8mm dia)

### ■ Applications

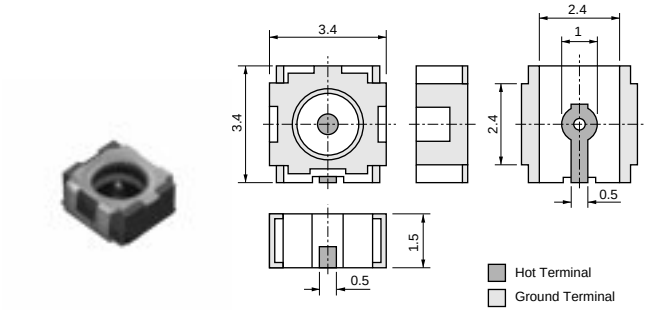
Portable telephone, mobile telephone, cordless telephone, GPS, and other microwave radio and measurement equipment.




MXFG76_/MXFK81_

Tolerances Unless Otherwise Specified:±0.3

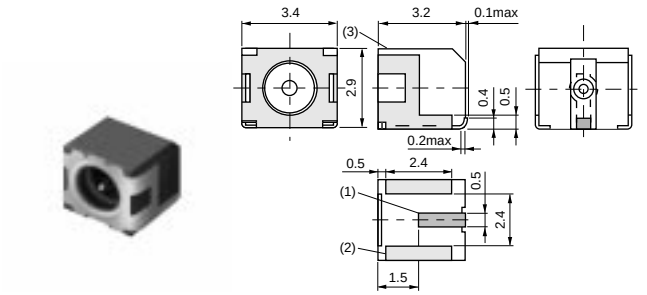
(in mm)




MM7329-2700

Tolerances Unless Otherwise Specified:±0.2

(in mm)




MM7329-2702

TOLERANCES UNLESS OTHERWISE SPECIFIED : ±0.2

(in mm)

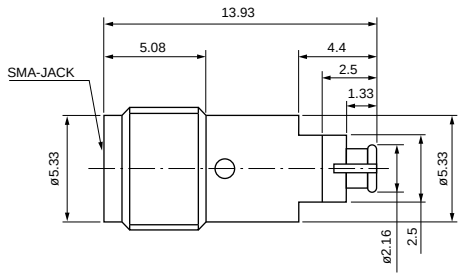
| Part Number | Rated Voltage (V) | Contact Resistance (max.) (ohm) | Withstanding Voltage (rms) | Insulation Resistance (min.) (M ohm) | Durability (cycles) | Frequency Rating (GHz) | Temperature Range (degree C) | VSWR | Center Contact | Outer Contact | Insulator |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **MM7329-2700** | 250 | 0.015 | 300 (AC) | 500 | 50 | to 3.0 | -40 to +90 | 1.3 max. | Copper Alloy Gold plated | Copper Alloy Gold plated | Engineering plastic |
| **MM7329-2702** | 250 | 0.015 | 300 (AC) | 500 | 50 | to 3.0 | -40 to +90 | 1.3 max. | Copper Alloy Gold plated | Copper Alloy Gold plated | Engineering plastic |

Impedance: 50ohm

## ■ Measurement Adapter Dimensions

### for Receptacle

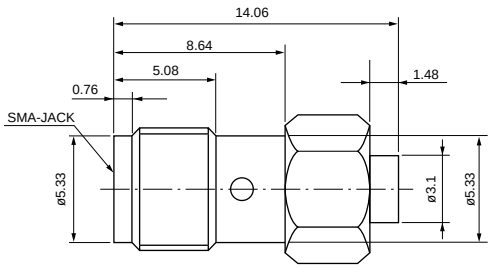
MM121454 (For FSC type receptacle)




(in mm)

### for Cable Assembly

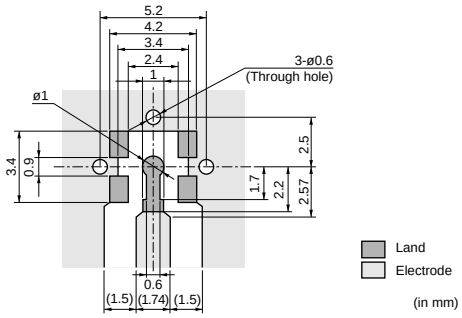
MM121460 (For FSC type cable assembly)




(in mm)

## ■ Land Pattern Dimensions

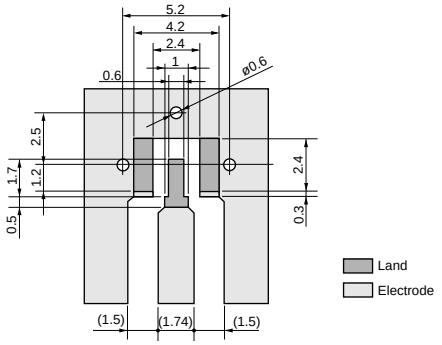
### MM7329-2700B




(in mm)

(Note) · Pattern should be designed to match 50 ohm impedance circuit.
· Typical PCB material is glass epoxy (εr=4.8). Thickness is 1.0mm.
· The solder resist should be printed except for the land pattern on the PCB.

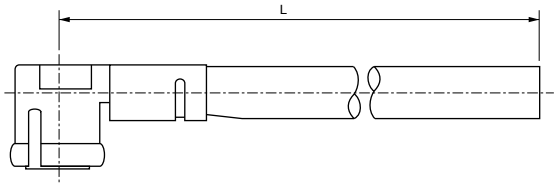
### MM7329-2702B




(in mm)

(Note) · Pattern should be designed to match 50 ohm impedance circuit.
· Typical PCB material is glass epoxy (εr=4.8). Thickness is 1.0mm.
· The solder resist should be printed except for the land pattern on the PCB.

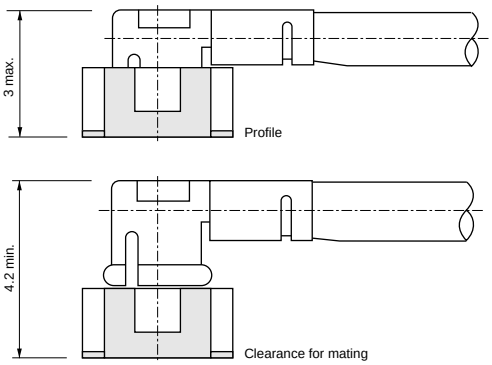
## ■ Cable Length Tolerance




| Cable Length L(mm)(∗) | | Dimensional tolerance(mm) |
|---|---|---|
| Over | Till | |
| 40 | 100 | ± 3 |
| 100 | 500 | ± 4 |
| 500 | 1000 | ±10 |
| 1000 | – | +2% of L<br>−0% of L |

∗L must be 40mm Min.

## ■ Profile Dimensions




(in mm)

Continued on the following page.

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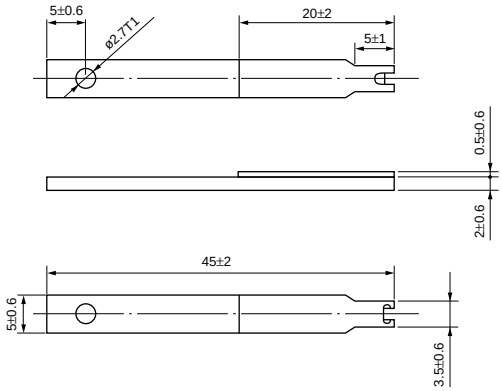
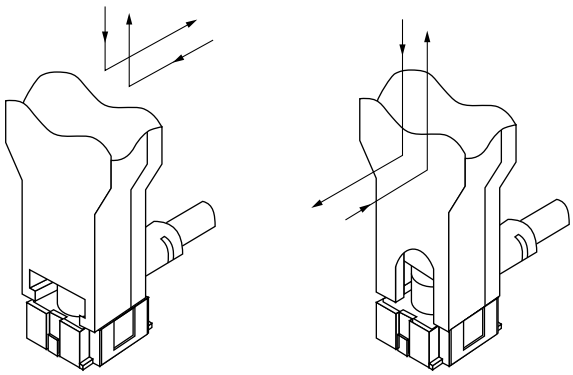
Continued from the preceding page.

## ■ Disengagement Tool

M19000 (for MM7329-2700)

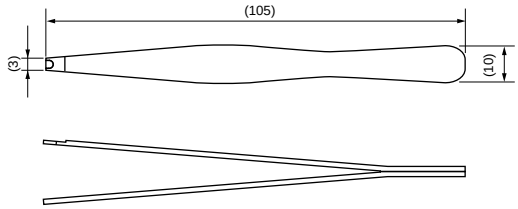



How to use tool (for MM7329-2700)

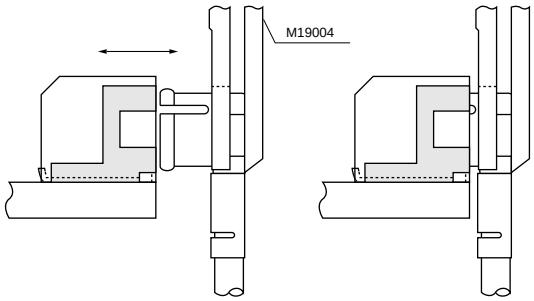


(in mm)

M19004 (for MM7329-2702)




How to use tool (for MM7329-2702)




(in mm)

5

# Notice

## ■ Notice (Storage and Operating Condition)

1. Environment Conditions

(1) This product is designed for use in electrical equipment in the environment (temperature, humidity, atmospheric pressure, etc.) specified in this approval drawing. It may not be used in the following environments or under the following conditions:

(a) Ambient air containing corrosive gas (Chlorine gas, Hydrogen sulfide gas, Ammonia gas, Sulfuric acid gas, Nitric oxide gas, etc.)

(b) Ambient air containing volatile or combustible gas

(c) In liquid (water, oil, chemical solution, organic solvents, etc.)

(d) In environments with a high concentration of airborne particles

(e) In direct sunlight

(f) Dusty conditions

(g) In freezing

(h) Other environments similar to the above conditions

(2) Contact the manufacturer before using the product in any of the above environments or under any of the above conditions.

2. Storage

Store in manufacturer's package or tightly re-closed box with the following conditions. Use this product within 6 months after receipt. Check the terminal solderability before use if the product has been stored for more than 6 months.

Temperature: -10 to +40 degree C

Humidity: 15 to 85% RH

# Notice

## ■ Notice (Soldering and Mounting)

1. Reflow soldering

Soldering must be carried out without exceeding the allowable soldering temperature and time shown within the shaded area of Figure "Allowable Temperature and Time of Reflow Soldering".

In case the soldering is repeated, the maximum time in Figure "Allowable Temperature and Time of Reflow Soldering" should be accumulated time. The standard soldering conditions are shown in Figure "Reflow Soldering Standard Conditions".

Follow Standard pattern dimensions.

2. Soldering by soldering iron

Soldering by soldering iron should be carried out in accordance to the following conditions.

| | | |
|---|---|---|
| Pre-heating | Temperature | 150℃ |
| | Time | 60 to 120 s. |
| Soldering | Temperature (at the tip of the soldering iron) less than 350℃ | |
| | Time | less than 3 s. |

3. We cannot warrant against mishaps caused by any use of this product that deviates from allowable temperature and time of reflow soldering.

4. In soldering, do not apply excessive mechanical force to terminals or leads greater than specified in the drawing.

5. Please note the following in case of soldering terminals or leads of the product.

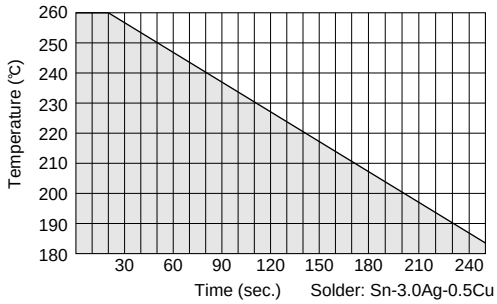
(1) Use Rosin based flux, but not with strong acid flux (Chlorine content should be less than 0.20wt%).

(2) Flux should be thoroughly cleaned from connector to prevent possible deterioration of electrical characteristics.

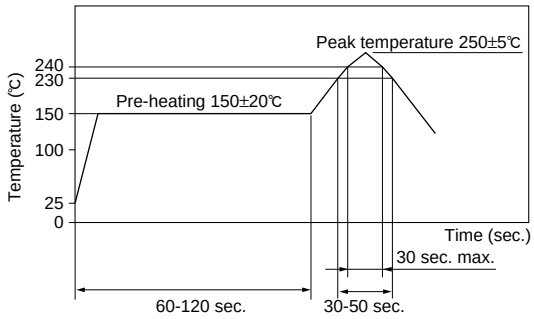
6. Please mount this product at the position so that stress by wrap and/or bend of the PCB may not apply to it.

7. Please dry out this product immediately after soldering and cleaning.

Allowable Temperature and Time of Reflow Soldering




Reflow Soldering Standard Conditions




Measuring point of temperature: In-Out Terminals of the Device
Reflow Soldering: Both Convection and Infrared Rays
: Hot Air
: Hot Plate

Continued on the following page.

5

# Notice

Continued from the preceding page.

## ■ Notice (Handling)

1. Usage Condition

(1) Do not apply electrical voltage greater than specified in the drawing. It might cause degradation or destruction of the product. Even if it endures during a short time, long time qualification is not guaranteed.
(2) Confirm product's performance is not influenced by contact of other components.
(3) Please contact the manufacturer beforehand, if the product is to be used in frequently bent position.

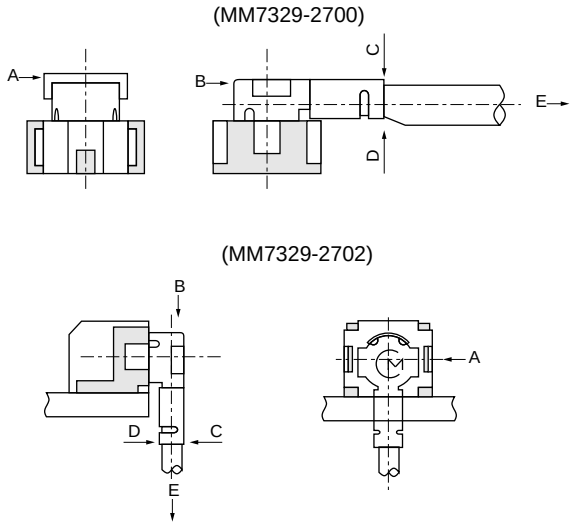
2. Handling

(1) Avoid excessive stress when handling and transporting printed circuit board after connector and/or assembly has been secured to PCB.
(2) Do not try to pull the cable, when a connector with a coaxial cable is handled.
(3) Disregarding the following notes could cause mechanical damage and/or poor electrical performance.

3. Handling Instructions

(1) Cable is designed to fit only with MM7329-2700 and MM7329-2702 receptacles. Any other receptacle can not be used with this cable.
(2) Disengagement:
Use tool P/N M19000 (for MM7329-2700) or M19004 (for MM7329-2702) to insert or remove cable in a vertical direction from receptacle. Avoid pulling only the cable to prevent cable damage.
(3) Avoid twisting probe or cable when inserting or removing from receptacle.
(4) Mechanical stress:
The stress to the connector should be limited as shown in Figure 1.
(a) Stress to the housing.
Stress A and B: 4.9N max.
(b) Stress to the outer sleeve.
Stress C: 2.94N max.
Stress D: 1.96N max.
(c) Cable pull strength.
Stress E: 7.84N max. (for MM7329-2700)
4.9N max. (for MM7329-2702)

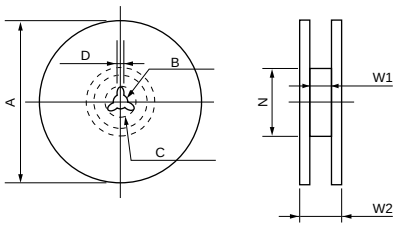
Figure 1. Mechanical Stress after Engagement



# Package

## ■ Dimensions of Reel

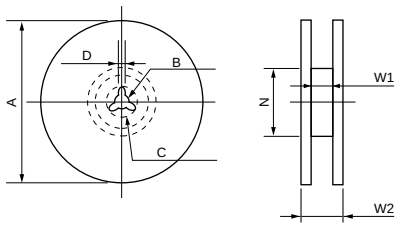
MM7329-2700RA1/RB4




(in mm)

| Murata Part Number | A | B | C | D | N (min.) | W1 | W2 (max.) |
|---|---|---|---|---|---|---|---|
| MM7329-2700RA1 | 178 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| MM7329-2700RB4 | 330 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| TOLERANCE | ±2.0 | ±0.5 | ±0.8 | ±0.5 | – | ±1.5 | – |

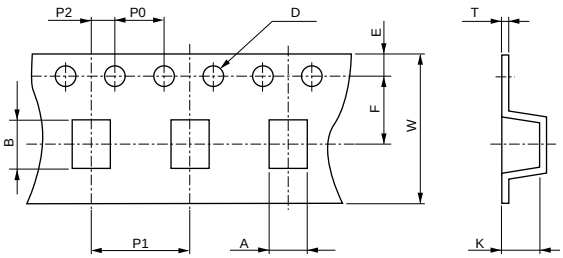
MM7329-2702RAB/RB2




(in mm)

| Murata Part Number | A | B | C | D | N (min.) | W1 | W2 (max.) |
|---|---|---|---|---|---|---|---|
| MM7329-2702RAB | 178 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| MM7329-2702RB2 | 330 | 13 | 21 | 2 | Dia. 50 | 13.5 | 18.5 |
| TOLERANCE | ±2.0 | ±0.5 | ±0.8 | ±0.5 | – | ±1.5 | – |

## ■ Dimensions of Taping




| A | B | W | D | E | F | K | P0 |
|---|---|---|---|---|---|---|---|
| 3.9±0.1 | 3.7±0.1 | 12±0.2 | ø1.5$^{+0.1}_{-0}$ | 1.75±0.1 | 5.5±0.1 | 3±0.15 | 4±0.1 |

| P1 | P2 | T |
|---|---|---|
| 8±0.1 | 2±0.1 | 0.3±0.05 |

(in mm)

## ■ Minimum Quantity

MM7329-2700RA1: dia.180 mm reel/1000 pcs.
MM7329-2700RB4: dia.330 mm reel/4000 pcs.
MM7329-2700B: Bulk/free
MM7329-2702RAB: dia.180 mm reel/ 500 pcs.
MM7329-2702RB2: dia.330 mm reel/2000 pcs.
MM7329-2702B: Bulk/free

# Miniaturized Microwave Coaxial Connector Cable List

| | | | 0.8D single shield FEP cable | 0.4D single shield FEP cable | 0.4D single shield PFA cable | 0.4D single shield PFA cable | 0.4D single shield PFA cable |
|---|---|---|---|---|---|---|---|
| Murata cable code | | | 76 | 81 | 88 | 92 | 32 |
| Inner conductor | Material | - | Silver coated copper covered steel wire | Silver coated copper wire | Silver coated copper covered steel wire | Silver coated copper wire | Silver coated copper wire |
| | No. and Dia. | (No./mm) | 1/0.26 | 7/0.05 | 1/0.15 | 7/0.05 | 7/0.05 |
| | Total Dia. | (mm) | 0.26 | 0.15 | 0.15 | 0.15 | 0.15 |
| Insulator | Material | - | FEP | FEP | PFA | PFA | PFA |
| | Melting point (Reference only) | Degree C | 285 | 250 | 302-310 | 302-310 | 302-310 |
| | Total Dia. | (mm) | 0.8 | 0.4 | 0.43 | 0.4 | 0.4 |
| Outer conductor | Material | - | Tin plated copper wire | Tin plated copper wire | Tin plated copper wire | Tin plated copper wire | Silver plated copper wire |
| | Dia. of wire | (mm) | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 |
| | Total Dia. | (mm) | 1.05 | 0.65 | 0.68 | 0.65 | 0.65 |
| Sheath | Material | - | FEP | FEP | PFA | PFA | PFA |
| | Nominal thickness | (mm) | 0.1 | 0.05 | 0.075 | 0.075 | 0.075 |
| | Color | - | Gray | White | White | White | White |
| Overall Dia. | | (mm) | 1.24 | 0.8 | 0.83 | 0.8 | 0.8 |
| Minimum bending radius | | (mm) | 6 | 4.8 | 3.3 | 3.3 | 3.3 |
| Nominal impedance | | (Ohm) | 50 | 50 | 50 | 50 | 50 |
| Continuous operating voltage | | | 300 Vrms max. | 300 Vrms max. | 300 Vrms max. | 300 Vrms max. | 300 Vrms max. |
| Nominal static capacitance | | (pF/m) | 100 | 100 | 100 | 100 | 100 |
| Nominal Insertion loss | dB/m at 1GHz | | 1.56 | 3.0 | 2.89 | 3.0 | 3.0 |
| | dB/m at 2GHz | | 2.3 | 4.26 | 4.28 | 4.26 | 4.26 |
| | dB/m at 3GHz | | 2.9 | 5.24 | 5.39 | 5.24 | 5.24 |
| | dB/m at 4GHz | | 3.5 | 6.18 | 6.44 | 6.18 | 6.18 |
| | dB/m at 6GHz | | | | 8.4 | 9.17 | 9.17 |
| Assembly to FSC | | | Suitable | Suitable | Not Suitable | Not Suitable | Not Suitable |
| Assembly to GSC | | | Not Suitable | Not Suitable | Suitable | Suitable | Not Suitable |
| Assembly to HSC | | | Not Suitable | Not Suitable | Not Suitable | Not Suitable | Suitable |

## ⚠Note:

1. Export Control
   〈For customers outside Japan〉
   No muRata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction (nuclear, chemical or biological weapons or missiles) or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.
   〈For customers in Japan〉
   For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.
2. Please contact our sales representatives or product engineers before using the products in this catalog for the applications listed below, which require especially high reliability for the prevention of defects which might directly damage a third party's life, body or property, or when one of our products is intended for use in applications other than those specified in this catalog.
   ① Aircraft equipment ② Aerospace equipment
   ③ Undersea equipment ④ Power plant equipment
   ⑤ Medical equipment ⑥ Transportation equipment (vehicles, trains, ships, etc.)
   ⑦ Traffic signal equipment ⑧ Disaster prevention / crime prevention equipment
   ⑨ Data-processing equipment ⑩ Application of similar complexity and/or reliability requirements to the applications listed above
3. Product specifications in this catalog are as of July 2007. They are subject to change or our products in it may be discontinued without advance notice. Please check with our sales representatives or product engineers before ordering. If there are any questions, please contact our sales representatives or product engineers.
4. Please read rating and ⚠CAUTION (for storage, operating, rating, soldering, mounting and handling) in this catalog to prevent smoking and/or burning, etc.
5. This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering.
6. Please note that unless otherwise specified, we shall assume no responsibility whatsoever for any conflict or dispute that may occur in connection with the effect of our and/or a third party's intellectual property rights and other related rights in consideration of your use of our products and/or information described or contained in our catalogs. In this connection, no representation shall be made to the effect that any third parties are authorized to use the rights mentioned above under licenses without our consent.
7. No ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

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