

# DC to 6GHz Ultra-Small Coaxial Switch

## MS-147 Series



### ■ Outline

The ultra-small MS-147 coaxial switch series was developed for the portable terminal interface and for inspection of microwave boards (substrates) (DC – 6GHz) used at high frequencies.

To respond to the development of portable terminal technologies and popularization of high-frequency applications – up to 6GHz – this switch features low loss, low profile, and light weight.

The switch circuit is designed so that the NC terminal is connected to the C terminal without a plug mated. Mating with a plug opens this connection.

Vertical mounting structure allows the switch to be placed near the antenna of the portable terminal and used to inspect output and switch to an external antenna.

### ■ Features

#### 1. Low insertion loss

Insertion loss is as low as:  
0.15dB(or less)(Typically, 0.08dB at 1GHz)  
(Typically, 0.1dB at 2GHz)

#### 2. Space saving

External dimensions are 5.8mm x 5.4mm. Saves installation space.

#### 3. Low profile

Switch height is 3.9mm.

#### 4. Light weight

Switch weight is 0.11g

#### 5. Long life

The switch is guaranteed for up to 12,000 mechanical operations.

#### 6. Auto insertable

Available in embossey tape-and-reel auto-insertable format

#### 7. Wide application range

Operating frequency from DC to 6GHz.

#### 8. Prevention of flux float-off

Switch structure prevents flux float-off.

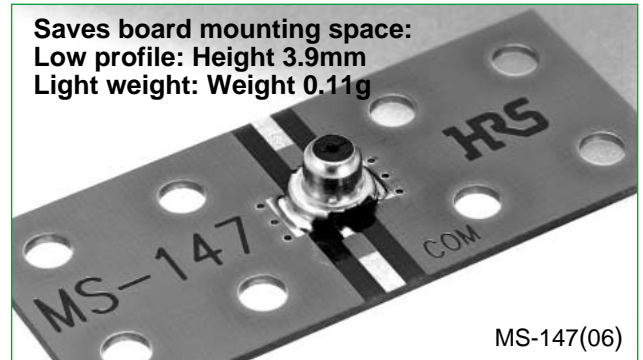
#### 9. Self-alignment

The eccentricity for plug mating is  $\pm 0.5$ mm.

### ■ Application

- \* Wireless communication  
(Bluetooth, IEEE 802.11)
- \* Machines  
(Portable terminal, notebook PC, ETC, POS terminal, GPS terminal PDA, etc.)
- \* Also suitable for other high-frequency machines.

Saves board mounting space:  
Low profile: Height 3.9mm  
Light weight: Weight 0.11g



MS-147(06)

#### ● Plug



MS-147-C(LP)-1

#### ● SMA conversion adapter



MS-147-HRMJ-1

## ■Product Specifications

	Not mated with the plug	Mated (MS-147-HRMJ-1)
Operating temperature range	-30°C ~ +85°C	-10°C ~ +65°C
Power rating	4 W	4 W
Frequency range	DC ~ 6 GHz	DC ~ 6 GHz
Insertion loss	0.15dB Max. (DC ~ 2GHz) 0.2dB Max. (2GHz ~ 3GHz) 0.4dB Max. (3GHz ~ 6GHz)	0.2dB max. (DC ~ 2GHz) 0.3dB max. (2GHz ~ 2.5GHz) 0.4dB max. (2.5GHz ~ 3GHz) 0.8dB max. (3GHz ~ 6GHz)
Isolation	25dB min. (DC ~ 1GHz) 20dB min. (1GHz ~ 3GHz) 14dB min. (3GHz ~ 6GHz)	
V.S.W.R.	1.2 Max. (DC ~ 3GHz) 1.5 Max. (3GHz ~ 6GHz)	1.25 max. (DC ~ 2GHz) 1.3 max. (2GHz ~ 2.5GHz) 1.4 max. (2.5GHz ~ 3GHz) 1.9 max. (3GHz ~ 6GHz)

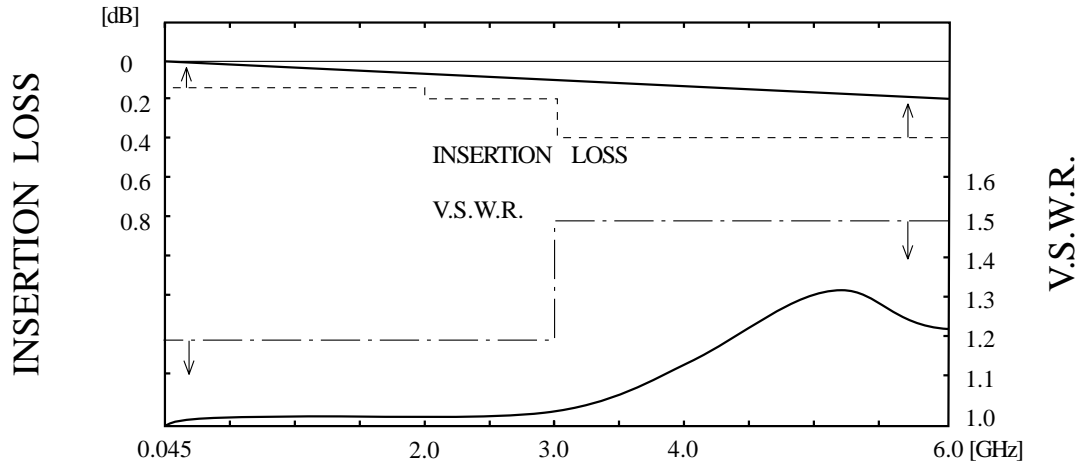
Item	Standard	Conditions
1.Contact resistance	Center 75m ohms max. Outer 50m ohms max.	100mA max.
2.Insulation resistance	1,000M ohms or more	100V DC
3.Withstanding voltage	No flashover or insulation breakdown	100V AC / one minute
4. Vibration	No electrical discontinuity for 10 $\mu$ s Min.	Frequency of 10 to 55 Hz, overall amplitude of 1.5 mm for 2 hours in each of 3 directions
5. Shock		Acceleration of 490 m/s <sup>2</sup> , sine half-wave waveform, 3 cycles in each of the 3 axis
6.Humidity	Contact resistance: Center 100m ohms max. Outer 75m ohms max. Insulation resistance 10M ohms min.	96 hours at temperature of 40°C and humidity of 90% to 95%
7.Temperature cycle		Temperature : -55°C → +5°C to +35°C → 85°C → +5°C to 35°C Time:30 → 15 max. → 30 → 15 max. 100 cycles
8.Salt spray	Contact resistance: Center 100m ohms max. Outer 75m ohms max. No excessive corrosion	Exposed to 5% salt water solution for 48 hours
9.Durability (Insertion/withdrawal)	Contact resistance: Center 100m ohms max. Outer 75m ohms max.	12,000 cycles

## ■Materials

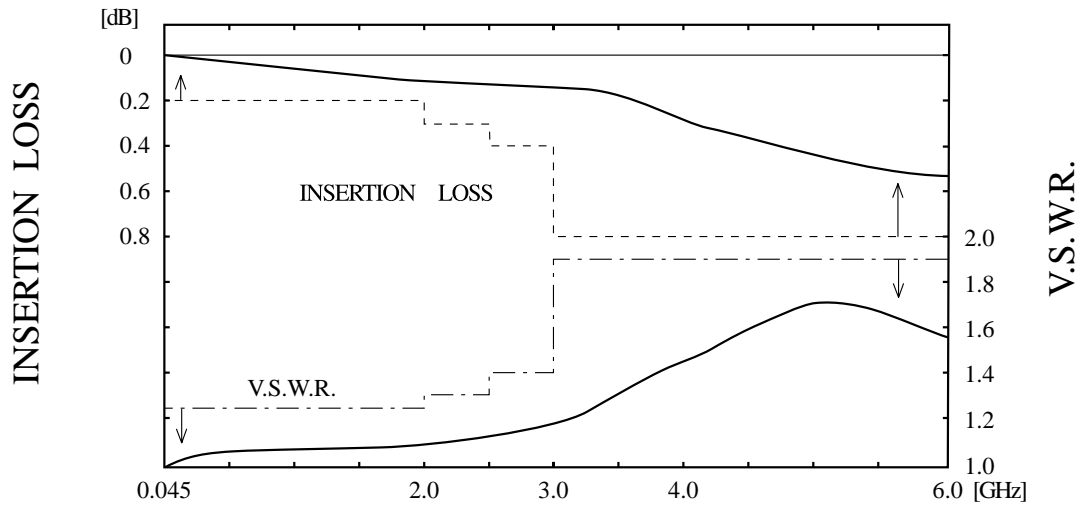
Part	Material	Finish	Remarks
Shell	Phosphor bronze	Gold plating	—————
Insulator	Polyamide resin	—————	UL94HB
Common terminal	Beryllium copper	Gold plating	—————
Board circuit side (N.C) terminal	Beryllium copper	Gold plating	—————

## Typical Data

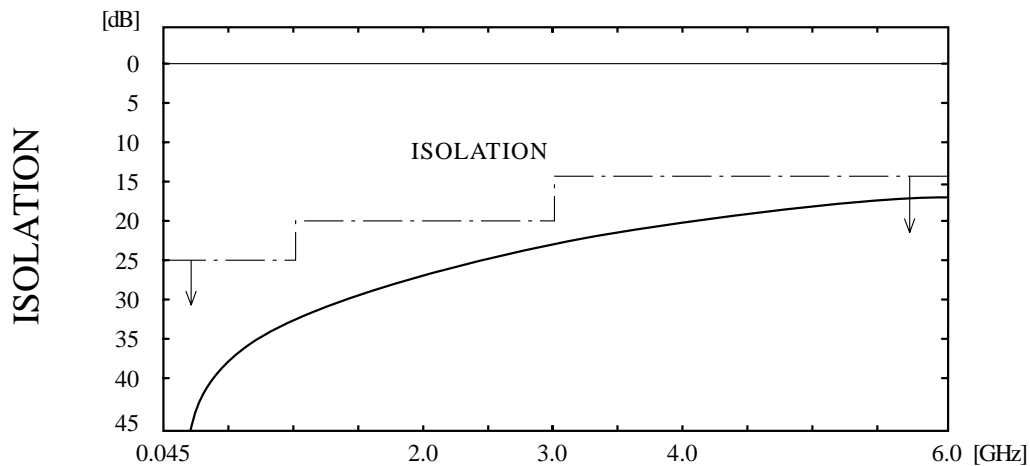
### ● NORMALLY CLOSED (N.C) ~ (Not mated with the plug)



### ● OPEN (N.O) ~ (Mated with the plug)

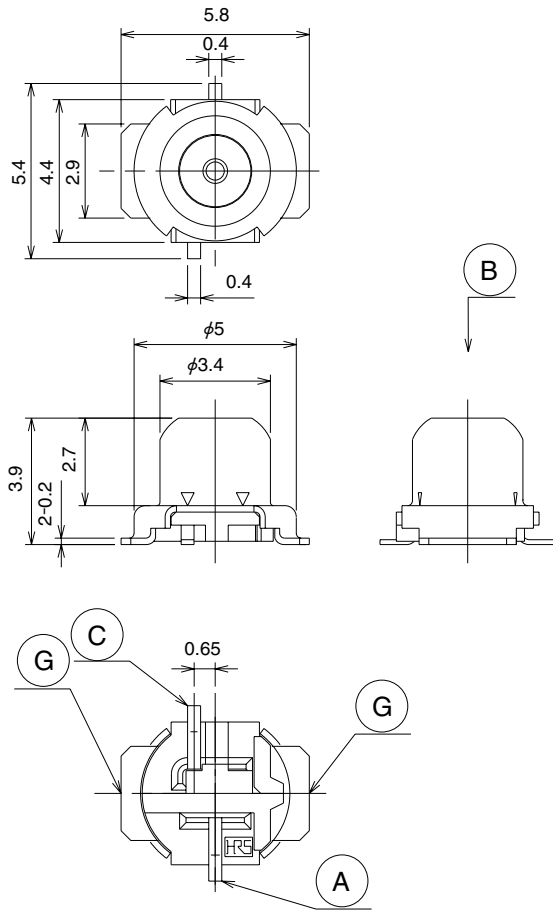


### ● ISOLATION

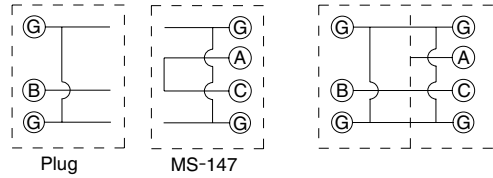


## ■ Receptacle

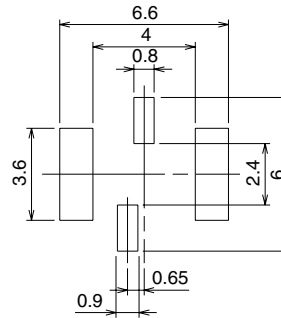
Product No. MS-147 (06)  
1,500 pieces per reel



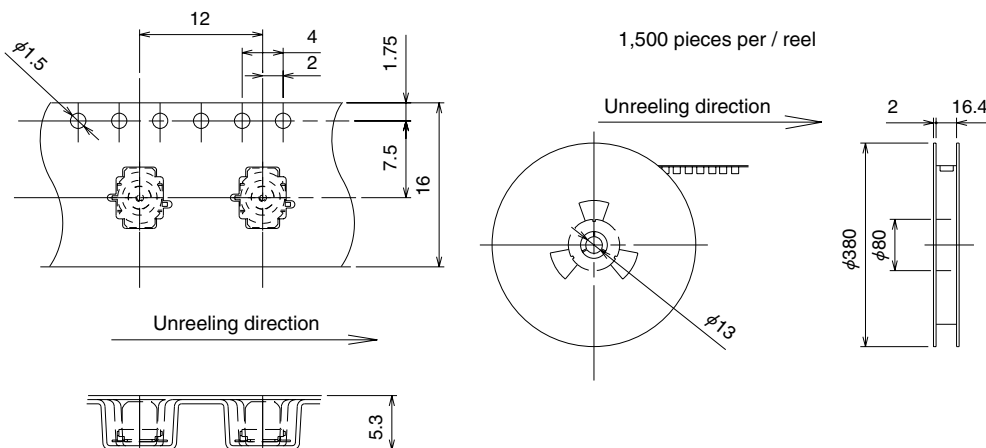
## ■ Circuit diagram



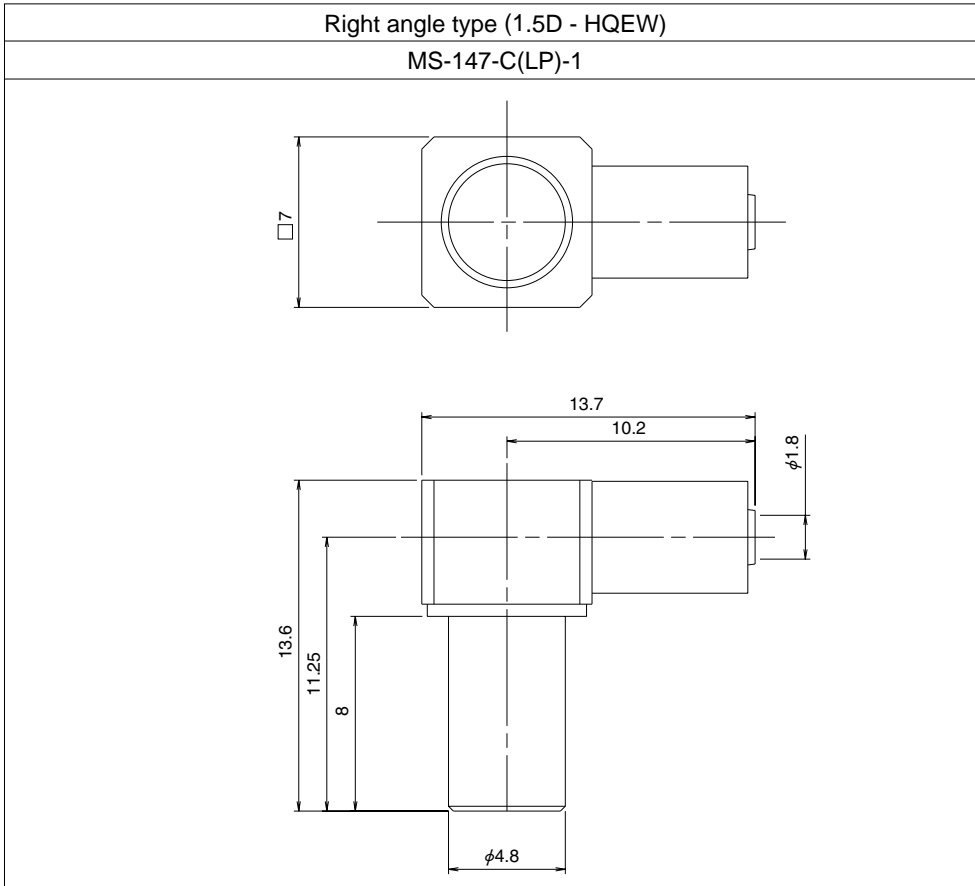
## ■ PCB Mounting Pattern



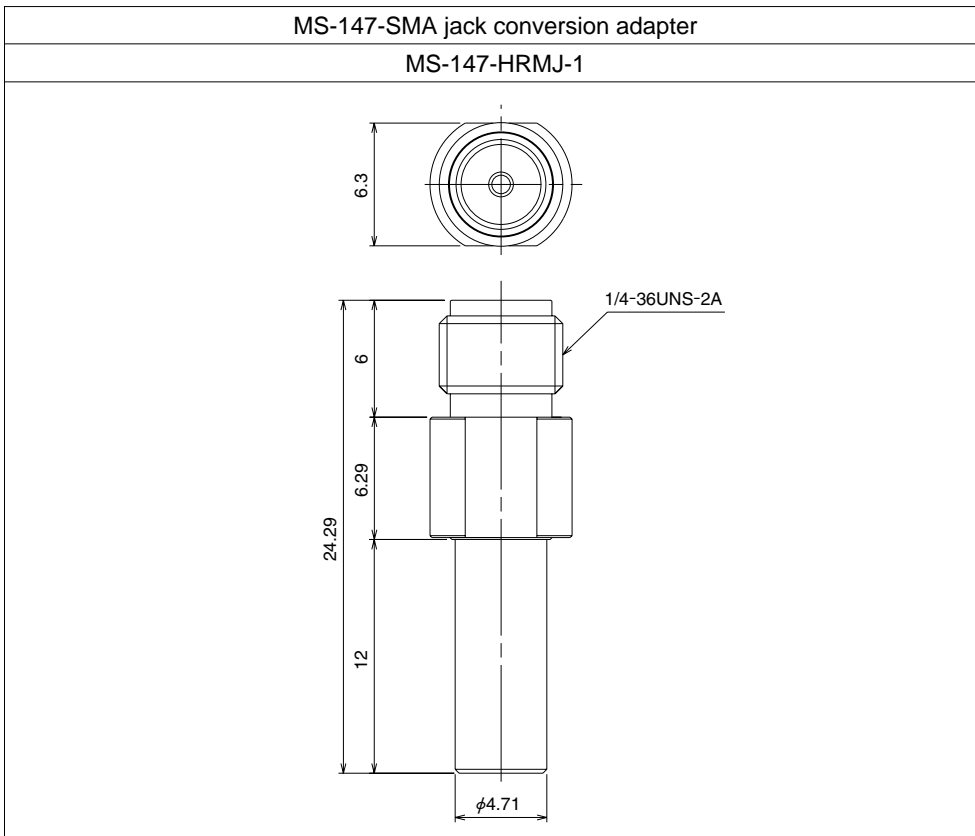
## ■ Embossed Carrier Tape Dimensions



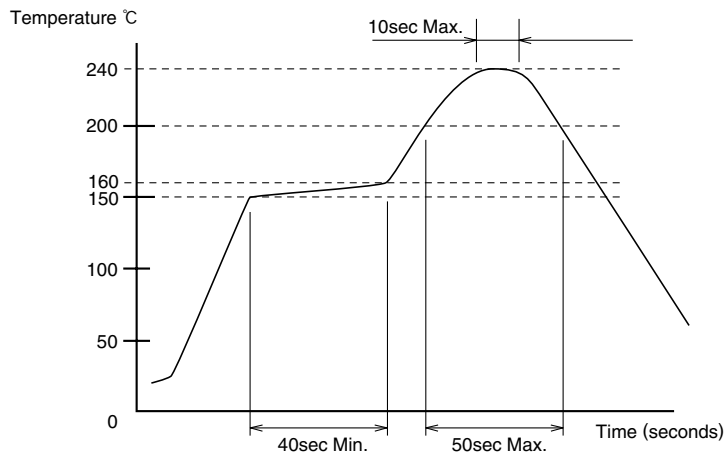
## ■ Plug



## ■ SMA conversion adapter

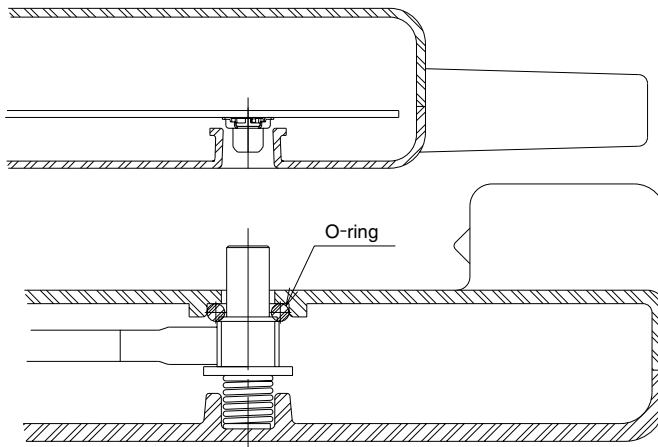


## Recommended Temperature Profile



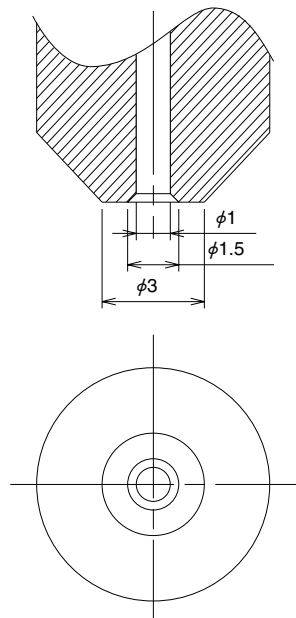
● Maximum temperature	: 240°C
● Duration of peak temperature	: 10sec Max.
● Base peak temperature	: 220°C – 235°C
● 200°C or over	: 50sec Max.
● 150°C – 160°C	: 40sec Min.

## Example of Application



Note: Mounting example

## Recommended Nozzle Dimensions



## ■Precautions

1. Compatible with the following plugs.

MS-147-C(LP)-1 : Plug harness type  
(Effective mating length: 0.87mm min.)

MS-147-HRMJ-1 : SMA conversion adapter  
(Effective mating length: 0.87mm min.)

2. Not washable.

3. Design the mounting holes with sufficient clearance to protect the switch from being subjected to excessive force should the board be dropped.

4. For RF interface application for portable terminals, cover the plug entry with a rubber cap to keep dust out when no plug is inserted.

5. Be sure to fully insert the plug until it contacts part P.

