

# Antenna

# YC0013AA Datasheet

## Antenna Services

Version: 3.0

OC (Antenna Only): **YC0013AA**

OC (Antenna + EVB): **YC0013AAEVB**

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# About the Document

## Revision History

Version	Date	Author	Note
-	2020-12-14	Kenny YIN	Creation of the document
1.0	2020-12-14	Kenny YIN	First official release
2.0	2021-06-09	Aria CHU	Updated all test data in this datasheet.
2.1	2021-06-21	Aria CHU	Updated the efficiency and gain charts in Chapter 4.
2.2	2021-06-28	Aria CHU	Updated the efficiency and gain charts in Chapter 4.
2.3	2021-07-08	Aria CHU	Updated the reference PCB design in Chapter 4.8.
2.4	2021-09-28	Aria CHU	Added the new OC YC0013AAEVB on the cover.
2.5	2021-12-03	Aria CHU	Updated the product description in Chapter 1.
3.0	2022-07-20	Wilson BAO	Updated all test data in this datasheet.

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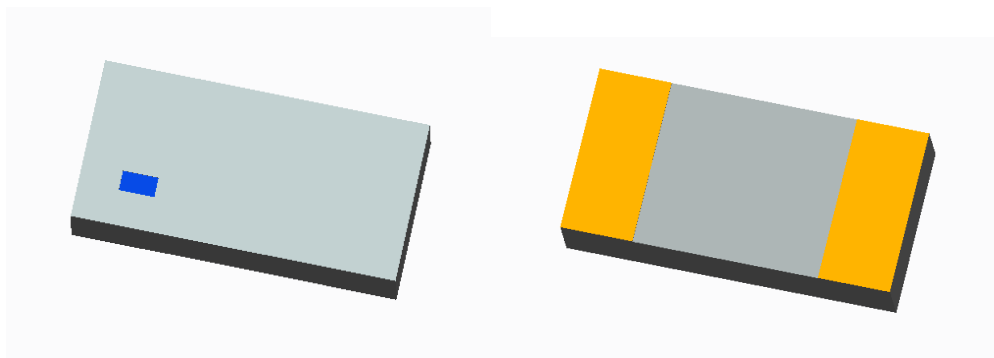
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## 1 Product Description

This Quectel GNSS antenna adopts a diversity of forms to guarantee the most suitable polarization type. Quectel's positioning products support single-band or multi-band operation modes to meet various high-precision positioning requirements of customers' products. Quectel also provides both passive and active antennas to satisfy the customer demand for high gain. Such antenna supports different installation or connection methods such as pin mount, surface mount, magnetic mount, internal cable, and external SMA. Customized connector type and cable length are provided according to requirements.

## 2 Product Features

- GNSS 1559–1606 MHz
- High efficiency
- Excellent performance



### 3 Product Specifications

#### Passive Electrical Specifications

Frequency Range	1559–1606 MHz
Input Impedence	50 $\Omega$
VSWR	< 3.0
Gain	< 2.0 dBi
Radiation Pattern	Omni-directional
Polarization Type	Linear

#### Mechanical Specifications

Antenna Size	3.2 (L) × 1.6 (W) × 0.6 (H) mm
Material	Ceramic
Weight	Typ. 0.007 g
Mounting Type	SMD
Operating Temperature	-40 °C to + 85 °C

#### EVB Mechanical Specifications

EVB Size	90 × 50 × 1 mm
Material	FR4
Color	Green
Connector Type	SMA Female
Weight	Typ. 13.22 g
Working Temperature	-40 °C to +85 °C
Mounting Type	Screw

## 4 Overall Performance

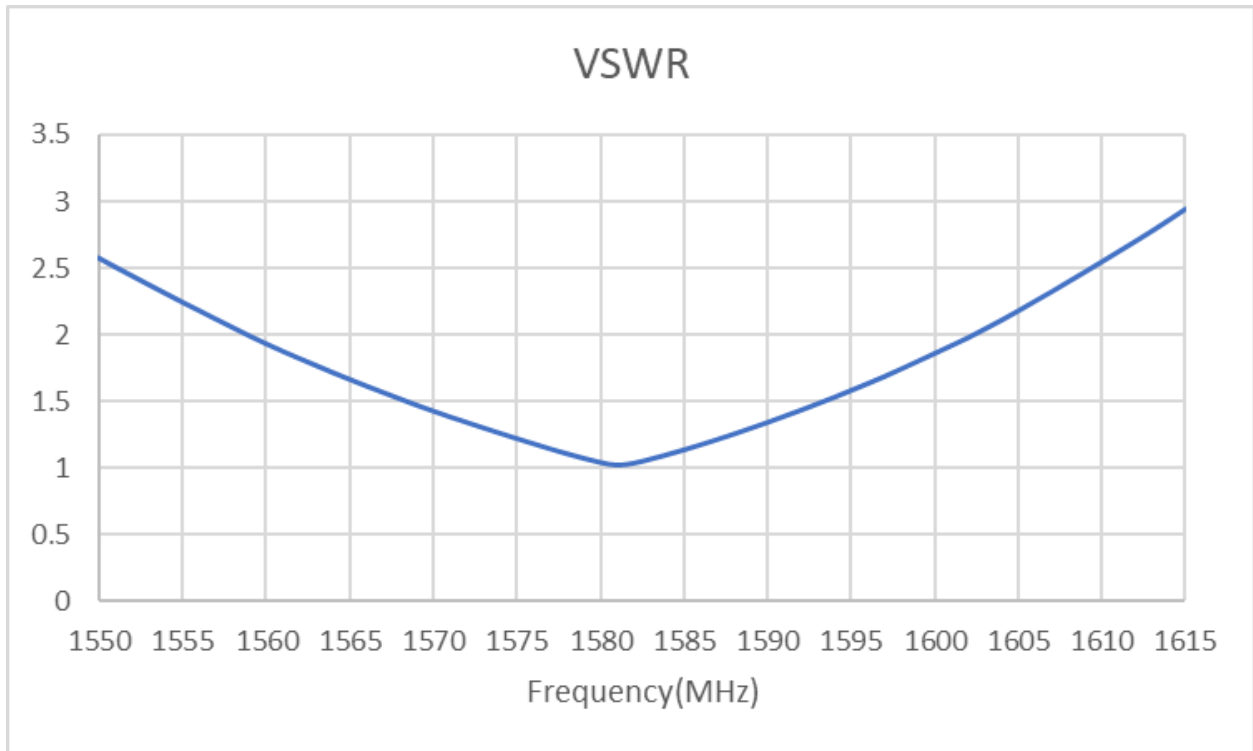
### 4.1. Test Environment

- KEYSIGHT ENA Network Analyzer E5063A 100 kHz – 8.5 GHz
- RayZone® 2800 Chamber 5G (FR1) SISO/MIMO, 600 MHz – 8.5 GHz



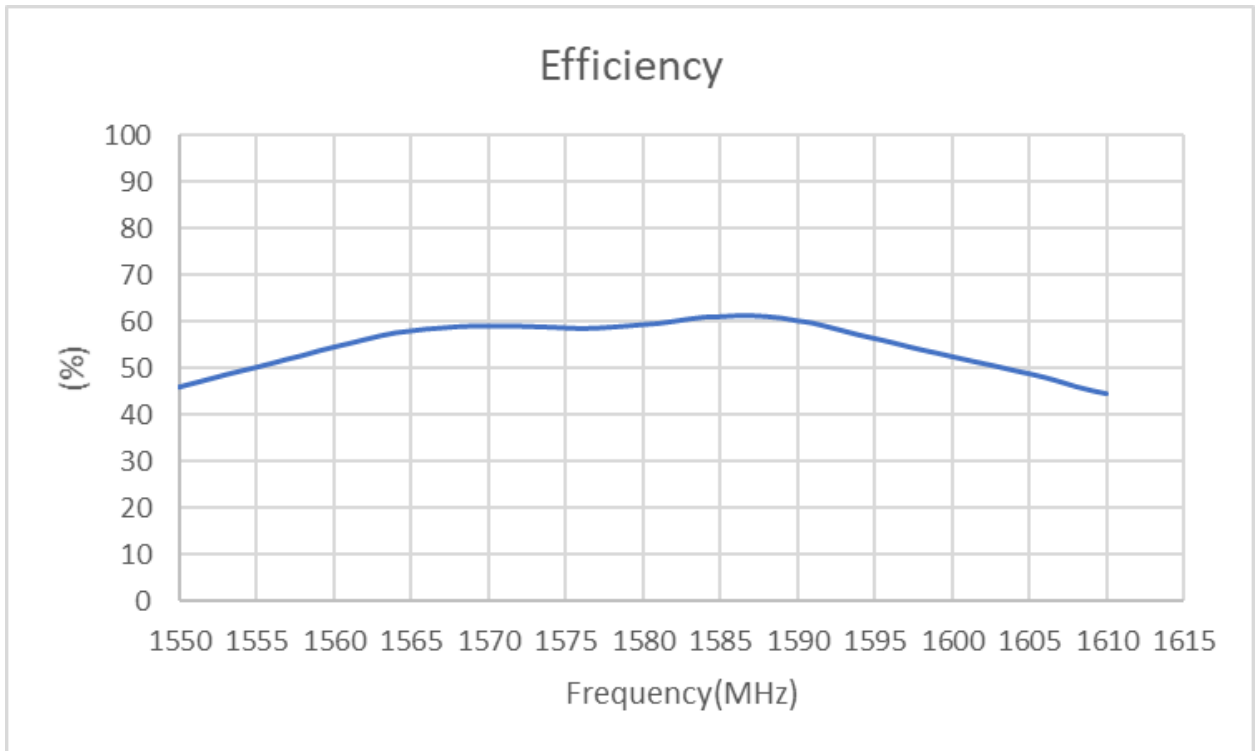


**4.2. VSWR**



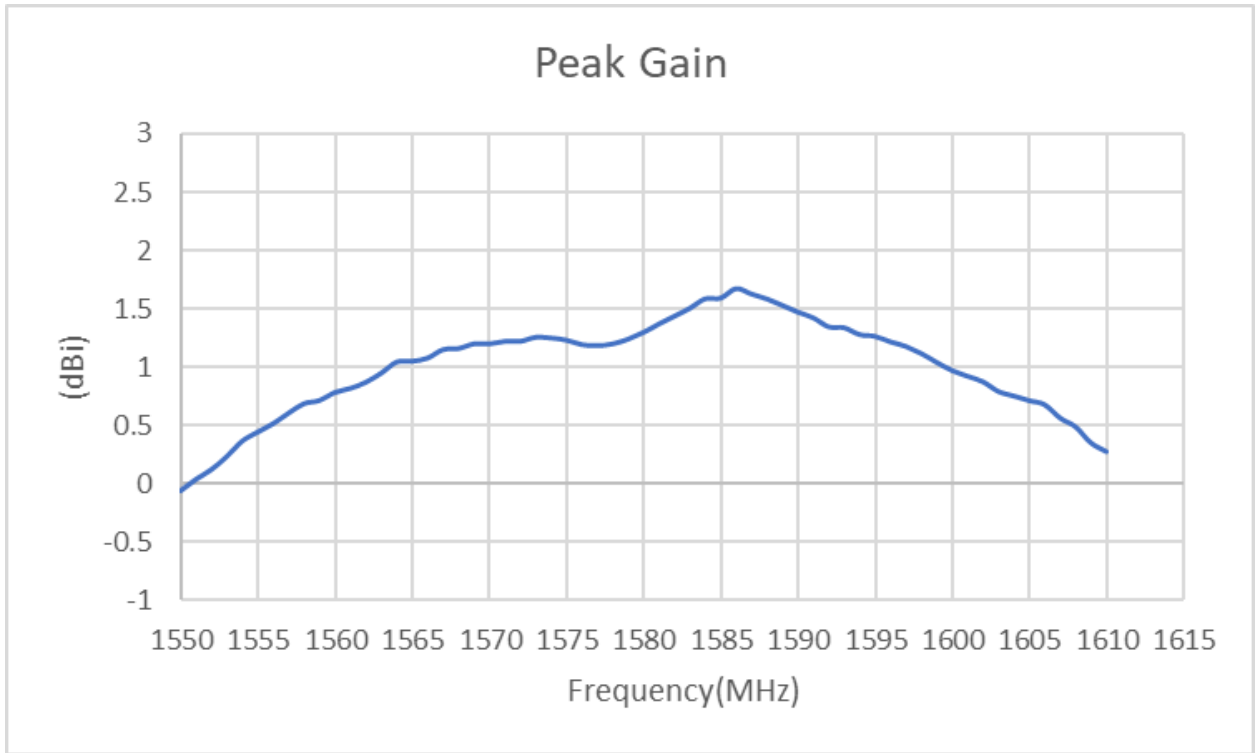
<b>Frequency (MHz)</b>	1561	1575	1602
<b>VSWR</b>	1.88	1.22	1.98

### 4.3. Efficiency



Frequency (MHz)	1561	1575	1602
Efficiency (%)	55.31	58.67	51.01

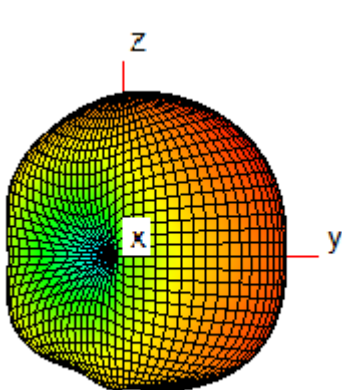
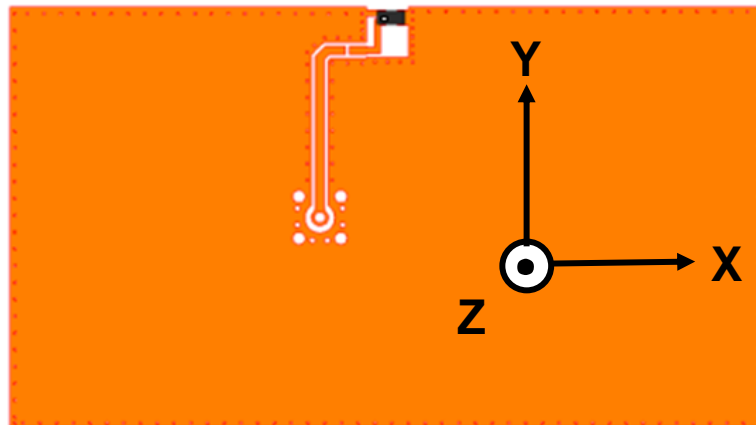
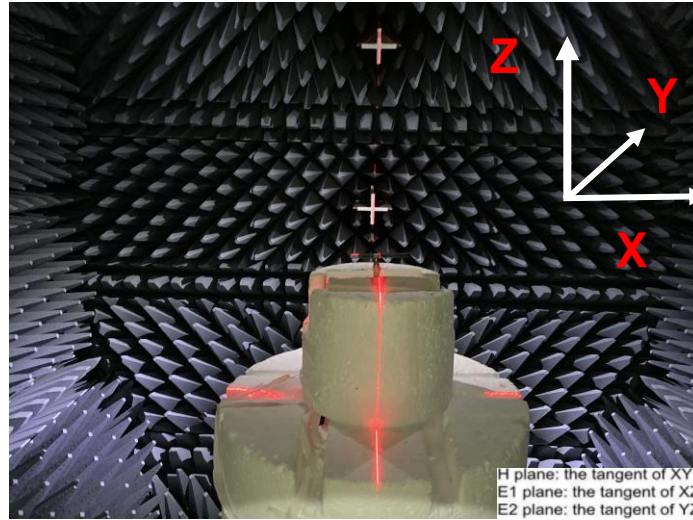
**4.4. Gain**



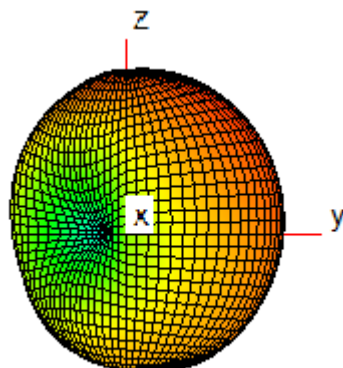
<b>Frequency (MHz)</b>	1561	1575	1602
<b>Gain (dBi)</b>	0.81	1.22	0.87

### 4.5. Radiation Pattern

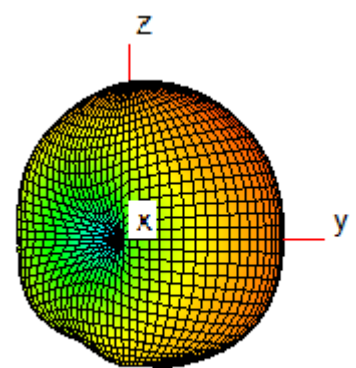
- Test condition: on a 50 mm × 90 mm evaluation board.



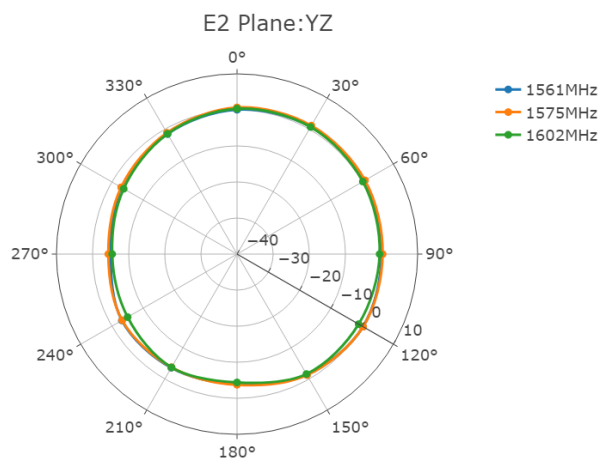
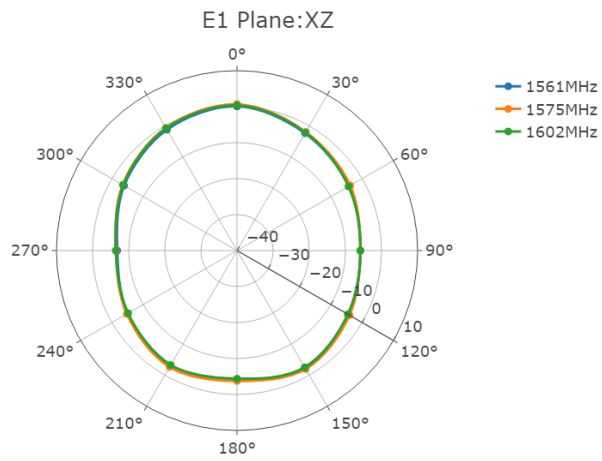
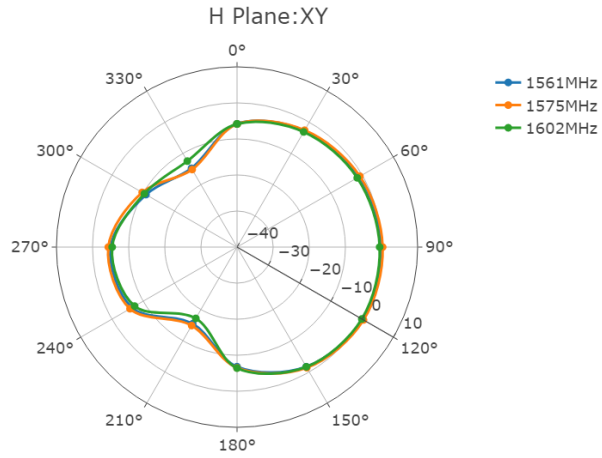
1561 MHz



1575 MHz



1602 MHz



## 4.6. Schematic Symbol and Pin Definition

The pin assignment for the antenna is as follows. The antenna has 2 pins which both work. All other pins are designed for mechanical strength.



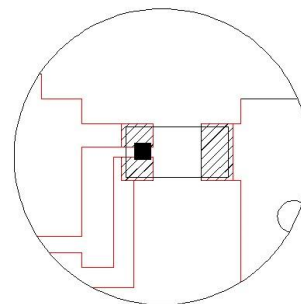
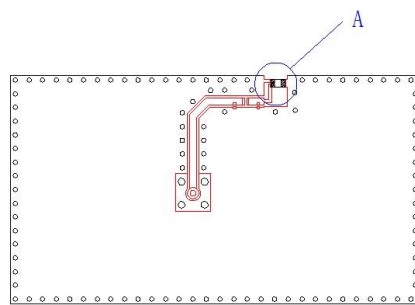
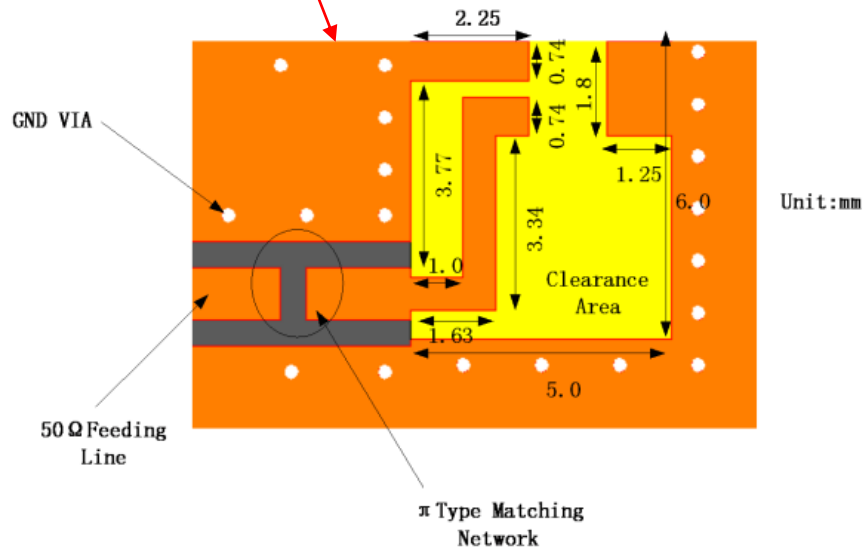
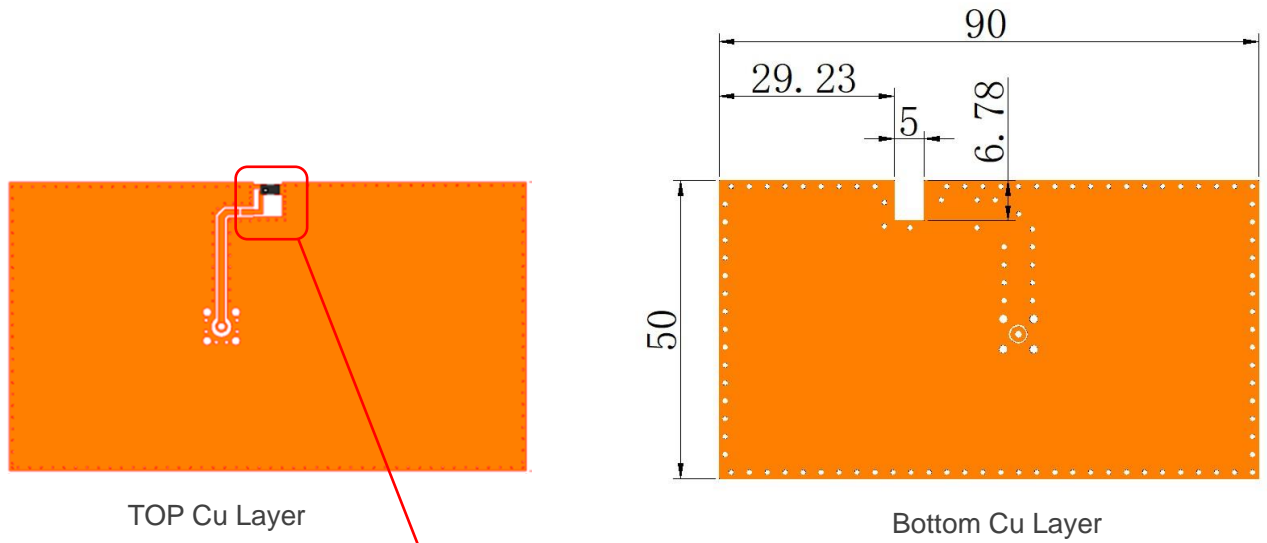
Pin No.	Description
1	Feed (GND)
2	GND (Feed)

## 4.7. Transmission Line

The characteristic impedance of all transmission lines shall be designed as 50  $\Omega$ .

- The length of the transmission lines should be kept as short as possible.
- Any other part of the RF system, such as transceiver, power amplifiers, etc., shall also be designed with an impedance of 50  $\Omega$ .

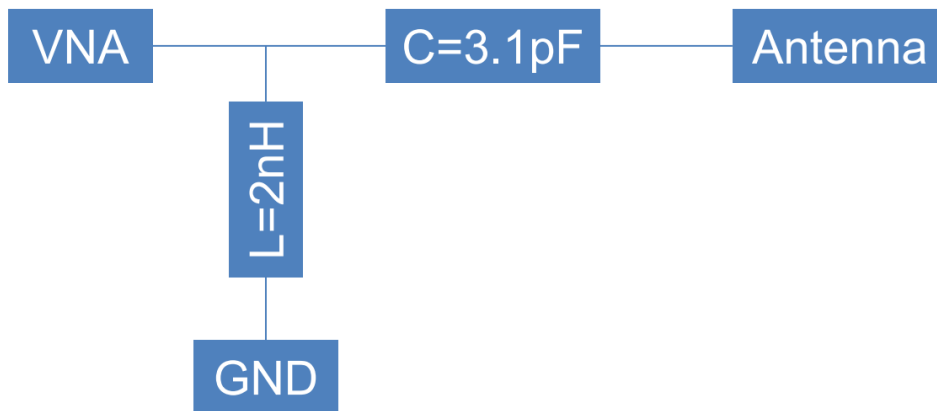
4.8. Reference PCB Design (Unit: mm)



Welding diagram

A  
SCALE 7:1

#### 4.9. Matching Circuit

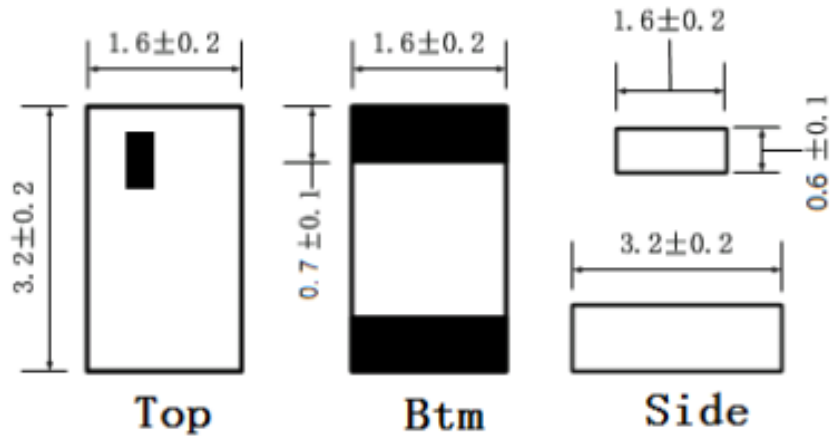


- Parallel Inductor – Murata; LQG15HS2N0B02;  $2\text{nH} \pm 0.1 \text{ nH}$
- Serial Capacitor – Murata; GJM1555C1H3R1BB01;  $3.1\text{pF} \pm 0.1 \text{ pF}$



## 5 Product Size (Unit: mm)

RoHS



## 6 Dependability Test

Reference Condition:	Temperature range	$25 \pm 5^{\circ}\text{C}$
	Relative Humidity range	55~75%RH
	Operating Temperature range	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
	Storage Temperature range	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

### 6.1 Vibration Resist

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after applied to the vibration of 10 to 55Hz with amplitude of 1.5mm for 2 hours each in X, Y and Z directions.

### 6.2 Drop Shock

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after dropping onto the hard wooden board from the height of 100cm for 3 times each facet of the 3 dimensions of the device.

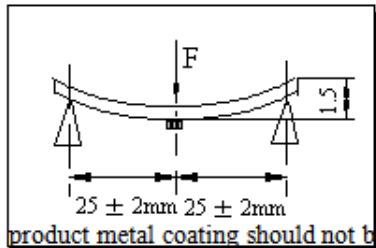
### 6.3 Solder Heat Proof

The device should be satisfied after preheating at  $120^{\circ}\text{C} \sim 150^{\circ}\text{C}$  for 120 seconds and dipping in soldering Sn at  $255^{\circ}\text{C} + 10^{\circ}\text{C}$  for  $5 \pm 0.5$  seconds, or electric iron  $300^{\circ}\text{C} - 10^{\circ}\text{C}$  for  $3 \pm 0.5$  seconds, without damnify.

### 6.4 Adhesive Strength of Termination

The device have no remarkable damage or removal of the termination after horizontal force of 5N( $\leq 0603$ ); 10N( $>0603$ )with  $10 \pm 1$  seconds.

### 6.5 Bending Resist Test



Weld the product to the center part of the PCB with the thickness  $1.6 \pm 0.2\text{mm}$  as the illustration shows, and keep exerting force arrow-ward on it at speed of  $1\text{mm/S}$ , and hold for  $5 \pm 1\text{S}$  at the position of 1.5mm bending distance, so far, any peeling off of the product metal coating should not be detected.

### 6.6 Moisture Proof

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to the temperature  $60 \pm 2^{\circ}\text{C}$  and the relative humidity 90~95% RH for 96 hours and 1~2 hours recovery time under normal condition.

### 6.7 High Temperature Endurance

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to temperature  $85 \pm 5^{\circ}\text{C}$  for  $96 \pm 2$  hours and 1~2 hours recovery time under normal temperature.

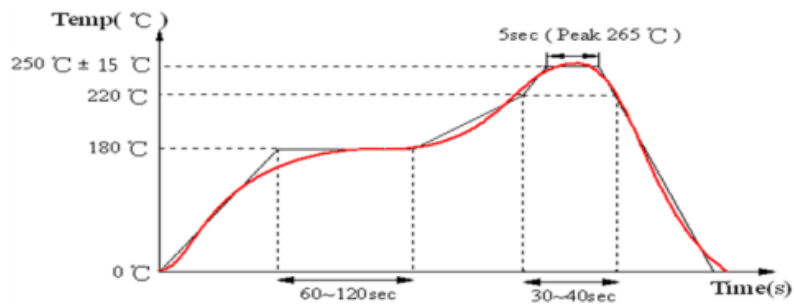
### 6.8 Low Temperature Endurance

The device should also satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to the temperature  $-40^{\circ}\text{C} \pm 5^{\circ}\text{C}$  for  $96 \pm 2$  hours and to 2 hours recovery time under normal temperature.

### 6.9 Temperature Cycle Test

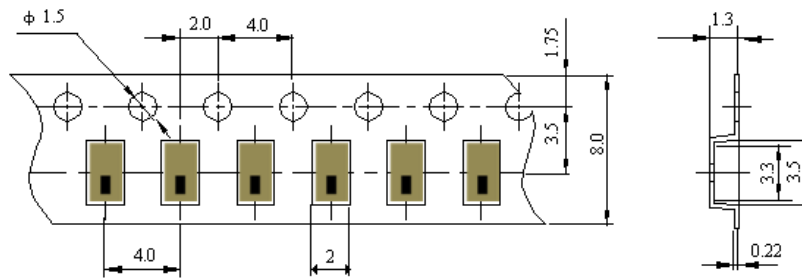
The device should also satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to the low temperature  $-40^{\circ}\text{C}$  and high temperature  $+85^{\circ}\text{C}$  for  $30 \pm 2$  min each by 5 cycles and 1 to 2 hours recovery time under normal temperature.

## 7 Reflow Profile



## 8 Packaging and Dimensions

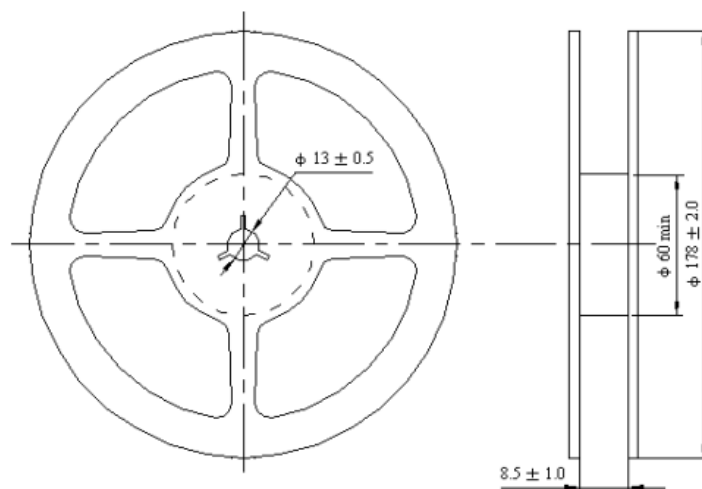
### 8.1 Plastic Tape



#### Remarks for Package

Reserve a length of 150~200mm for the trailer of the carrier and 250~300 mm for the leader of the carrier and further 250mm of cover tape at the leading part of the carrier.

### 8.2 Reel (3000 pcs/Reel)



### 8.3 Storage Period

Product should be used within six months of receipt.

MSL 1 / Storage Temperature Range : <30 degree C, Humidity : <85%RH