

## 1. Features

- Antenna for 1559 – 1609 MHz, GNSS for embedded applications
- Solution for all global public constellations: GPS, GLONASS, Beidou and GALILEO.
- Works over a ground plane. No clearance required.
- Ideal for wearables.
- Maintains high performance on device: DFI (Designed for Integration)
- SMD mounted
- Supplied on Tape and Reel

## 2. Description

Beltii is intended for use with GNSS applications. Designed for small ground planes and integrates into the corner with no GND clearance required. High resistance to detuning makes this antenna ideal for small wearable devices.

## 3. Applications

- Wearable devices
- Trackers
- Portable Devices
- Drones
- Navigation
- Sports tracking



## 4. Part Number

**Beltii: SR4G013**



## 5. General Data

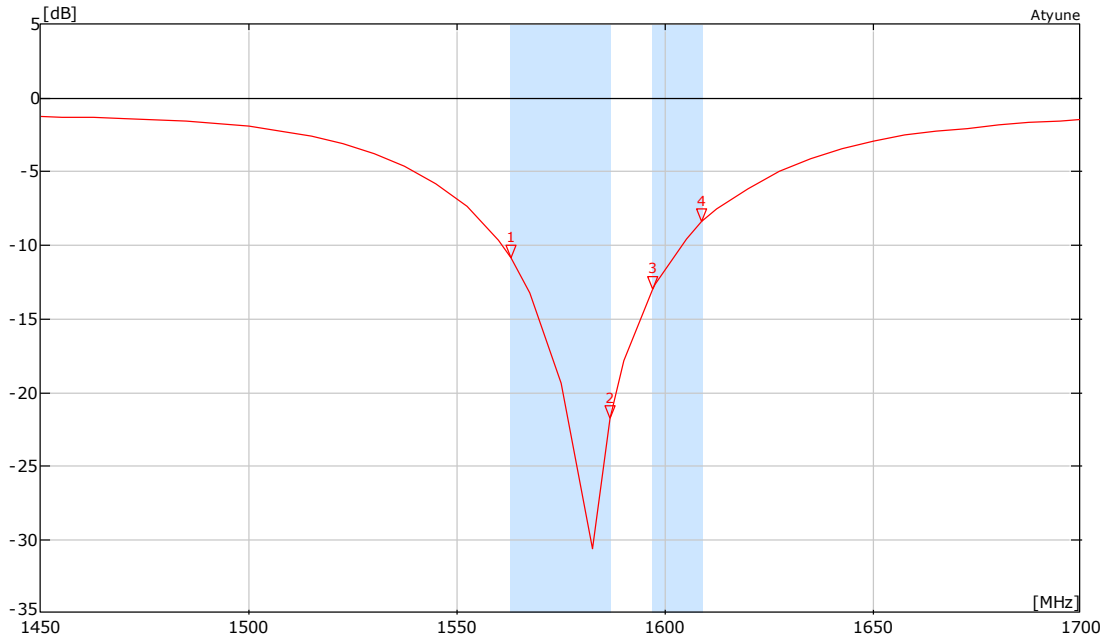
Product name	Beltii
Part Number	SR4G013
Frequency	1559 - 1609 MHz
Polarization	Linear
Operating temperature	-40°C to 140°C
Environmental Condition Test	ISO16750-4 5.1.1.1/5.1.2.1/5.3.2
Impedance with matching	50 Ω
Weight	< 0.5 g
Antenna type	SMD
Dimensions	15.6 x 3.3 x 4.4 (mm)

## 6. RF Characteristics

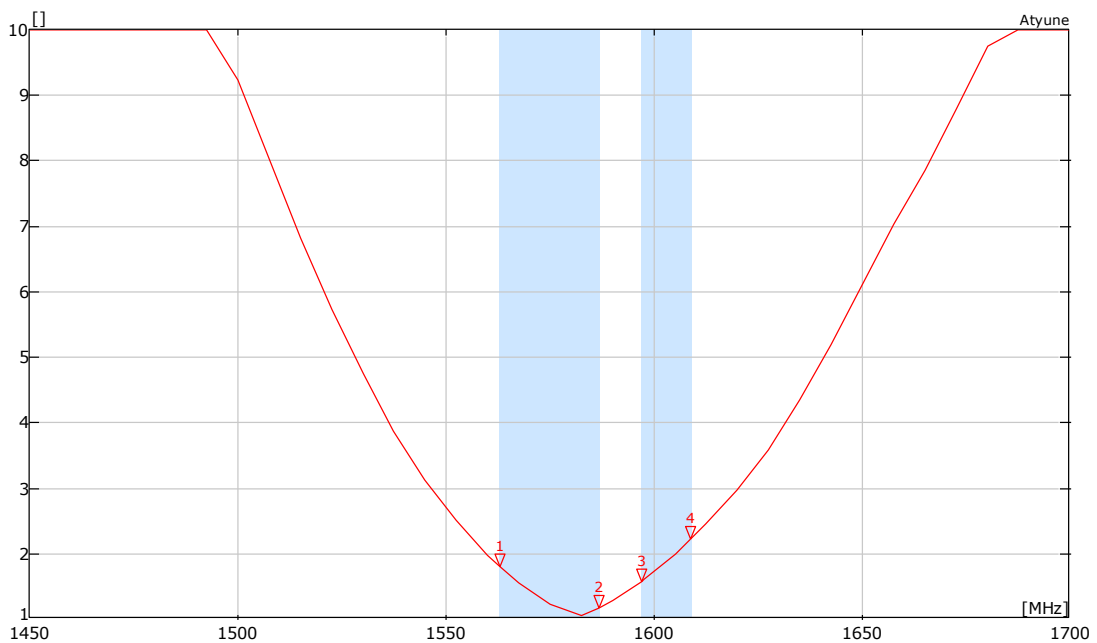
	Typical performance	Conditions
Peak gain	2.3dBi	<b>1559 – 1609 MHz frequency range</b> All data measured on Antenova's evaluation PCB Part No. SR4G013-U1
Average gain	-2.3dBi	
Average efficiency	>60%	
Maximum return loss	<-8.0dB	
Maximum VSWR	2.2:1	

## 7. RF Performance

### 7.1 Return Loss

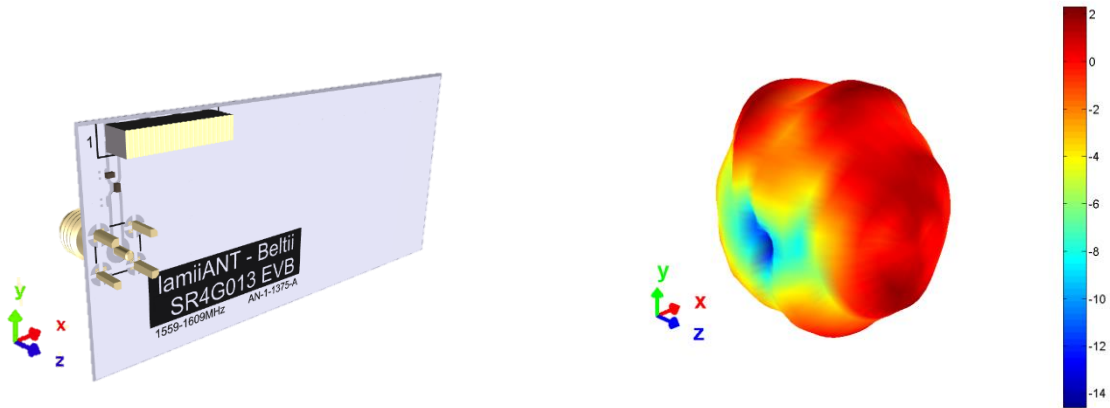


### 7.2 VSWR



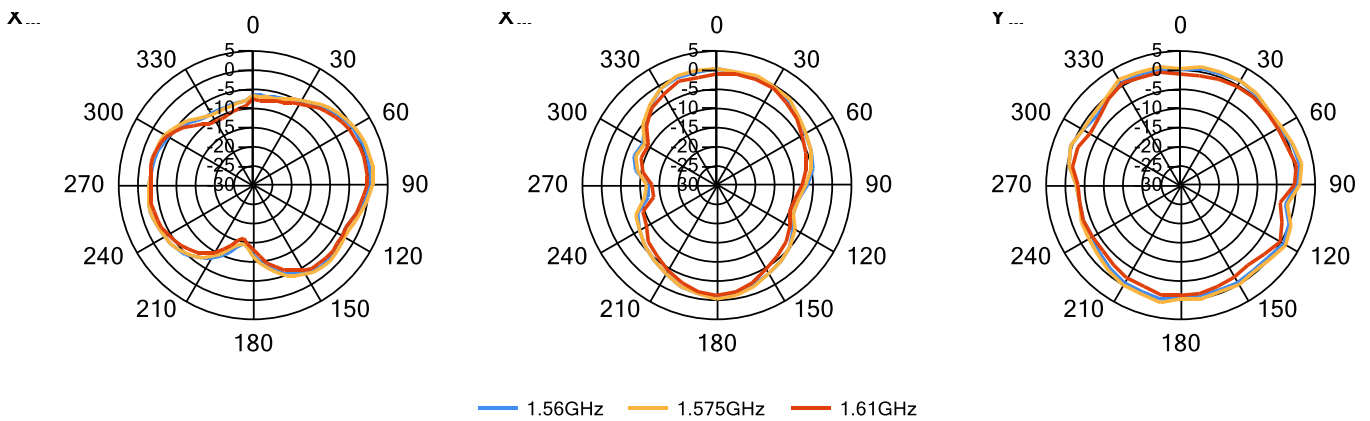
## 7.3 Antenna Radiation Pattern

### 7.3.1 1559 - 1609 MHz

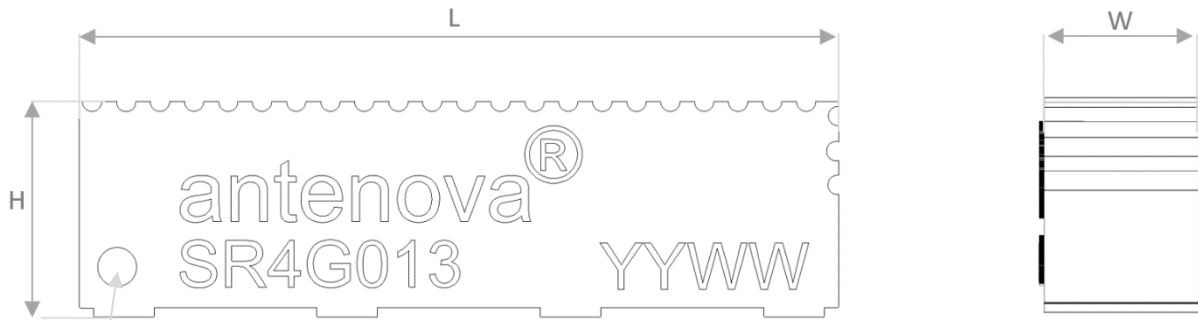


#### 3D pattern at 1575.42MHz

Drag to rotate pattern and PCB by using Adobe Reader  
(Click to Activate)



## 8. Antenna Dimensions



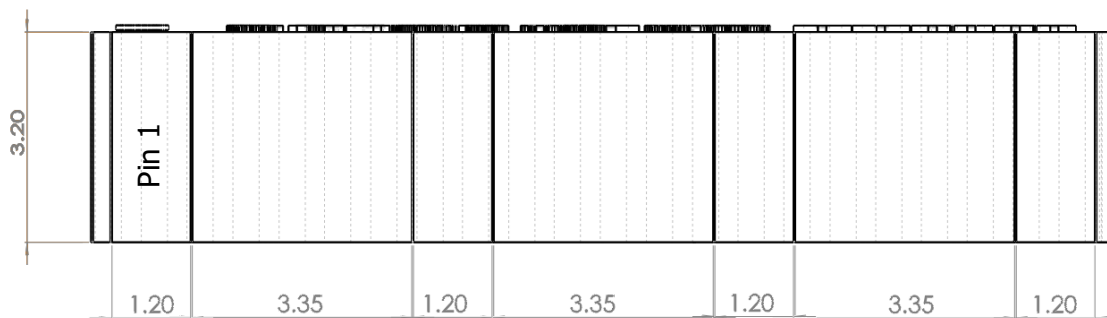
Pin 1 marker

L	W	H
Length	Width	Height
15.6	3.3	4.4

All dimensions in mm

### Bottom side dimensions

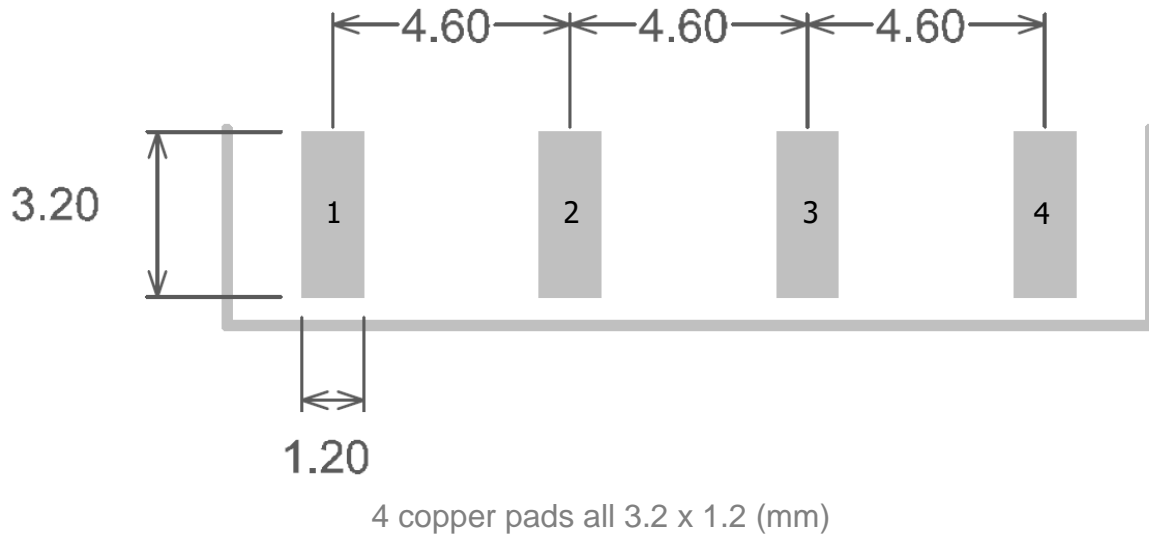
4 solder pads (3.2 x 1.2 mm)



Antennas for Wireless Applications

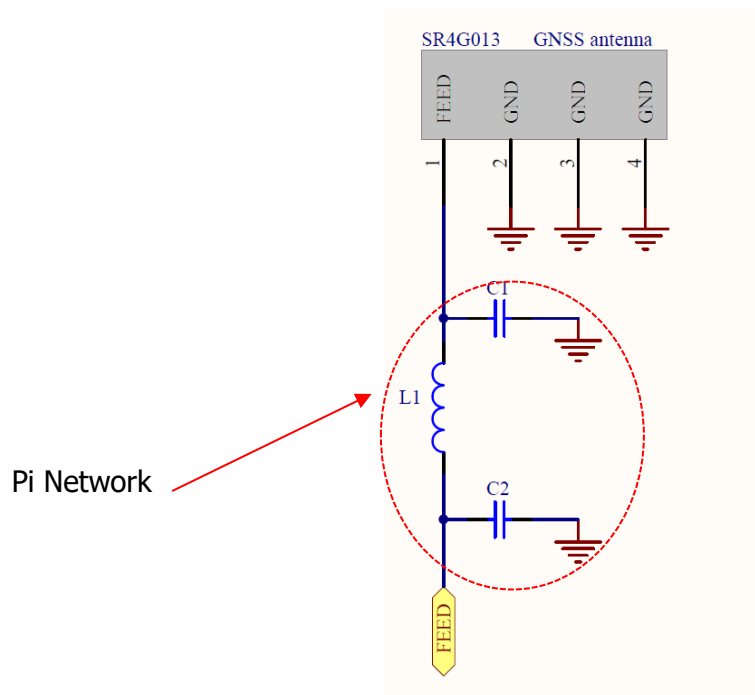
## 9.0 Antenna footprint

The recommended host PCB footprint is below.



## 10.0 Schematic

The circuit for the antenna and the matching components is below. The RF feed connection and GND connections are critical to the function of the antenna, and must be followed as shown.



## 11. Electrical Interface

### 11.1 Transmission Line

All transmission lines should be designed to have a characteristic impedance of 50Ω.

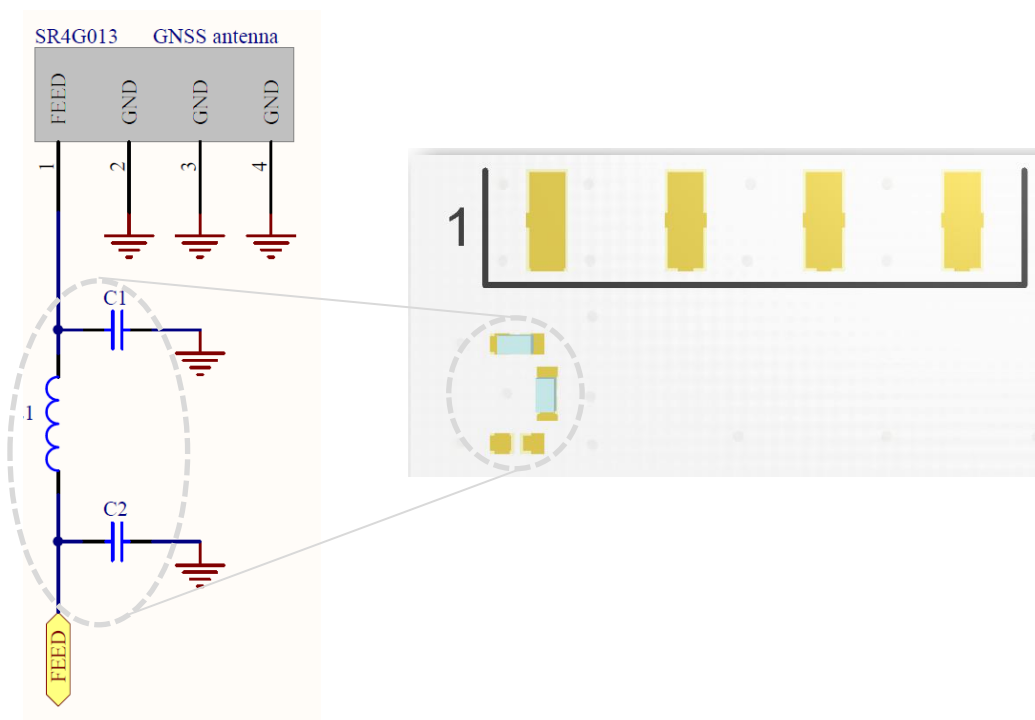
- The length of the transmission lines should be kept to a minimum
- Any other parts of the RF system like transceivers, power amplifiers, etc, should also be designed to have an impedance of 50 Ω

Once the material for the PCB has been chosen (PCB thickness and dielectric constant), a coplanar transmission line can easily be designed using any of the commercial software packages for transmission line design. For the chosen PCB thickness, copper thickness and substrate dielectric constant, the program will calculate the appropriate transmission line width and gaps on either side of the feed.

### 11.2 Matching Circuit

The antenna requires a matching circuit that must be optimized for each product. The matching circuit will require up to three components and the following pad layout should be designed into the device so the correct circuit can be installed.

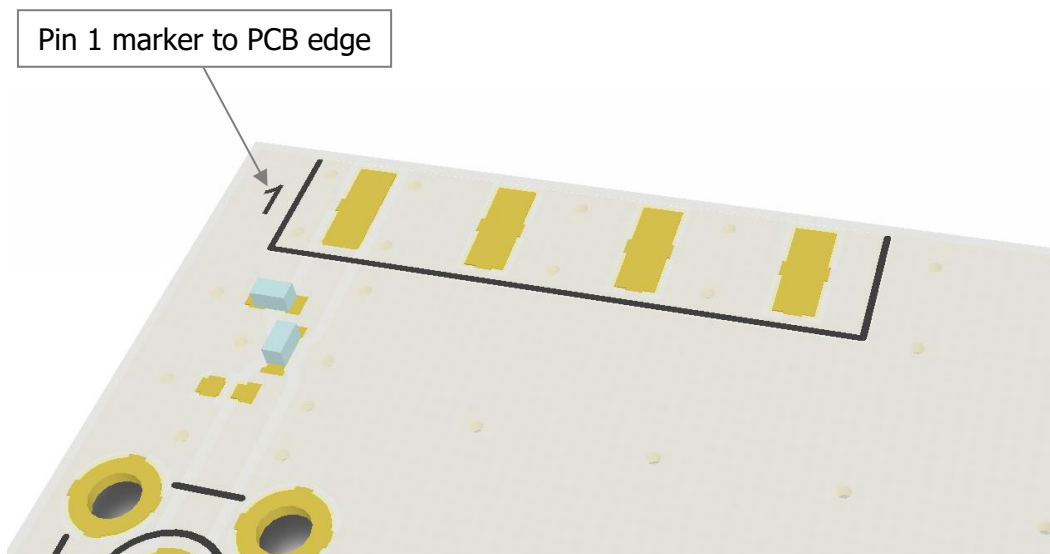
The Pi matching network must be placed close to the antenna feed to ensure it is more effective in tuning the antenna.



## 12.0 Antenna Integration Guide

### 12.1 Antenna Placement

Whichever size of host PCB is used, the antenna should be placed into the PCB corner. Ideally Pin 1 should be closest to the PCB edge.

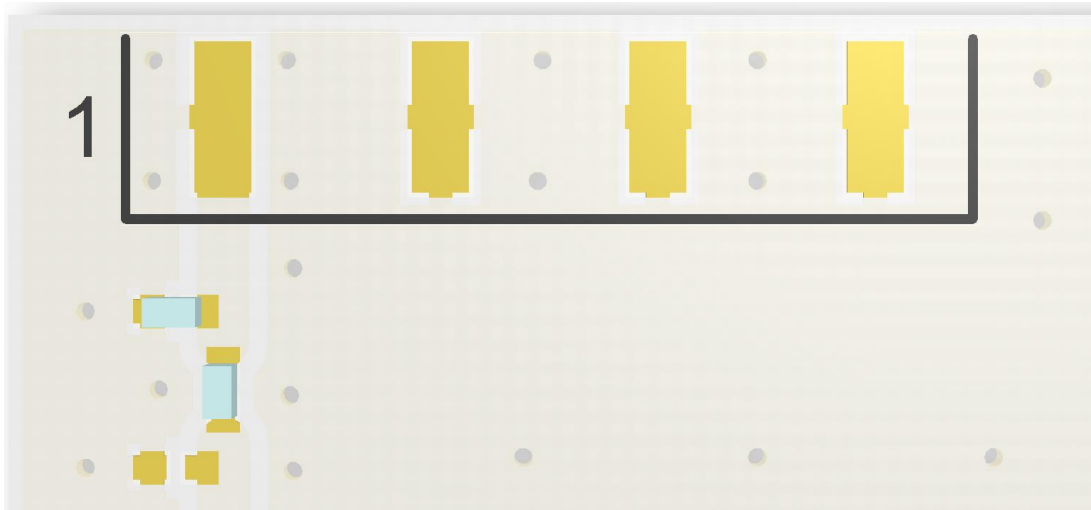




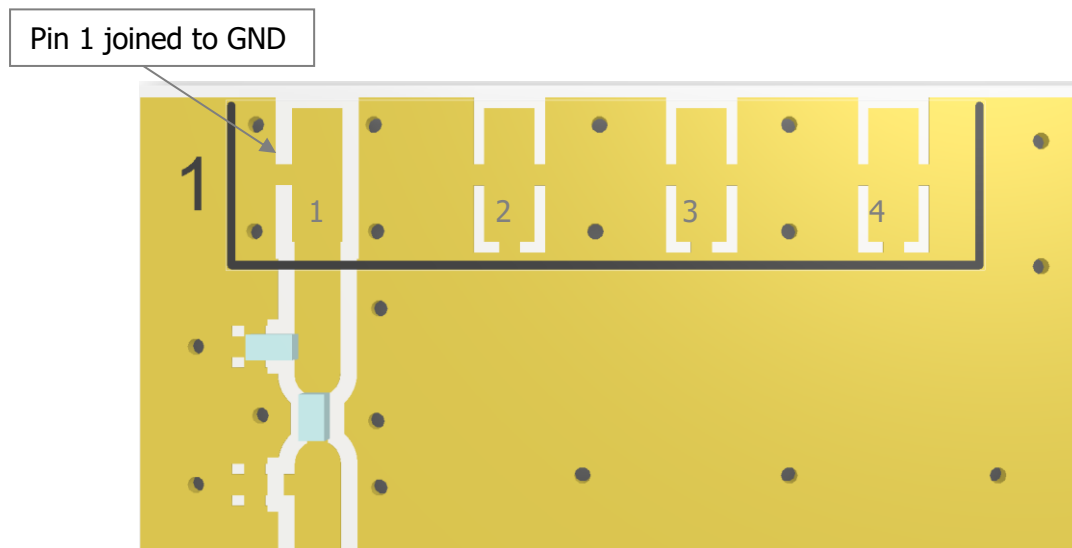
## 12.2 Host PCB Layout

The host PCB must ensure the footprint meets the antenna specification. An example of the PCB layout shows the antenna footprint. The antenna uses solder mask defined pads.

Example host layout



Below the footprint is shown again but without the solder mask. Pin 1 feed must be connected to GND as shown here.



## 13.0 Reference Board

The reference board has been designed for evaluating the SR4G013, and includes an SMA female connector.

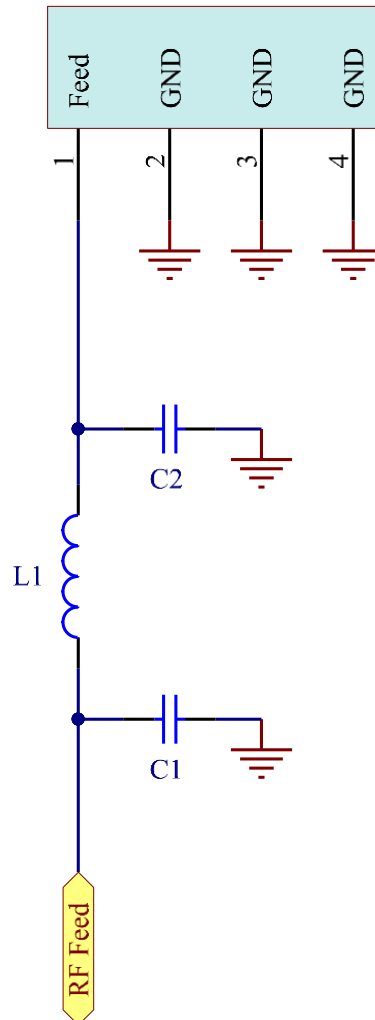
SR4G013-U1 Evaluation Board



To order a reference board please see [www.antenova.com](http://www.antenova.com)

## 13.1 Reference Board Matching Circuit

The reference board has been designed in order to evaluate the SR4G013 and is fitted with an SMA female connector.



Designator	Type	Value	Description
C1	Capacitor	1.8pF	Murata GJM15 series
C2	Capacitor	Not fitted	Not fitted
L1	Inductor	1.8nH	Murata LQG15HN series

## 14. Soldering

This antenna is suitable for lead free soldering.

The reflow profile should be adjusted to suit the device, oven and solder paste, while observing the following conditions:

- The maximum temperature should not exceed 240 °C
- However, for lead free soldering, a maximum temperature of 255 °C for no more than 20 seconds is permitted.
- The antenna should not be exposed to temperatures exceeding 120 °C more than 3 times during the soldering process.

## 15. Hazardous Material Regulation Conformance

The antenna has been tested to conform to RoHS requirements. A certificate of conformance is available from Antenova's website.

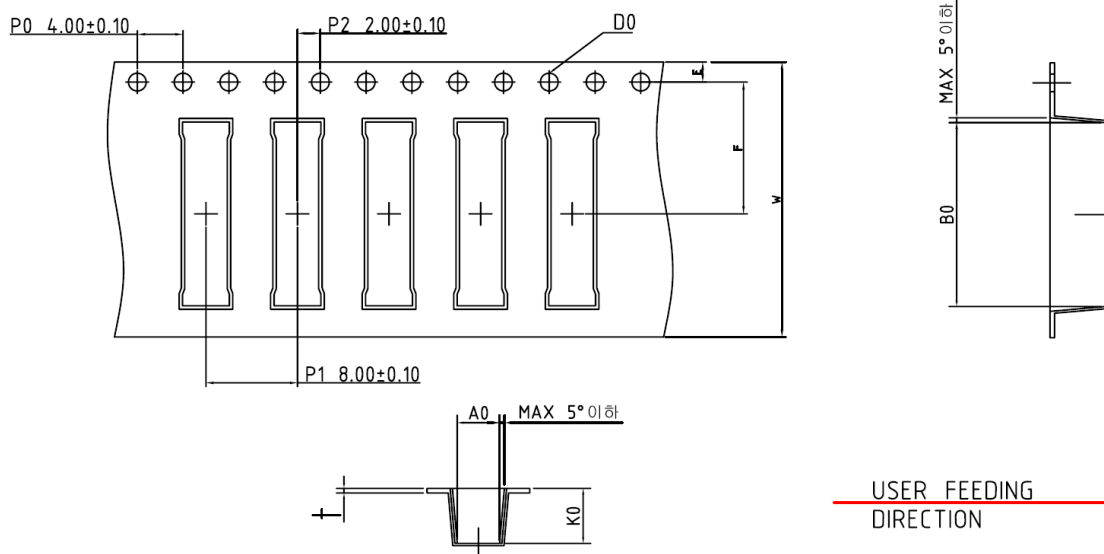
## 16. Packaging

### 16.1 Optimal Storage Conditions

Temperature	-10°C to 40°C
Humidity	Less than 75% RH
Shelf life	24 Months
Storage place	Away from corrosive gas and direct sunlight
Packaging	Reels should be stored in unopened sealed manufacturer's plastic packaging.

**Note: Storage of open reels of antennas is not recommended due to possible oxidization of pads on antennas. If short term storage is necessary, then it is highly recommended that the bag containing the antenna reel is re-sealed and stored in like storage conditions as in above table.**

## 16.2 Tape Characteristics



Do	Ao	Bo	P0	P1	P2
1.50 +0.1	3.70 ± 0.1	16.05 ± 0.1	4.00 ± 0.1	8.00 ± 0.1	2.00 ± 0.1

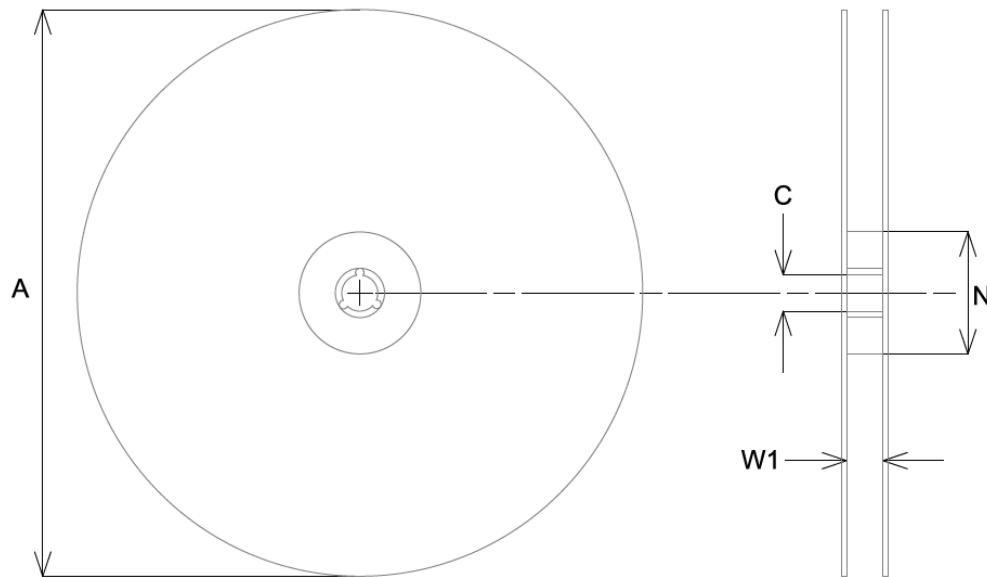
E	F	W	K0
1.75 ± 0.1	11.50 ± 0.1	24.00 ± 0.3	4.80 ± 0.1

Dimensions in mm

### Notes:

- Sprocket hole pitch cumulative tolerance =  $\pm 0.2$  per 10
- Chamber not to exceed 1mm in 100mm
- Ao and Bo measured on a plane 0.1mm above the bottom of the pocket.
- K0 measured from a plane on the inside bottom of the pocket to the top surface of the carrier.

### 16.3 Reel Dimensions

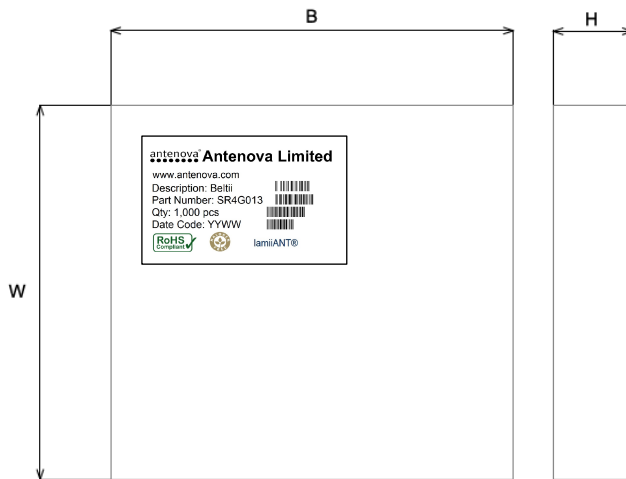


A	C	N	W1
330.0 ± 2.0	14.0 ± 0.5	80.0	32.0

All dimensions in mm

Quantity	Leading Space	Trailing Space
1000 pcs / reel	16 blank holders	24 blank holders

## 16.4 Box Dimensions



Width (W)	Breadth (B)	Thickness (H)
203mm	188mm	40mm

## 16.5 Bag Properties

Reels are supplied in protective plastic packaging.

## 16.6 Reel Label Information

