



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!



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## 1 Features

- Designed for 2.4 GHz applications: Bluetooth® (BT, BT EDR, BT LE), Wi-Fi® (802.11a/b/g/n), ZigBee®, etc.
- Ceramic chip antenna
- Low profile design for use with no ground beneath the antenna
- High efficiency
- Light weight
- Intended for SMD mounting
- Supplied in tape on reel

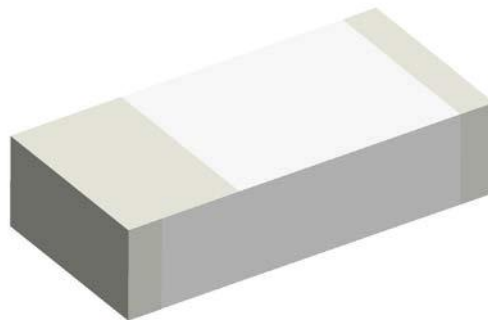
## 2 Description

Indica is intended for use with all 2.4 GHz applications. The antenna uses a ground plane in order to radiate efficiently, but this ground plane must not extend underneath the antenna itself.

Copper tracks on the host PCB are required for the antenna to work properly. For correct integration, it is important to follow very closely the footprint drawings, preferably importing the electronic files (dxf or Gerber) into the PCB layout CAD.

## 3 Applications

- Mobile phones
- PDAs
- PNDs
- Headsets
- PMPs / MP3s
- Electronic Shelf Labels
- PC-Cards
- Medical devices
- Sensors
- Laptops



## 4 Part number

**Indica: A10381**



## 5 General data

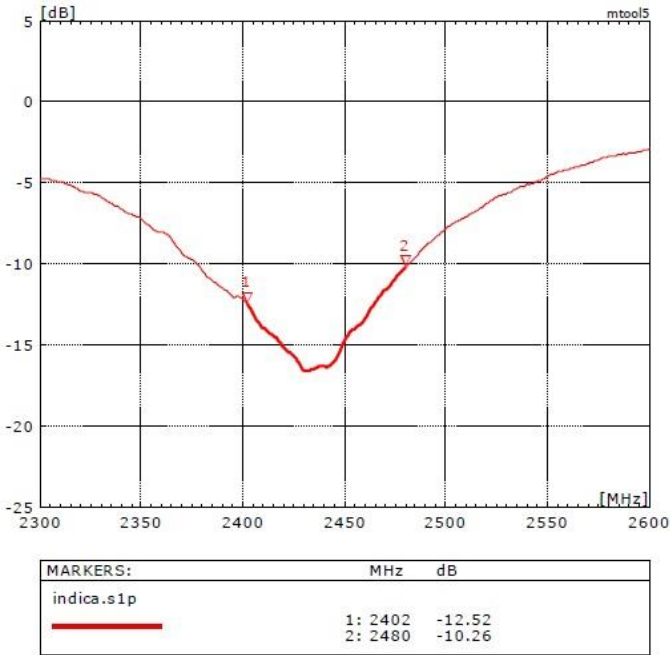
<b>Product name</b>	Indica 2.4GHz Chip Antenna
<b>Part Number</b>	A10381
<b>Frequency</b>	2.4 – 2.5 GHz
<b>Polarization</b>	Linear
<b>Operating temperature</b>	-40 °C to +85 °C
<b>Impedance with matching</b>	50 Ω
<b>Weight</b>	<0.016g
<b>Antenna type</b>	SMD
<b>Dimensions</b>	3.3 x 1.6 x 0.65 [mm]
<b>Footprint Size</b>	3.3 x 1.6 [mm]

## 6 Electrical characteristics

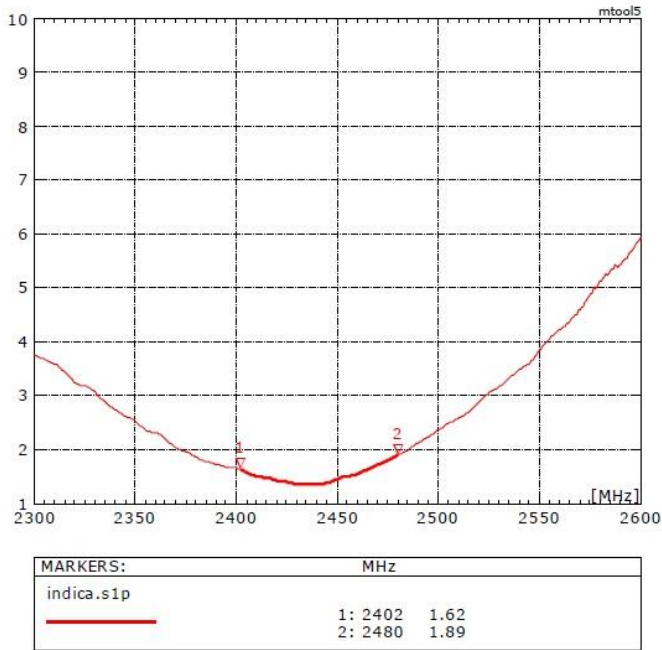
	Typical performance	Conditions
<b>Peak gain</b>	1.5 dBi	All data measured on Antenova's reference board, part number A10381-U1  Data given for the 2.402 – 2.480 GHz frequency range
<b>Average gain</b>	-1.5 dBi	
<b>Average efficiency</b>	70%	
<b>Maximum Return Loss</b>	-10 dB	
<b>Maximum VSWR</b>	1.6:1	

# 7 Electrical performance

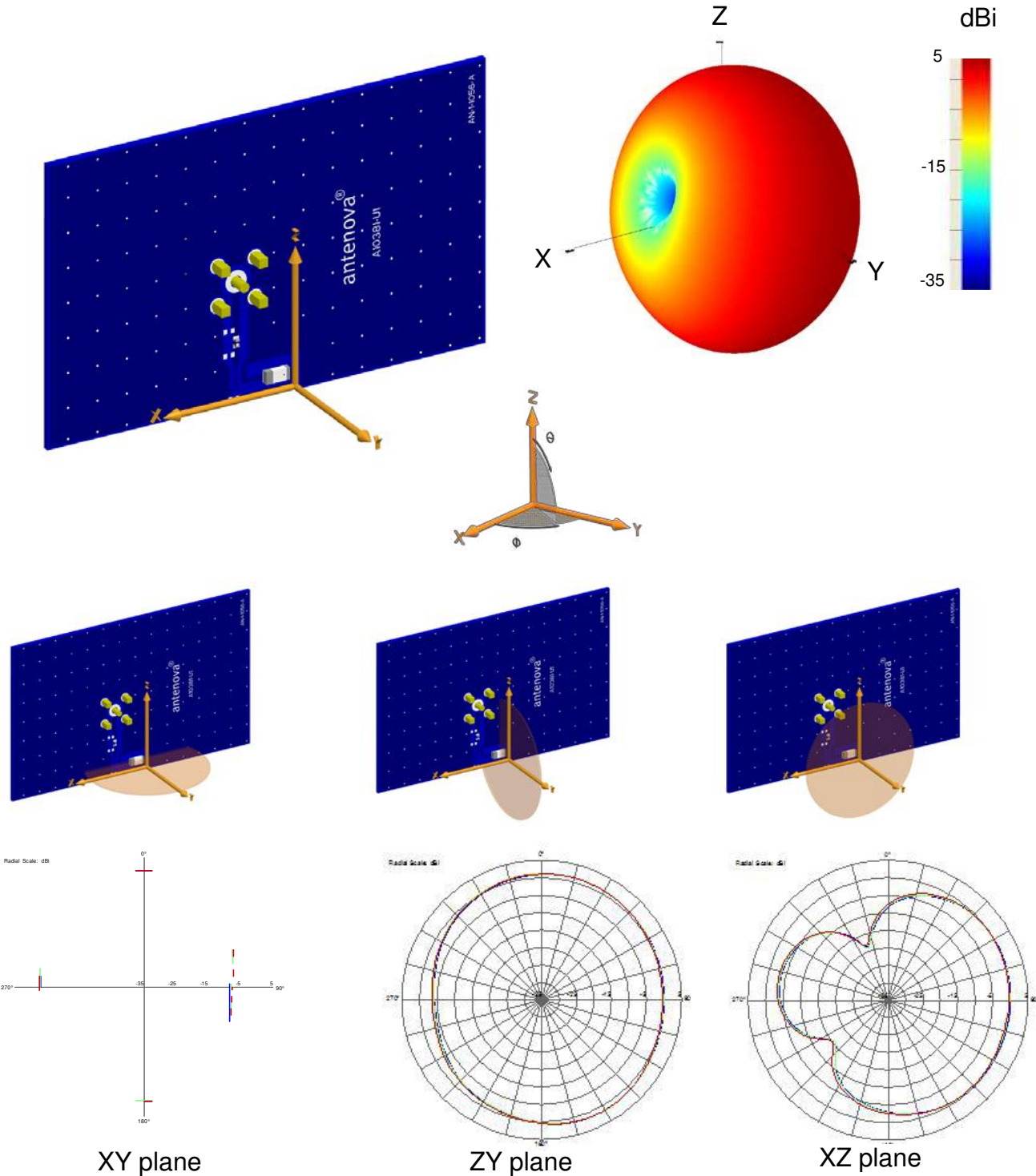
## 7-1 Return Loss



## 7-2 VSWR

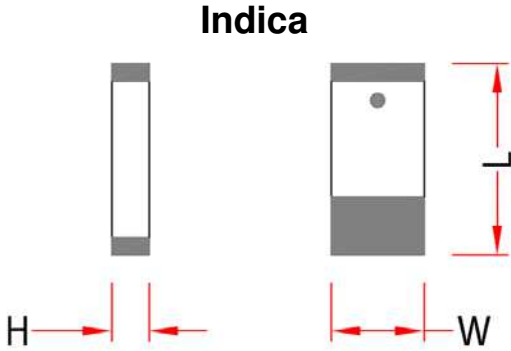


### 7-3 Antenna patterns



Patterns show combined polarisations  
measured on reference board A10381-U1

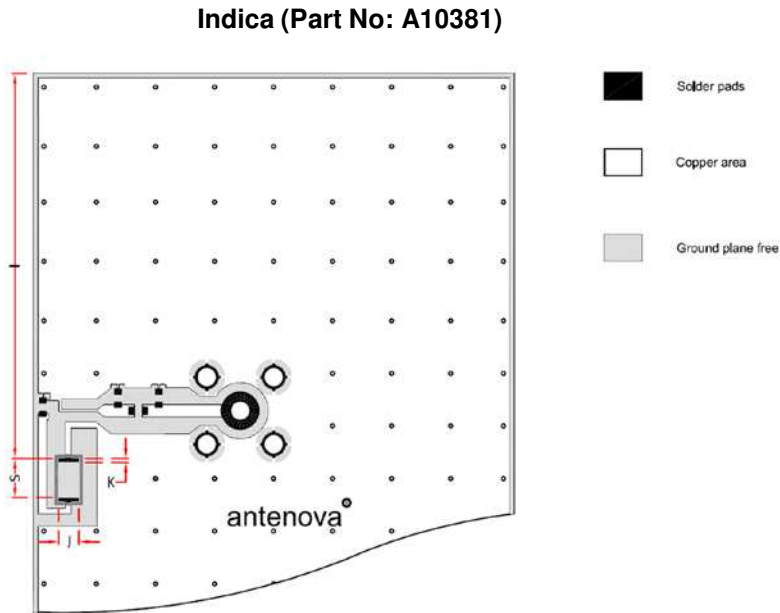
### 8 Antenna dimensions



L	W	H
Length	Width	Height
3.3.0 ± 0.1	1.6 ± 0.15	0.65 ± 0.1

Dimensions in mm

### 9 Antenna footprint



\* CAD files of the antenna footprint are available to download from [www.antenna-m2m.com](http://www.antenna-m2m.com)

I	S	K	J
29.27 ± 0.1	3 ± 0.1	0.3 ± 0.1	1.6 ± 0.1

Dimensions in mm

## 10 Electrical interface

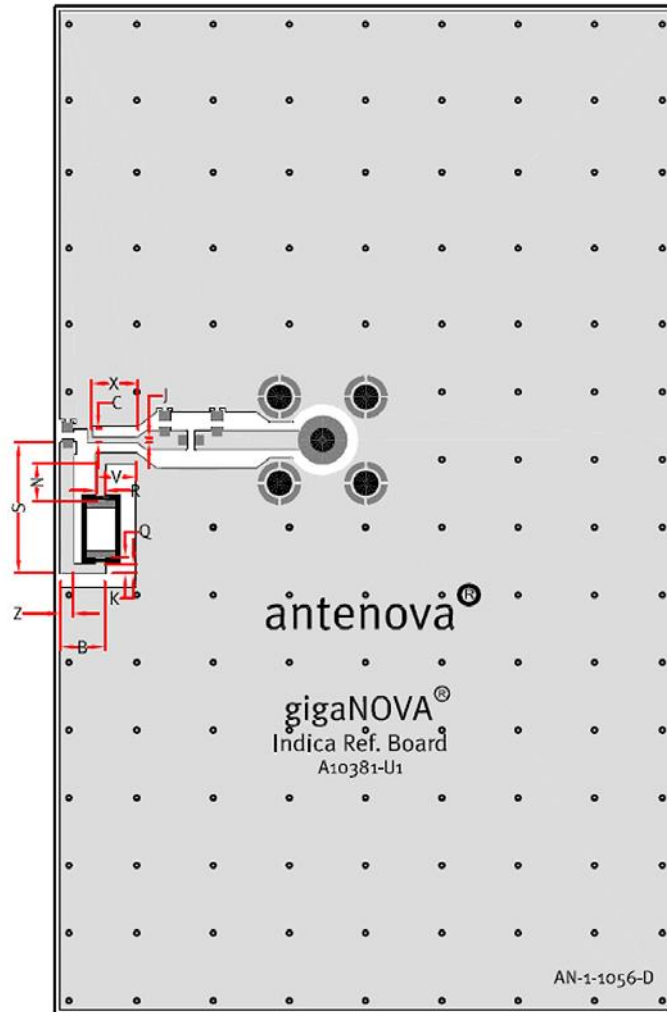
### 10-1 Transmission lines

- All transmission lines should be designed to have a characteristic impedance of  $50 \Omega$
- 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  $50 \Omega$

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 track so the characteristic impedance of the coplanar transmission line is  $50 \Omega$ .

## 10-2 Copper Track

The copper tracks etched on the PCB form an integral part of the antenna, and any deviation from the advised layout shown below will result in a loss in the antenna performance. It is best that the copper track layout is imported from CAD files which are available from Antenova M2M on request. Please contact [sales@antenova-m2m.com](mailto:sales@antenova-m2m.com) for further details.



Z	B	K	Q	S	N	V	R	X	C	J
0.75 ± 0.1	2.6 ± 0.1	0.5 ± 0.1	0.95 ± 0.1	7.7 ± 0.1	2.25 ± 0.1	2.40 ± 0.1	0.5 ± 0.1	2.73 ± 0.1	0.85 ± 0.1	0.25 ± 0.1

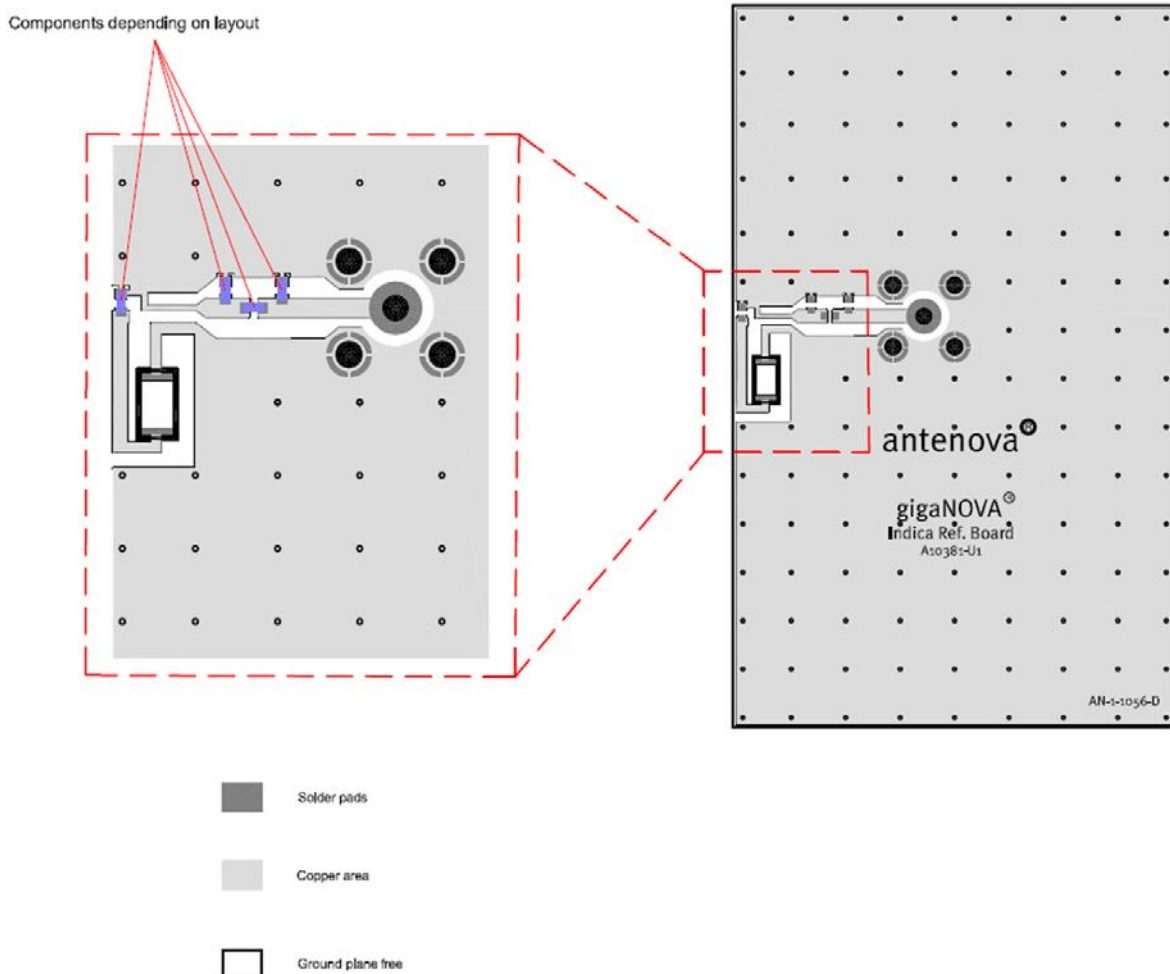
Dimensions in mm



### 10-3 Matching circuit

The antenna requires a matching circuit that must be optimized for each customer's product. The matching circuit will require up to three components (0402 size), and an additional tuning element is also required (0402 size) the following pad layout should be designed into the device so the correct circuit can be installed.

Note: The tuning element by default is a 0402 zero ohm resistor

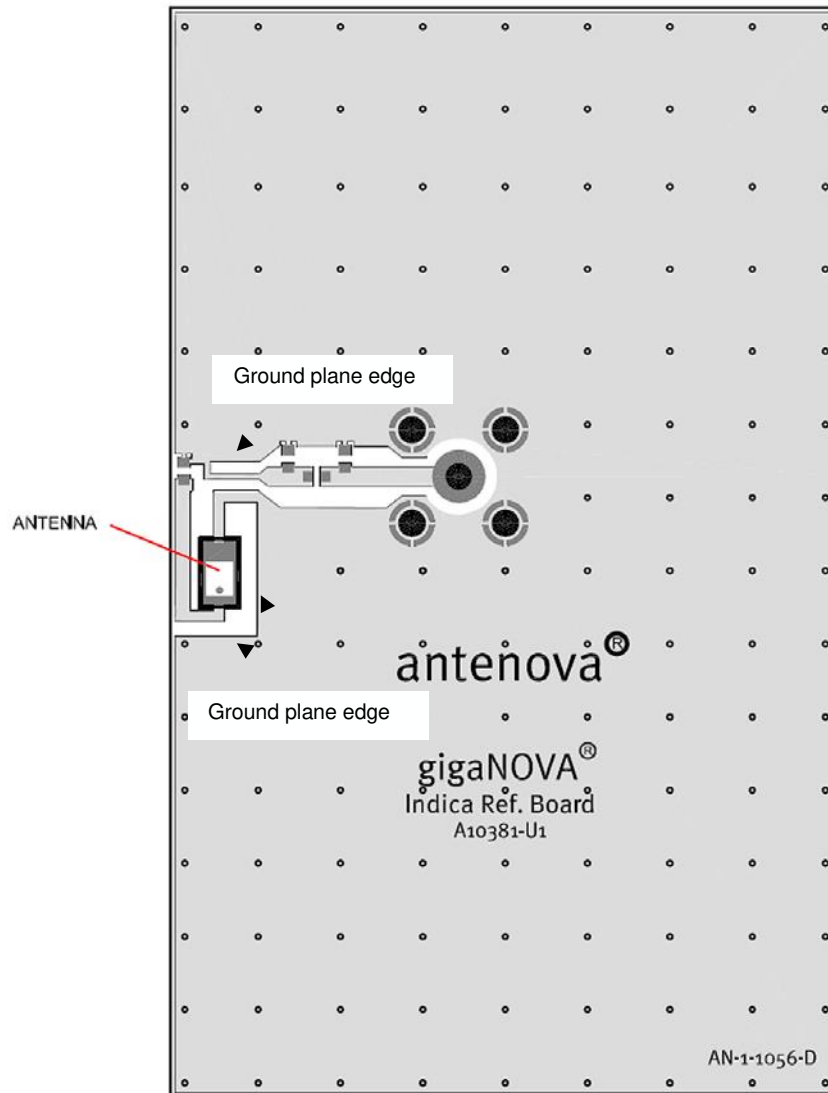


In addition to the matching circuit, a separate DC blocking capacitor will also be required between the radio and the antenna matching circuit.

**Note: The component values for the matching circuit will vary depending on the size of the PCB and surrounding components.** The impedance of the antenna should be measured before selecting suitable matching components. Antenva M2M offers this service on request. Contact [sales@antenva-m2m.com](mailto:sales@antenva-m2m.com) for further information.

## 10-4 Antenna placement

Antenova M2M strongly recommends placing the antenna near the edge of the board. Maximum antenna performance is achieved by placing the antenna towards the middle of the PCB, as shown in the diagram below. Other configurations are possible but recommend contacting Antenova for advice on any other antenna placement options.

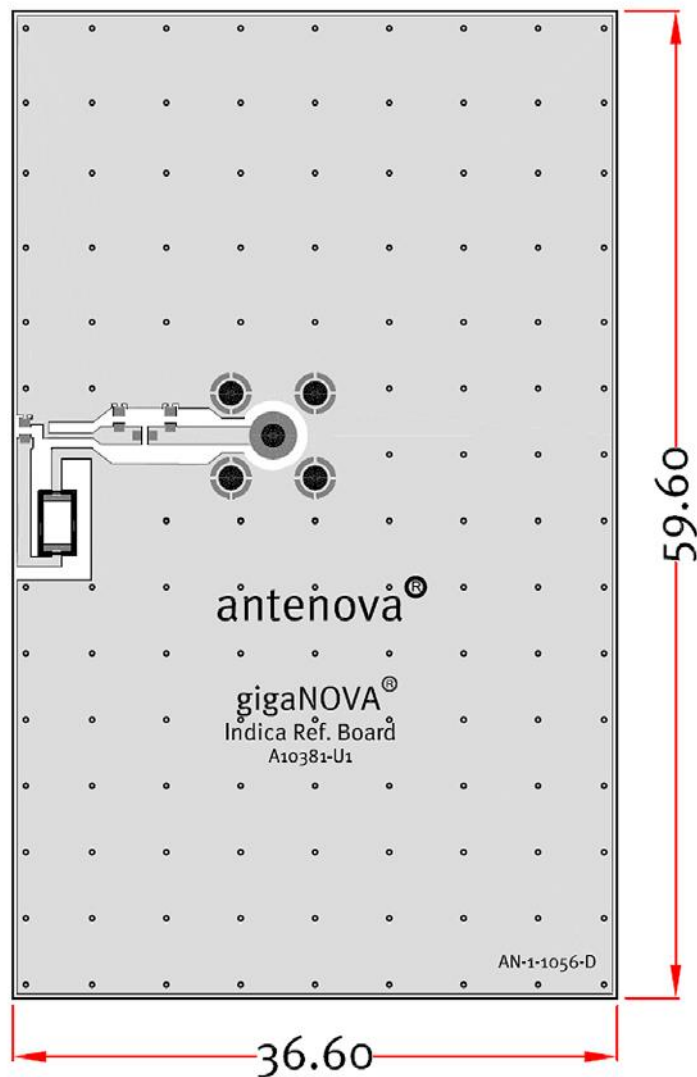


Additional electronic components near the antenna should be at a distance of at least 2 mm away from the ground plane edges. The antenna should also be clear of ground from both the top surface of the antenna and below the antenna.

## 10-5 Reference board

The reference board has been designed for evaluation purposes of Indica 2.4 GHz and it includes a SMA female connector

### Indica A10381-U1 Reference Board



Dimensions in mm

To order a reference board contact [sales@antenna-m2m.com](mailto:sales@antenna-m2m.com)

## 11 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.

## 12 Hazardous material regulation conformance

The antenna has been tested to conform to RoHS requirements. A certificate of conformance is available from Antenova M2M's website.

## 13 Packaging

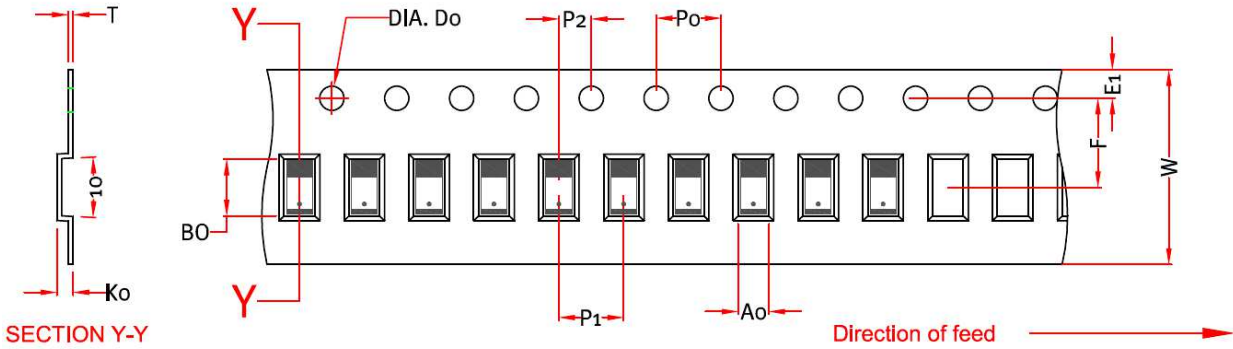
### 13-1 Optimal storage conditions for packaged reels

<b>Temperature</b>	-10°C to 40°C
<b>Humidity</b>	Less than 75% RH
<b>Shelf Life</b>	18 Months
<b>Storage place</b>	Away from corrosive gas and direct sunlight
<b>Packaging</b>	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.**

### 13-2 Tape characteristics

#### Indica

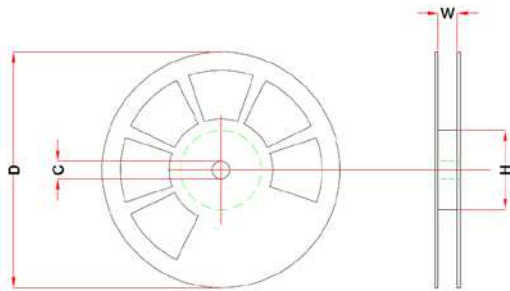


W	F	E1	P0	P1	P2	A0	B0	K0	T	D0
12 ± 0.3	5.5 ± 0.05	1.75 ± 0.1	4 ± 0.1	4 ± 0.1	2 ± 0.05	1.9 ± 0.1	3.5 ± 0.1	1.0 ± 0.1	0.3 ± 0.05	1.5 ± 0.1

Dimensions in mm

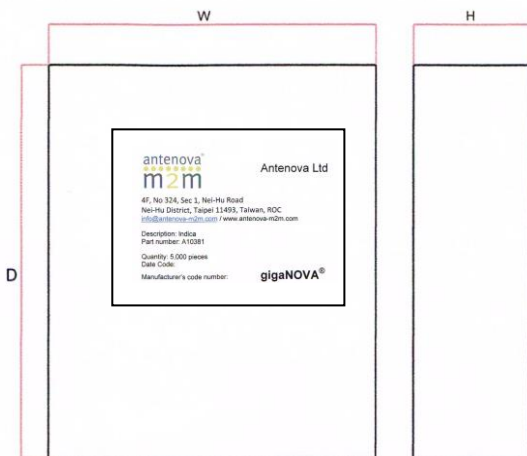
Quantity	Leading Space	Trailing Space
5000 pcs / reel	16 blank antenna holders	24 blank antenna holders

### 13-3 Reel dimensions



Width (W)	Reel Diameter (D)	Hub Diameter (H)	Shaft Diameter (C)
11.5 ±2.0 mm	178 ±2.0 mm	60 ±1.0 mm	13.5 ±1.0 mm

### 13-4 Box dimensions



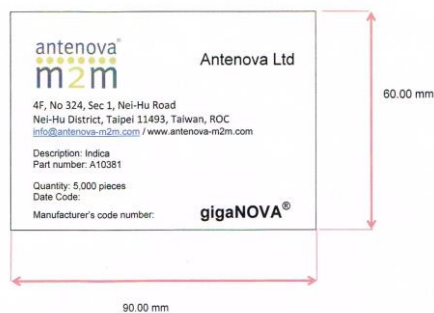
Width W	Breadth B	Thickness H
340 mm	350 mm	47 mm

### 13-5 Bag properties

Reels are supplied in protective plastic packaging.

### 13-6 Reel label information

#### Indica





**[www.antenova-m2m.com](http://www.antenova-m2m.com)**

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Certificate No: 4598

Antennas for Wireless M2M Applications