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6 x 4 mm

RoHS/RoHS II Compliant

MSL Level = 1

## Features

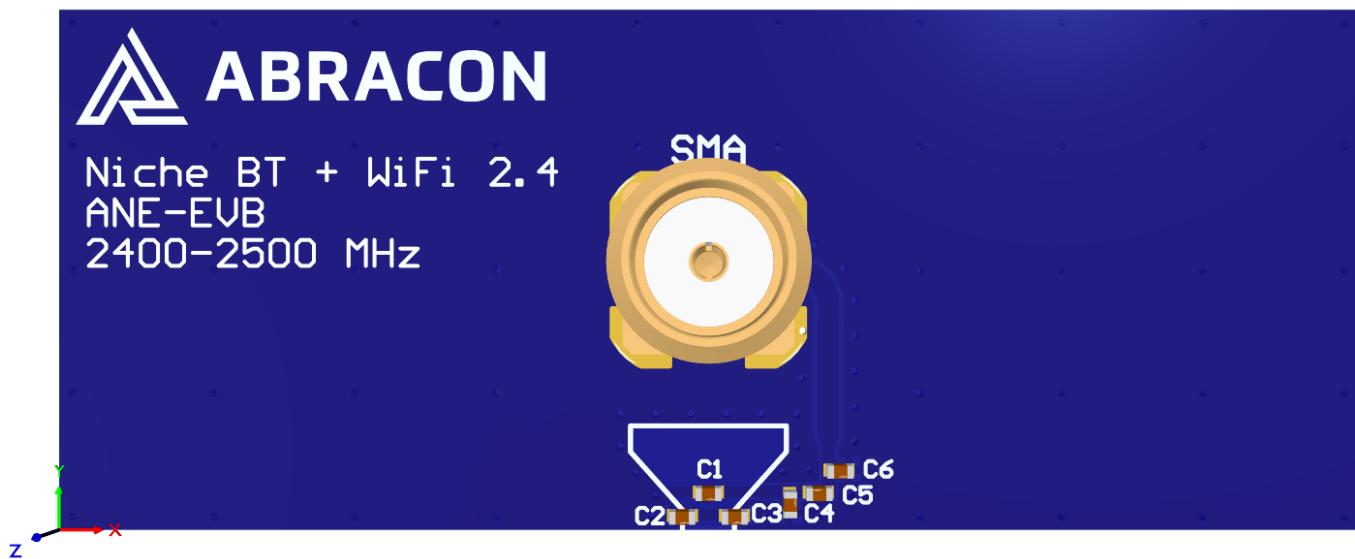
- Very low cost
- Patented Technology (License Agreement)
- Low profile
- Highly efficient  $> -0.9$  dB (81%)
- Low Return Loss:  $< -10.6$  dB
- Integration : Along PCB Edge

## Applications

- 2.4 GHz - WiFi 2.4/BT/BLE /ZigBee/ISM
- Suitable for potting
- IoT, M2M
- Wearables
- Wireless Remote Control
- Personal Area Networks (PAN)
- Industrial/Commercial equipment

## Product Image

The Niche antenna (triangular) is implemented on an evaluation board in the image below.



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## Electrical Specification

Parameter	Specification	Unit
Operating Frequency	2400 - 2500	MHz
Return Loss	< -10.6	dB
Polarization	Linear	-
Peak Gain	3.4	dBi
Efficiency	> -0.9 (81)	dB (%)
Impedance	50	$\Omega$

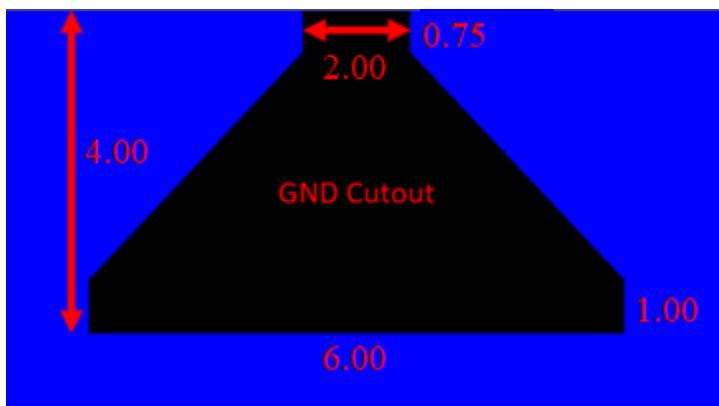
*Note:* All measurements were conducted on the evaluation board in free space. Performance will vary depending on the ground plane, application, and environment.

## Mechanical Specification

Parameter	Specification
Antenna Dimension	6 x 4 mm
Evaluation board Dimension	50 x 20 mm
Mounting Type	N/A: The antenna is implemented in the customer layout design under license agreement

## Product Dimensions

The triangular Niche antenna cutout is 6 by 4 mm in size, see dimensions in millimeters below.



*Image not to scale.*

## Licensing Information

The Niche concept is an Abracon patented technology that is sold through licensing. License agreement information, terms and conditions, and design advice are provided upon request. Please send all requests to [niche@abracon.com](mailto:niche@abracon.com)



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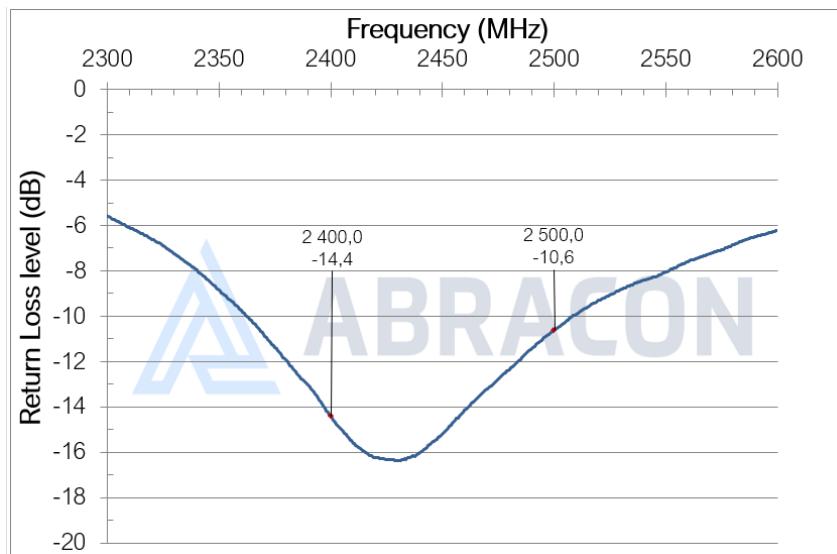
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## Measurement Setup

The antenna measurements were all done in free space, with the Niche antenna implemented on its evaluation board that has a PCB size of 50 by 20 (X by Y) mm:



## Reflection Characteristics – Return Loss





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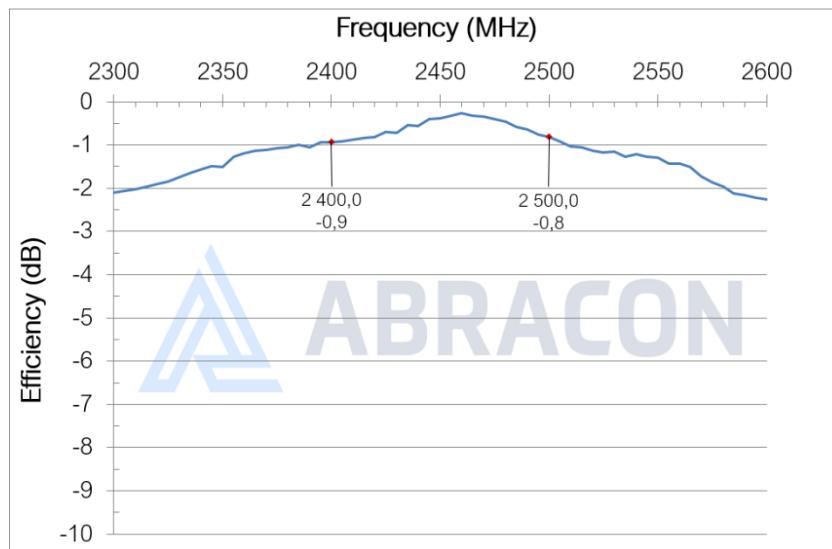


6 x 4 mm

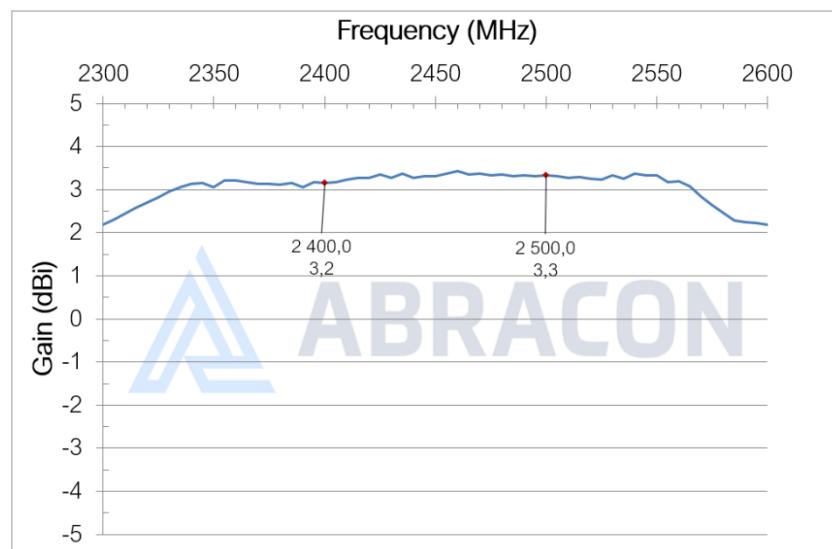
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MSL Level = 1

## Radiation Characteristics – Total Efficiency



## Radiation Characteristics – Maximum Gain





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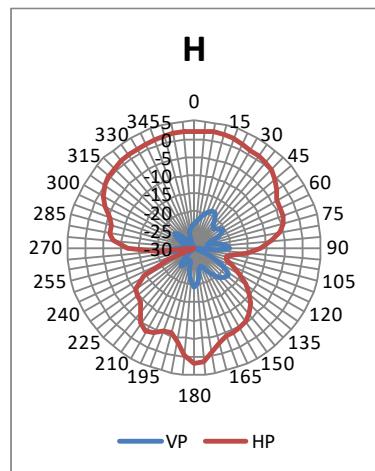
6 x 4 mm

RoHS/RoHS II Compliant

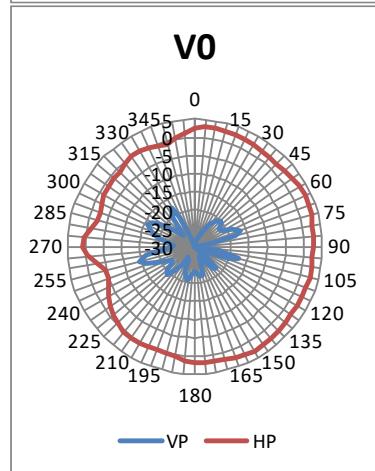
MSL Level = 1

## Radiation Characteristics – 2D Pattern @ 2450 MHz

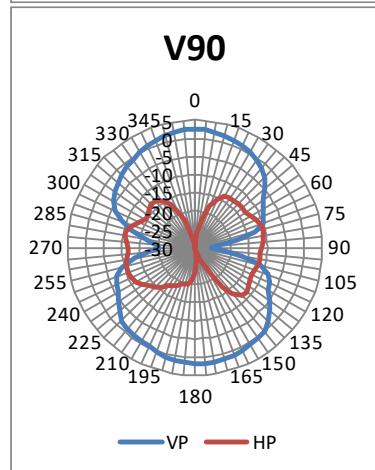
XY-plane:



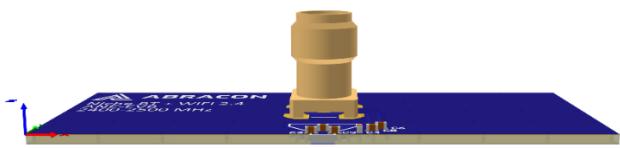
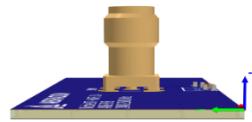
YZ-plane:



XZ-plane:



VP: Vertical Polarization  
HP: Horizontal Polarization



Unit: dBi



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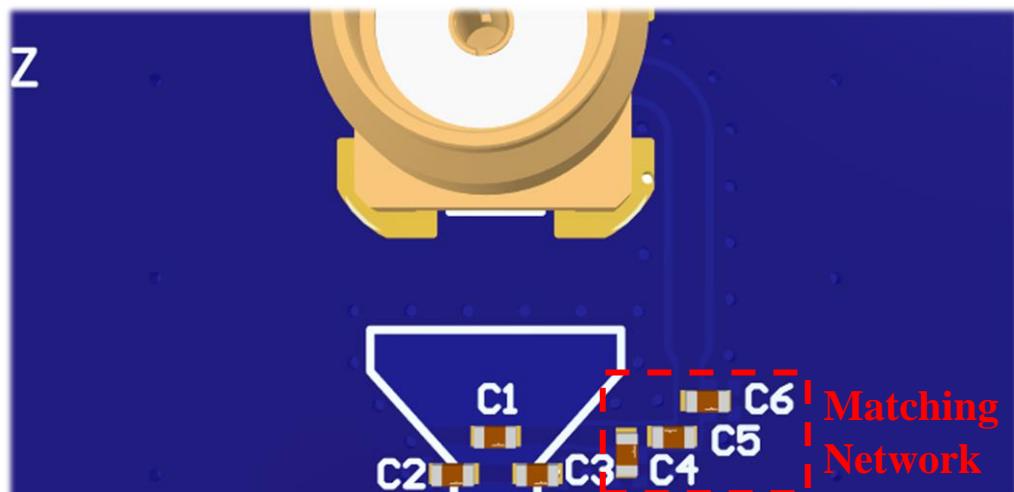
6 x 4 mm

RoHS/RoHS II Compliant

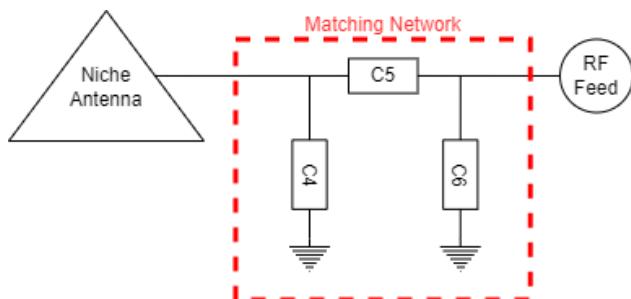
MSL Level = 1

## Evaluation Board Outline & Matching Circuit

The evaluation board is developed to showcase the performance of the Niche antenna on a typical PCB and to simplify antenna testing and evaluation. It has a size of 50 x 20 mm and includes an SMA connector. The performance will vary with different PCB sizes. Abracon can offer support to optimize the antenna for specific applications.



The evaluation board has a matching circuit implemented next to the antenna to enable optimization possibilities for the user. The component footprints are sized for 0402 (1005 metric) SMD components. Components C1-C3 are part of the antenna and will be disclosed upon design-in.



The standard tuning for the evaluation board is the following (can be replaced by equivalent):

C4 = Not Mounted

C5 = Zero Ohm (KOA Speer RK73Z1ETTP)

C6 = Not Mounted

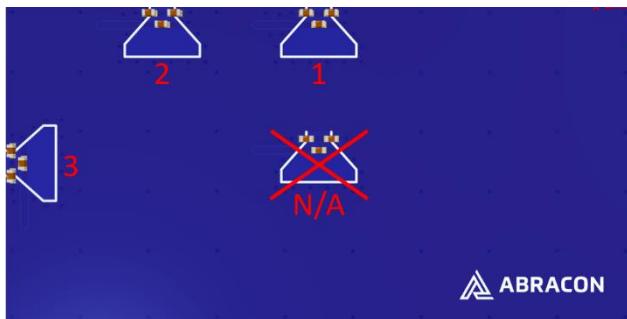
However, it is common that the resonant frequency will shift during implementation in an arbitrary device. Therefore, this matching may be changed with other values/components/brands for compensation of such effects. This is further described in the General Implementation Guidelines section below.



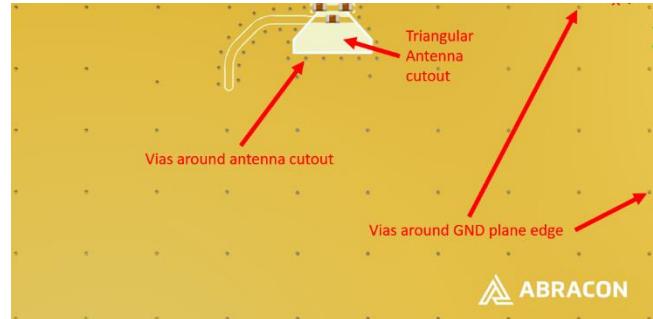
## General Implementation Guidelines for the Niche antenna

The antenna can be positioned in different ways, although there are some positions which are more beneficial. The left picture shows a typical PCB with examples on different antenna positions. The optimal position is option 1. Options 2 and 3 are also possible. The antenna must be placed along the PCB edge, i.e., it cannot be placed in the middle.

Antenna Positions:



Triangular antenna cutout & via-structure:



The triangular copper cutout needs to go through all the layers in the PCB stackup, meaning that there cannot be copper on any layer in this triangular area. It is also recommended to have a good via-structure around the antenna and the edge of the ground plane, see the right image above.

If other electrical components are positioned in the surrounding area of the antenna cutout, some impact on the antenna tuning and radiated performance may be expected. It is recommended that such components are distributed below a topographical slope that starts on PCB level at the antenna cutout, and slowly increases the height. In other words, small electrical components may be mounted close to the antenna if they do not enter the triangular copper cutout. This is a space-efficient solution which usually has low influence on the performance

It shall also be highlighted that plastic and metal parts in the near proximity of antennas may influence the antenna tuning and/or performance. This aspect should be noted as a general guideline for all antennas. The effects are difficult to estimate without detailed information, but it is common that a plastic housing above the antenna shifts the resonant frequency down. It is recommended to measure the antenna in the actual device after implementation and to implement a matching network on the antenna feed to adjust for the potential frequency shift.

The Niche antenna shows great performance when potted compared to other antenna solutions and has also shown good performance in proximity of metal and other harsh antenna environments.

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