

# 2.4/5GHz OnBoard WLAN SMD - Antenna



**PRO-OB-536**

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14.20 x 6.60 x 2.50 mm  
RoHS/RoHS II Compliant  
MSL Level = 1

## Features

- Compact
- Profile of 2.5 mm
- Mixed Linear Polarization
- Peak Gain of 2.7 dBi
- Efficiency > 44%
- Surface Mount
- Durable-Shelf life of up to 10 years

## Applications

- 2.4/5 GHz
  - Wi-Fi/BT/BLE/ZigBee/ISM
- IoT, M2M
- Telemetry
- Wireless Remote Control
- Personal Area Networks (PAN)
- Industrial/Commercial Equipment

## Product Image



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## Electrical Specification

Parameter	Specification		Unit
Operating Frequency	2400 - 2500	5150 - 5850	MHz
Center Frequency	2450	5500	
Return Loss	< -6.2	< -3.2	dB
Polarization	Mixed Linear		-
Peak Gain	1.7	2.7	dBi
Efficiency	> 51	> 44	%
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	14.20 x 6.60 x 2.50 mm
Evaluation board Dimension	47 x 17 mm
Mounting Type	Surface Mount

## Environmental Specification

Parameter	Specification
Operating Temperature	-40°C to +125°C
Storage Temperature	
Maximum Temperature	
RoHS Compliance	Yes Compliant with EU directive 2011/65/EU and 2015/863
Shelf life	10 years
MSL	Level 1, unlimited
Mechanical resistance	Immunity to vibrations IEC/EN 60068-2-6, Fc test Immunity to shock IEC/EN 60068-2-27, Ea test

*Note: •The product has been tested according to the standard IEC 60721-3-5 – Class 5M3 (road vehicles in areas without well-developed road systems, light-weighted vehicles, tracked vehicles and self-propelled machines).*



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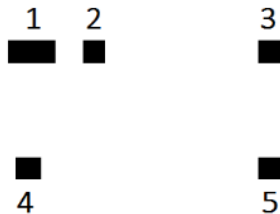
Check Inventory



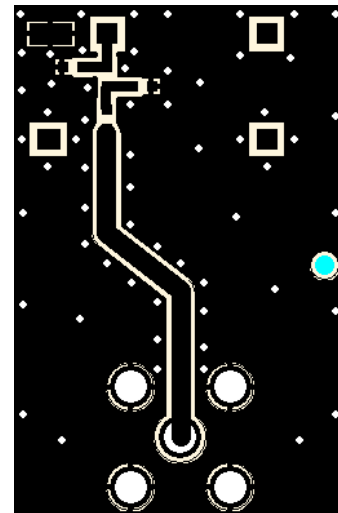
14.20 x 6.60 x 2.50 mm  
**RoHS/RoHS II Compliant**  
 MSL Level = 1

## PCB layout and antenna pin numbering

The antenna uses PIFA technology and should thus be mounted on a ground plane. If there are several layers in the PCB, there is an advantage to add vias for smooth interconnection of the ground areas to avoid splits in the ground plane. It is also important that there is a ground clearance around the NC pads and the RF feed pad, through all layers of the PCB. It is recommended to implement a matching network to optimize the antenna impedance in your application. The components can be positioned under the antenna. See recommendations in the figures below.

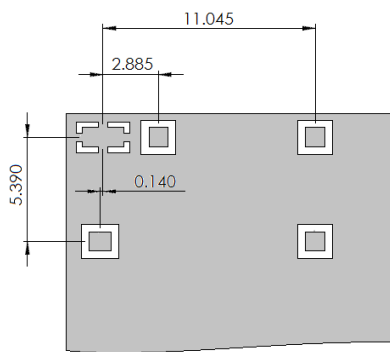


- 1 = GND
- 2 = Feed
- 3 = NC
- 4 = NC
- 5 = NC

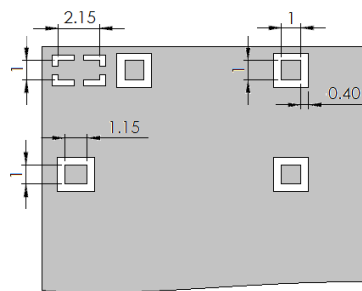


*Pin configuration*

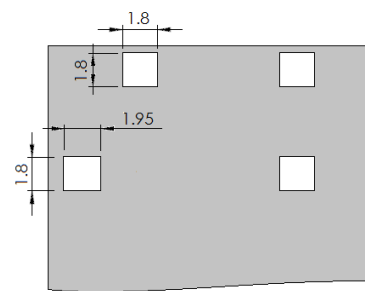
*PCB Layout (from evaluation board)*



*Distance between pads*



*Pad dimensions, size of pads 2, 3 & 5 are identical*



*Clearance through all layers. Size of pads 2, 3 & 5 are identical*

*Unit: mm*



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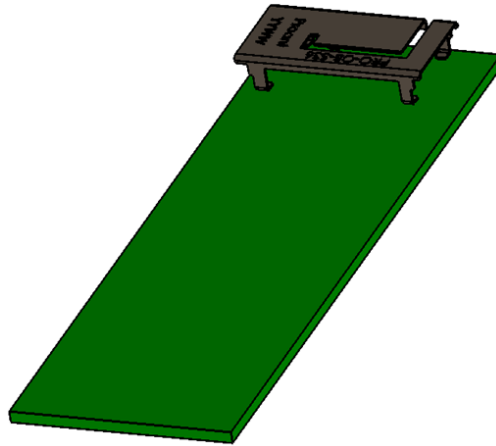
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14.20 x 6.60 x 2.50 mm  
RoHS/RoHS II Compliant  
MSL Level = 1

## Measurement Setup

The antenna measurements were all done in free space with the OnBoard WLAN SMD evaluation board (PRO-EB-550) that has a PCB size of 47 x 17 mm.



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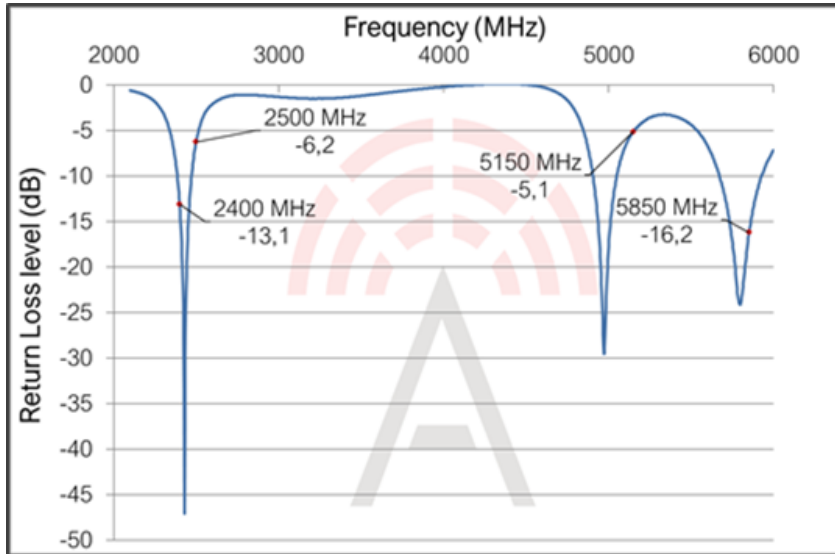


Check Inventory

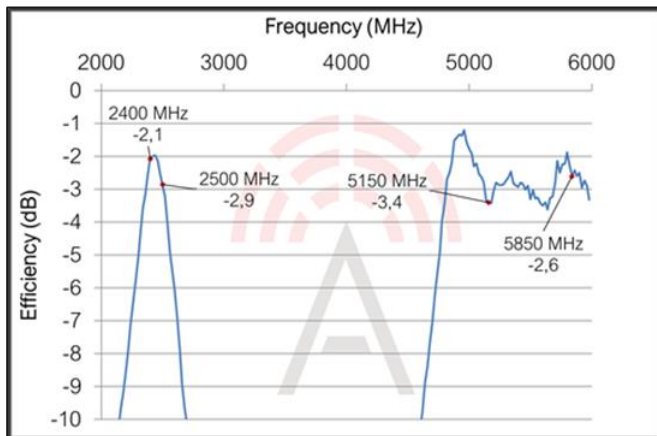


14.20 x 6.60 x 2.50 mm  
RoHS/RoHS II Compliant  
MSL Level = 1

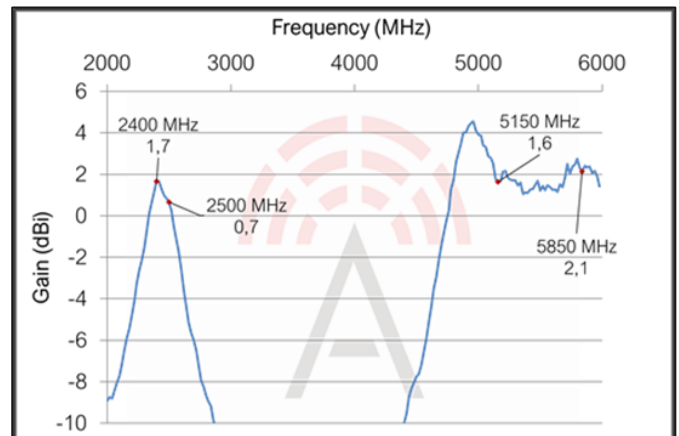
## Reflection Characteristics – Return Loss



## Total Radiation Efficiency



## Maximum Radiation Gain



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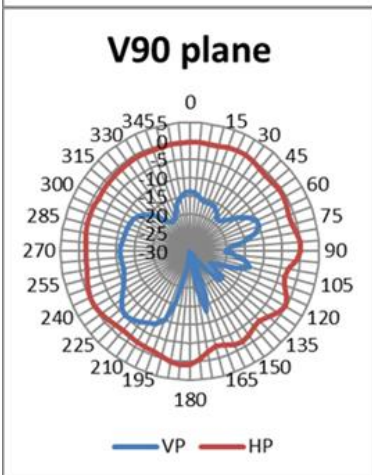
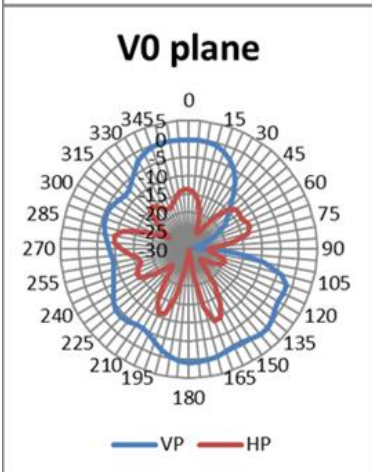
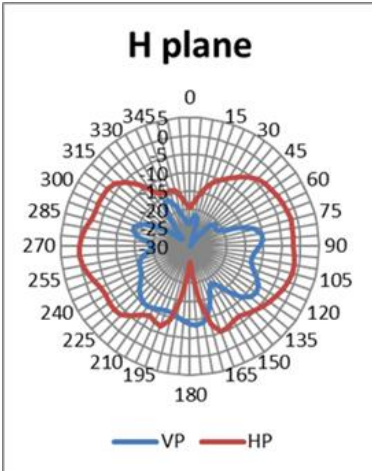


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14.20 x 6.60 x 2.50 mm  
RoHS/RoHS II Compliant  
MSL Level = 1

## Radiation Characteristics – 2D Pattern (2450 MHz)



VP: Vertical Polarization  
HP: Horizontal Polarization



Unit: dBi



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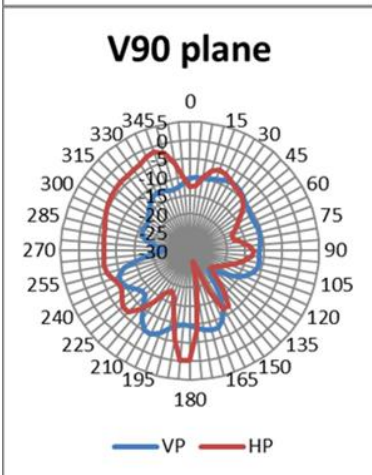
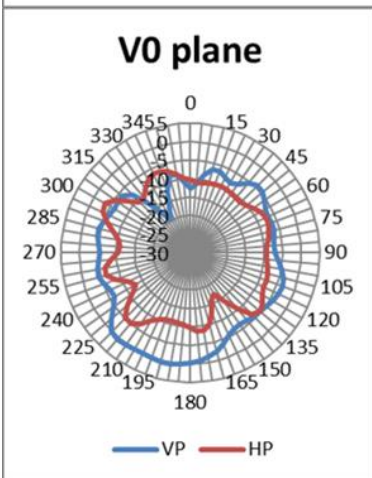
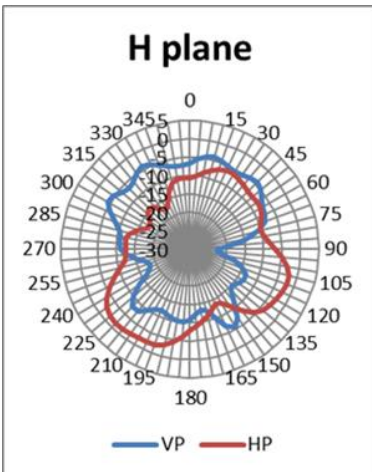


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14.20 x 6.60 x 2.50 mm  
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MSL Level = 1

## Radiation Characteristics – 2D Pattern (5150 MHz)



VP: Vertical Polarization  
HP: Horizontal Polarization



Unit: dBi



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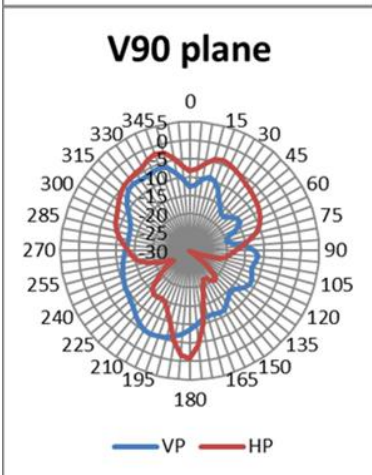
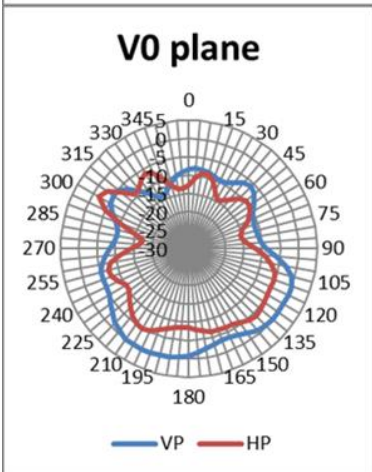
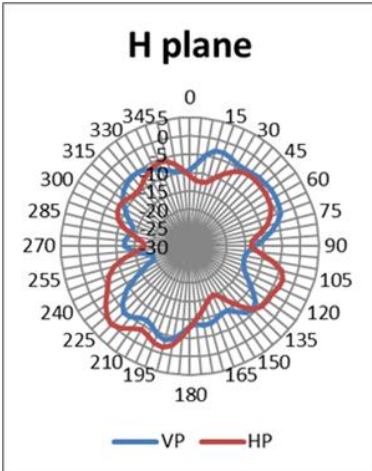


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14.20 x 6.60 x 2.50 mm  
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MSL Level = 1

## Radiation Characteristics – 2D Pattern (5850 MHz)



VP: Vertical Polarization  
HP: Horizontal Polarization



Unit: dBi



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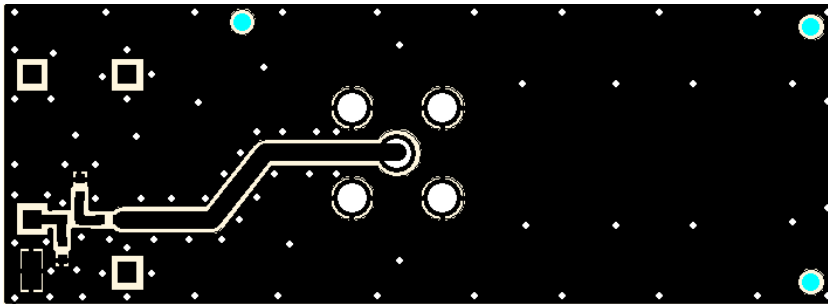
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MSL Level = 1

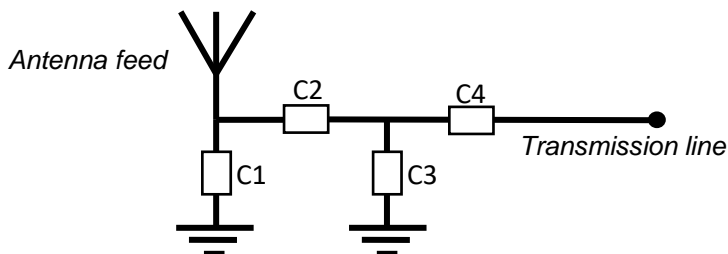
### Evaluation Board Outline & Matching Circuit

The evaluation board (PRO-EB-550) is developed to simplify antenna testing and evaluation. It has an arbitrary size of 47 x 17 mm and includes an SMA connector. The purpose is to give a reference design for an optimal antenna implementation. The evaluation board can also be used to test other implementations by cutting and soldering the PCB into any device.

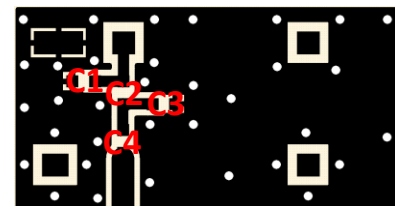


Evaluation board outline

The evaluation board has a matching circuit implemented next to the antenna. This is aimed to enable optimization possibilities for the user. The component positions are sized for 0402 (1005 metric) SMD components.



Matching circuit



Layout on evaluation board

The antenna needs a matching circuit to adjust the resonant frequency balance. When delivered, the evaluation board is tuned for optimum balance at the WLAN frequency bands using the following (can be replaced by equivalent):

C1 = 0.3 pF (Murata GJM1555C1HR30WB01D)

C3 = 0.4 pF (Murata GJM1555C1HR40WB01D)

C2 = 2.2 nH (Murata LQW15AN2N2C10D)

C4 = 1.5 pF (Murata GJM1555C1H1R5WB01D)

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.

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PRO-OB-536

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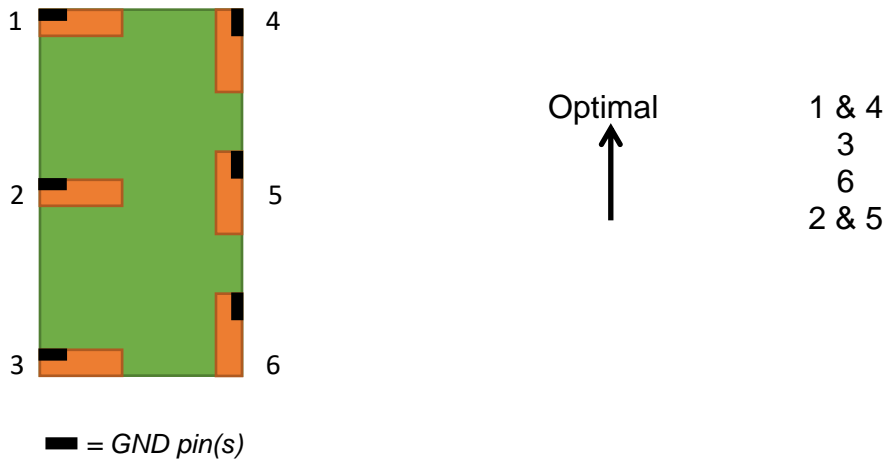
Check Inventory



14.20 x 6.60 x 2.50 mm  
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MSL Level = 1

## General Implementation Guidelines

The antenna can be positioned in different ways, although there are some positions which are more beneficial. Below picture shows a typical PCB with examples on different antenna positions. The optimal position is option 1 or 4.



The antenna should be aligned with the PCB edge if possible, preferably with the GND pin(s) close to a corner.

The antenna enables that small electrical components are mounted inside the antenna keep-out block. This is a space-efficient solution which has very little influence on the performance. It may have an impact on the antenna tuning, but is fully possible if there is limited space on the PCB.

Another general aspect on surface mounted antennas is regarding the PCB population. If other electrical components are positioned in the surrounding area of the antenna, 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 keep-out block, and slowly increases the height.

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.

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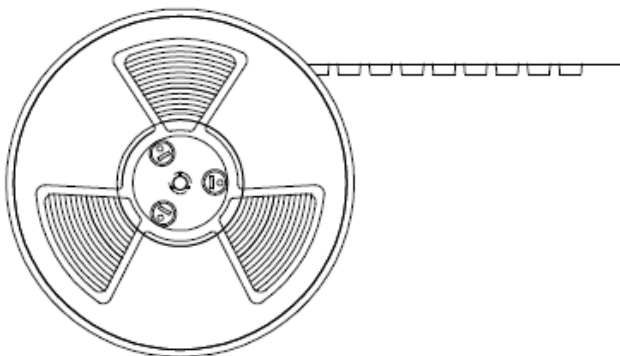
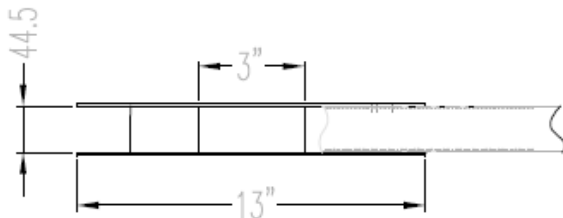
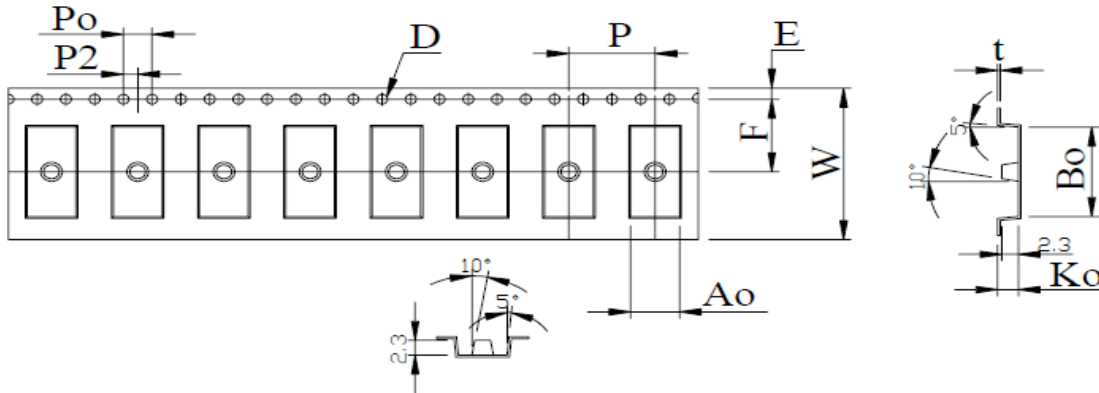
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## Packaging

The antenna is delivered on tape and reel according to following specifications. The quantity per 13" reel is 1000 pcs.



ITEM	SPEC
W	24.0 <sup>+0.30</sup> <sub>-0.30</sub>
Ao	6.80 <sup>+0.10</sup> <sub>-0.10</sub>
Bo	14.2 <sup>+0.10</sup> <sub>-0.10</sub>
Ko	2.90 <sup>+0.10</sup> <sub>-0.10</sub>
P	12.0 <sup>+0.10</sup> <sub>-0.10</sub>
F	11.5 <sup>+0.10</sup> <sub>-0.10</sub>
E	1.75 <sup>+0.10</sup> <sub>-0.10</sub>
D	1.50 <sup>+0.10</sup> <sub>-0.00</sub>
D1	0.00 <sup>+0.10</sup> <sub>-0.10</sub>
Po	4.00 <sup>+0.10</sup> <sub>-0.10</sub>
P2	2.00 <sup>+0.10</sup> <sub>-0.10</sub>
t	0.35 <sup>+0.05</sup> <sub>-0.05</sub>

Unit: mm (unless otherwise noted)



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**RoHS/RoHS II Compliant**  
 MSL Level = 1

## Part Marking

The top marking of the antenna is arranged according to the following illustration.

Abracon

PRO-OB-536

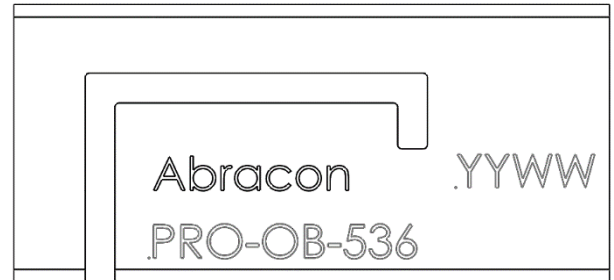
Part number

YYWW

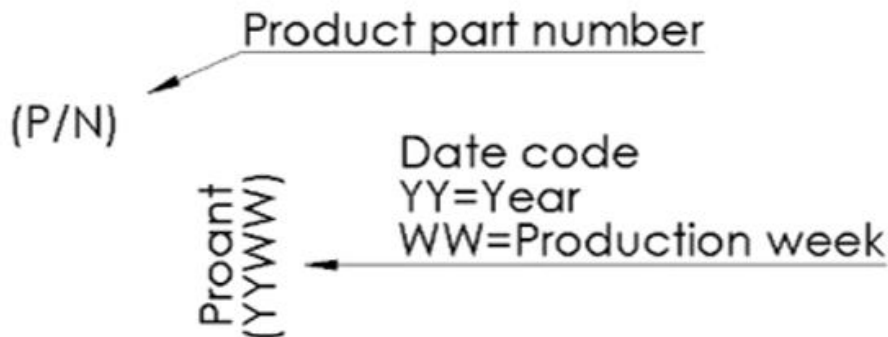
Date code

YY=Year

WW=Week



There will be a transition period for the part marking until production batches after 2222 (YYWW). Produced batches before 2222 are marked according to the below illustration.



Example top marking

## Ordering Information

Part number	Part name	Details
PRO-OB-536	OnBoard SMD WLAN	Antenna for WLAN/WiFi.
PRO-EB-550	Evaluation board SMD WLAN	Evaluation board with PRO-OB-536 for WLAN/WiFi

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