2450 MHz Chip Antenna

ACAG0201-2450

Request Samples | Check Inventory

2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

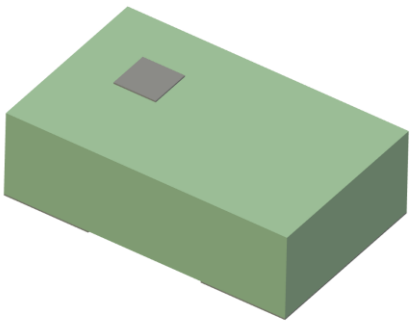
Features

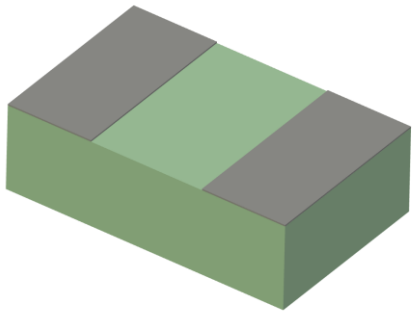
- Miniature Form Factor: 2.0 x 1.25 x 0.6 mm
- Low Return Loss of: ≤ -6 dB
- Peak Gain: 1.5 dBi
- Average Total Efficiency: -0.6 dB (86%)
- Linear Polarization
- Surface Mount (SMD)
- Integration: PCB Edge Mounting

Applications

- Bluetooth®/ ZigBee® / Thread/ Matter/Wi-Fi®
- Bluetooth®/ Wi-Fi® Modules
- Consumer Hearables & Wearables
- Medical Wearables & Tele-Medicine
- Smart Home & Smart Building
- Asset Tracking & Telematics
- Smart Metering
- Intelligent Lighting

Product Image





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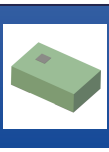
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2450 MHz Chip Antenna



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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Electrical Specification

Parameter	Specification	Unit
Operating Frequency	2400 - 2500	MHz
VSWR (Typ.)	< 3.0	-
Peak Gain	1.5	dBi
Average Gain	-0.6	dBi
Maximum Total Efficiency	86	%
Average Total Efficiency	73.7	%
Polarization	Linear	-
Impedance	50	Ω
Radiation Pattern	Omni-directional	-
Input Power	≤ 2.0	W

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	2.0 x 1.25 x 0.6 mm
Evaluation Board Dimension	90 x 50 mm
Mounting Type	Surface Mount
Mounting Location	PCB Edge Mounting
Material(s)	Ceramic

Environmental Specification

Parameters	Specifications
Operating Temperature	-40ºC ~ +85ºC
Storage Temperature	-40ºC ~ +85ºC
Humidity	10% - 70% R.H.
MSL level	1
RoHS Compliant	Yes

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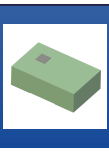
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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Ordering Information

Part Number	Description
ACAG0201-2450	2450 MHz Chip Antenna on Cut Tape
ACAG0201-2450-T	2450 MHz Chip Antenna on Tape & Reel
ACAG0201-2450-EVB	2450 MHz Chip Antenna Evaluation Kit

Note: Other options not listed may be available upon request via Abracon online support

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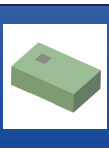
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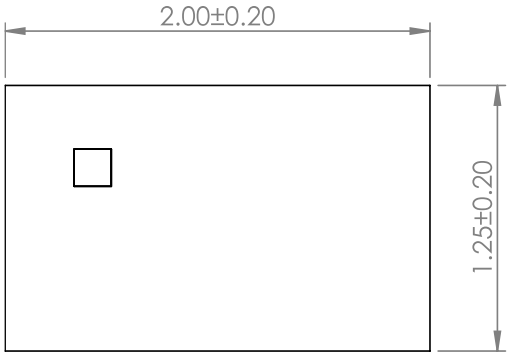


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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Product Dimensions

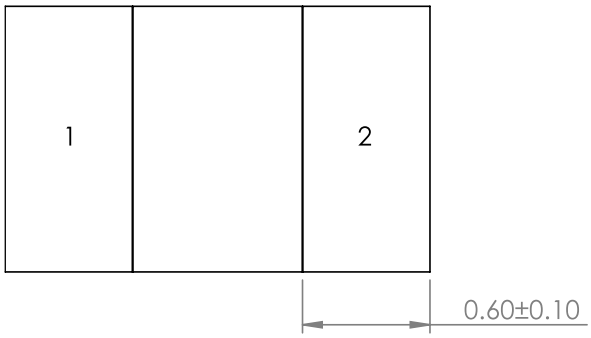


TOP VIEW

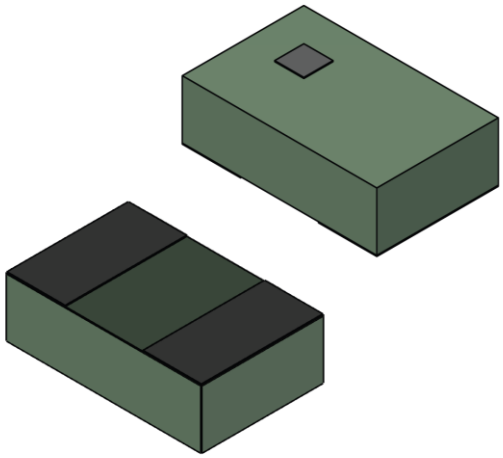


SIDE VIEW

Pin #	Function
1	INPUT
2	GND



BOTTOM VIEW



Unit: mm

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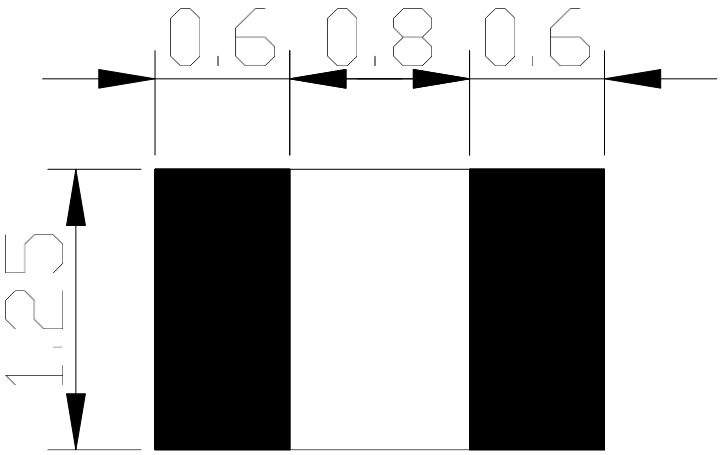
2450 MHz Chip Antenna

ACAG0201-2450

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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Recommended Land Pattern



Unit: mm

Please note: The line width should be designed to achieve a 50-ohm characteristic impedance, depending on the PCB material and thickness. For detailed reference layout information, please contact Abracon online support for assistance.

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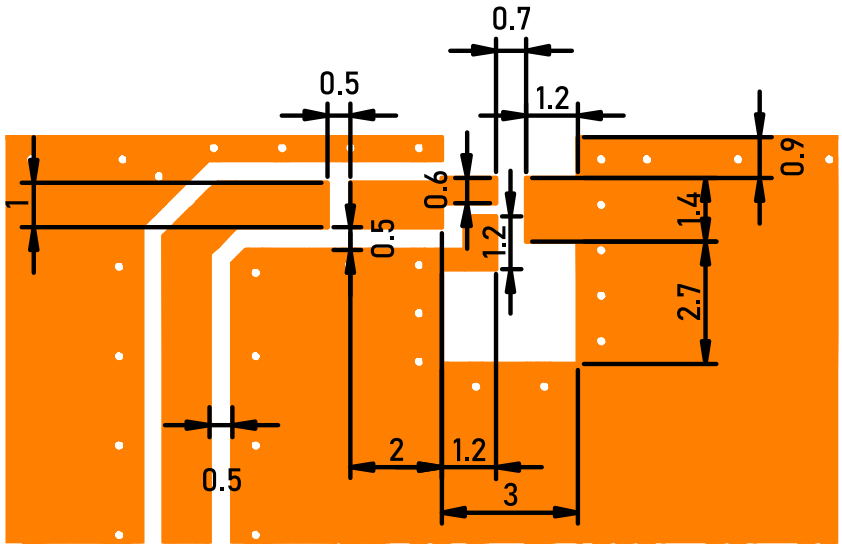
ACAG0201-2450

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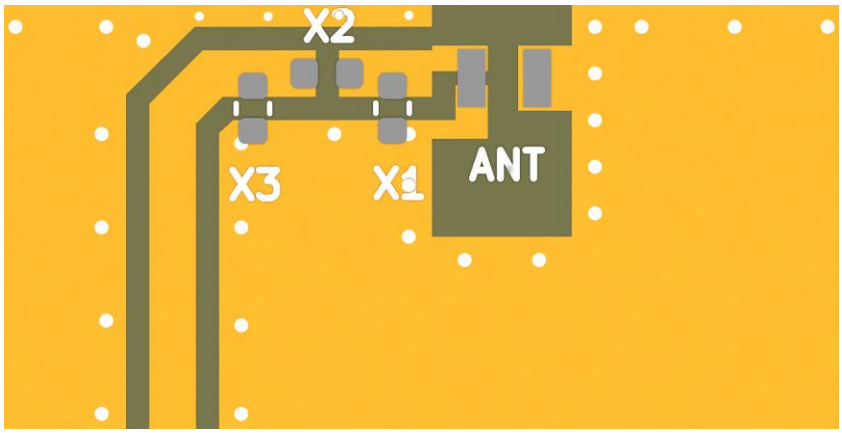
2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Recommended PCB layout

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 ground clearance is respected through all layers of the PCB. It is recommended to implement a matching network to optimize the antenna impedance in your application.



PCB Layout Dimensions



Components Placement

Unit: mm

Transmission Line

The transmission line should be kept as short as possible and be designed to have a characteristic impedance of 50Ω. Abracon recommends using a Co-Planar Waveguide with Ground (CPWG), which dimensions can be derived by any trusted calculator, using the correct input for PCB materials and layer stack-up.

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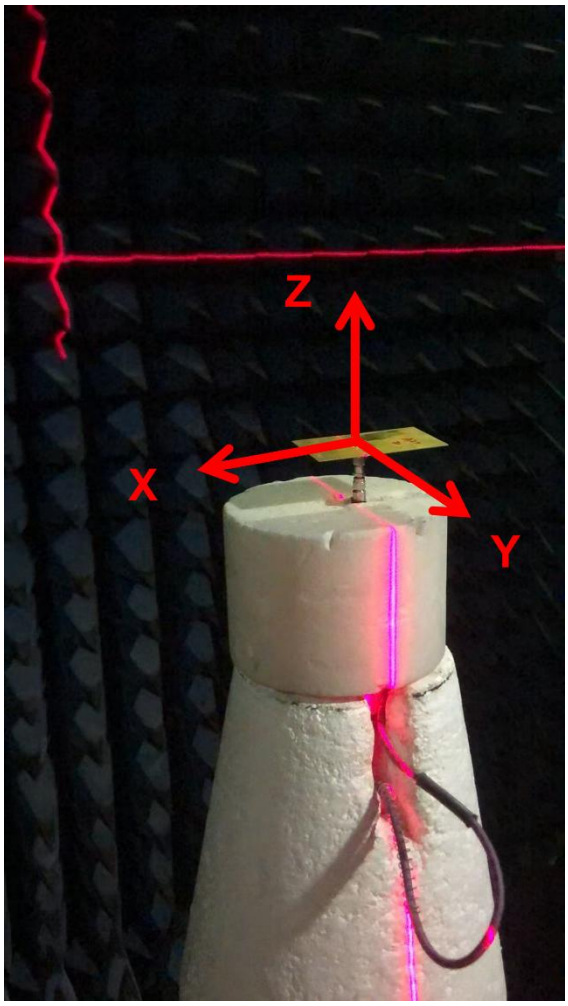
ACAG0201-2450

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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Measurement Setup

The radiation measurements were all done in an anechoic chamber with the antenna implemented on its evaluation board (ACAG0201-2450-EVB) that has a PCB size of 90 x 50 mm:



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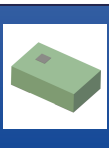
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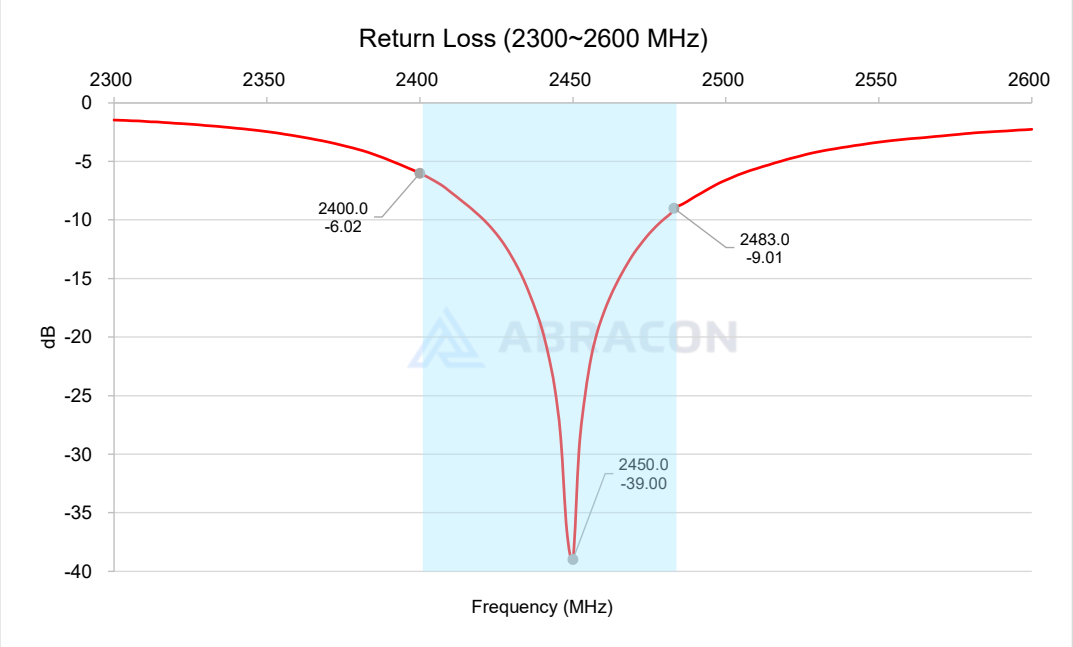


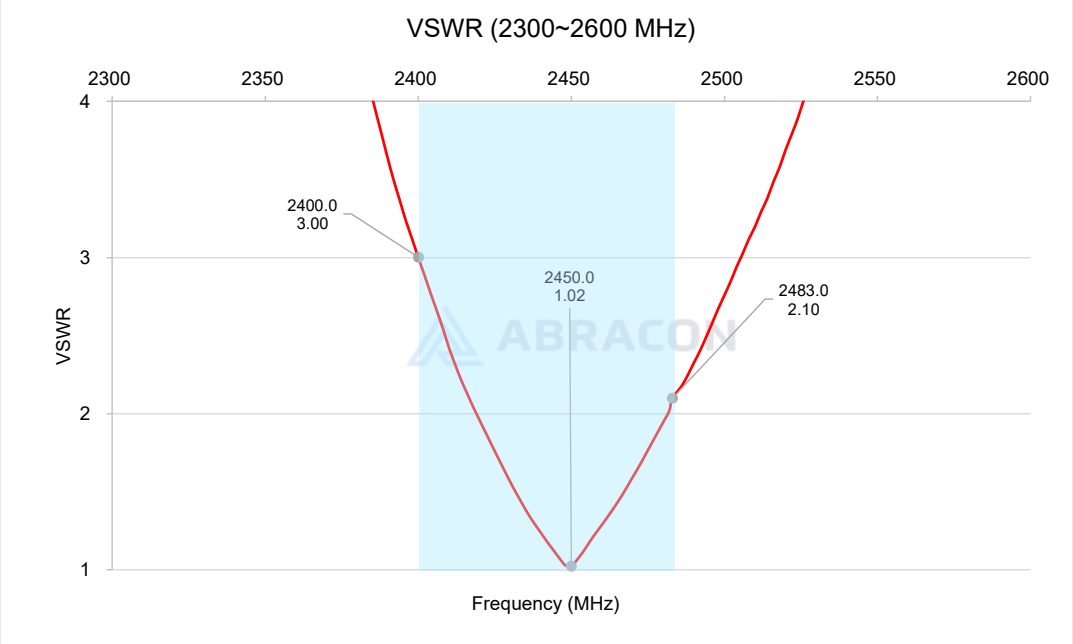
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MSL Level = 1

Reflection Characteristics –Return Loss & VSWR





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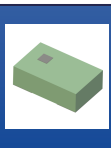
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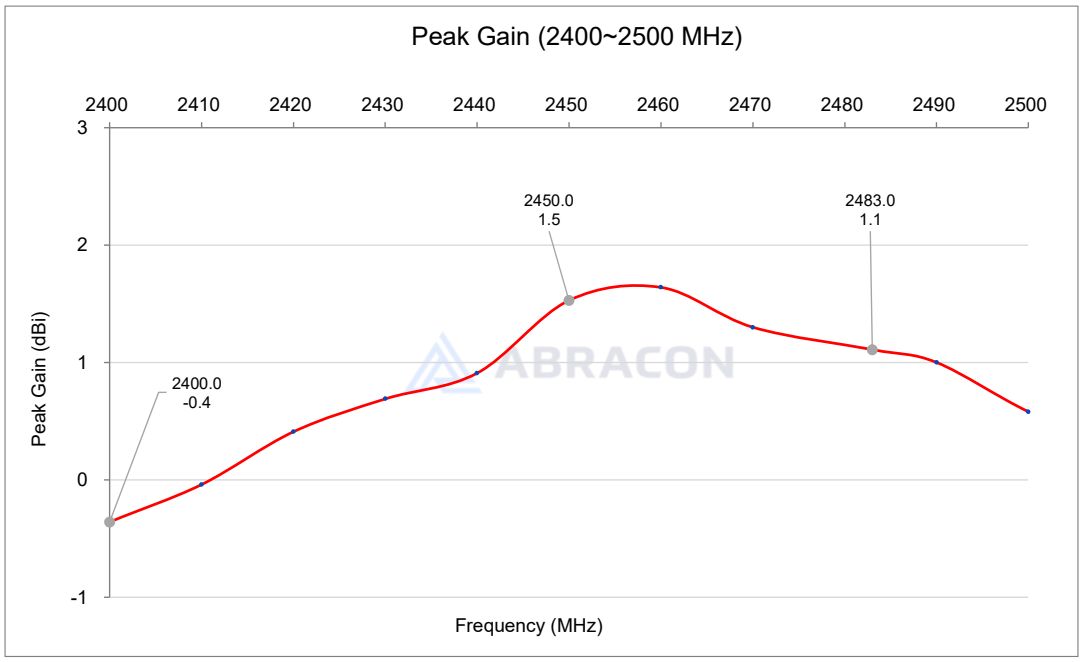


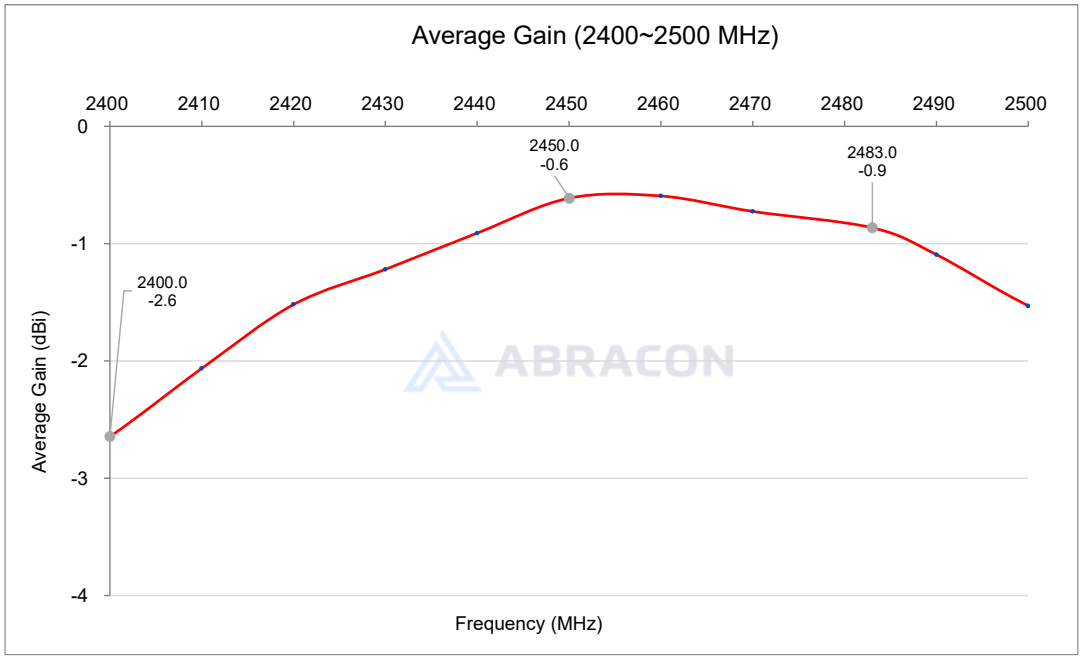
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Radiation Characteristics –Gain





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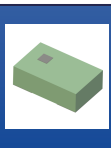
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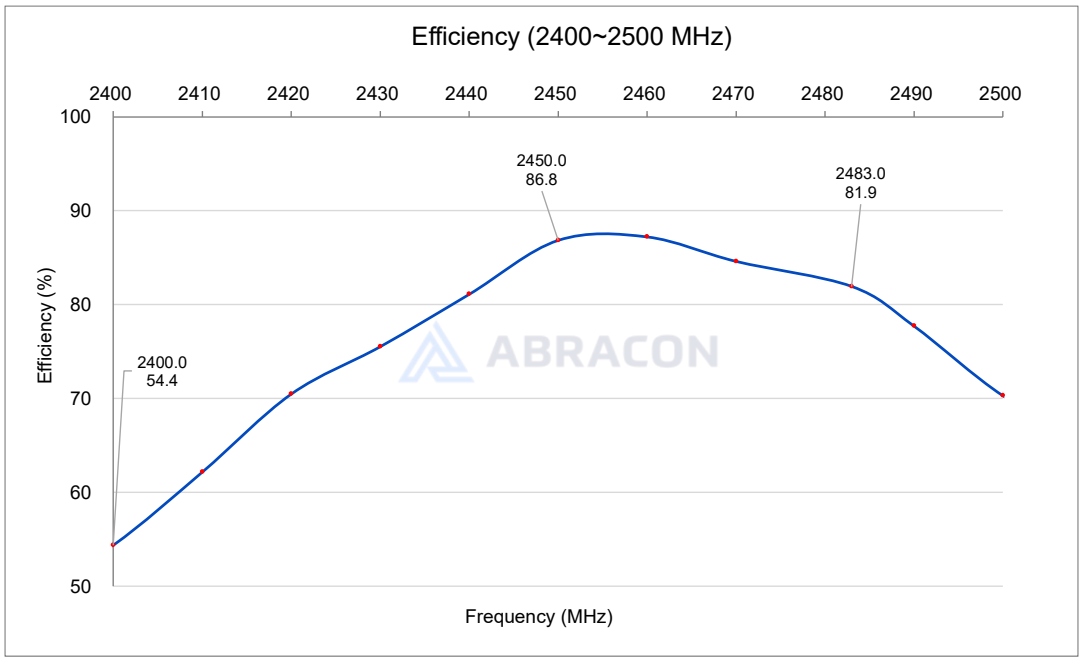
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Radiation Characteristics – Total Efficiency



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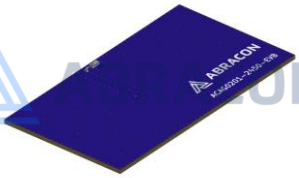
ACAG0201-2450

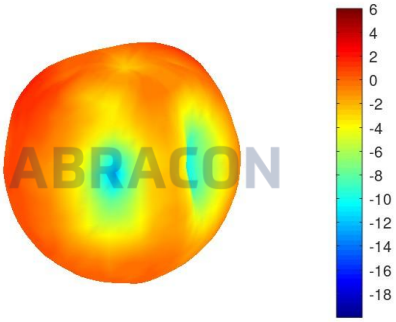
Request Samples | Check Inventory

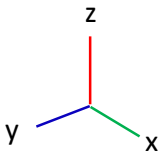
2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

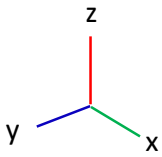
Radiation Characteristics – 3D & 2D pattern

2450 MHz

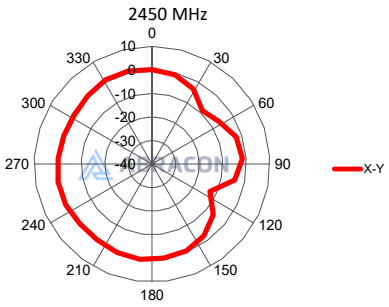




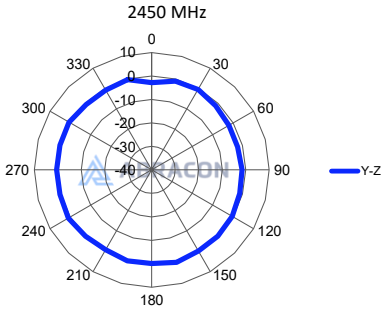




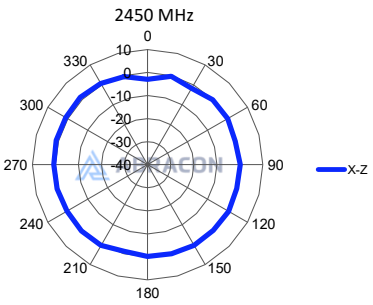
XY plane



YZ plane



XZ plane



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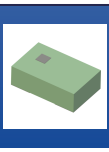
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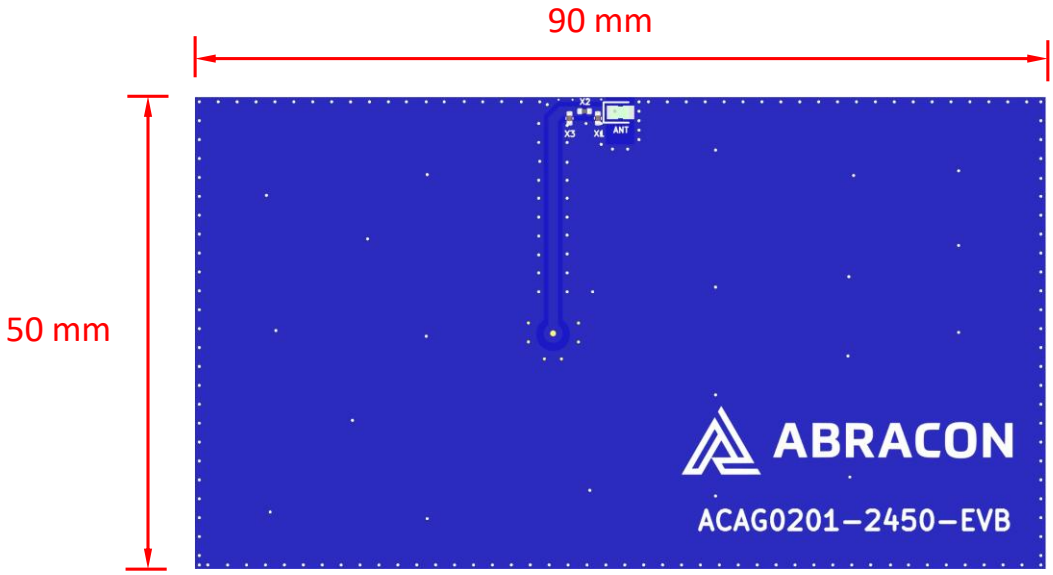
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RoHS/RoHS II Compliant
MSL Level = 1

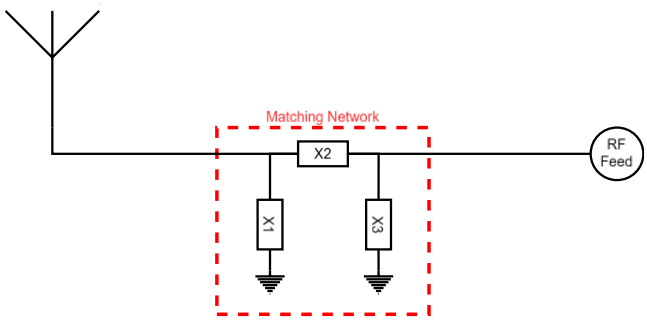
Evaluation Board Outline & Matching Circuit

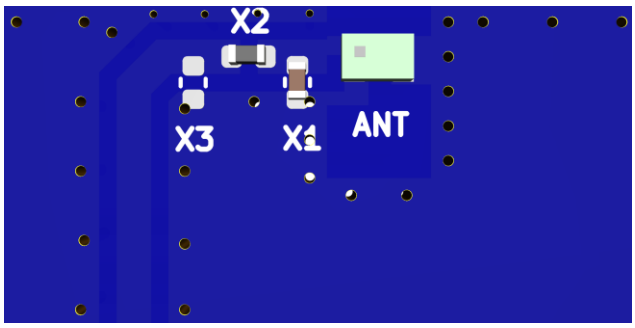
The evaluation board (Abracon ACAG0201-2450-EVB) is developed to simplify antenna testing and evaluation. It has an arbitrary size of 90 x 50 mm and includes an SMA connector. The purpose is to give a reference design for an optimal antenna implementation. The evaluation board can also be used to test other implementations by cutting and soldering the PCB into any device.



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

The antenna requires a matching circuit to fine-tune the resonant frequency and achieve optimal balance. The evaluation board is pre-tuned for optimal performance in the 2.4–2.5 GHz range using the components listed below (equivalents may be used):





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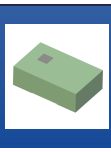
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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Bill of Material

Component	Description	Manufacturer	Manufacturer Part	QTY
ANT	2450 MHz Chip Antenna	Abracon	ACAG0201-2450	1
X1	0.3 pF Capacitor (0402 / 1005 Metric)	-	-	1
X2	2.4 pF Capacitor (0402 / 1005 Metric)	-	-	1
X3	NC	-	-	0

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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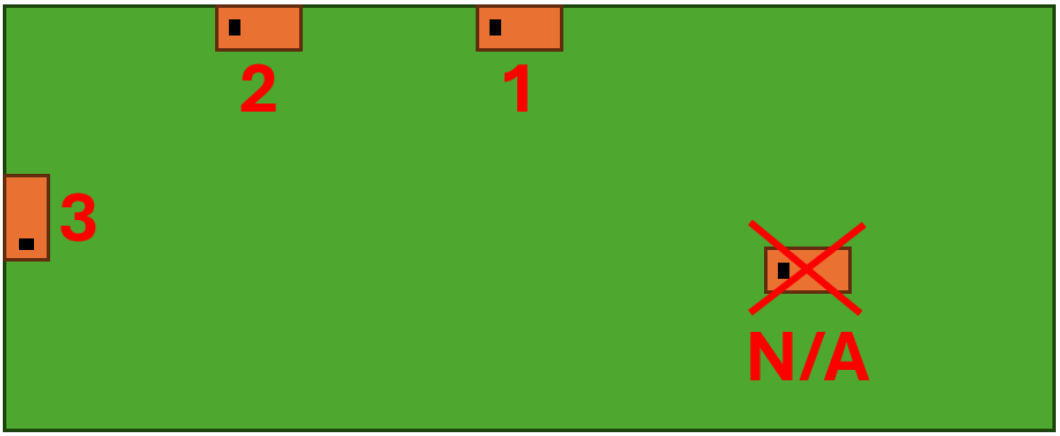
Request Samples | Check Inventory

2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

General Implementation Guidelines

The antenna can be positioned in different ways, although there are some positions which are more beneficial. The illustration below shows a typical PCB with examples on different antenna positions (the GND cutout is not visualized):

- The optimal position is usually 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 (see "N/A").
- Option 2 or 3 may be the best option for PCB's much larger than the evaluation board.



The rectangular copper cutout in the footprint must extend through all layers of the PCB stack-up, ensuring there is **no copper on any layer in this area**. Additionally, a robust via structure around the cutout and along the edge of the ground plane is highly recommended for optimal performance.

It is important to note that plastic and metal parts in close proximity to antennas may significantly affect antenna tuning and performance. For instance, plastic housing above the antenna often causes the resonant frequency to shift downward. Since such effects are challenging to predict without detailed design information, it is recommended to measure the antenna performance in the final device after implementation. To compensate for potential frequency shifts, implementing a matching network on the antenna feed is advisable.

Another general consideration for surface-mounted antennas relates to PCB population. Electrical components placed near the antenna may impact its tuning and radiation performance. To mitigate this, components in the surrounding area should be positioned below a topographical slope. This slope should begin at the PCB level near the antenna's designated keep-out zone and gradually increase in height as distance from the antenna grows.

For technical assistance, please contact Abracon online support through our online support platform.

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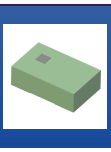
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2450 MHz Chip Antenna



ACAG0201-2450

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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Reflow Profile [JEDEC J-STD-020]

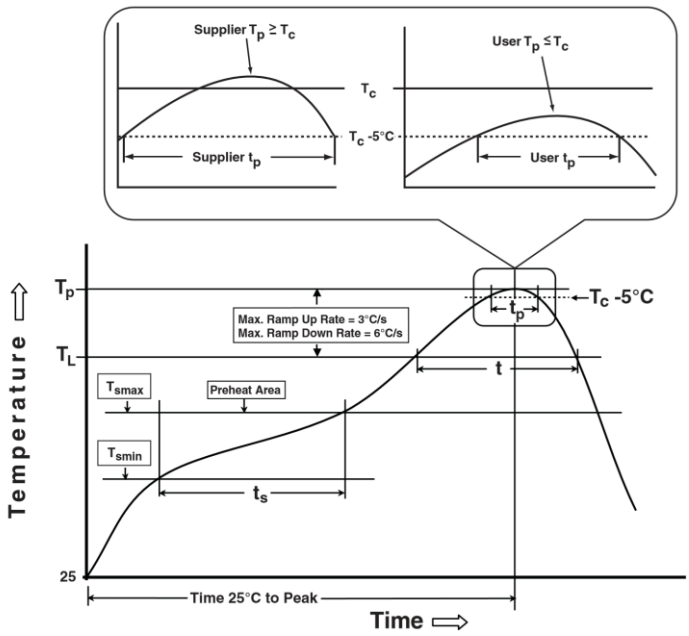


Table 1

SnPb Eutectic Process Classification Temperatures (T_c)		
Package Thickness	**Volume mm³ <350**	**Volume mm³ ≧350**
<2.5mm	235°C	220°C
≧2.5mm	220°C	220°C

Table 2

Pb-Free Process Classification Temperatures (T_c)			
Package Thickness	**Volume mm³ <350**	**Volume mm³ 350-2000**	**Volume mm³ >2000**
<1.6mm	265°C	265°C	265°C
1.6mm - 2.5mm	260°C	250°C	245°C
>2.5mm	250°C	245°C	245°C

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum (T_{smin})	100°C	150°C
Temperature maximum (T_{smax})	150°C	180°C
Time (T_{smin} to T_{smax}) (t_s)	60 – 120 sec.	60 – 120 sec.
Average ramp-up rate (T_{smax} to T_p)	3°C/sec. max	3°C/sec. max
Liquidous temperature (T_L)	183°C	220°C
Time at Liquidous (T_L)	60 – 150 sec.	30 – 40 sec.
Peak package body temperature (T_p)*	**See Table 1**	**See Table 2**
Time (T_p)** within 5°C of the specified classification temperature (T_c)	20 sec.	5 sec.
Ramp-down rate (T_p to T_{smax})	6°C/sec. max	3°C/sec. max
Time 25°C to peak temperature	6 min. max	8 min. max
Reflow cycles	2 max	2 max

*Tolerance for peak profile temperature (T_p) is defined as a supplier minimum and a user maximum.
**Tolerance for time at peak profile temperature (t_p) is defined as a supplier minimum and a user maximum.

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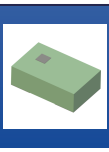
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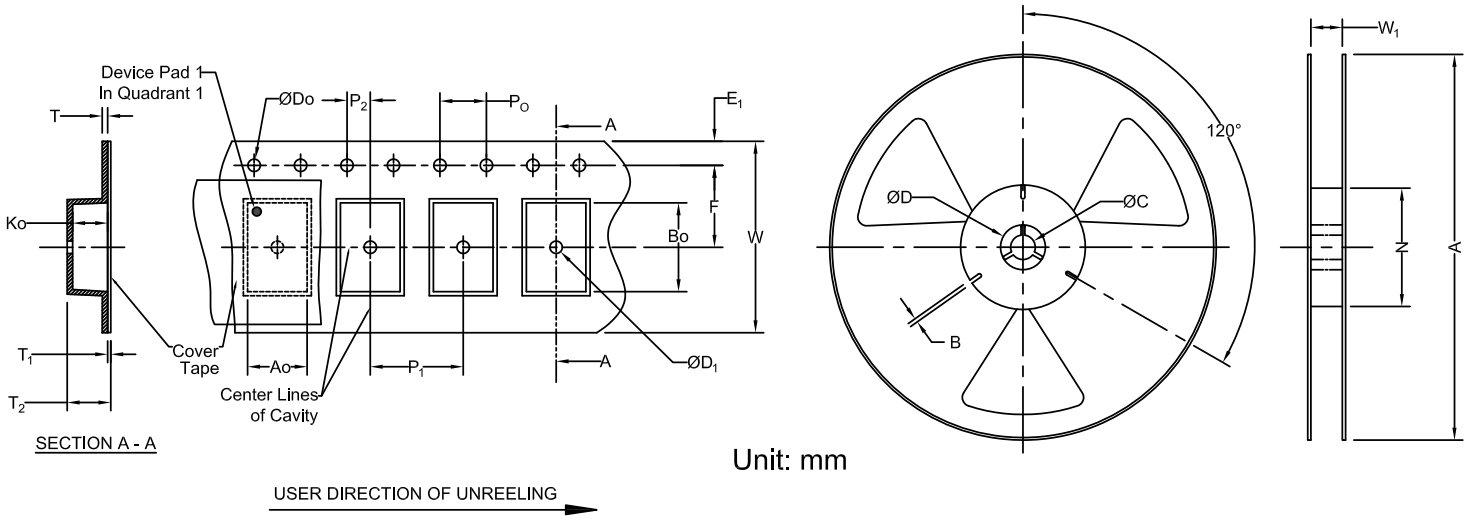
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2.0 x 1.25 x 0.6 mm
RoHS/RoHS II Compliant
MSL Level = 1

Packaging

Tape & Reel Dimension



Unit: mm

USER DIRECTION OF UNREELING

Carrier Tape Specifications (mm)											
Do	K_0	E_1	P_0	P_2	T	F	P_1	W	A_0	B_0	Reel Qty
1.50 ± 0.1	1.25 ± 0.1	1.75 ± 0.1	4.0 ± 0.1	2.0 ± 0.10	0.22 ± 0.05	3.5 ± 0.10	4.0 ± 0.1	8.0 ± 0.10	1.6 ± 0.1	2.3 ± 0.1	4,000

Reel Specifications (mm)			
A	W_1	N	C
178 ± 2.0	8.5 ± 1.0	60	13 ± 0.5

ATTENTION: Abracon LLC's products are Commercial-Off-The-Shelf ('COTS'), which are designed, intended, and validated for use in commercial, industrial, and automotive applications. The customer is responsible for testing and verifying the performance of an Abracon solution to meet their system-level requirements.

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