Datasheet

2.4GHz Ceramic Chip Antenna

Part No:
WLA.04

Description

2400MHz to 2500MHz Wi-Fi/Bluetooth/ WLAN/ZIGBEE/ISM Chip Antenna

Features:

Low Profile, Small Footprint Design

Peak Gain: 0.5dBi

Dimensions: 1.6*0.8*0.4mm

50 Ohm Impedance

RoHS and REACH Compliant

1. Introduction

The Taoglas WLA.04 is a compact size LTCC SMD antenna designed for use in 2.4GHz systems such as Bluetooth, Wi-Fi, BLE, WLAN, THREAD and ZigBee. It is designed to be utilized on devices with small ground planes, and due to the miniature footprint size of just 1.6 x 0.8mm, it can be used in devices where larger antennas do not fit. It is delivered on tape and reel for ease of integration through pick and place machines.

Typical Applications Include:

- Handheld Devices & Wearables
- Connected Health & Patient Monitoring Devices
- Security Systems and Personal Safety Devices
- IoT development Kits

For further information regarding the integration of the WLA.04 into your device please contact your regional Taoglas customer support team.

2. Specification

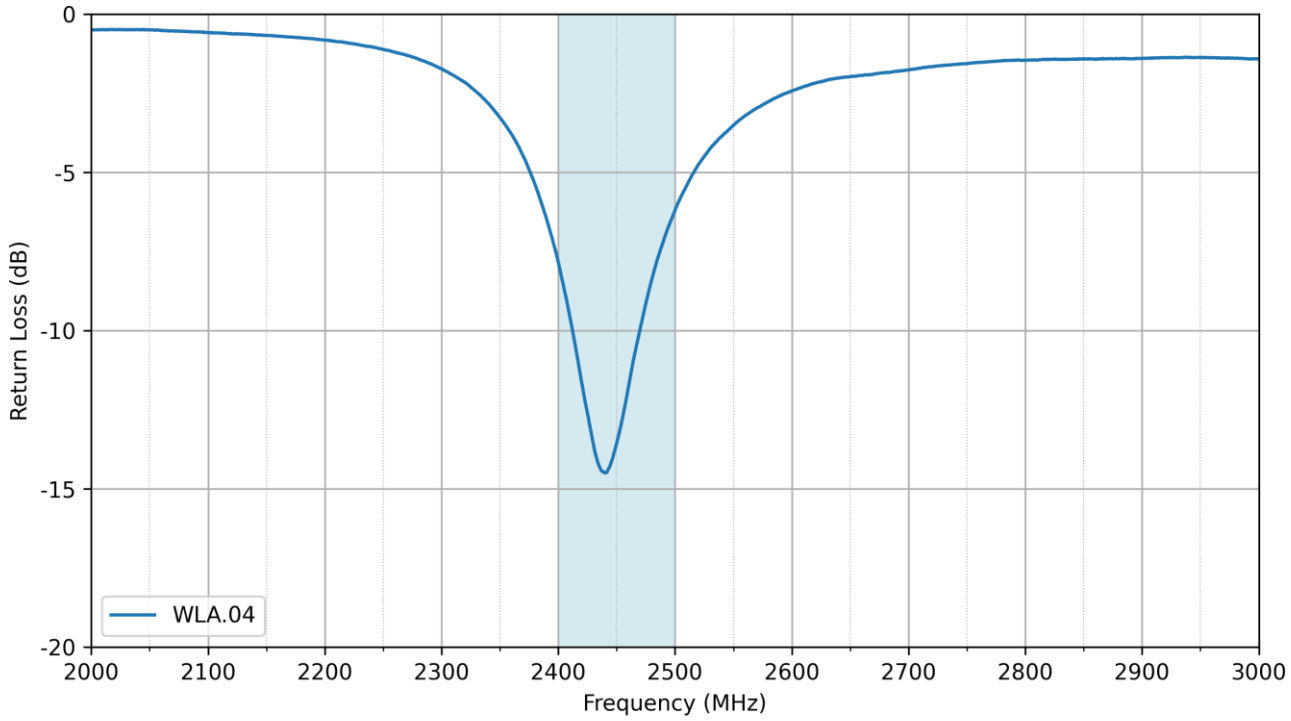
Wi-Fi Electrical								
Band	Frequency (MHz)	Efficiency (%)	Average Gain (dB)	Peak Gain (dBi)	VSWR	Impedance	Polarization	Radiation Pattern
Wi-Fi 2.4GHz	2400-2500	60.5	-2.18	0.50	≤2.0	50 Ω	Linear	Omni
***Tested on a 90x50mm Evaluation Board**								

Mechanical	
Dimensions	1.6 x 0.8 x 0.4mm
Material	Ceramic

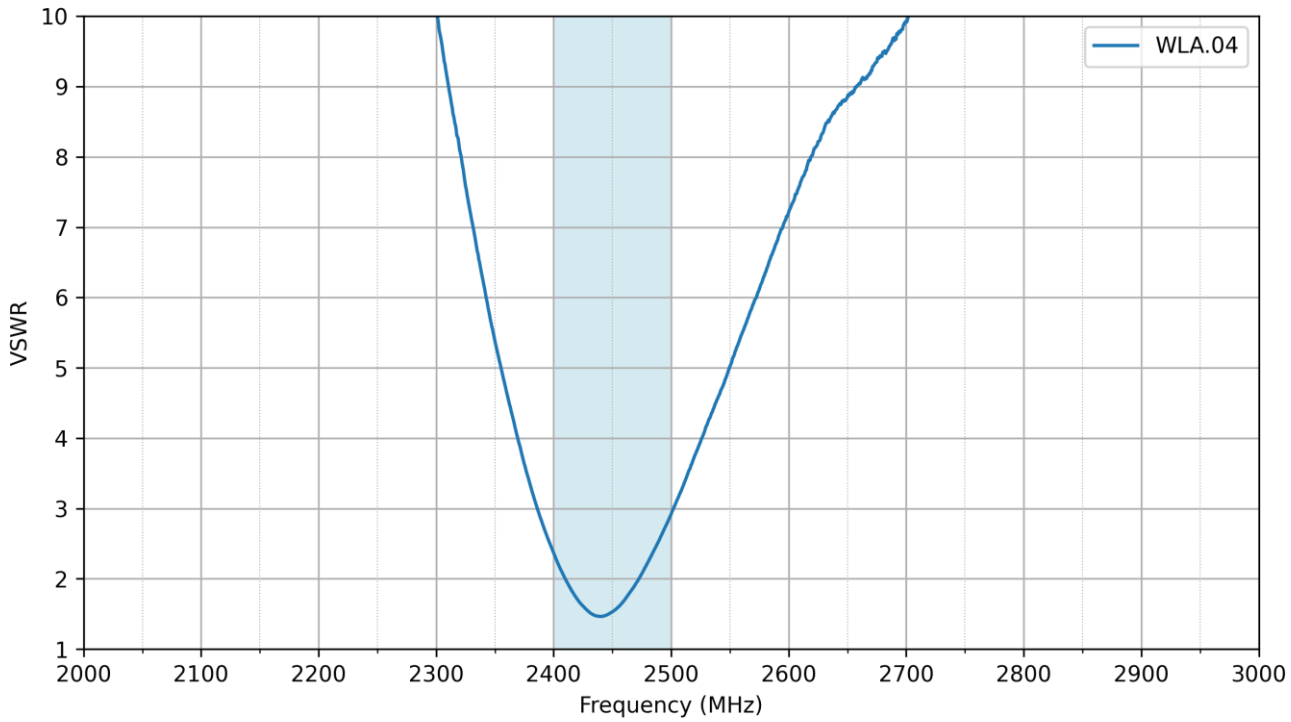
Environmental	
Relative Humidity range	55~75%RH
Operating Temperature	-40°C~+85°C
Storage Temperature	-40°C~+85°C

3. Antenna Characteristics

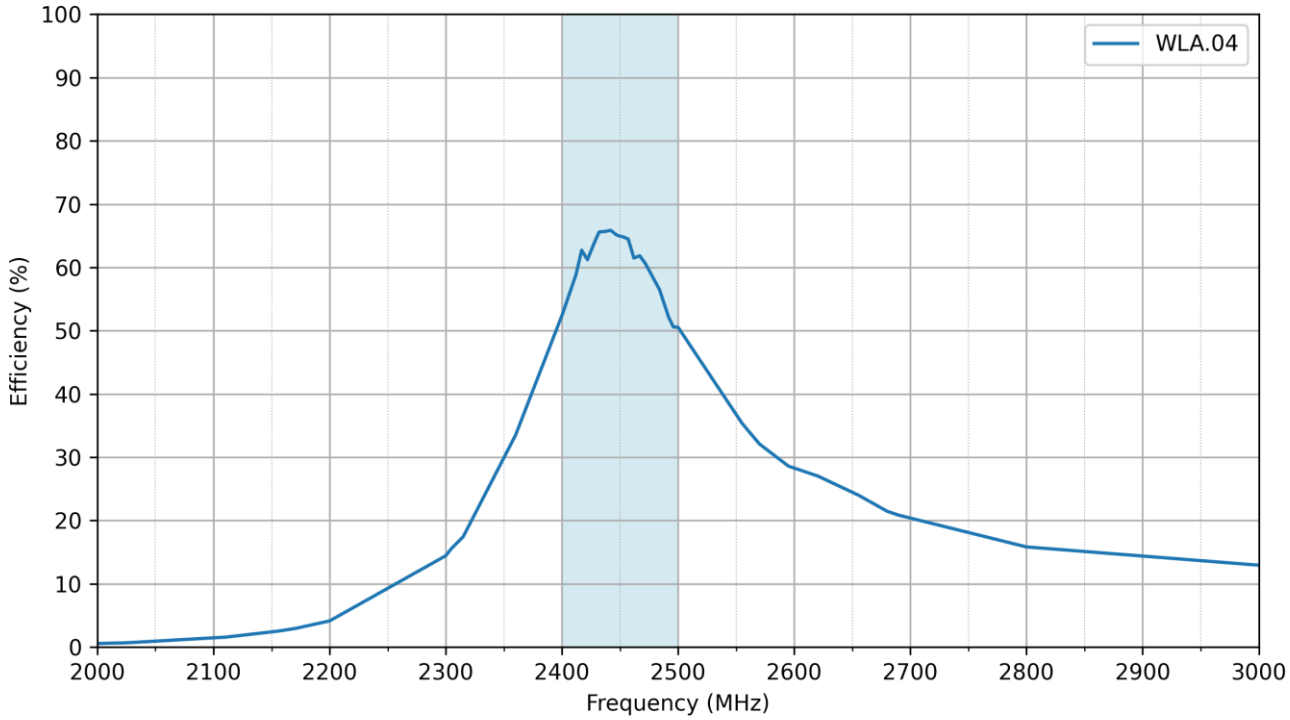
3.1 Return Loss



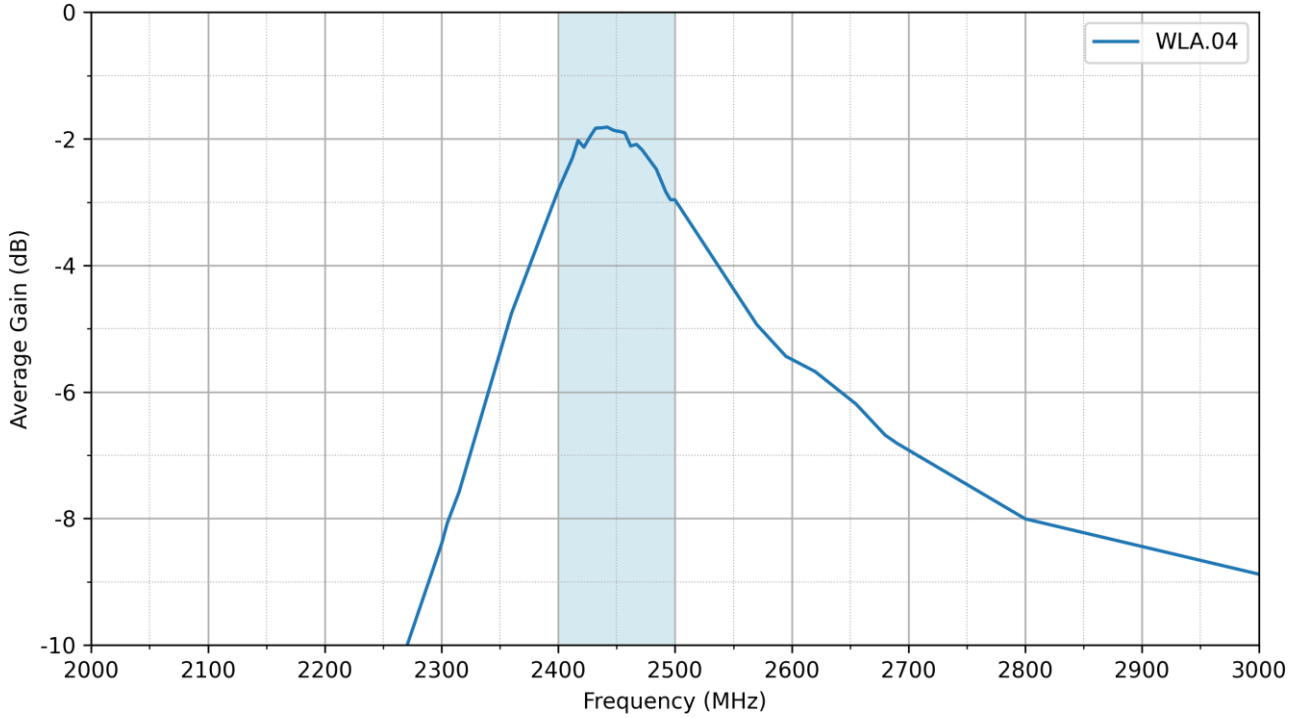
3.2 VSWR



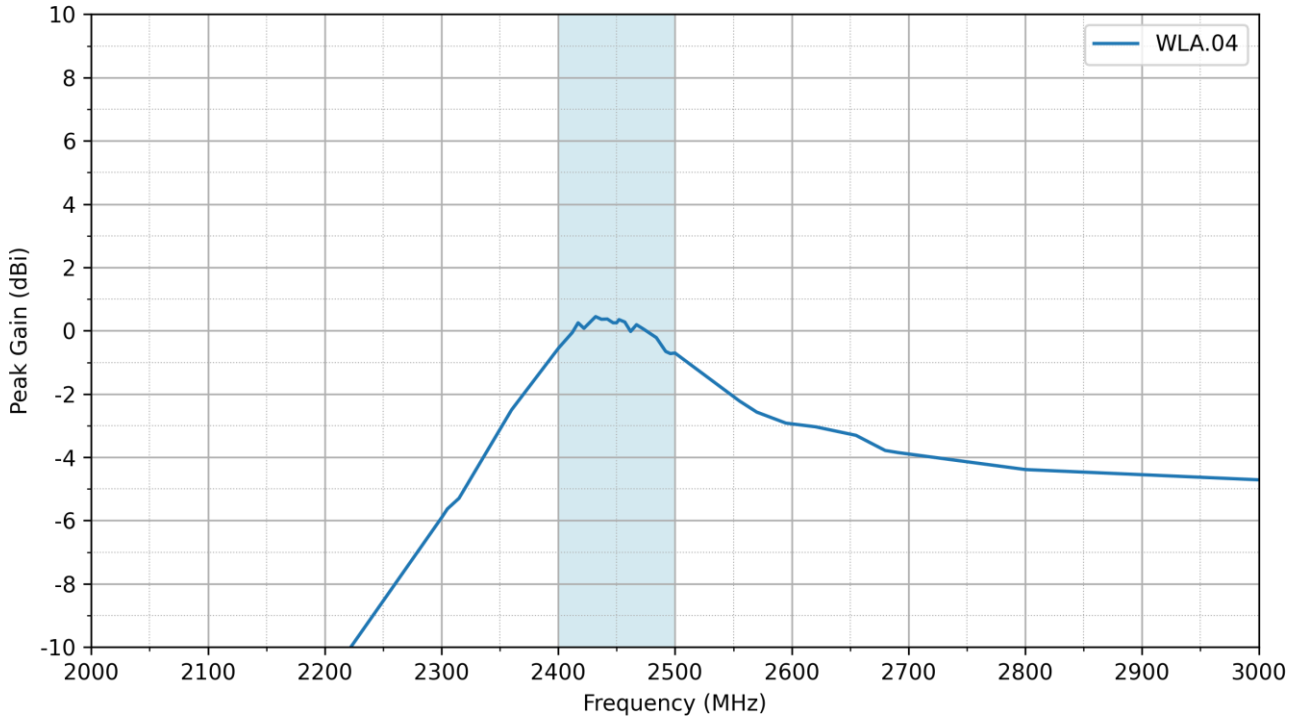
3.3 Efficiency



3.4 Average Gain

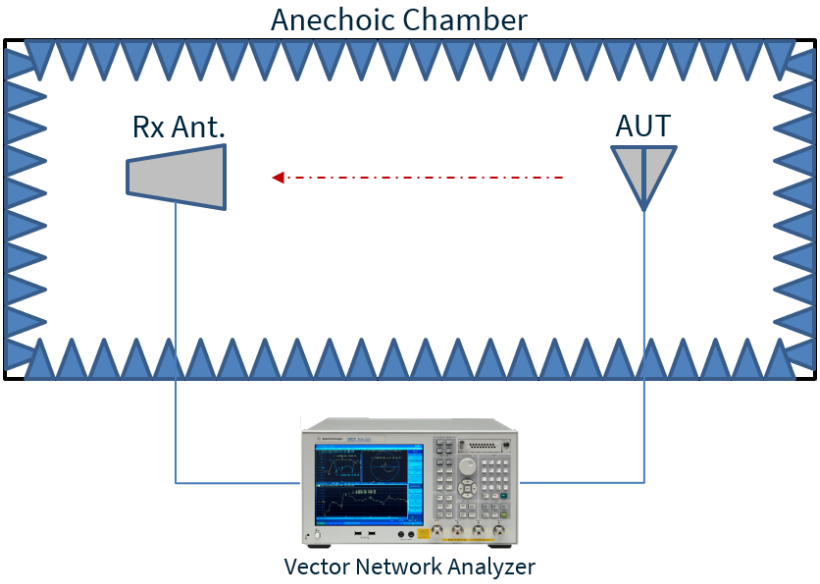


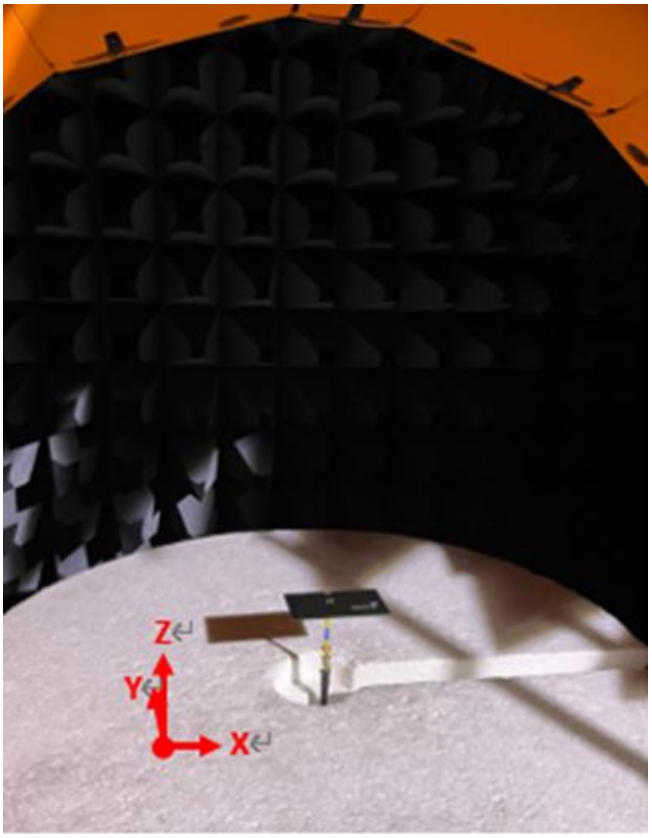
3.5 Peak Gain


WLA.04
Peak Gain (dBi)
10
8
6
4
2
0
-2
-4
-6
-8
-10
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
Frequency (MHz)

4. Radiation Patterns

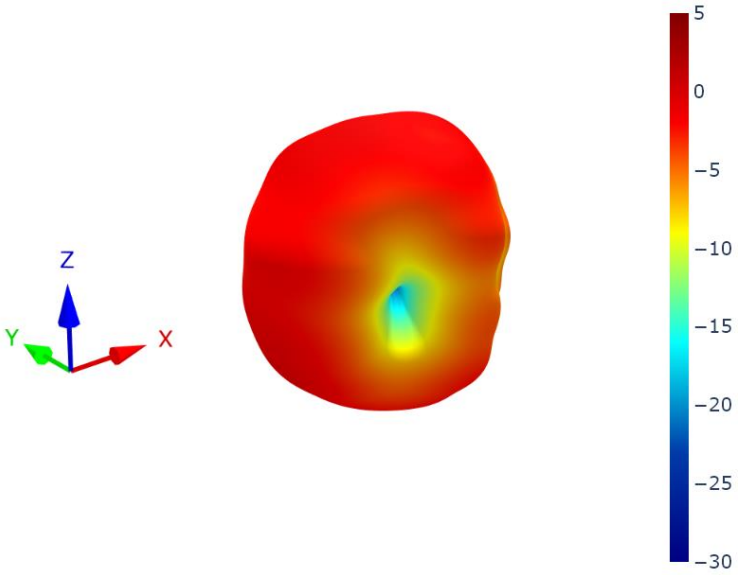
4.1 Test Setup

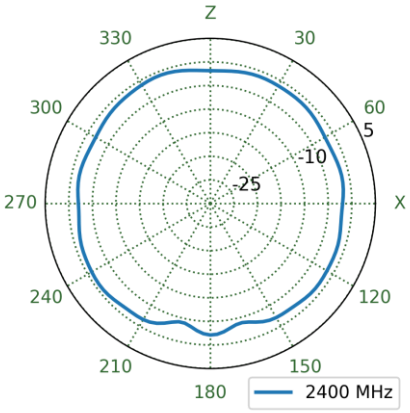
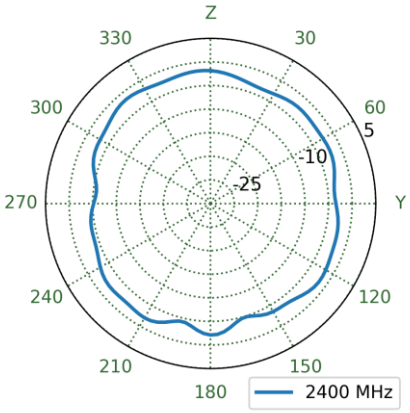
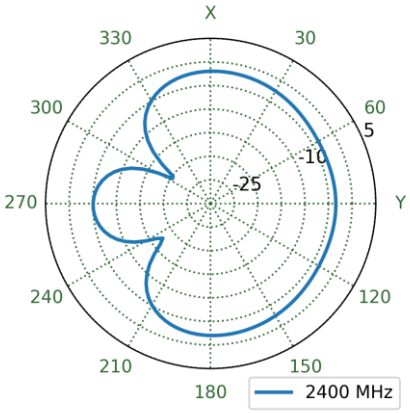




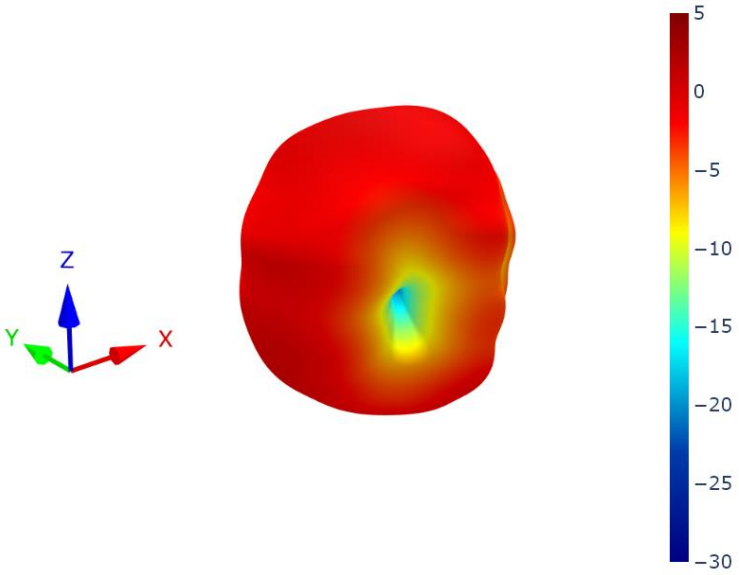
Chamber test setup on a 90x50mm Evaluation Board

4.2 Patterns at 2400 MHz

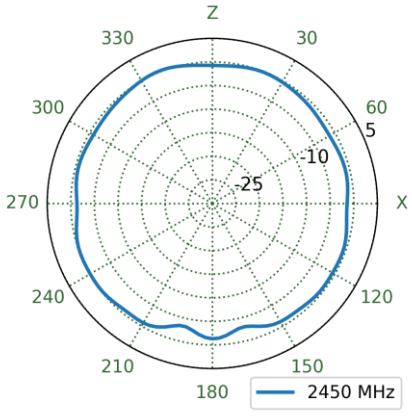


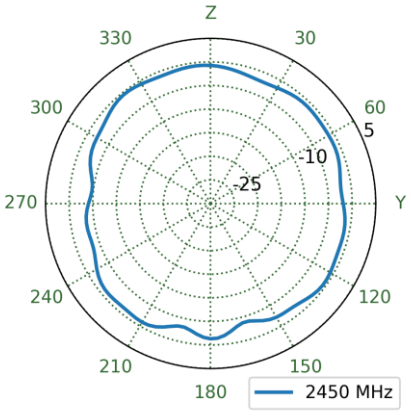
XZ Plane	YZ Plane	XY Plane
		

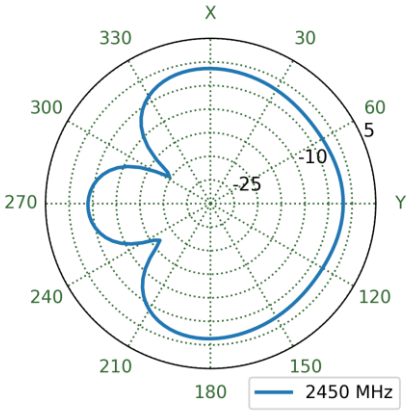
4.3 Patterns at 2450 MHz



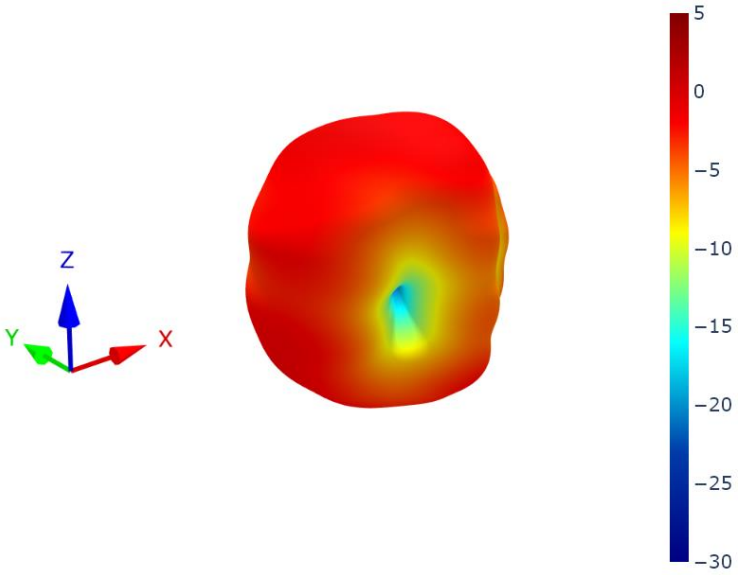
XZ Plane	YZ Plane	XY Plane



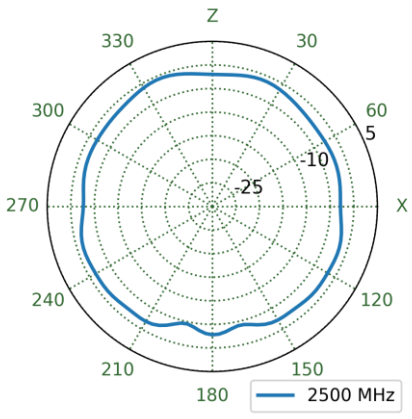


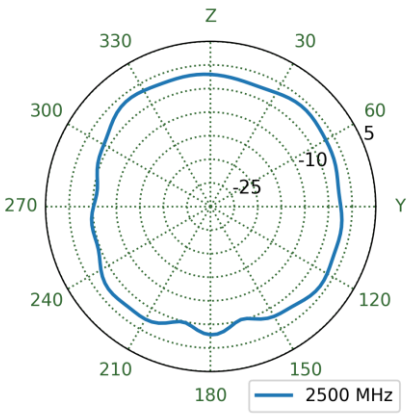


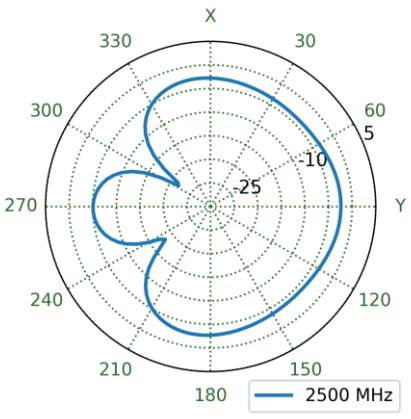
4.4 Patterns at 2500 MHz



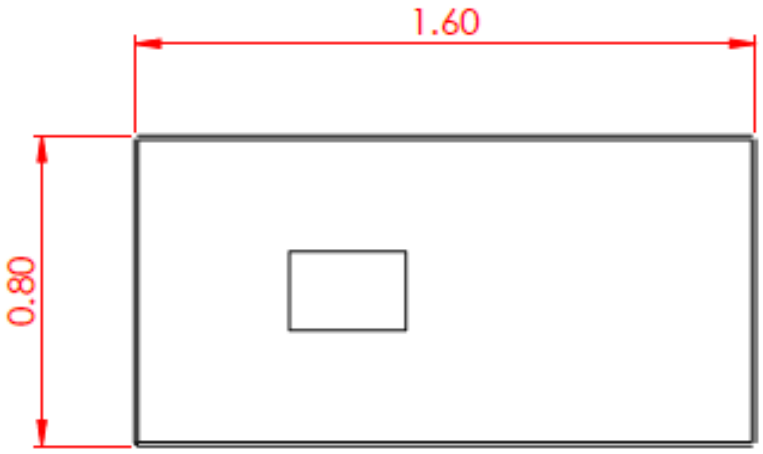
XZ Plane	YZ Plane	XY Plane





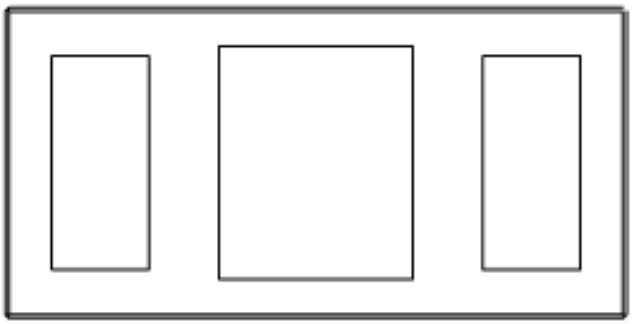


5. Mechanical Drawing



TOP VIEW

FRONT VIEW

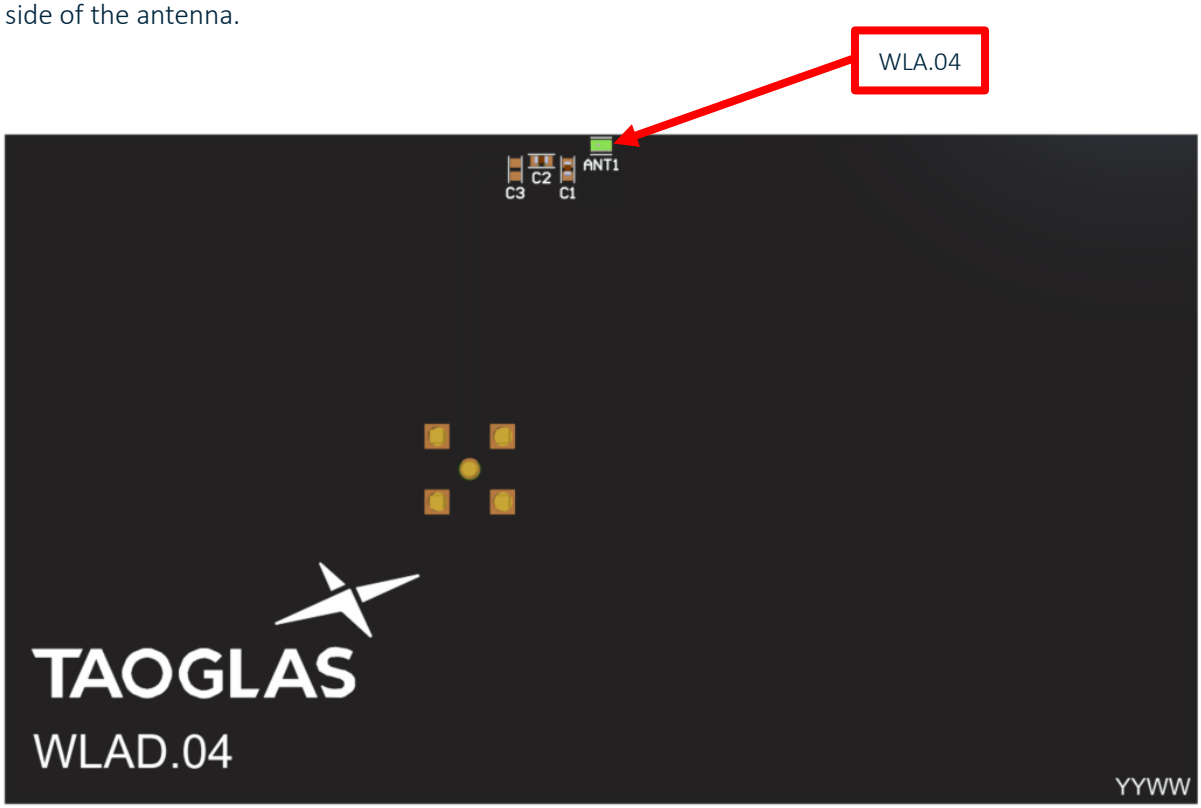


BOTTOM VIEW

6. Integration Guide

The following integration example shows best practice on how to integrate the WLA.04 into your design. This antenna has 4 pins, where one pin is used for the RF Feed. Taoglas recommends using a minimum of 90x50mm ground plane (PCB) to ensure optimal performance. Smaller ground planes can be use with a trade off on performance.

The antenna should be placed mid-point on the long side of the PCB to take advantage of the ground plane on each side of the antenna.

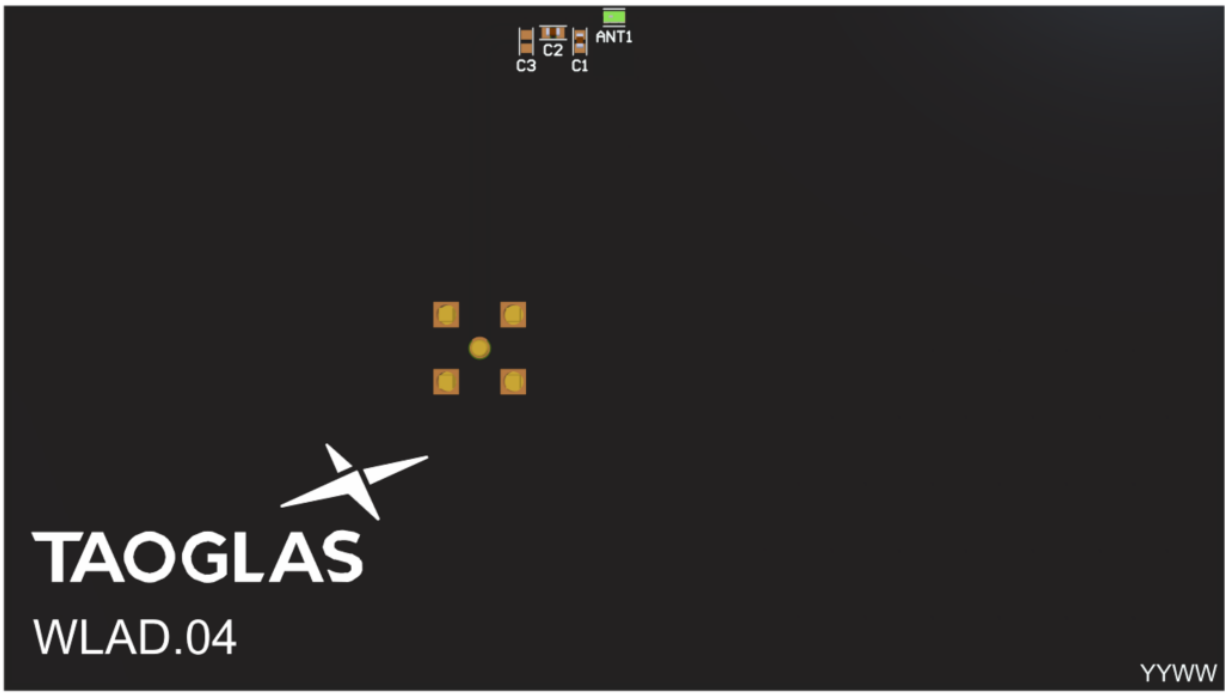


Top view of PCB.

Magnified image of WLA.04

Please find the Integration files in Altium, 2D formats and the 3D model for the WLA.04 here:
https://www.taoglas.com/product/miniature-2-4ghz-ceramic-chip-antenna/

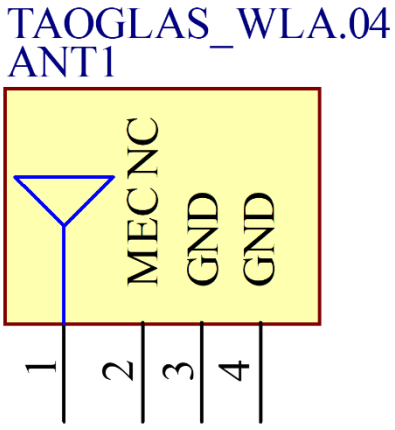
6.1 Schematic Symbol and Pin Definitions



Above is a 3D model of the WLA.04 on a PCB.

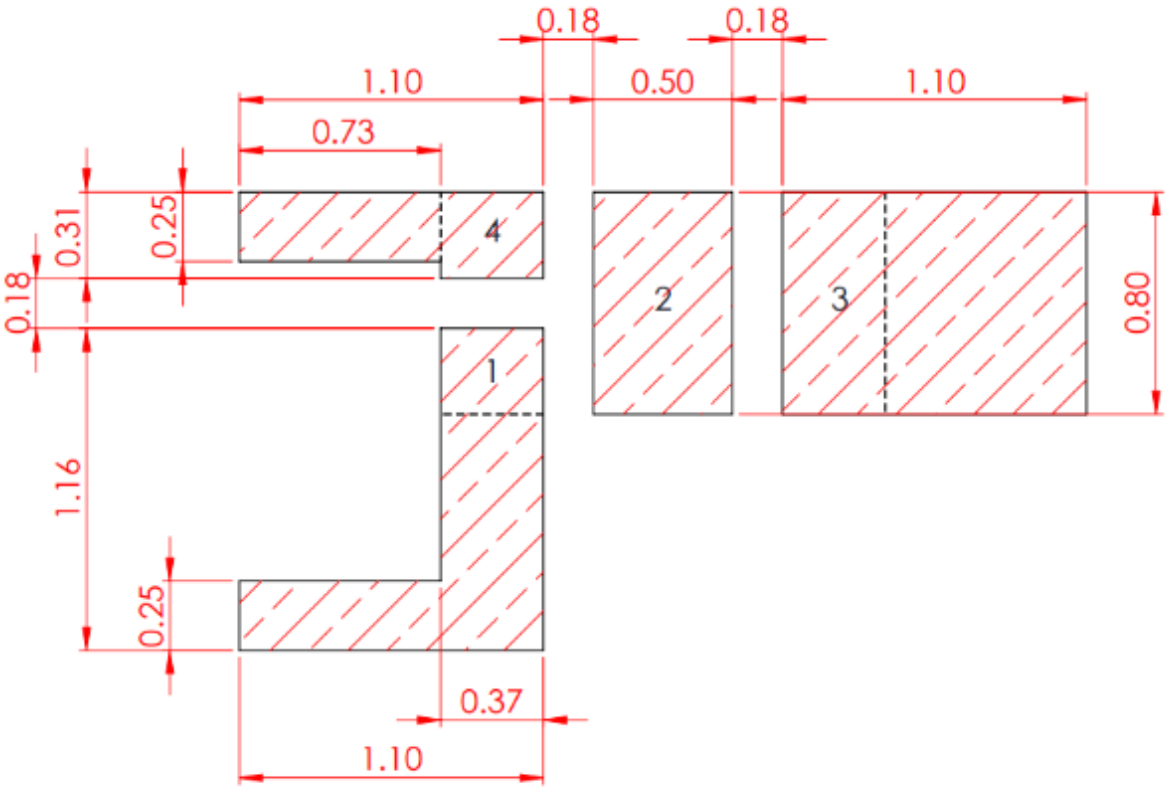
The circuit symbol for the WLA.04 is shown below. The antenna has 4 pins as indicated below.

Pin	Description
1	RF Feed
2	Mechanical, No Connection
3, 4	Ground



Above is a schematic symbol of WLA.04 and a table of the pin definitions.

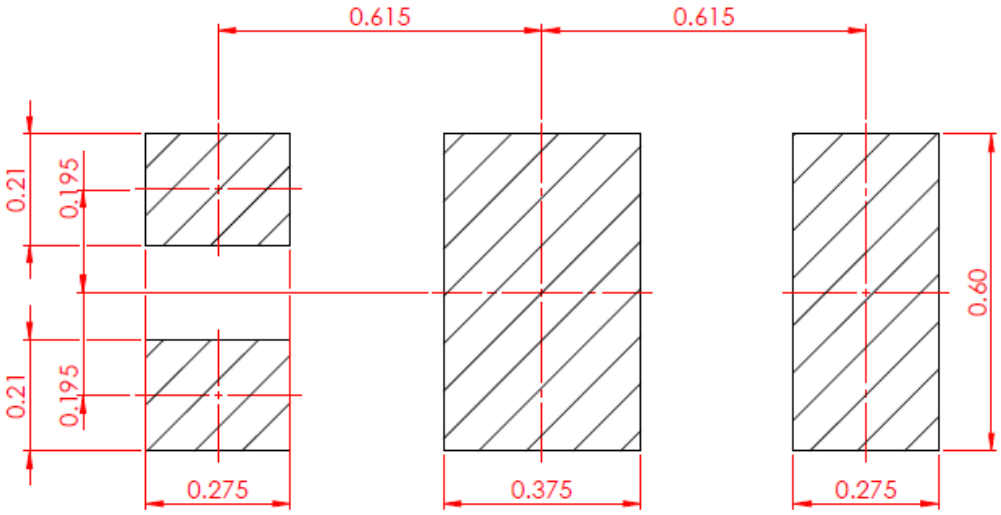
6.2 Antenna Footprint



Pin	Description
1	RF Feed
2	Mechanical, No Connection
3, 4	Ground

6.3 Top Solder Paste

COPPER AREA
COPPER KEEPOUT AREA
SOLDER PASTE AREA

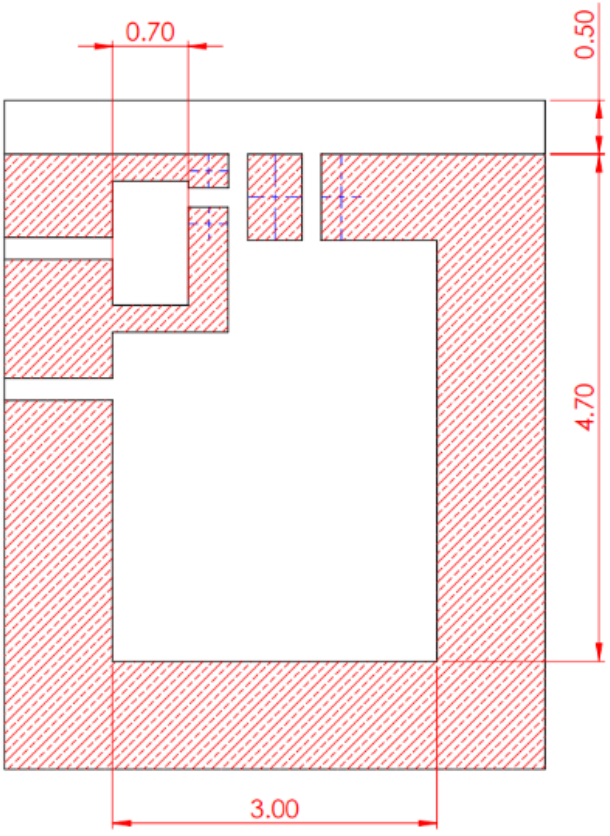


TOP SOLDER PASTE

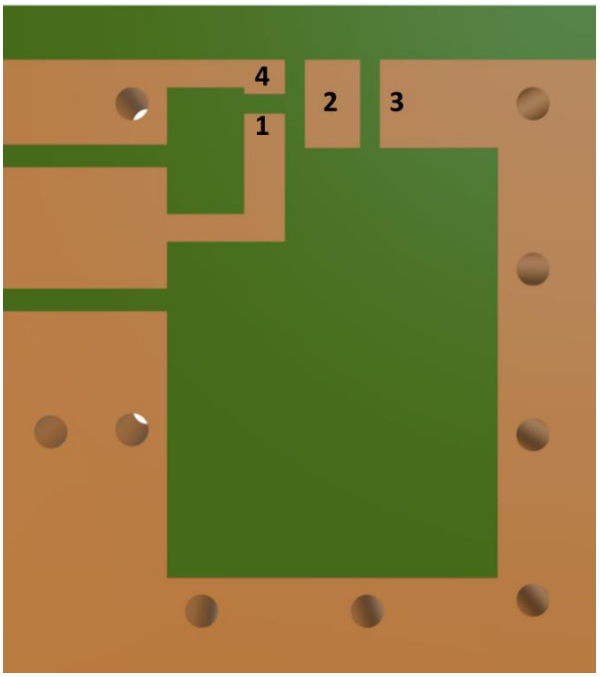
6.4 Copper Clearance for WLA.04

The footprint and clearance on the PCB must comply with the antenna's specification. The PCB layout shown in the diagrams below demonstrates the WLA.04 clearance area. The copper keep out area applies to all layers on the PCB.

The copper clearance area extends to 4.7mm in length and 3mm in width around the antenna. The PCB edge clearance should be a minimum of 0.1mm, example below is 0.5mm.



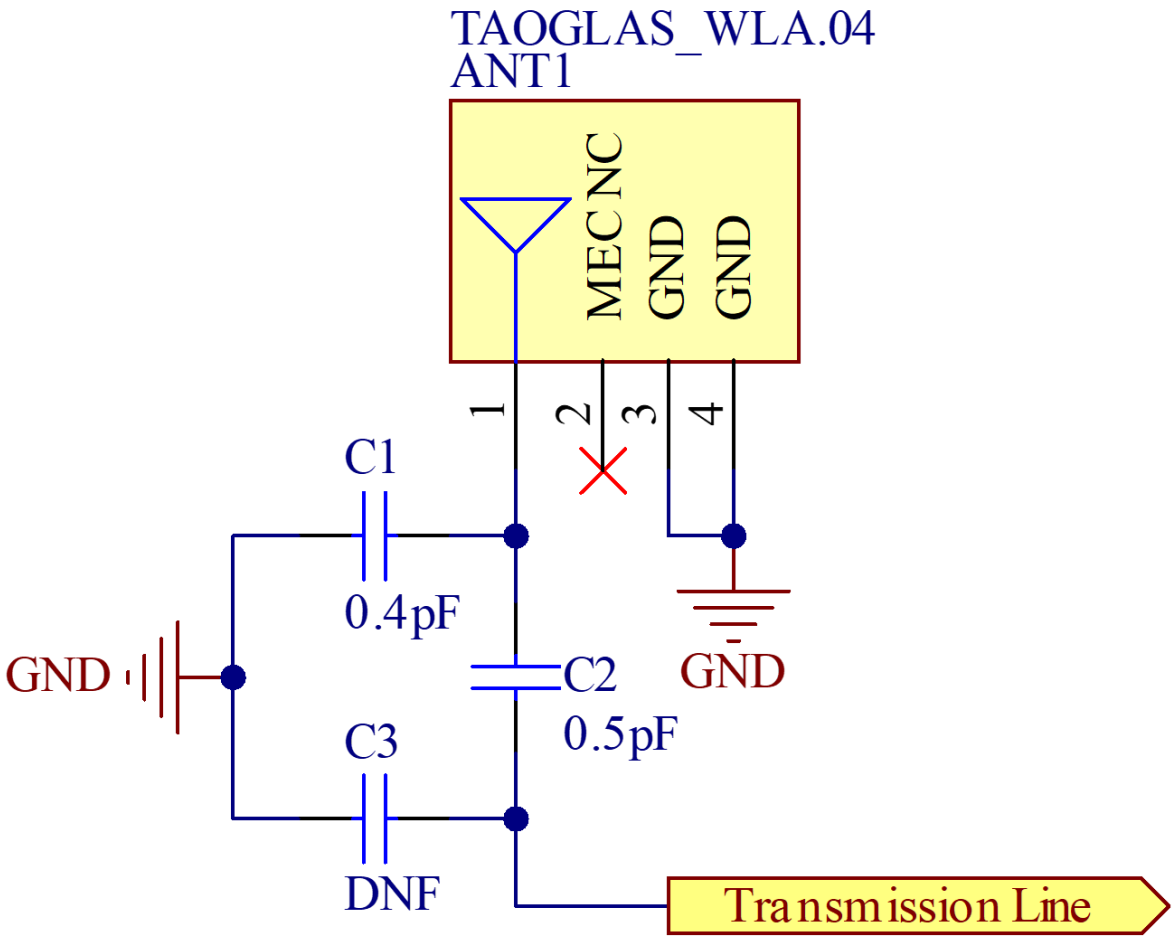
COPPER KEEP OUT



6.5 Schematic Layout

Matching components with the WLA.04 are required for the antenna to have optimal performance in the spaces specified in the schematic below. Additional matching components may be necessary for your device, Taoglas recommends incorporating extra component footprints, forming a “pi” network, for the WLA.04.

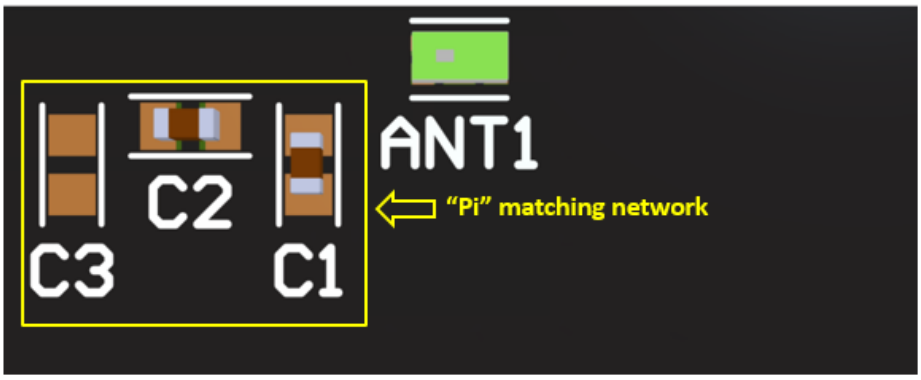
Designator	Type	Value	Manufacturer	Manufacturer Part Number
C1	Capacitor	0.4pF	Murata	GRM1555C1HR40CA01D
C2	Capacitor	0.5pF	Murata	GRM1555C1HR50CA01D
C3	Not Fitted	-	-	-



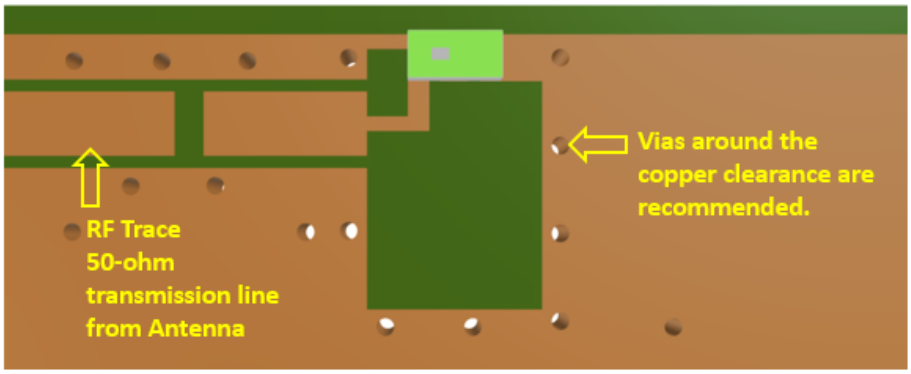
6.6 Antenna Integration

The WLA.04 should be placed mid-point on the long side of the PCB to take advantage of the ground plane extending from each side of the antenna.

The RF trace must maintain a 50 Ohm transmission line. A “Pi” Matching Network is recommended for the RF transmission line, the values and components for the matching circuit will depend on the tuning needed. Ground vias should be placed around the copper clearance area.



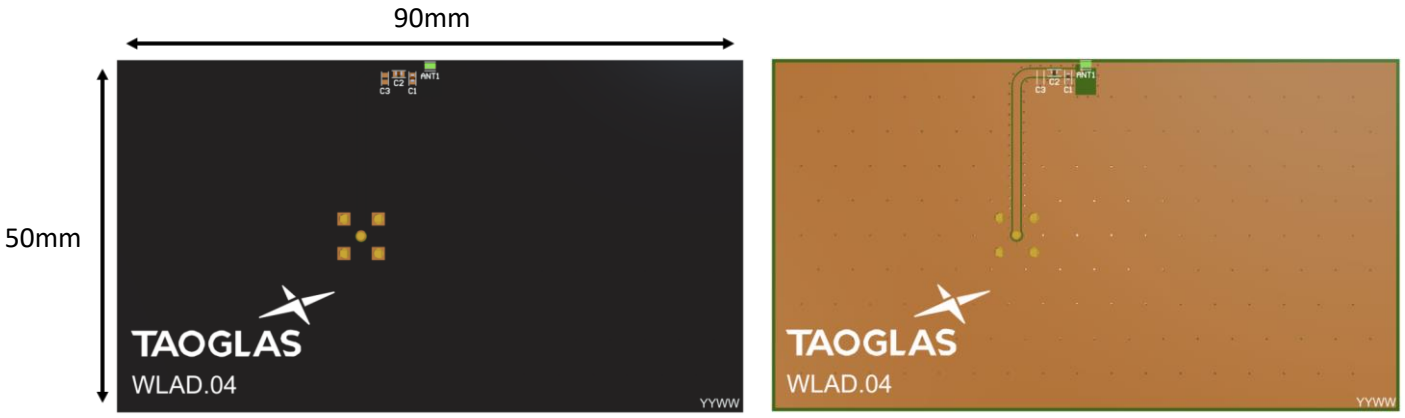
WLA.04 antenna mounted on a PCB, showing “Pi” matching network.



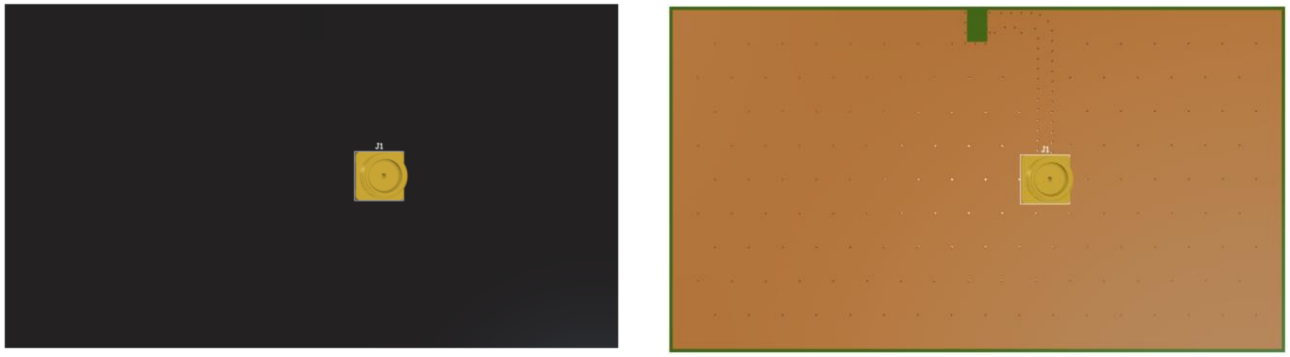
WLA.04 antenna mounted on a PCB, showing transmission line and integration notes.

6.7 Final Integration

The top side image shown below highlights the antenna transmission line. Taoglas recommends using a minimum of 90x50mm ground plane (PCB) to ensure optimal performance.`



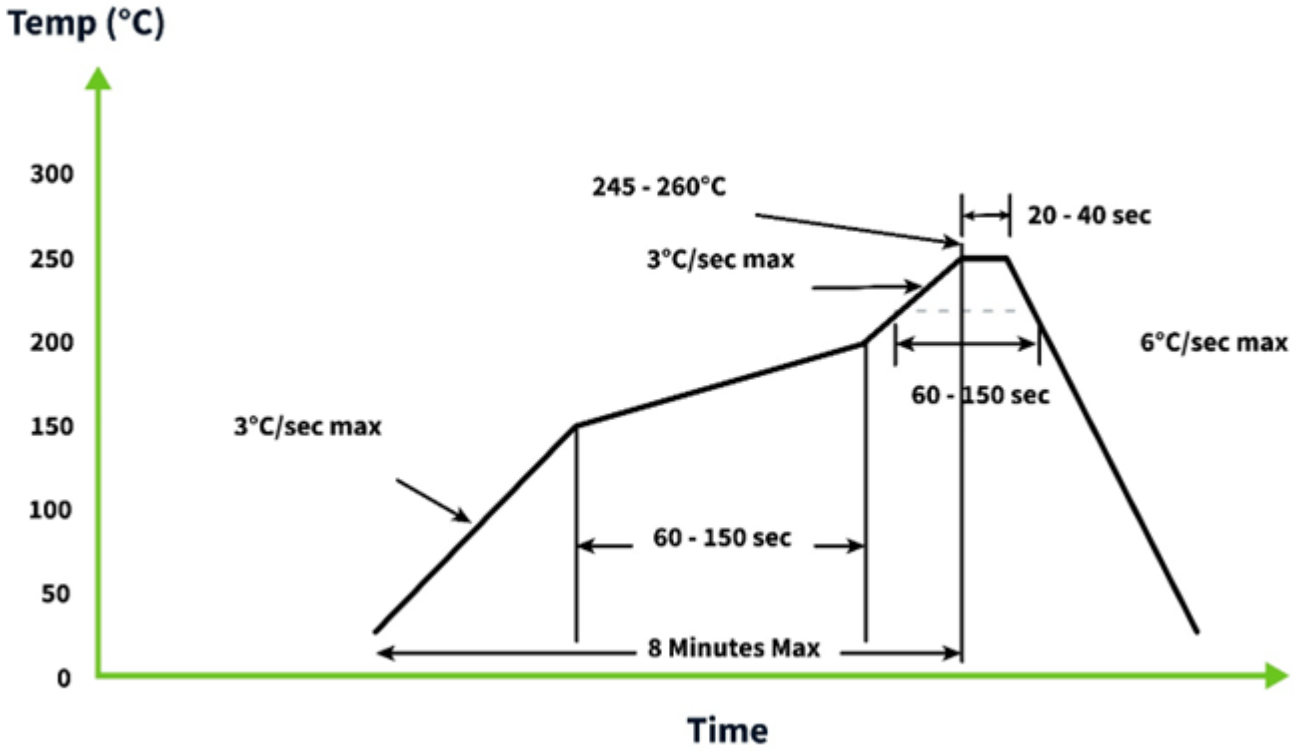
Top Side (WLA.04 placement on 90x50mm PCB)



Bottom Side (90x50mm PCB)

7. Solder Reflow Profile

The WLA.04 can be assembled by following the recommended soldering temperatures are as follows:



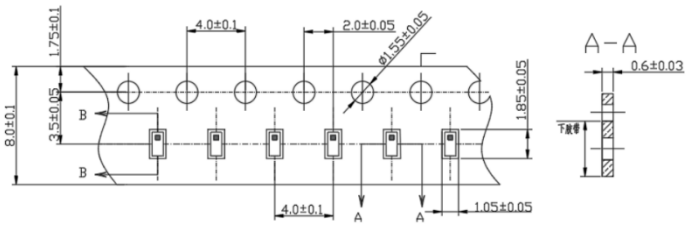
*Temperatures listed within a tolerance of +/- 10º C

Smaller components are typically mounted on the first pass, however, we do advise mounting the WLA.04 when placing larger components on the board during subsequent reflows.

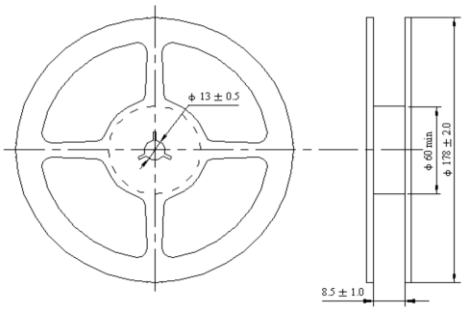
Note: Soldering flux classified ROL0 under IPC J-STD-004 is recommended.

8. Packaging

1pc WLA.04 per Tape



6000pcs WLA.04 per reel



Changelog for the datasheet

SPE-23-8-135 – WLA.04

Revision: B (Current Version)	
Date:	2024-01-24
Notes:	Full datasheet update, addition of new integration guide.
Author:	Gary West

Previous Revisions

Revision: A (Original First Release)	
Date:	2023-05-23
Notes:	First Release
Author:	Cesar Sousa

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