TAOGLAS

Datasheet

SWLP.2450.10.4.A.02

Description:

10*10*4mm 2.4GHz Wi-Fi SMD Patch Antenna

Features:

2.4 - 2.5GHz Wi-Fi Patch Antenna

For Wi-Fi/WLAN/ISM/Zigbee Industrial Applications

Linearly Polarized

RoHS & Reach Compliant

1. Introduction

The SWLP.2450.10.4.A.02 patent pending 10mm SMT ceramic patch antenna is a breakthrough antenna in terms of size and performance. The smallest 2.4GHz patch available worldwide, it is ideally suited for 2.4 GHz applications such as Bluetooth LE, Wi-Fi, ISM, and ZigBee. It was developed specifically for Bluetooth LE wearable applications to work directly on ground (except for feed area) and over metal, device environments which traditional chip antennas cannot operate in. The antenna also does not need ground plane clearance around it (except for feed area). It provides omni-directional coverage similar to chip antennas on small boards. The antenna exhibits 24.8% efficiency on a 12*16mm ground plane at 2455 MHz If utilized on a 50*50 ground plane, efficiency will improve to 40% at 2455MHz.

Many module manufacturers specify peak gain limits for any antennas that are to be connected to that module. Those peak gain limits are based on free-space conditions. In practice, the peak gain of an antenna tested in free space can degrade by at least 1 or 2dBi when put inside a device. So ideally you should go for a slightly higher peak gain antenna than mentioned on the module specification to compensate for this effect, giving you better performance.

Upon testing of any of our antennas with your device and a selection of appropriate layout, integration technique, or cable, Taoglas can make sure any of our antennas' peak gain will be below the peak gain limits. Taoglas can then issue a specification and/or report for the selected antenna in your device that will clearly show it complying with the peak gain limits, so you can be assured you are meeting regulatory requirements for that module.

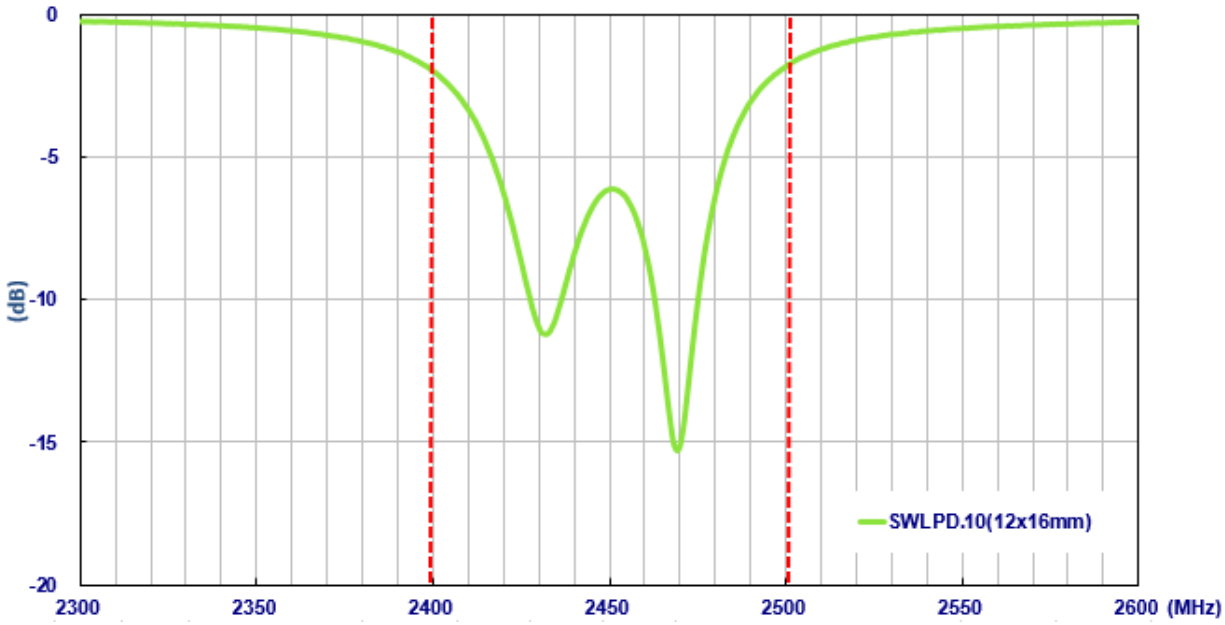
For example, a module manufacturer may state that the antenna must have less than 2dBi peak gain, but you don't need to select an embedded antenna that has a peak gain of less than 2dBi in free space. This will give you a less optimized solution. It is better to go for a slightly higher free-space peak gain of 3dBi or more if available. Once that antenna gets integrated into your device, performance will degrade below this 2dBi peak gain due to the effects of GND plane, surrounding components, and device housing. If you want to be absolutely sure, contact Taoglas and we will test. Choosing a Taoglas antenna with a higher peak gain than what is specified by the module manufacturer and enlisting our help will ensure you are getting the best performance possible without exceeding the peak gain limits.

2. Specifications

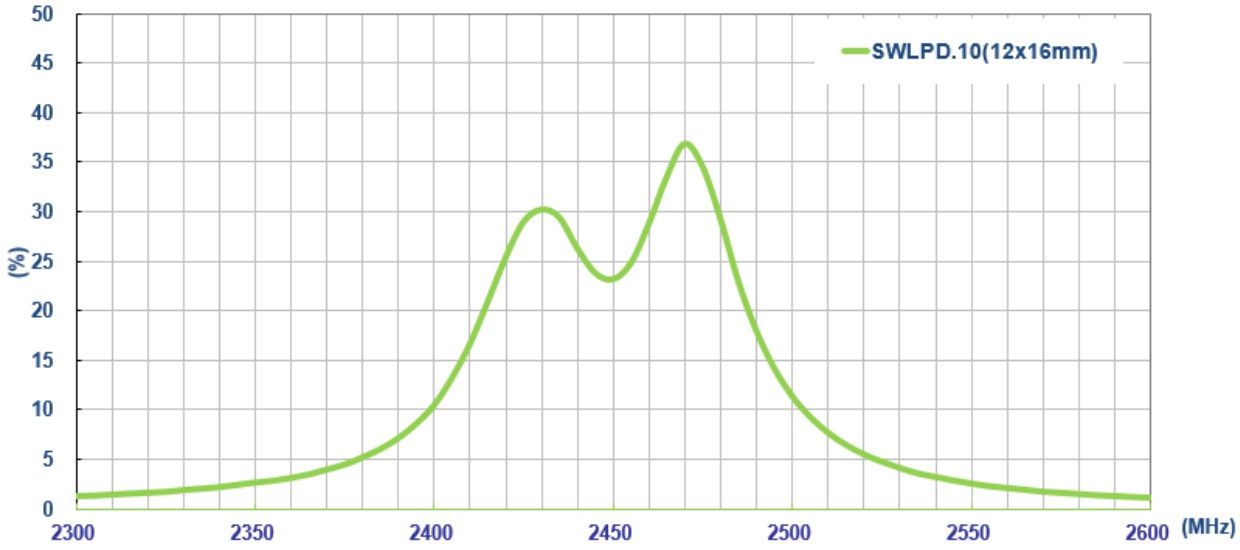
Electrical	
Frequency Range	2400~2500MHz
Efficiency	24.80% @2455 MHz, Edge 10.42% @2400 MHz, 11.40% @2500 MHz
Average Gain	-6 dBi @2450 MHz
VSWR	3.0 max @ Centre Freq
Peak Gain	-1.0 dBi typ
Polarization	Linear
Impedance	50Ω
Mechanical	
Dimensions	10*10*4mm
Weight	3.1g
Environmental	
Operating Temperature	-40℃ to +85℃
Storage Temperature	-40℃ to +85℃
Termination	Ag (Environmentally Friendly Pb Free)
Moisture Sensitivity Level (MSL)	3 (168 Hours)

3. Antenna Characteristics

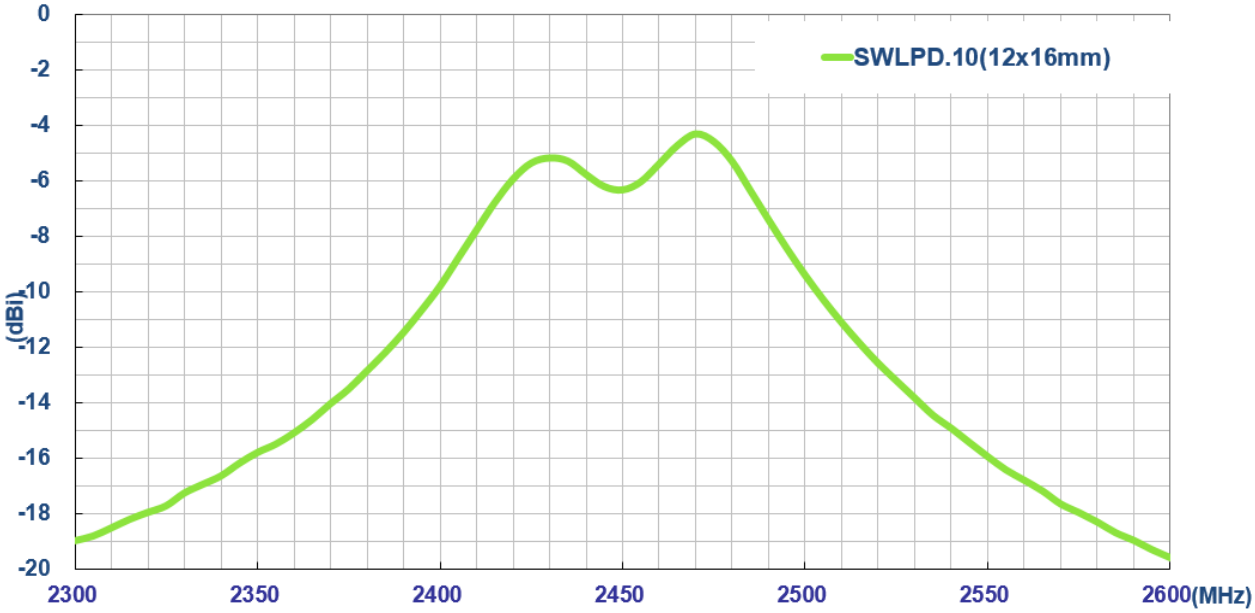
3.1 Return Loss



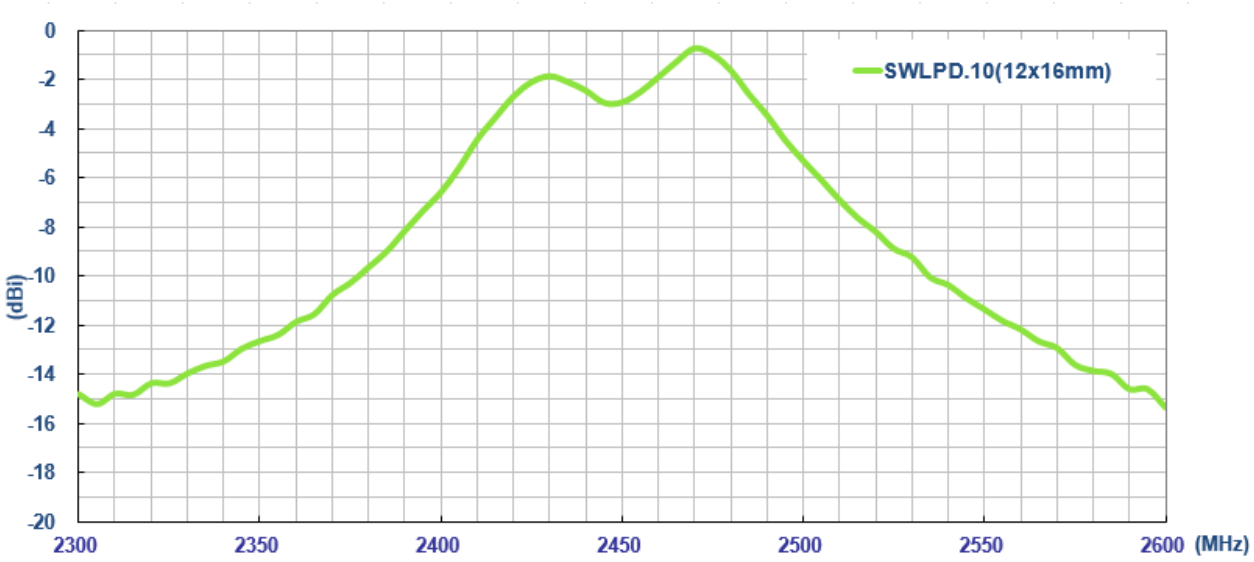
3.2 Efficiency



3.3 Average Gain

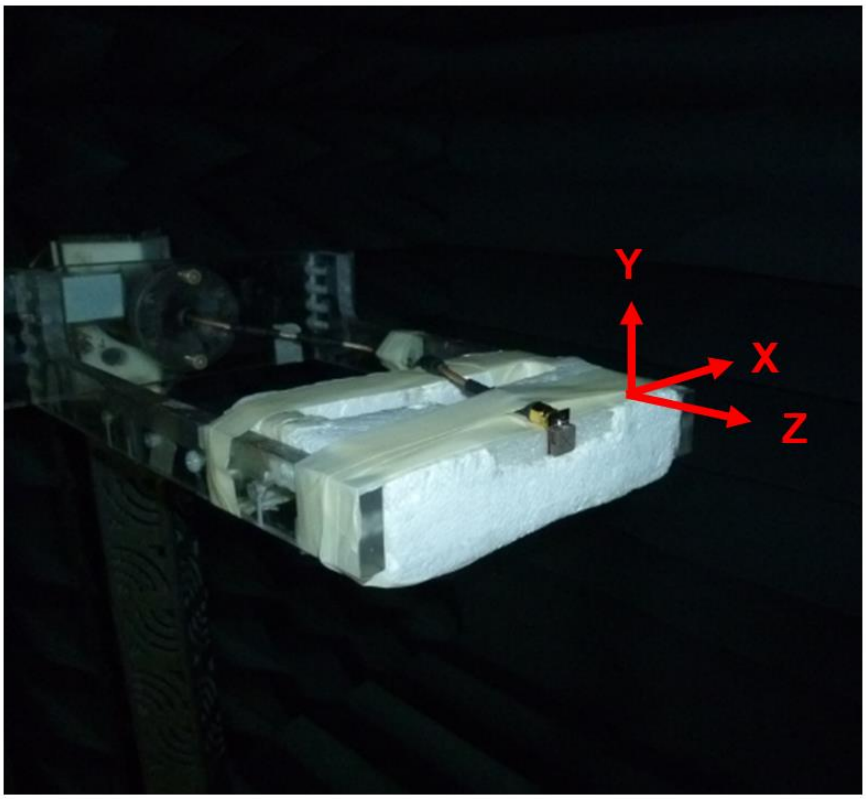


3.4 Peak Gain



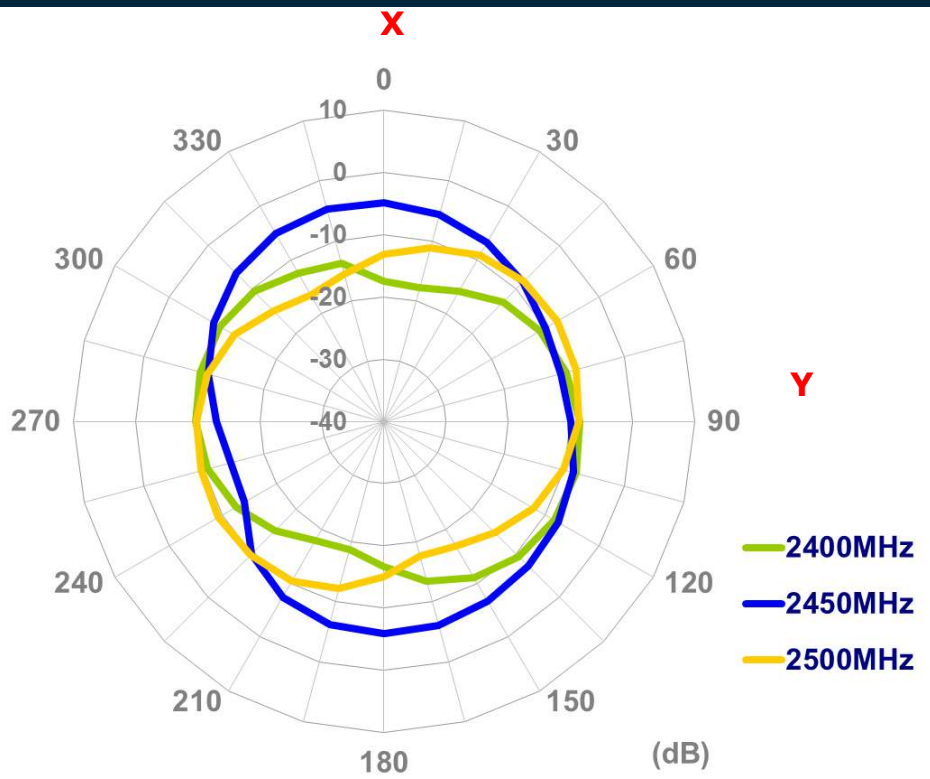
4. 2D Radiation Patterns

4.1 Test Setup

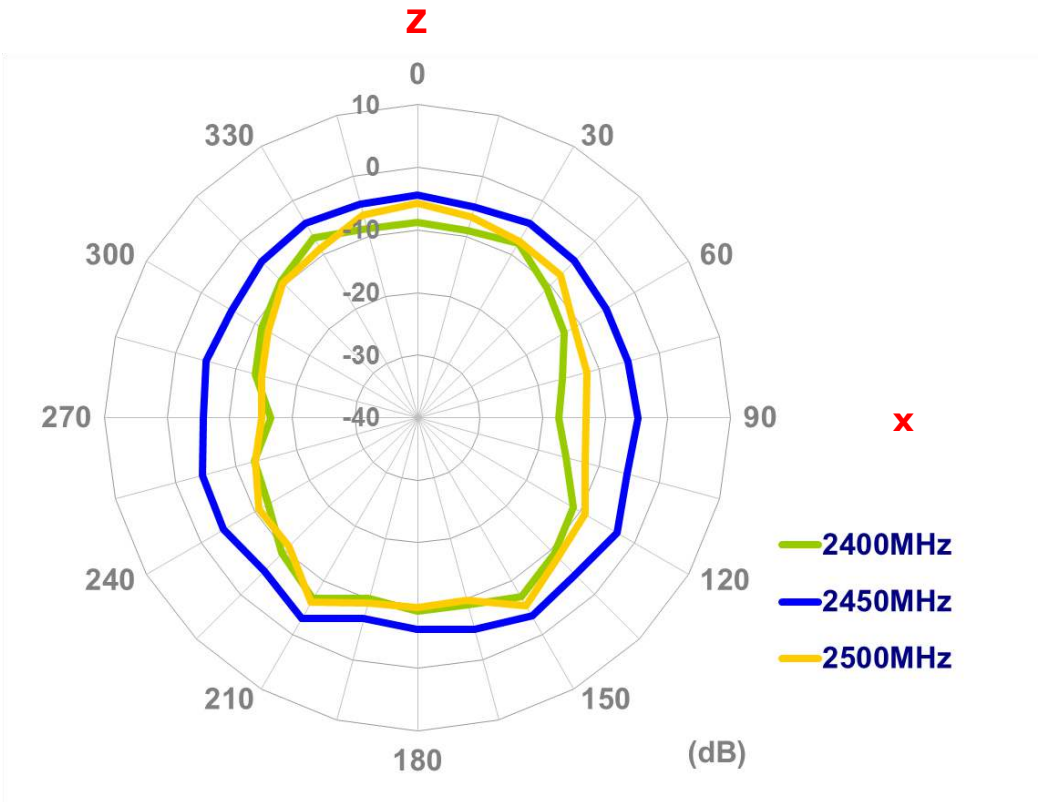


On Evaluation Board

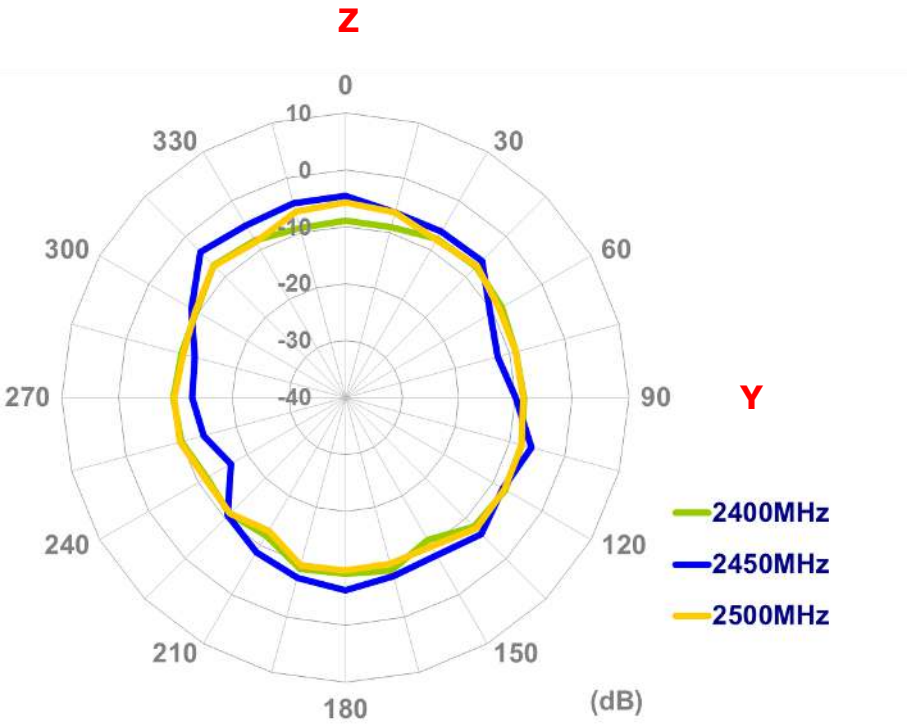
XY Plane



XZ Plane

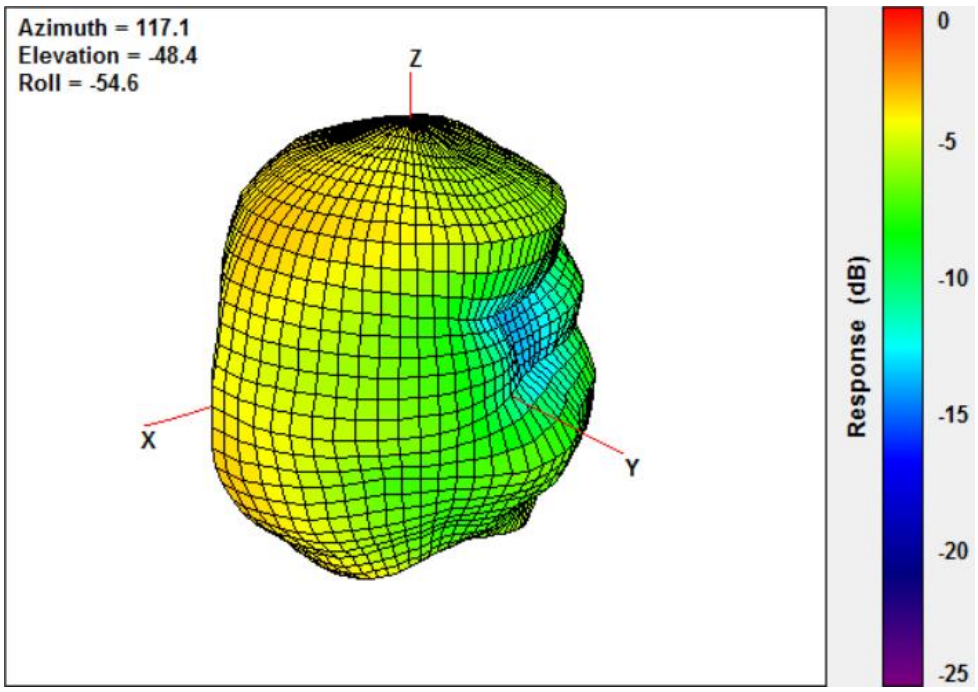


YZ Plane


Z
0
10
0
-10
-20
-30
-40
30
60
90
Y
120
150
180
210
240
270
300
330
(dB)
2400MHz
2450MHz
2500MHz

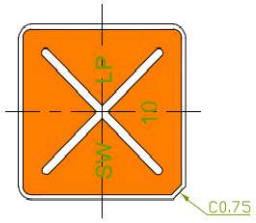
5. 3D Radiation Patterns

5.1 Radiation Pattern at 2450MHz

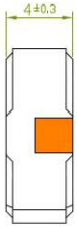


6. Mechanical Drawing (Units: mm)

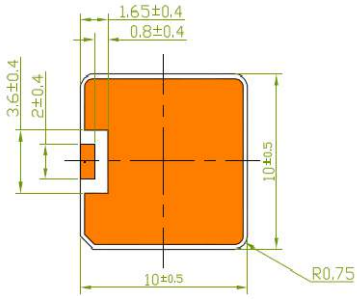
6.1 Antenna Dimension and Drawing



Top View

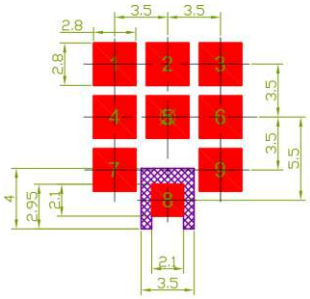
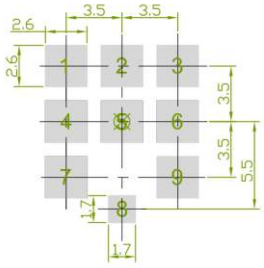
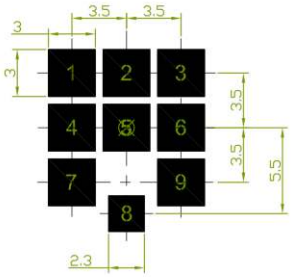
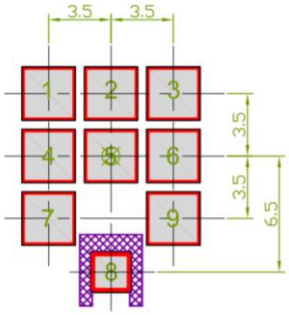


Side View



Bottom View

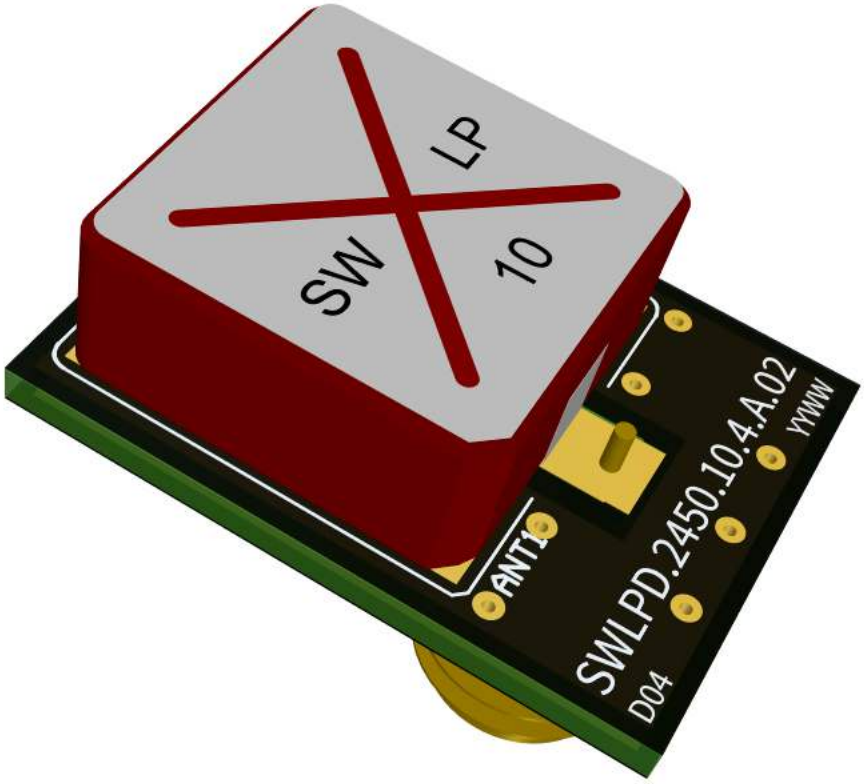
6.2 Antenna Footprint

6.1 Top Copper	6.2 Top Solder Paste
Pads 1, 2, 3, 4, 5, 6, 7 and 9 are the same size. They should be connected to GND. 	Pads 1, 2, 3, 4, 5, 6, 7 and 9 are the same size. 
6.3 Top Solder Mask	**6.4 Composite Diagram**
Pads 1, 2, 3, 4, 5, 6, 7 and 9 are the same size, This drawing is a negative of solder mask. Black regions are anti-mask. 	

NOTE:
1. Ag Plated area
2. Solder Mask area
3. Copper area
4. Paste area
5. Keepout Region area
6. Ground keepout should extend through all layers to minimize coupling from RF feed to ground.
7. Any vias in pads should be either filled or tented to prevent solder from wicking away from the pad during reflow.
8. The dimension tolerances should follow standard PCB manufacturing guidelines.

*Taoglas is able to provide CAD drawing file to customers for evaluation.

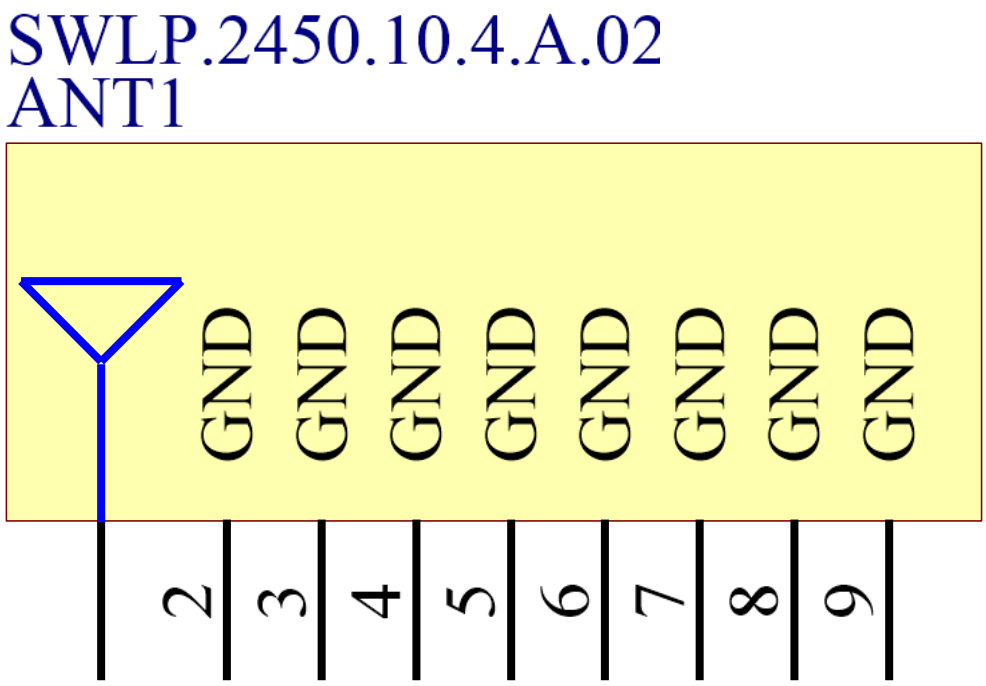
7. Antenna Integration Guide



7.1 Schematic Symbol and Pin Definition

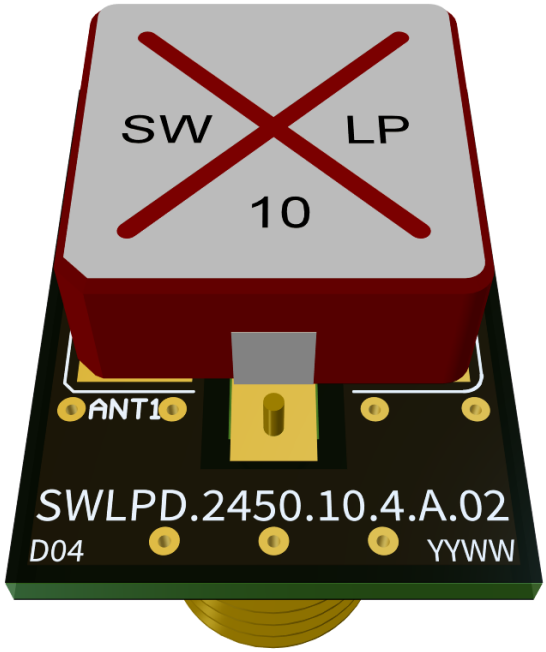
The circuit symbol for the antenna is shown below. The antenna has 9 pins as indicated below.

Pin	Description
1	RF Feed
2, 3, 4, 5, 6, 7, 8, 9	Ground

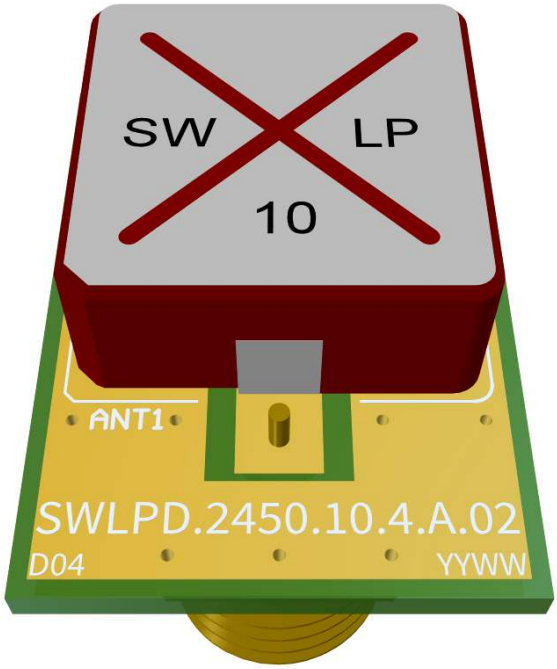


7.2 Antenna Integration

The antenna should be placed at the center of the ground plane with a length of 16mm and a width of 12mm. Maintaining a rectangle symmetric ground plane shape and symmetric environment around the antenna is critical to maintaining the excellent axial ratio and phase center performance shown in this datasheet.



Top Side w/ Solder Mask

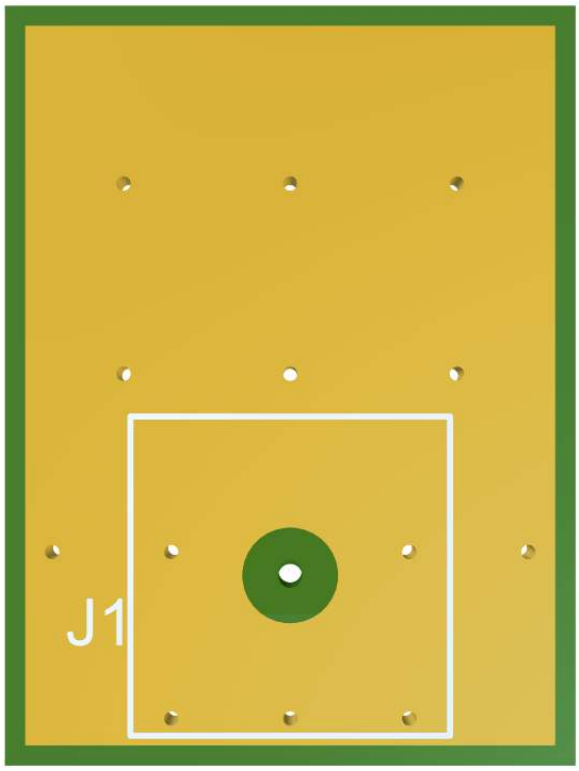


Top Side w/o Solder Mask

7.3 PCB Layout

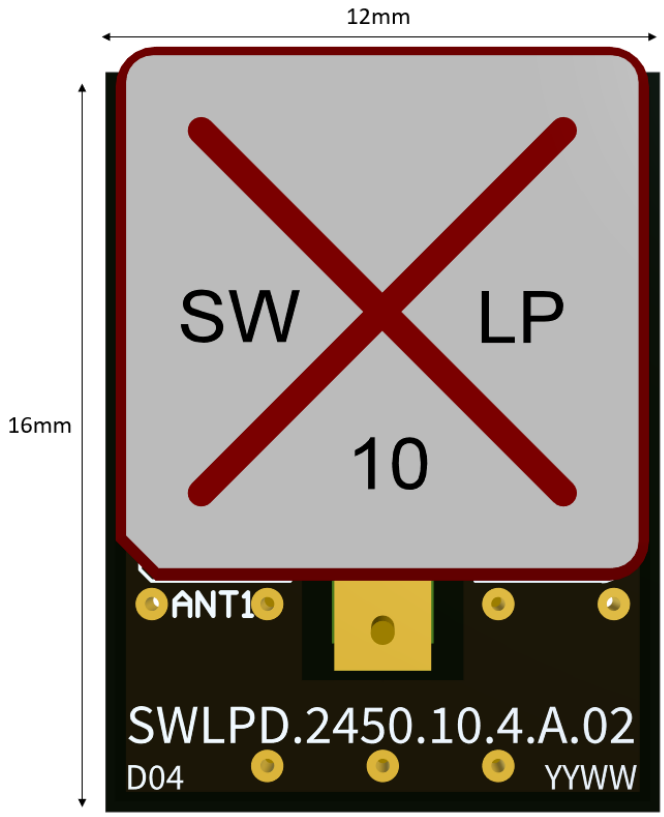
The footprint and clearance on the PCB must comply with the antenna specification. The PCB layout shown in the diagram below demonstrates the antenna footprint.

Topside

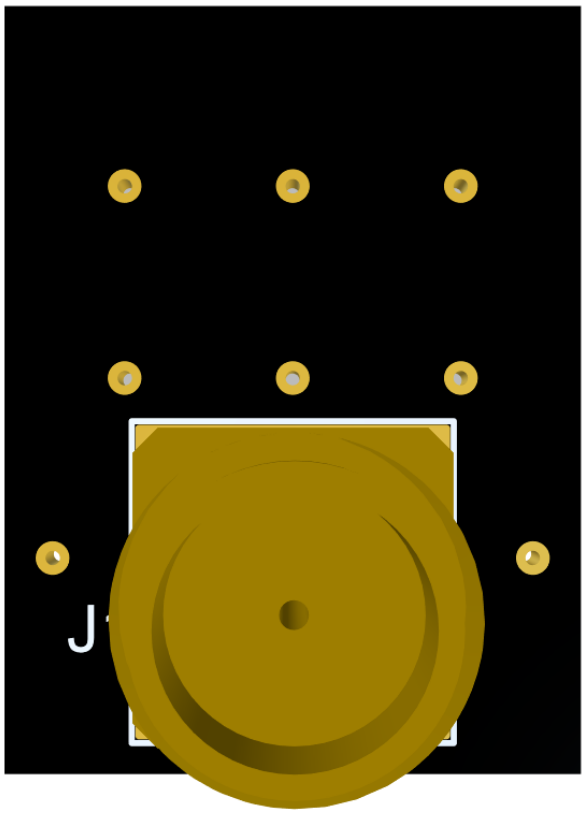


Bottom Side

7.4 Evaluation Board

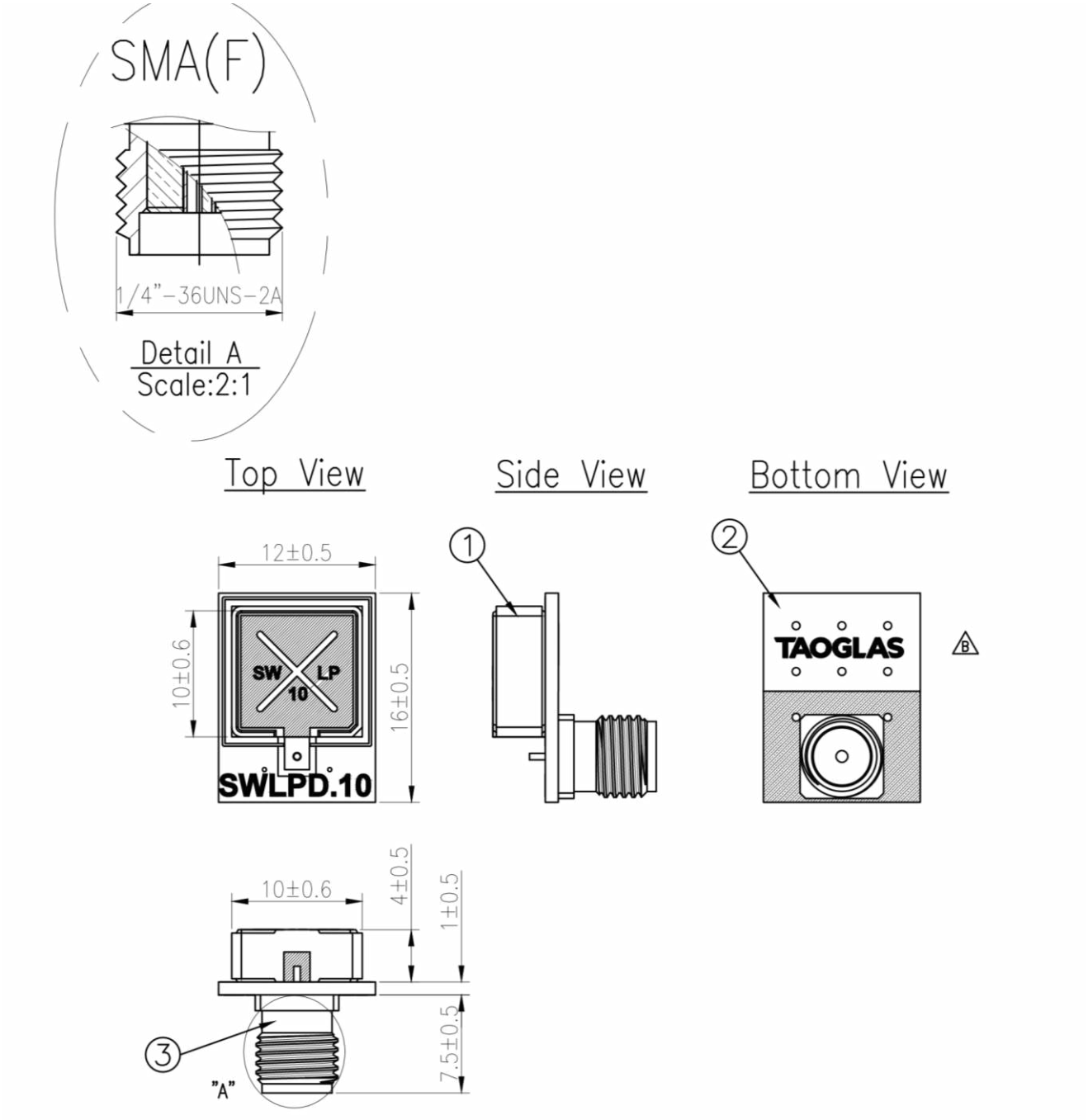


Topside



Bottom Side

8. Mechanical Drawing - Evaluation Board

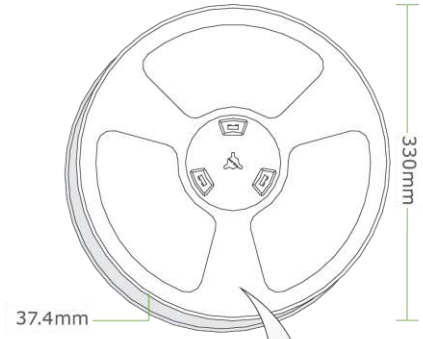


NOTES:
1. Silver Area
2. Logo & Text Ink Printing :White
3. Solder

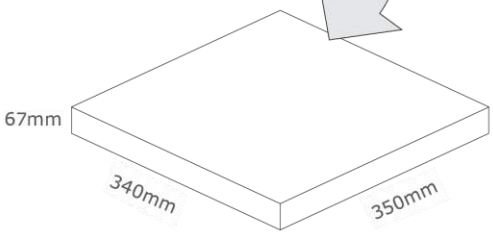
	Name	P/N	Material	Finish	QTY
1	SWLP.2450.10.4.A.02 Antenna	001514L030007A	Ceramic	N/A	1
2	SWLPD.10 EVB Board	100214L000007A	FR4 1.0t	Black	1
3	SMA (F) ST	200414L000007A	Brass	Au Plated	1

9. Packaging

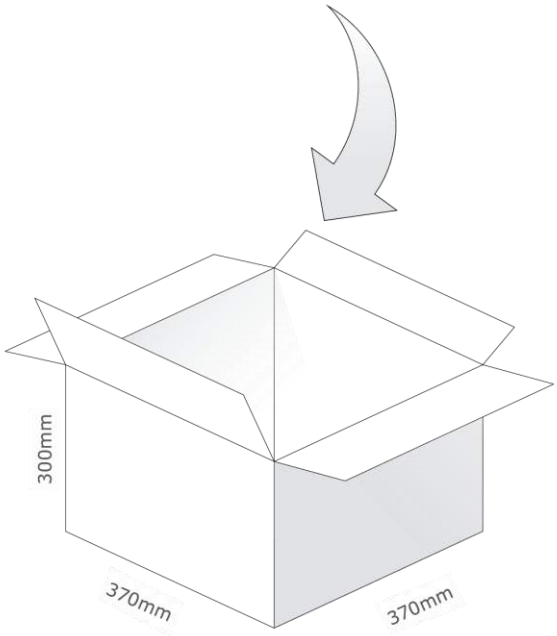
500pcs SWLP.2450.10.4.A.02 per Tape & Reel
Dimensions - ⌀330*37.4mm



1 Tape and Reel per Small Carton
Carton Dimensions - 340*350*67mm



2000pcs per Large Carton
Carton Dimensions - 370*370*300mm



Changelog for the datasheet

SPE-15-8-009 – SWLP.2450.10.4.A.02

Revision: C (Current Version)	
Date:	2023-06-22
Changes:	Antenna Integration Guide Added
Changes Made by:	Cesar Sousa

Previous Revisions

Revision: B	
Date:	2015-08-21
Changes:	Updated Specifications
Changes Made by:	Aine Doyle

Revision: A	
Date:	2019-11-25
Changes:	Initial Release
Changes Made by:	Author

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