TAOGLAS®



Datasheet

SMD Patch Antenna

Part No:
SWLP.2450.10.4.A.02

Description

10.0 x 10.0 x 4.0mm 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

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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 27.4% 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.

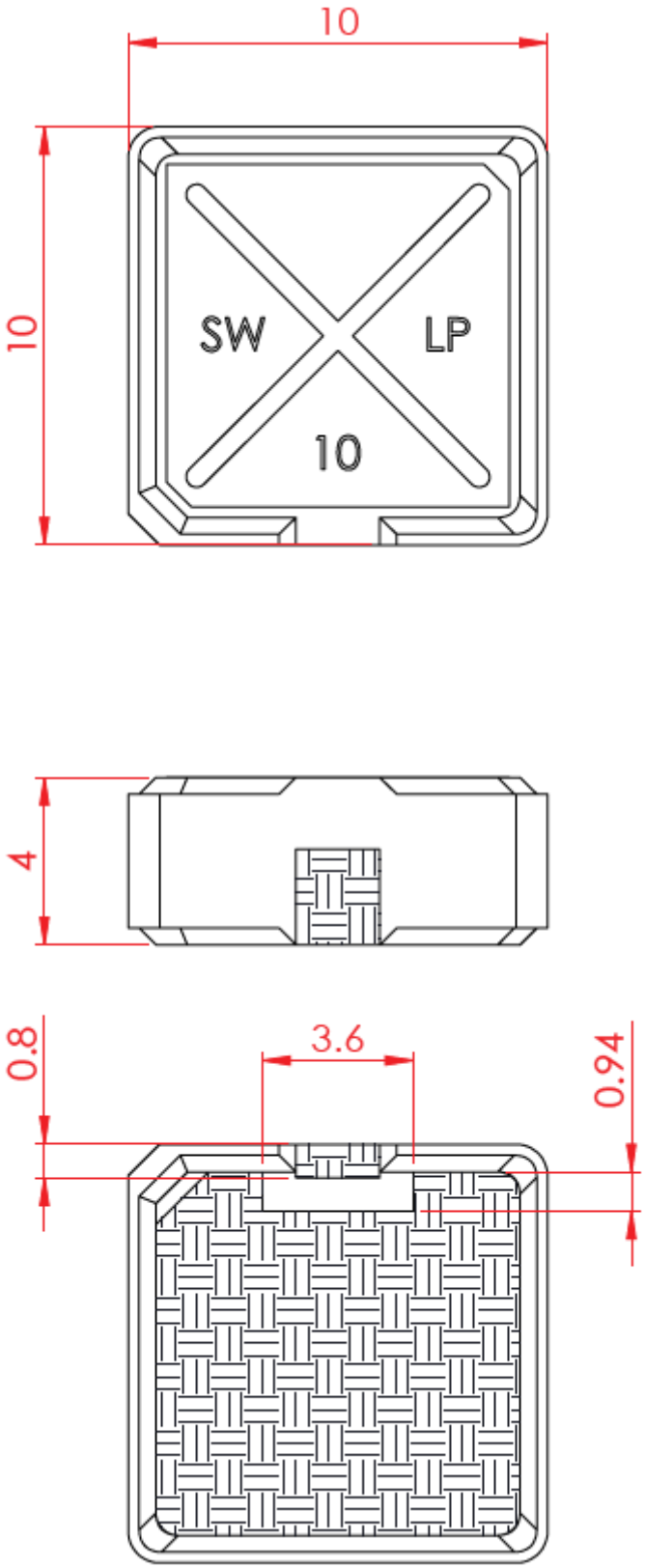
2. Specification

Electrical								
Band	Frequency (MHz)	Efficiency (%)	Average Gain (dB)	Peak Gain (dBi)	Impedance	Polarization	Radiation Pattern	Max. input power
Wi-Fi 2.4GHz	2400-2500	27.4	-5.62	-0.26	50 Ω	Linear	Omni directional	10W

Mechanical	
Dimensions	10.0 x 10.0 x 4.0mm
Weight	3.1g

Environmental	
Operating Temperature	-40°C to +85°C
Storage Temperature	-40°C to +85°C
Termination	Ag (Environmentally Friendly Pb Free)
Moisture Sensitivity Level (MSL)	3 (168 Hours)

3. Mechanical Drawing



4. Antenna Integration Guide

The following is an example on how to integrate the SWLP.2450.10.4.A.02 into a design. This antenna has 9 pins, where one pin is used for the RF Feed. Taoglas recommends using a minimum of 16x12mm ground plane (PCB) to ensure optimal performance.



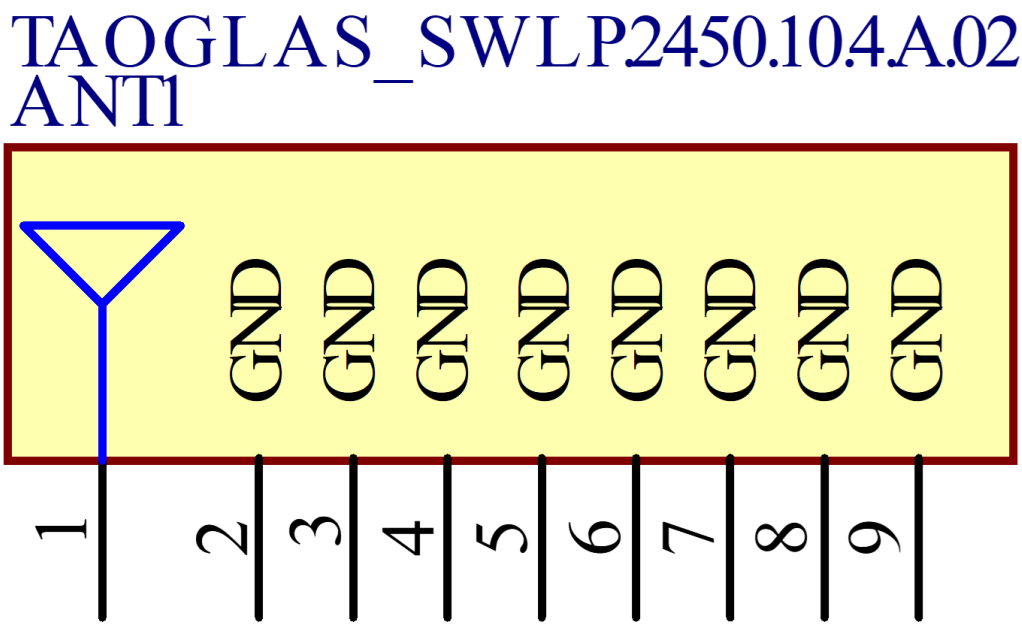
Top view of PCB reference design

Please find the Integration files in Altium, 2D formats and the 3D model for the SWLP.2450.10.4.A.02 here: https://www.taoglas.com/product/swlp-2450-10-4-a-02-2-4ghz-smd-patch-antenna-10mm/

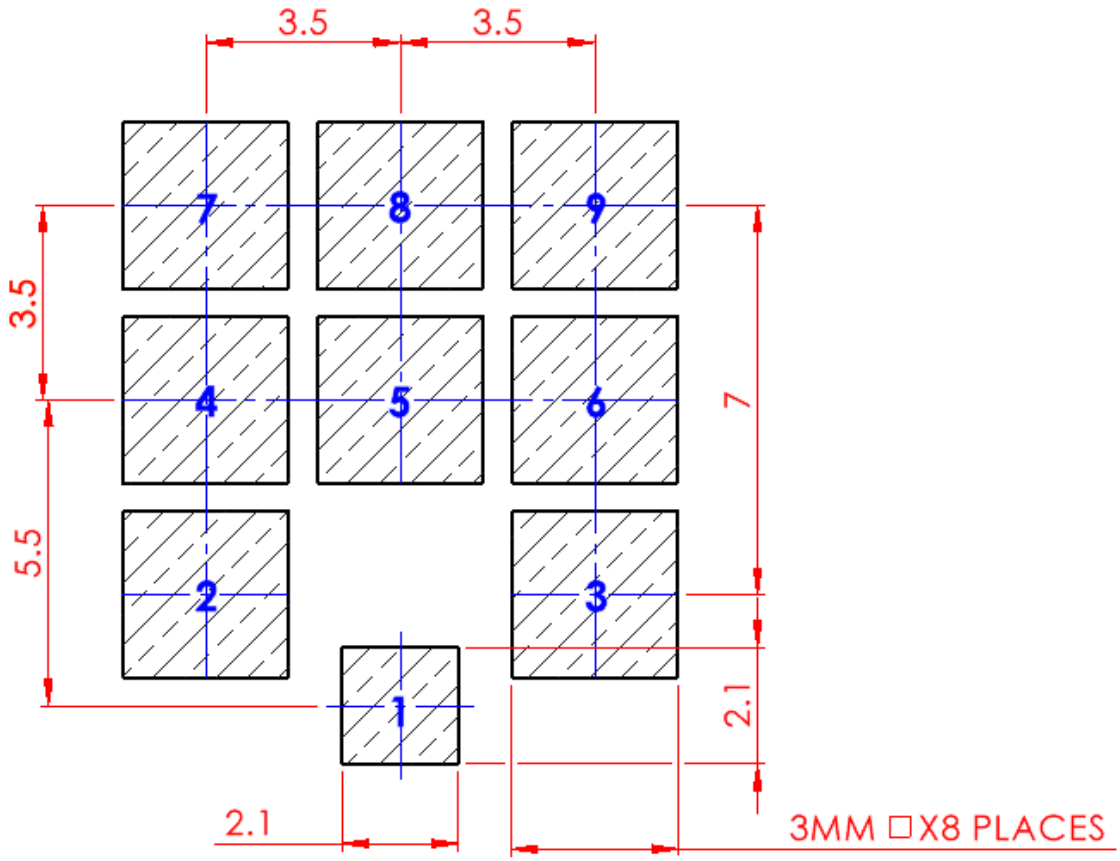
4.1 Schematic Symbol and Pin Definitions

The circuit symbol for the SWLP.2450.10.4.A.02 is shown below. The antenna has 9 pins as indicated below.

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

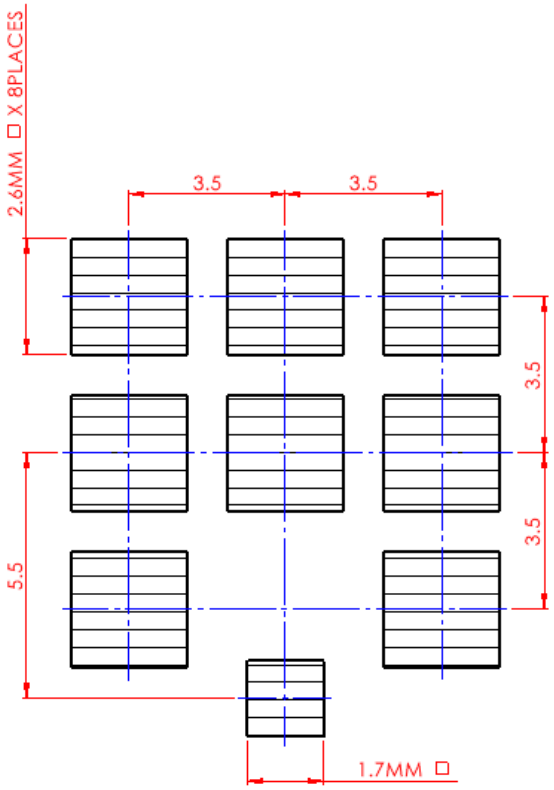


4.2 Footprint

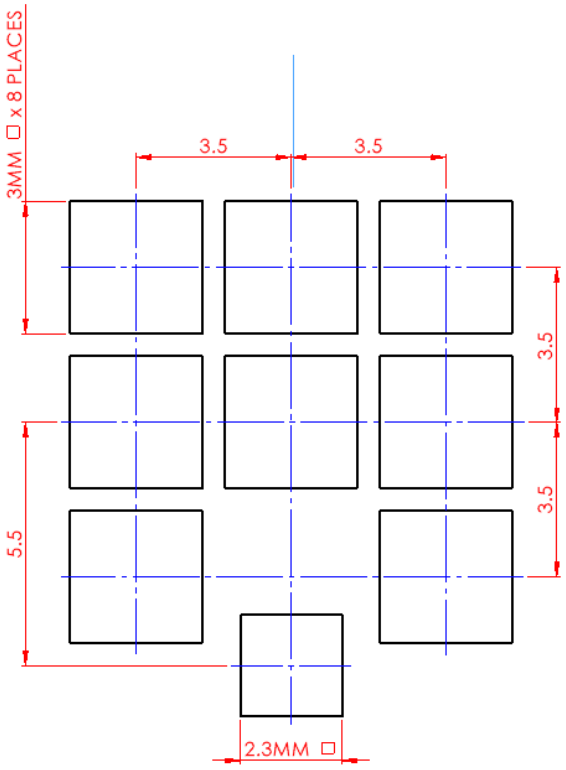


Pin	Description
1	RF Feed
2, 3, 4, 5, 6, 7, 8, 9	GND

4.3 Top Solder Paste



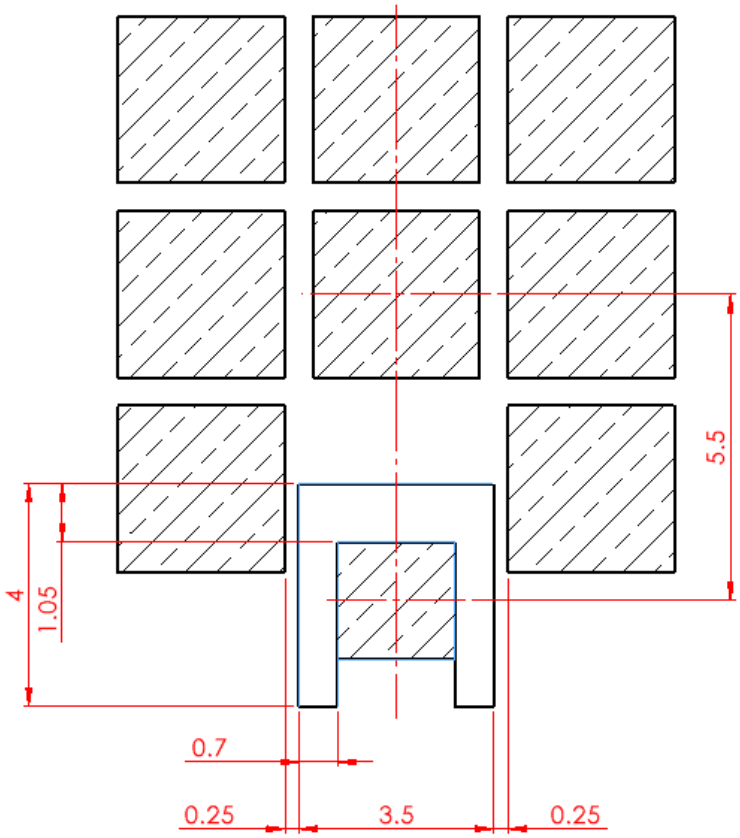
4.4 Top Solder Mask



4.5 Copper Clearance

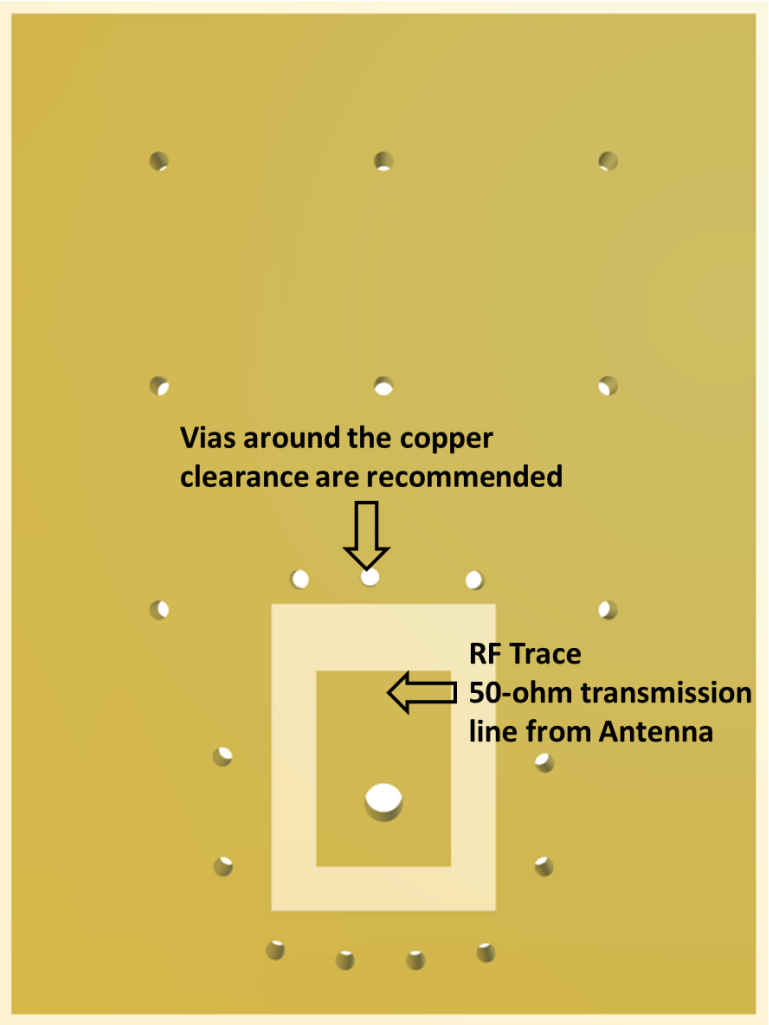
The footprint and clearance on the PCB must comply with the antenna's specification. The PCB layout shown in the diagrams below demonstrates the SWLP.2450.10.4.A.02 clearance area. The copper keep out area only applies to the same layer SWLP.2450.10.4.A.02 is placed on.

The copper clearance area should extend to 3.5mm in width and 4mm in length around the antenna feed pad.



4.6 Antenna Integration

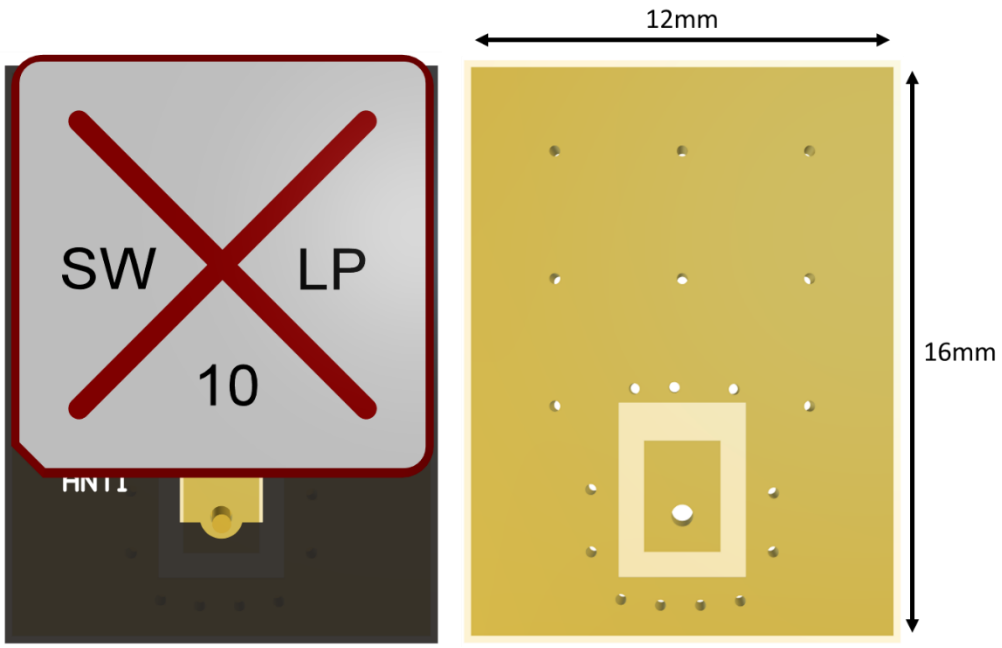
The SWLP.2450.10.4.A.02 should be placed near the centre of the PCB, to take advantage of the ground plane. The RF trace must maintain a 50 Ohm transmission line. Ground vias should be placed around the transmission line and the copper clearance area.



SWLP.2450.10.4.A.02 antenna mounted on a PCB reference design, showing the transmission line and integration notes.

4.7 Final Integration

The top side image shown below highlights the antenna transmission line. Taoglas recommends using a minimum of 16x12mm ground plane (PCB) to ensure optimal performance.



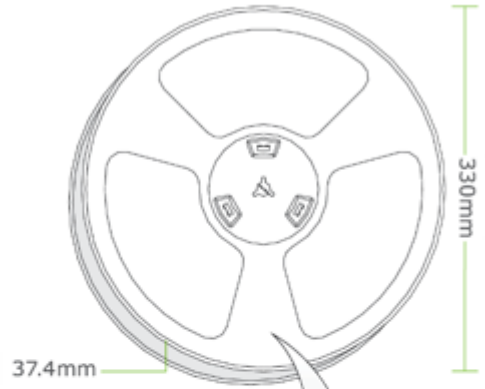
Top Side (SWLP.2450.10.4.A.02 placement on 16x12mm PCB reference design)



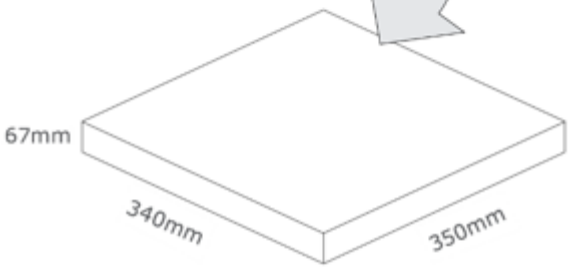
Bottom Side

5. Packaging

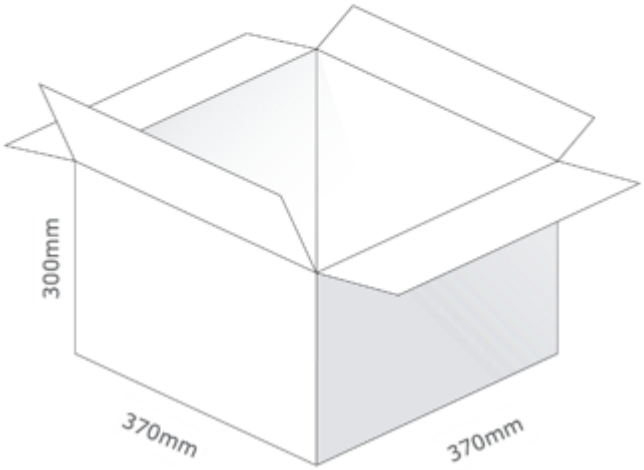
500pcs SWLP.2450.10.4.A.02 per Tape & Reel
Dimensions – Ø330 x 37.4mm



1Tape & Reel per small carton
Carton dimensions – Ø340 x 350 x 67mm

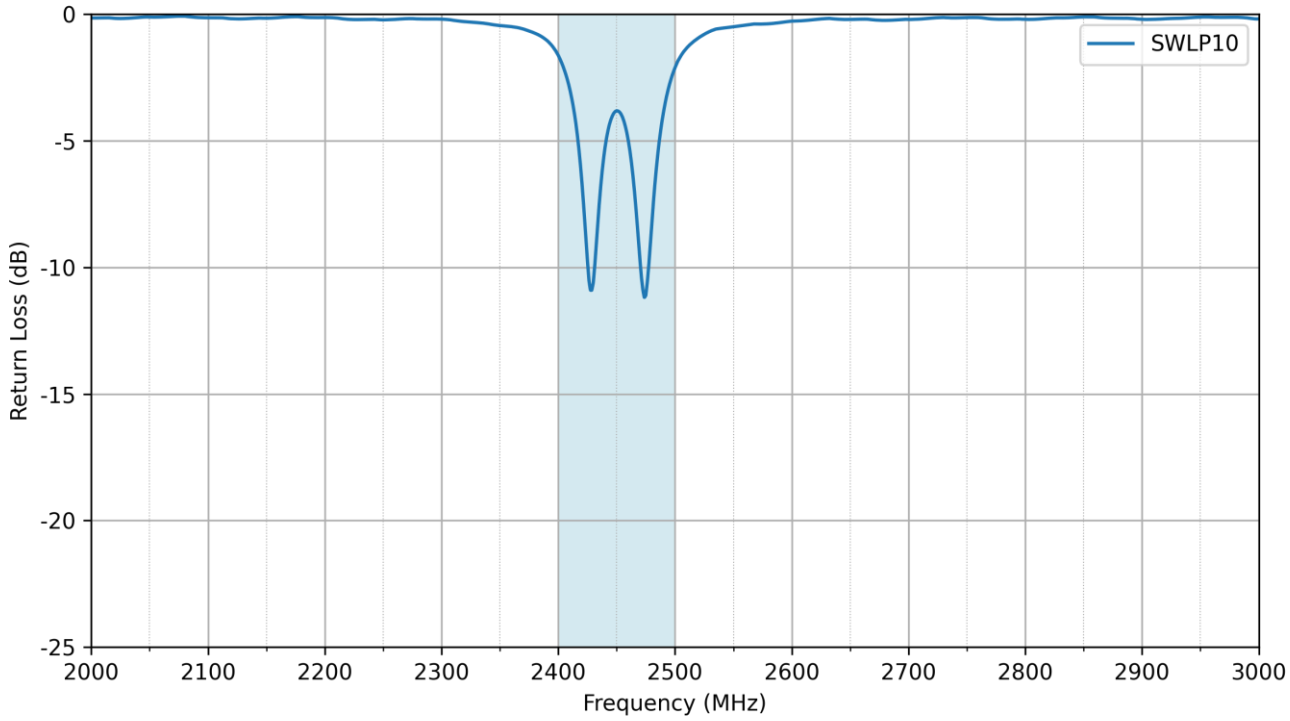


2000pcs per large carton
Carton dimensions – Ø370 x 370 x 300mm

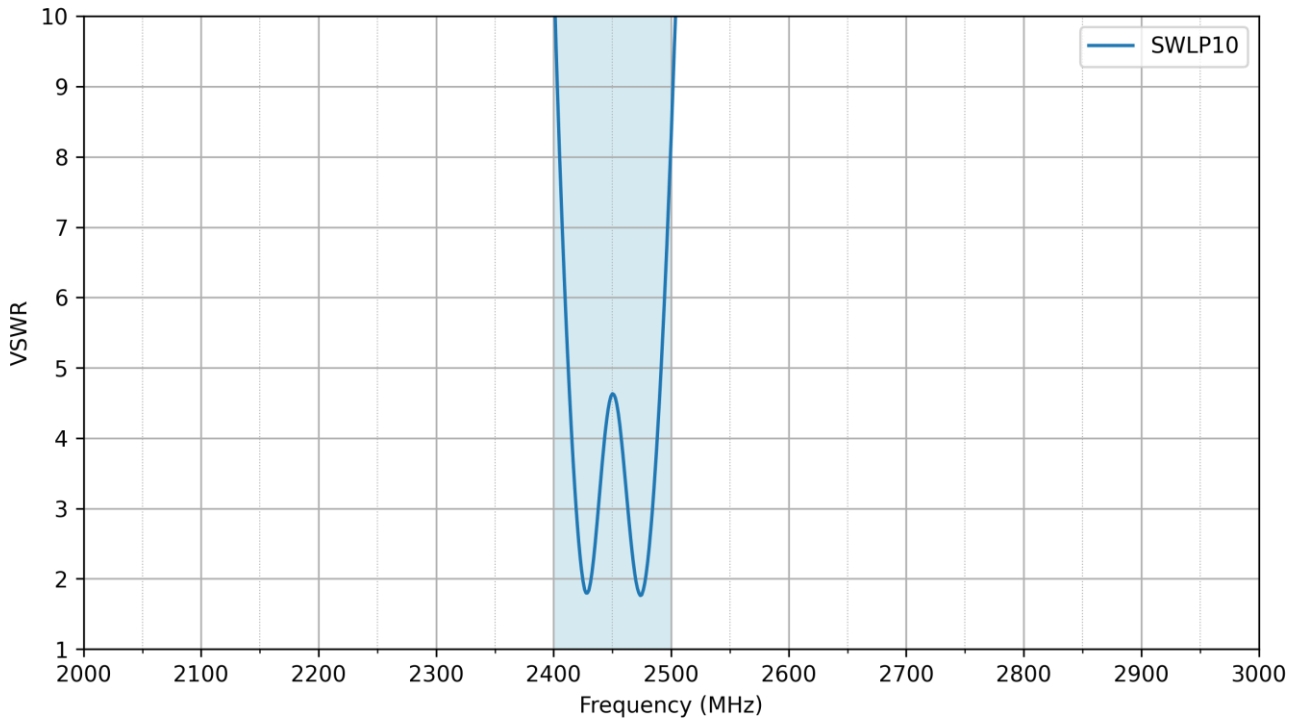


6. Antenna Characteristics

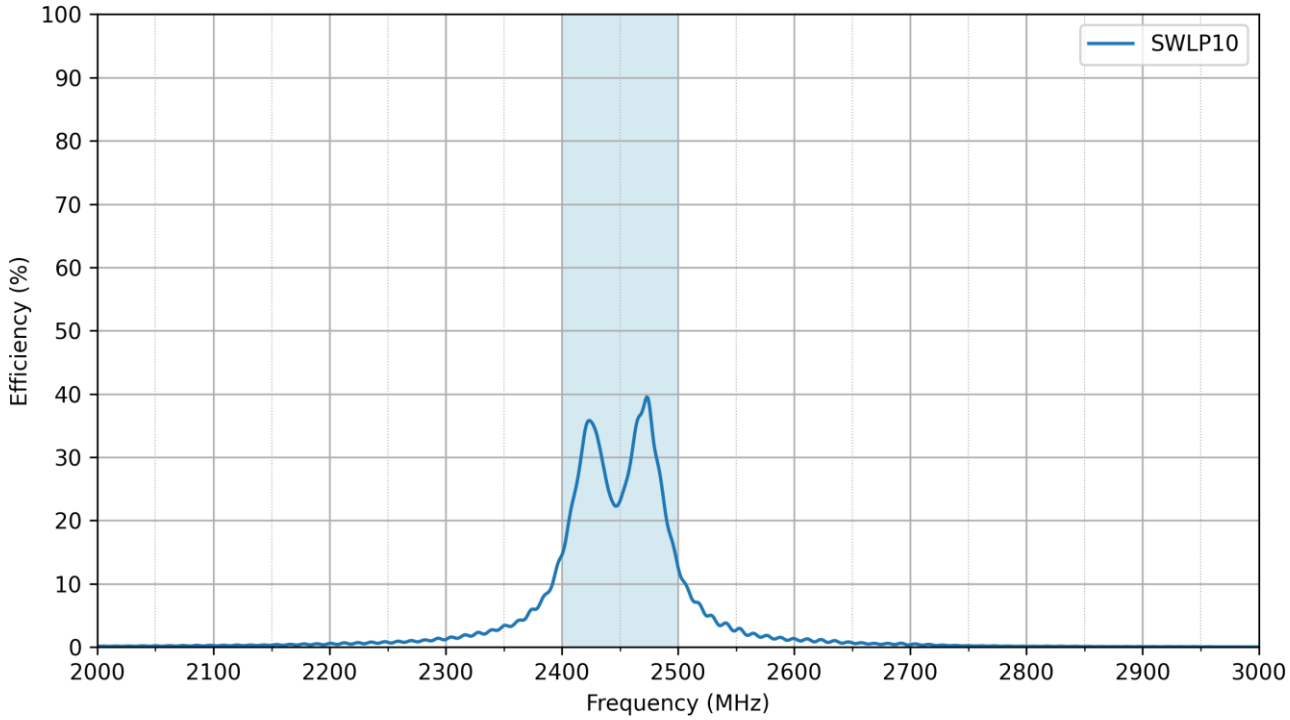
6.1 Return Loss



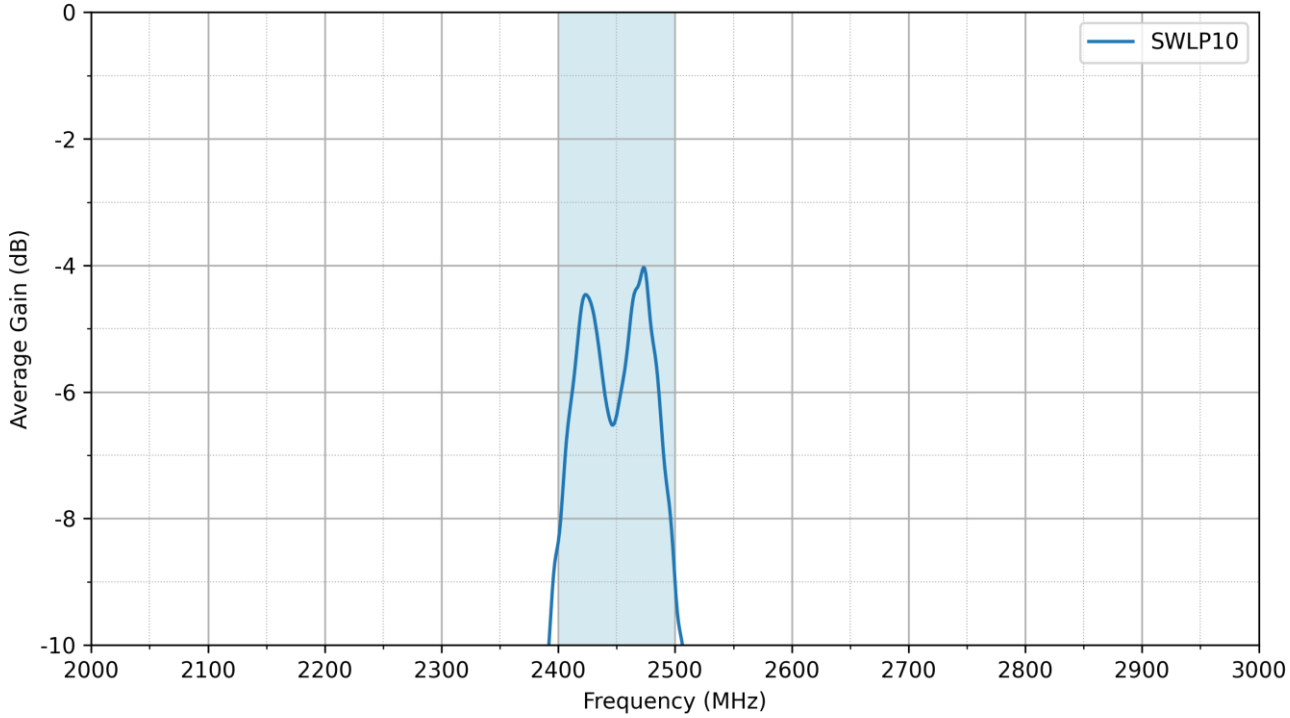
6.2 VSWR



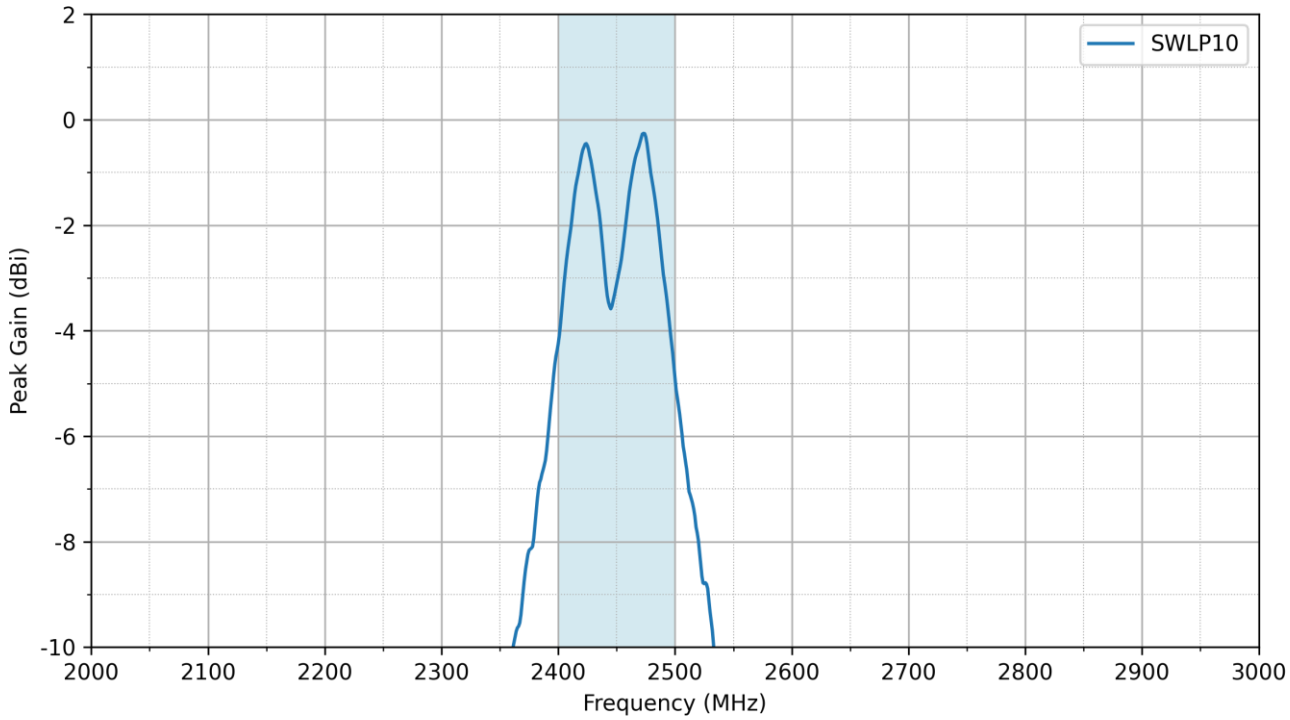
6.3 Efficiency



6.4 Average Gain

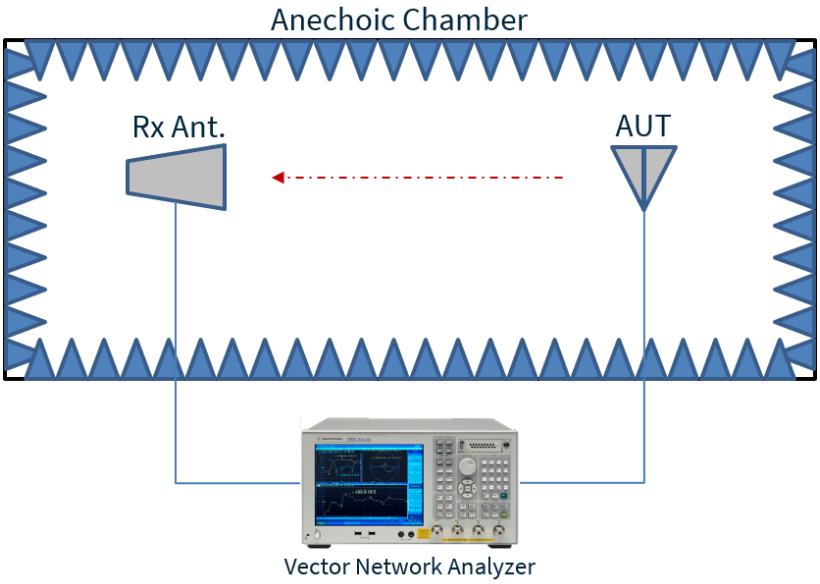


6.5 Peak Gain


SWLP10
Peak Gain (dBi)
2
0
-2
-4
-6
-8
-10
2000
2100
2200
2300
2400
2500
2600
2700
2800
2900
3000
Frequency (MHz)

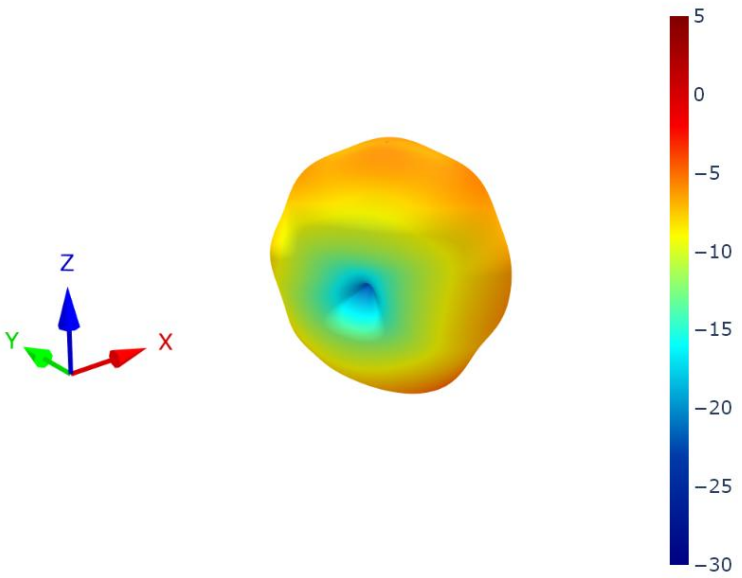
7. Radiation Patterns

7.1 Test Setup

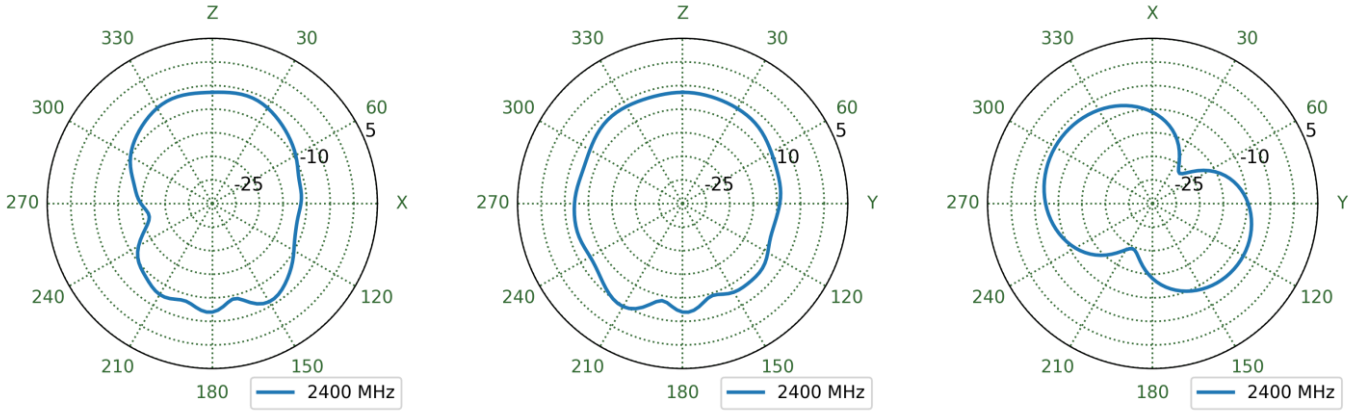




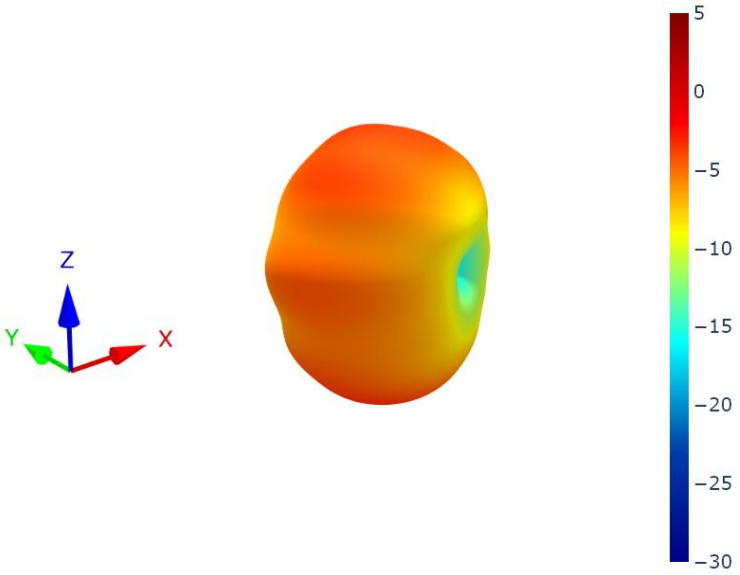
7.2 Patterns at 2400 MHz

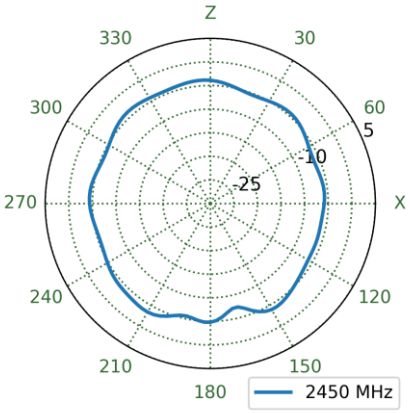
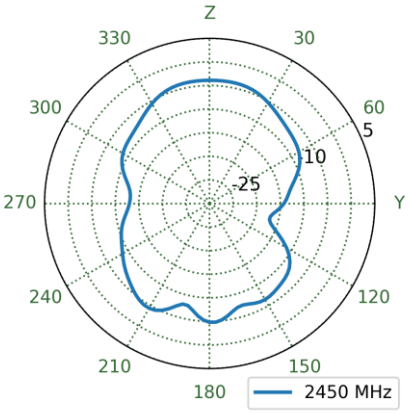
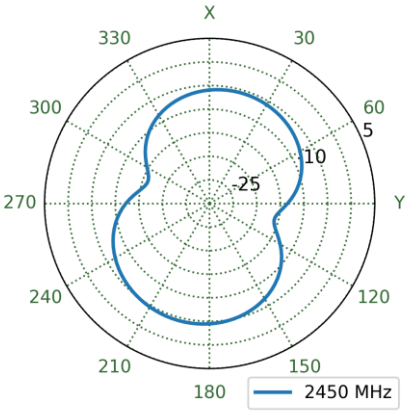


XZ Plane	YZ Plane	XY Plane

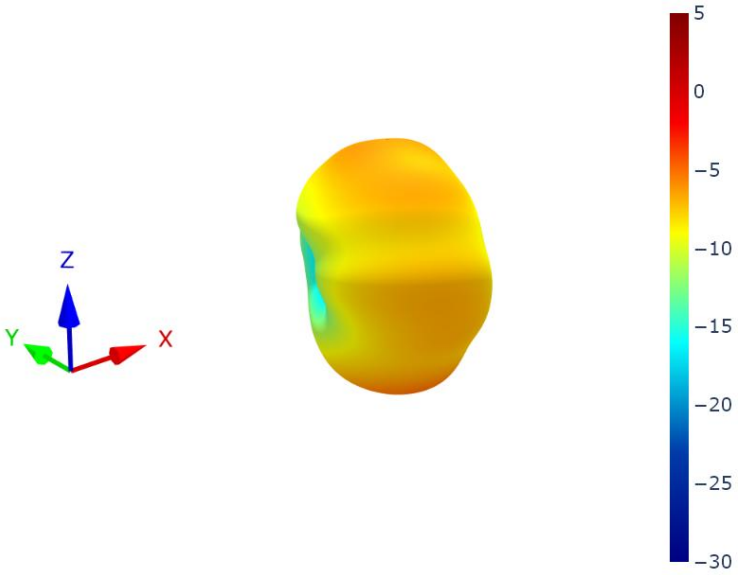


7.3 Patterns at 2450 MHz

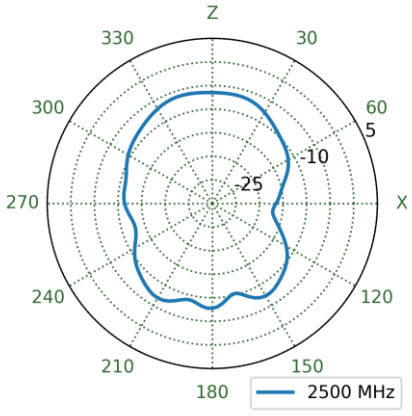


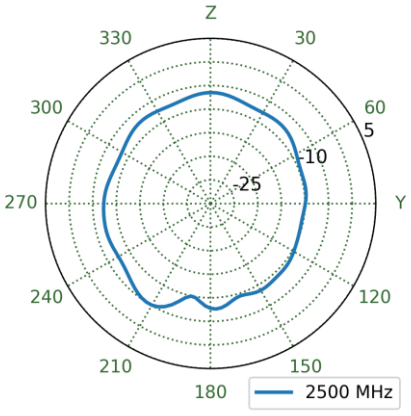
XZ Plane	YZ Plane	XY Plane
		

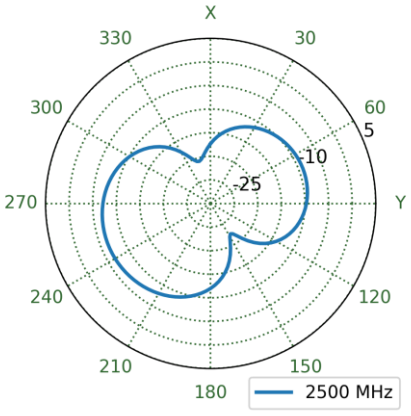
7.4 Patterns at 2500 MHz



XZ Plane	YZ Plane	XY Plane







Changelog for the datasheet

SPE-15-8-009 – SWLP.2450.10.4.A.02

Revision: E (Current Version)	
Date:	2026-05-18
Changes:	Updated antenna integration guide.
Changes Made by:	Gary West

Previous Revisions

Revision: D	
Date:	2023-11-17
Changes:	Full datasheet update
Changes Made by:	Gary West

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

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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