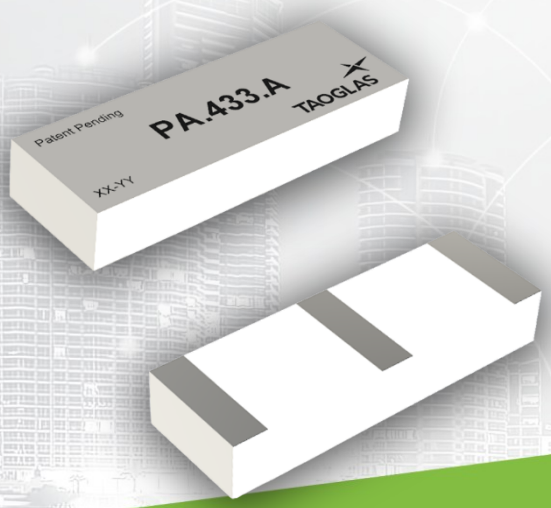
TAOGLAS



Datasheet

Part No:
PA.433.A

Description

433MHz Ceramic SMD Antenna 30.0 x 10.0 x 5.0 mm

Features:

Compact 433MHz Ceramic SMD Antenna
Frequency Range: 433 - 435 MHz
Dims: 30.0 x 10.0 x 5.0 mm
RoHS & Reach Compliant

1.	Introduction	3
2.	Specification	4
3.	Mechanical Drawing	5
4.	Antenna Integration Guide	6
5.	Packaging	14
6.	Antenna Characteristics	16
7.	Radiation Patterns	20
8.	Application Note	22
	Changelog	26

1. Introduction

The PA.433.A is a compact, high-performance ceramic SMD antenna designed for reliable wireless communication in the 433 MHz ISM band. Its robust ceramic structure ensures long-term durability, while the surface-mount design simplifies integration into compact PCB layouts. With an omnidirectional radiation pattern and stable electrical characteristics, the PA.433.A delivers consistent performance across diverse environments, even if the orientation of the device is not known.

Typical applications include:

- Smart Metering (water, gas, and electricity meters)
- Remote Keyless Entry (RKE) systems
- Industrial Control and automation equipment
- Wireless Sensor Networks (WSN)
- Home and Building Automation
- Remote Monitoring Systems
- Security and Access Control Devices

Engineered for ease of integration, the PA.433.A is ideally suited for space-constrained designs that require reliable, long-range sub-GHz communication.

For further optimization to customer-specific device environments and for support to integrate and test this antennas performance in your device, contact your regional Taoglas Customer Services Team.

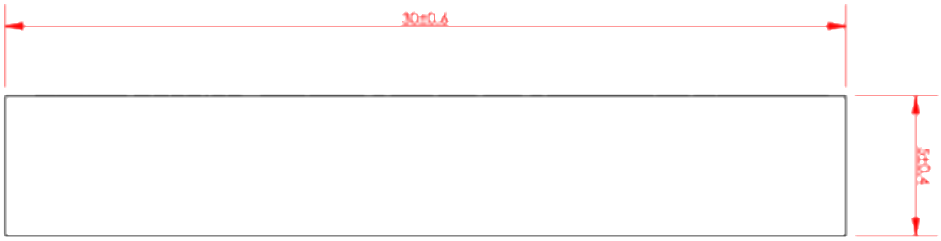
2. Specification

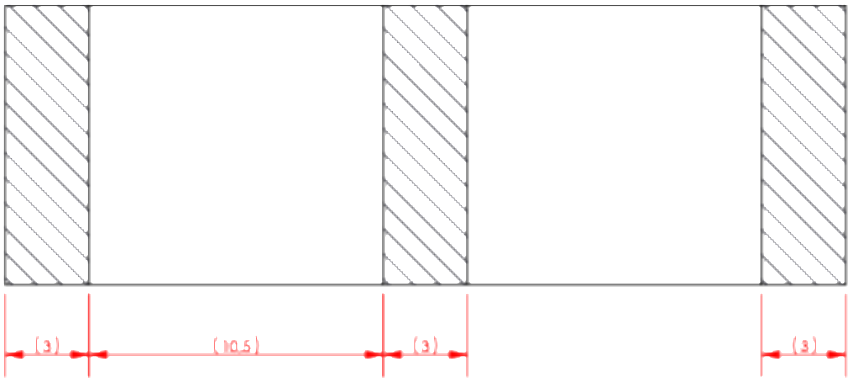
Electrical								
Band	Frequency (MHz)	Efficiency (%)	Average Gain (dB)	Peak Gain (dBi)	Impedance	Polarization	Radiation Pattern	Max. input power
433MHz	433-435	36.3	-4.40	-1.15	50 Ω	Linear	Omni directional	10W

Mechanical	
Dimensions	30.0 x 10.0 x 5.0 mm
Weight	6gCa
Material	Ceramic
Antenna Type	SMD

Environmental	
Operation Temperature	40°C to 85°C
Storage Temperature	40°C to 85°C
MSL	3

3. Mechanical Drawing





4. Antenna Integration Guide

The following is an example on how to integrate the PA.433.A into a design. This antenna has 3 pins, where one pin is used for the RF Feed. Taoglas recommends using a minimum of 149x50mm ground plane (PCB) to ensure optimal performance.

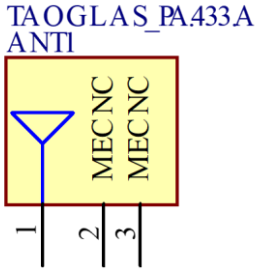
Top view of PCB reference design

4.1 Schematic Symbol and Pin Definitions

Above is a 3D model of the PA.433.A on a PCB reference design

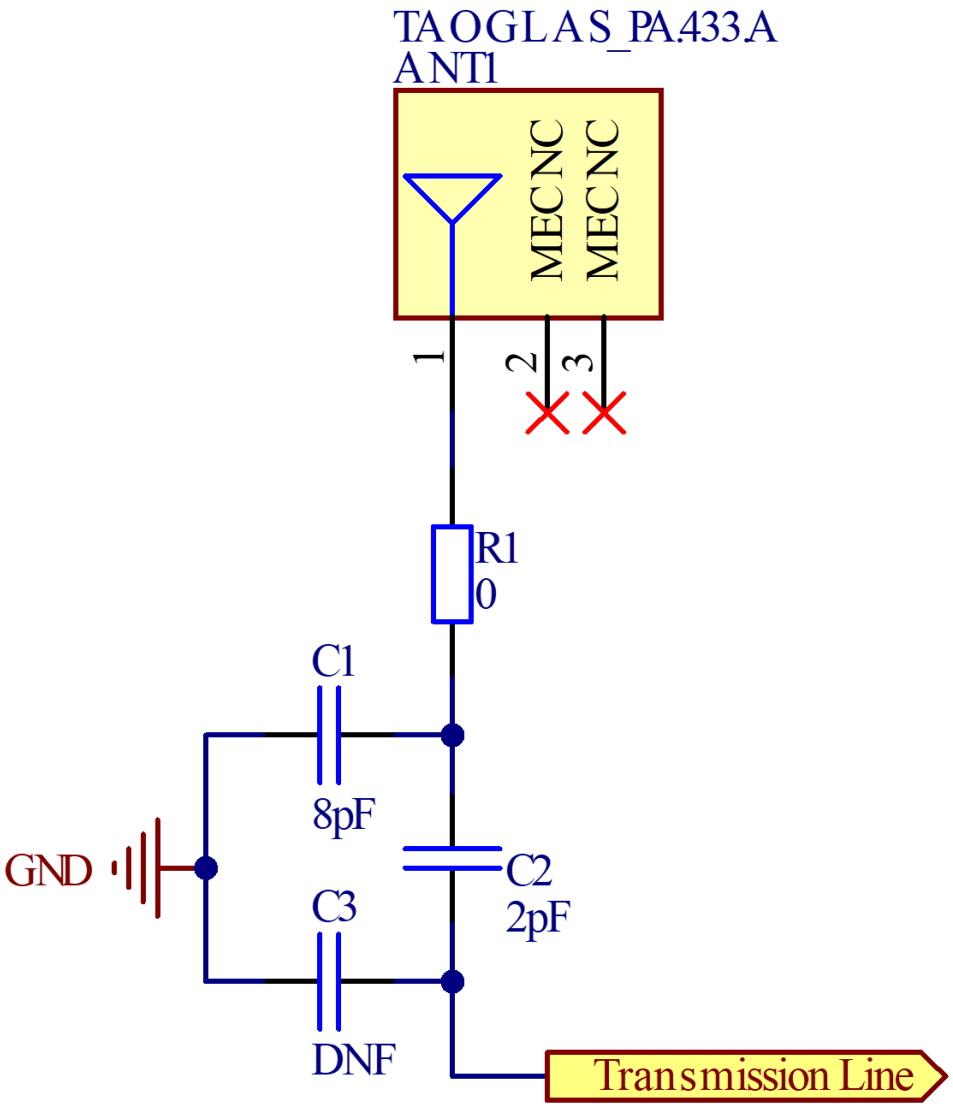
The circuit symbol for the PA.433.A is shown below. The antenna has 3 pins as indicated below.

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



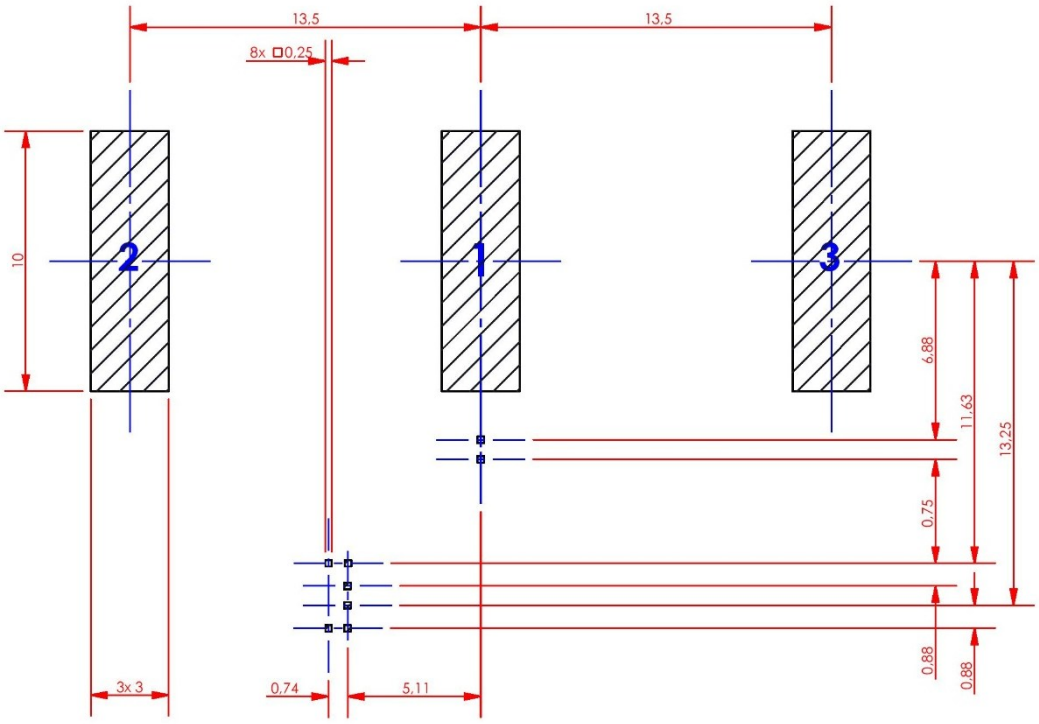
4.2 Schematic Layout

Matching components with the PA.433.A 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 PA.433.A.



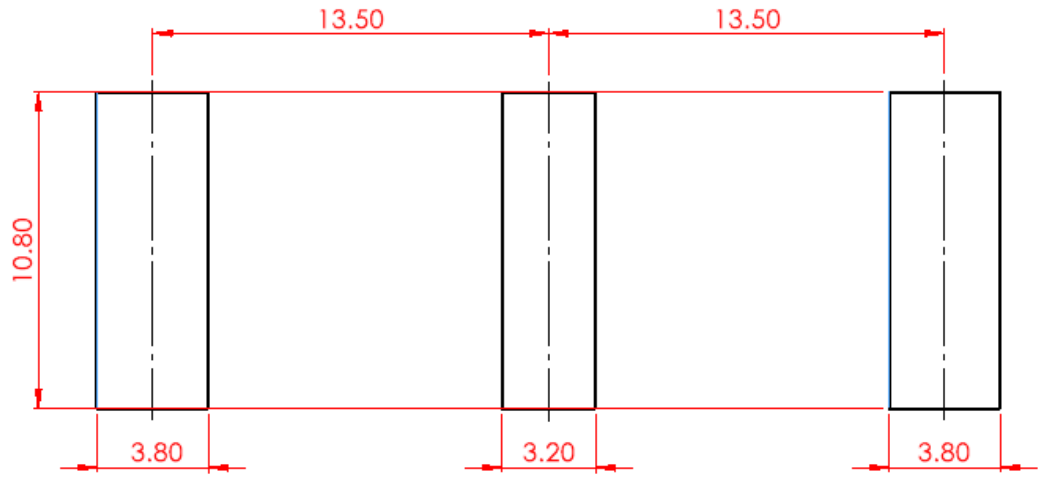
Designator	Type	Value	Manufacturer	Manufacturer Part Number
C1	Capacitor	8pF	Murata	GJM1555C1H8R0BB01D
C2	Capacitor	2pF	Murata	GRM1555C1H2R0BA01D
C3	Capacitor	Not Fitted	-	-
R1	Resistor	0 Ohm	YAGEO	RC0402JR-070RL

4.3 Footprint

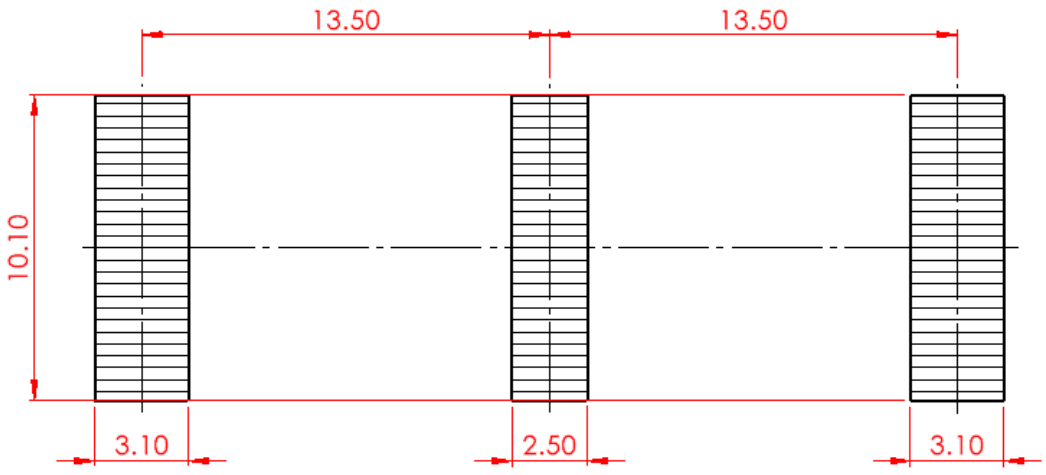


FOOTPRINT PCB

4.4 Top Solder Mask



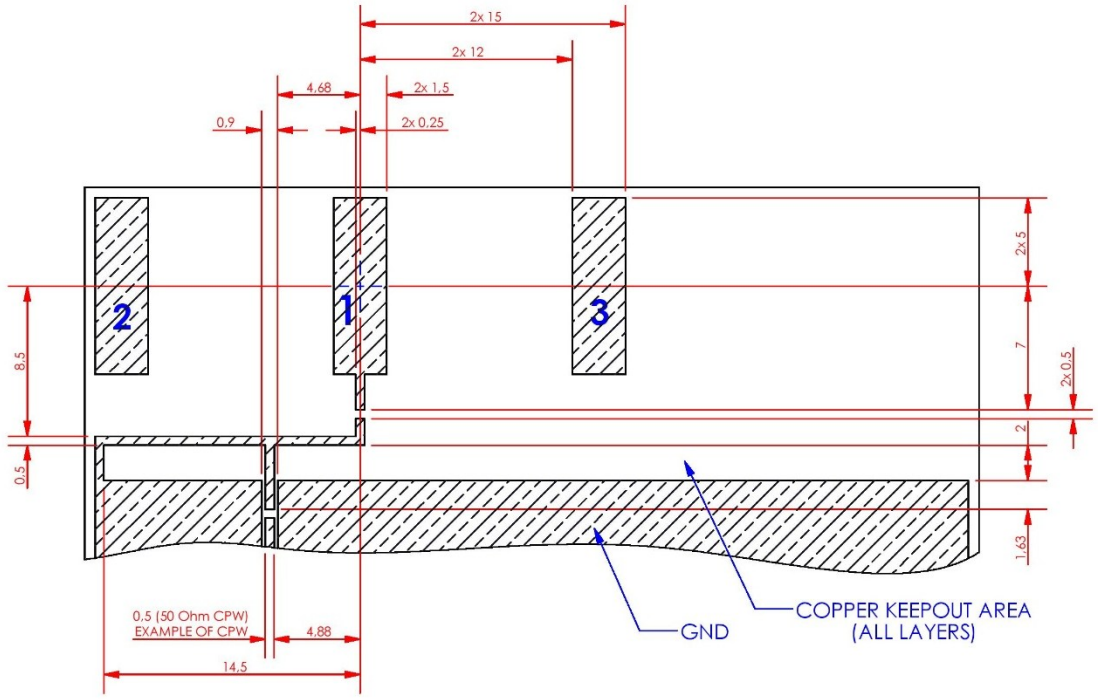
4.5 Top Solder Paste



4.6 Copper Clearance for PA.433.A

The footprint and clearance on the PCB must comply with the antenna's specification. The PCB layout shown in the diagrams below demonstrates the PA.433.A clearance area. The copper keep out area applies to all layers that are below the PA.433.A.

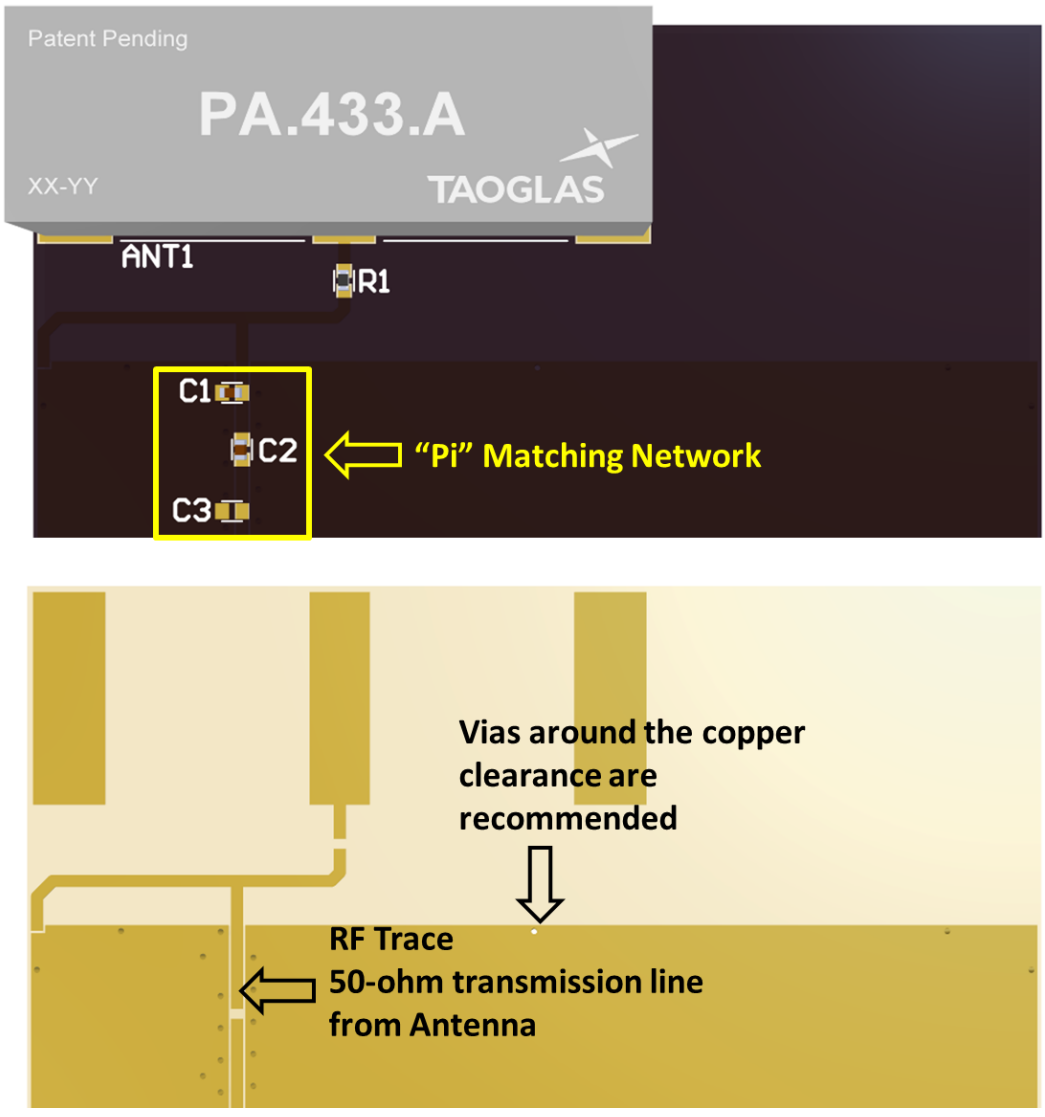
The copper clearance area should extend to 6mm from the mechanical pads to the ground plane. The PCB edge clearance should be 0.3mm.



GROUND CLEARANCE TOP VIEW
(SILKSCREEN NOT SHOWN)

4.7 Antenna Integration

The PA.433.A should be placed in the centre, as close to the edge on the long side of the PCB as possible, to take advantage of the ground plane. 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 transmission line and the copper clearance area.

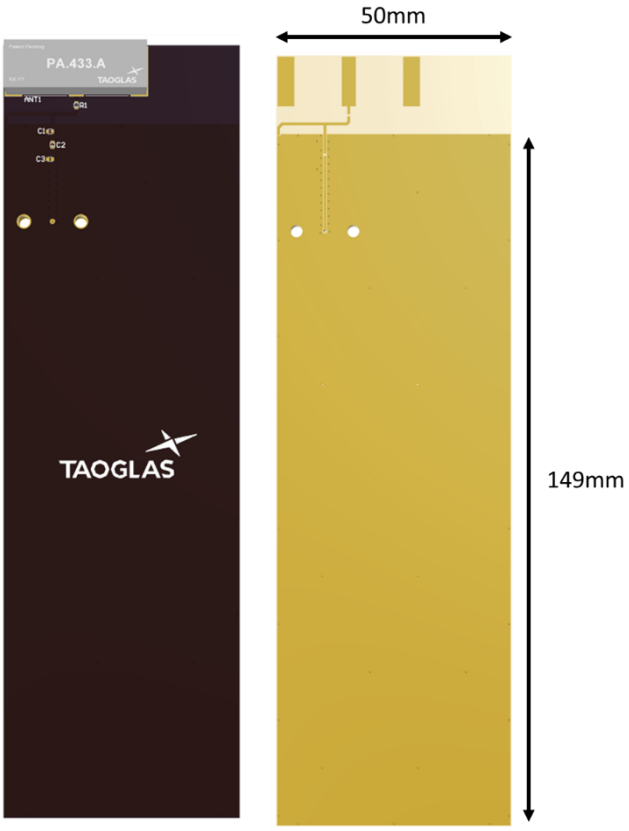


PA.433.A antenna mounted on a PCB reference design,

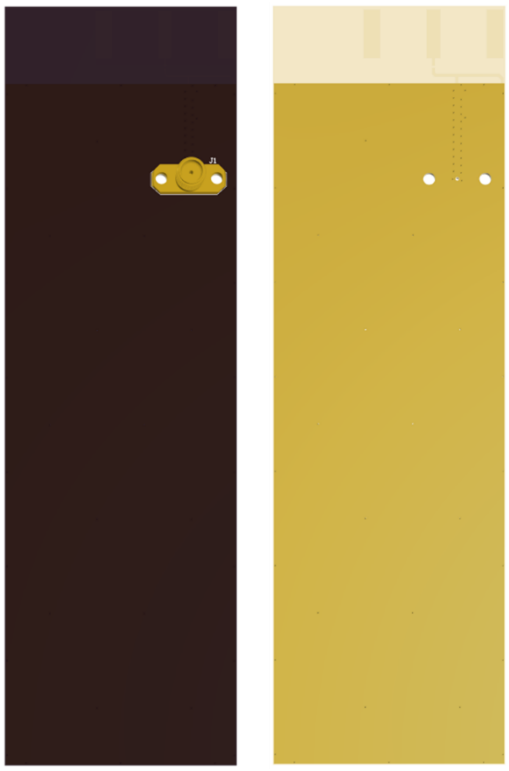
showing the transmission line and integration notes.

4.8 Final Integration

The top side image shown below highlights the antenna transmission line. Taoglas recommends using a minimum of 149x50mm ground plane (PCB) to ensure optimal performance.

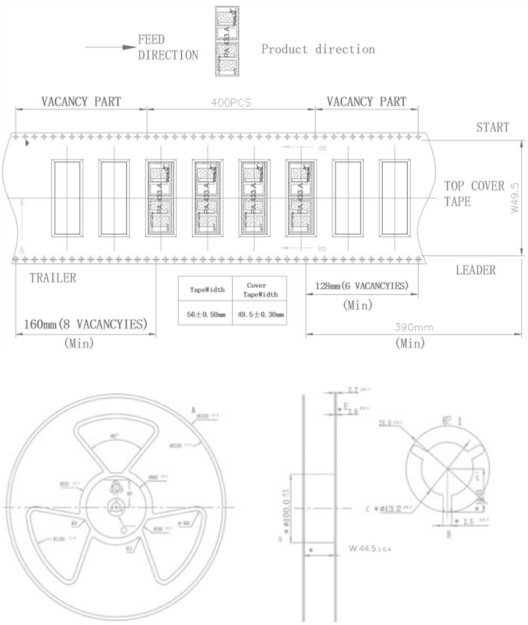


Top Side (PA.433.A placement on 149x50mm PCB reference design)



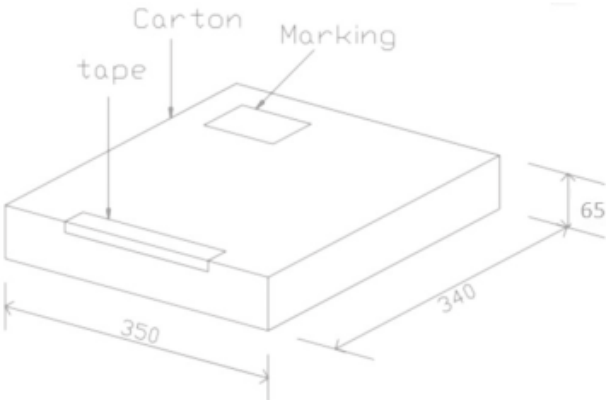
Bottom Side

5. Packaging

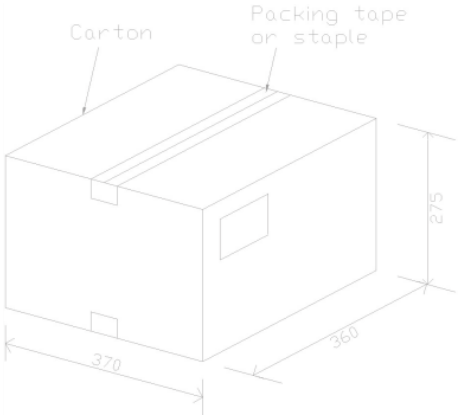


- ☑ 400 PCS / Tape & Reel
- ☑ 2 PCS / 3g Desiccant
- ☑ 1 PCS / Humidity test paper
- ☑ SPQ Label

- ☑ 400 PCS / Vacuum bag
- ☑ MSID Label
- ☑ Caution Label
- ☑ SPQ Label



- ☑ 400 PCS / Box
- ☑ Box(mm): 350x340x65
- ☑ Weight (Kg): 3.2 ±3%
- ☑ SPQ Label



☑ 1600 PCS / Carton

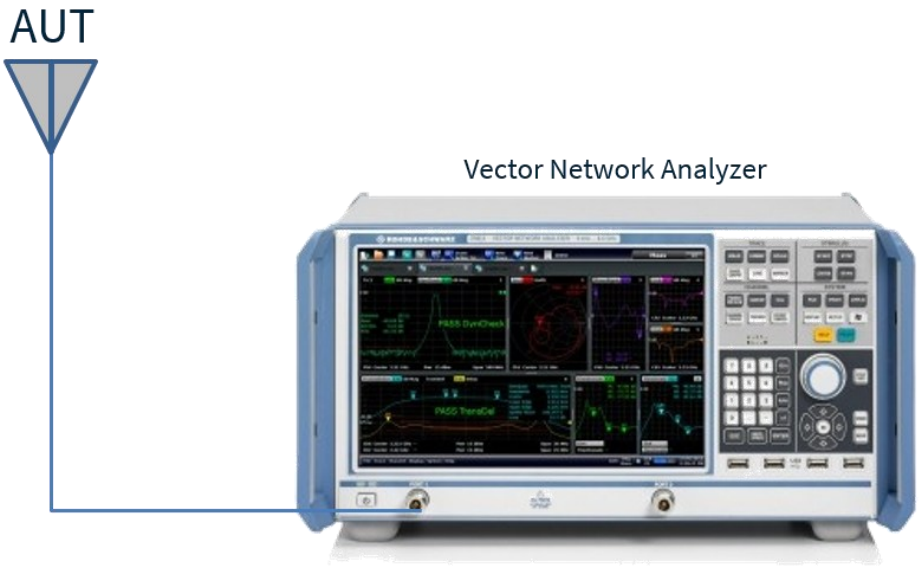
☑ Carton(mm): 370x360x275

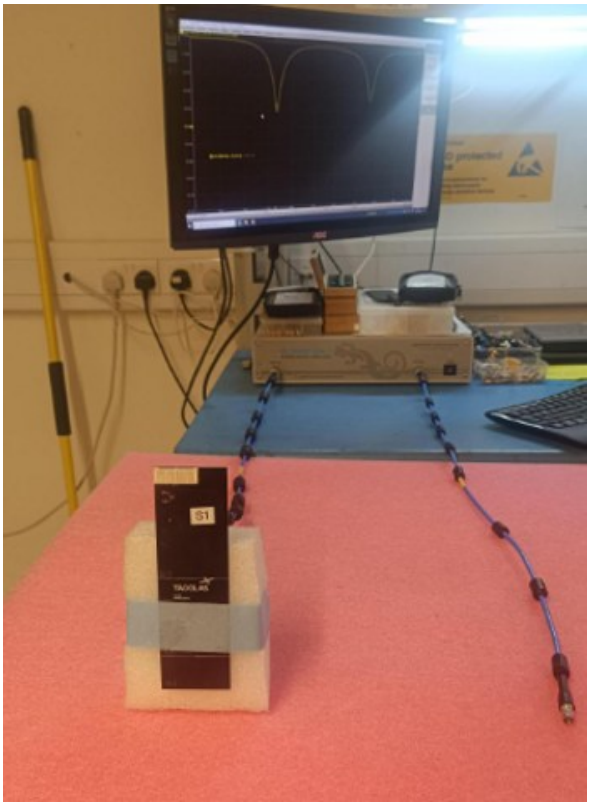
☑ Weight (Kg): 13.7 ±3%

☑ Carton Label

6. Antenna Characteristics

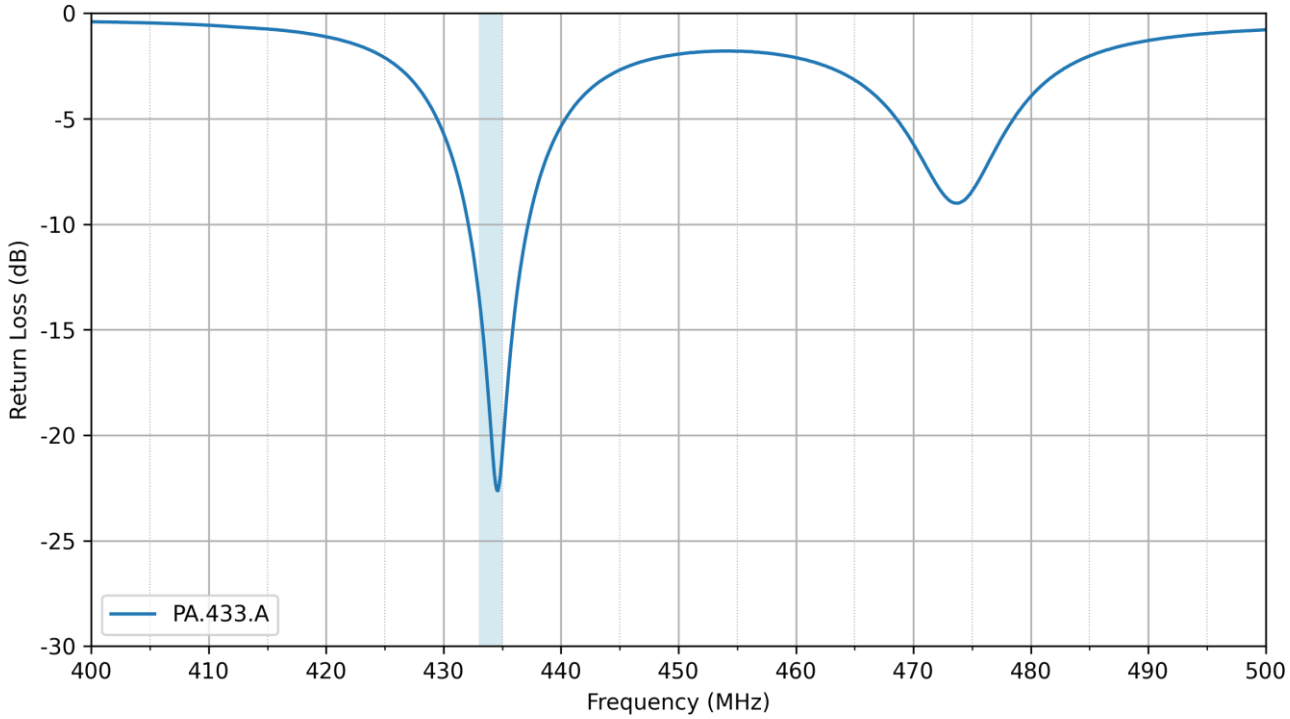
6.1 Test Setup



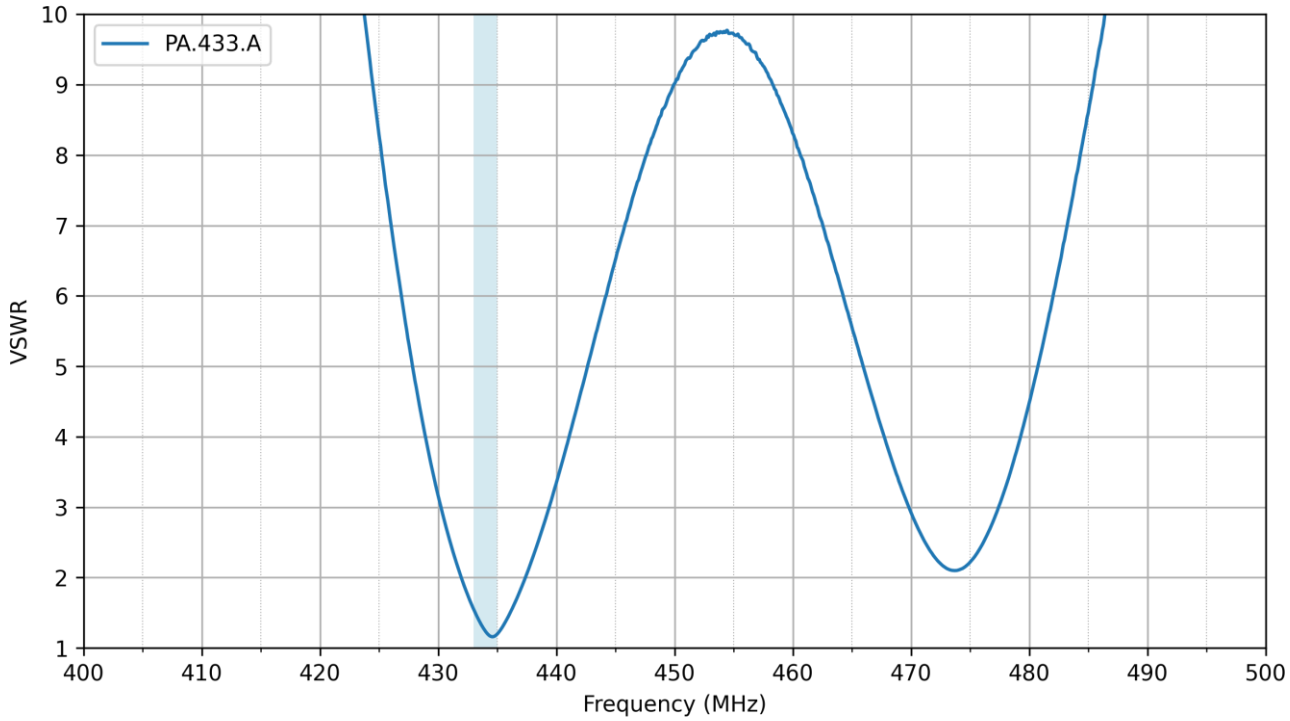


VNA Test Set-up

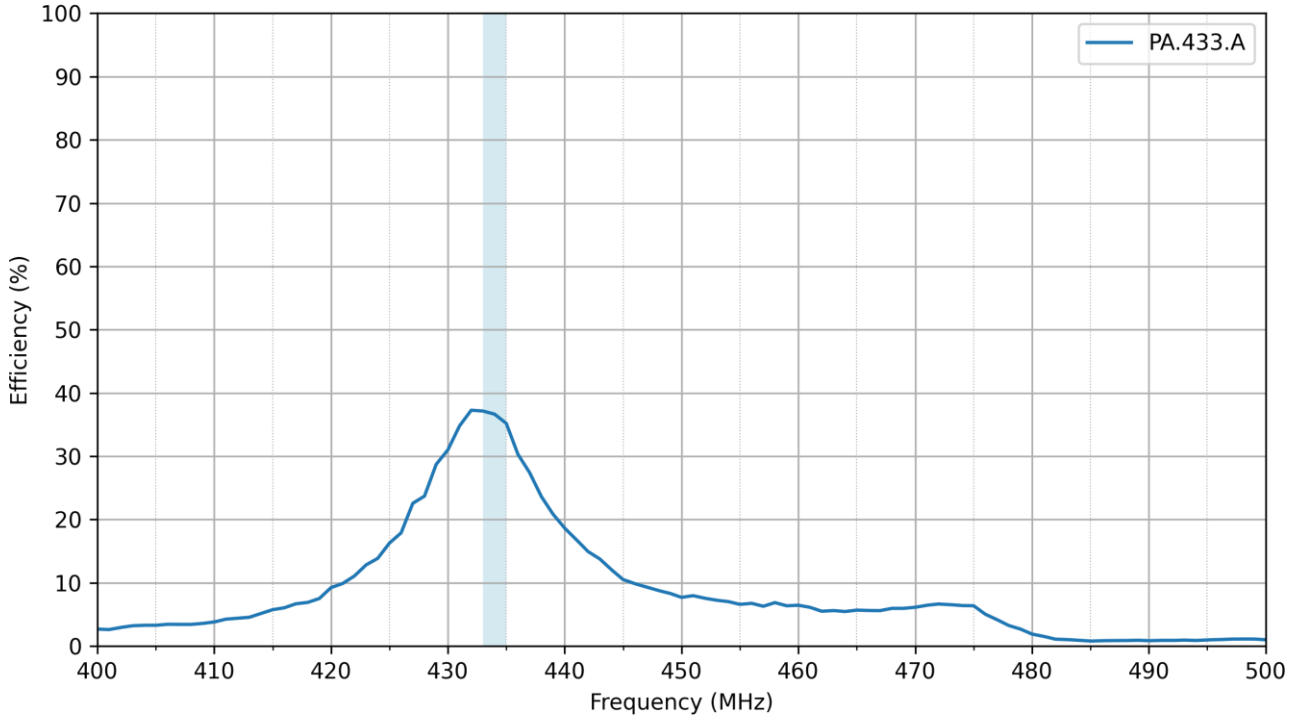
6.2 Return Loss



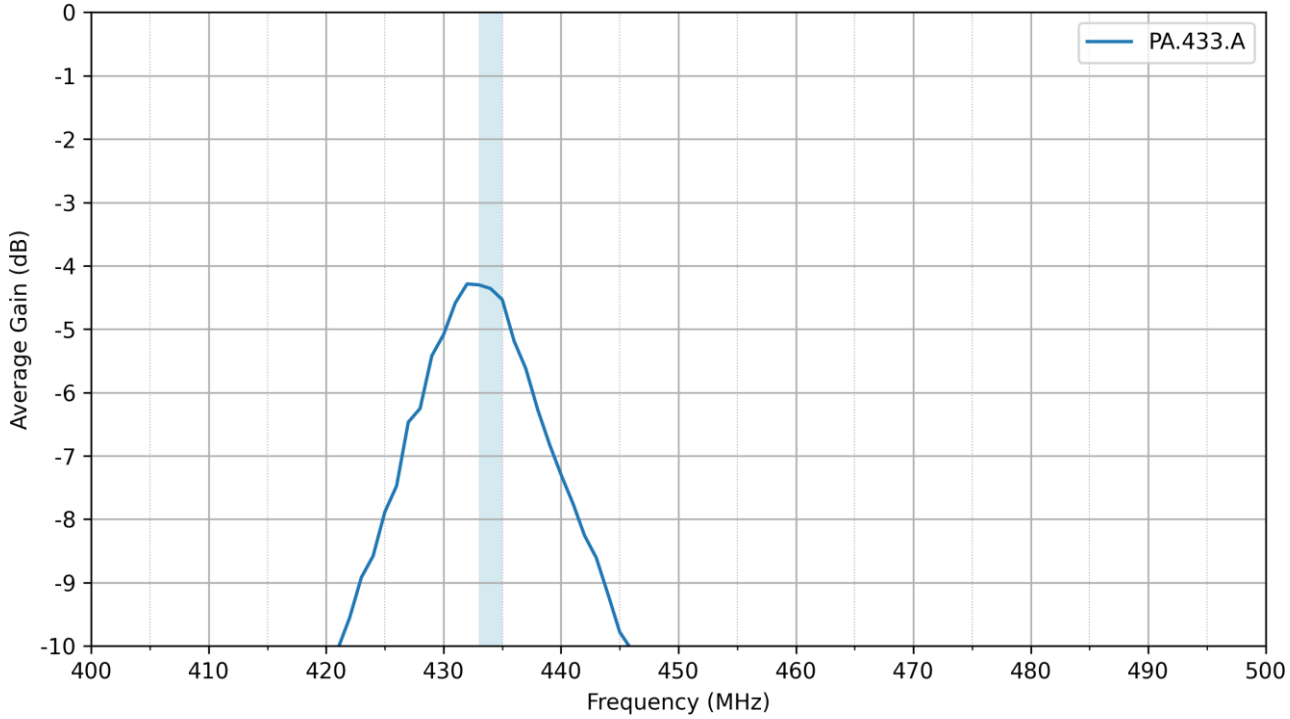
6.3 VSWR



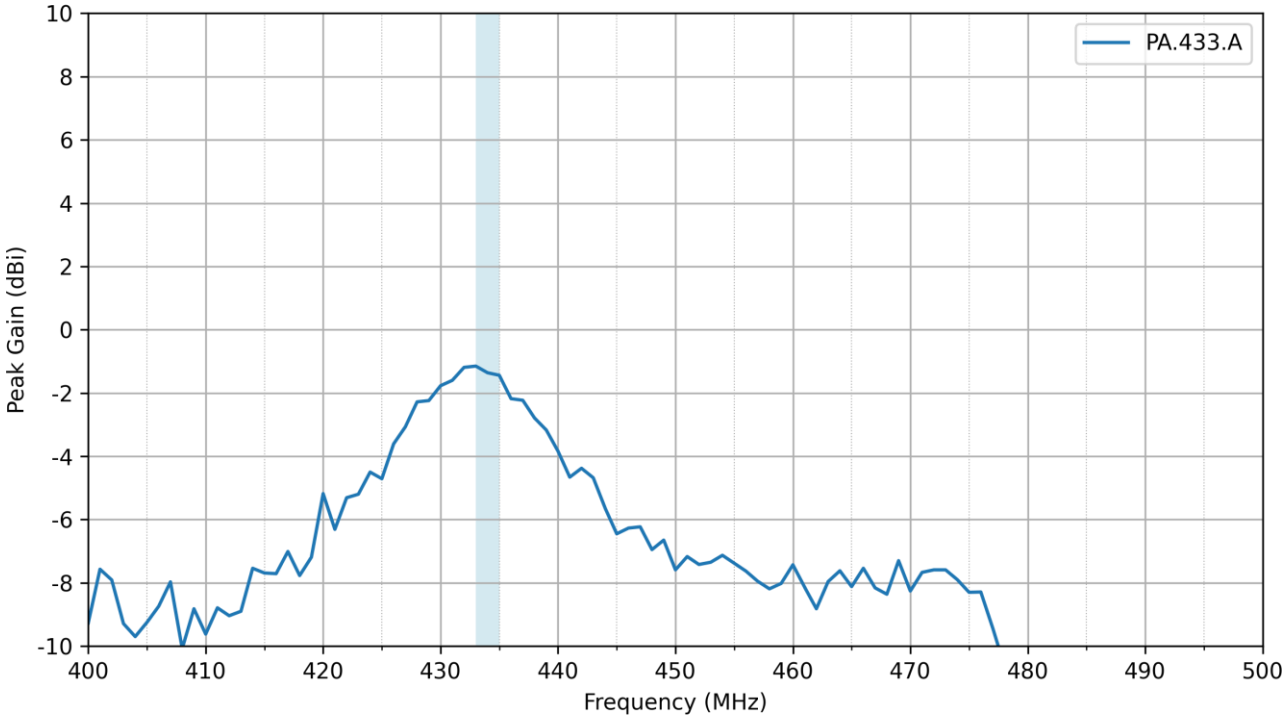
6.4 Efficiency



6.5 Average Gain

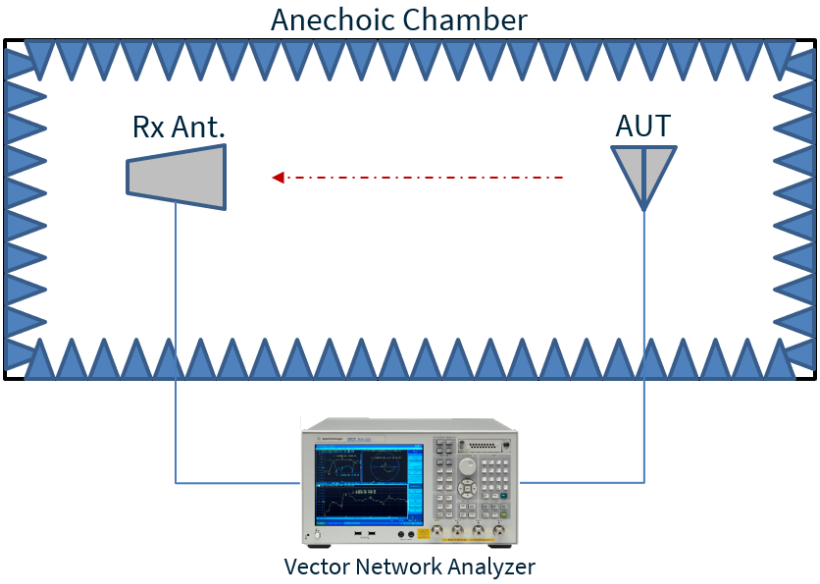


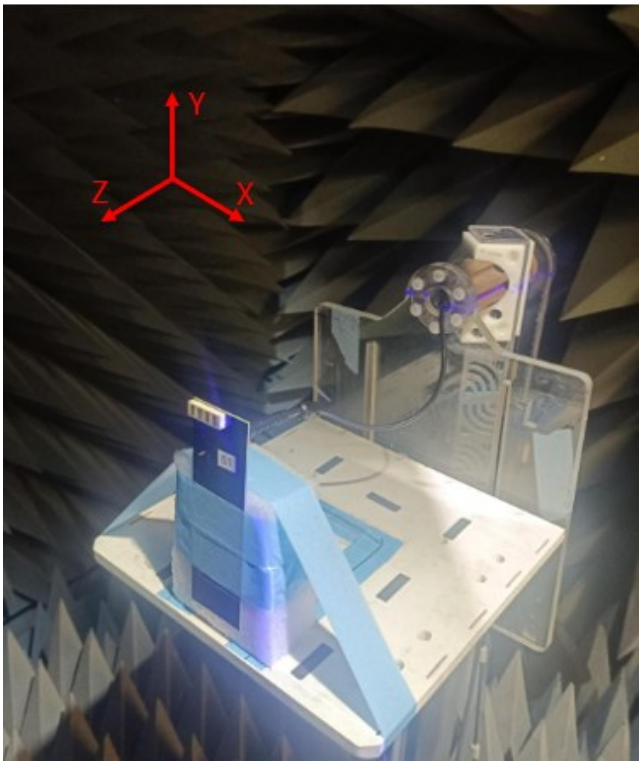
6.6 Peak Gain


PA.433.A
Peak Gain (dBi)
Frequency (MHz)
10
8
6
4
2
0
-2
-4
-6
-8
-10
400
410
420
430
440
450
460
470
480
490
500

7. Radiation Patterns

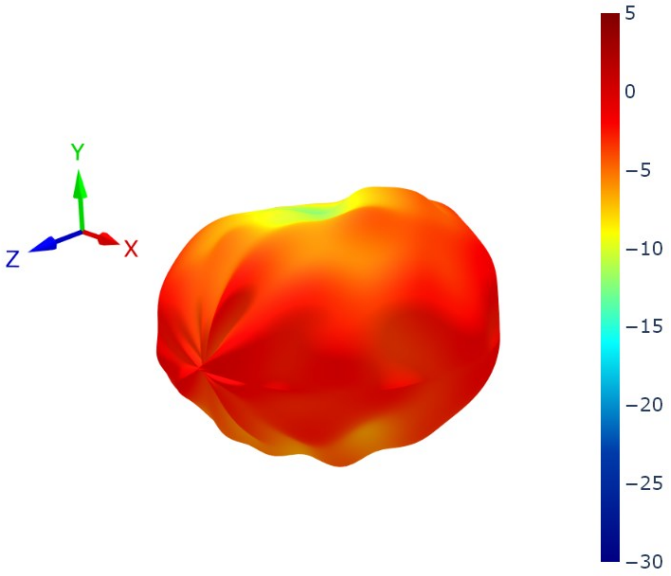
7.1 Test Setup

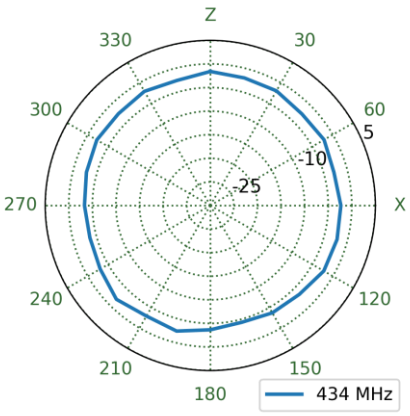
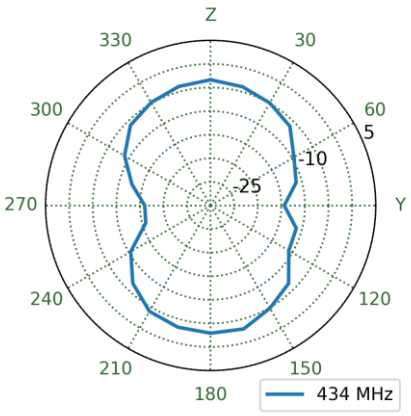
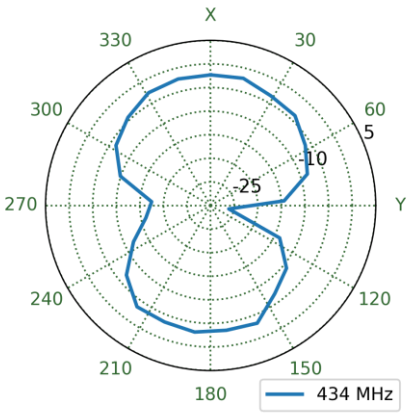




Chamber Test Set-up

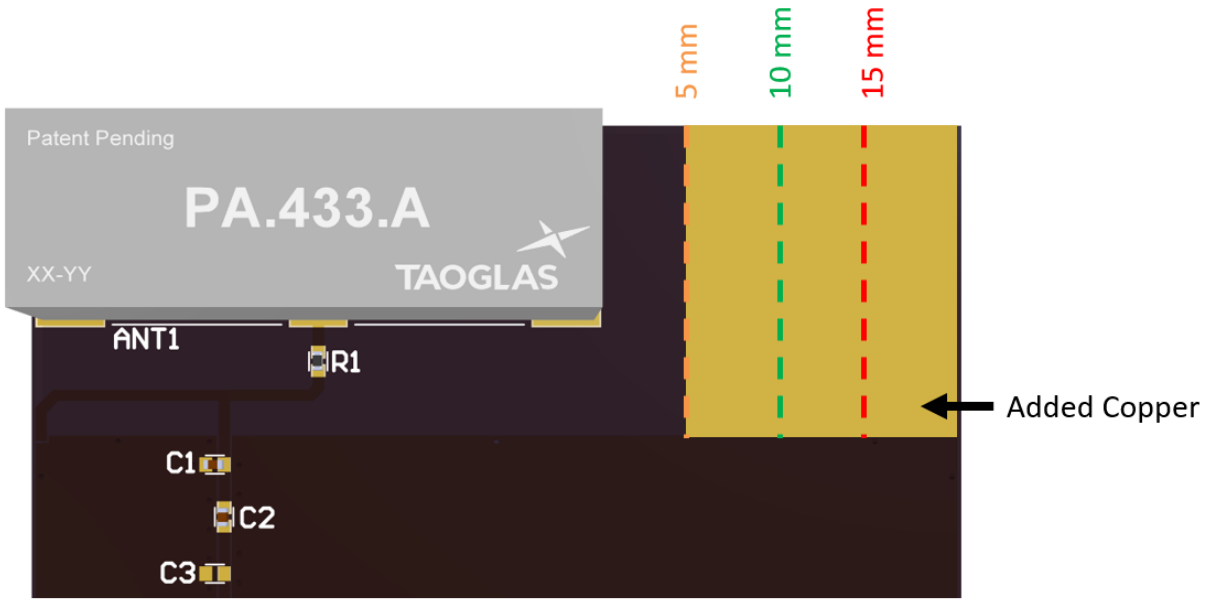
7.2 Patterns at 434 MHz



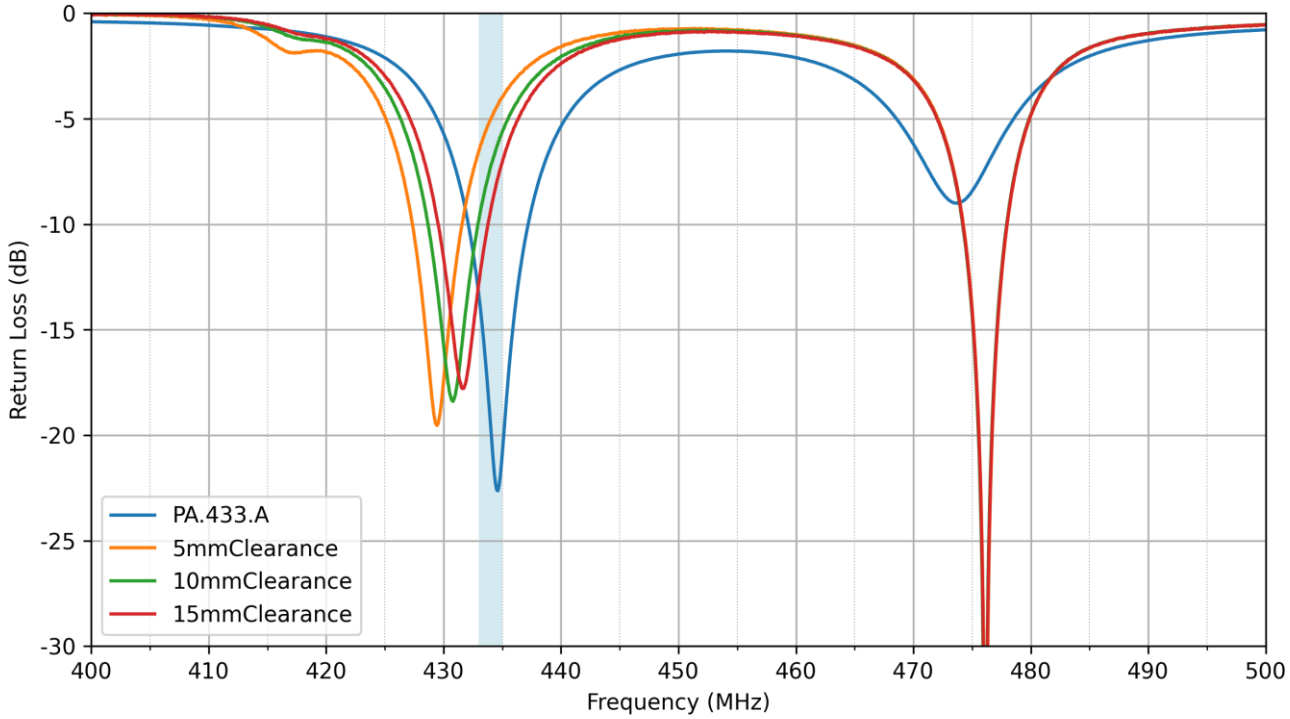
XZ Plane	YZ Plane	XY Plane
		

8. Application Note

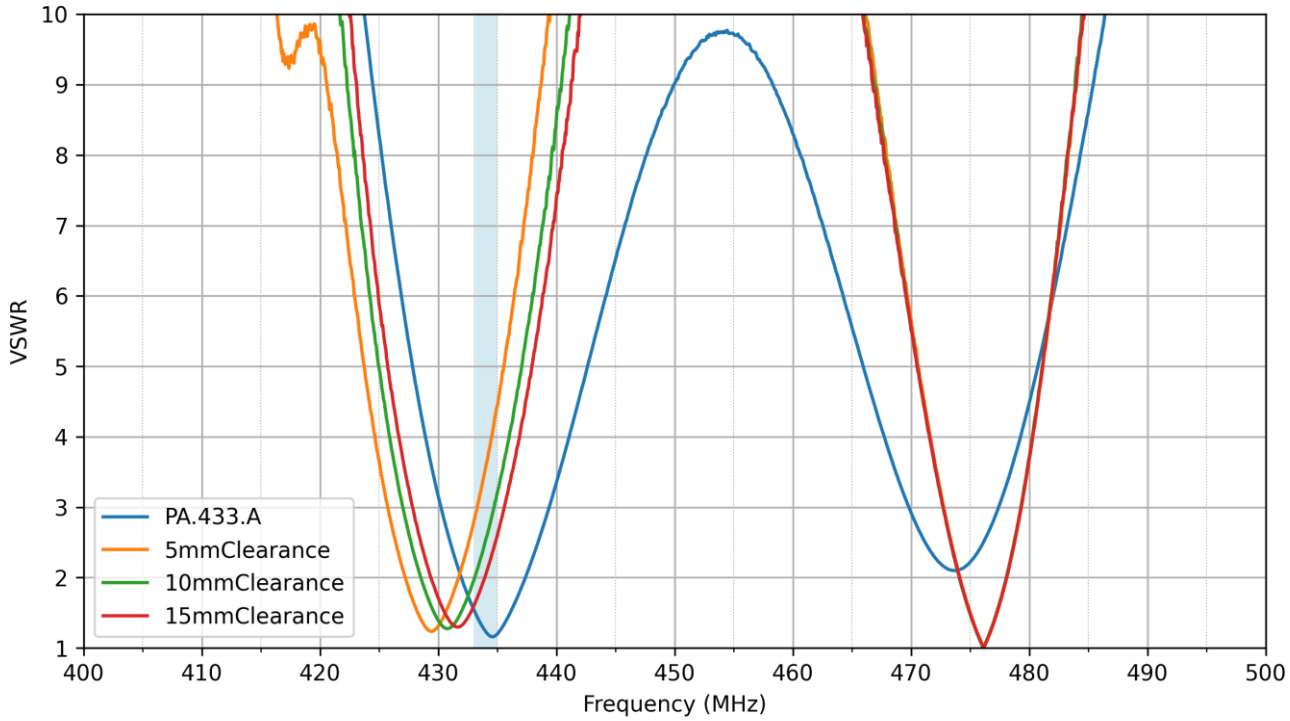
The following illustrates how copper clearance affects antenna performance. In the example below, copper is added at distances of 5 mm, 10 mm, and 15 mm from the antenna.



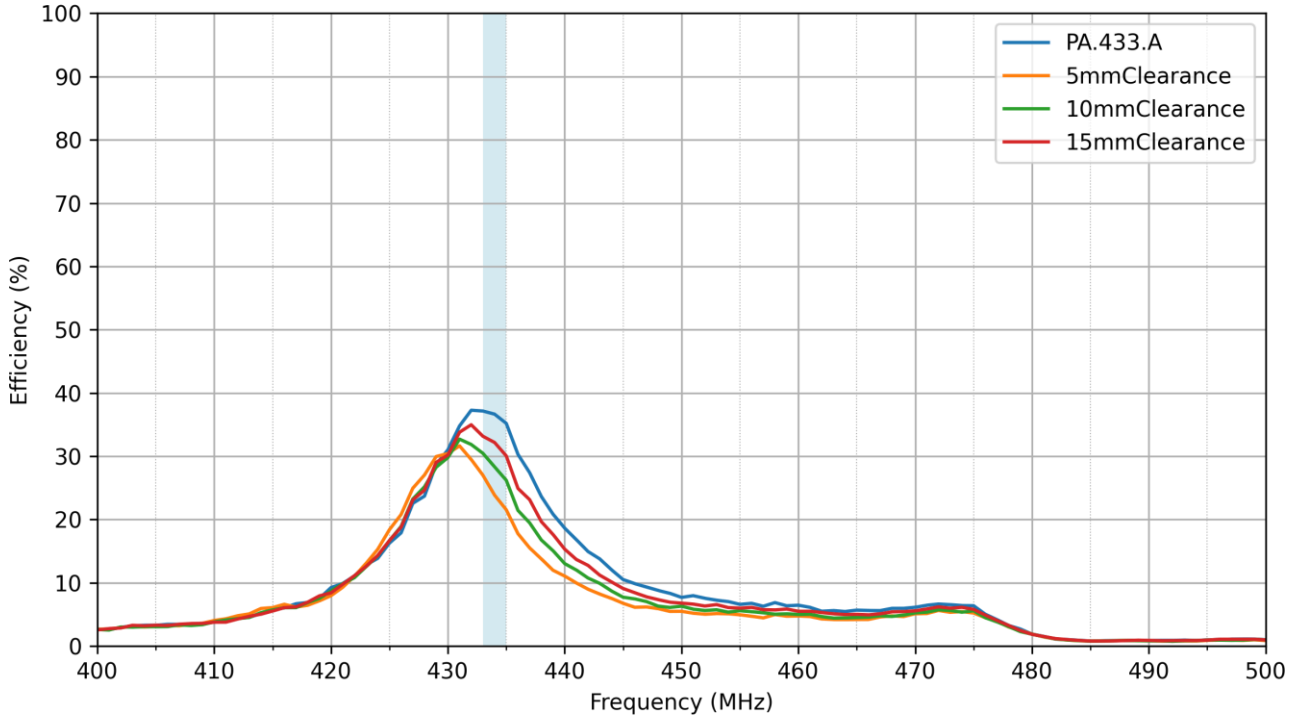
8.1 Return Loss



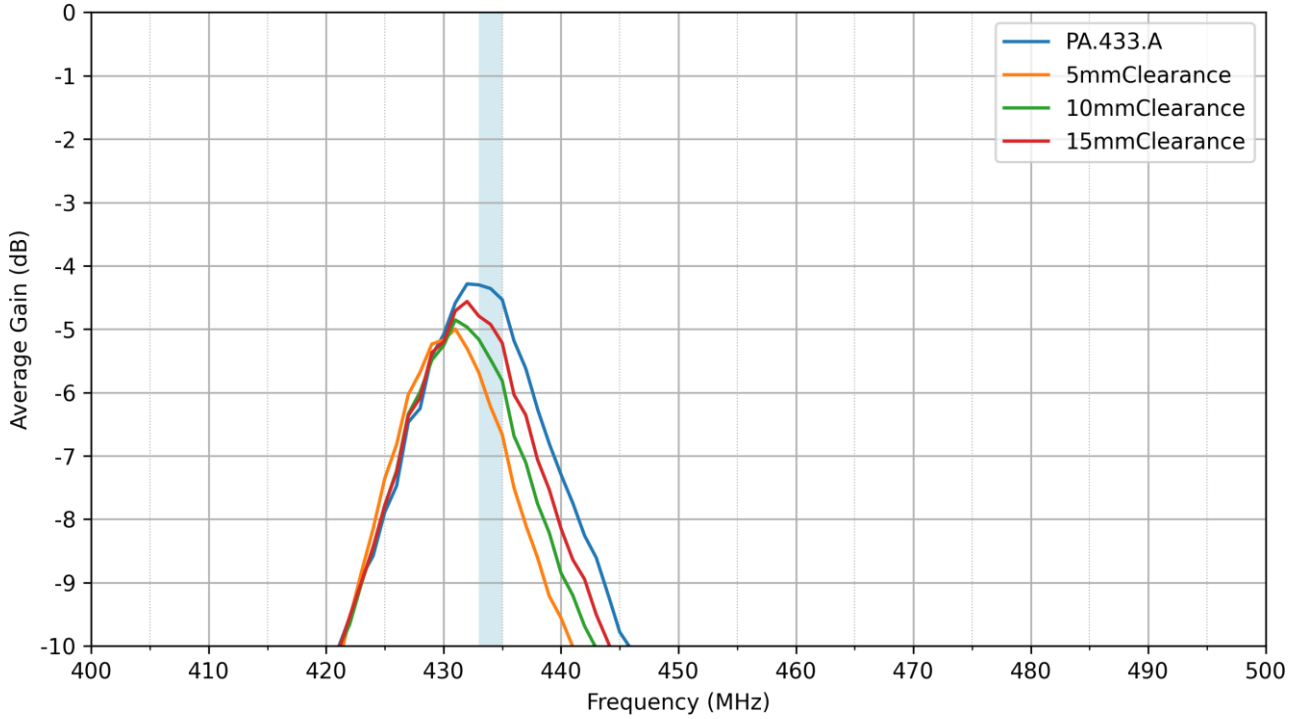
8.2 VSWR



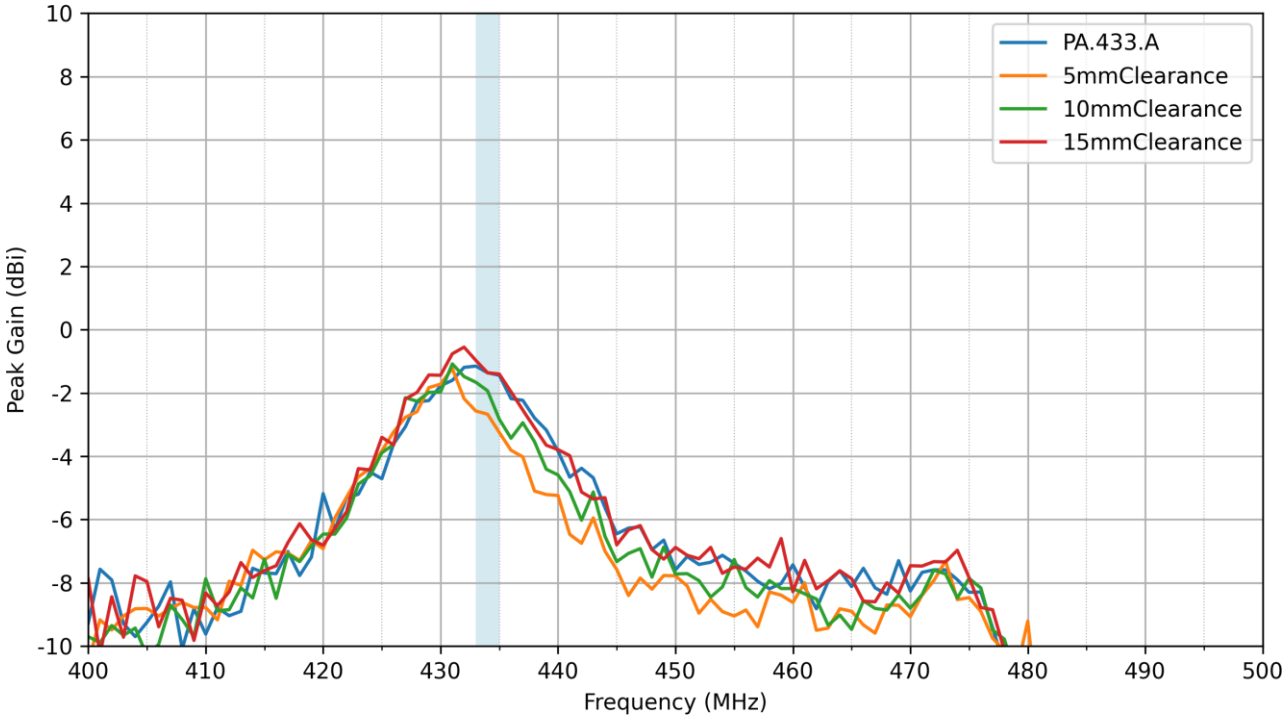
8.3 Efficiency



8.4 Average Gain



8.5 Peak Gain


PA.433.A
5mmClearance
10mmClearance
15mmClearance
Peak Gain (dBi)
Frequency (MHz)
10
8
6
4
2
0
-2
-4
-6
-8
-10
400
410
420
430
440
450
460
470
480
490
500

Changelog for the datasheet

SPE-25-8-258 – PA.433.A

Revision: A (Original First Release)	
Date:	2025-09-19
Notes:	Initial Release
Author:	Gary West

Previous Revisions

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