



TAOGLAS®



Datasheet

Part No:
UWA.01

Description

6-9GHz UWB Ceramic Substrate Chip Antenna 3.2*1.6*0.5(mm)

Features:

Dimensions: 3.2mm * 1.6mm * 0.5mm

High Efficiency

6-9GHz

Low profile

Compact Size

Surface-Mount

RoHS and REACH compliant

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1. Introduction



Ultra-Wideband (also known as UWB) is a low power digital wireless technology for transmitting large amounts of digital data over a wide spectrum of frequency bands typically spanning more than 500MHz with very low power for short distances.

The low power requirements of UWB mean increased battery life of sensors and tags leading to reduction in overall operational costs. Taoglas has developed various innovative and new-to-market flexible embedded UWB antennas designed for seamless integration on plastics and using highly flexible micro-coaxial cable mounting while achieving high performance where space is limited. Taoglas UWB antennas have been designed for use with the recently launched UWB modules and are also compatible with any other UWB sensor modules on the market.

The UWA.01chip antenna, at 3.2mm * 1.6mm * 0.5mm, is a small form factor Ultra-Wideband (UWB) antenna with high efficiencies across the pulsed UWB communications operational bands. It is mounted to a PCB via standard SMT reflow process. It enables designers to use only one antenna that covers most common UWB commercial bands, namely bands, 5 through 12 simultaneously.

Typical applications include:

- Indoor Tracking
- Warehousing and asset location
- Keyless entry and security

The UWA.01 antenna is a high efficiency, miniature SMD, edge mounted ceramic antenna that has a peak gain of more than 4dBi, an efficiency of more than 60% across the bands and is designed to be mounted directly onto a PCB. It is an ideal choice for any device maker that needs to keep manufacturing costs down over the lifetime of a product. Like all such antennas, care should be taken to mount the antenna at least 3mm from metal components or surfaces, and ideally 5mm for best Radiation efficiency.

The results below are based on a 80mm x 40mm ground-plane. If your ground-plane is smaller the efficiency will decrease, this can be tested in conjunction with Taoglas and we are happy to support customers integration. For more information please contact your regional Taoglas customer support team.

1.1 Applications of Pulsed UWB antenna Technology

Radar-These short-pulsed antennas provide very fine range resolution and precision distance and positioning measurement capabilities. UWB signals enable inexpensive high definition radar antennas which find use in automotive sensors, smart airbags, and precision surveying applications amongst many others.

Home Network Connectivity- Smart home and entertainment systems can take advantage of high data rates for streaming high quality audio and video contents in real time for consumer electronics and computing within a home environment.

Position location & Tracking- UWB antennas also find use in Position Location and Tracking applications such as locating patients in case of critical condition, hikers injured in remote areas, tracking cars, and managing a variety of goods in a big shopping mall. UWB offers better noise immunity and better accuracy to within a few cm compared to current localization technologies such as Assisted GPS for Indoors, Wi-Fi and cellular which are at best able to offer meter level precision. Tethered Indoor positioning UWB systems that measure the angles of arrival of ultra-wideband (UWB) radio signals perform triangulation by using multiple sensors to communicate with a tag device.

2. Specification

Electrical								
Band	Frequency (MHz)	Efficiency (%)	Average Gain (dB)	Peak Gain (dBi)	Impedance	Polarization	Radiation Pattern	Max. input power
Channel 5	6240-6739	84.3	-0.74	4.62	50 Ω	Linear	Omni	2W
Channel 6	6739-7238	81.7	-0.88	4.79				
Channel 7	5948-7030	82.7	-0.82	4.66				
Channel 8	7238-7737	89.6	-0.48	5.13				
Channel 9	7737-8236	80.5	-0.94	4.47				
Channel 10	8236-8736	74.3	-1.29	4.95				
Channel 11	7321-8652	81.7	-0.88	5.13				
Channel 12	8736-9235	71.5	-1.46	5.54				

*Results based on 80x40mm Evaluation Board

Mechanical	
Dimensions (mm)	3.2 x 1.6 x 0.5
Material	Ceramic
Weight (g)	0.02

Environmental	
Temperature Range	-40°C to 105°C
Humidity	Non-condensing 65°C 95% RH
Moisture Sensitivity Level (MSL)	3 (168 Hours)

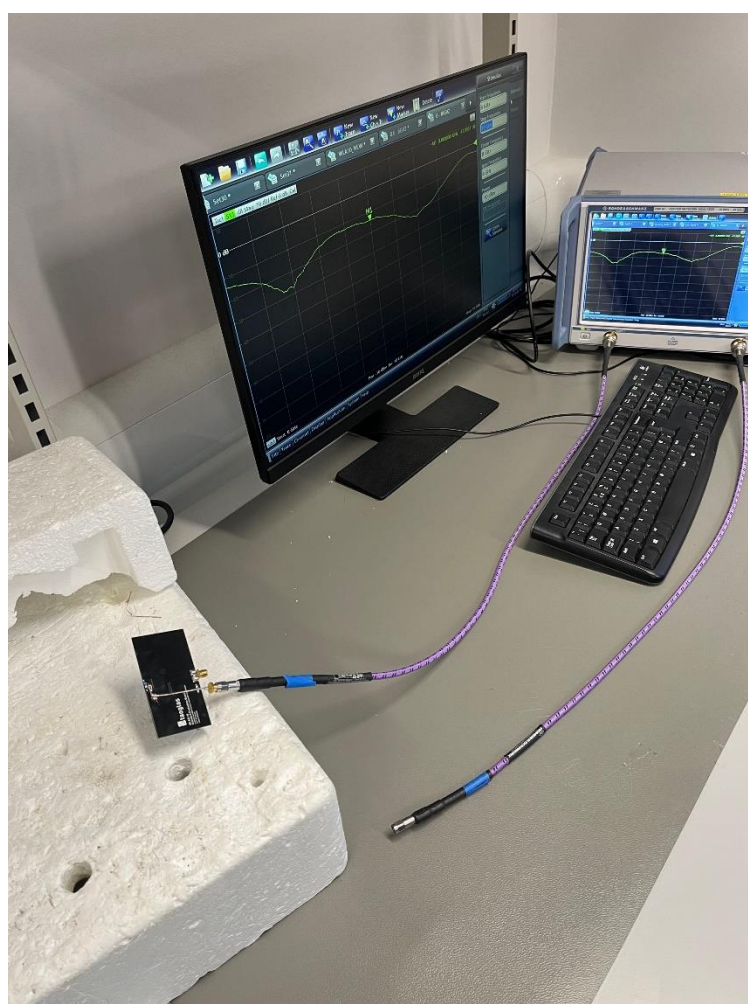
3. Antenna Characteristics

3.1 Test Setup

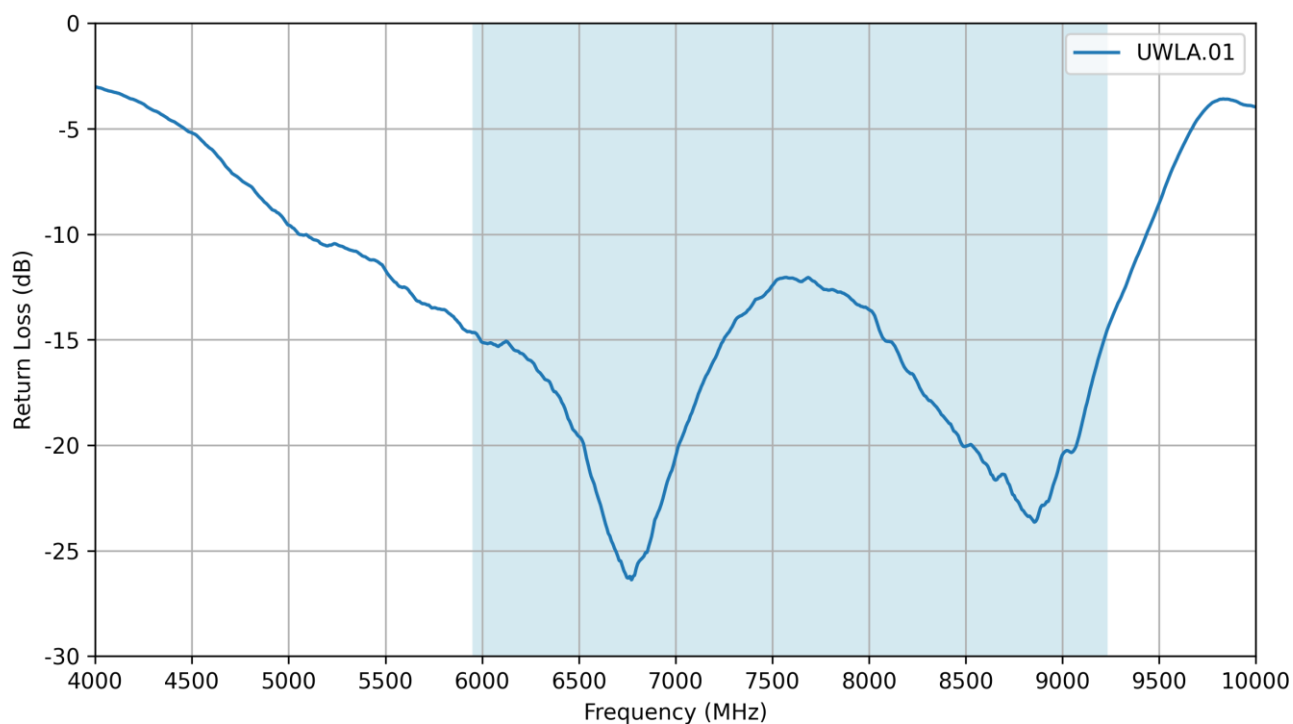
AUT



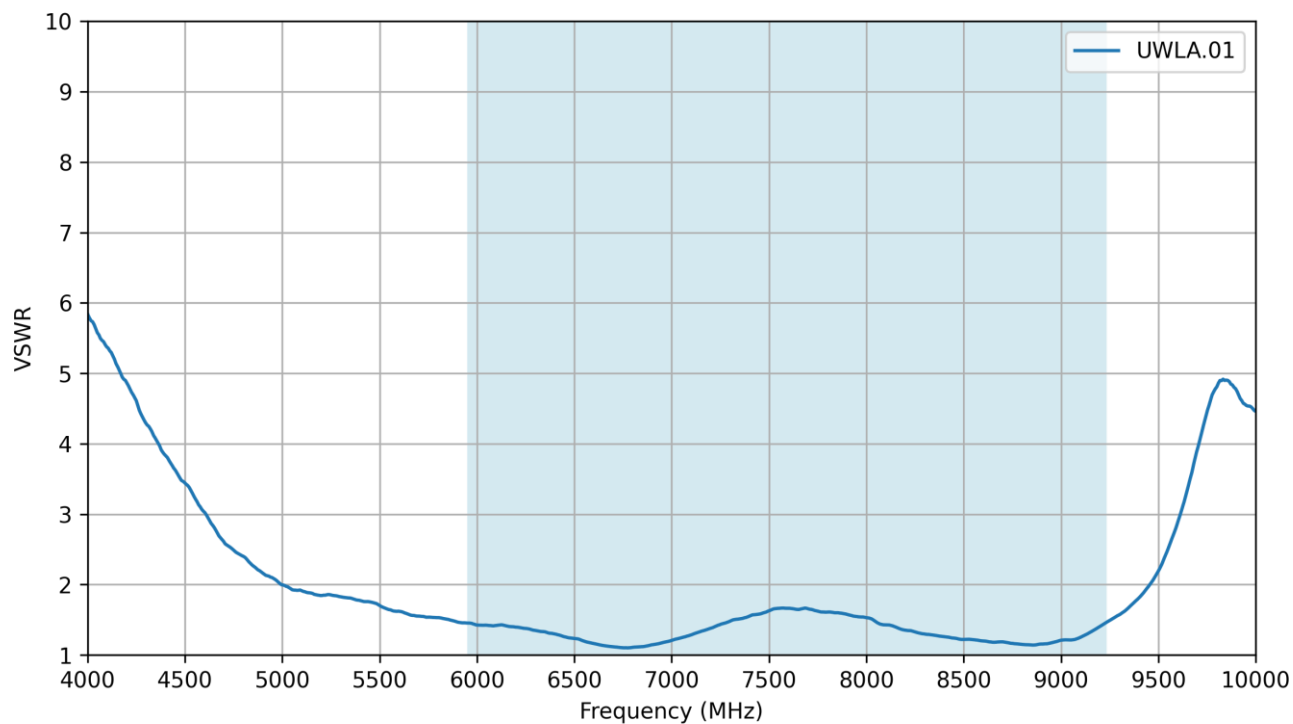
Vector Network Analyzer



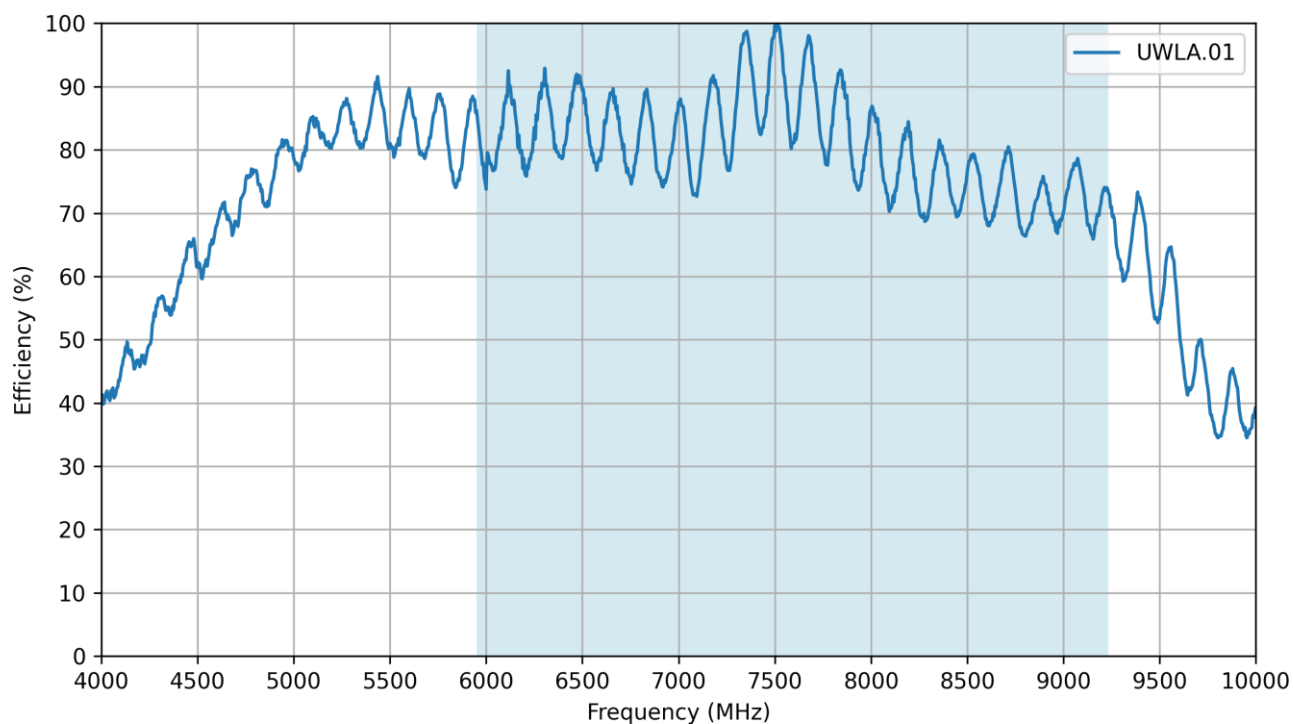
3.2 Return Loss



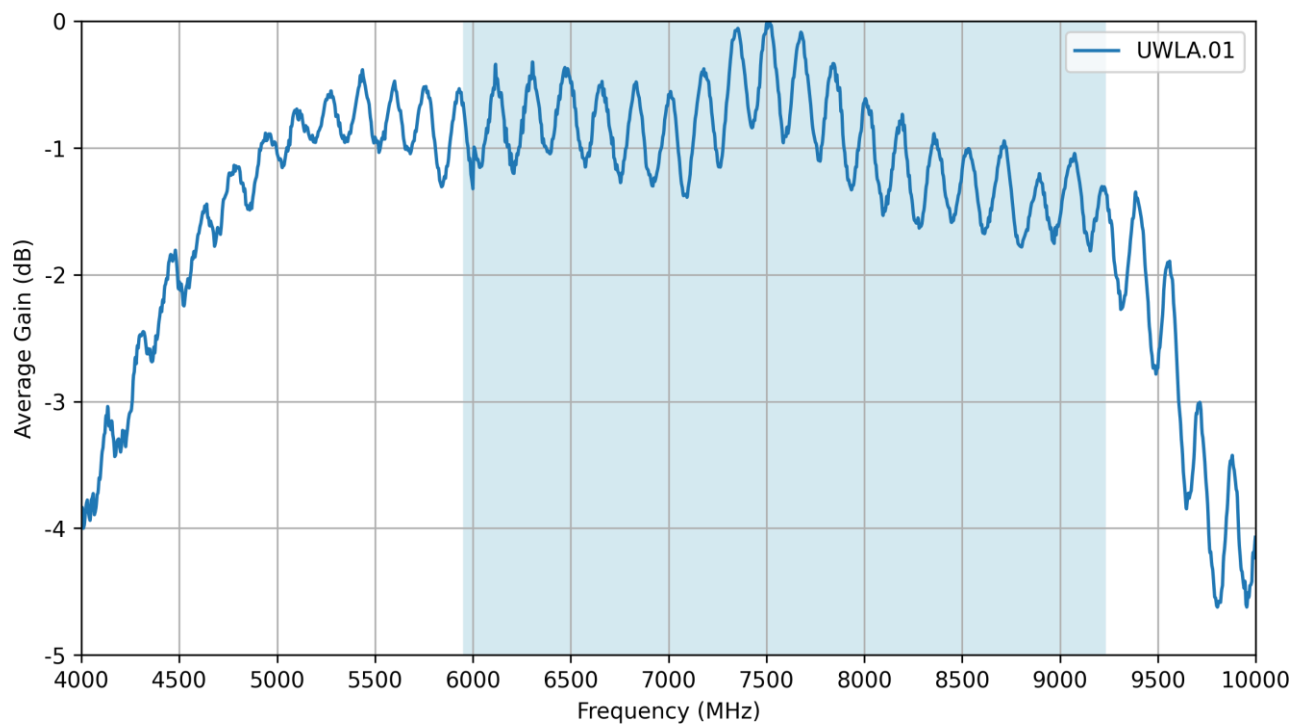
3.3 VSWR



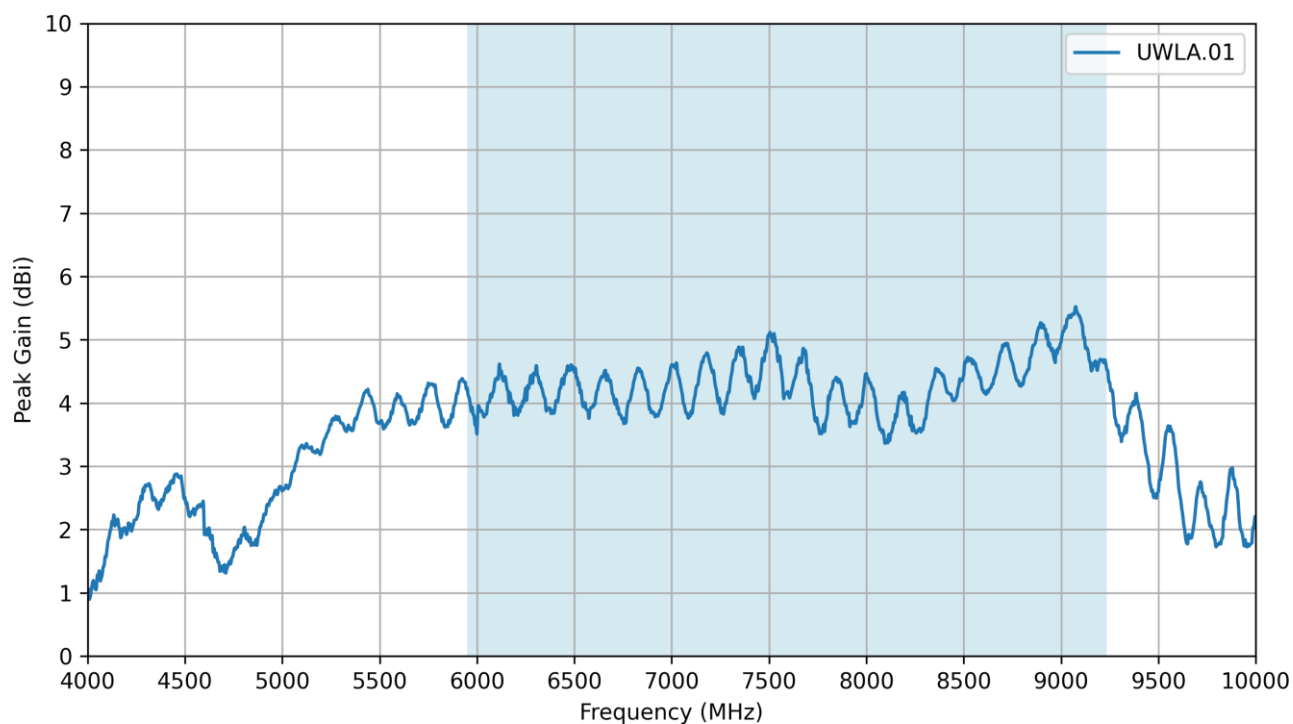
3.4 Efficiency



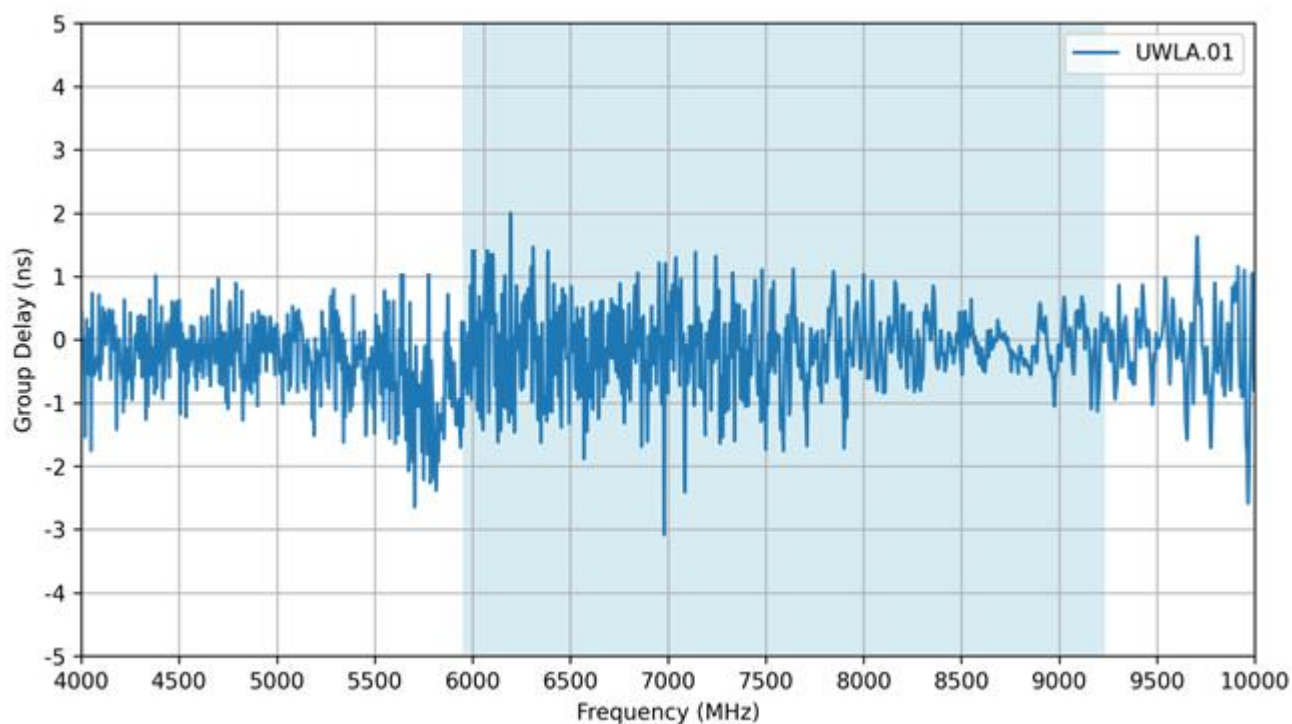
3.5 Average Gain



3.6 Peak Gain

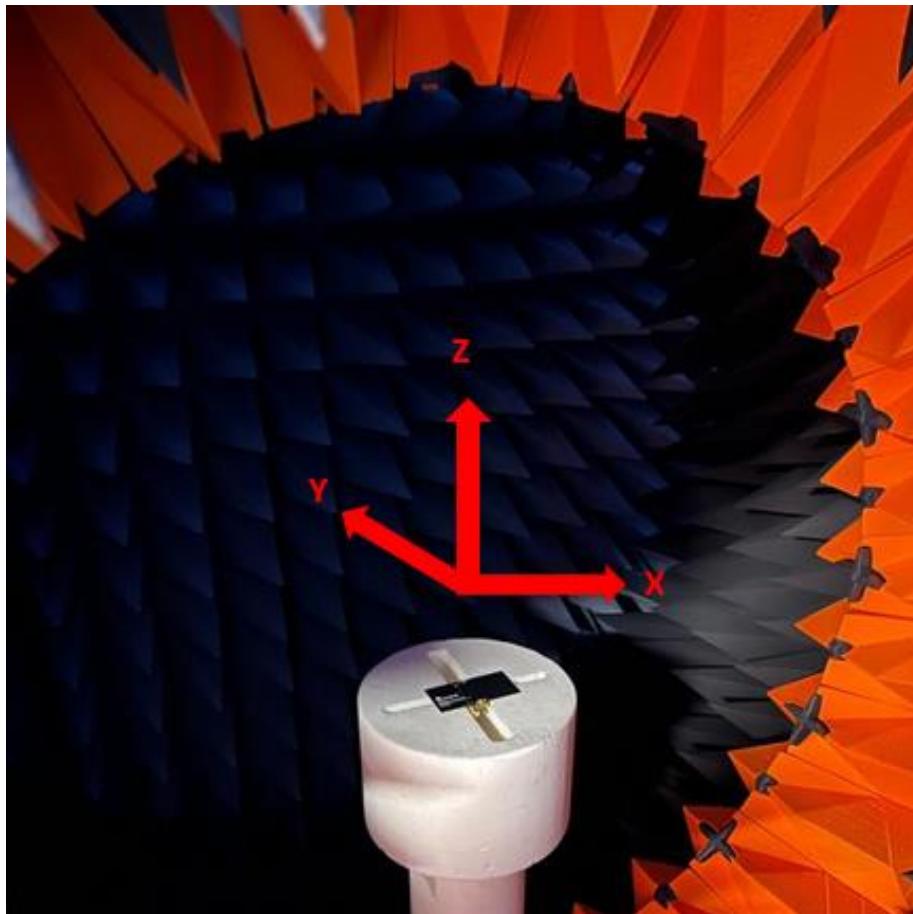
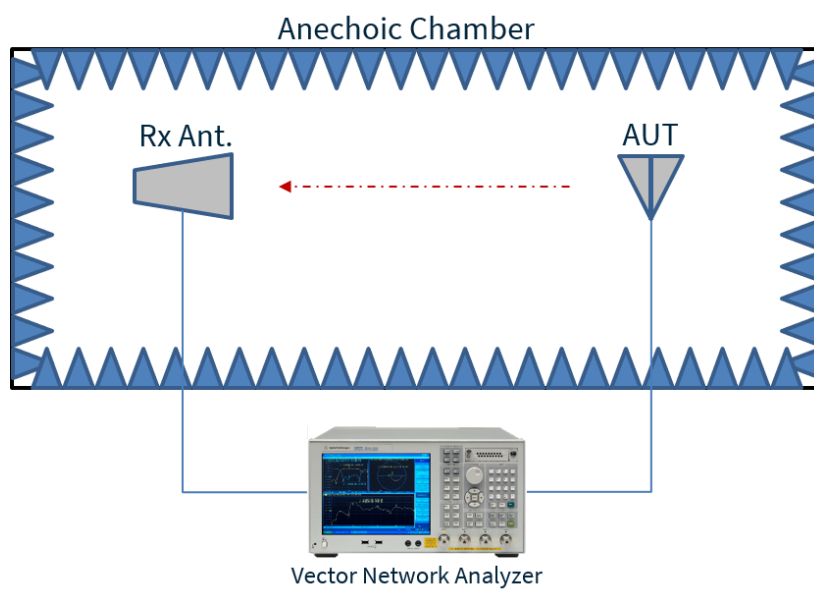


3.7 Group Delay

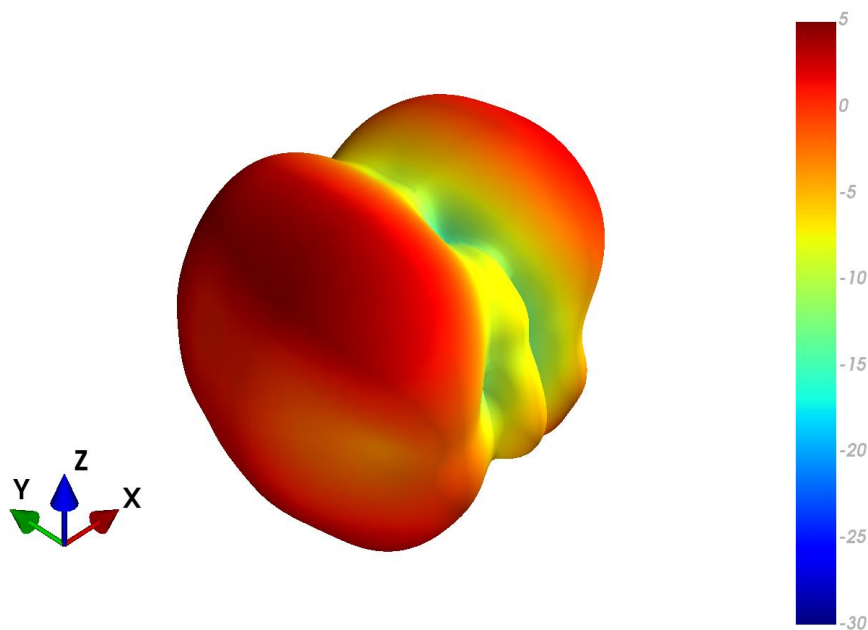


4. Radiation Patterns

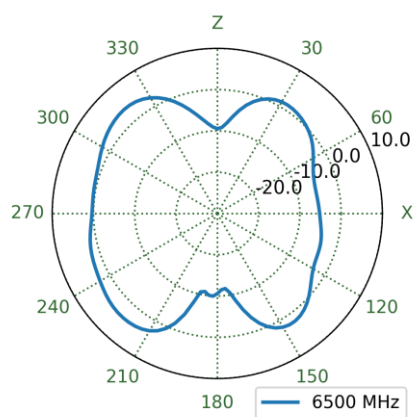
4.1 Test Setup



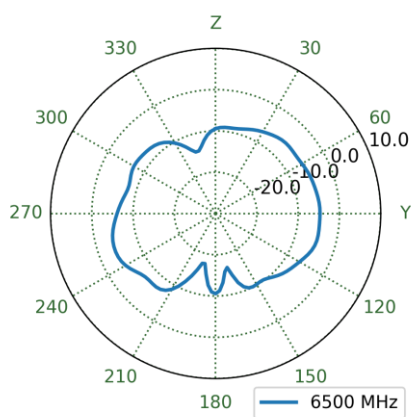
4.2 UWA.01 Patterns at 6500 MHz



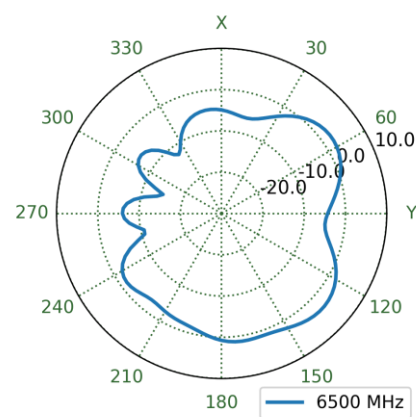
XZ Plane



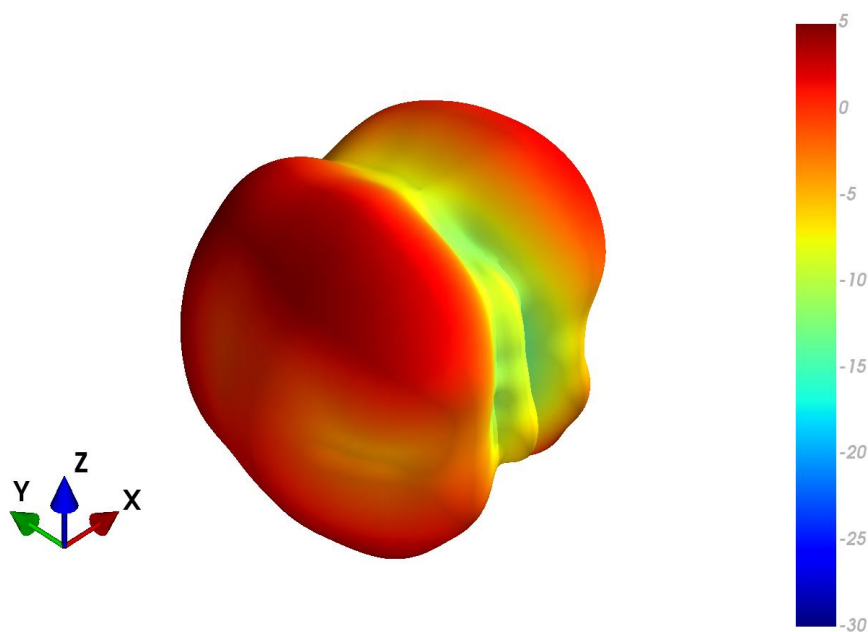
YZ Plane



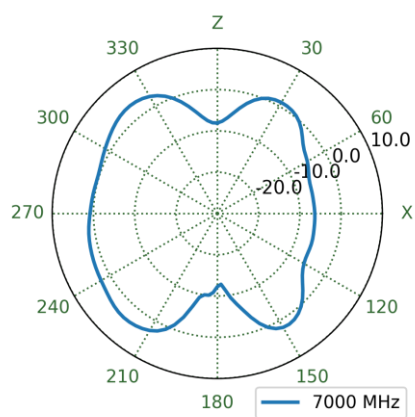
XY Plane



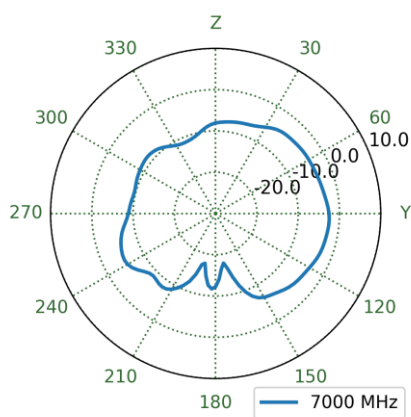
4.3 UWA.01 Patterns at 7000 MHz



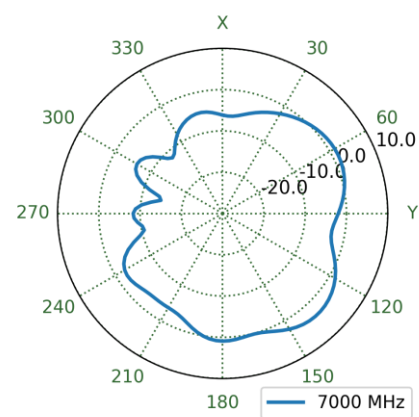
XZ Plane



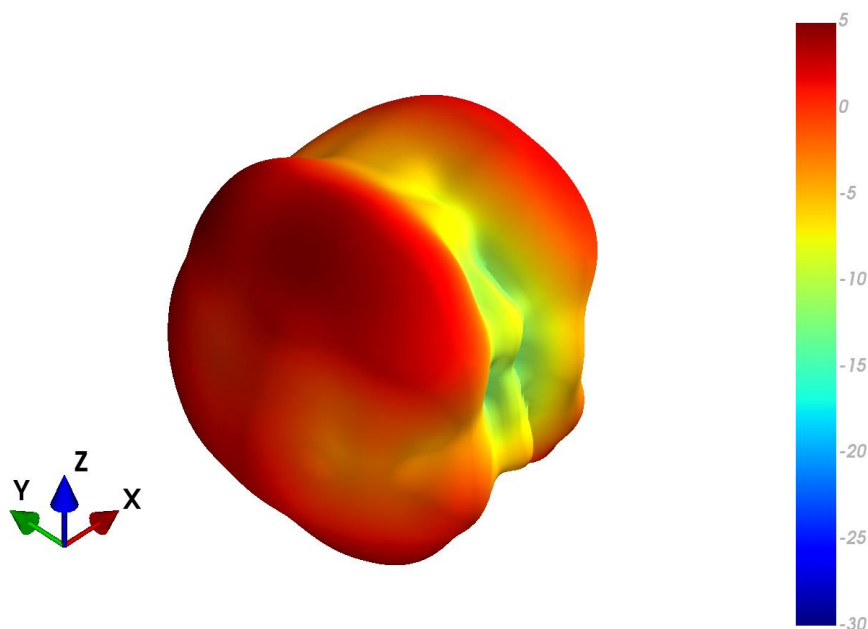
YZ Plane



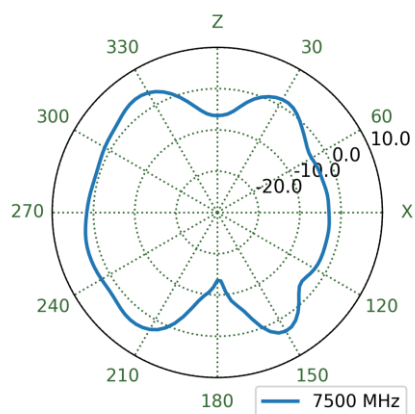
XY Plane



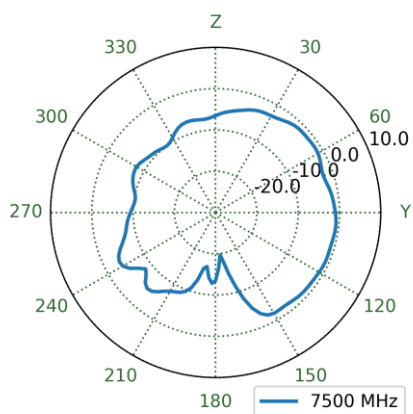
4.4 UWA.01 Patterns at 7500 MHz



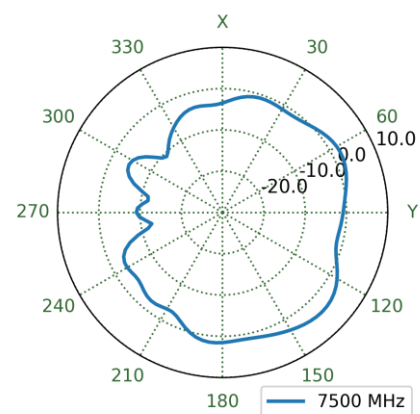
XZ Plane



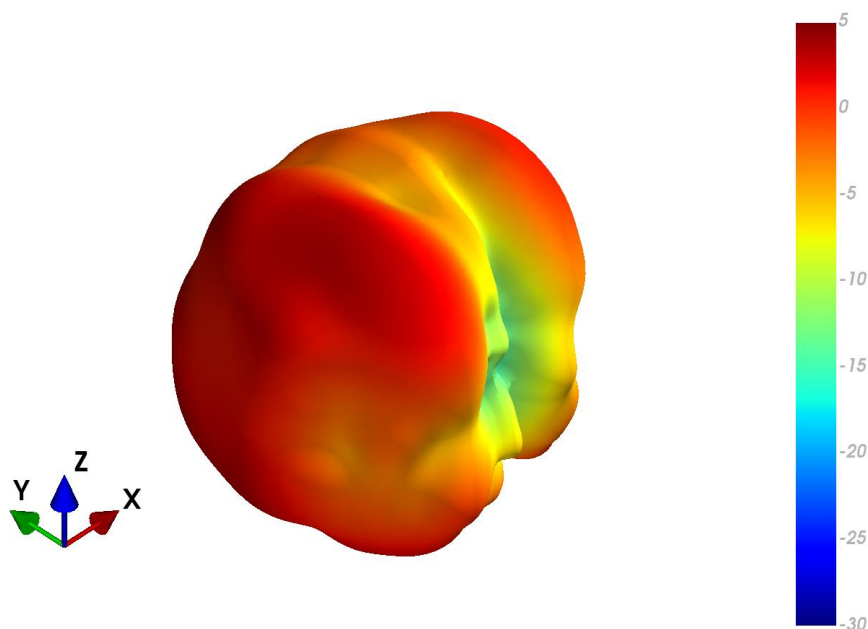
YZ Plane



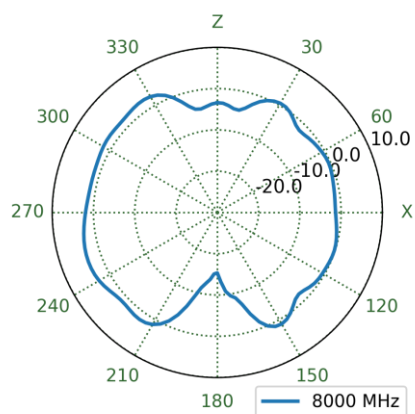
XY Plane



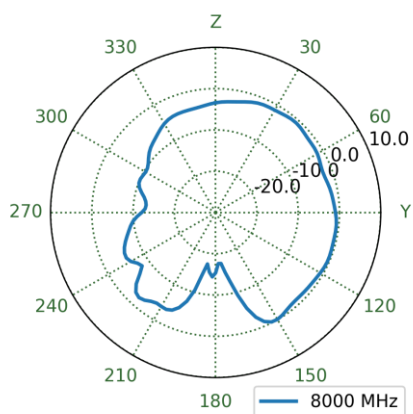
4.5 UWA.01 Patterns at 8000 MHz



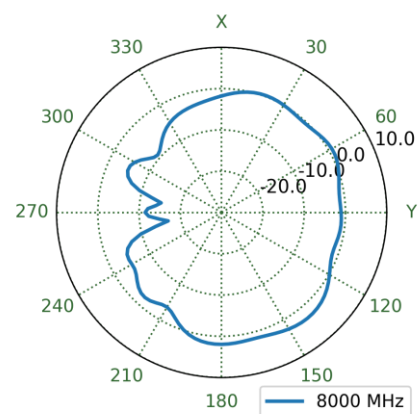
XZ Plane



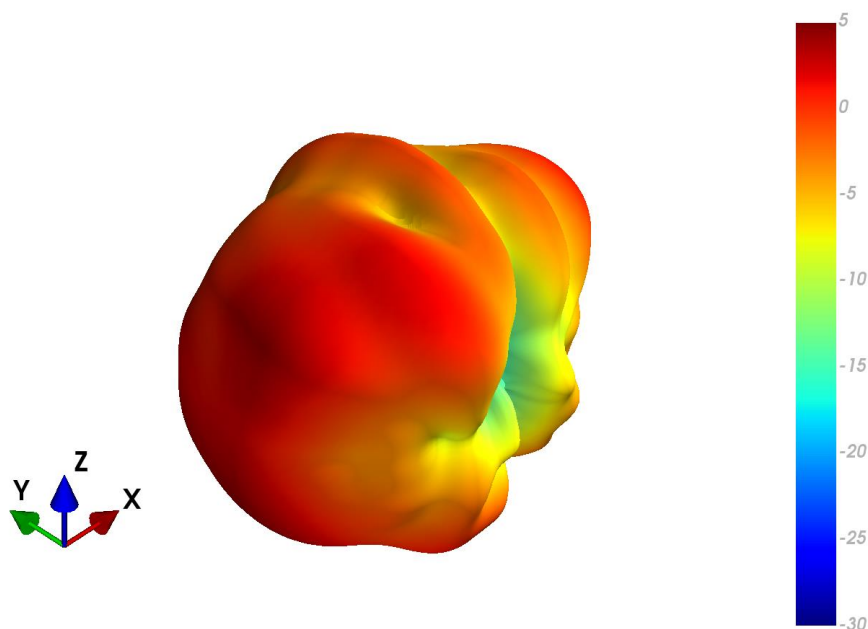
YZ Plane



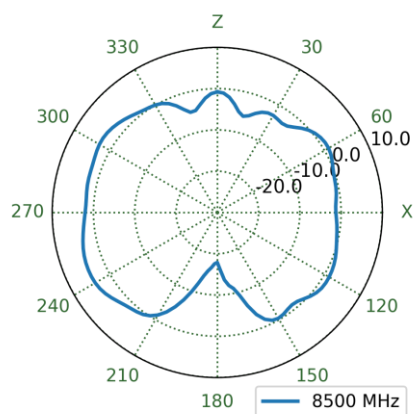
XY Plane



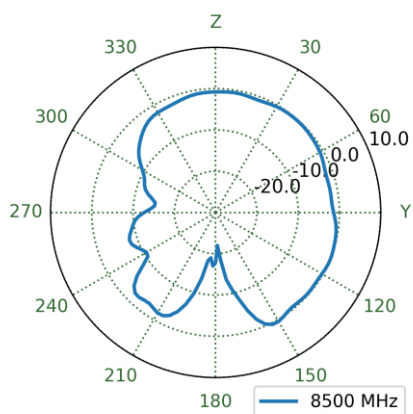
4.6 UWA.01 Patterns at 8500 MHz



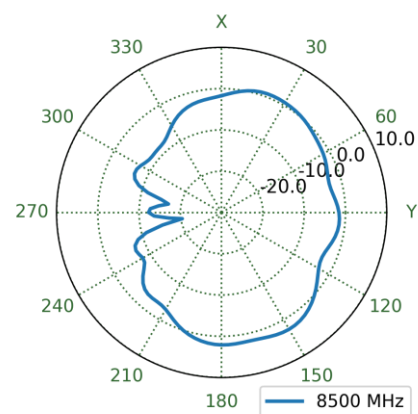
XZ Plane



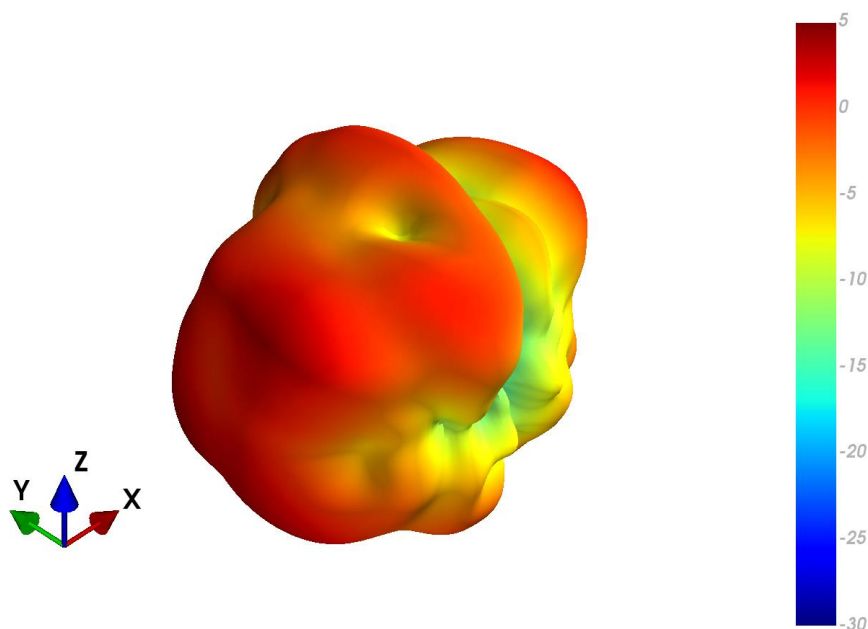
YZ Plane



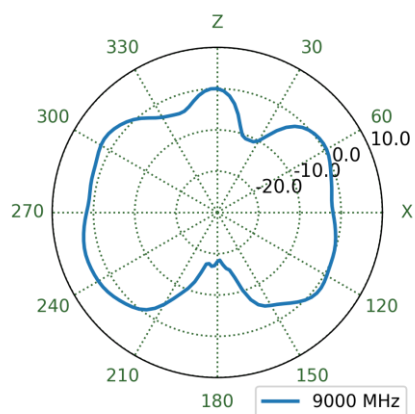
XY Plane



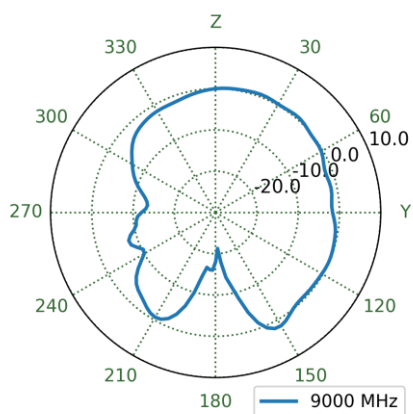
4.7 UWA.01 Patterns at 9000 MHz



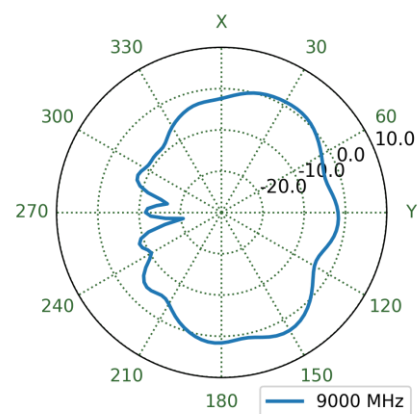
XZ Plane



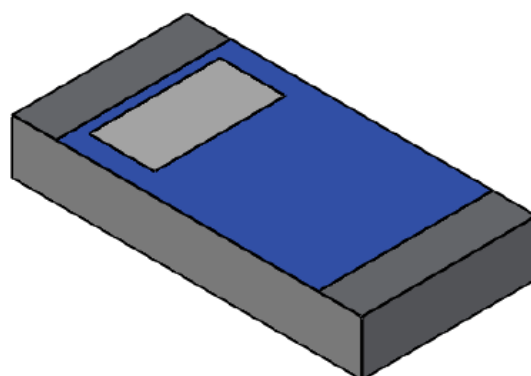
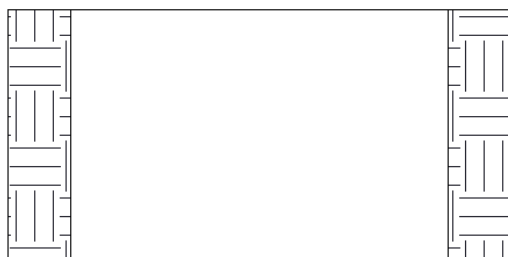
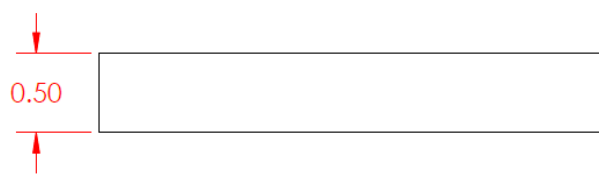
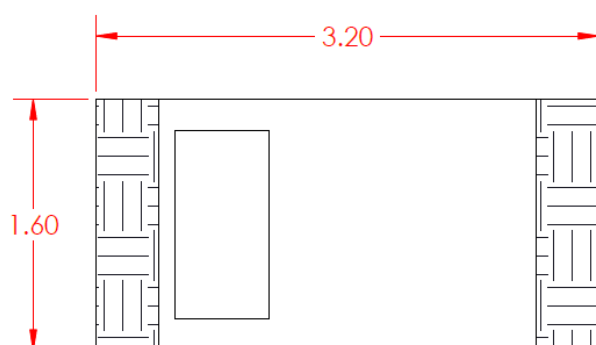
YZ Plane



XY Plane

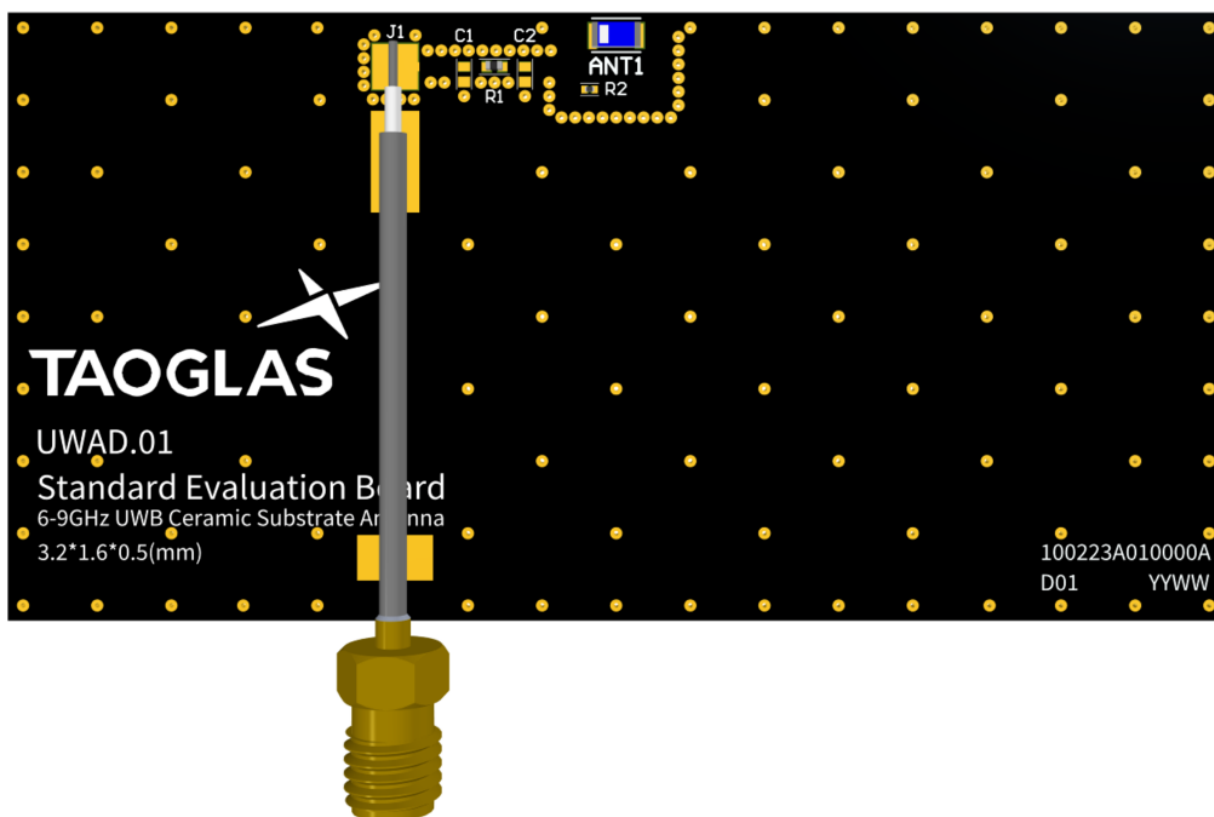
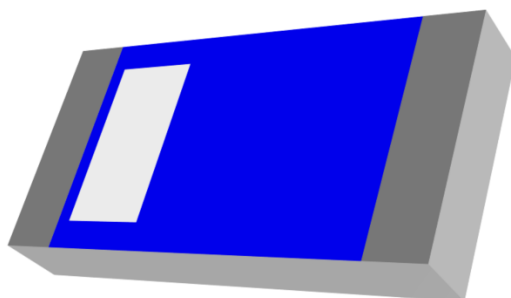


5. Mechanical Drawing



MODEL VIEW

6. Antenna Integration Guide

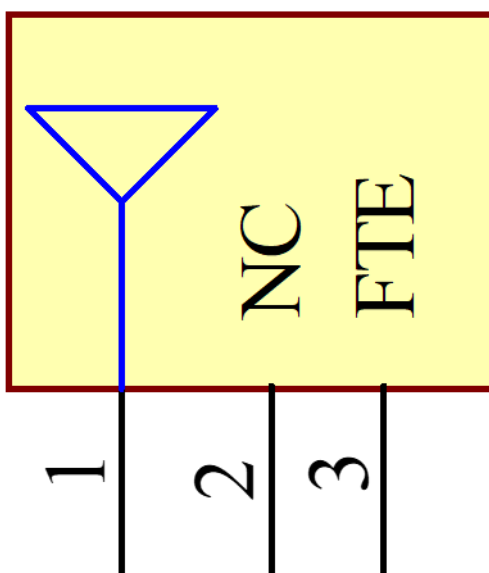


6.1 Schematic and Symbol Definition

The circuit symbol for the antenna is shown below. The antenna has 3 pins with only two pins as functional.

Pin	Description
1	RF Feed
2	Mechanical, Not Connected
3	FTE (Fine Tuning Element)

UWA.01
ANT1

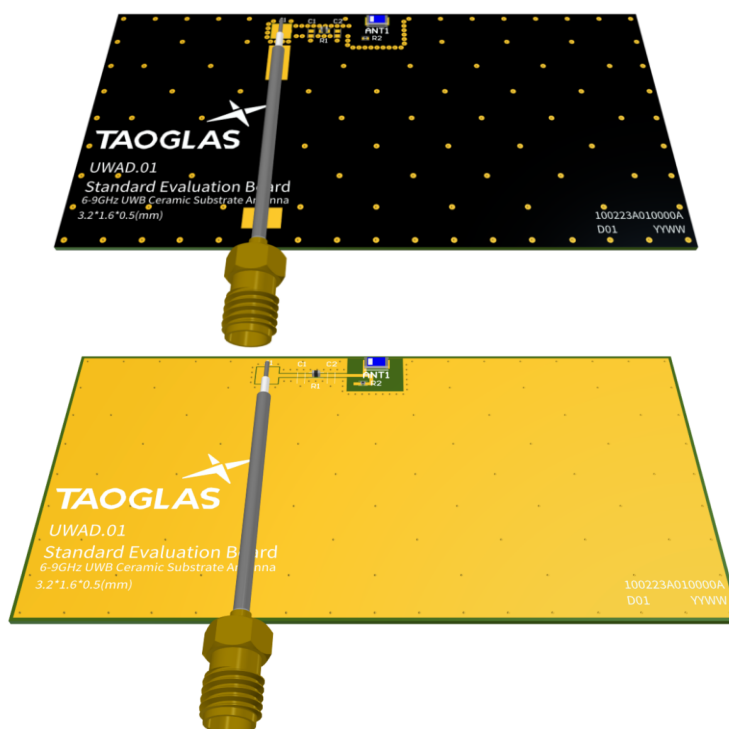


Please note you can download the design files, 3D model and 2D drawings files from the website here:

<https://www.taoglas.com/datasheets/UWA.01 .pdf>

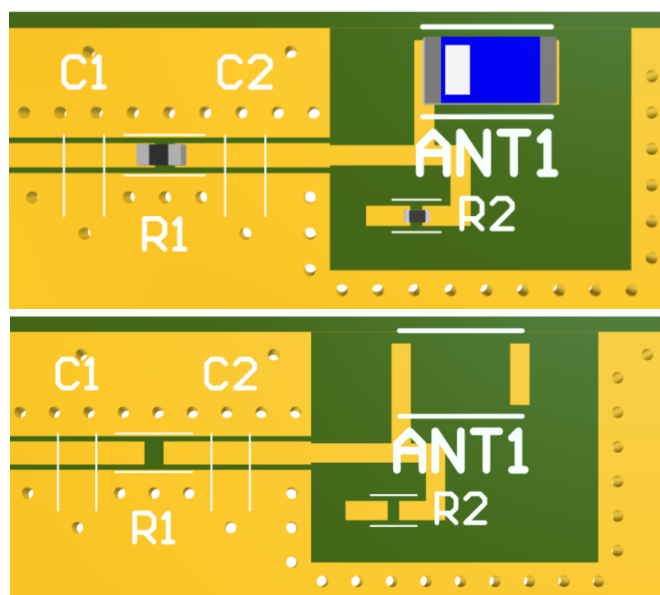
6.2 Antenna Integration

For any given PCB size, the antenna should ideally be placed at the centre edge of the PCB's longest side, to take advantage of the ground plane.



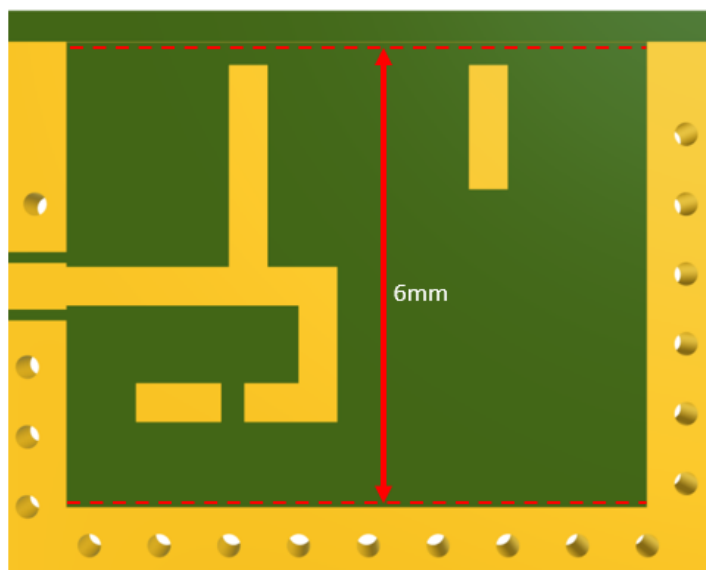
6.3 PCB Layout

The footprint and clearance on the PCB must meet the layout drawing in section (Footprint Drawing). Note the placement of the optimized components. R1 is placed as close as possible to the RF feed (pad 1) outside the copper keep out area. R2 is then placed tightly within the copper keep out area connected to RF Feed and the Fine-Tuning Element (pad 3). C1 & C2 are an optional components but the footprints are recommended in case they are needed.

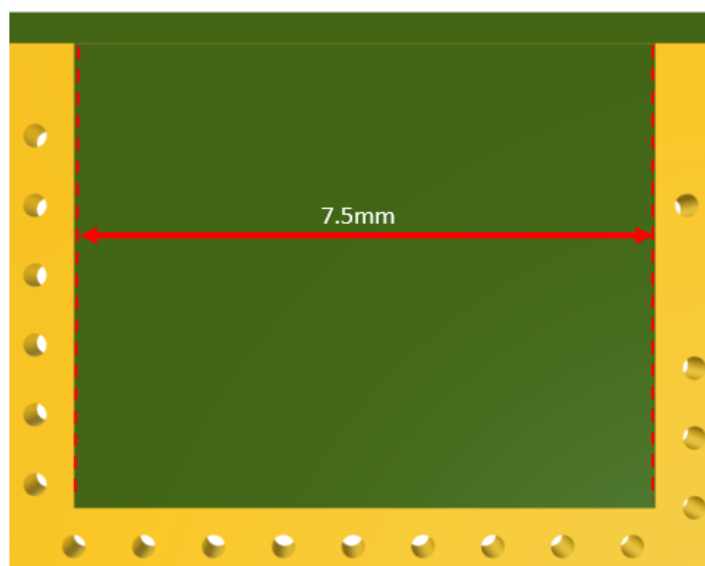


6.4 PCB Keep out

Below shows the antenna footprint and clearance through ALL layers on the PCB. Only the antenna pads and connections to feed and GND are present within this clearance area (marked RED). The clearance area extends to 6mm in length and 7.5mm in width from the centre edge on the long side of the PCB. This clearance area includes the bottom side and ALL internal layers on the PCB.

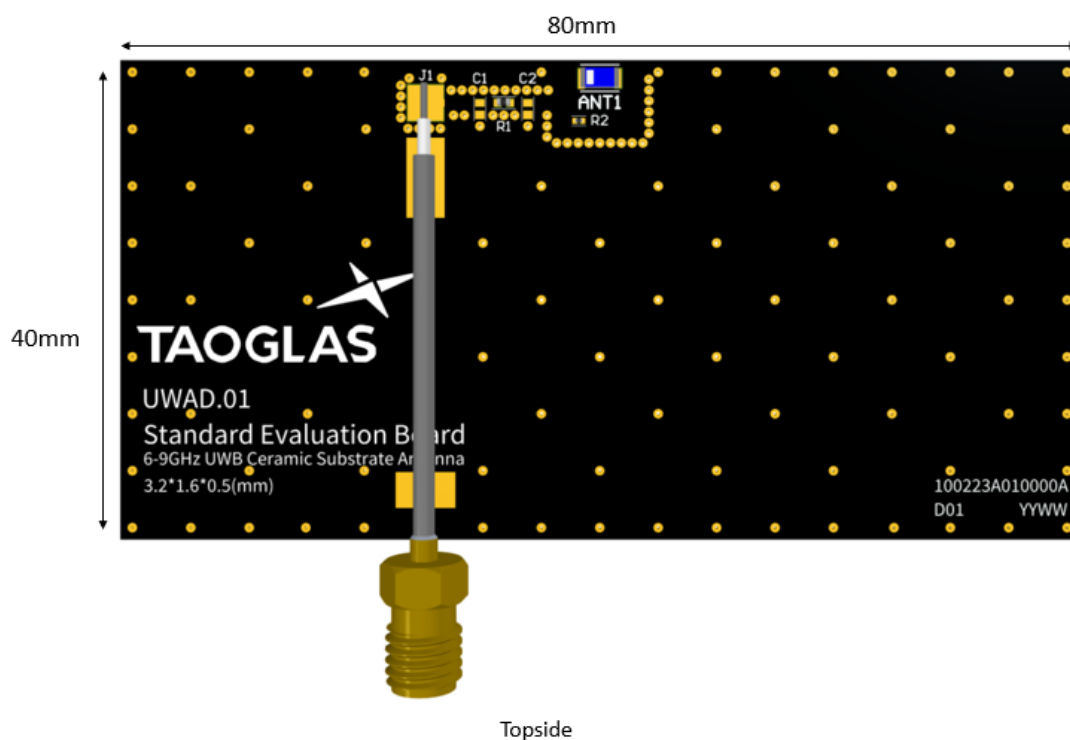


Topside



Bottom Side

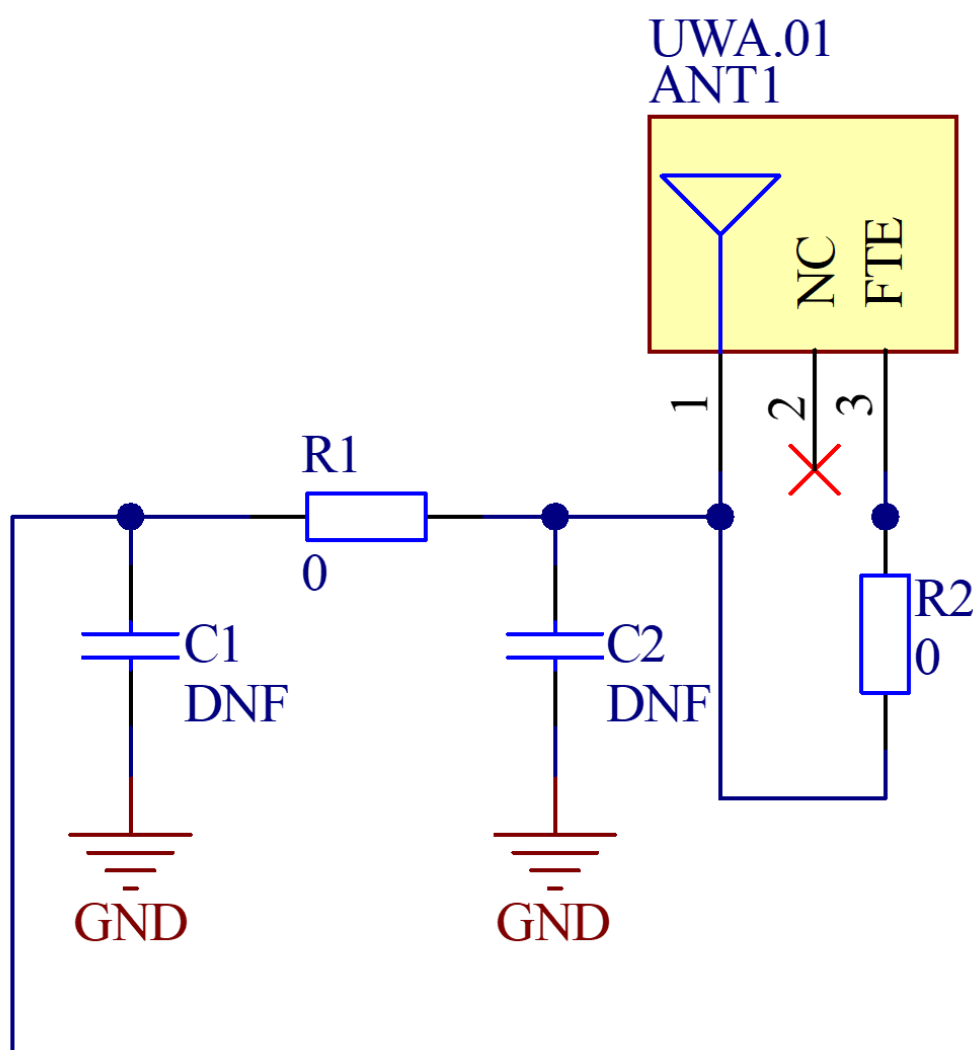
6.5 Evaluation Board



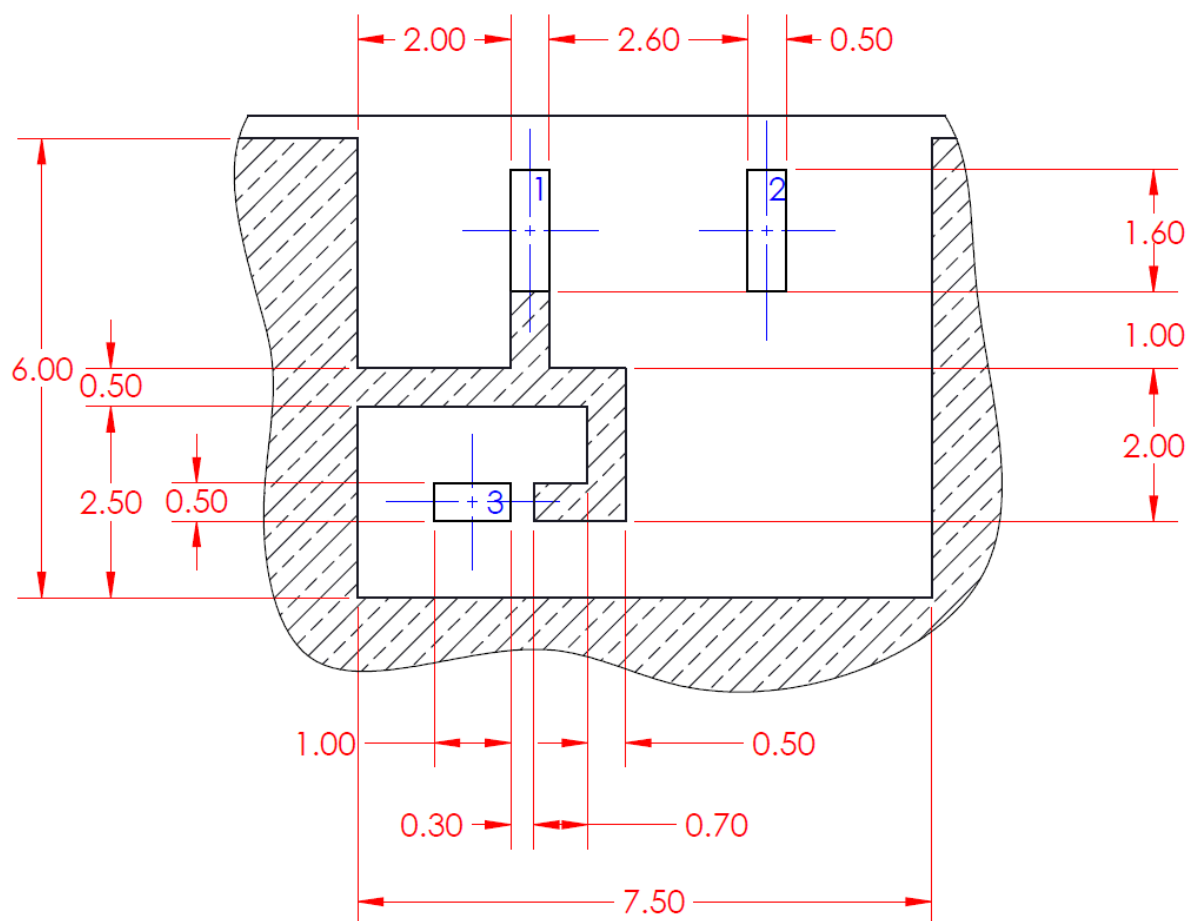
6.6 Evaluation Board Matching Circuit

The UWA.01 doesn't require any matching components on the Evaluation board, however, a 'pi' matching network is recommended if it is necessary for your device. A '0 ohms' link is applied in our Evaluation board. Another '0 ohms' (R2) is applied in the Fine Tune Element port (FTE) which can be changed later to fine tune the antenna.

Designator	Type	Value	Manufacturer	Manufacturer Part Number
R1	Resistor	0 Ohms	Yageo	RC0402JR-070RL
R2	Resistor	0 Ohms	Panasonic	ERJ-1GN0R00C
C1, C2	Capacitor	Not Fitted	-	-



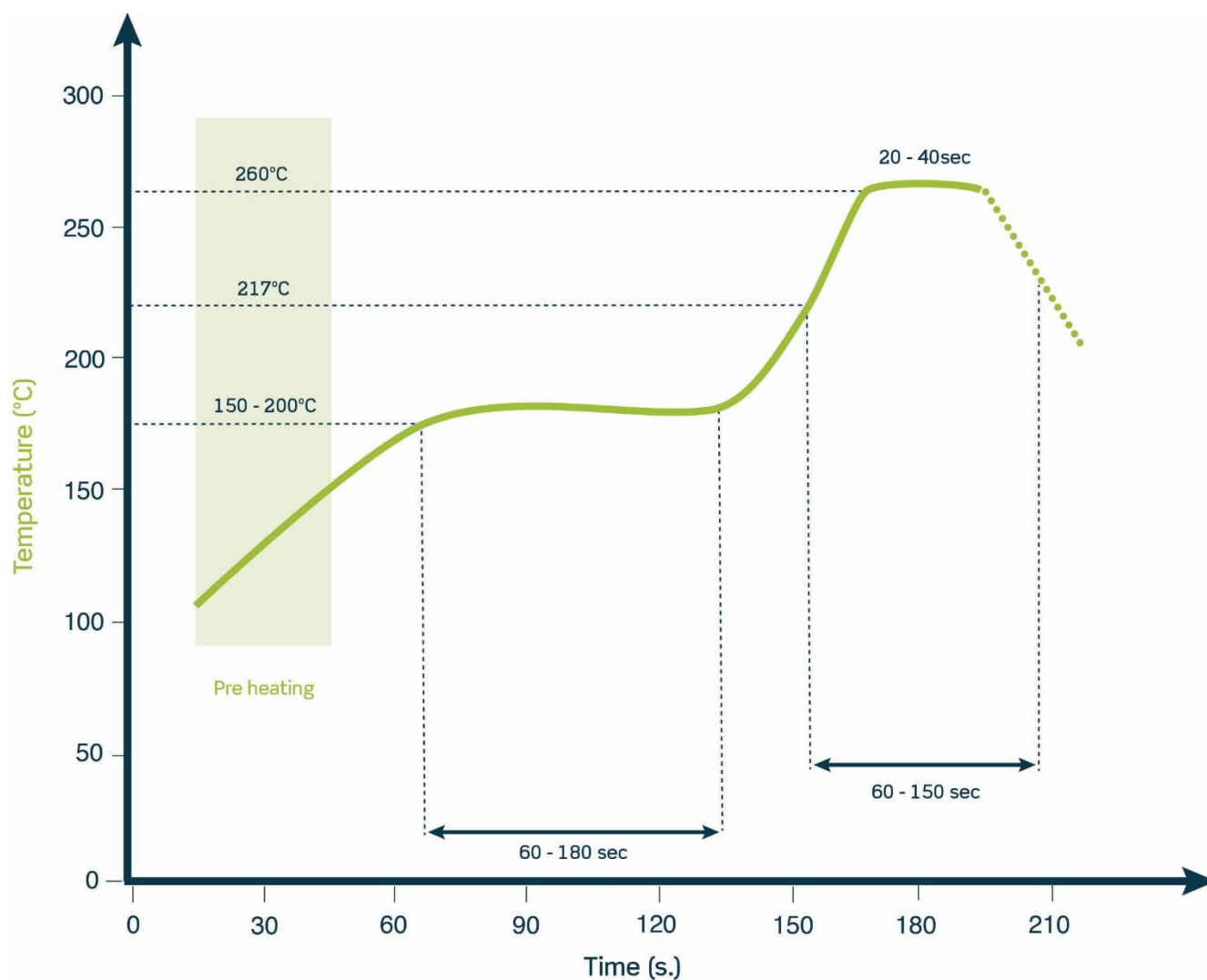
6.7 Footprint



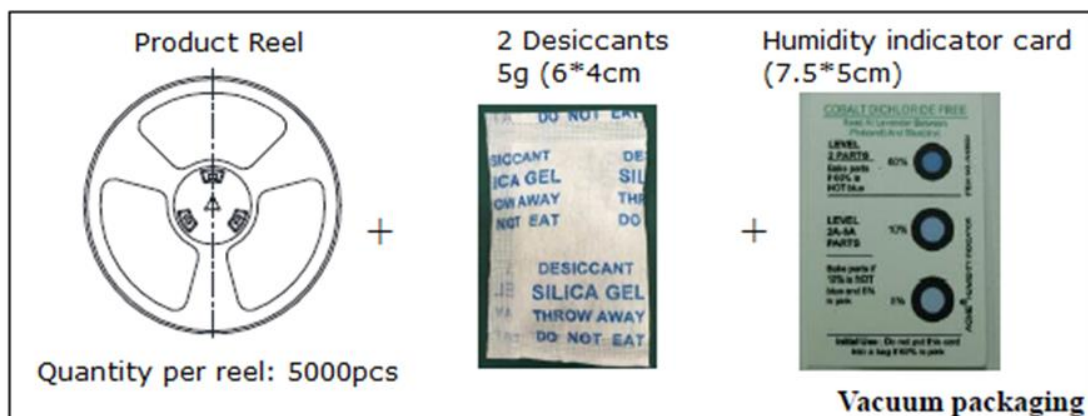
PIN	DESCRIPTION
1	RF FEED
2	NO CONNECTION
3	FINE TUNING COMPONENT

7. Solder Reflow Profile

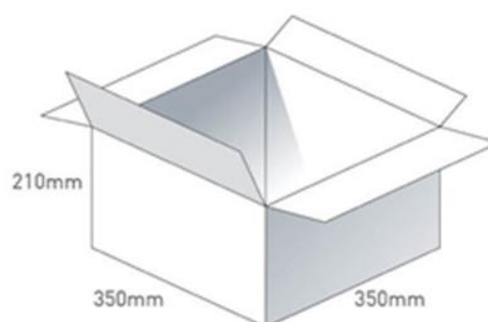
Typical Soldering Profile for Lead-free Process:



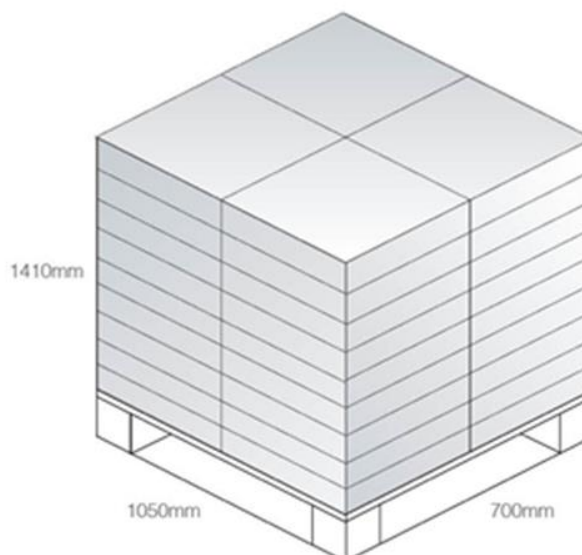
8. Packaging



9 reels / 45000 pcs in one carton
Carton Dimensions - 350*350*210mm
Weight - 9Kg



Pallet Dimensions 1050*700*1410mm
36 Cartons per Pallet
4 Cartons per layer
9 Layers



Changelog for the datasheet

SPE-23-8-017 - UWLA.01

Revision: A (Original First Release)	
Date:	2023-01-30
Notes:	Initial Release.
Author:	Gary West

Previous Revisions



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