

October 19, 2023

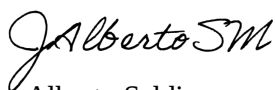
Alveo Technologies
1000 Atlantic Ave, Suite 114
Alameda, California 94501
USA

Dear Wayne Okada,

Enclosed is the radio test report for Passive Antenna testing of the PCB antenna.

Thank you for using the services of Eurofins E&E North America. If you have any questions regarding these results or if we can be of further service to you, please feel free to contact me.

Sincerely yours,
Eurofins E&E North America



Alberto Saldivar
Wireless Laboratory

Reference: (\\Alveo Technologies\\WIRS115645-PassiveAntennaTesting Rev. 1.0)



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Radio Test Report

For the

Manufacturer: Alveo Technologies

Model Name/Number: PCB antenna

Device Type: PCB Antenna

Report: WIRS115645-PassiveAntennaTesting Rev. 1.0

October 19, 2023

Prepared For:

**Alveo Technologies
35 Medford St. Suite 201
Somerville, MA 02143
USA.**

Prepared By:
Eurofins E&E North America
3162 Belick St,
Santa Clara CA, 95054

Radio Test Data

For the

Manufacturer: Alveo Technologies

Model Name/Number: PCB antenna

Device Type: PCB Antenna

Report: WIRS115645-PassiveAntennaTesting Rev. 1.0

Eddie Parsons

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Director, Wireless Technologies

Report Status Sheet

Revision	Report Date	Reason for Revision
1.0	October 19, 2023	Initial Issue.

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1. Executive Summary

Eurofins E&E North America was contracted by Alveo Technologies to perform Passive Antenna Testing on the PCB antenna under the Alveo Technologies purchase order number PO 2110056825.4.

The services performed will include:

- Testing each antenna in an accredited test environment, providing the characteristics of the antenna.

Deliverables:

- Report detailing the results of each antenna includes: Radiation Pattern and Peak Gain.

Requirements:

- Sample prototype to be tested

2. Equipment Configuration

2.1. Overview

This document describes the test setups, test methods, required test equipment used to perform Passive Antenna Testing of the PCB antenna. The objective of the testing was to verify the antenna efficiency and peak gain of the PCB antenna.

2.1.1. Equipment Under Test (EUT) Information

Manufacture:	Pulse	
Model:	PCB antenna	
Serial number / ESN(s) / IMEI(s):	SN: 23782-1	
Primary Mechanical Mode:	Monoblock	
Device Type:	PCB Antenna	
Antenna Type:	Internal	
Radio Mode(s)	2400-2500 MHz Antenna Peak Gain.	
Band/Frequency Range	2400-2500 MHz	
EUT Specifications:	Device Code:	PCB antenna
	Primary Power:	N/A
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 15-35° C	
	Relative Humidity: 30-60%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Alberto Saldivar	
Report Date(s):	October 19, 2023	

2.1.2. References

ISO/IEC 17025:2017	General Requirements for the Competence of Testing and Calibration Laboratories
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2.2. Test Site

All testing was performed in a limited access test laboratory facility located at Eurofins E&E North America, 3162 Belick St., Santa Clara, CA 95054. All testing performed at Eurofins E&E North America. Was conducted in the Environmental Simulation Lab. All equipment used in making physical determinations is accurate and bears recent traceability to the National Standards and Technology.

2.3. EUTs used for Testing

2.3.1. EUTs Used for Each Test

Serial Number/ ESN/IMEI	CATL and Chamber used	Radio Mode(s)	Band/Frequency Range(s)	Test Type(s)	Test Condition(s)
23782-1	OTA4	2400-2500 MHz Antenna Peak Gain.	2400-2500 MHz	Passive Antenna Testing	FS

2.4. Test Equipment Used During Testing

2.4.1. Passive Antenna Testing

MET Asset #	Equipment	Manufacturer	Model Number	Last Cal Date	Cal Due Date
1S4853	Vector Network Analyzer	R&S	ZNB40	04/26/2023	04/26/2024
Note 1: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.					

2.4.2. Measurement Software

Description	Manufacturer	Name	Version
OTA software	ETS	EMQuest	1.16

3. Result Summary

3.1. Project Summary

Customer:	Alveo Technologies
EUT Name/Model:	PCB antenna
Job Number	# 115645
Test Standard:	n/a
Test Name	OTA Passive Antenna Testing
Test Dates:	October 19, 2023
Laboratory	Eurofins E&E North America, 3162 Bellick St., Santa Clara, CA 95054
Test Engineer:	Alberto Saldivar
Test Results:	Completed
Additional Notes:	

4. Summation Test Report

4.1. Antenna Peak Gain Tables

4.1.1. PCB antenna Peak Gain from 2400 MHz to 2500 MHz

Frequency [MHz]	Antenna Peak Gain [dBi]
2400	-13.8
2402	-14.0
2404	-14.2
2406	-14.4
2408	-14.4
2410	-14.5
2412	-14.6
2414	-14.8
2416	-14.9
2418	-15.1
2420	-15.1
2422	-15.0
2424	-15.1
2426	-15.2
2428	-15.1
2430	-15.1
2432	-15.0
2434	-14.8
2436	-14.5
2438	-14.6
2440	-14.6
2442	-14.5
2444	-14.5
2446	-14.3
2448	-14.1
2450	-14.0
2452	-14.0
2454	-14.1
2456	-14.1
2458	-14.0
2460	-13.8
2462	-13.8
2464	-13.8

2466	-14.0
2468	-13.9
2470	-13.9
2472	-13.7
2474	-13.8
2476	-13.9
2478	-14.0
2480	-14.0
2482	-14.2
2484	-14.2
2486	-14.1
2488	-14.2
2490	-14.5
2492	-14.6
2494	-14.7
2496	-14.6
2498	-14.8
2500	-15.0

4.2. PCB Antenna Peak Gain Plot

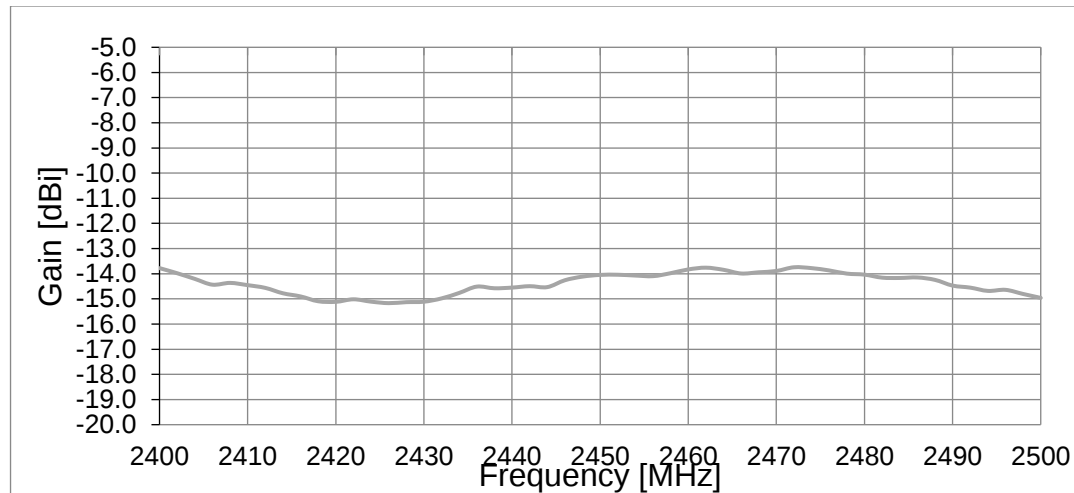
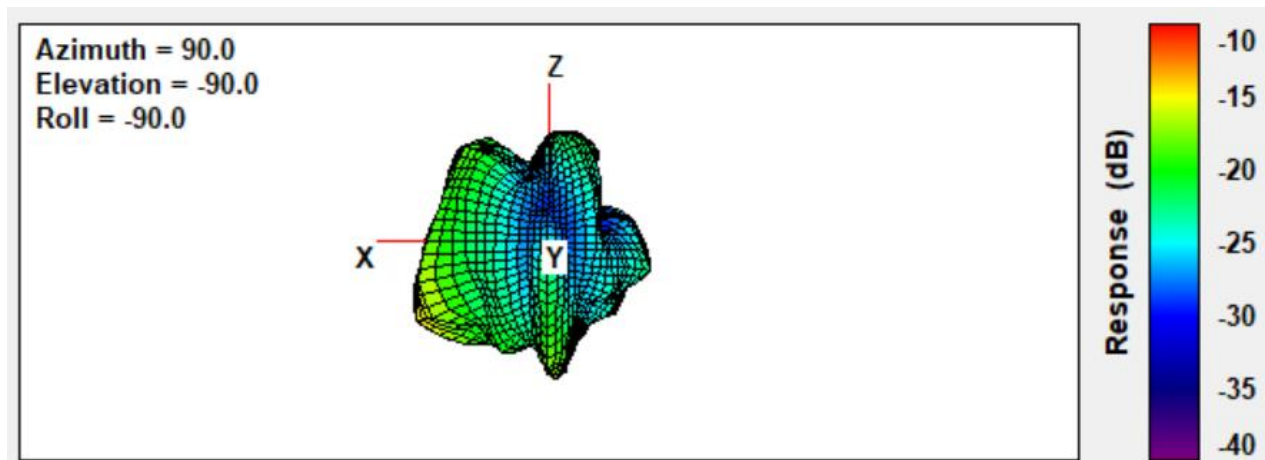


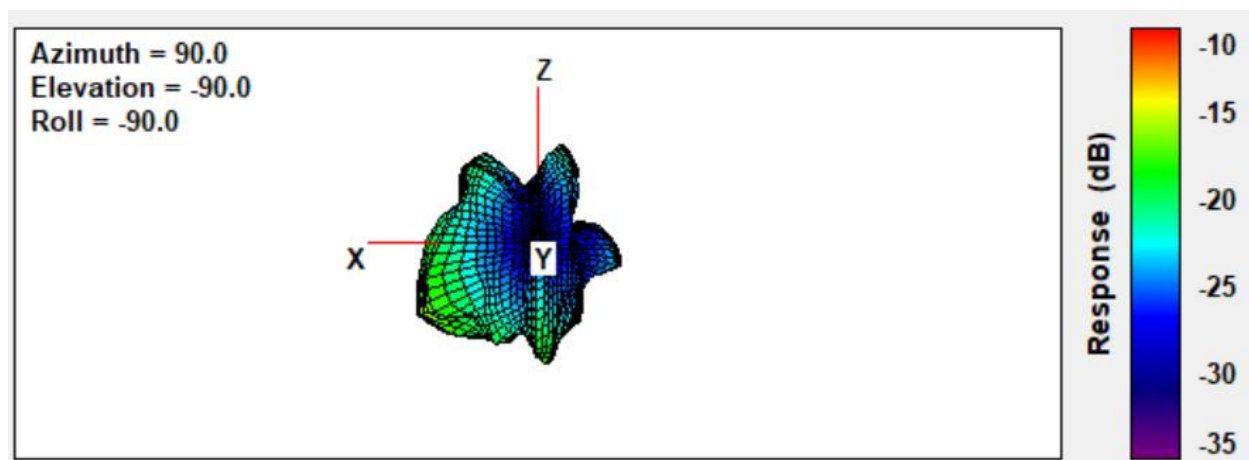
Figure 1; Antenna Peak Gain from 2400MHz to 2500MHz

4.3. 3D Antenna Patterns

4.3.1. 3D Antenna Patterns



2400 MHz



2440 MHz

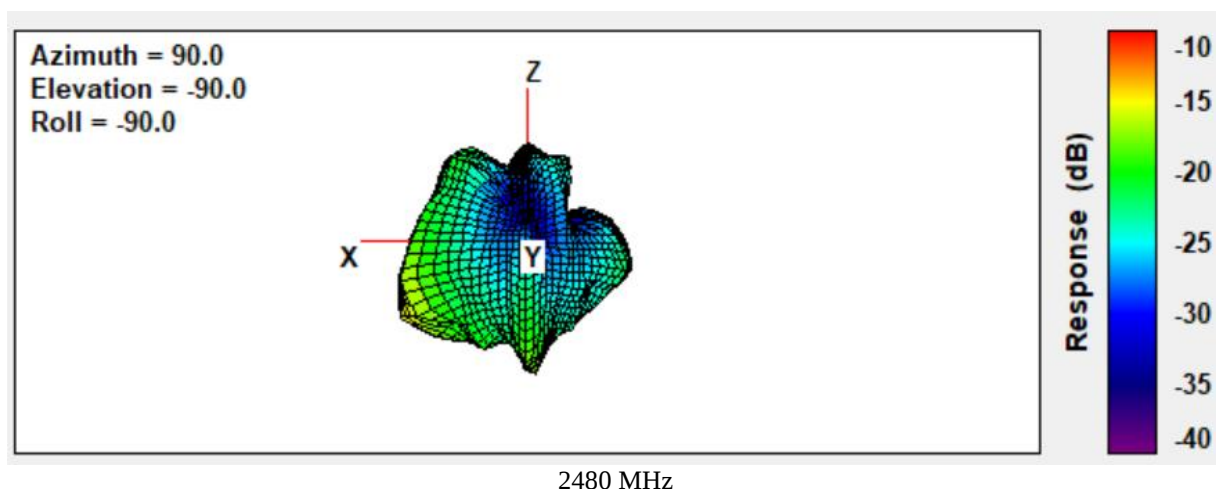


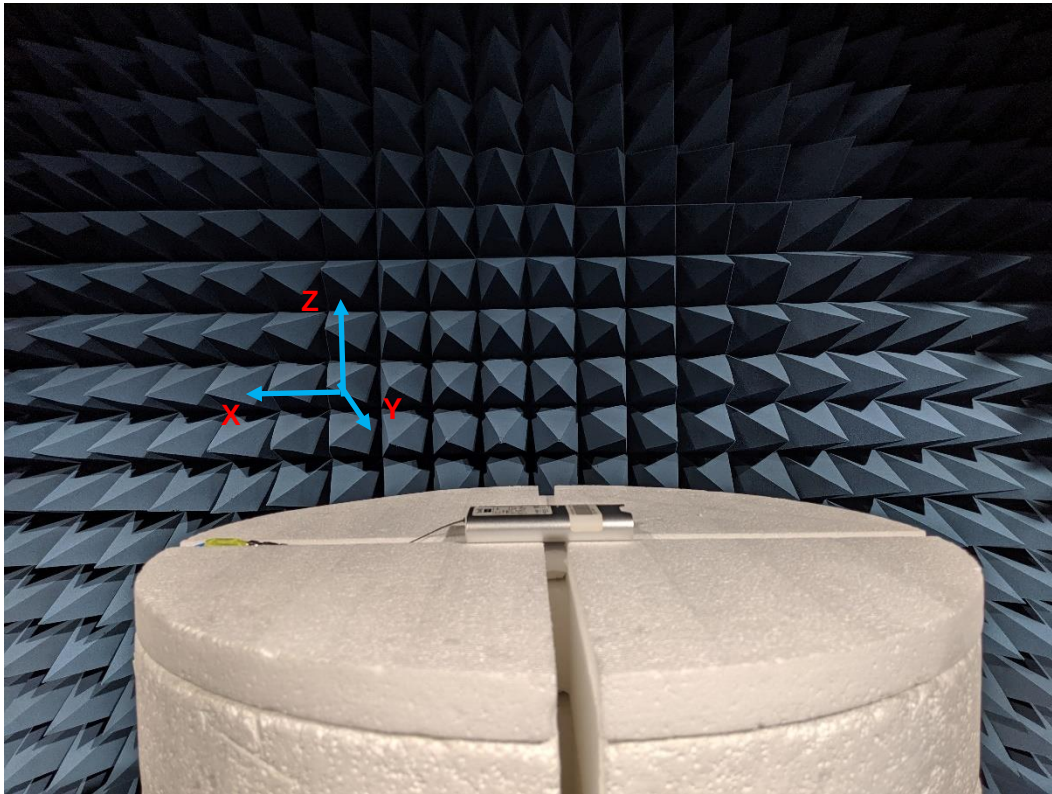
Figure 2; 3D Radiation Patterns from 2400MHz to 2500MHz

4.4. Measurement Uncertainty

4.4.1. Measurement Uncertainty

OTA 4 Free Space	
Band	Expanded Uncertainty [dB]
WLAN 2400 – 2500 MHz	1.62
WLAN 5000 – 6000 MHz	1.72

ANNEX A EUT photos



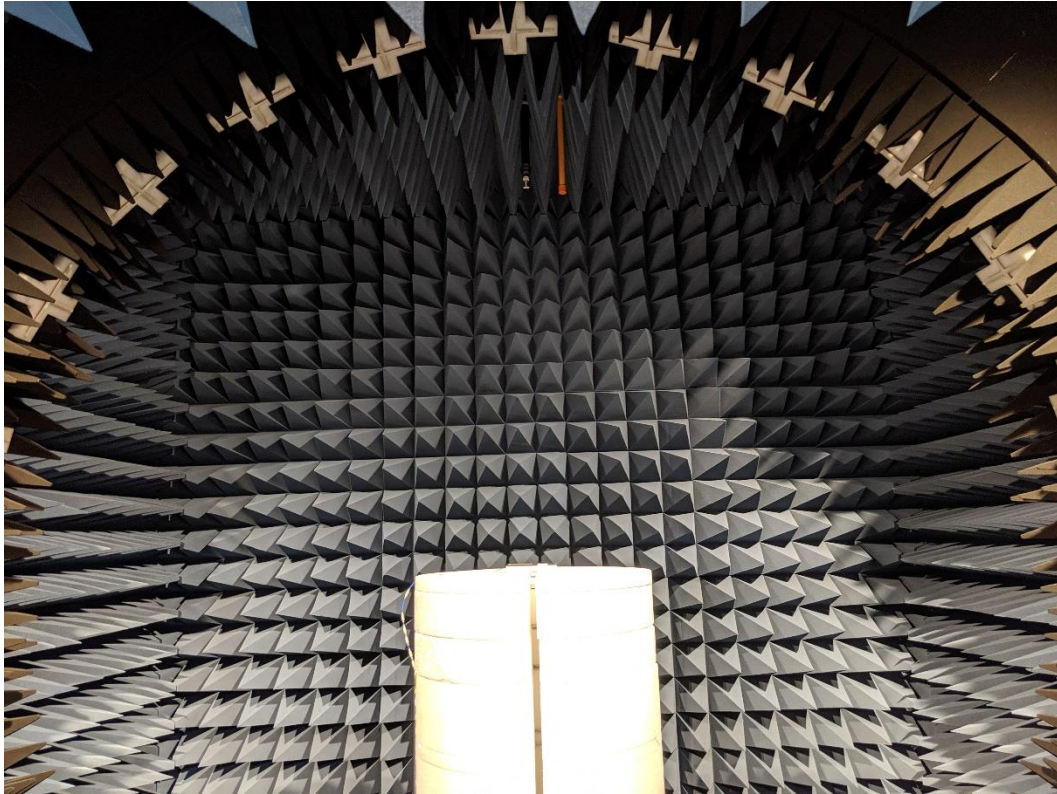


Figure 3; PCB Antenna OTA setup

END OF REPORT