

Applicant	Plume Design, Inc.
Product Type	SuperPod Aon
Model Number	G2X, X=A, E, U, R, J.

Antenna Report

1. Measurement information

- Measurement: Plume HW lab
- Equipment: MVG SG24-C chamber , ANRITSU MS46522B VNA
- * Test Equipment list

Description	Manufacturer	Model	S/N	Cal Date
Network Analyzer	ANRITSU	MS46522B	1745103/M1:7295 0015	2021-12-10
Probe Array 1.5 meters internal diameter	MVG	SG24C	ATL1602S	2022-02-25
Azimuth Positioner	MVG	GONI-009/010	0018	N.C.R ¹

Note 1: N.C.R. = No Calibration Request.

* Test Engineer: Arthur Tung

2. Measurement Standards

-Reference: IEEE Std. 149-2021 section 8.4.1

3. Measurement Method

4. EUT set on multi-axis positioner and adjust EUT's physical center to measurement reference center. Measurement antenna set at phi polarization and 1.5 meters height. Port 1 of Network analyzer connect to antenna 1 of EUT. Record G value every 15 degree from 0 to 345 degree on Phi angle and 0 to 180 on theta of multi-axis positioner. Then set measurement antenna to theta polarization and repeat process. Repeat process to each antenna of EUT.

5. Measurement Environment

To use anechoic chamber with full 3D far field measurement capability. The detail refers to the Information below.

5.1. Radiation Pattern Test

Antennas tested for Gain and Efficiency must be assembled into the enclosure and tested in the fully assembled and operating G2X. The antenna is tested in free space in the full 3D anechoic chamber in the H, E1 and, E2 planes. The radiation patterns are measured at the center of transmit and receive bands.

5.2. Rectangular Fully Anechoic Chamber

Shield Dimensions (L x W x H): 3.5 m x 3.5 m x 2.7 m

5.3. Open Boundary 23 Probe Antenna Stargate System

Open Boundary 23 Probe Antenna Stargate System is based on positioning 23 waveguide probe antennas positioned 15 degrees apart from each other from 0 degrees to 345 degrees to measure all possible angles of a radiating electric field

5.4. Dual polarized probes

The probe aims to measure at a given location in space the value of the electromagnetic field radiated by an antenna under test.

Inside SATIMO measurement systems, the probes used are wideband dual polarized passive antennas. Each probe consists in two elementary antennas mounted in cross to collect the electromagnetic field according to two orthogonal polarizations. These probes are entirely reciprocal and can be used both in reception and transmission way.

5.5. Data Acquisition and Analysis Software

Satimo WaveStudio and SatEnv Antenna Measurement Software supports data acquisition in either the great circle-cut or conical-cut test sequence to perform full spherical antenna measurements. Post-processing calculations include derivation of antenna half-power beam-width, directivity, gain, radiation efficiency, total radiated power, and total optional isotropic sensitivity. Advanced graphic capabilities allow acquired data to be displayed in a variety of 2D and 3D formats.

5.6. Instrumentation

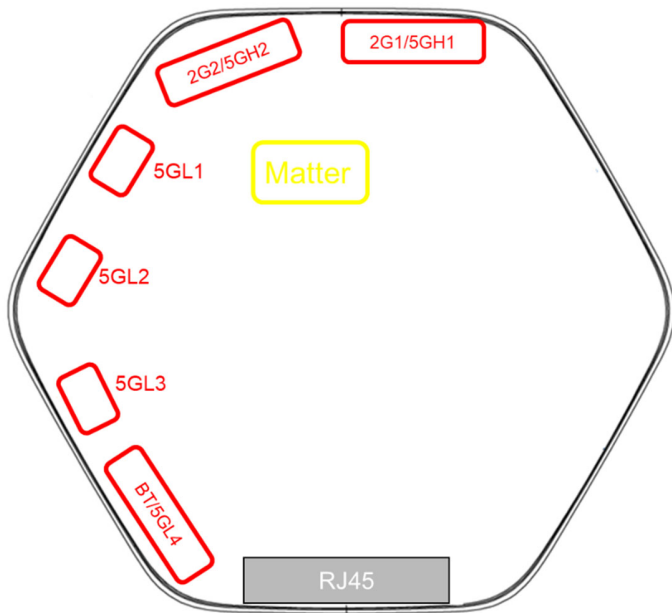
The system is configured to perform generic antenna measurement by using a multi-channel Vector Network Analyzer (VNA).

6. Equipment Configuration

6.1. EUT supports bands.

	Frequency Band	Frequency Range (MHz)	Number of Channels	
Operate Frequency (WLAN 2.4G)	IEEE 802.11b IEEE 802.11g IEEE 802.11n 20 MHz (64QAM) IEEE 802.11ac 20 MHz (256QAM) IEEE 802.11ax 20 MHz	2412 - 2462	11	
	IEEE 802.11n 40 MHz (64QAM) IEEE 802.11ac 40 MHz (256QAM) IEEE 802.11ax 40 MHz	2422 - 2452	9	
Operate Frequency (WLAN 5G)	IEEE 802.11a IEEE 802.11n 5 GHz 20 MHz / IEEE 802.11ac 20 MHz / IEEE 802.11ax 20 MHz	U-NII Band I	5180 – 5240	4
		U-NII Band II-A	5260 – 5320	4
		U-NII Band II-C	5500 – 5720	12
		U-NII Band III	5745 – 5825	5
	IEEE 802.11n 5 GHz 40 MHz / IEEE 802.11ac 40 MHz / IEEE 802.11ax 40 MHz /	U-NII Band I	5190 – 5230	2
		U-NII Band II-A	5270 – 5310	2
		U-NII Band II-C	5510 – 5710	6
		U-NII Band III	5755 – 5795	2
	IEEE 802.11ac 80 MHz / IEEE 802.11ax 80 MHz /	U-NII Band I	5210	1
		U-NII Band II-A	5290	1
		U-NII Band II-C	5530 – 5690	3
		U-NII Band III	5775	1
	IEEE 802.11ac 160MHz / IEEE 802.11ax 160MHz	U-NII Band I	5250	1
U-NII Band II-A				
U-NII Band II-C		5570	1	

6.2. EUT Antenna Configuration



6.3. EUT Antenna System Description:

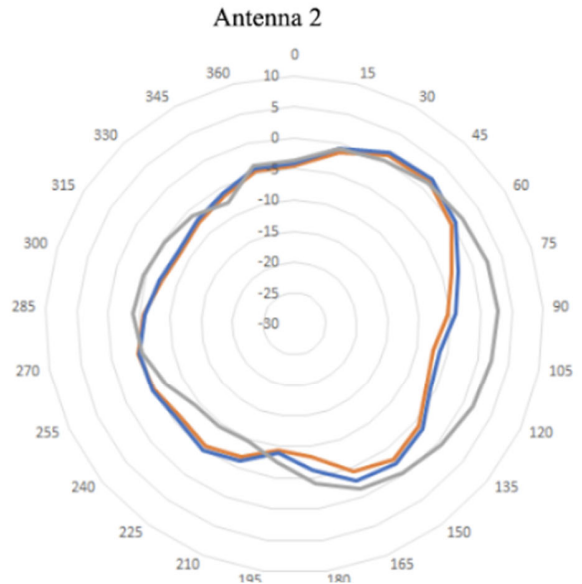
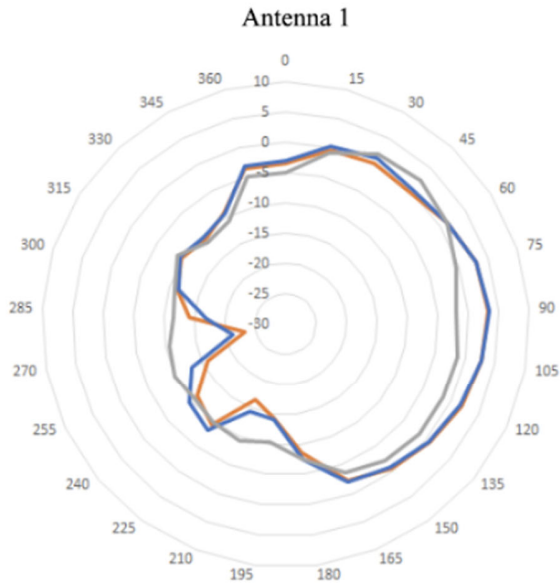
Ant.	Ant. Type
2G1/5GH1	IFA Antenna
2G2/5GH2	IFA Antenna
5GL1	IFA Antenna
5GL2	IFA Antenna
5GL3	IFA Antenna
BLE/5GL4	IFA Antenna
Matter	IFA Antenna



7. Result Summary and Pattern Plots

2.4G

	2G Antenna 1(dBi)	2G Antenna 2(dBi)
2420 MHz	3.2	1.5
2450 MHz	3.5	2.2
2480 MHz	2.5	2.7





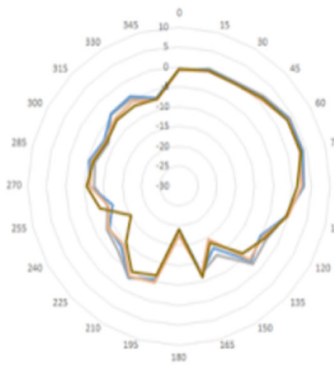
Plume

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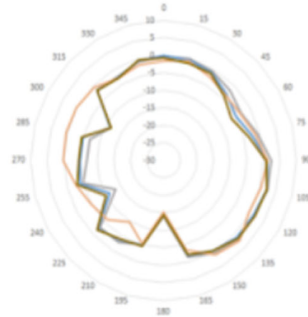
5GLB

	5GL Antenna 1 (dBi)	5GL Antenna 2 (dBi)	5GL Antenna 3 (dBi)	5GL Antenna 4 (dBi)
5100 MHz	4	2.5	3.2	2.9
5200 MHz	3.8	2.2	3.7	3
5250 MHz (Added Point)	3.3	2.2	3.8	2.3
5300 MHz	3.3	2.4	3.7	2.3

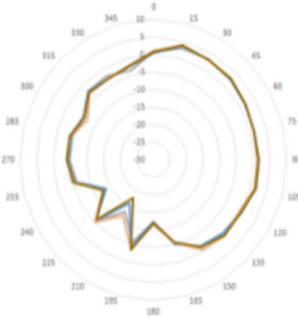
Antenna 1



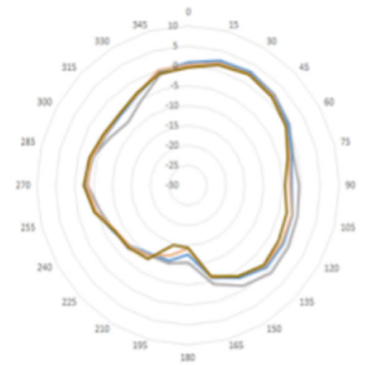
Antenna 2



Antenna 3



Antenna 4

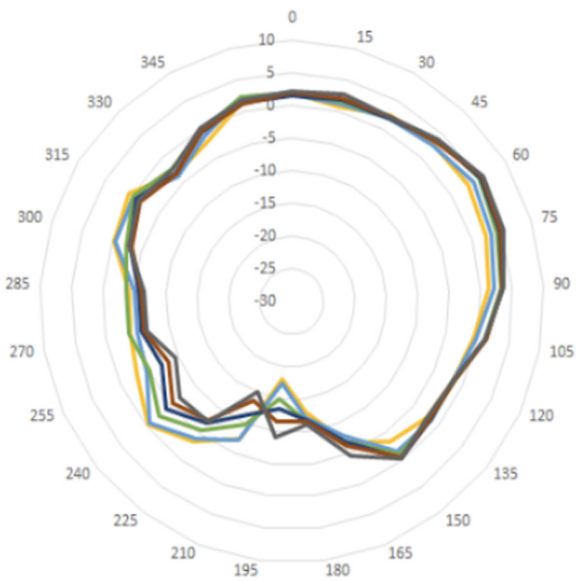




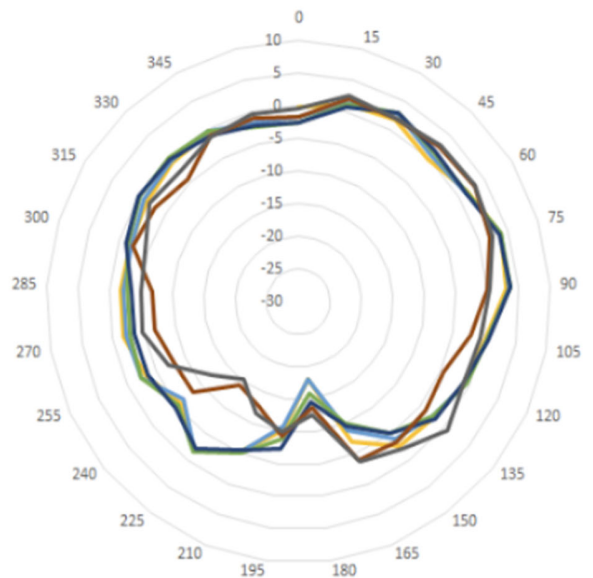
5GHB

	5GH Antenna 1(dBi)	5GH Antenna 2 (dBi)
5400 MHz	3.3	3.8
5500 MHz	3.6	3.7
5600 MHz	3.8	3.8
5700 MHz	5.5	3.7
5800 MHz	5.7	3.4
5900 MHz	5.9	3.2

Antenna 1



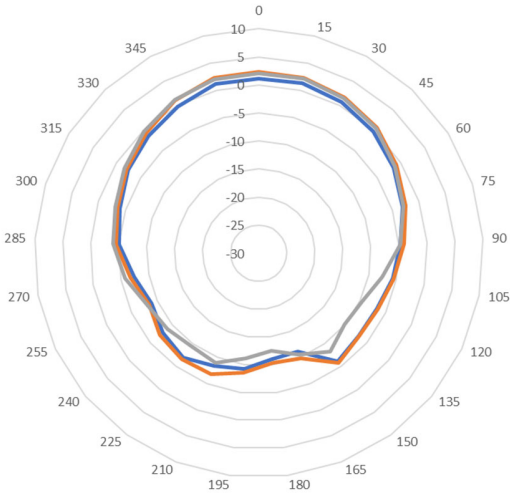
Antenna 2





Matter

Matter (dBi)	
2400MHz	0.08
2450MHz	2.62
2500MHz	2.19



BLE

BLE (dBi)	
2400MHz	0.8
2450MHz	1.7
2500MHz	2.4

