
Antenna measurement data

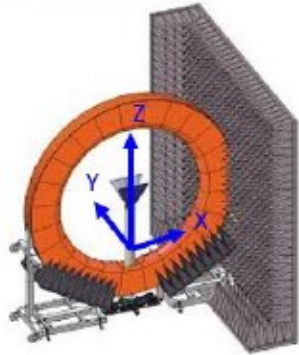
Introduction

- ❖ This report provides Sub GHz Ant & wi-fi Ant passive measurement results which include:
 - Return loss
 - Antenna Gain
 - 2D Radiation Pattern
- The return loss and isolation are measured by Agilent E5071C.
- The radiation pattern, antenna gain by SATIMO SG24 chamber as below picture.

Test Setup for Radiation Pattern Measurement

Chamber Information

- SATIMO SG-24L Multi-Probe Antenna Measurement System
- Angle between probes: 15°
- Frequency range: 400 MHz – 9 GHz
- Chamber Room Size: 5m L x 5m W x 5m H



SATIMO SG-24



E5071C

Antenna Vendor Info & Measurement Setup

- Antenna Vendor: Pegatron
- Test Date: 20230320
- Test Engineer :Joel Kuo
- Measurement Setup:

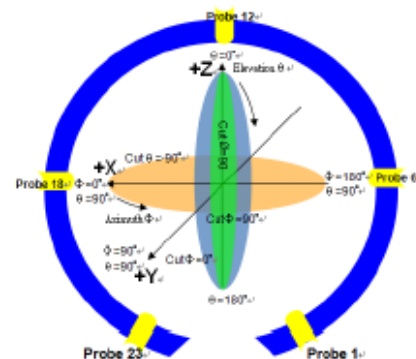
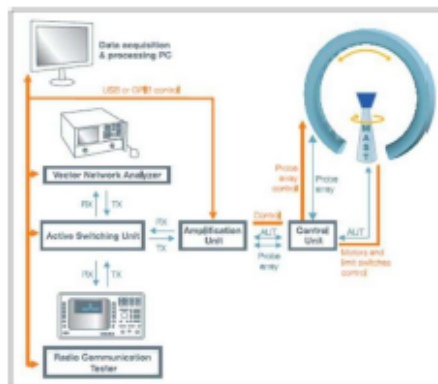
- Reflection Coefficient Measurement:

1. Network Analyzer (Keysight Agilent E5071C)
2. Setup:

- calibrate the Network Analyzer by one port calibration using 85033E calibration kit.
- connect the antenna under test to the Network Analyzer.
- measure the S11 (return loss)& S12(isolation)

- Pattern & Gain measurement:

1. Satimo chamber (SG24)
2. Satimo program (wave studio)
3. system overview :

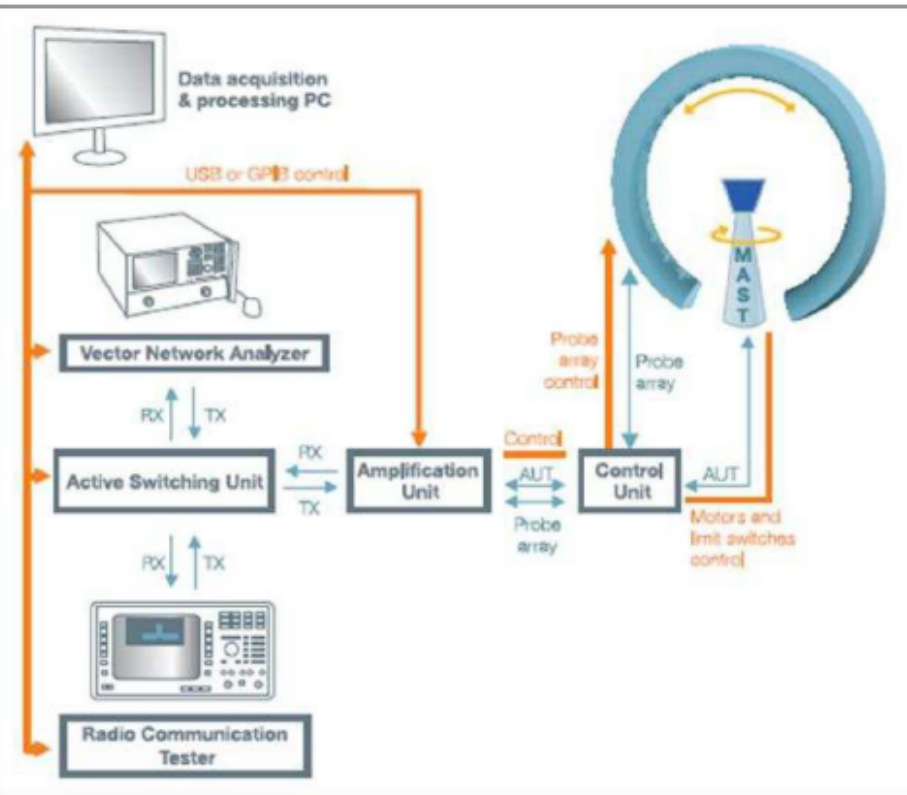


- Test Item

1. Antenna passive test 400MHz~6GHz

Description	Manufacturer	Model No.	Serial No.	Calibrated Date	Calibrated Until
OTA Chamber	Satimo	SG24	MVG/ HKG0147S	2022/09/15	2023/09/16
Network Analyzer	Keysight	E5071C	MY46212481	2022/5/15	2023/5/16

Test Procedure



1. Place the device to be tested on the fixture and align it with the center of the chamber.
2. Connect the antenna cable to the RF connector of the chamber.
3. Use the SW to configure parameters (antenna name, frequency points, measurement angles, antenna dimension), and then run the test SW (wave studio).
4. By phi from 0° to 360° and theta from 0° to 180° with a step size of 2 degrees, get the 3D data, including efficiency, peak gain, 2D and 3D radiation patterns.
5. This is far field test for antenna verification.
6. This is passive measurement, which means the device is off and not in any operating mode.

Antenna Placement



Antenna

Antenna Proposal	
Wireless Function	<ul style="list-style-type: none"> ■ Wi-Fi 2.4G antenna*2 ■ Sub-GHz antenna*1
Antenna type	<ul style="list-style-type: none"> ■ 2.4G FPC Ant(Dipole type)*2 ■ Sub GHz FPC Ant(loop Type)*1
Measurement data	
Return loss	<-10 dB
Isolation	< -14 dB
Peak Gain	<ul style="list-style-type: none"> ■ Wi-Fi_L @2.99 dBi ■ Wi-Fi_R @3.07 dBi ■ Sub-GHz @-2.45 dBi
Antenna efficiency	<ul style="list-style-type: none"> ■ Ant-1 > 59% ■ Ant-2 > 55% ■ Sub-GHz > 14%



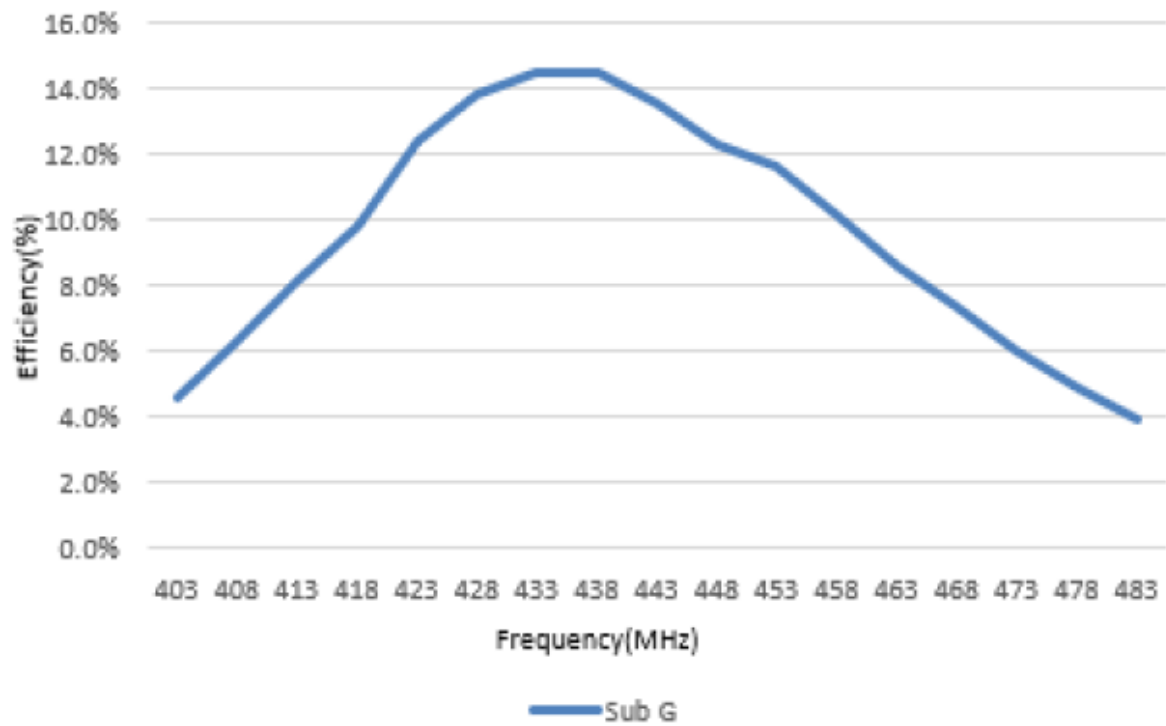
Front View



Left View

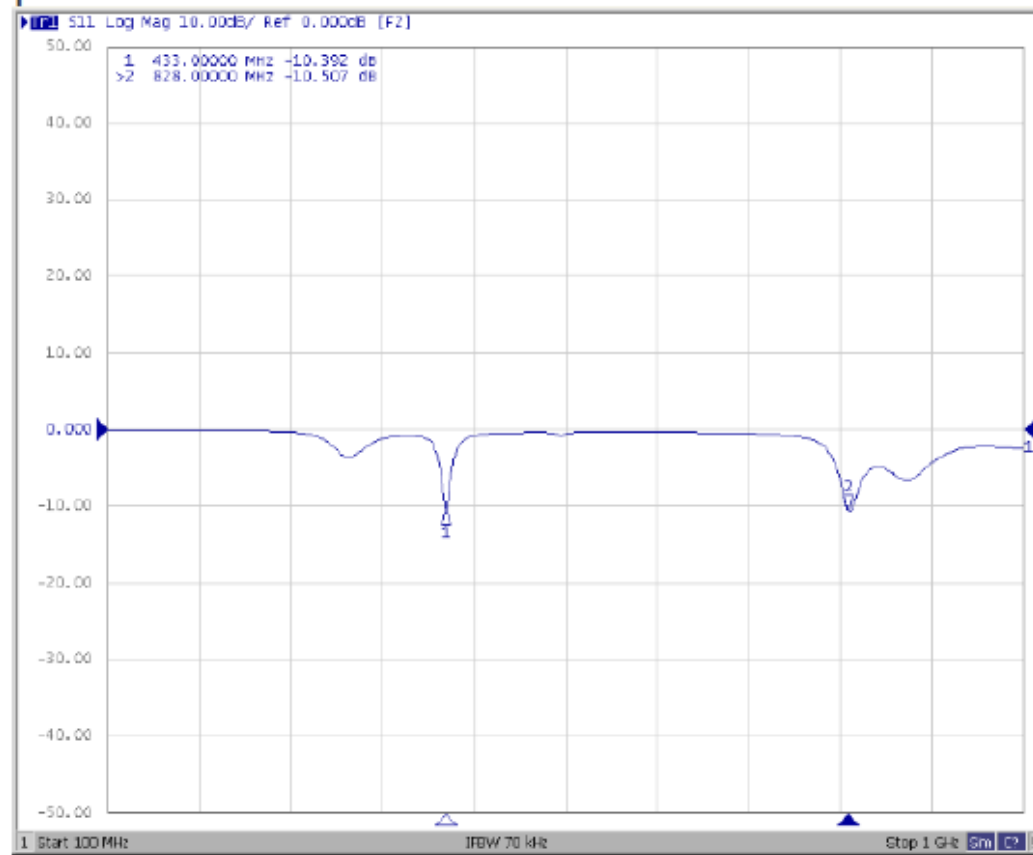
Measurement data

Sub GHz Antenna: Efficiency & Gain & S-parameter



Frequency(MHz)	423	433	448
Efficiency(%)	13%	14%	12%
E-total(dBi)	-4.48	-2.68	-4.18

Gain table



Frequency(MHz)	433	828	
S11(dB)	-10.39	-10.50	

Return Loss

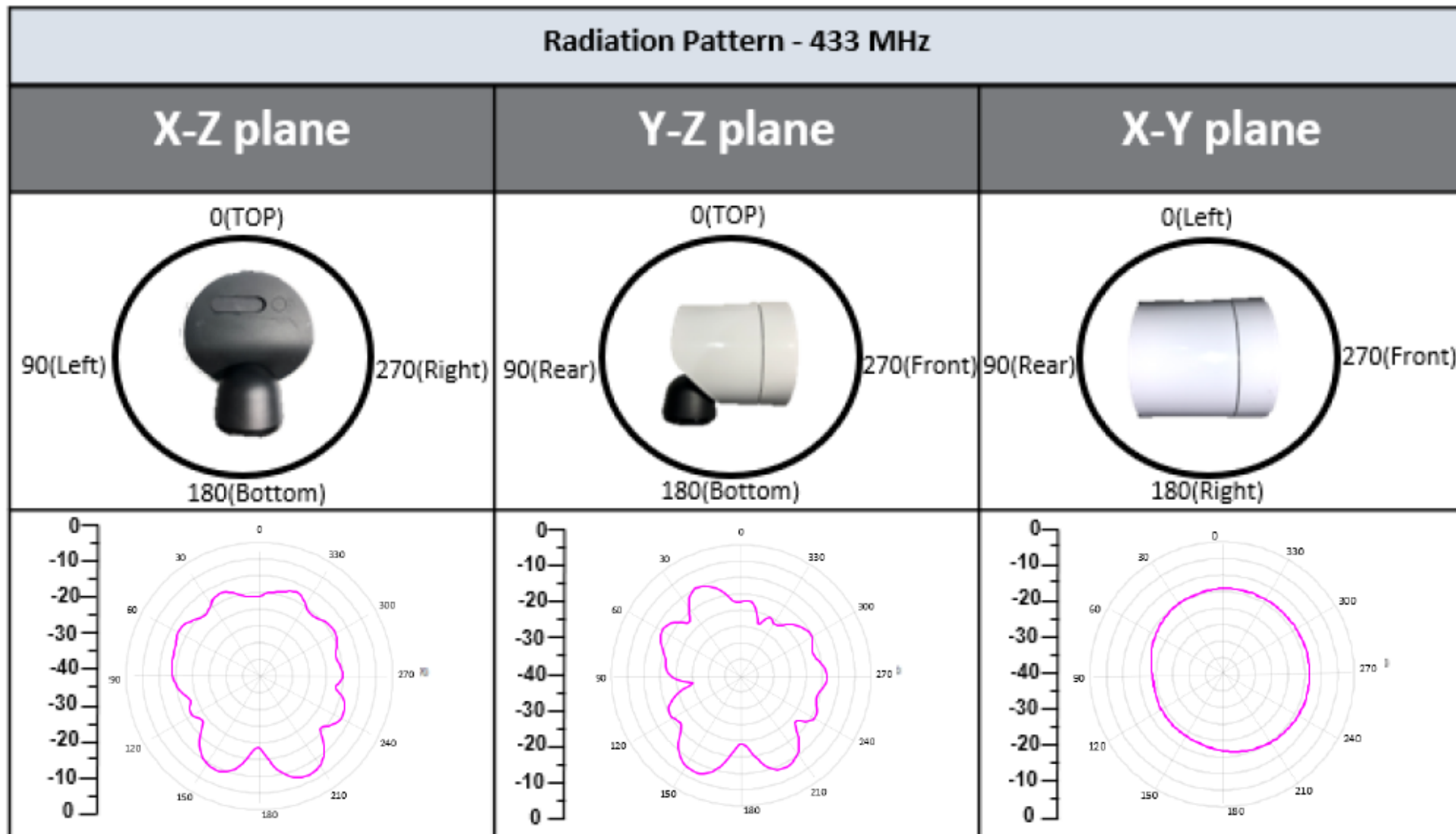
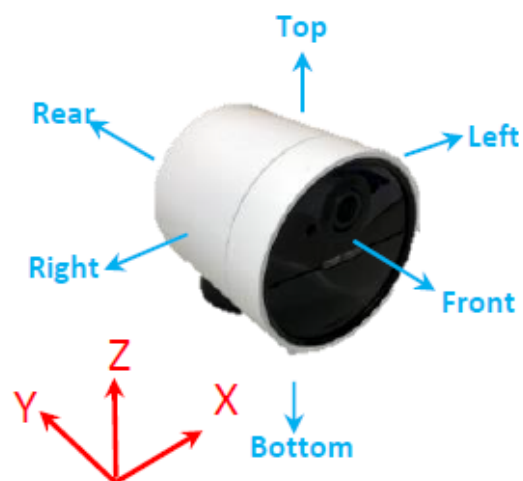
Measurement data

❖ Gain table: Sub GHz Ant

Frequency (MHz)	E-total (dBi)	Efficiency (%)
423	-4.48	13%
428	-3.35	14%
433	-2.68	14%
438	-2.45	14%
443	-2.89	13%
448	-4.18	12%
453	-6.09	11%

Measurement data

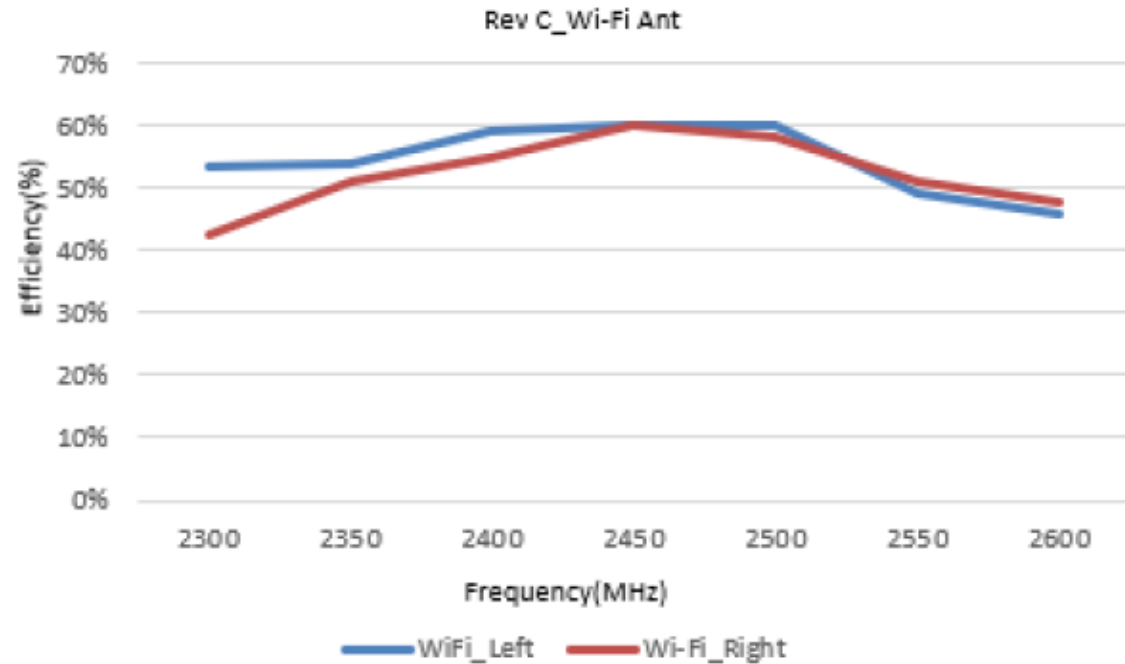
Sub GHz Antenna: 2D radiation pattern



	XZ	YZ	XY
0°	Top	Top	Left
90°	Left	Rear	Rear
180°	Bottom	Bottom	Right
270°	Right	Front	Front

Measurement data

Wi-Fi Antenna: Efficiency & Gain & S-parameter

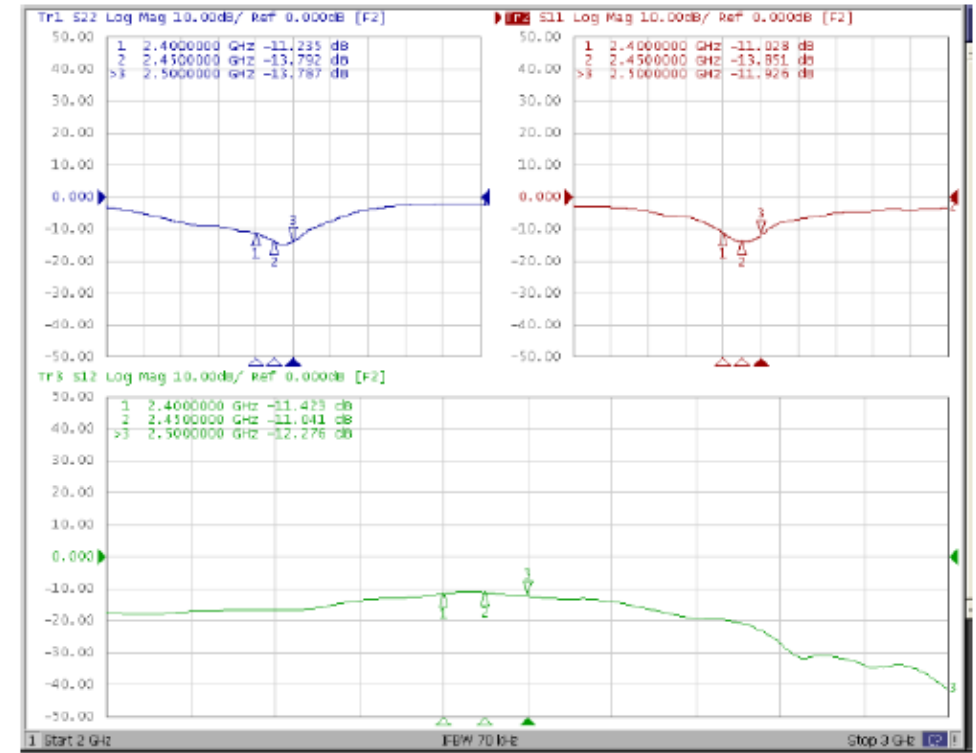


Frequency (MHz)	Wifi Ant L		Wifi Ant R	
	Efficiency(%)	E-total(dBi)	Efficiency(%)	E-total(dBi)
2400	59%	1.72	55%	1.92
2450	60%	2.88	60%	3.07
2500	60%	2.99	58%	2.78

Gain table

Wifi_Left

Wifi_Right



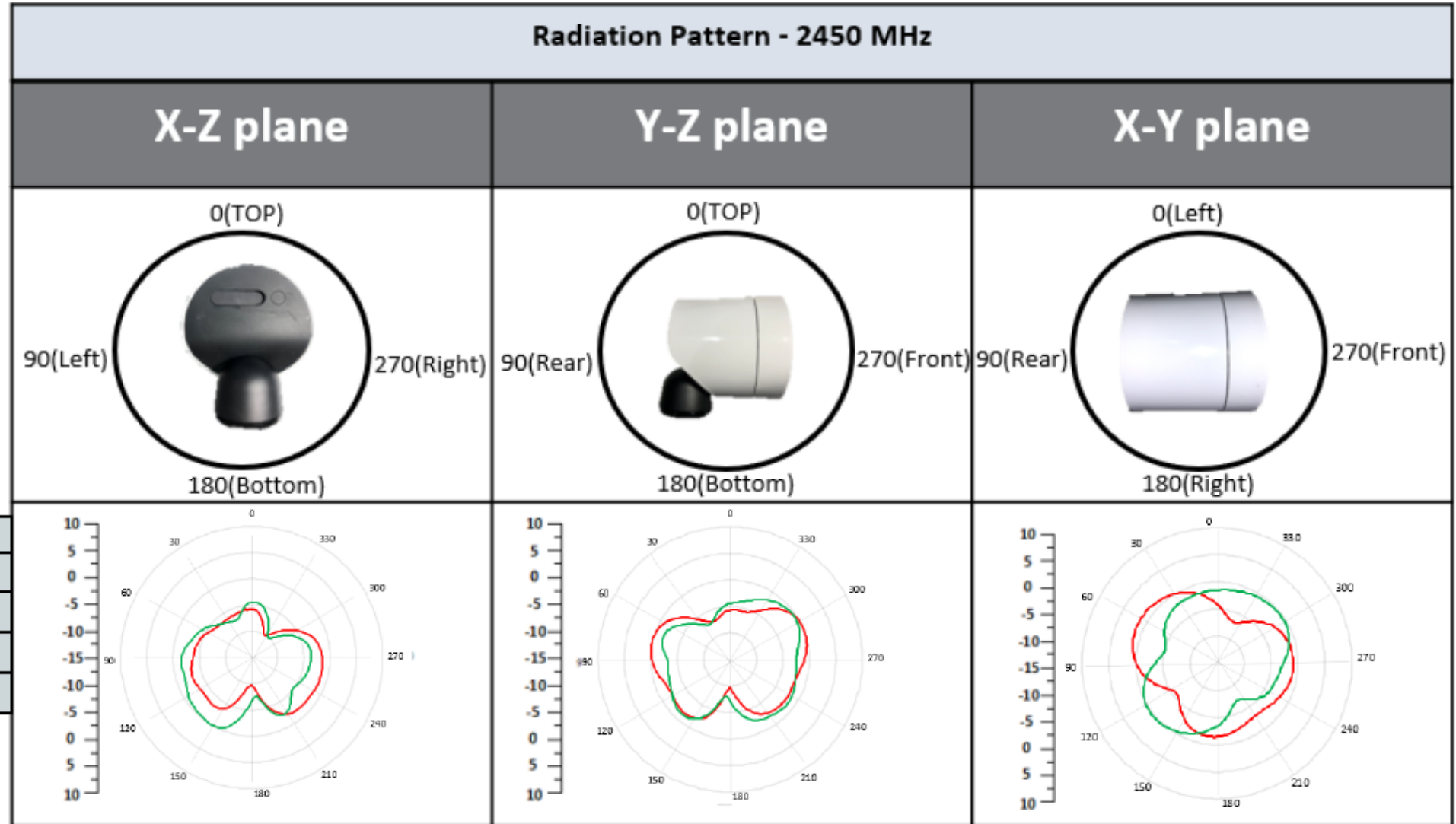
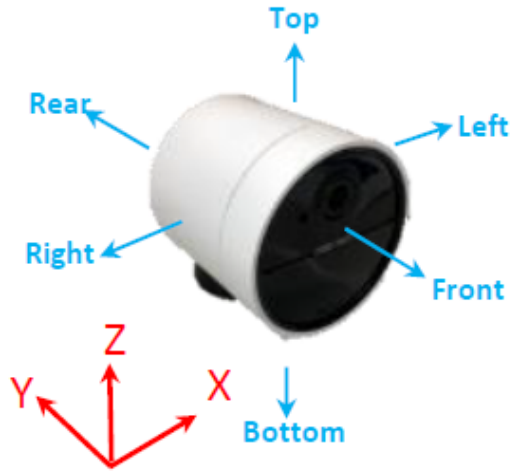
Frequency(MHz)	Wifi_Left	Wifi_Right	Isolation(L to R)
S11(dB)	-13.79	-13.85	-11.04

Return Loss

Measurement data

Wi-Fi Antenna: 2D radiation pattern

— WiFi_Left
— WiFi_Right



	XZ	YZ	XY
0°	Top	Top	Left
90°	Left	Rear	Rear
180°	Bottom	Bottom	Right
270°	Right	Front	Front