电连技术股份有限公司
ELECTRIC CONNECTOR TECHNOLOGY CO., LTD

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ID & Reversion	P0

用科技改变生活
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Antenna Evaluation Report

Onboard Bluetooth Antenna & 2024.03.20

Index

Summary

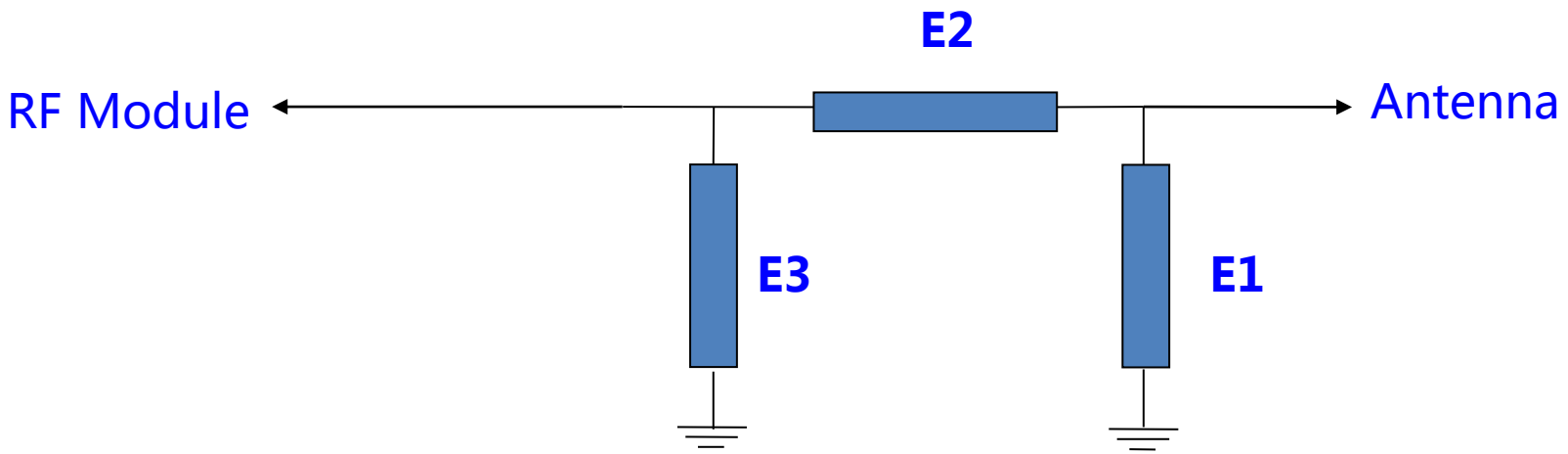
1. Antenna operating frequency band：2400-2500MHz

2. Antenna types： PCB On-board Antenna

3. The following data is the test report。

please refer to the internal photos.

Matching Circuits



Element	Value
E1	NC
E2	NC
E3	NC

Test Method and Requirement

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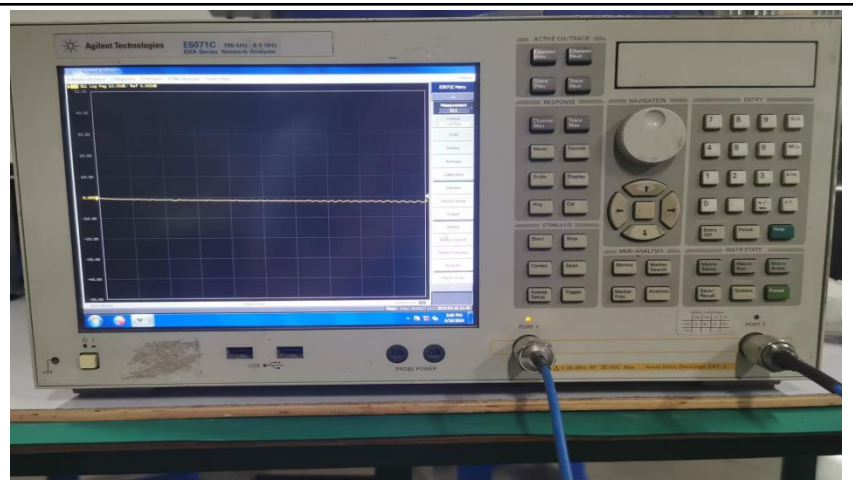
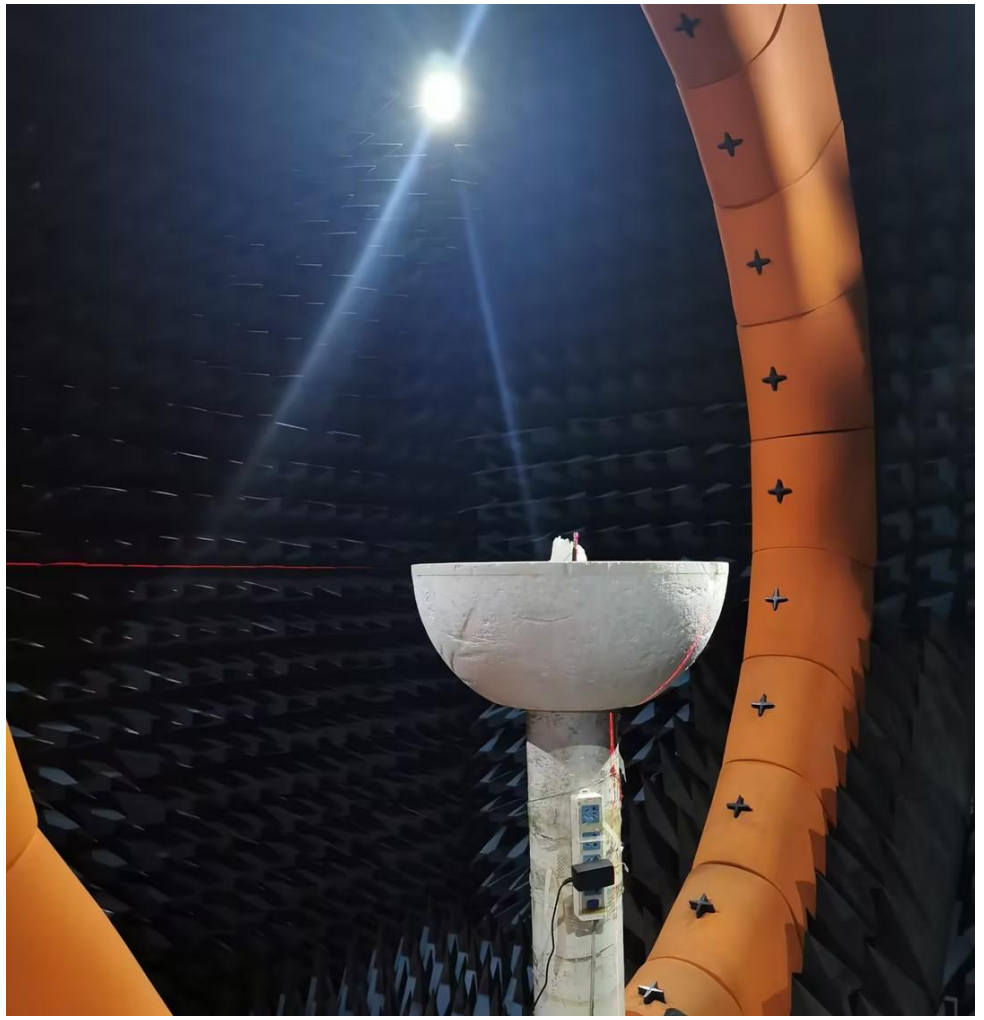
Test Description	Test Method	Test Requirement
VSWR	The antenna is located on the RF motherboard, which is placed inside the machine, After calibrating the Agilent E5071C, use the RF cable to connect the whole machine to the Agilent E5071C for measurement.	2400~2500MHz<2.0
Efficiency	The antenna is located on the RF motherboard, which is placed inside the machine, then, put the whole machine in the Microwave Anechoic Chamber Test System for testing. Follow the picture on page 11 shows the test status of the antenna been put in the microwave anechoic chamber.	2400~2500MHz>60%
Gain		2400~2500MHz>2.5dBi

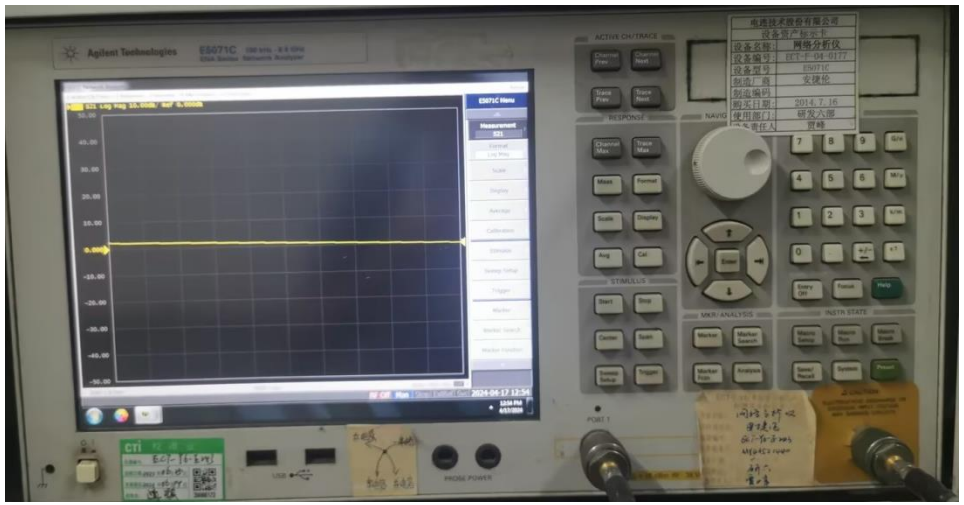
Testing equipment List

Test Description	Test Equipment				Test Software
	Equipment	Model	Diagram	Calibration Date	
VSWR	Agilent E5071C Network Analyzer	E5071C		2023-06-25	N/A

Testing equipment List

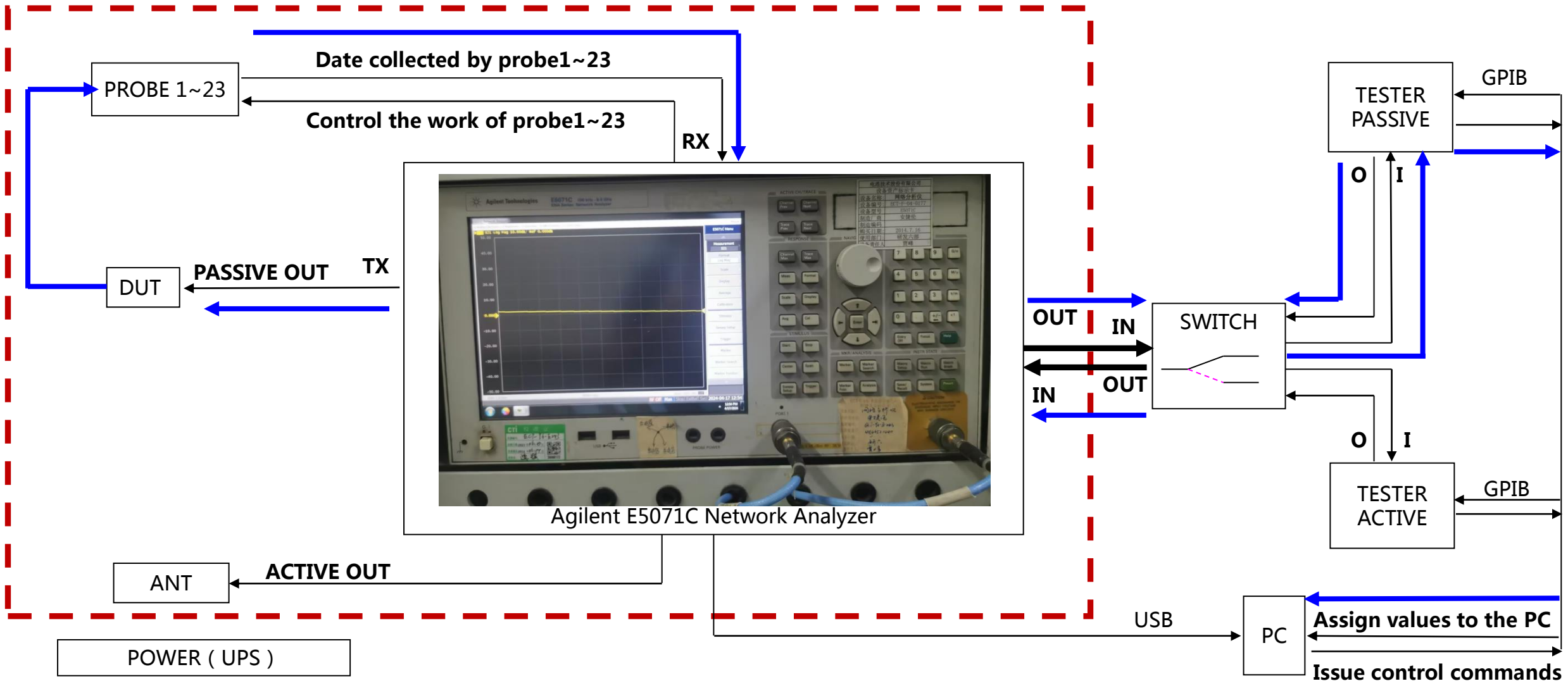
Test Description	Test Equipment				Test Software
	Equipment	Model	Diagram	Calibration Date	
Passive test (Efficiency & Gain & Radiation Pattern)	Microwave Anechoic Chamber	SATIMO-SG24		2024-01-18	PMS (Passive Measurement System)

Testing equipment List

Test Description	Test Equipment				Test Software
	Equipment	Model	Diagram	Calibration Date	
Passive test (Efficiency & Gain & Radiation Pattern)	Agilent E5071C Network Analyzer	E5071C		2023-06-25	PMS (Passive Measurement System)

Testing Configuration

(Components inside Microwave Anechoic Chamber)

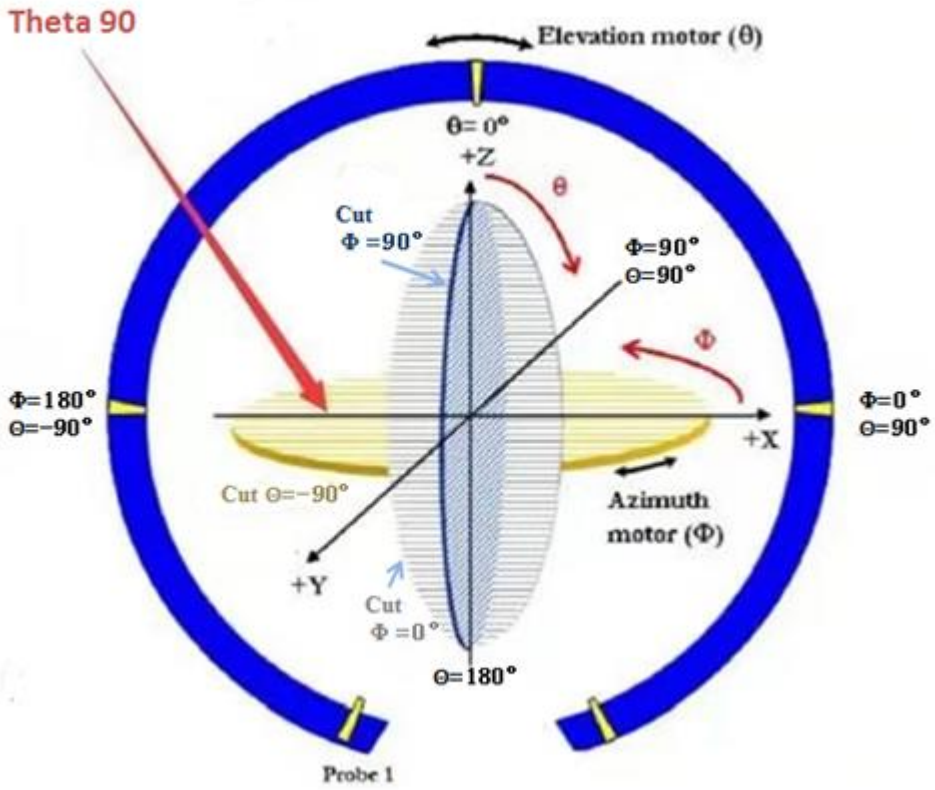


→ :The direction of the signal during the Passive Test

Test setup photo:
please refer to the antenna setup photo.

Position in the chamber during the test

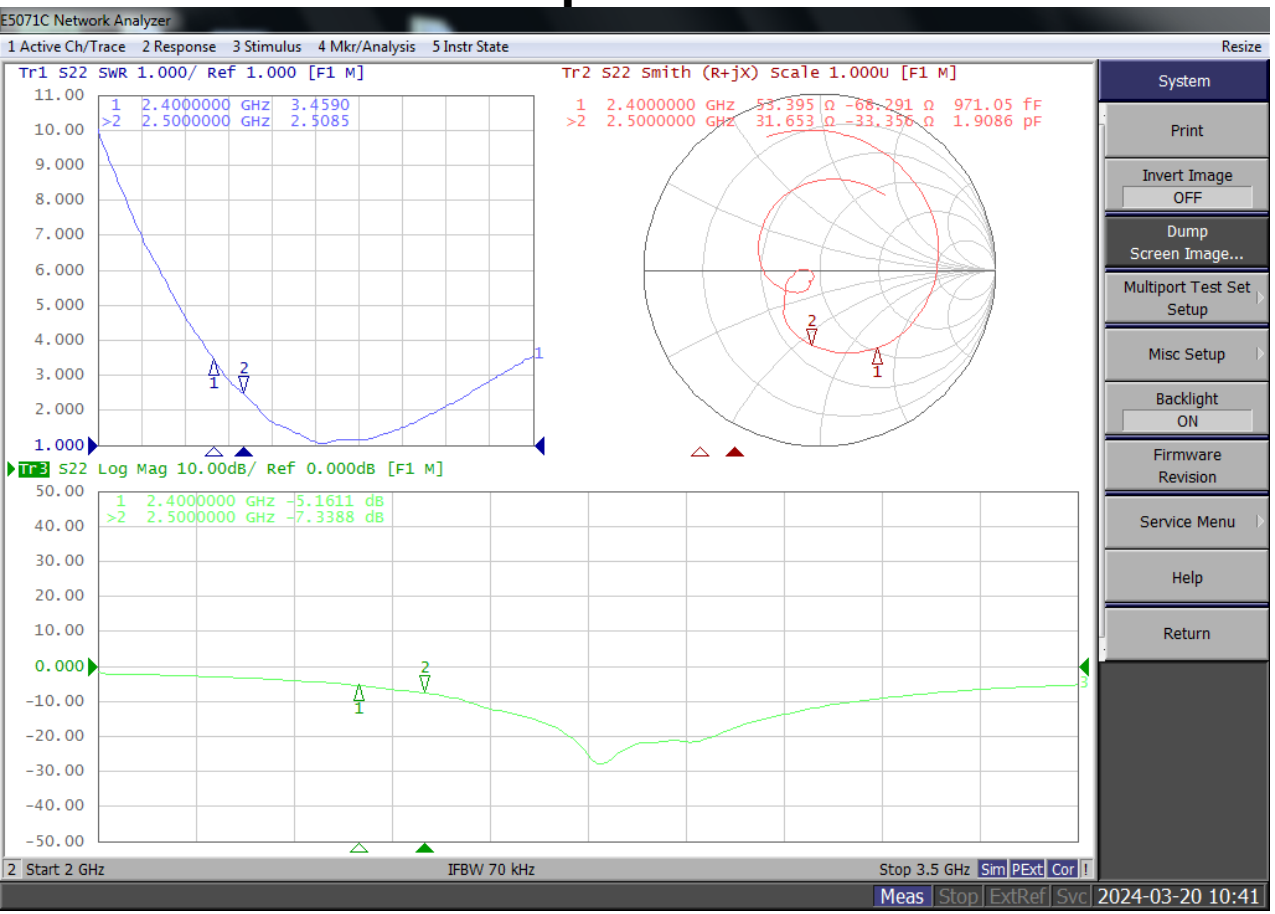
The definition of coordinate system



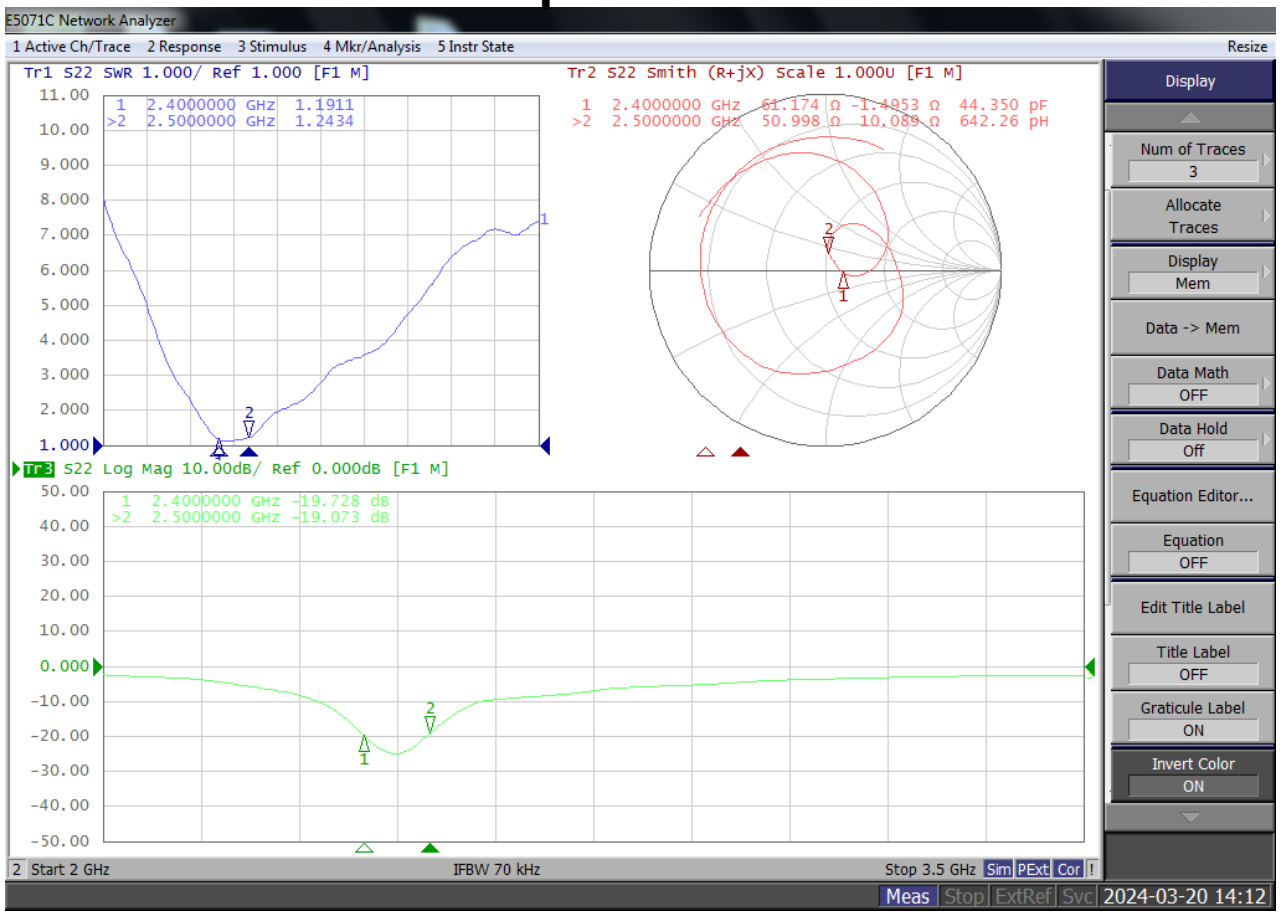
The coordinate system of chamber

Results – VSWR

Before Optimization



After Optimization



Frequency	VSWR	
	Before Optimization	After Optimization
2400MHz-2500MHz	<4.0	<2.0

Results – Efficiency and Gain Table

	Before Optimization		After Optimization	
Frequency	Efficiency (%)	Gain(dBi)	Efficiency (%)	Gain(dBi)
2400MHz	39%	0.60	68%	2.63
2410MHz	38%	0.63	66%	2.74
2420MHz	43%	1.02	68%	2.79
2430MHz	45%	1.35	67%	2.81
2440MHz	44%	1.28	65%	2.65
2450MHz	45%	1.09	67%	2.55
2460MHz	46%	1.06	69%	2.57
2470MHz	50%	1.51	69%	2.62
2480MHz	54%	1.96	68%	2.69
2490MHz	55%	2.21	65%	2.69
2500MHz	53%	2.19	63%	2.73
AVG	47%	1.36	67%	2.68

Test status: Complete machine testing

Results – 2D and 3D Radiation Pattern

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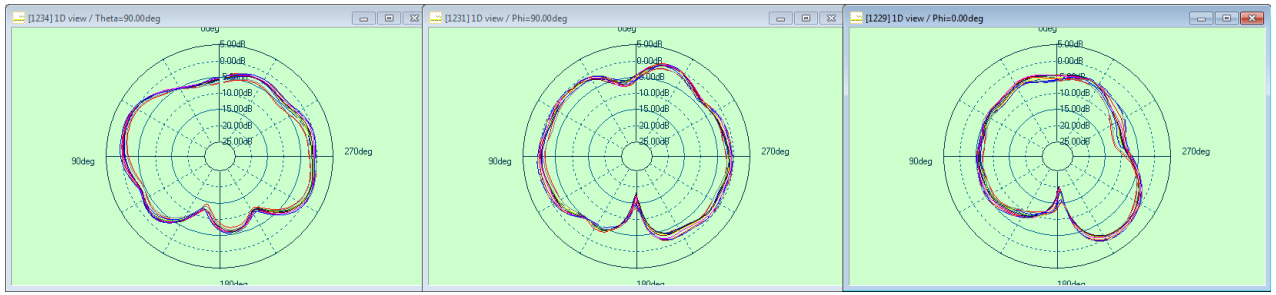
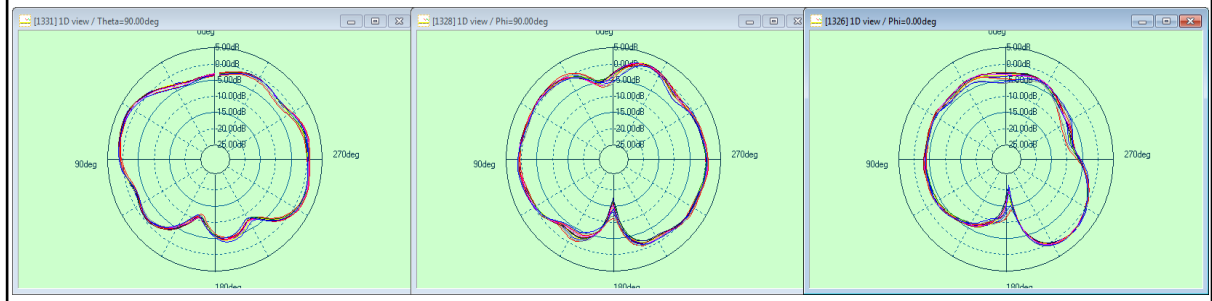
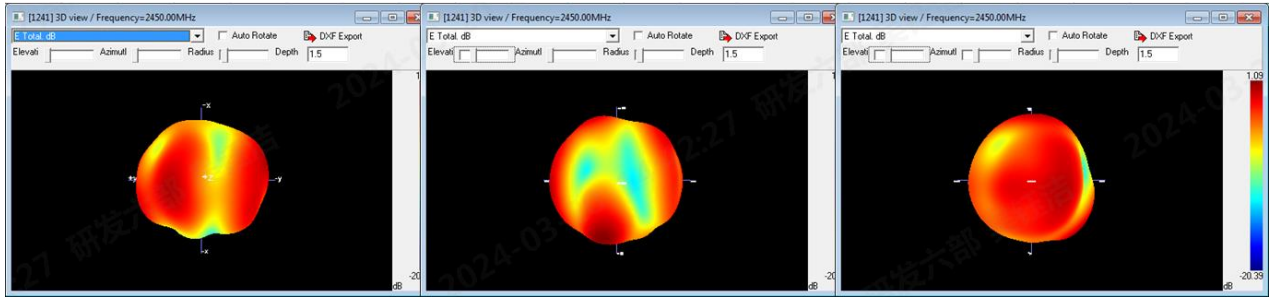
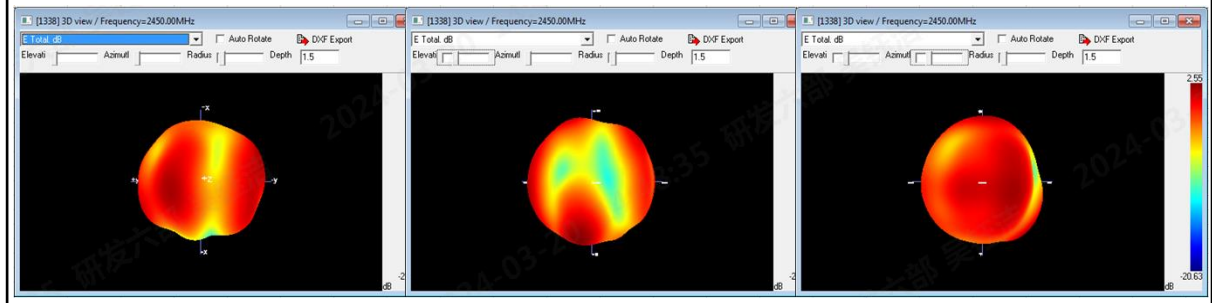
	Before Optimization			After Optimization		
2D						
3D						
	XOY	YOZ	XOZ	XOY	YOZ	XOZ

Conclusion

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Date Conclusion :

Test status	Frequency	antenna	VSWR	Efficiency	Gain
Complete machine	2400MHz-2500MHz	Before Optimization	<4.0	47%	1.36dBi
		After Optimization	<2.0	67%	2.68dBi

The VSWR of the original antenna is less than 4.0 at 2400-2500MHz. After the antenna is optimized, the VSWR is less than 2.0, the Efficiency is greater than 60%, and the Gain is greater than 2.5dBi.

Design History

Date	Action	Designed by
2024.03.20	Active Evaluation Report	Wu Yujie

END

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