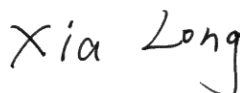


TEST REPORT

Applicant: Star Systems International Limited
Address: Unit 7, 8/F, Vanta Industrial Centre. 21-23 Tai Lin
Pai Road, Kwai Chung, NT, Hong Kong
Equipment Type: PYXIS Portable RFID Reader
Model Name: HRD23
Brand Name: STAR SYSTEMS INTERNATIONAL
Test Standard: IEEE Std 149-2021
Sample Arrival Date: Nov. 12, 2024
Test Date: Nov. 17, 2024
Date of Issue: Nov. 28, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Mai Jintian**Checked by:** Xia Long**Approved by:** Tolan Tu
(Testing Director)

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Nov. 28, 2024</u>	<u>Initial Issue</u>

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1 GENERAL INFORMATION

1.1 Test Laboratory

Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
Phone Number	+86 755 6685 0100

1.2 Test Location

Name	Shenzhen BALUN Technology Co., Ltd.
Location	☒ Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China
	☐ 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Star Systems International Limited
Address	Unit 7, 8/F, Vanta Industrial Centre. 21-23 Tai Lin Pai Road, Kwai Chung, NT, Hong Kong

2.2 Manufacturer Information

Manufacturer	Star Systems International Limited
Address	Unit 7, 8/F, Vanta Industrial Centre. 21-23 Tai Lin Pai Road, Kwai Chung, NT, Hong Kong

2.3 General Description for Equipment under Test (EUT)

EUT Name	PYXIS Portable RFID Reader
Model Name Under Test	HRD23
Antenna Type	FPC Antenna
Dimensions	26*10 mm

Note: This sample contains test data for two frequency bands. In this report, 1# are used to represent the frequency band 2400MHz ~ 2500MHz and corresponding test data, 2# are used to represent the frequency band 5150MHz ~ 5850MHz and corresponding test data.

2.4 Ancillary Equipment

Note: Not applicable.

3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	IEEE Std 149-2021	IEEE Standard Test Procedures for Antennas

3.2 Test Verdict

Report Section	Description	Remark
ANNEX A.1	Gain and Efficiency	--
ANNEX A.2	VSWR	--
ANNEX B	Radiation Pattern	--

3.3 Test Uncertainty

The uncertainty is calculated using the methods suggested in the "Guide to the Expression of Uncertainty in Measurement" (GUM) published by ISO.

Item	Uncertainty
VSWR(S11)	± 0.61
Gain	$\pm 1.92\text{dB}$

4 GENERAL TEST CONFIGURATIONS

4.1 Test Condition

Environment Parameter	Selected Values During Tests			
	Ambient Pressure(KPa)	Temperature(°C)	Voltage	Relative Humidity (%)
Normal Temperature, Normal Voltage (NTNV)	101	21.7	N/A	52

4.2 Test Equipment List

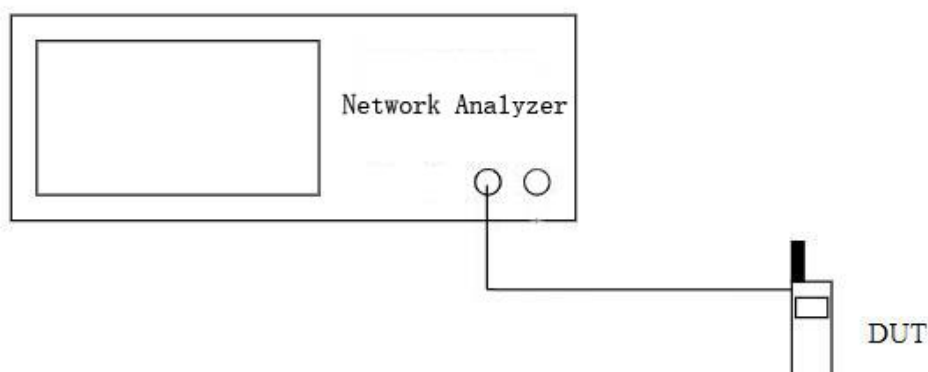
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
SG24 Multi-probe Antenna Measurement System	SATIMO	SG24-L	1101855- 0001	2024.11.12	2027.11.11
Vector Network Analyzer	Agilent	E5071B	MY42404001	2024.01.16	2025.01.15
Description	Manufacturer	Name		Version	
Test Software	MVG	SPM		V 1.8	

4.3 Test Setup

4.3.1 Antenna gain, efficiency and radiation pattern test setup



4.3.2 S11 parameter test setup



4.4 Test Frequencies

Test Frequencies	1#: 2400MHz, 2410MHz, 2420MHz, 2430MHz, 2440MHz, 2450MHz, 2460MHz, 2470MHz, 2480MHz, 2490MHz, 2500MHz
	2#: 5150MHz, 5200MHz, 5250MHz, 5300MHz, 5350MHz, 5400MHz, 5450MHz, 5500MHz, 5550MHz, 5600MHz, 5650MHz, 5700MHz, 5750MHz, 5800MHz, 5850MHz

ANNEX A TEST RESULTS

A.1 Gain and Efficiency

1#:

Frequency	Gain (dBi)	Efficiency (%)
2400MHz	1.63	44
2410MHz	1.44	44
2420MHz	1.33	44
2430MHz	1.36	43
2440MHz	1.61	44
2450MHz	1.95	45
2460MHz	2.00	46
2470MHz	1.83	47
2480MHz	1.64	47
2490MHz	1.70	48
2500MHz	1.72	48

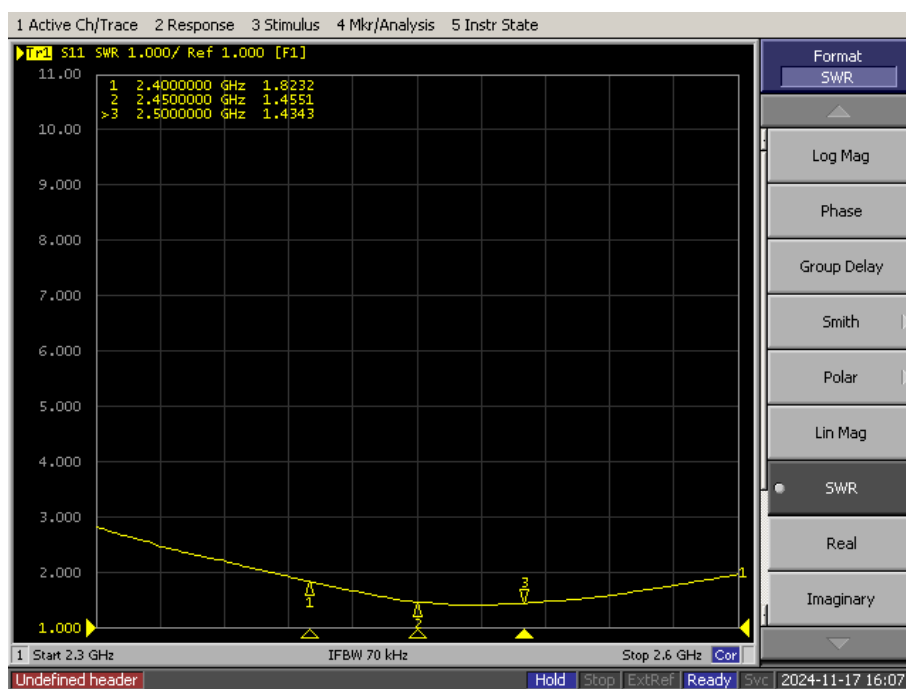
2#:

Frequency	Gain (dBi)	Efficiency (%)
5150MHz	0.50	40
5200MHz	0.75	43
5250MHz	1.85	51
5300MHz	2.94	61
5350MHz	3.00	58
5400MHz	2.81	53
5450MHz	2.41	46
5500MHz	3.02	48
5550MHz	2.36	39
5600MHz	0.95	27
5650MHz	0.73	25
5700MHz	1.91	32
5750MHz	2.92	40
5800MHz	3.75	47
5850MHz	3.06	41

A.2 VSWR

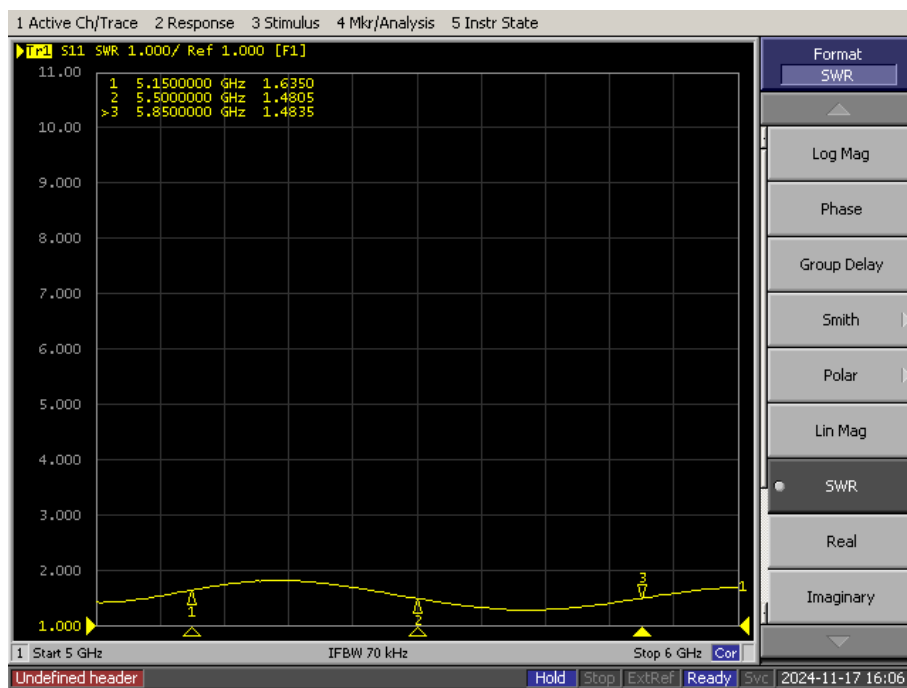
1#:

Frequency	VSWR
2400MHz	1.82
2450MHz	1.46
2500MHz	1.43



2#:

Frequency	VSWR
5150MHz	1.64
5500MHz	1.48
5850MHz	1.48

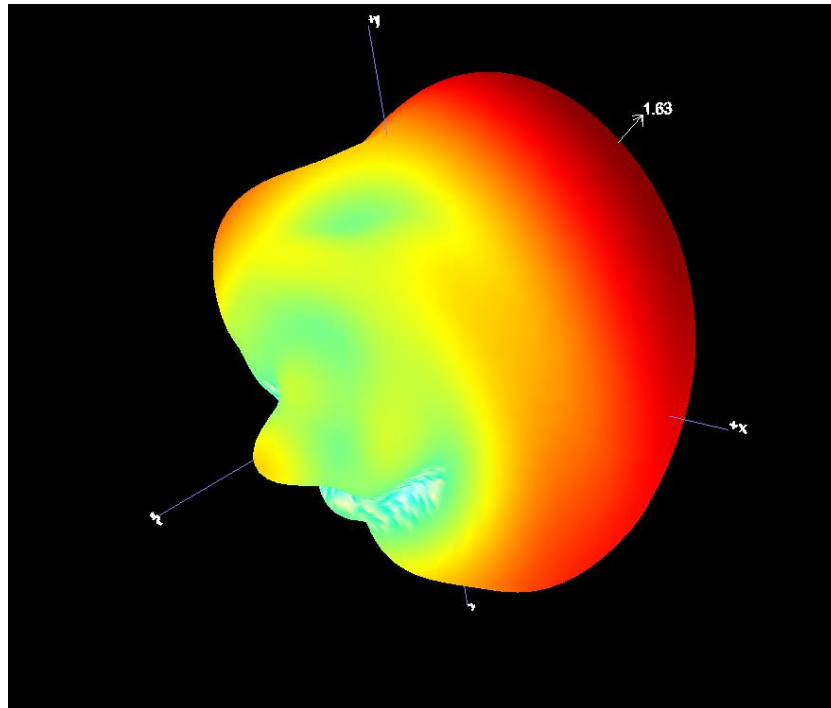


ANNEX B RADIATION PATTERN

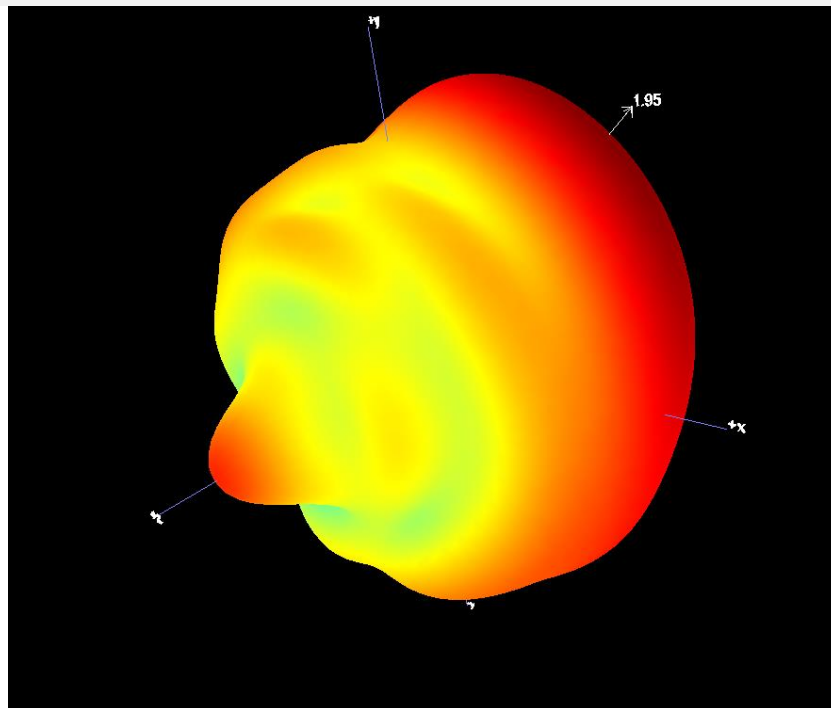
B.1 3D Pattern

1#:

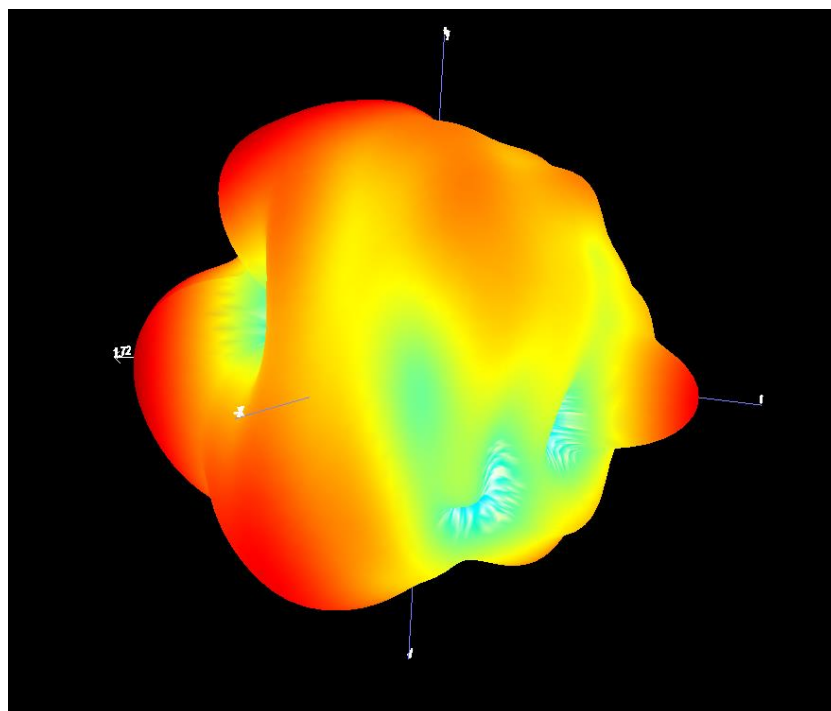
B1.1 3D Pattern for 2400MHz



B1.2 3D Pattern for 2450MHz

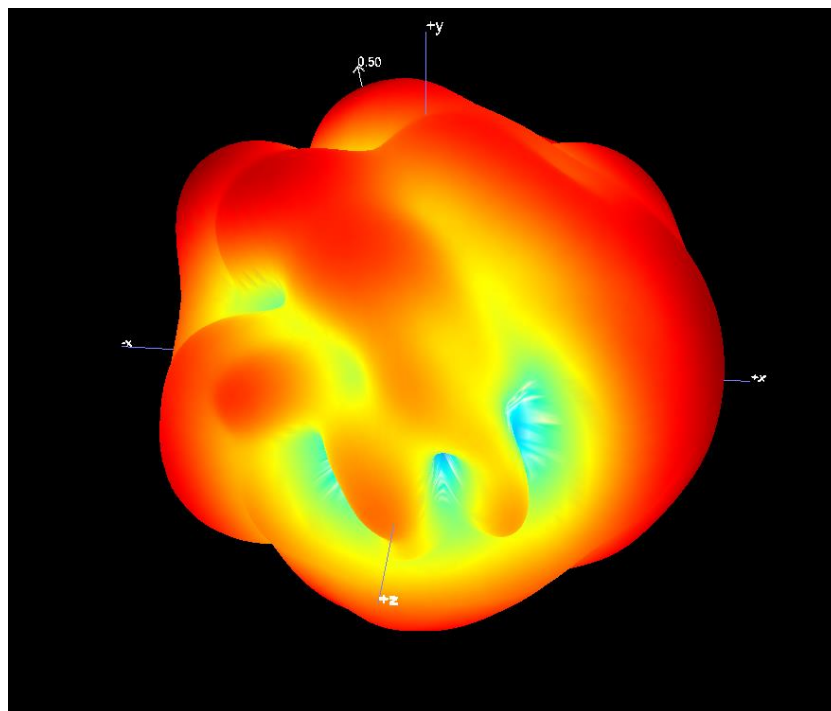


B1.3 3D Pattern for 2500MHz

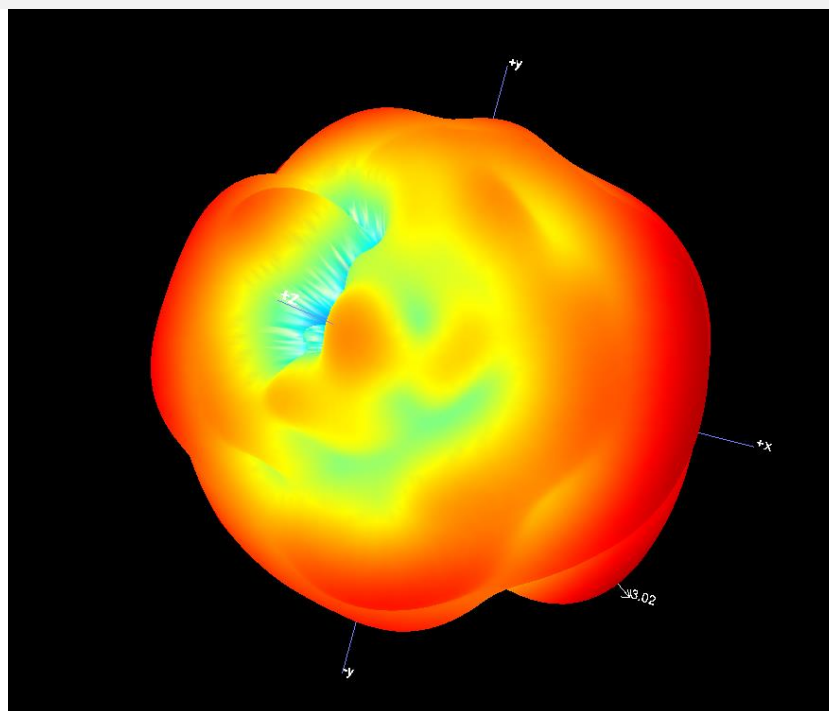


2#:

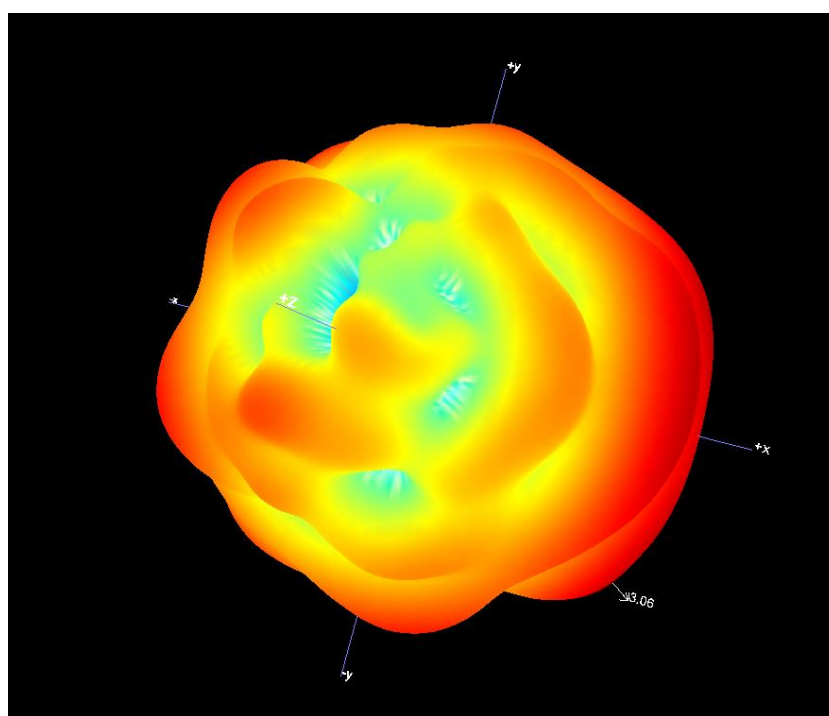
B1.4 3D Pattern for 5150MHz



B1.5 3D Pattern for 5500MHz



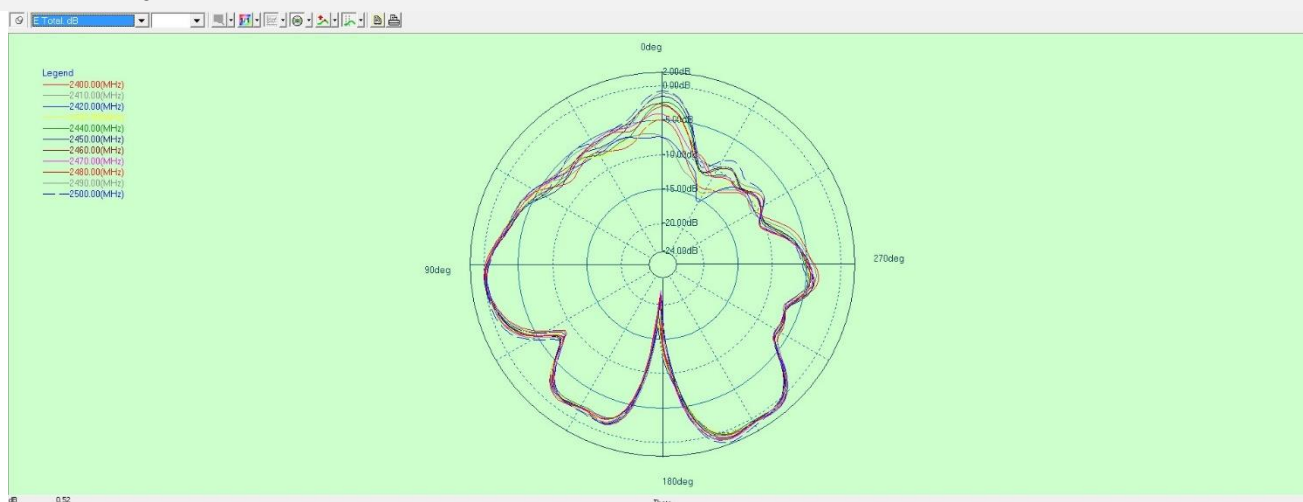
B1.6 3D Pattern for 5850MHz



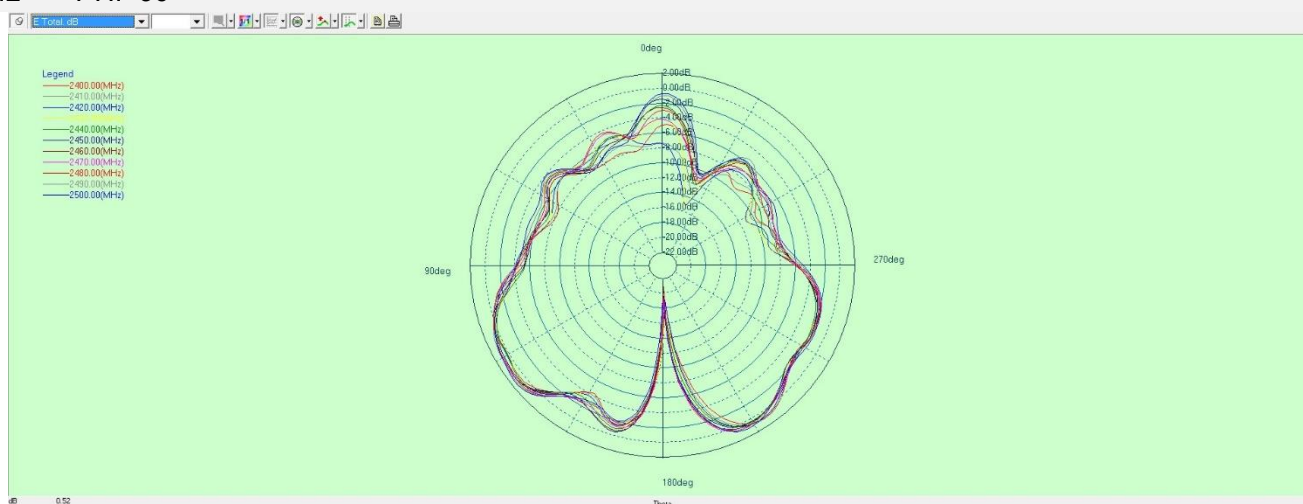
B.2 1D Radiation Pattern

1#:

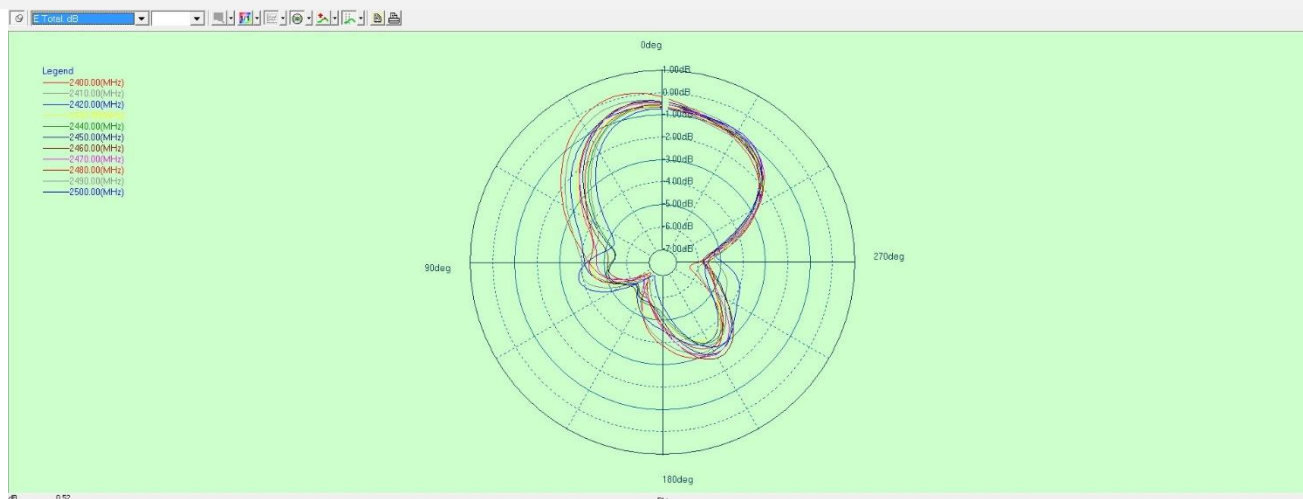
B2.1 PHI=0



B2.2 PHI=90

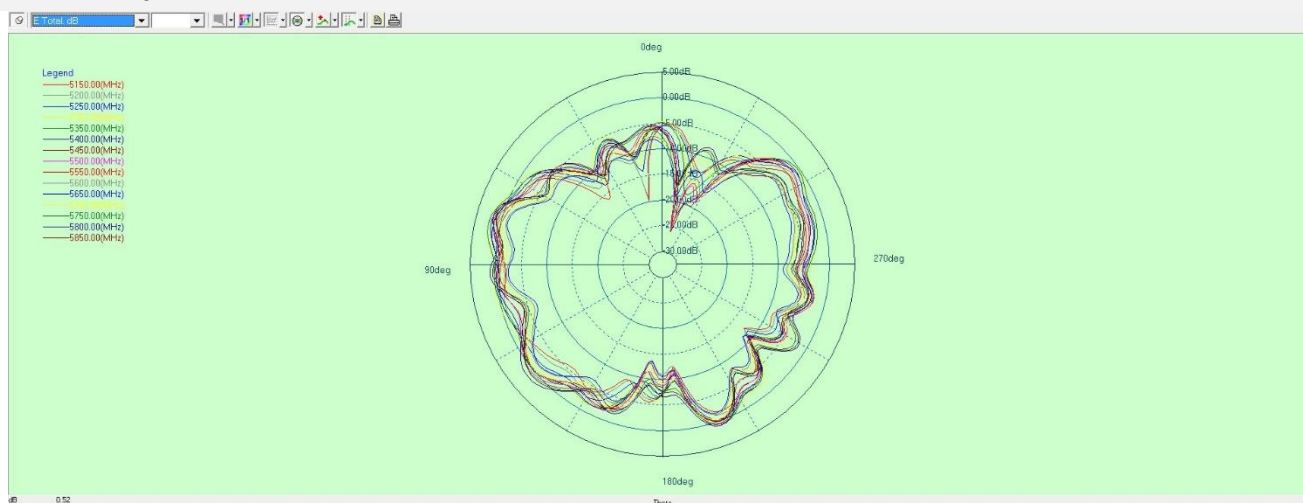


B2.3 THETA=90

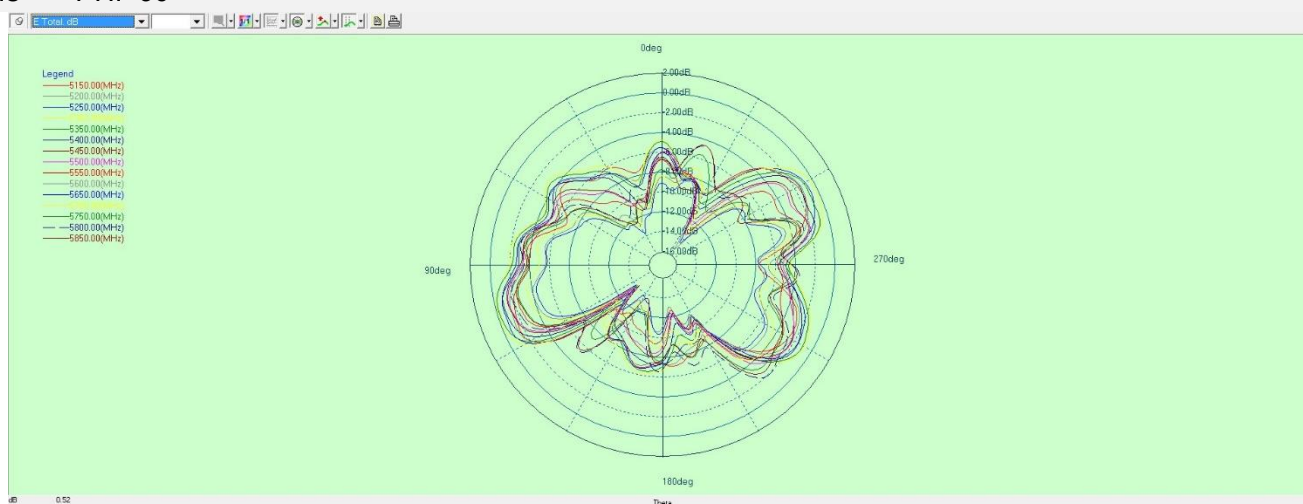


2#:

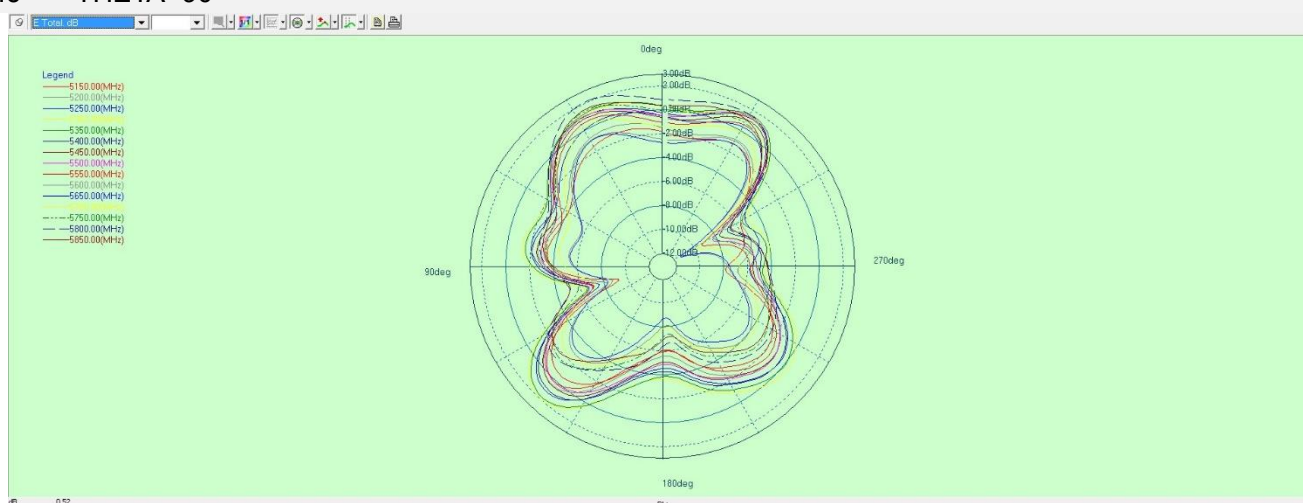
B2.4 PHI=0



B2.5 PHI=90



B2.6 THETA=90



ANNEX C TEST SETUP PHOTOS

Please refer the document “BL-SZ24B0557-AO.PDF”.

ANNEX D EUT PHOTO

Please refer the document “BL-SZ24B0557-AA.PDF”.

Statement

1. The laboratory guarantees the scientificity, accuracy and impartiality of the test, and is responsible for all the information in the report, except the information provided by the customer. The customer is responsible for the impact of the information provided on the validity of the results.
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7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--