

TEST REPORT

Applicant: HASHDOG PTE. LTD.
Address: 152 BEACH ROAD #11-05, GATEWAY EAST,
SINGAPORE
Equipment Type: Macaron FPC PIFA Antenna
Model Name: Macaron Mini OBD2 Dongle
Brand Name: HashDog
Test Standard: IEEE Std 149-2021
Sample Arrival Date: May 25, 2023
Test Date: May 29, 2023 - May 31, 2023
Date of Issue: Jul. 13, 2023

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Mai Jintian

Checked by: Zou Liu

Approved by: Tolan Tu
(Testing Director)

Mai Jintian

Zou Liu

Tolan Tu

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Jul. 13, 2023</u>	<u>Initial Issue</u>

TABLE OF CONTENTS

1	GENERAL INFORMATION.....	3
1.1	Test Laboratory	3
1.2	Test Location.....	3
2	PRODUCT INFORMATION	4
2.1	Applicant Information.....	4
2.2	Manufacturer Information	4
2.3	General Description for Equipment under Test (EUT)	4
2.4	Ancillary Equipment.....	4
2.5	Technical Information	4
3	SUMMARY OF TEST RESULTS	5
3.1	Test Standards.....	5
3.2	Test Verdict	5
3.3	Test Uncertainty	5
4	GENERAL TEST CONFIGURATIONS	6
4.1	Test Condition	6
4.2	Test Equipment List.....	6
4.3	Test Setup.....	7
ANNEX A	TEST RESULTS.....	8
A.1	Gain and Efficiency	8
A.2	VSWR	9
ANNEX B	RADIATION PATTERN	11
ANNEX C	TEST SETUP PHOTOS	15
ANNEX D	EUT PHOTO	15

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	HASHDOG PTE. LTD.
Address	152 BEACH ROAD #11-05, GATEWAY EAST, SINGAPORE

2.2 Manufacturer Information

Manufacturer	HASHDOG PTE. LTD.
Address	152 BEACH ROAD #11-05, GATEWAY EAST, SINGAPORE

2.3 General Description for Equipment under Test (EUT)

EUT Name		Macaron FPC PIFA Antenna
Model Name Under Test		Macaron Mini OBD2 Dongle
Antenna Type		PIFA Antenna
Dimensions	BT Antenna	22.2*20.7 mm
	Lora Antenna	34.3*29.6 mm

Note: This report contains test data for Two wireless systems In this report, 1#-BT, 2#-Lora are used to represent the corresponding Antenna and corresponding test data.

2.4 Ancillary Equipment

Note: Not applicable.

2.5 Technical Information

1#-BT

Test Frequencies	2400MHz, 2410MHz, 2420MHz, 2430MHz, 2440MHz, 2450MHz, 2460MHz, 2470MHz, 2480MHz, 2490MHz, 2500MHz
------------------	---

2#-Lora

Test Frequencies	850MHz, 860MHz, 870MHz, 880MHz, 890MHz, 900MHz, 910MHz, 920MHz, 930MHz, 940MHz, 950MHz
------------------	--

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

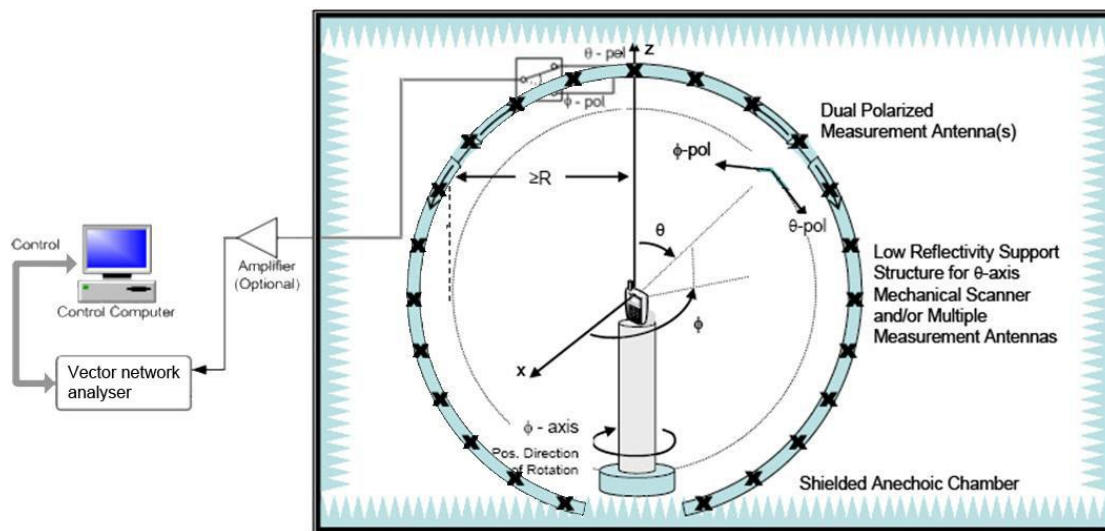
Environment Parameter	Selected Values During Tests			
	Ambient Pressure(KPa)	Temperature(°C)	Voltage	Relative Humidity (%)
Normal Temperature, Normal Voltage (NTNV)	101	21.5	N/A	47

4.2 Test Equipment List

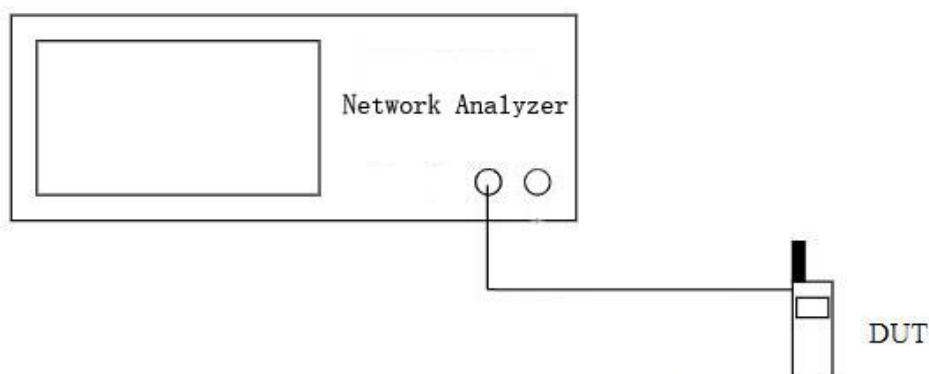
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
SG24 Multi-probe Antenna Measurement System	SATIMO	SG24-L	1101855- 0001	2021.11.12	2024.11.11
Vector Network Analyzer	Agilent	E5071B	MY42404001	2023.03.26	2024.03.25
Description	Manufacturer	Name		Version	
Test Software	MVG	SPM		V 1.8	

4.3 Test Setup

4.3.1 Antenna gain, efficiency and radiation pattern test setup



4.3.2 S11 parameter test setup



ANNEX A TEST RESULTS

A.1 Gain and Efficiency

1#-BT

Frequency	Gain (dBi)	Efficiency (%)
2400MHz	3.11	56
2410MHz	3.37	59
2420MHz	3.63	60
2430MHz	3.90	62
2440MHz	3.99	63
2450MHz	4.17	64
2460MHz	4.13	64
2470MHz	4.05	65
2480MHz	4.04	66
2490MHz	3.88	66
2500MHz	3.57	66

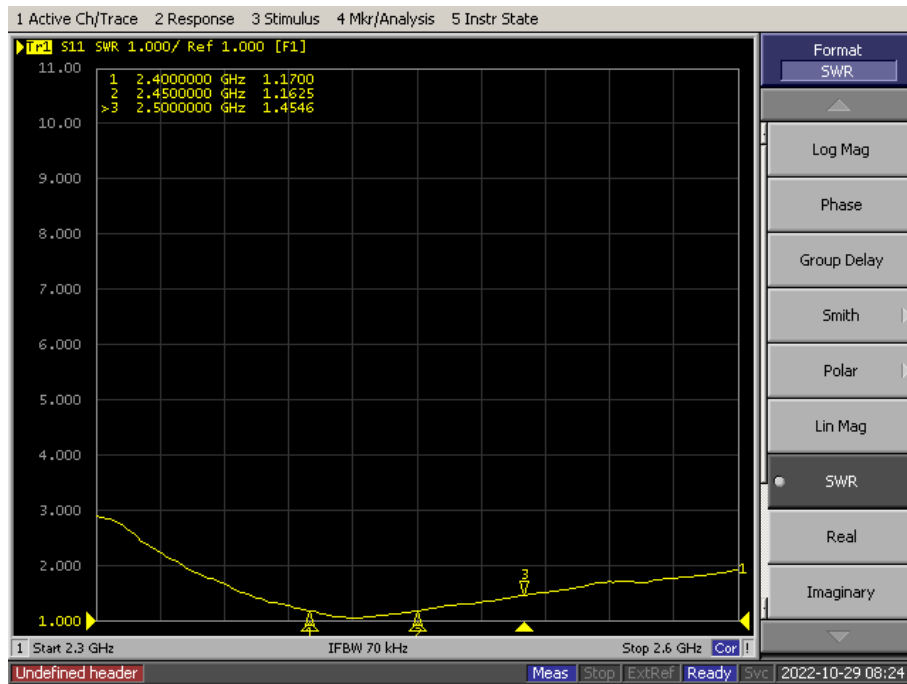
2#-Lora

Frequency	Gain (dBi)	Efficiency (%)
850MHz	-1.99	22
860MHz	-1.33	26
870MHz	-0.91	29
880MHz	-0.50	31
890MHz	-0.45	33
900MHz	-0.51	36
910MHz	-0.89	35
920MHz	-1.20	32
930MHz	-1.61	29
940MHz	-2.41	26
950MHz	-2.19	23

A.2 VSWR

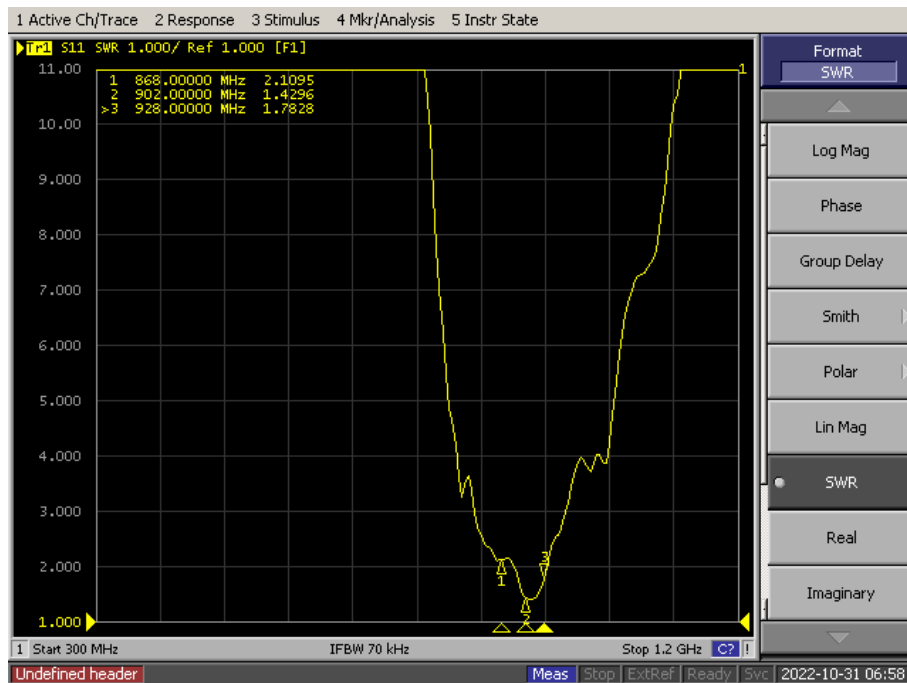
1#-BT

Frequency	VSWR
2400MHz	1.17
2450MHz	1.16
2500MHz	1.45



2#-Lora

Frequency	VSWR
868MHz	2.11
902MHz	1.43
928MHz	1.78

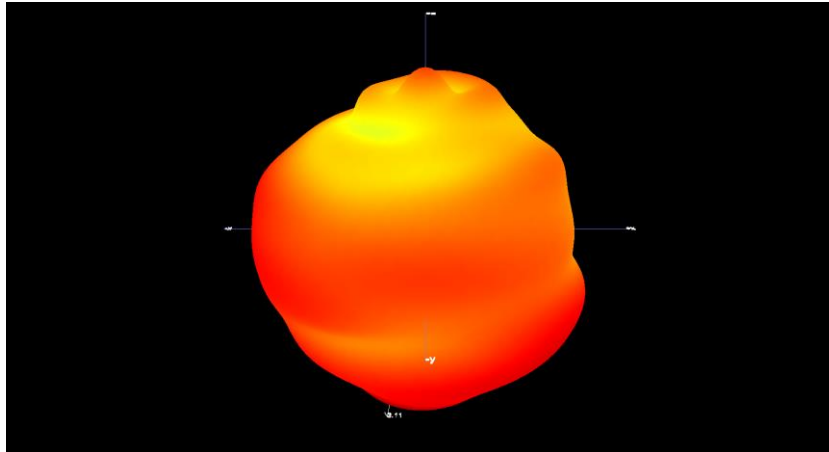


ANNEX B RADIATION PATTERN

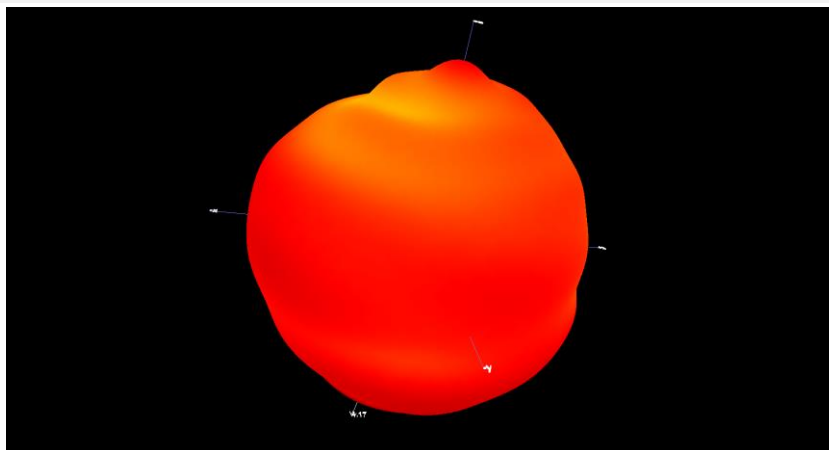
B.1 3D Pattern

1#-BT

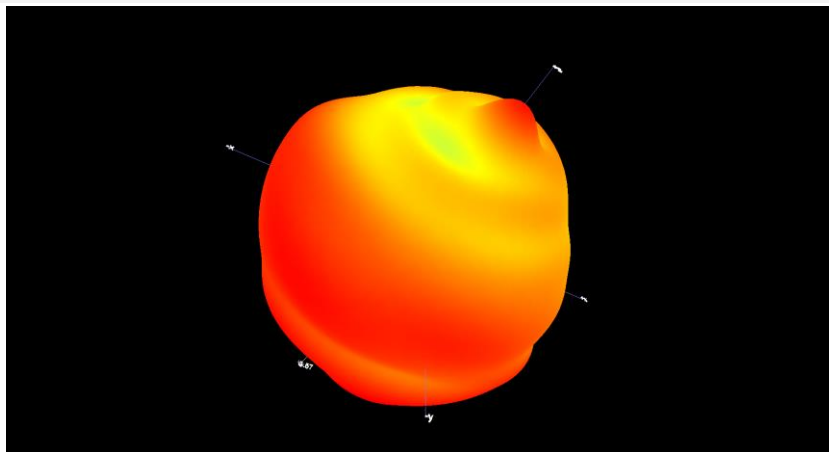
B1.1 3D Pattern for 2400MHz



B1.2 3D Pattern for 2450MHz

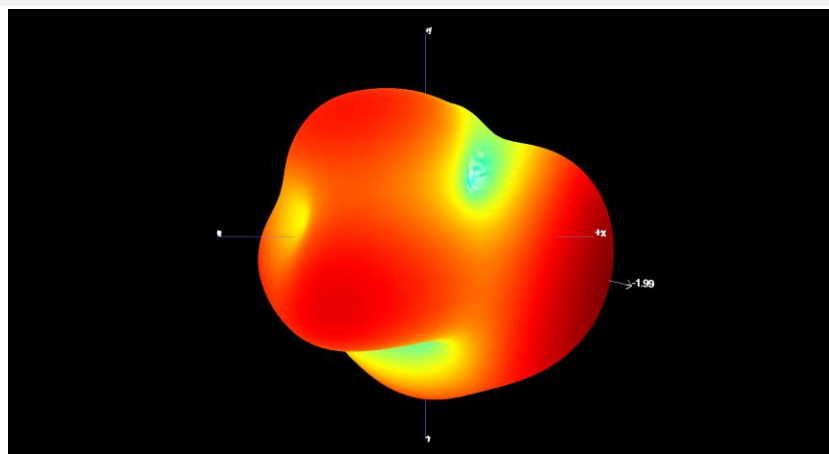


B1.3 3D Pattern for 2500MHz

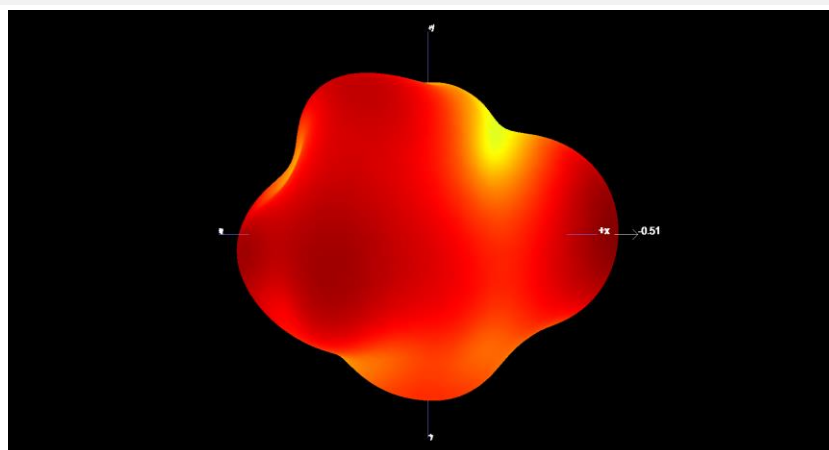


2#-Lora

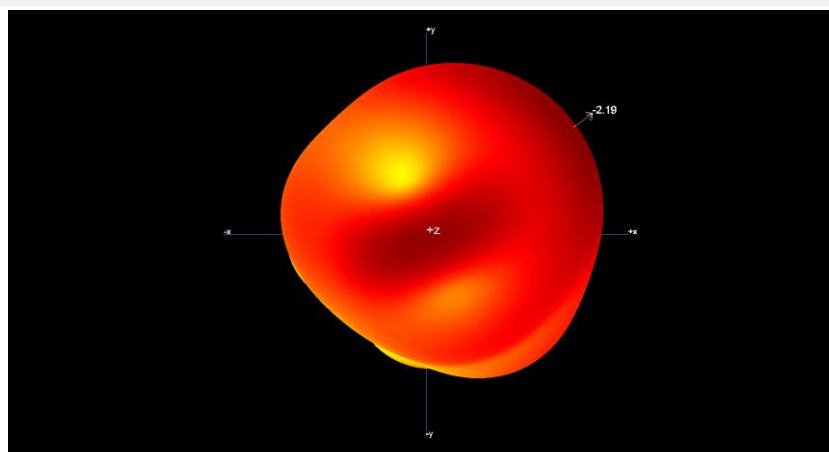
B1.1 3D Pattern for 850MHz



B1.2 3D Pattern for 900MHz



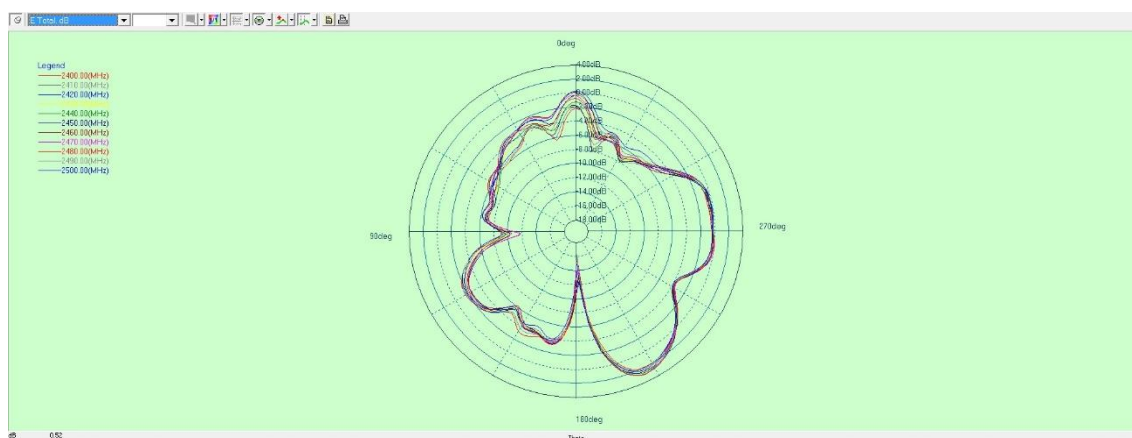
B1.3 3D Pattern for 950MHz



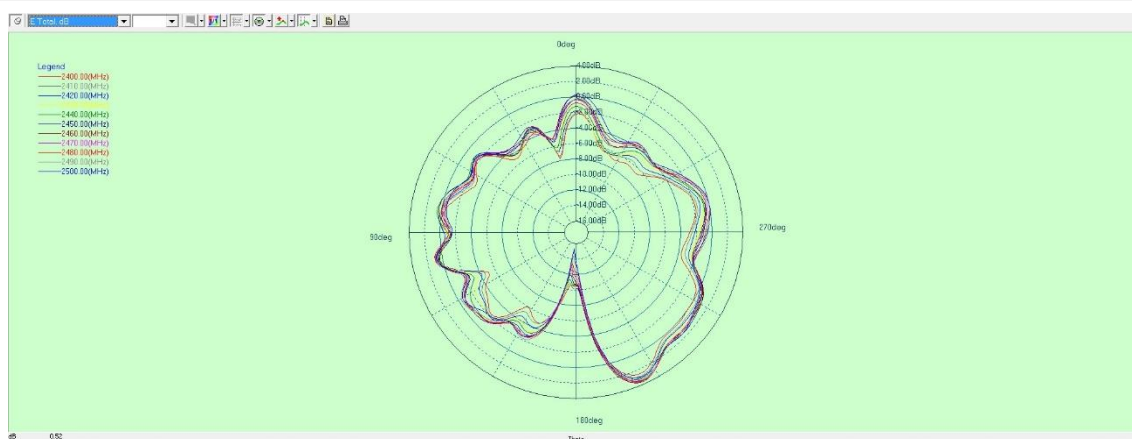
B.2 1D Radiation Pattern

1#-BT

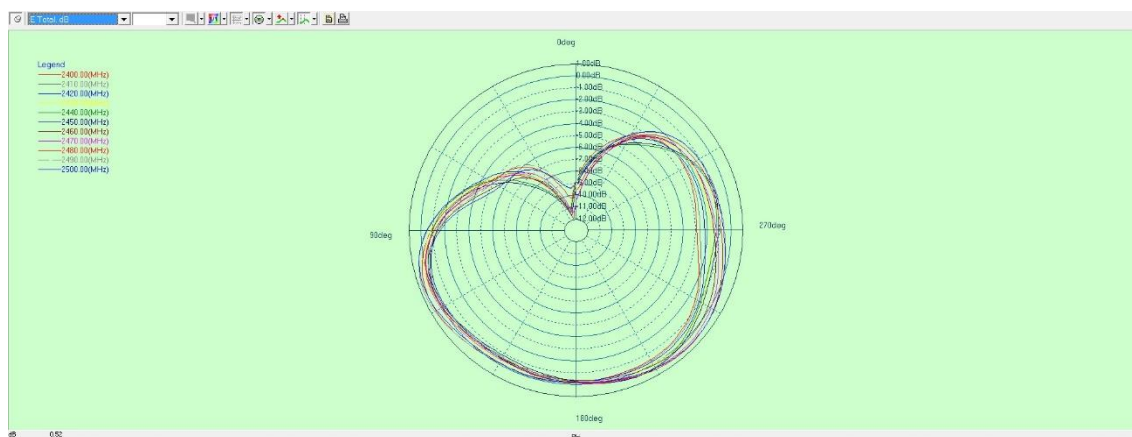
B2.1 PHI=0



B2.2 PHI=90

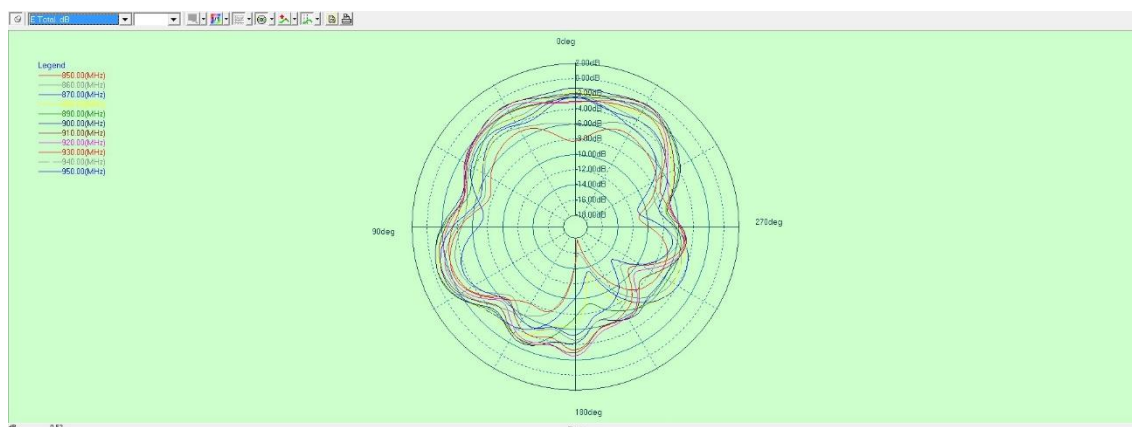


B2.3 THETA=90

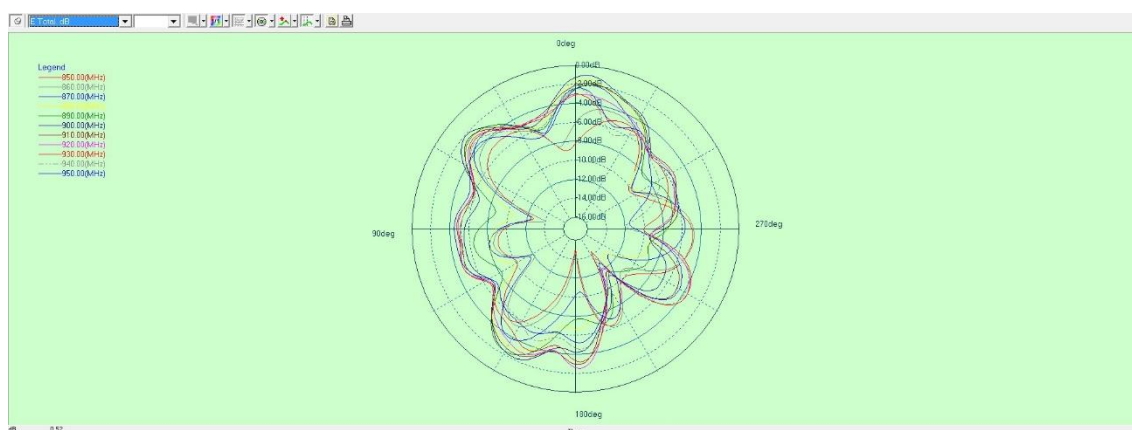


2#-Lora

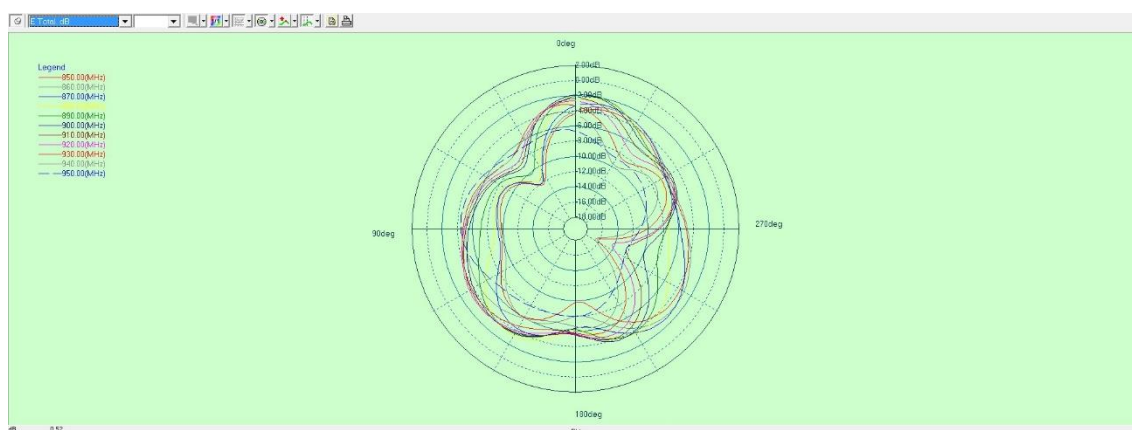
B2.4 PHI=0



B2.5 PHI=90



B2.6 THETA=90



ANNEX C TEST SETUP PHOTOS

Please refer the document “BL-SZ2350847-AO.PDF”.

ANNEX D EUT PHOTO

Please refer the document “BL-SZ2350847-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.
2. The report without China inspection body and laboratory Mandatory Approval (CMA) mark has no effect of proving to the society.
3. For the report with CNAS mark or A2LA mark, the items marked with "☆" are not within the accredited scope.
4. This report is invalid if it is altered, without the signature of the testing and approval personnel, or without the "inspection and testing dedicated stamp" or test report stamp.
5. The test data and results are only valid for the tested samples provided by the customer.
6. This report shall not be partially reproduced without the written permission of the laboratory.
7. Any objection shall be raised to the laboratory within 30 days after receiving the report.

--END OF REPORT--