TEST REPORT

Applicant:	Smart Vehicle Engineering GmbH & Co. (SVE)
Address:	Karl-Frasch-Str. 14, 73037 Goeppingen, Germany
Equipment Type:	RaceChip SmartController
Model Name:	SC
Brand Name:	N/A
Test Standard:	IEEE Std 149-2021
Sample Arrival Date:	Nov. 21, 2023
Test Date:	Nov. 23, 2023
Date of Issue:	Nov. 28, 2023

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

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

Mai Jintian Xia Long Tolan Tu

Revision History

Version	Issue Date	Revisions
Rev. 01	Nov. 28, 2023	Initial Issue

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 10

ANNEX C TEST SETUP PHOTOS 13

ANNEX D EUT PHOTO 13

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	Smart Vehicle Engineering GmbH & Co. (SVE)
Address	Karl-Frasch-Str. 14, 73037 Goeppingen, Germany

2.2 Manufacturer Information

Manufacturer	Smart Vehicle Engineering GmbH & Co. (SVE)
Address	Karl-Frasch-Str. 14, 73037 Goeppingen, Germany

2.3 General Description for Equipment under Test (EUT)

EUT Name	RaceChip SmartController
Model Name Under Test	SC
Antenna Type	PCB Antenna
Dimensions	10*4 mm

2.4 Ancillary Equipment

Note: Not applicable.

2.5 Technical Information

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

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
Gain	±1.92dB
VSWR(S11)	±0.61

4 GENERAL TEST CONFIGURATIONS

4.1 Test Condition

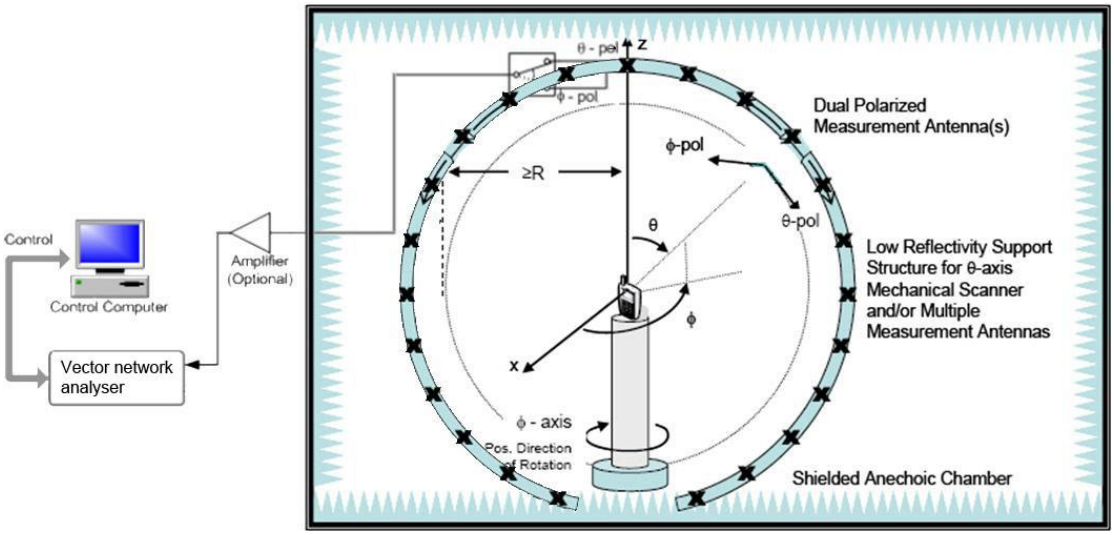
Environment Parameter	Selected Values During Tests			
	Ambient Pressure(KPa)	Temperature(℃)	Voltage	Relative Humidity (%)
Normal Temperature, Normal Voltage (NTNV)	101	21.7	N/A	46

4.2 Test Equipment List

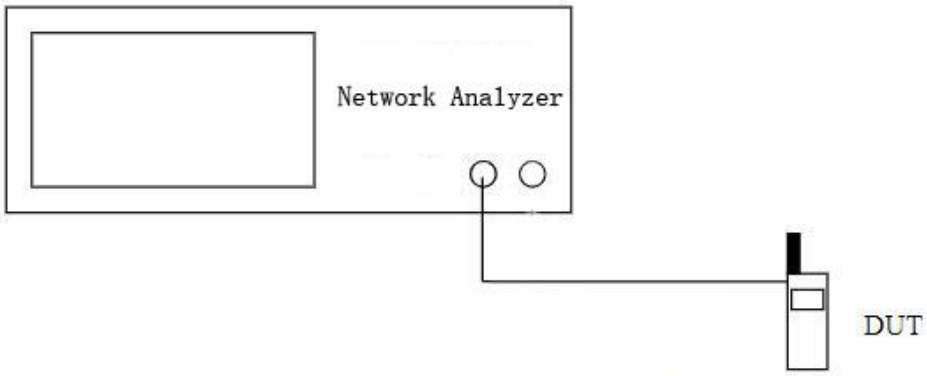
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
SG24 Multi-probe Antenna Measurement System	SATIMO	SG24-L	1101855-0001	2021.11.12	2024.11.11
Vector Network Analyzer	Agilent	E5071B	MY42404001	2023.03.26	2024.03.25
Description	Manufacturer	Name		Version	
Test Software	MVG	SPM		V 1.8	

4.3 Test Setup

4.3.1 Antenna gain, efficiency and radiation pattern test setup



4.3.2 S11 parameter test setup



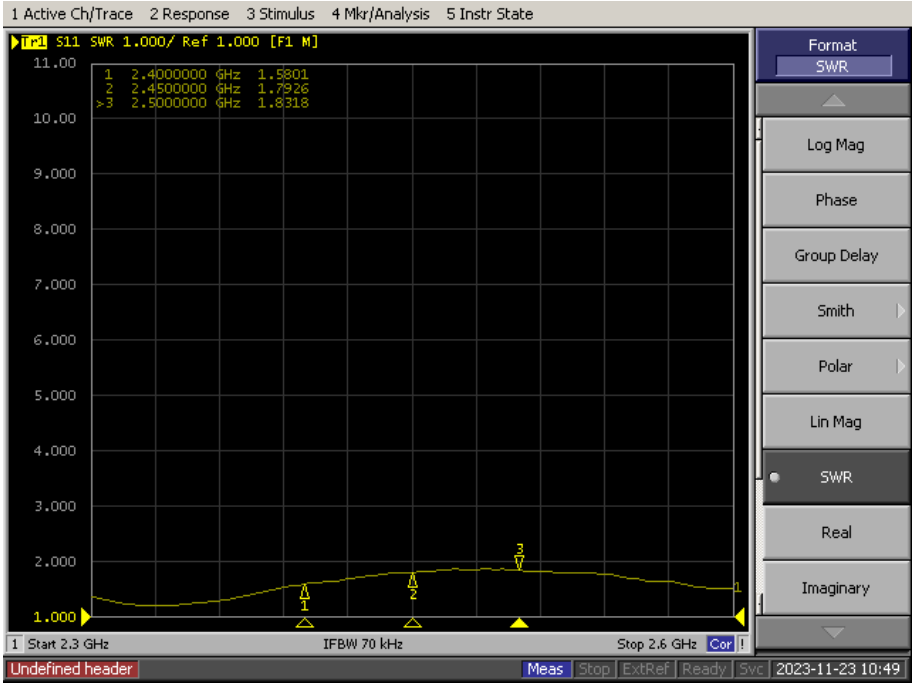
ANNEX A TEST RESULTS

A.1 Gain and Efficiency

Frequency	Gain (dBi)	Efficiency (%)
2400MHz	1.04	30
2410MHz	1.01	30
2420MHz	0.90	30
2430MHz	0.82	30
2440MHz	0.78	30
2450MHz	0.98	30
2460MHz	1.16	31
2470MHz	1.28	31
2480MHz	**1.36**	**32**
2490MHz	1.14	31
2500MHz	0.96	31

A.2 VSWR

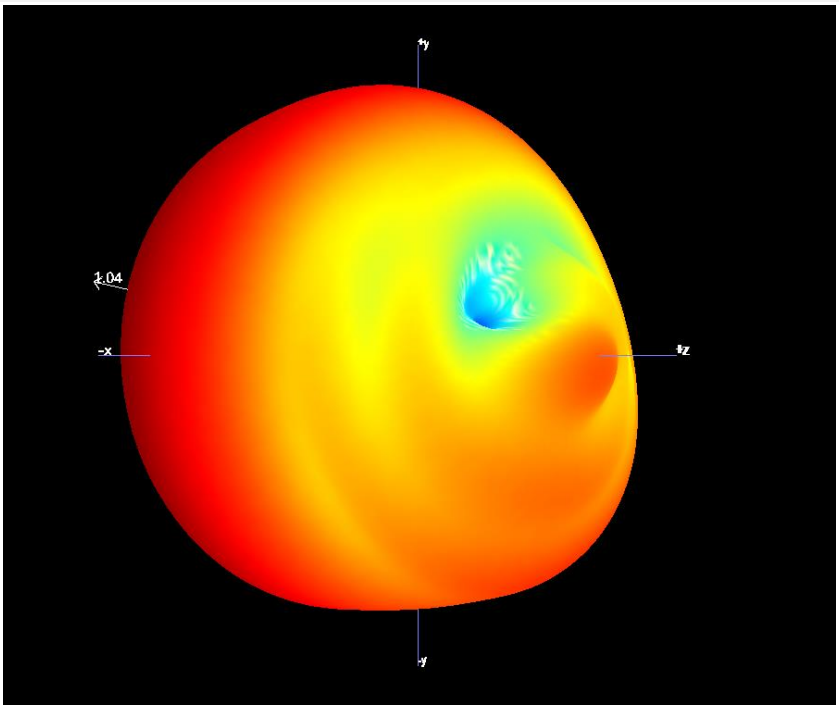
Frequency	SWR
2400MHz	1.58
2450MHz	1.79
2500MHz	1.83



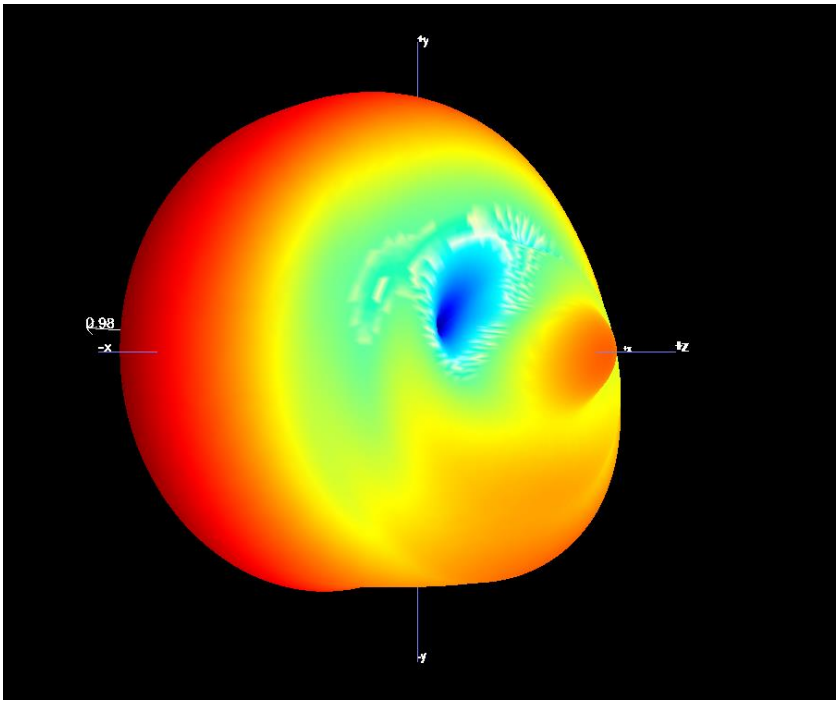
ANNEX B RADIATION PATTERN

B.1 3D Pattern

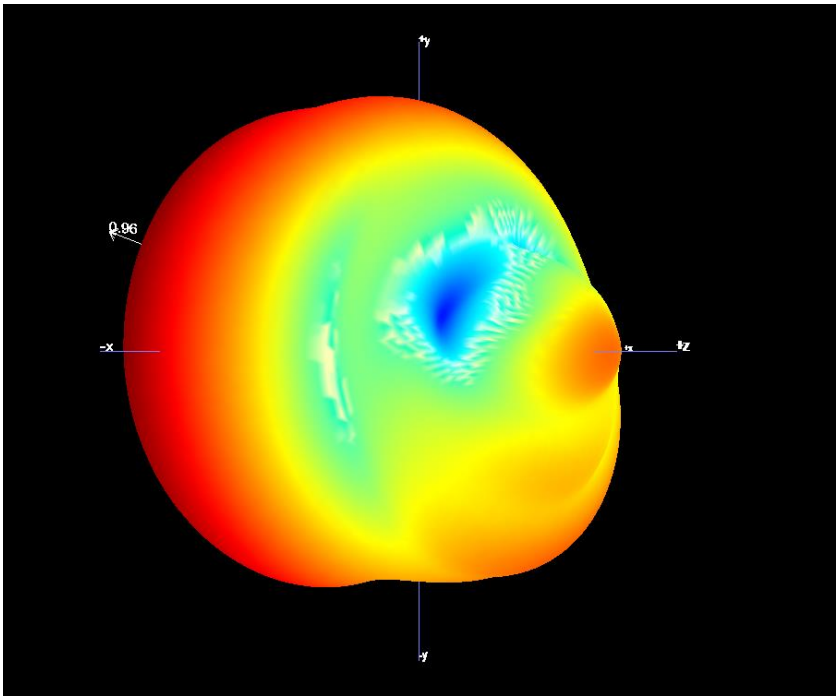
B1.1 3D Pattern for 2400MHz



B1.2 3D Pattern for 2450MHz

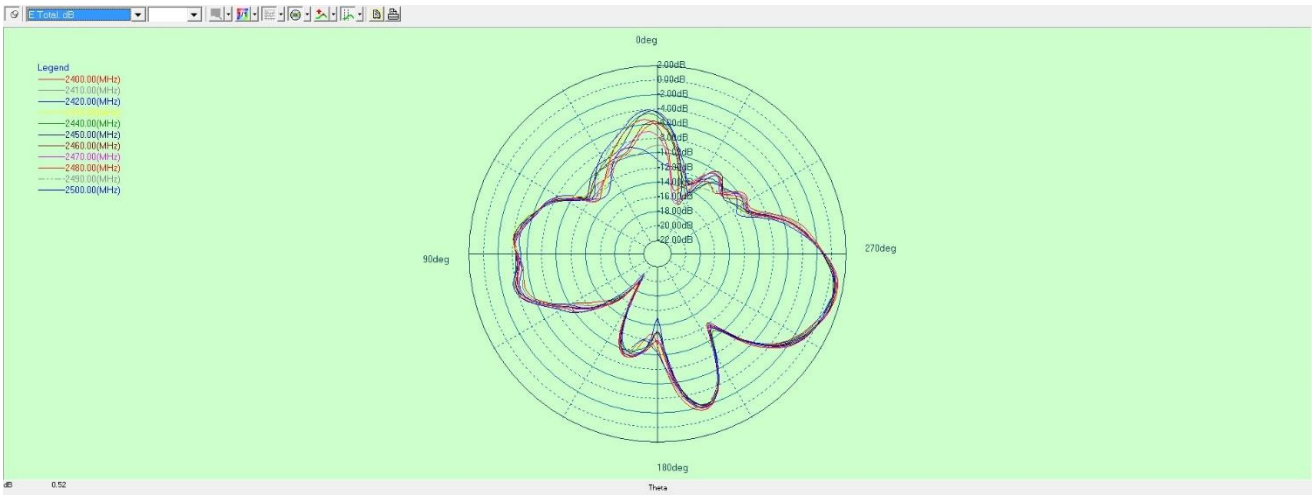


B1.3 3D Pattern for 2500MHz

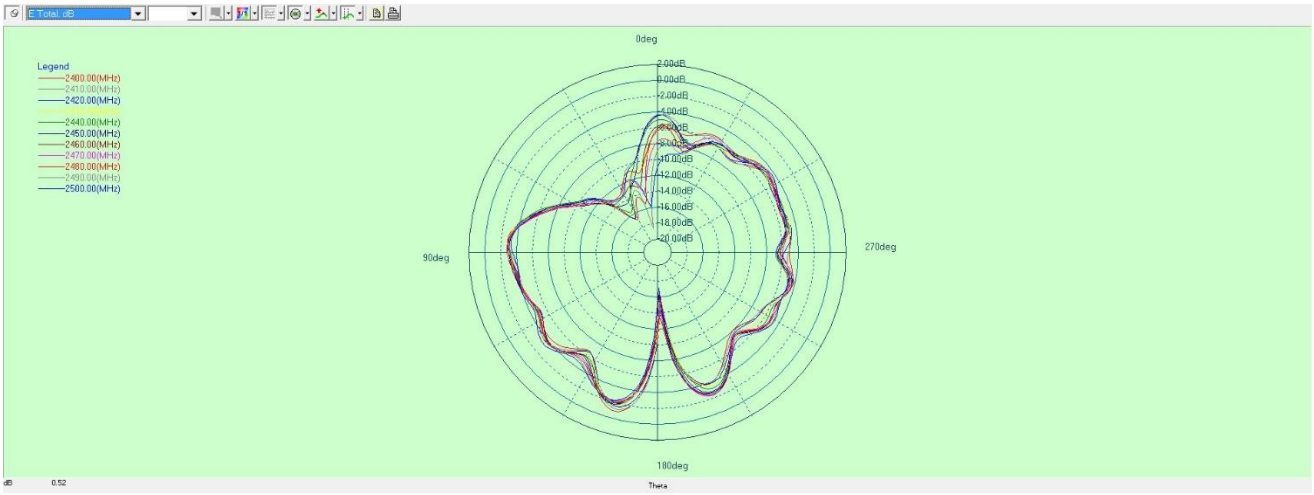


B.2 1D Radiation Pattern

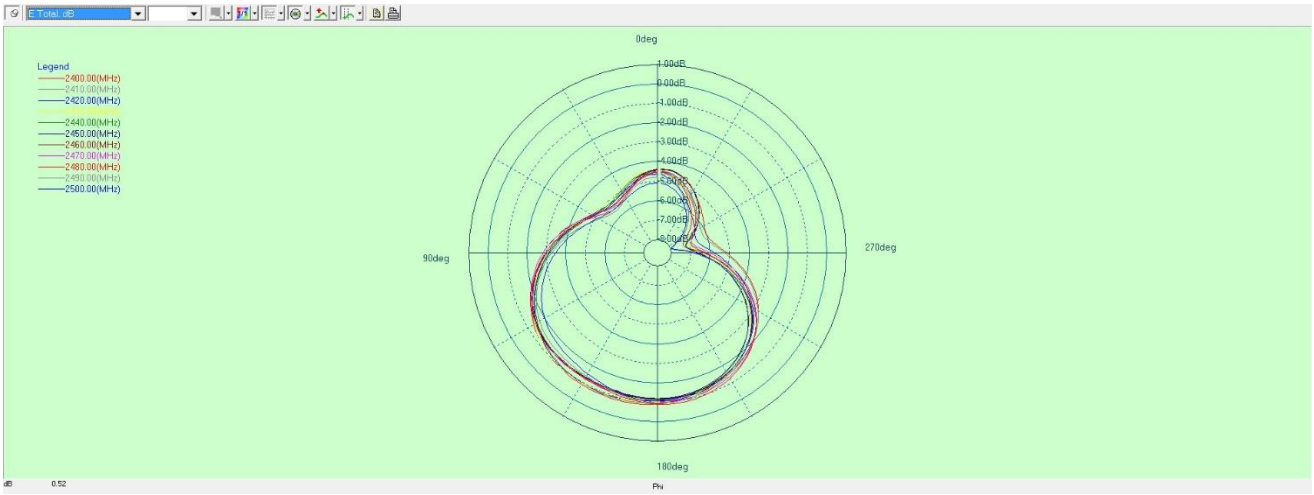
B2.1 PHI=0



B2.2 PHI=90



B2.3 THETA=90



ANNEX C TEST SETUP PHOTOS

Please refer the document “BL-SZ23B1054-AO.PDF”.

ANNEX D EUT PHOTO

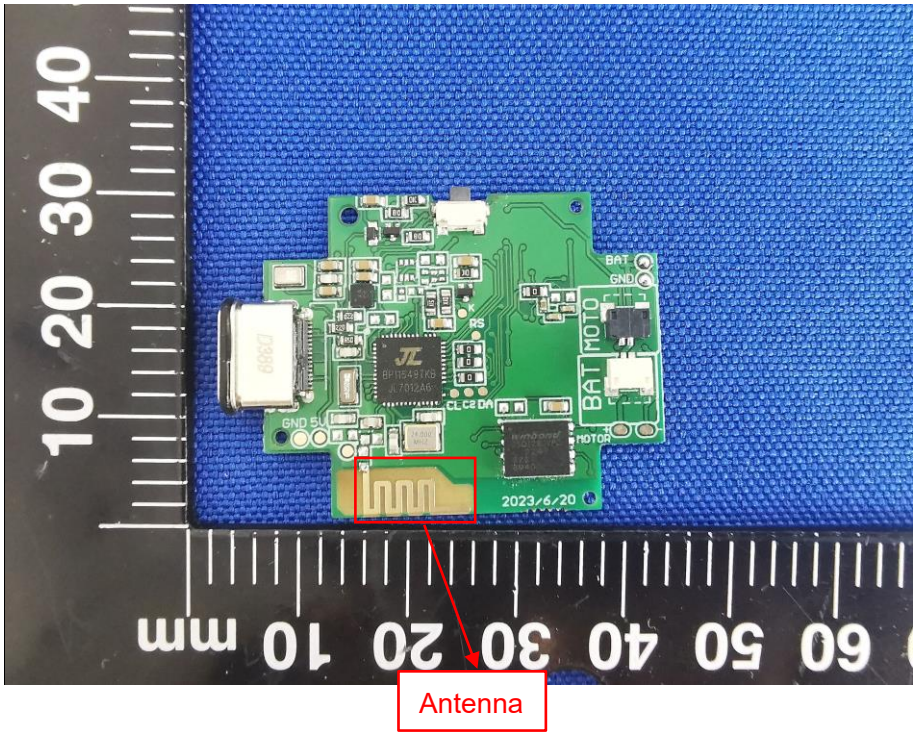
Please refer the document “BL-SZ23B1054-AA.PDF”.

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.

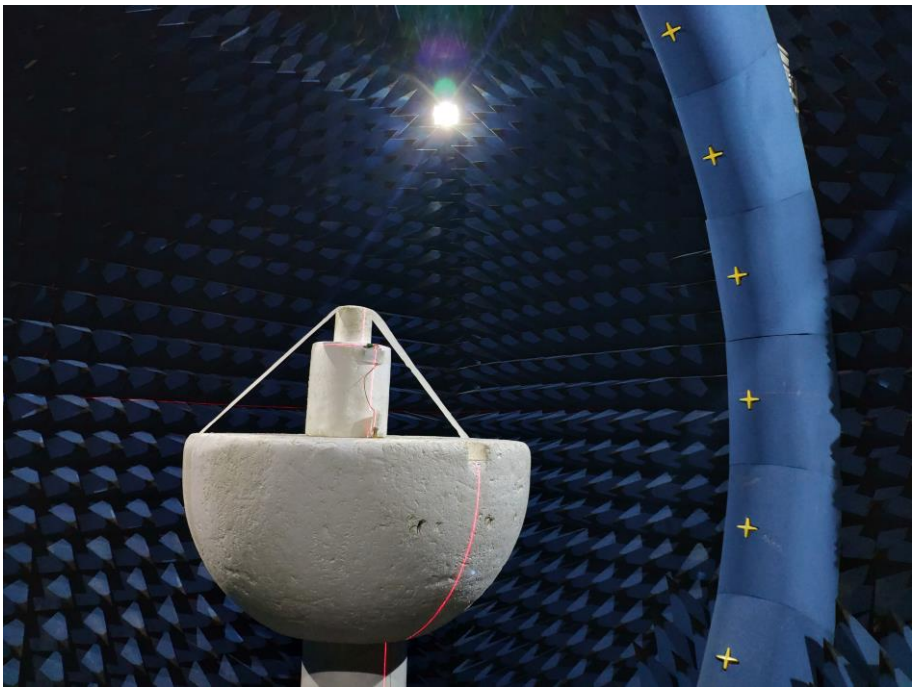
--END OF REPORT--

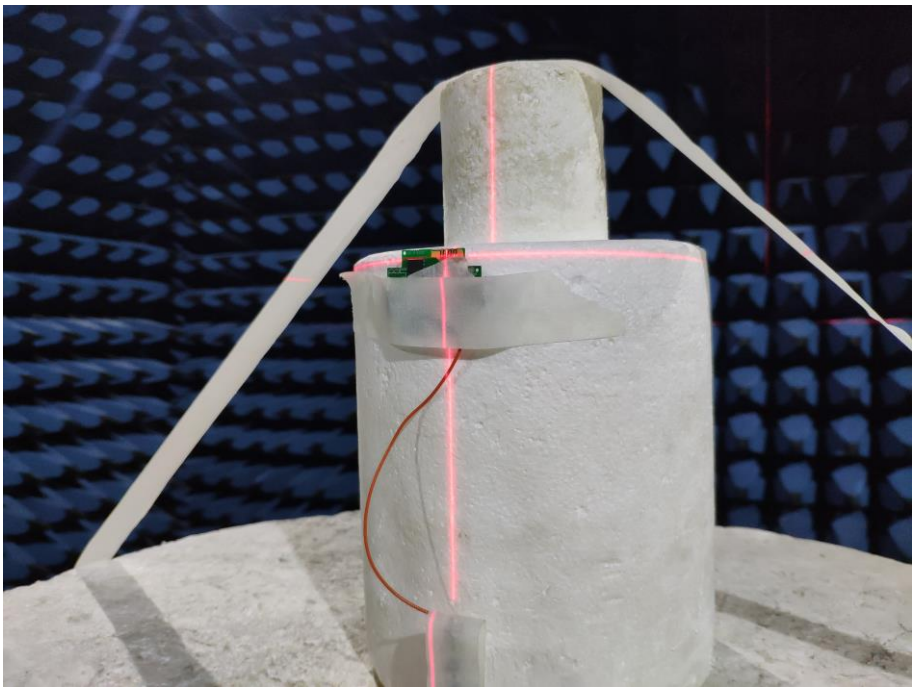
EUT PHOTO

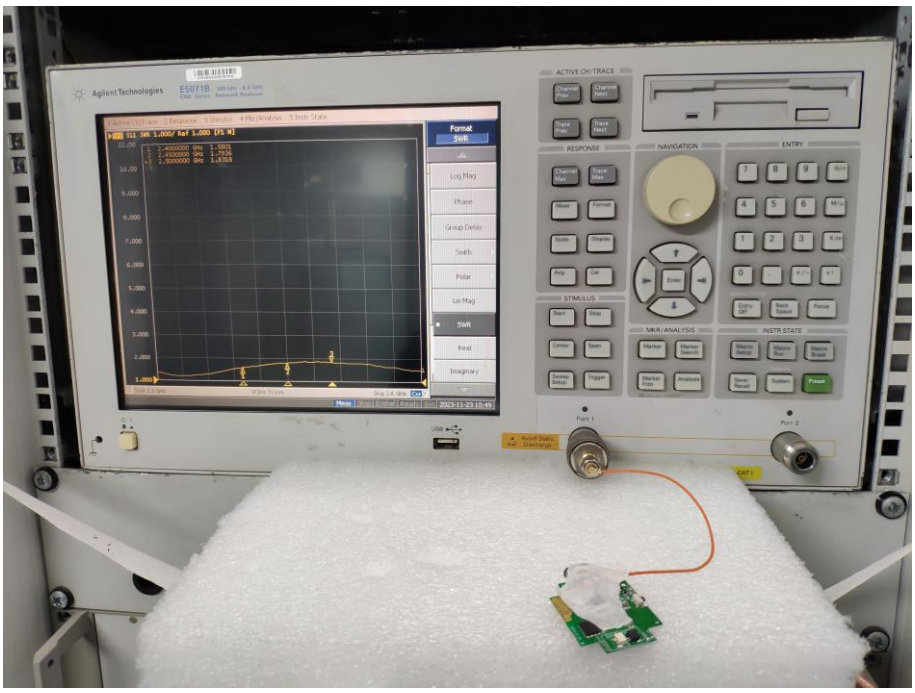


--BLANK BELOW--

TEST SETUP PHOTOS






Agilent Technologies
E5071B
Format
SWR
Log Mag
Phase
Group Delay
Smith
Polar
Lin Mag
SWR
Real
Imaginary
ACTIVE CH/TRACE
RESPONSE
NAVIGATION
ENTRY
STIMULUS
MKR/ANALYSIS
INSTR STATE
Port 1
Port 2

--BLANK BELOW--