

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
<u>Rev. 01</u>	<u>Nov. 28, 2023</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	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
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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	$\pm 1.92\text{dB}$
VSWR(S11)	± 0.61

4 GENERAL TEST CONFIGURATIONS

4.1 Test Condition

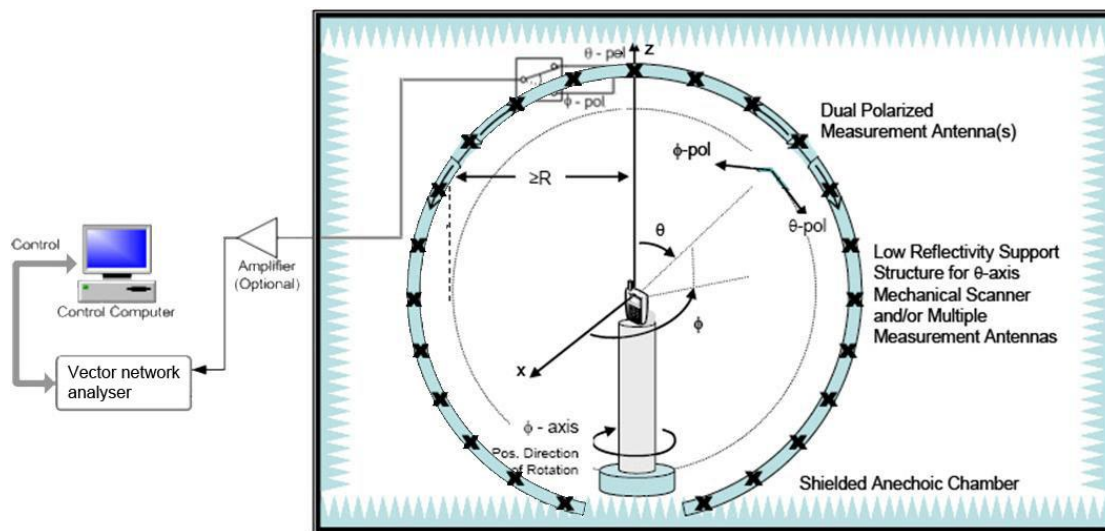
Environment Parameter	Selected Values During Tests			
	Ambient Pressure(KPa)	Temperature(°C)	Voltage	Relative Humidity (%)
Normal Temperature, Normal Voltage (NTNV)	101	21.7	N/A	46

4.2 Test Equipment List

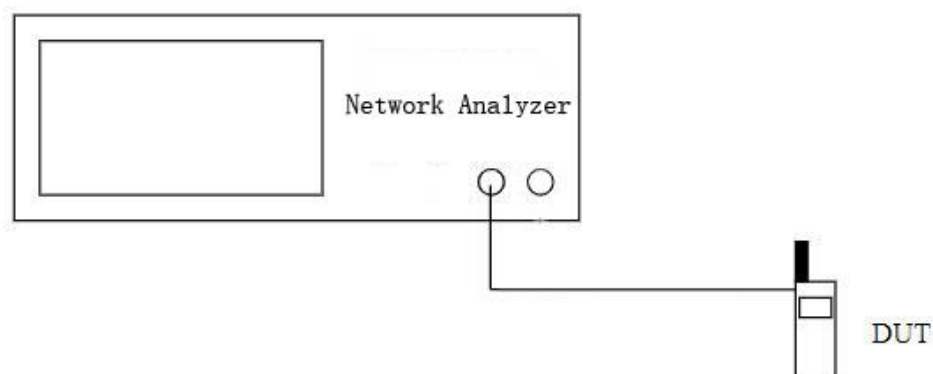
Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
SG24 Multi-probe Antenna Measurement System	SATIMO	SG24-L	1101855- 0001	2021.11.12	2024.11.11
Vector Network Analyzer	Agilent	E5071B	MY42404001	2023.03.26	2024.03.25
Description	Manufacturer	Name		Version	
Test Software	MVG	SPM		V 1.8	

4.3 Test Setup

4.3.1 Antenna gain, efficiency and radiation pattern test setup



4.3.2 S11 parameter test setup



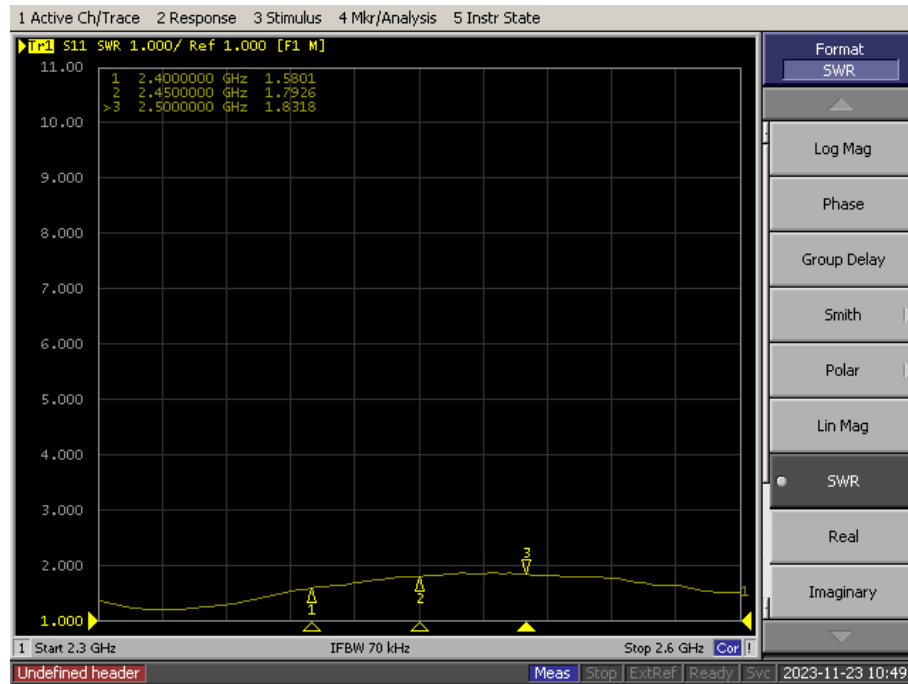
ANNEX A TEST RESULTS

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

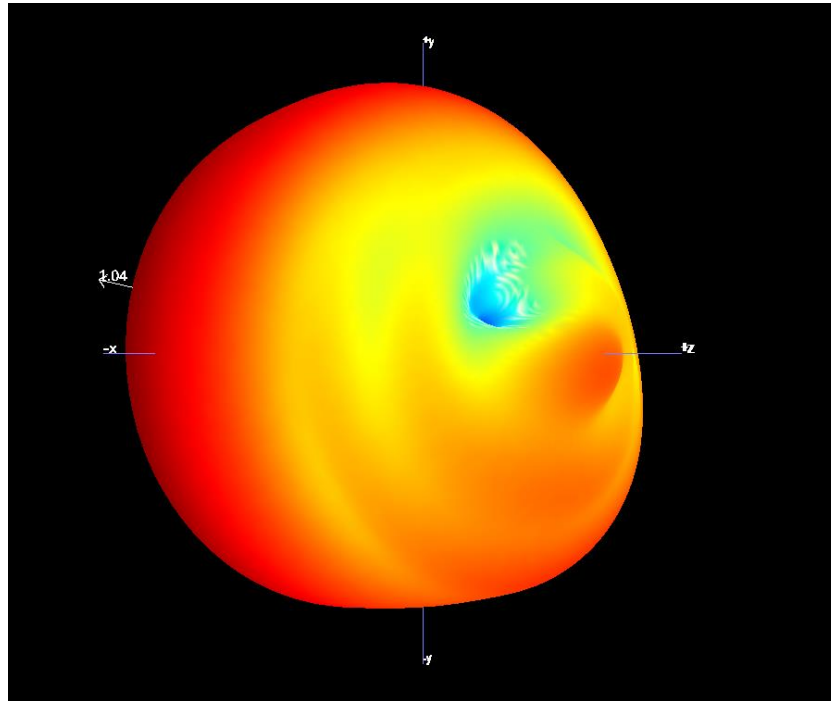
Frequency	SWR
2400MHz	1.58
2450MHz	1.79
2500MHz	1.83



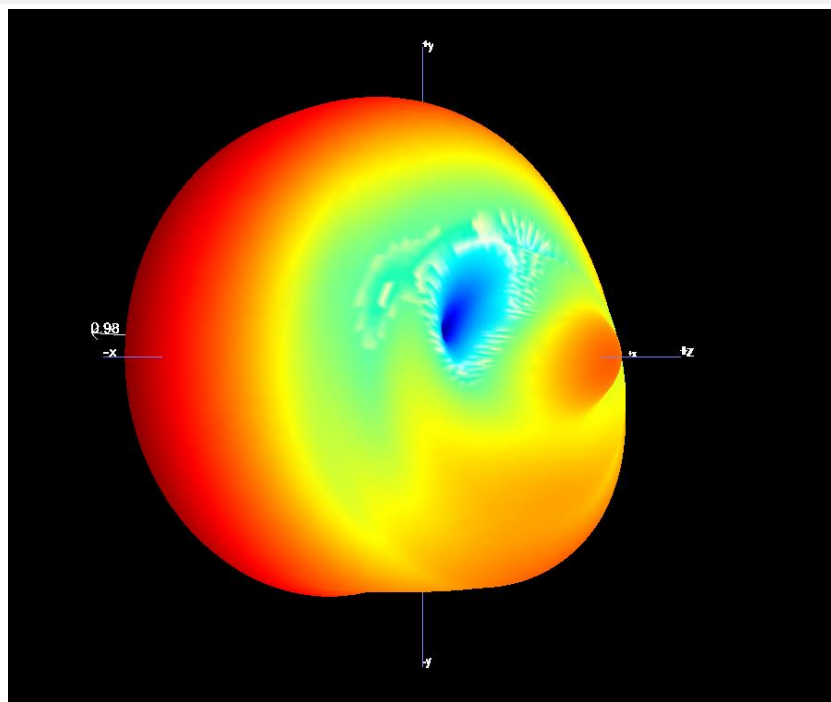
ANNEX B RADIATION PATTERN

B.1 3D Pattern

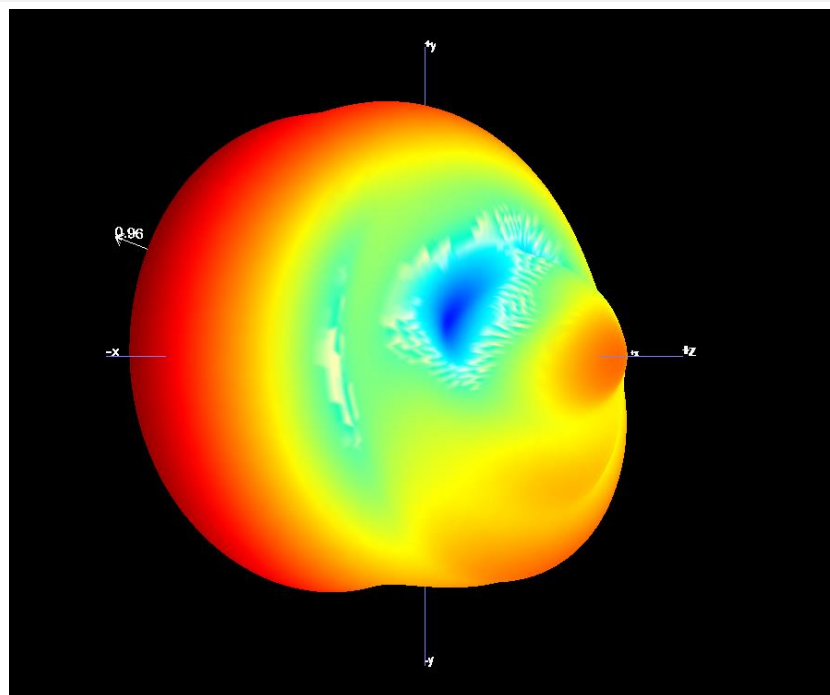
B1.1 3D Pattern for 2400MHz



B1.2 3D Pattern for 2450MHz

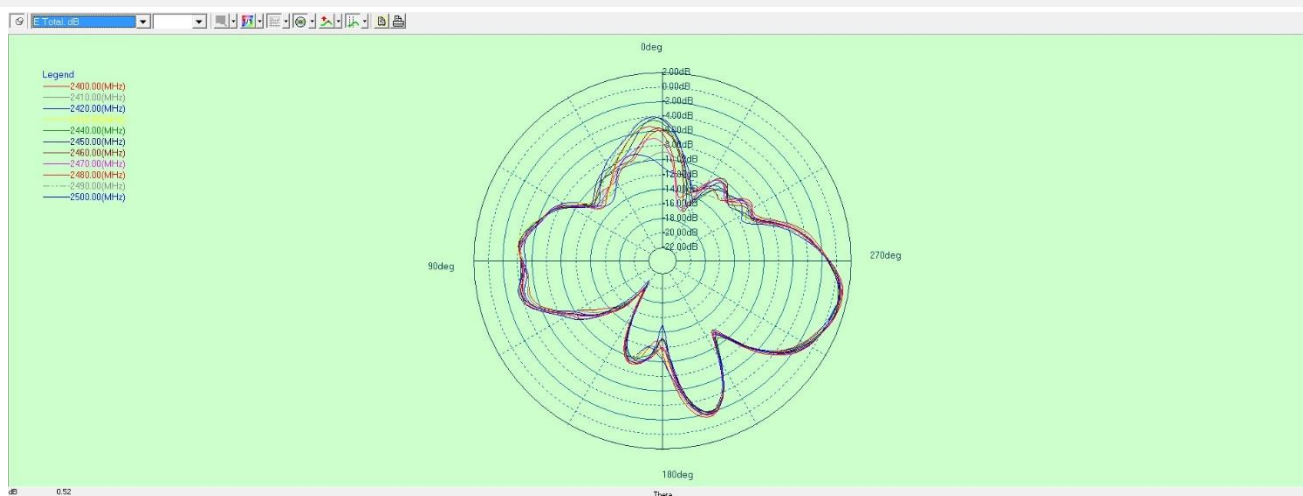


B1.3 3D Pattern for 2500MHz

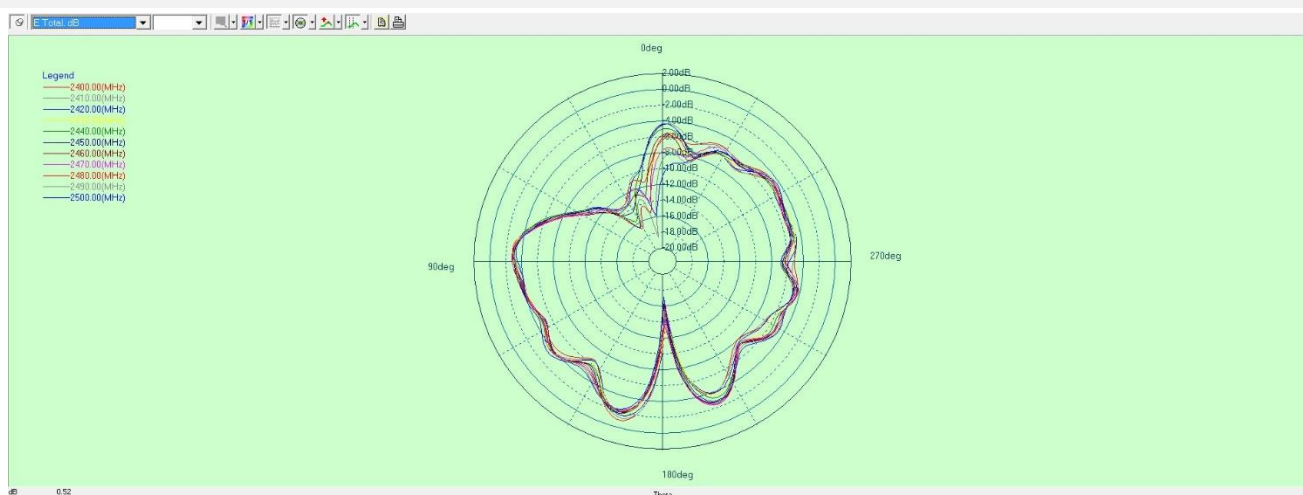


B.2 1D Radiation Pattern

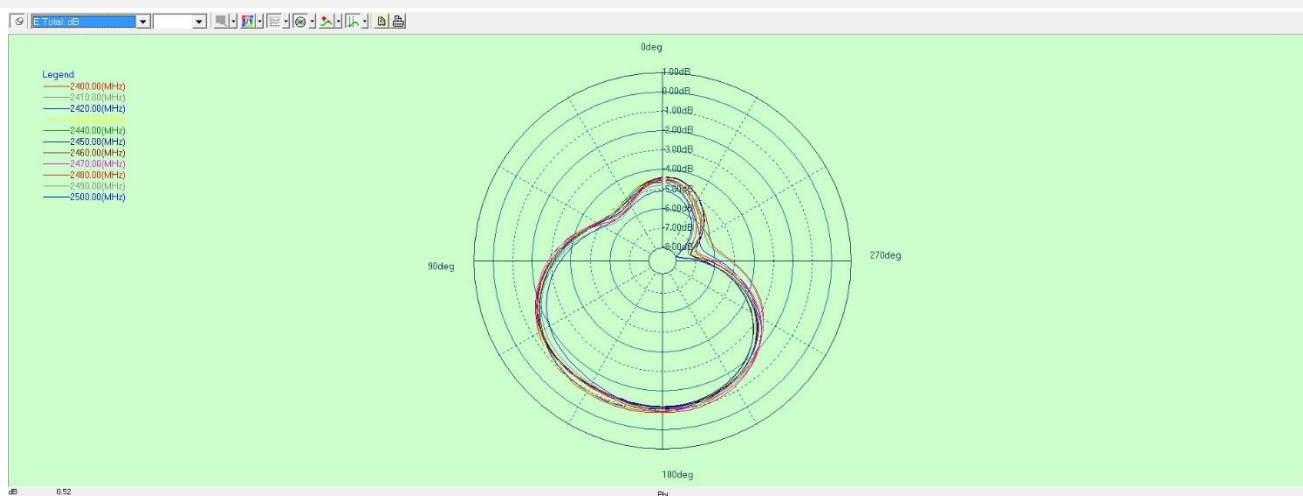
B2.1 PHI=0



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

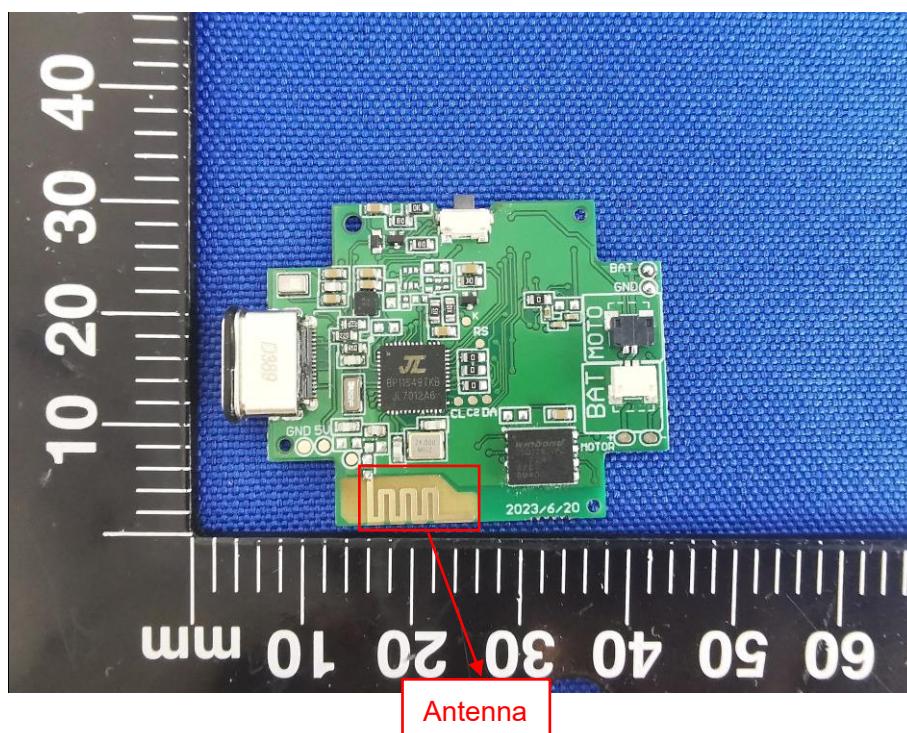
Please refer the document “BL-SZ23B1054-AA.PDF”.

Statement

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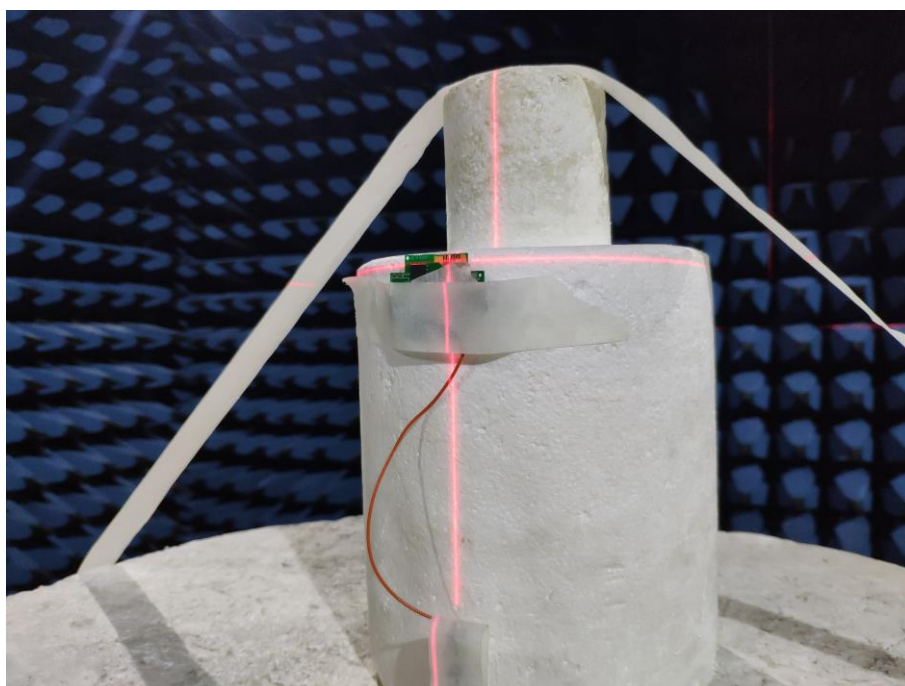
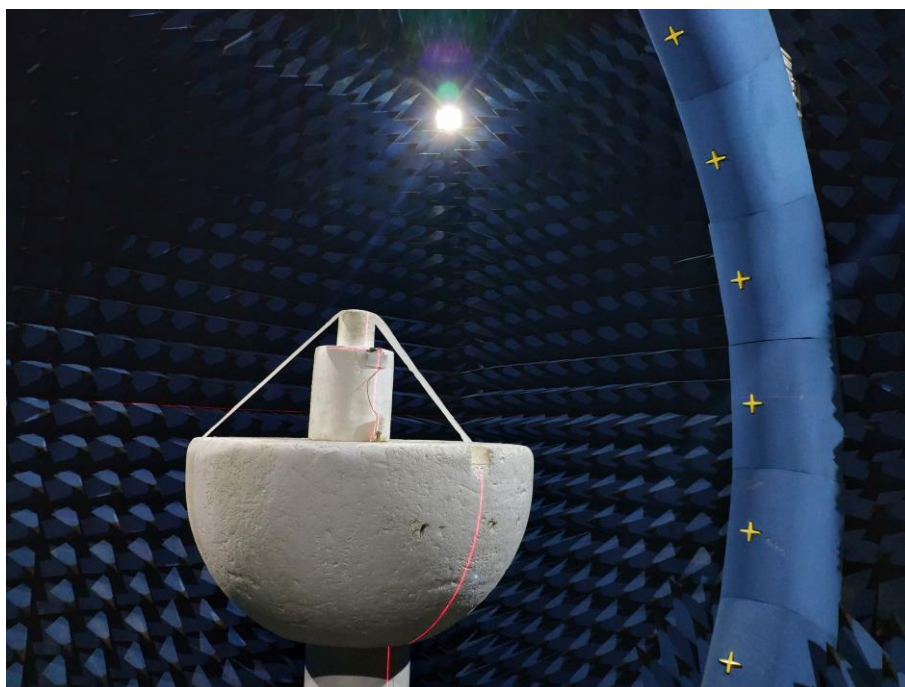
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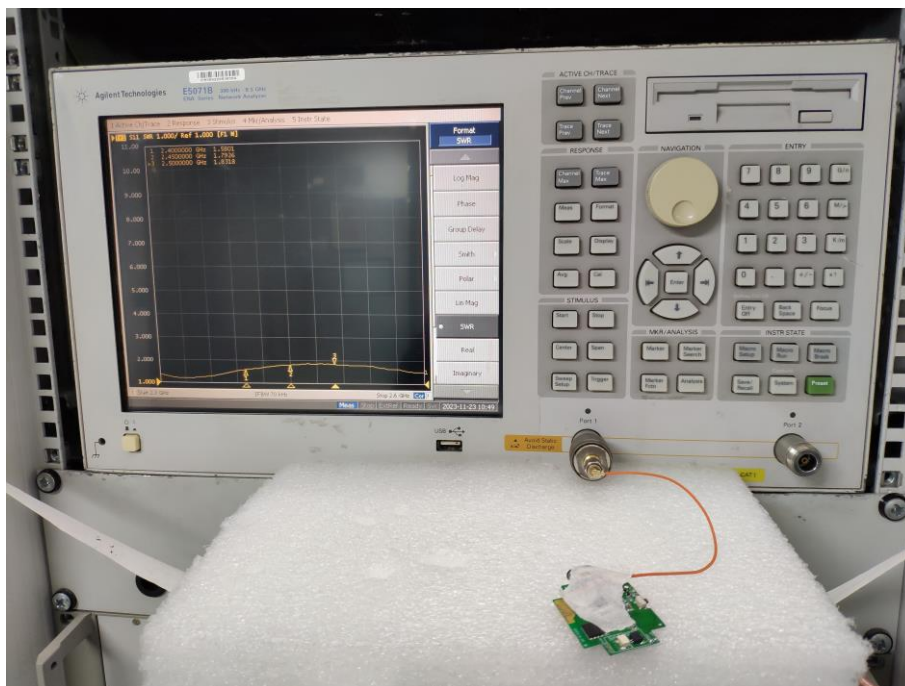
EUT PHOTO



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TEST SETUP PHOTOS





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