

TEST REPORT

Applicant: Ningbo Sunfree Motor Technology Co., Ltd.
Address: 202, No. 418, Qihang North Road, Yinzhou District,
Ningbo, China
Equipment Type: WIFI module
Model Name: WRG1
Brand Name: N/A
Test Standard: ANSI/IEEE Std 149-1979
Test Date: Nov. 14, 2022
Date of Issue: Nov. 17, 2022

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

**Tested by:** Mai Jintian**Checked by:** Tolan Tu**Approved by:** Liao Jianming
(Technical Director)*Mai Jintian**Tolan Tu**Jm Liao*

Revision History

Version	Issue Date	Revisions
<u>Rev. 01</u>	<u>Nov. 17, 2022</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	Ningbo Sunfree Motor Technology Co., Ltd.
Address	202, No. 418, Qihang North Road, Yinzhou District, Ningbo, China

2.2 Manufacturer Information

Manufacturer	N/A
Address	N/A

2.3 General Description for Equipment under Test (EUT)

EUT Name	WIFI module
Model Name Under Test	WRG1
Antenna Type	PCB Antenna
Dimensions	15*5 mm

2.4 Ancillary Equipment

Note: Not applicable.

2.5 Technical Information

Test Frequencies	2402MHz, 2404MHz, 2406MHz, 2408MHz, 2410MHz, 2412MHz, 2414MHz, 2416MHz, 2418MHz, 2420MHz, 2422MHz, 2424MHz, 2426MHz, 2428MHz, 2430MHz, 2432MHz, 2434MHz, 2436MHz, 2438MHz, 2440MHz, 2442MHz, 2444MHz, 2446MHz, 2448MHz, 2450MHz, 2452MHz, 2454MHz, 2456MHz, 2458MHz, 2460MHz, 2462MHz, 2464MHz, 2466MHz, 2468MHz, 2470MHz, 2472MHz, 2474MHz, 2476MHz, 2478MHz, 2480MHz
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3 SUMMARY OF TEST RESULTS

3.1 Test Standards

No.	Identity	Document Title
1	ANSI/IEEE Std 149-1979	IEEE Standard Test Procedures for Antennas

3.2 Test Verdict

Report Section	Description	Remark
ANNEX A.1	Gain and Efficiency	--
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	$\pm 1.92\text{dB}$

4 GENERAL TEST CONFIGURATIONS

4.1 Test Condition

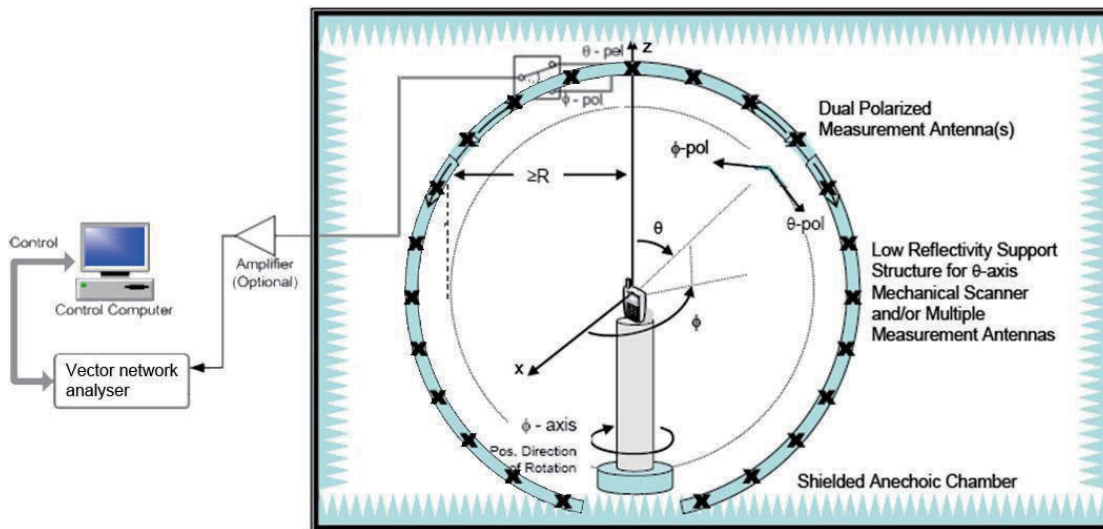
Environment Parameter	Selected Values During Tests			
	Ambient Pressure(KPa)	Temperature(°C)	Voltage	Relative Humidity (%)
Normal Temperature, Normal Voltage (NTNV)	101	21.7	N/A	62

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	2022.04.02	2023.04.01
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



ANNEX A TEST RESULTS

A.1 Gain and Efficiency

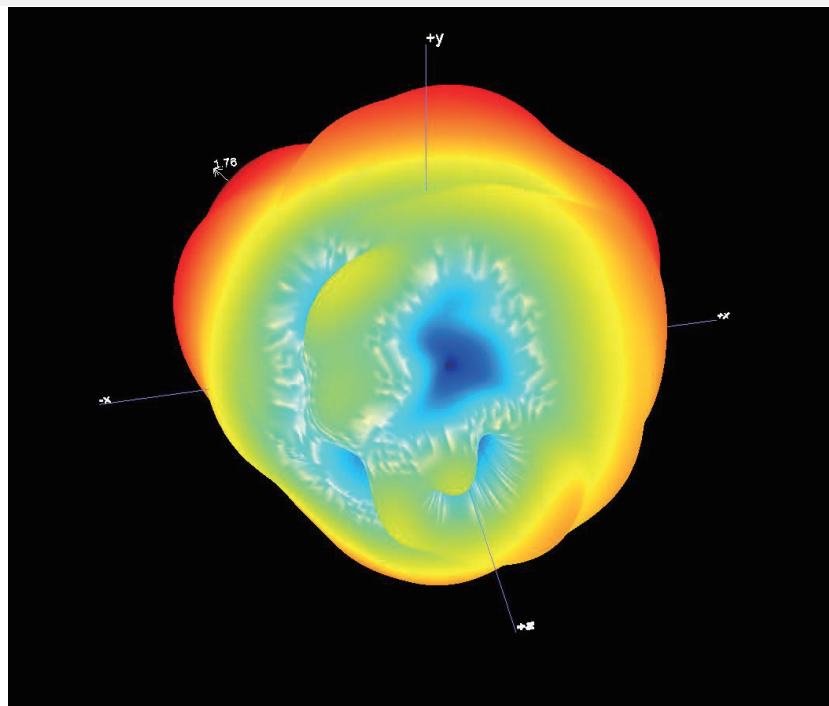
Frequency	Gain (dBi)	Efficiency (%)
2402MHz	1.76	41
2404MHz	1.73	40
2406MHz	1.70	40
2408MHz	1.69	40
2410MHz	1.68	40
2412MHz	1.65	40
2414MHz	1.62	40
2416MHz	1.69	40
2418MHz	1.67	40
2420MHz	1.61	40
2422MHz	1.58	40
2424MHz	1.59	40
2426MHz	1.63	40
2428MHz	1.60	40
2430MHz	1.58	40
2432MHz	1.60	40
2434MHz	1.61	40
2436MHz	1.62	40
2438MHz	1.60	40
2440MHz	1.63	40
2442MHz	1.66	40
2444MHz	1.66	40
2446MHz	1.50	40
2448MHz	1.51	40
2450MHz	1.53	40
2452MHz	1.52	40
2454MHz	1.49	39
2456MHz	1.33	39
2458MHz	1.34	39
2460MHz	1.31	39
2462MHz	1.32	39
2464MHz	1.35	38
2466MHz	1.39	39
2468MHz	1.42	39
2470MHz	1.43	39
2472MHz	1.42	39
2474MHz	1.41	39
2476MHz	1.50	39

2478MHz	1.49	39
2480MHz	1.47	39

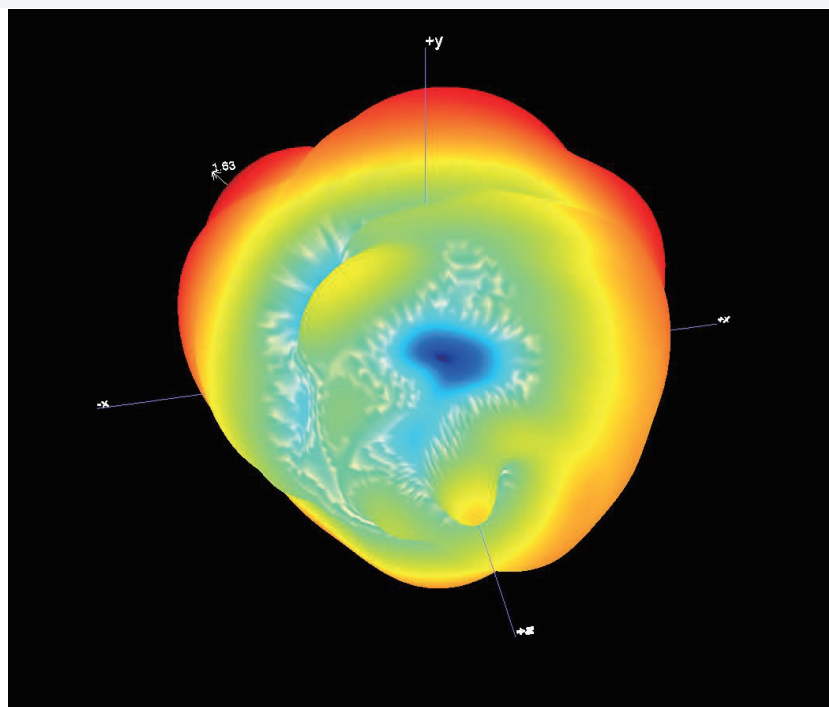
ANNEX B RADIATION PATTERN

B.1 3D Pattern

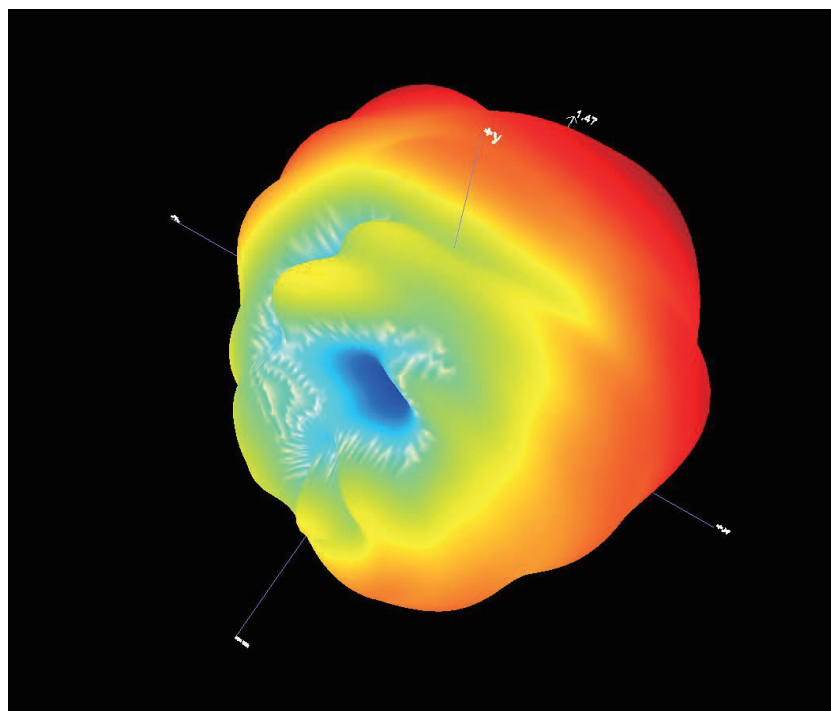
B1.1 3D Pattern for 2402MHz



B1.2 3D Pattern for 2440MHz

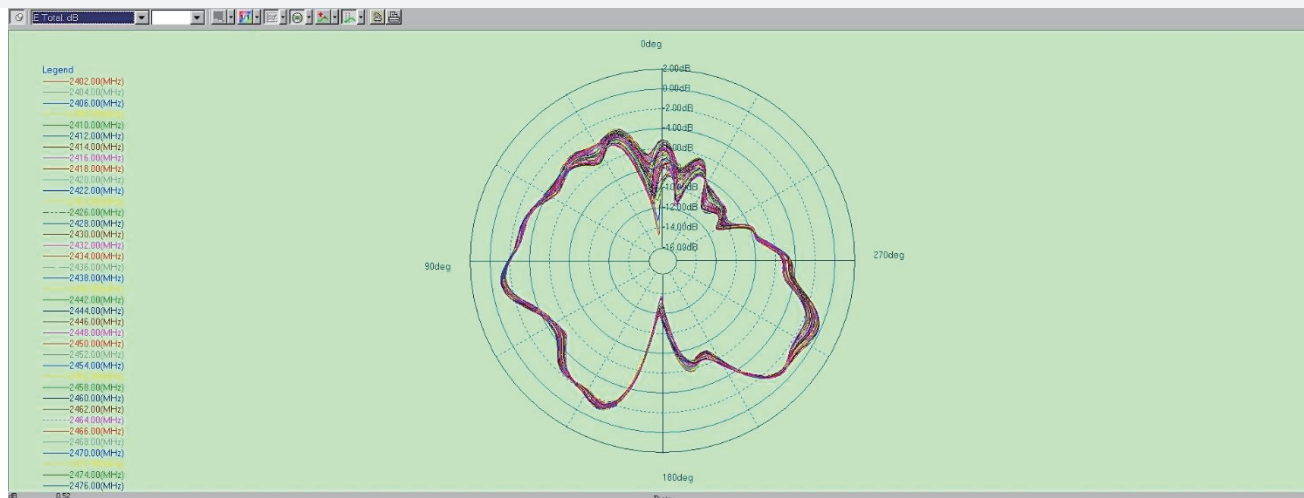


B1.3 3D Pattern for 2480MHz

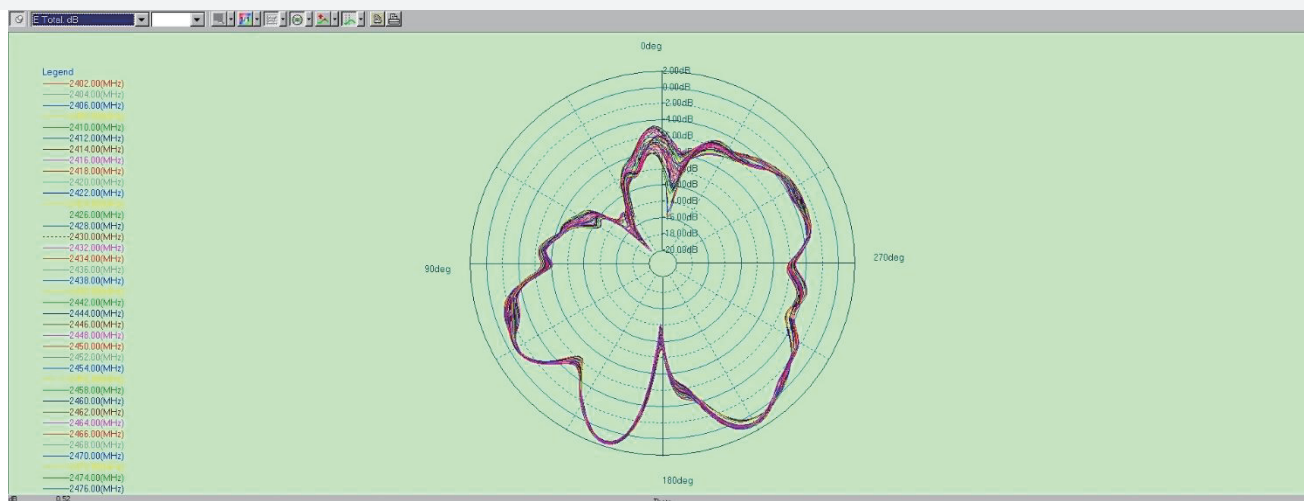


B.2 1D Radiation Pattern

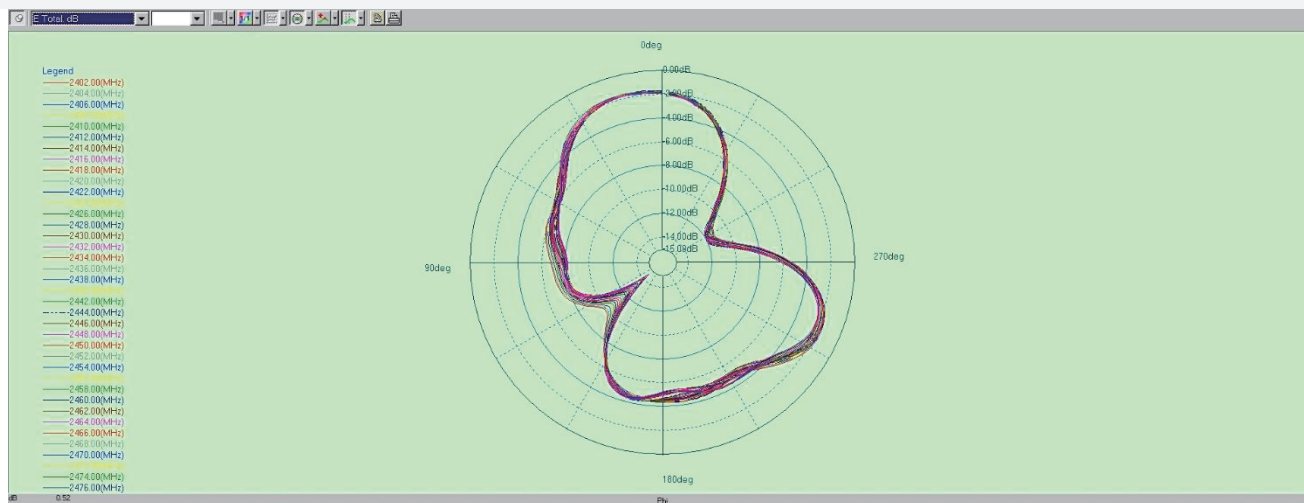
B2.1 PHI=0



B2.2 PHI=90



B2.3 THETA=90



ANNEX C TEST SETUP PHOTOS

Please refer the document “BL-SZ22B0501-AO.PDF”.

ANNEX D EUT PHOTO

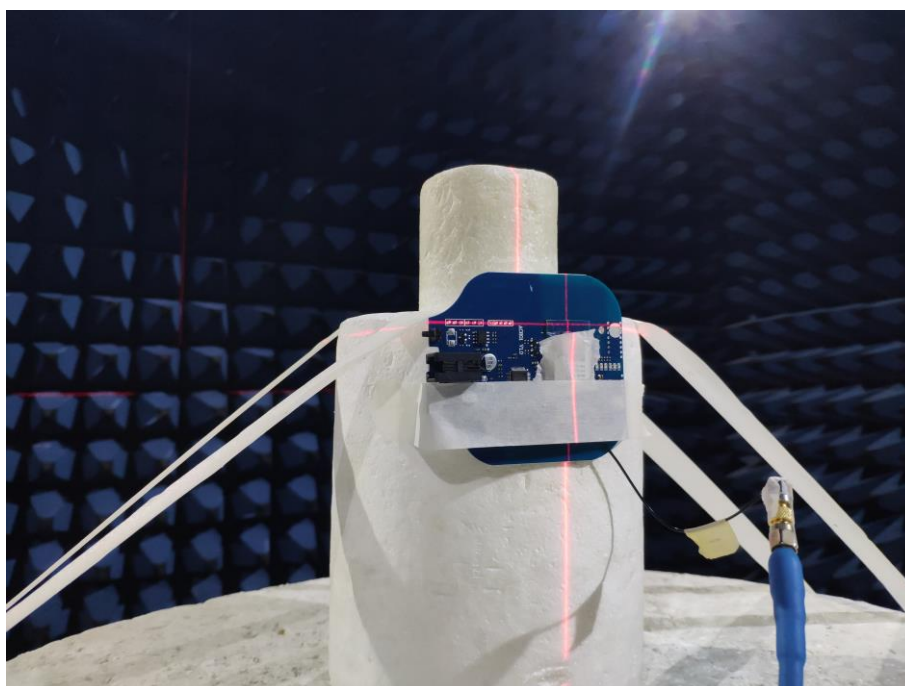
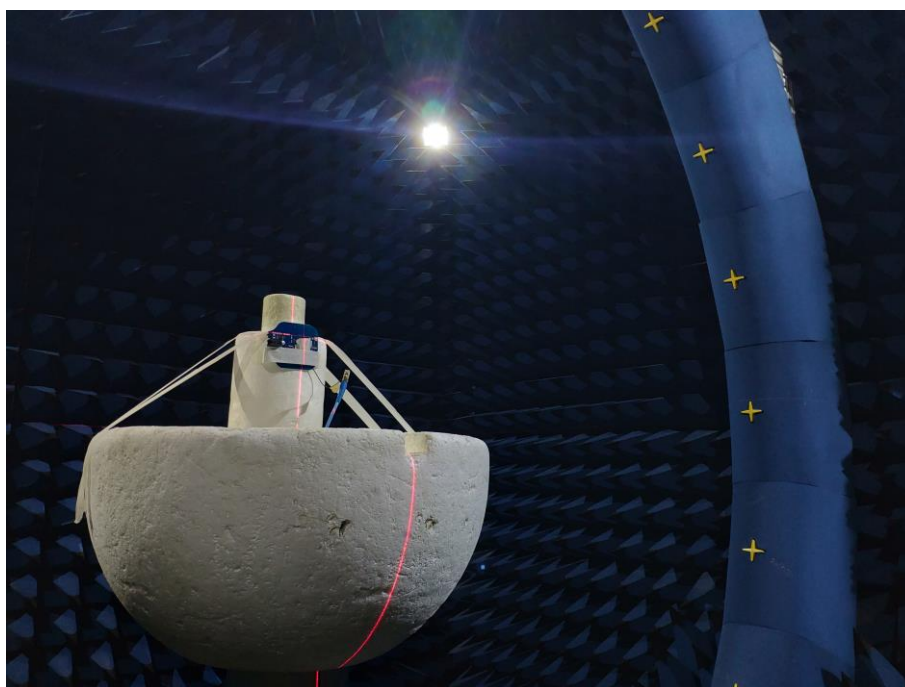
Please refer the document “BL-SZ22B0501-AA.PDF”.

Statement

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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--

TEST SETUP PHOTOS



EUT PHOTO

