

Testing Report

Customer Name: Bestgreen Novelties Company Limited

Product Name: 433 module

Sample Model: DX-433RF-2140

Reference Standard: *GB/T 9410-2008; ANSI/IEEE Std 149-2021*

Issue Date: 2023.01.10

Engineer: Jackson	Date: 2023.1.10
Auditor: Eason	Date: 2023.1.10
Approver: Amon	Date: 2023.1.10



Version

Version No.	Date	Description	Formulate	Approval
A0	2023.01. 10	For the first time, formulate	Jackson	Eason

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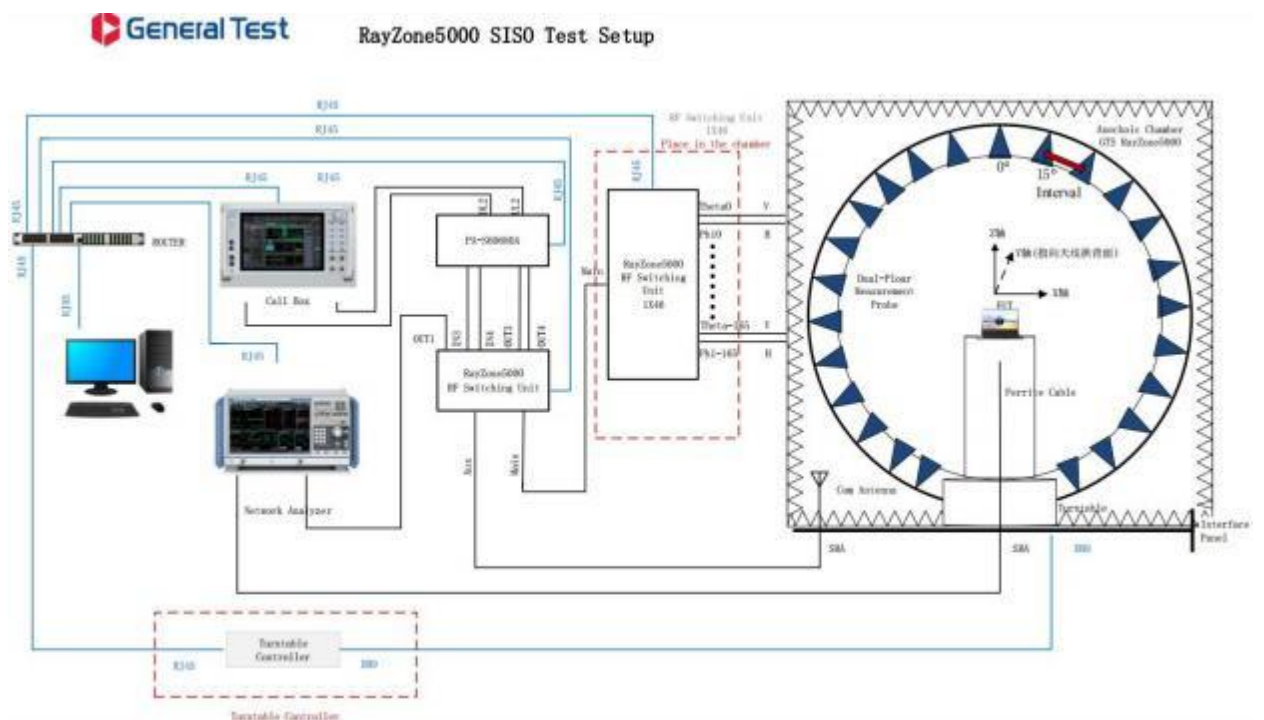
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1. General Information

1.1 General information of testing institutions

Name	Shenzhen RFI-LAB Communication Technology Co., Ltd.
Address	10/F A, Lingyun Bld, Liufang Rd, Baoan District, SZ
Tel	13682621346
E-mail	rfi-lab@tech-now.com
Equipment	All the equipment used in the report is fixed in Zone B, West Side of 1/F, Building 1, Tingwei Industrial Park, No.6 Liufang Road, Bao 'an District, Shenzhen

1.2 Testing principle



1.3 Test equipment

Equipment	Model No.	Serial No.	Manufacturer	Calibration date	Next calibration date
OTA Test System	RayZone-5000	RFI-LAB-RF-D00	GTS	2021.3. 15	2023.3. 14
Network Analyzer	E5071C	RFI-LAB-RF-D01	KEYSIGHT	2022.5. 13	2023.5. 12

1.4 Test environment

Temperature	23.8℃
Humidity	57%RH
Pressure	100. 15kPa

1.5 Statement

- (1) The test results in the report are only applicable to the tested samples and the tested samples work under the environment described in the report.
- (2) Only Shenzhen RFI-LAB Communication Technology Co., Ltd. have the right to modify the report, and the modification information shall be annotated in the revision form.
- (3) Any objection to this report shall be raised within 30 days after formal confirmation of the report.
- (4) This report is invalid if there is any evidence that the sample information provided is falsified.
- (5) The report is invalid without the signature of the auditor and approver.

2. Sample Information

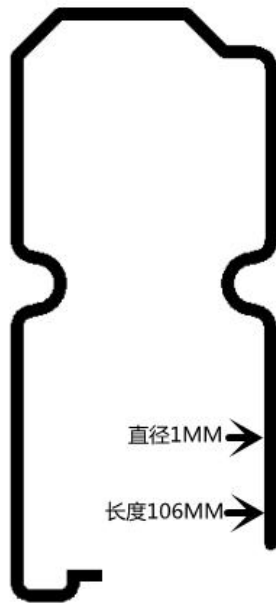
2.1 Client information

Name	Bestgreen Novelties Company Limited
Address	22 Ke Kan Road, Dakan Cun, XiLi, Nan Shan District, Shenzhen, Guangdong, China 518055
Contacts	/
Tel	/
E-mail	/
Manufacturer	/

2.2 Description of EUT(S)

Product Name	433 module
Sample Model	DX-433RF-2140
Antenna Size	/
Serial No.	/
Antenna Type	External Antenna
Test Item	Antenna gain; Efficiency; Radiation pattern
Frequency Range	428-438MHz
Received Date	2023.01. 10
Test Date	2023.01. 10
Remark	The length of the RF cable is 45mm

2.3 EUT appearance

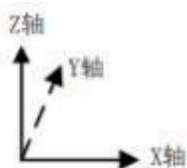
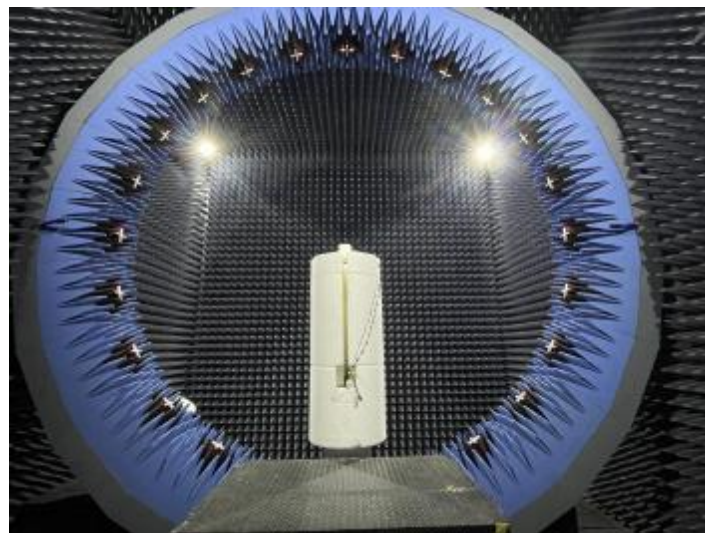


433.92MHz, antenna, material: Copper

The antenna is whip with a width of 1mm, a thickness of 1 oz, and a total straightening length of 106mm.

2.4 EUT setup photo of free space OTA testing

Front view



3. Test Results

3.1 Test standard

Name	Parameter	Method	Standard no.
Mobile communication antenna	Antenna gain	Generic specification for antennas used in the mobile communications	GB/T 9410-2008
	Radiation pattern		
Antenna	Radiation efficiency	IEEE Standard Test Procedures for Antennas	ANSI/IEEE Std 149-2021
	Gain and directivity		

3.2 Test uncertainty

The uncertainty was calculated on the basis of the GUM published by ISO, using the inclusion factor of K=2 and the 95% confidence level to express the extended uncertainty.

Item	Uncertainty
Antenna gain	$\pm 0.72\text{dB}$
Radiation efficiency	$\pm 0.72\text{dB}$

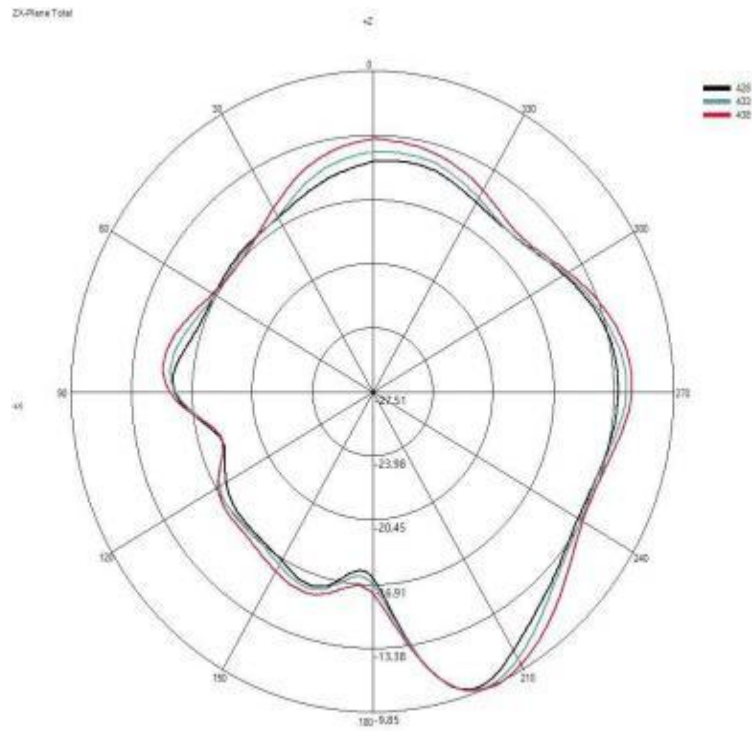
3.3 Test data

3.3.1 Typical free space efficiency and gain

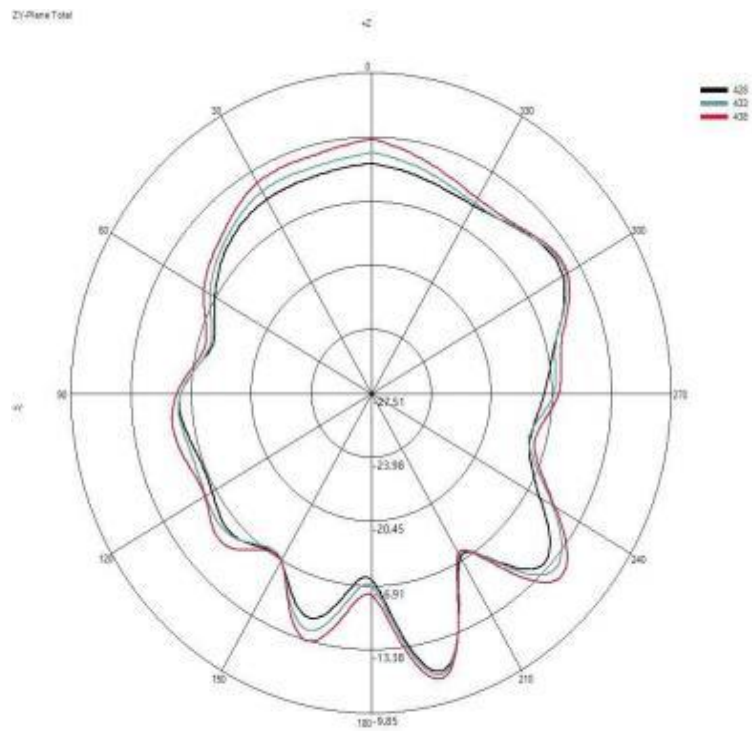
Frequency/ MHz	428	429	430	431	432	433	434	435	436	437	438
Peak Gain/dBi	- 10.67	- 10.85	- 10.71	- 10.73	- 10.58	- 10.61	- 10.52	- 10.39	- 10.38	- 10.31	- 10.21
Efficiency/%	2.97	3.00	3.04	3.06	3.08	3.14	3.17	3.20	3.24	3.32	3.37

3.3.2 Typical free space radiation pattern

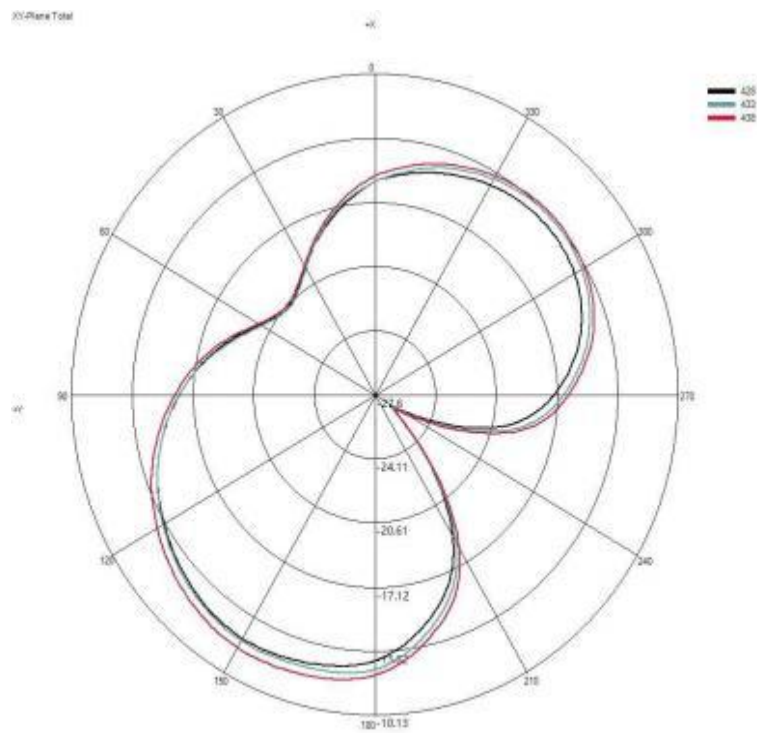
(1) X-Z Plane (unit:dBi):



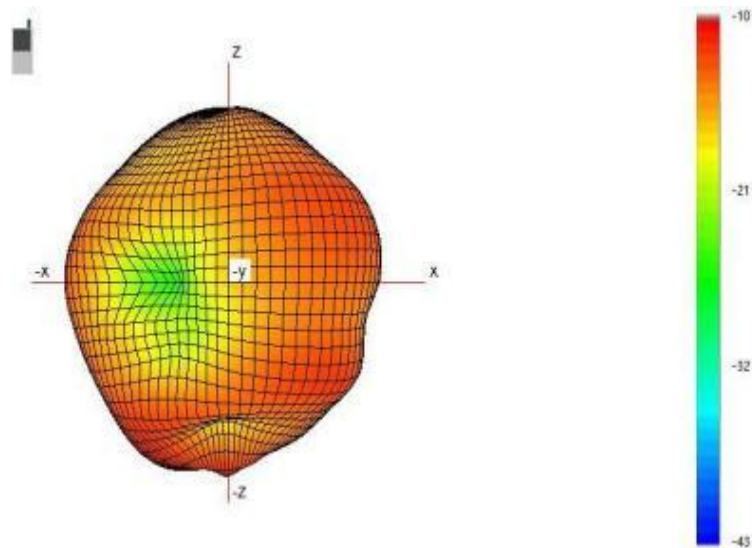
(2) Y-Z Plane (unit:dBi):



(3) X-Y Plane (unit:dBi):



(4) Typical Free Space 3D Radiation Pattern at 433MHz (unit:dBi):



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