

Testing Report

Customer Name: Shenzhen RF-star Technology Co.,Ltd.

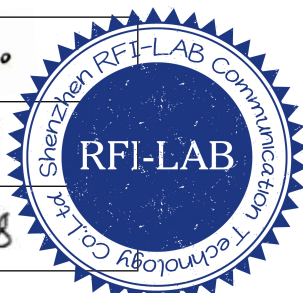
Product Name: BT Module

Sample Model: RF-BM-BG22A1 / RF-BM-BG22A3

Reference Standard: *GB/T 9410-2008; ANSI/IEEE Std 149-1979*

Issue Date: 2022.5.18

Engineer: <i>Amanda</i>	Date: <i>2021.7.30</i>
Auditor: <i>Eason</i>	Date: <i>2022.5.18</i>
Approver: <i>Amanda</i>	Date: <i>2022.5.18</i>

A circular blue seal with a serrated edge. The outer ring contains the text "Shenzhen RFI-LAB Communication Technology Co., Ltd." in white. The center of the seal is dark blue with the text "RFI-LAB" in white.

Version

Version No.	Date	Description	Formulate	Approval
A0	2022.5.18	For the first time, formulate	Amanda	Eason

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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	13631623357
E-mail	liss@tech-now.com
Equipment	All the equipment used in the report is fixed in 10/F A, Lingyun Bld, Liufang Rd, Baoan District, SZ

1.2 Testing principle

Multi-Probe OTA Measurement System



1.3 Test equipment

Equipment	Model No.	Serial No.	Manufacturer	Calibration date	Next calibration date
16 probe microwave chamber	3*3*2.5	RFI-LAB-RF-A00	SUNYIELD	2021.3.15	2023.3.14
Network Analyzer	E5071C	RFI-LAB-RF-A02	Agilent	2022.5.13	2023.5.12
Network Analyzer	E5071C	RFI-LAB-RF-C02	KEYSIGHT	2022.5.13	2023.5.12

1.4 Test environment

Temperature	24.2℃
Humidity	55%RH
Pressure	100.04kPa

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

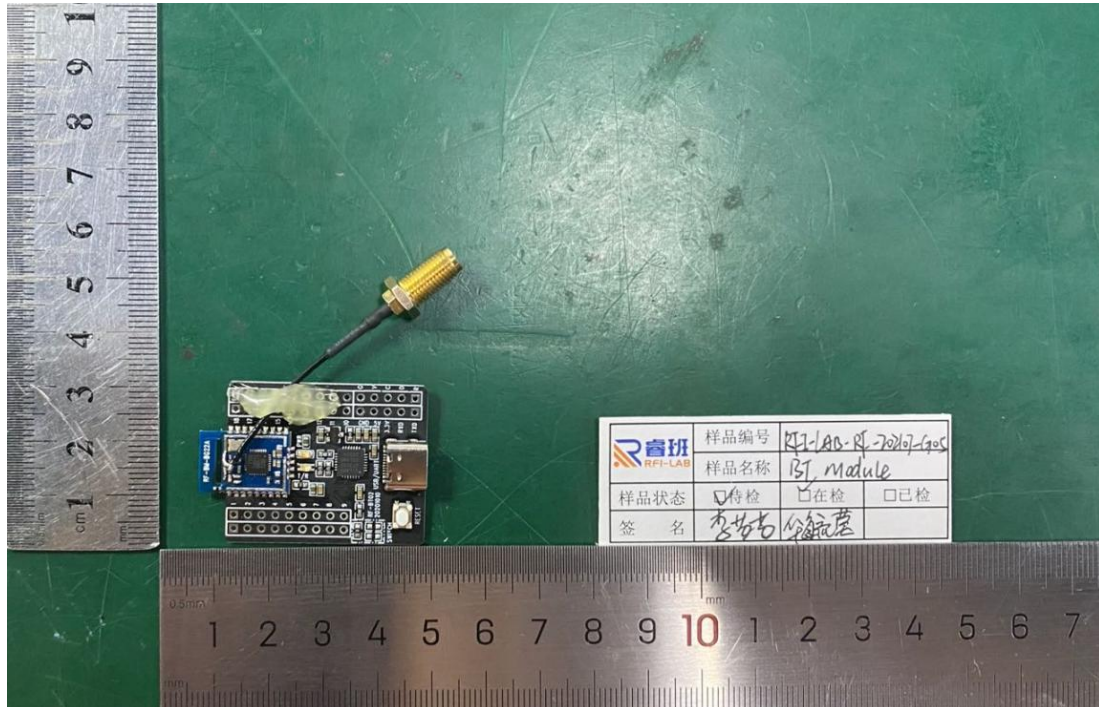
Name	Shenzhen RF-star Technology Co.,Ltd.
Address	C601, Skyworth Building, High-tech Park, Nanshan District, Shenzhen, China
Contacts	Mr. Xie
Tel	13580115040
E-mail	aiden@szrfstar.com

2.2 Description of EUT(S)

Product Name	BT Module
Sample Model	RF-BM-BG22A1 / RF-BM-BG22A3
Size	/
Serial No.	/
Test Item	VSWR; Gain; Efficiency; Radiation pattern
Frequency Range	2400-2500MHz
Received Date	2021.7.29
Test Date	2021.7.30
Remark	1、The length of the RF cable is 45mm; 2、The antennas of the two models are the same, but the IC is different; 3、The client confirms that only RF-BM-BG22A1 will be tested.

2.3 EUT appearance

RF-BM-BG22A1



RF-BM-BG22A3

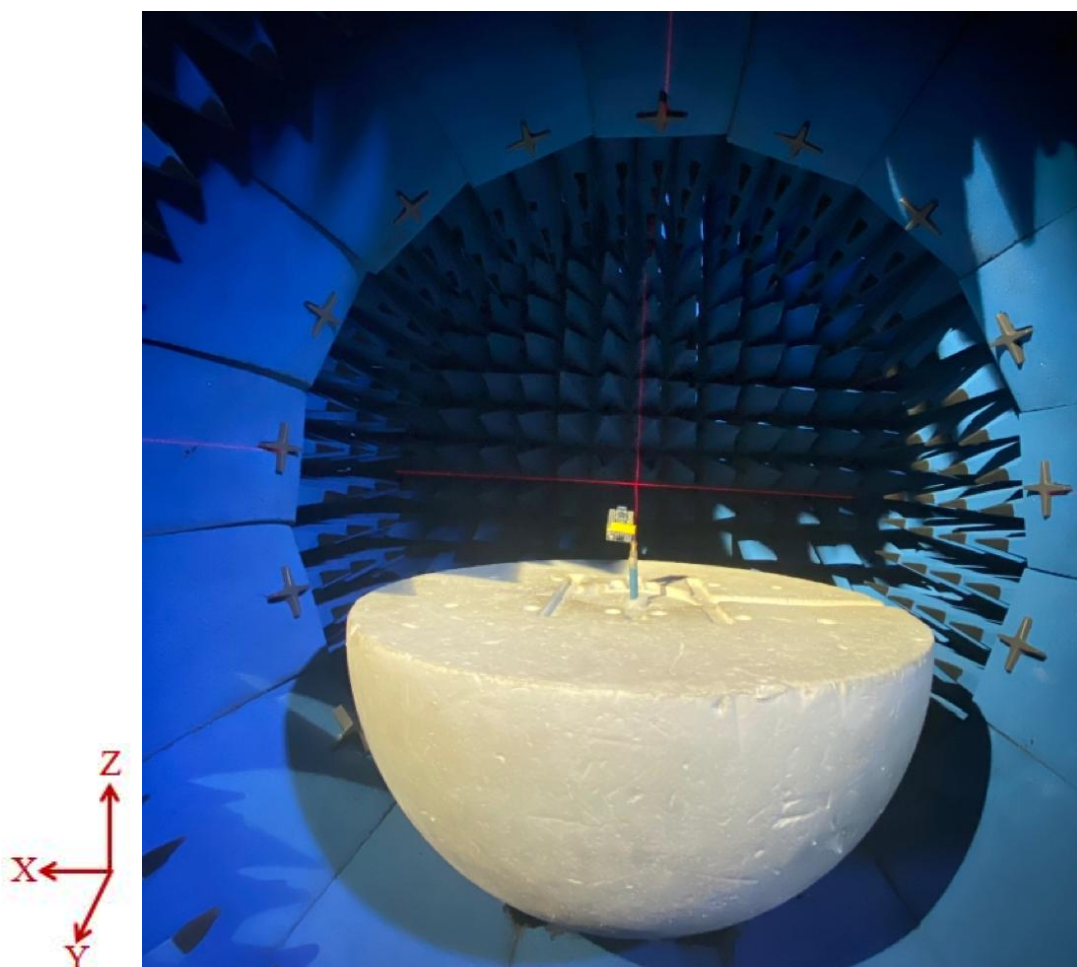


2.4 DUT setup photo of free space OTA testing

RF-BM-BG22A1 Planform



RF-BM-BG22A1 Front view



3. Test Results

3.1 Test standard

Name	Parameter	Method	Standard no.
Mobile communication antenna	VSWR	Generic specification for antennas used in the mobile communications	GB/T 9410-2008
	Antenna gain		
	Radiation pattern		
Antenna	Radiation efficiency	IEEE Standard Test Procedures for Antennas	ANSI/IEEE Std 149-1979
	Gain and directivity		

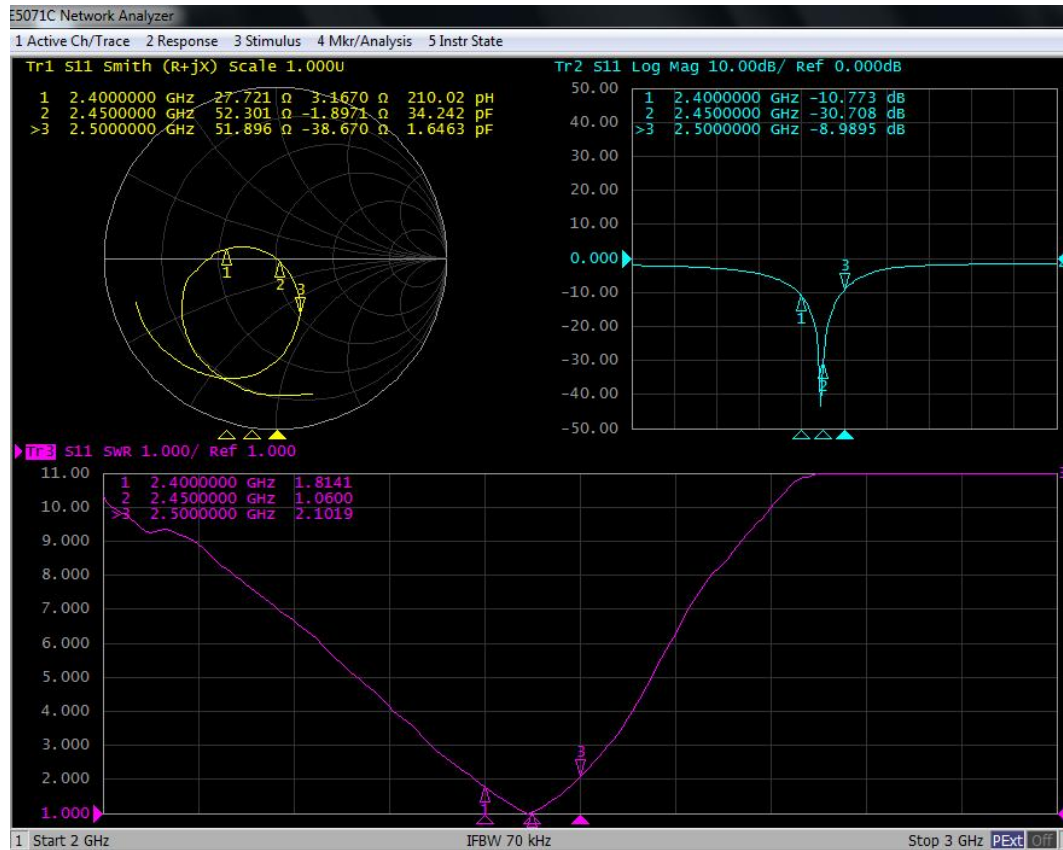
3.2 Test uncertainty

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
VSWR	± 0.3
Antenna gain	$\pm 1\text{dB}$
Radiation efficiency	$\pm 10\%$

3.3 RF-BM-BG22A1 Test data

3.3.1 S11 parameters



3.3.2 S11 test data

Frequency/MHz	2400	2450	2500
VSWR	1.8141	1.0600	2.1019

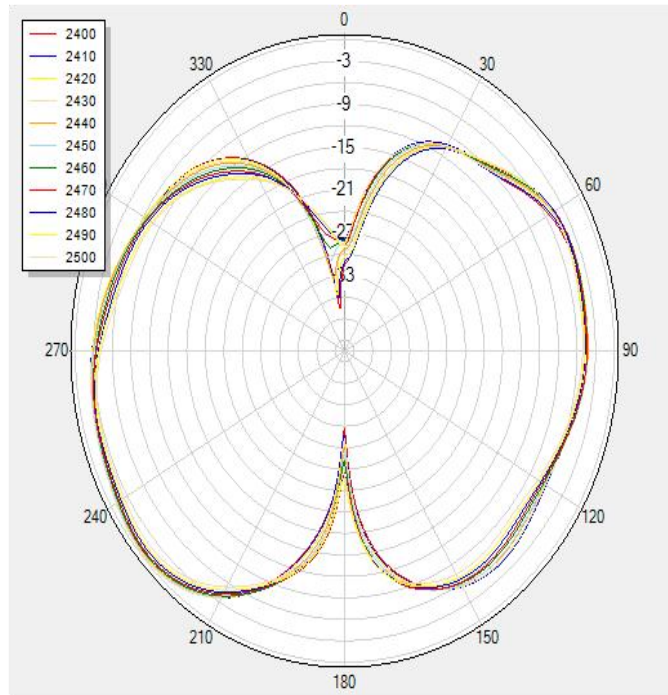
3.3.3 Typical free space efficiency and gain

Frequency/MHz	2400	2410	2420	2430	2440	2450	2460	2470	2480	2490	2500
Peak Gain/dBi	-0.3	-0.02	-0.15	-0.02	-0.33	-0.35	-0.65	-0.82	-1.2	-1.39	-1.91
Efficiency/%	36.36	37.13	36.81	36.78	35.52	35.35	33.89	32.78	30.81	29.08	26.88

3.3.4 Typical free space radiation pattern

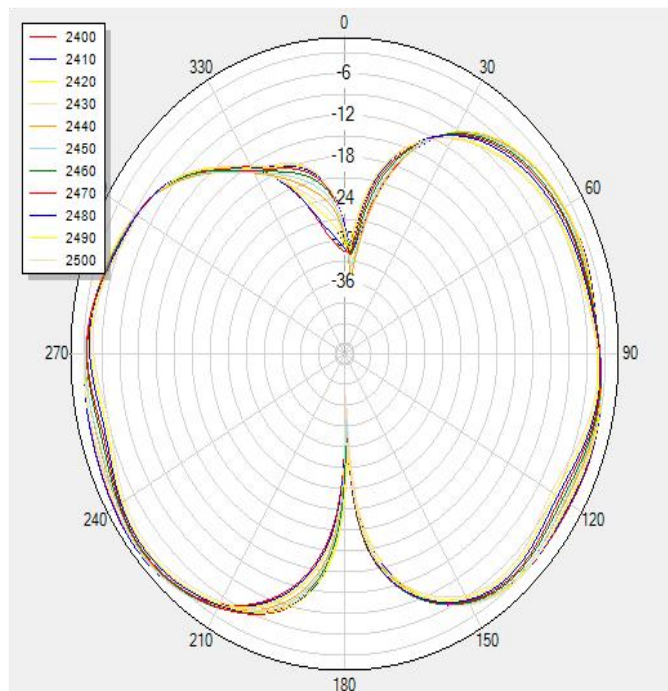
(1) X-Z Plane:

V Phi=0



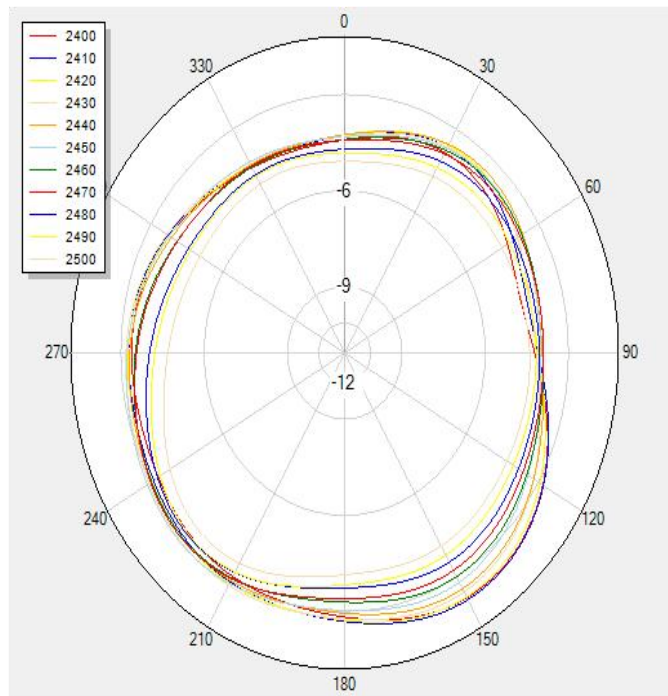
(2) Y-Z Plane:

V Phi=90

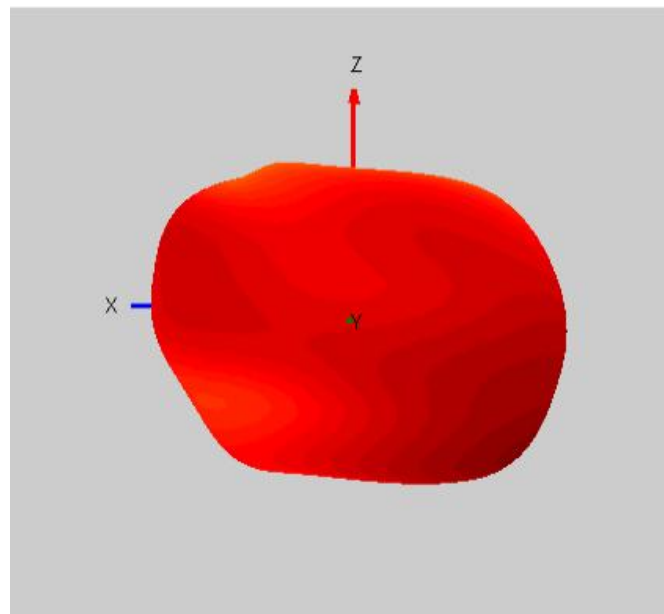


(3) X-Y Plane:

H Theta=90



(4) Typical Free Space 3D Radiation Pattern at 2.45GHz:



End

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