Testing Report

Customer Name: Robosen Robotics（ShenZhen）Co.,Ltd

Product Name: PCB antenna

Sample Model: /

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

Issue Date: 2021.8.9

Engineer:	Amanda	Date:	2021.8.9
Auditor:	Eason	Date:	2021.8.9
Approver:	Aaron	Date:	2021.8.9

ShenZhen RFI-LAB Communication Technology Co.,Ltd RFI-LAB

QP030-E11

Version

Version No.	Date	Description	Formulate	Approval
A0	2021.8.9	For the first time, formulate	Amanda	Eason

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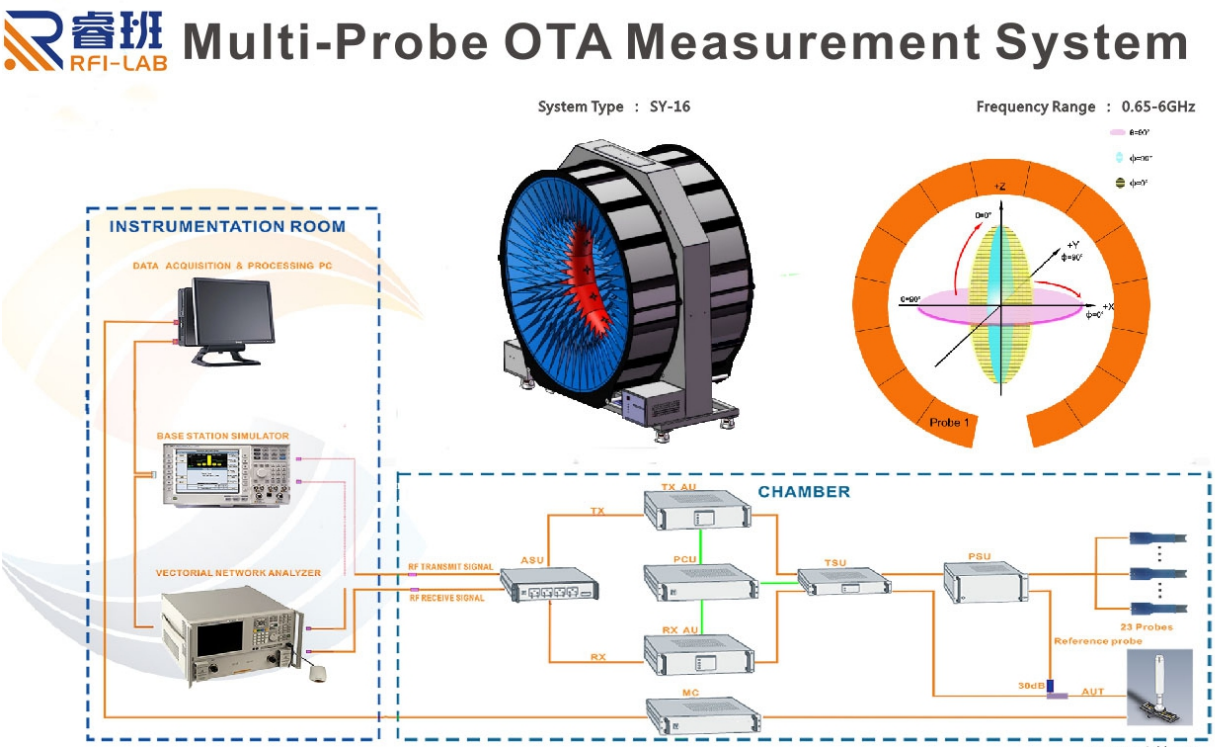
1.General Information

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	13798473001
E-mail	lait@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



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	2021.5.14	2022.5.13
Network Analyzer	E5071C	RFI-LAB-RF-C02	KEYSIGHT	2021.5.14	2022.5.13

1.4 Test environment

Temperature	24.5℃
Humidity	56%RH
Pressure	100.06kPa

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	Robosen Robotics（ShenZhen）Co.,Ltd
Address	509, Building 6, Shenzhen Bay Science and Technology Ecological Park, No. 6, Gaoxin Nanjiu Road, Gaoxin Community, Yuehai Street, Nanshan District, Shenzhen
Contacts	/
Tel	/
E-mail	/

2.2 Description of EUT(S)

Product Name	PCB antenna
Sample Model	/
Size	Antenna: 15mm*5mm
Serial No.	/
Test Item	VSWR; Impedance; Return Loss; Gain; Efficiency; Radiation pattern
Frequency Range	2400MHz-2500MHz
Received Date	2021.8.5
Test Date	2021.8.9
Remark	The length of the RF cable is 50mm

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		
	Impedance		

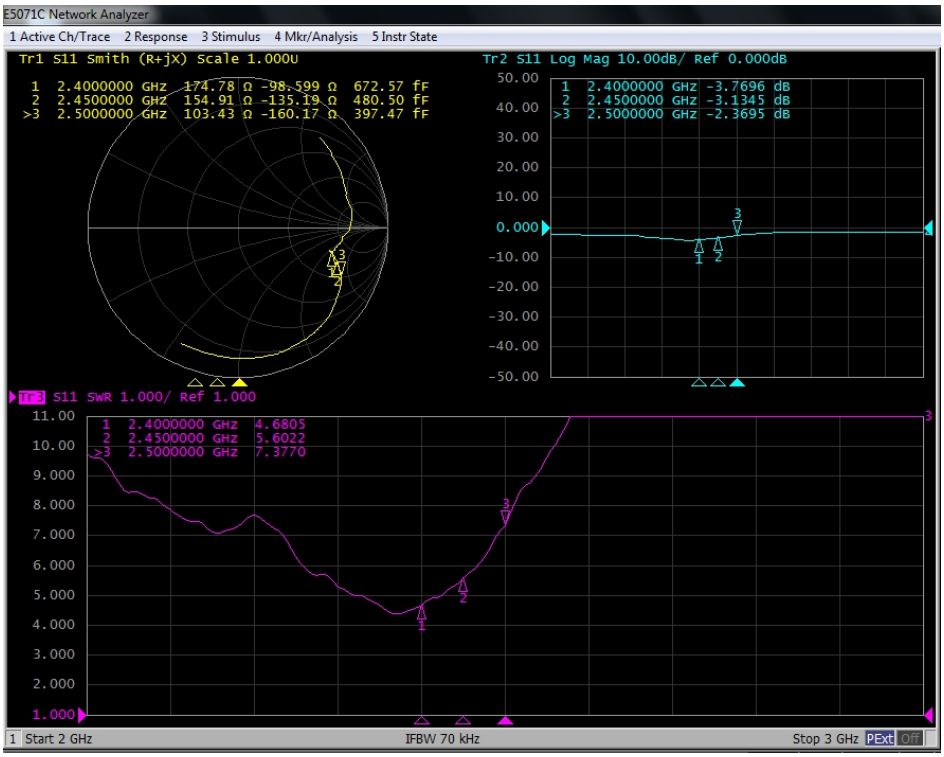
3.2 Test uncertainty

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	±1dB
Radiation efficiency	±10%

3.3 Test data

3.3.1 S11 parameters



3.3.2 S11 test data

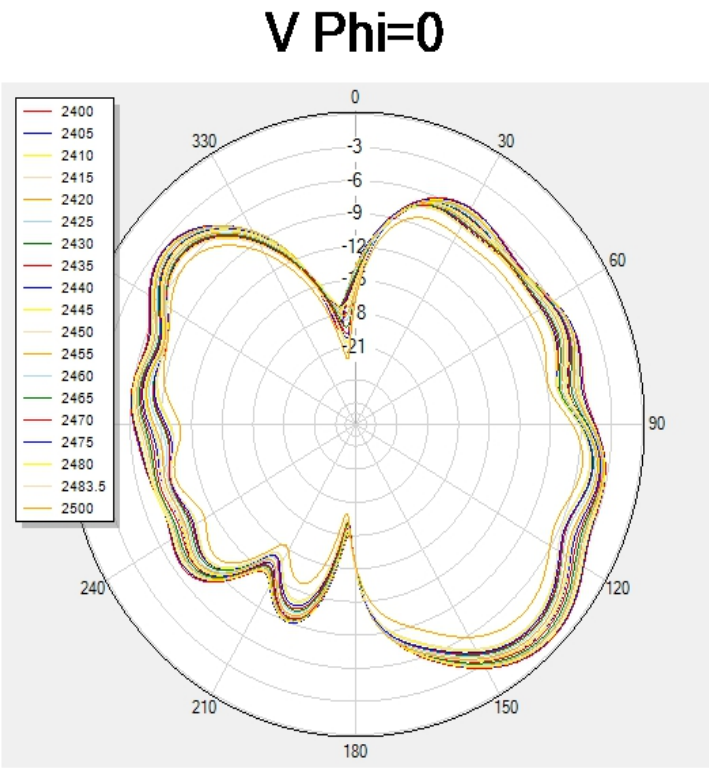
Frequency/MHz	2400	2450	2500
VSWR	4.6805	5.6022	7.3770

3.3.3 Typical free space efficiency and gain

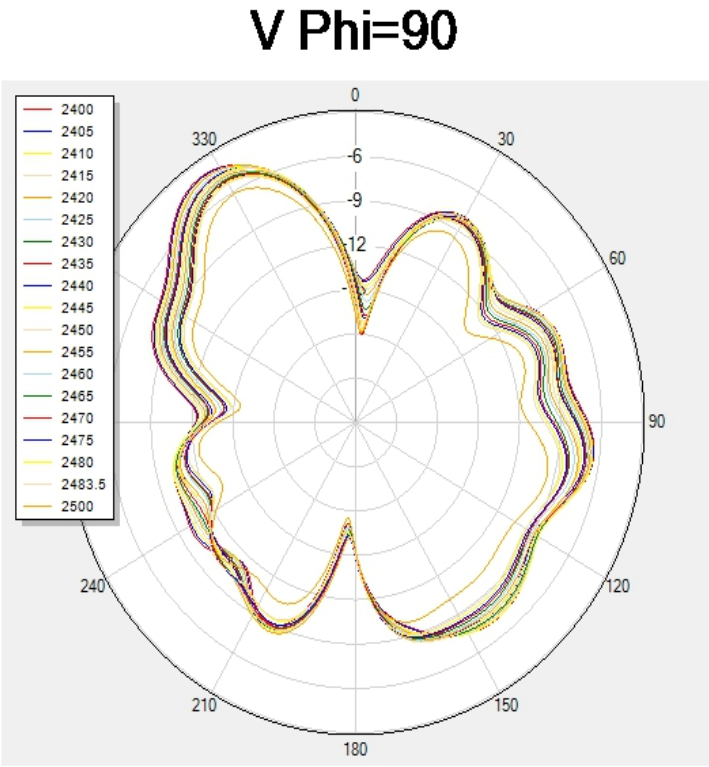
Frequency/MHz	2400	2405	2410	2415	2420	2425	2430	2435	2440	2445
Peak Gain/dBi	-0.79	-0.87	-0.95	-1.11	-1.28	-1.39	-1.53	-1.76	-1.94	-1.97
Efficiency/%	19.23	18.96	18.66	18.18	17.71	17.23	16.84	16.43	16.04	15.82
Average Gain/dBi	-8.15	-8.2	-8.26	-8.35	-8.44	-8.55	-8.64	-8.72	-8.8	-8.85
Frequency/MHz	2450	2455	2460	2465	2470	2475	2480	2483.5	2500	/
Peak Gain/dBi	-2.06	-2.28	-2.5	-2.68	-2.83	-2.96	-3.12	-3.26	-4.42	
Efficiency/%	15.52	14.93	14.22	13.65	13.31	12.98	12.57	12.24	9.94	
Average Gain/dBi	-8.92	-9.08	-9.28	-9.44	-9.54	-9.65	-9.78	-9.89	-10.81	

3.3.4 Typical free space radiation pattern

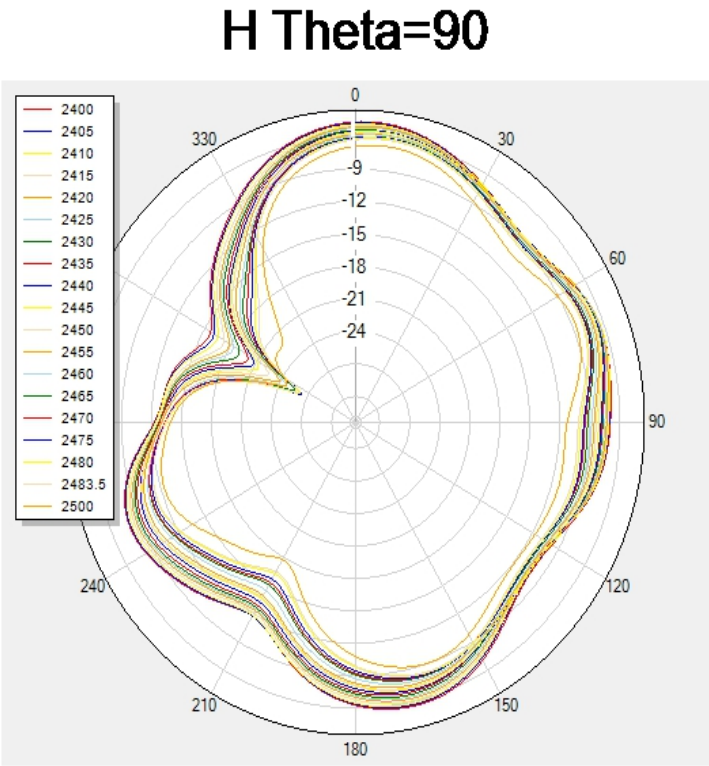
(1) X-Z Plane:



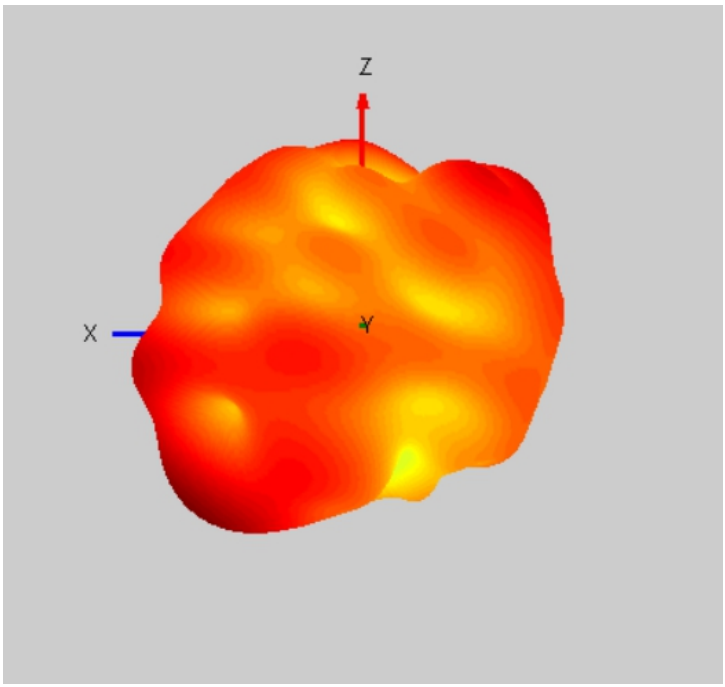
(2) Y-Z Plane:



（3）X-Y Plane:



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



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