

# ANTENNA

# TEST REPORT

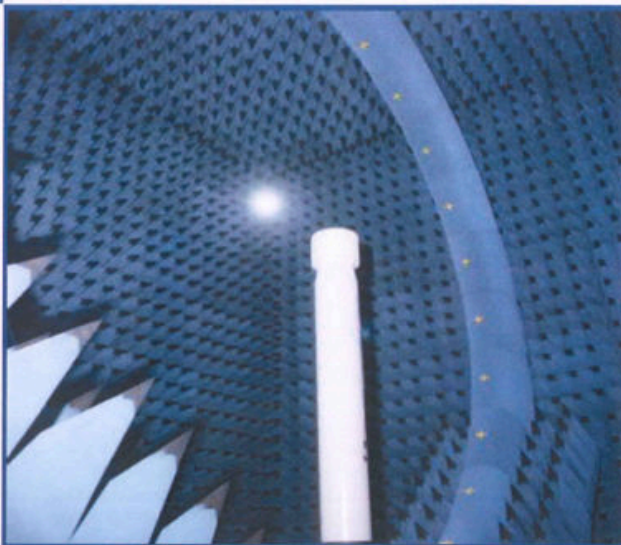
ISSUED BY  
Shenzhen BALUN Technology Co., Ltd.



FOR  
**mouse module**

ISSUED TO  
SHENZH BOYCHUANG TECHNOLOGY CO., LTD

Room 407-408, skyworth semiconductor building, no.18, gaixin south  
4th road, nanshan district, shenzhen



Tested by: *Zong Liyao*  
Zong Liyao  
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Date *Sep. 27, 2019*

Approved by: *Wei Yanquan*  
Wei Yanquan  
(Chief Engineer)

Date *Sep. 27, 2019*

Report No: BL-SZ1998167-901  
EUT Name: mouse module  
Model Name: HS6210  
Brand Name: N/A  
Test Standard: IEEE149-1979  
Maximum: Gain: -4.62 (dBi)  
Efficiency: 11%

Test Date: Sep. 20, 2019  
Date of Issue: Sep. 27, 2019

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**Revision History**

| <u>Version</u> | <u>Issue Date</u>    | <u>Revisions</u>     |
|----------------|----------------------|----------------------|
| <u>Rev. 01</u> | <u>Sep. 27, 2019</u> | <u>Initial Issue</u> |

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## 1 Administrative Data (GENERAL INFORMATION)

### 1.1 Identification of the Testing Laboratory

|              |                                                                                                                                 |
|--------------|---------------------------------------------------------------------------------------------------------------------------------|
| Company Name | Shenzhen BALUN Technology Co., Ltd.                                                                                             |
| Address      | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Phone Number | +86 755 6685 0100                                                                                                               |

### 1.2 Identification of the Responsible Testing Location

|                           |                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Location             | Shenzhen BALUN Technology Co., Ltd.                                                                                                                                                                                                                                                                                                                         |
| Address                   | Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China                                                                                                                                                                                                                             |
| Accreditation Certificate | The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.<br>The laboratory is a testing organization accredited by China Metrology Accreditation (CMA). The accreditation certificate number is 2017192290Z. |
| Description               | All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055                                                                                                                                         |

### 1.3 Laboratory Condition

|                           |                    |
|---------------------------|--------------------|
| Ambient Temperature       | 19°C to 25°C       |
| Ambient Relative Humidity | 45% to 55%         |
| Ambient Pressure          | 100 kPa to 102 kPa |

### 1.4 Announce

- (1) The test report reference to the report template version v2.2.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

## 2 PRODUCT INFORMATION

### 2.1 Applicant Information

|                  |                                                                                                         |
|------------------|---------------------------------------------------------------------------------------------------------|
| Applicant        | SHENZH BOYCHUANG TECHNOLOGY CO., LTD                                                                    |
| Address          | Room 407-408, skyworth semiconductor building, no.18, gaoxin south 4th road, nanshan district, shenzhen |
| Contact Person   | QIAN.YI                                                                                                 |
| Telephone Number | 13612864217                                                                                             |
| E-mail Address   | qian.yi@huntersun.com.cn                                                                                |

### 2.2 Manufacturer Information

|              |                                                                                                         |
|--------------|---------------------------------------------------------------------------------------------------------|
| Manufacturer | SHENZH BOYCHUANG TECHNOLOGY CO., LTD                                                                    |
| Address      | Room 407-408, skyworth semiconductor building, no.18, gaoxin south 4th road, nanshan district, shenzhen |

### 2.3 Factory Information

|         |     |
|---------|-----|
| Factory | N/A |
| Address | N/A |

### 2.4 General Description for Equipment under Test (EUT)

|                       |              |
|-----------------------|--------------|
| EUT Name              | mouse module |
| Model Name Under Test | HS6210       |
| Antenna Type          | PCB Antenna  |
| Dimensions            | 12mm * 6mm   |

### 2.5 Ancillary Equipment

Note: Not applicable.

### 2.6 Technical Information

|                  |                           |
|------------------|---------------------------|
| Frequency Range  | 2402MHz ~ 2480MHz         |
| Test Frequencies | 2402MHz, 2441MHz, 2480MHz |

### 3 SUMMARY OF TEST RESULTS

#### 3.1 Test Standards

| No. | Identity     | Document Title                             |
|-----|--------------|--------------------------------------------|
| 1   | IEEE149-1979 | 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        |
|-----------|--------------------|
| VSWR(S11) | $\pm 0.2$          |
| Gain      | $\pm 0.5\text{dB}$ |

## 4 GENERAL TEST CONFIGURATIONS

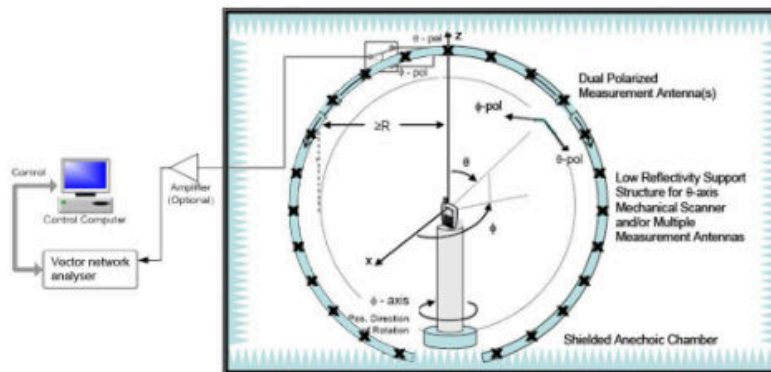
### 4.1 Test Condition

| Environment Parameter                     | Selected Values During Tests |                 |         |                       |
|-------------------------------------------|------------------------------|-----------------|---------|-----------------------|
|                                           | Ambient Pressure(KPa)        | Temperature(°C) | Voltage | Relative Humidity (%) |
| Normal Temperature, Normal Voltage (NTNV) | 100 to 102                   | 19 to 25        | N/A     | 45 to 55              |

### 4.2 Test Equipment List

| Description                                 | Manufacturer | Model  | Serial No.   | Cal. Date  | Cal. Due   |
|---------------------------------------------|--------------|--------|--------------|------------|------------|
| Vector Network Analyzer                     | Agilent      | E5071C | MY46103472   | 2019.02.28 | 2020.02.27 |
| SG24 Multi-probe Antenna Measurement System | SATIMO       | SG24-L | 1101855-0001 | 2018.06.22 | 2020.06.21 |

### 4.3 Test Setup



## ANNEX A TEST RESULTS

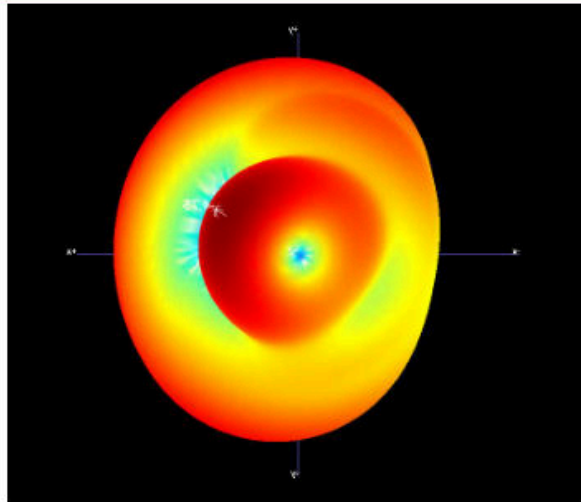
### A.1 Gain and Efficiency

| Frequency | Gain (dBi) | Efficiency (%) |
|-----------|------------|----------------|
| 2402MHz   | -4.75      | 11             |
| 2441MHz   | -5.51      | 11             |
| 2480MHz   | -4.62      | 10             |

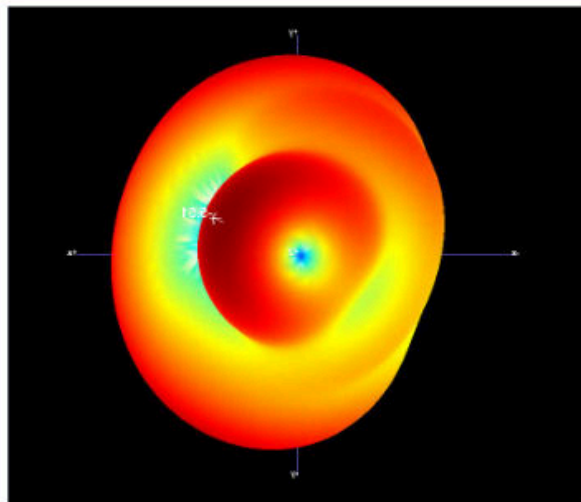
## ANNEX B RADIATION PATTERN

### B.1 3D Pattern

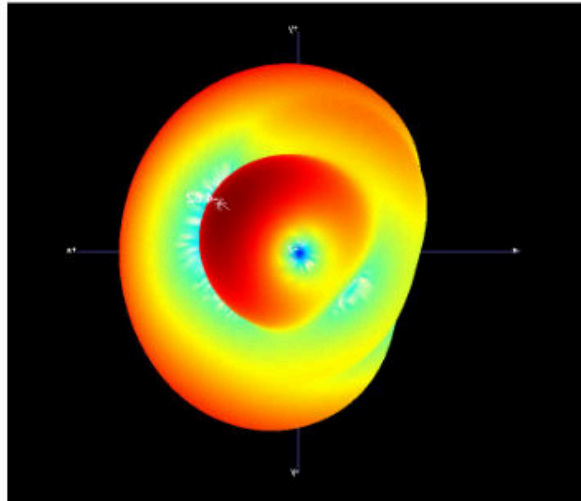
B1.1 3D Pattern for 2402MHz



B1.2 3D Pattern for 2441MHz

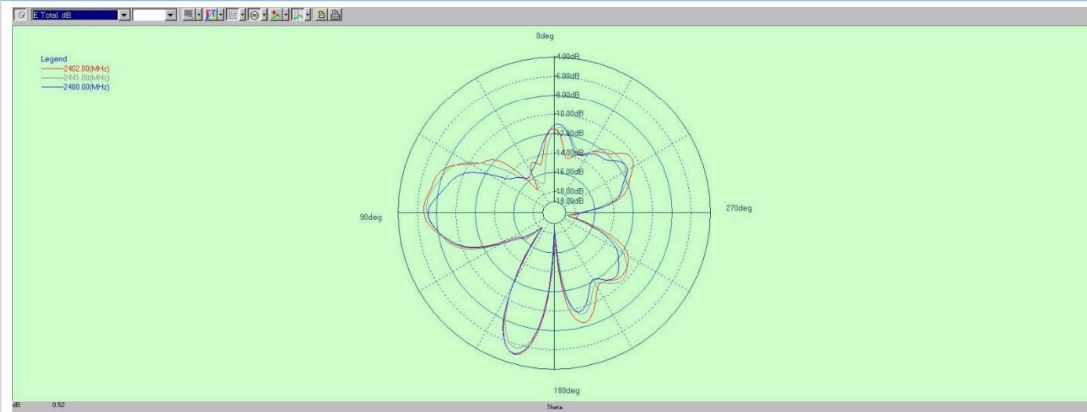


B1.3 3D Pattern for 2480MHz

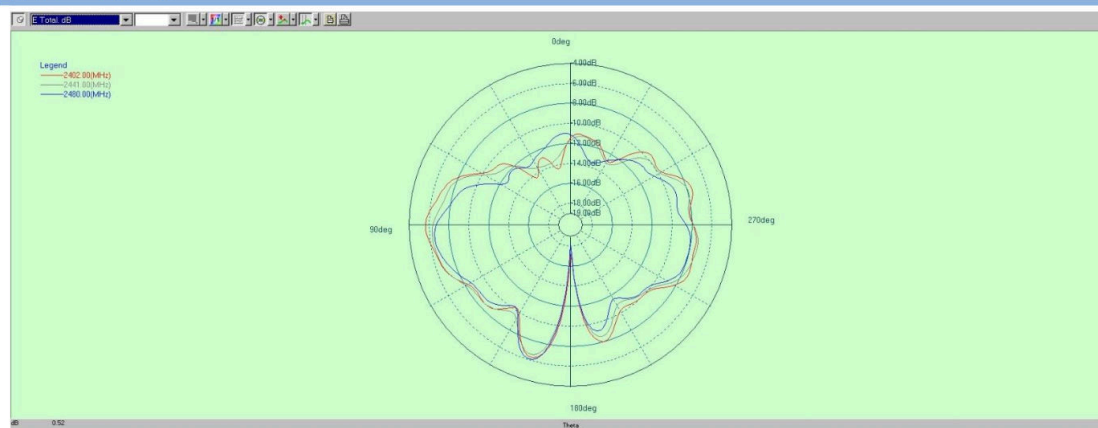


## B.2 1D Radiation Pattern

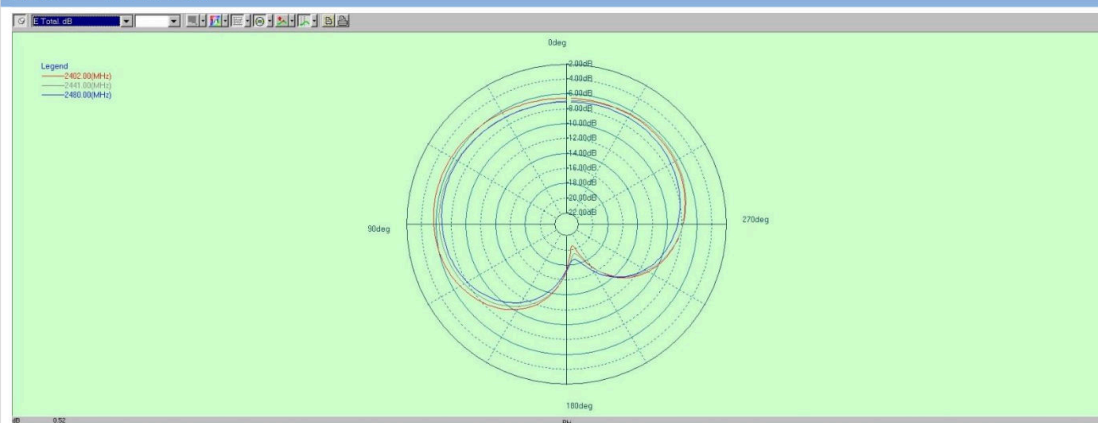
B2.1 PHI=0



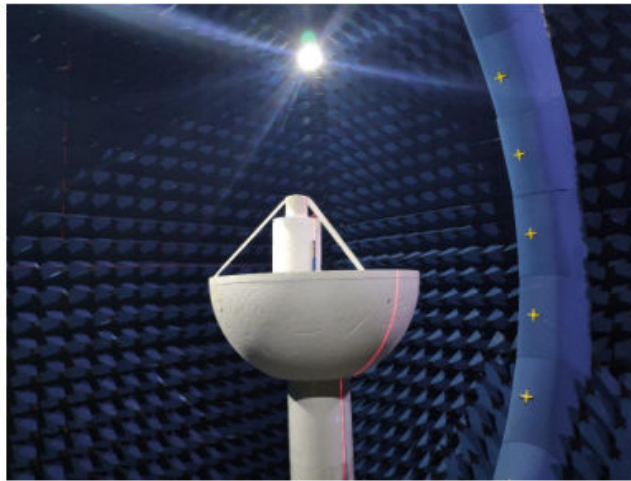
B2.2 PHI=90



B2.3 THETA=90



## ANNEX C TEST SETUP PHOTO



## ANNEX D EUT PHOTO

