Logitech
Antenna Under Test (AUT)
Report

Model Name: SR0197

Equipment Type: Bluetooth speakers

Manufacturer: Logitech Far East LTD.

Test Location: 103 Building 1 Tingwei Industrial Park,No.6, Liufang Road, Zone 67Xingdong,Xin'an Subdistrict,Bao'an District, Shenzhen, Guangdong, China

Tested by: B&T Boantong

Report Date: 2024/05/26

Report Release History

Report version	Description	Date Issued
Macaron Report	Original release	2024/01/12
Macaron Report	Second release	2024/05/26

Table of Contents

1. EUT Antenna Information

1) Antenna Material : Metal Stamping antenna on board

2) Antenna Type : PIFA

3) Antenna Dimension: 13.5 x 6.3x5.8 mm

4) Operating Frequency : 2.4 GHz - 2.4835 GHz

5) Input Impedance : 50 Ω

6) Standing-Wave Ratio : 2:1

7) S-parameter

S11 parameter
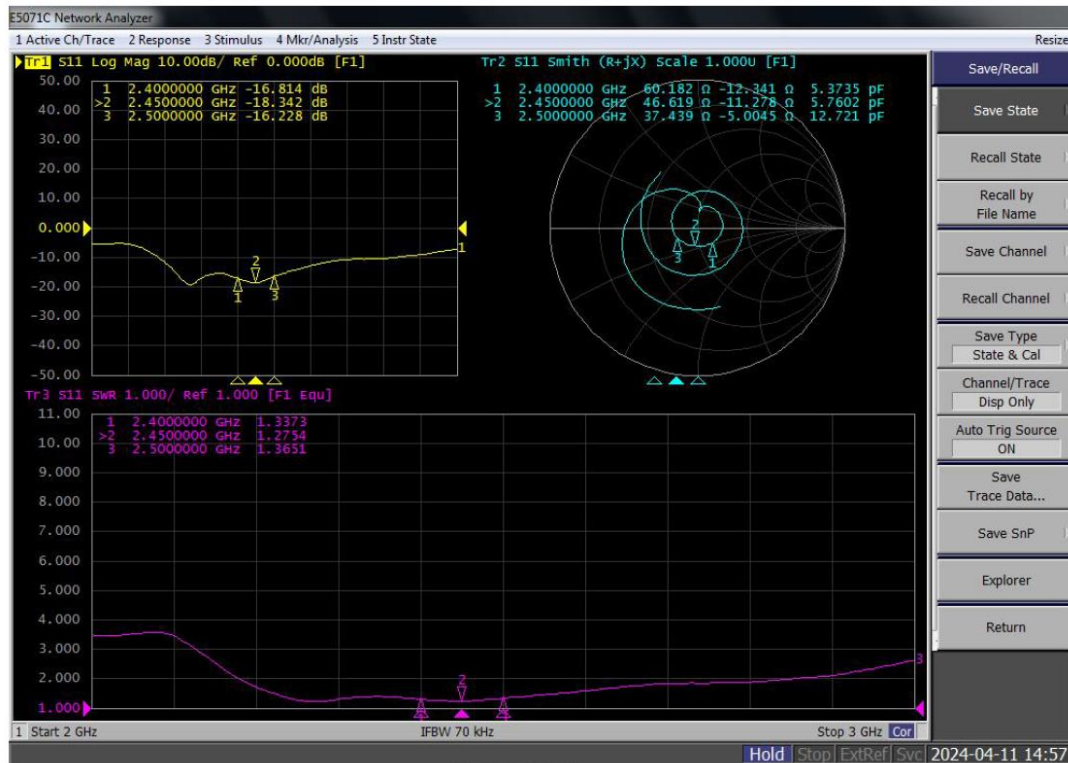
VSWR

Freq/MHz	2400MHz	2450MHz	2500MHz
VSWR	1.3373	1.2754	1.3651

2. Measured Values and Calculation of Antenna Gains
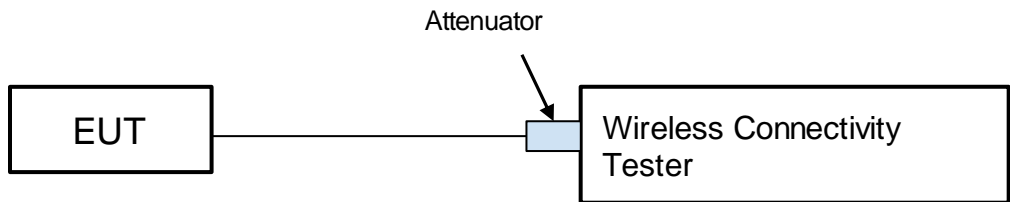
The maximum antenna gain is 0.86

Antenna Peak Gain (dBi) = Max EIRP(dBm) - Conducted Power (dBm)

Frequency	X-Y Plane $\phi=0\sim360°, \theta=90°$		X-Z Plane $\phi=0°, \theta=0\sim360°$		Y-Z Plane $\phi=90°, \theta=0\sim360°$		Max Peak EIRP (dBm)	Conducted Power (dBm)	Antenna Peak Gain (dBi)
	Ver. Peak EIRP (dBm)	Hori. Peak EIRP (dBm)	Ver. Peak EIRP (dBm)	Hori. Peak EIRP (dBm)	Ver. Peak EIRP (dBm)	Hori. Peak EIRP (dBm)			
2402	3.60	8.22	9.13	4.93	2.19	10.63	10.63	9.77	0.86
2440	4.38	8.36	9.51	4.61	3.94	10.41	10.41	9.80	0.61
2480	4.44	8.46	8.86	4.08	4.12	9.97	9.97	9.74	0.23

3. Conducted Power Measurement

3.1 Test Setup

Attenuator

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┌─────────┐                    ┌──────────────────────┐
│         │            ▣       │ Wireless Connectivity │
│   EUT   │────────────────────│ Tester                │
│         │                    │                       │
└─────────┘                    └──────────────────────┘
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3.2 Test Instruments

Description	Model No.	Serial No.	Last Calibration
Wireless Connectivity Tester	CMW270	102209	2024.5.12

Note: The calibration interval of the above test instruments is __12__ months

3.3 Test Procedure

A spectrum analyzer or Power meter was used to perform output power measurement, setting the detector to average and configuring EUT continuously transmitting power(100% duty cycle).
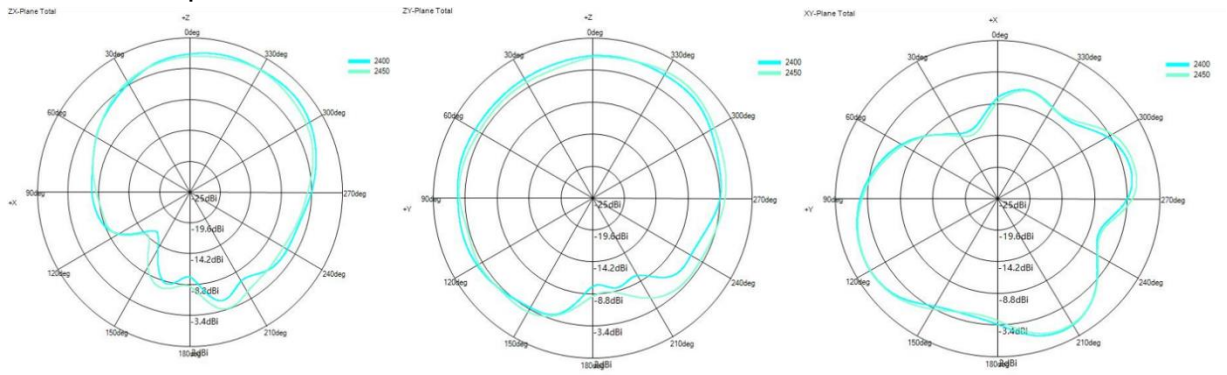
3.4 Test Result of RF conducted Power

Frequency	Conducted Power (dBm)
2402	9.77
2440	9.80
2480	9.74

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4. 2D Radiation Pattern Measurement

4.1 Test Location

2D radiation pattern measurement in the anechoic chamber
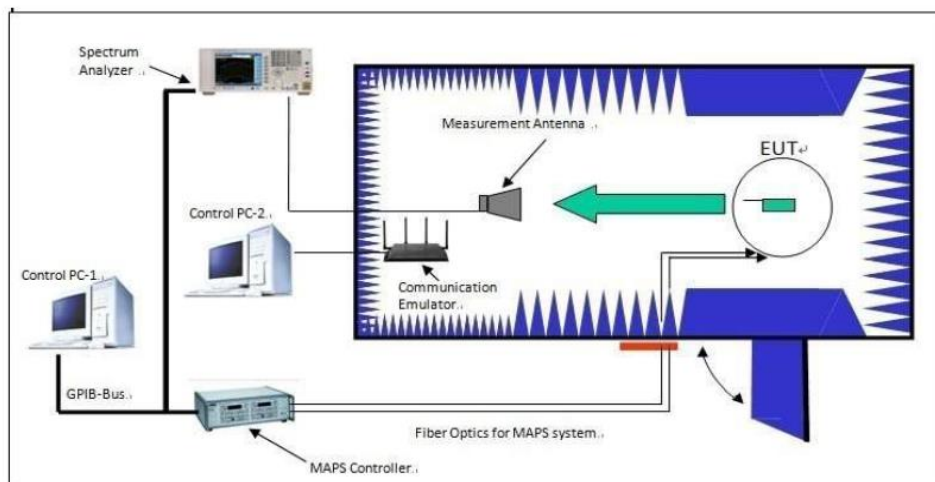

4.2 Description of the anechoic chamber

Length: 5m
Width: 5m
Height: 5m
Turntable height:2.2m
Measurement antenna height:2.3m

4.3 Test Instruments

Description	Model No.	Serial No.	Last Calibration
Software	Libra	V1.2.5	N/A
Chamber	RayZone-5000	CT1012115C6004	2024.3.14
Wireless Connectivity Tester	CMW270	102209	2024.5.11
Network Analyzer	E5071C	MY46418225	2024.5.11

Note: The calibration interval of the above test instruments is 6 months

4.4 Test Procedure

i. Connect the EUT to Spectrum Analyzer and record the power setting of EUT and the measured conducted power.

ii. Fasten the EUT in the center of the turntable, record the coordinates and take pictures.

iii. Configuring EUT continuously transmitting power(100% duty cycle).

iv. Make sure the transmit signal is stable and at the maximum RF power level.

v. Setup the channel power function by spectrum analyzer.

vi. Read the channel power level on the spectrum analyzer and record in the following positions.

    1. The turntable is then stepped between 0 to 360 degrees along the horizontal plane in 15-degree increments.

    2. Data is recorded using the spectrum analyzer for both theta and phi polarizations at each position.

vii. Rotate the EUT with 90 degrees and repeat step f.1 and step f.2 until all 3 planes(X-Y,X-Z,Y-Z) were measured.

viii. According to substitution techniques, a substitution horn antenna is substituted for EUT at the same position and the signal generator exports the CW signal to the substitution antenna via a TX cable. Rotated the turntable and moved the receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a value of spectrum reading equal to "Raw Value" gotten from step vii. Record the power level of S.G.

$$EIRP = P_{SigGen} + G_T - L_C$$

where:

P_{SigGen} = power setting of the signal generator that produces the same received power reading as the DUT, in dBm;
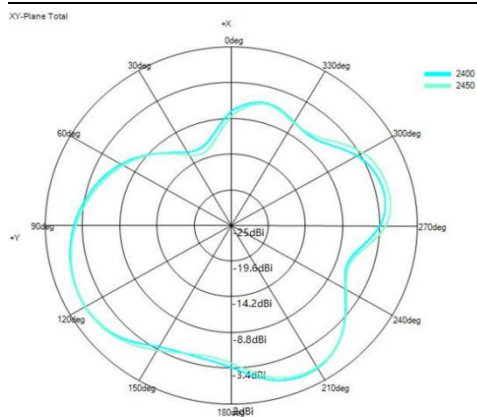
G_T = gain of the substitute antenna, in dBd (ERP) or dBi (EIRP);

L_C = signal loss in the cable connecting the signal generator to the substitute antenna, in dB
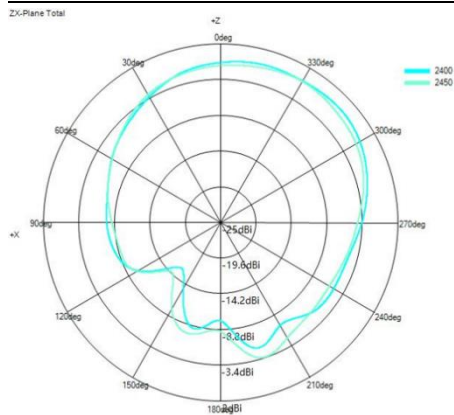
ix. Antenna Peak Gain (dBi) = Max EIRP(dBm) - Conducted Power (dBm)

4.6 2D Pattern Test Plot

X-Y Plane: Horizontal and Vertical

X-Z Plane: Horizontal and Vertical

Y-Z Plane: Horizontal and Vertical

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ZY-Plane Total

2400
2450