Logitech
Antenna Under Test (AUT)
Report

Model Name: A00202

Equipment Type: Wireless Headset

Manufacturer: Logitech Far East LTD.

Test Location: Logitech Inc, 3930 N First St, San Jose, CA 95134 USA

Tested by: Nikhil Nilakantan

Report Date: 02-28-2025

Report Release History

Report version	Description	Date Issued
Zircon CR AUT Report	Original release	2025/02/28

Table of Contents

1. EUT Antenna Information

1) Antenna Material : PCB on board, stamped sheet metal on board

2) Antenna Type : Monopole

3) Antenna Dimension: 8.24 x 8.66 mm, 15.44 x 6.07mm, 21.5 x 9mm

4) Operating Frequency : 2.4 GHz - 2.4835 GHz

5) Input Impedance : 50 Ω

6) Standing-Wave Ratio : 2:1

2. Measured Values and Calculation of Antenna Gains

Measure peak horizontal/vertical EIRP on each x-y, y-z, x-z plane. The highest measured values will be used to calculate the antenna peak gain.

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

	BT Antenna								
	X-Y Plane ϕ=0~360º, θ=90º		X-Z Plane ϕ=0º, θ=0~360º		Y-Z Plane ϕ=90º, θ=0~360º		Max Peak EIRP (dBm)	Conducted Power (dBm)	Antenna Peak Gain (dBi)
Frequency	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	-3.80	-2.64	-1.56	-1.79	-5.85	-3.34	4.75	3.02	1.73
2440	-5.33	-2.82	-2.04	-2.26	-7.52	-5.35	4.29	3.08	1.21
2480	-6	-3.86	-3.12	-3.39	-6.10	-6.69	3.82	3.19	0.63

|	HMB Ant 0					
Frequency	X-Y Plane ϕ=0~360º, θ=90º	X-Z Plane ϕ=0º, θ=0~360º	Y-Z Plane ϕ=90º, θ=0~360º	Max Peak EIRP		Antenna Peak

Frequency	Ver. Peak EIRP (dBm)	Hori. Peak EIRP (dBm)	Ver. Peak EIRP (dBm)	Hori. Peak EIRP (dBm)	Ver. Peak EIRP (dBm)	Hori. Peak EIRP (dBm)	(dBm)	Conducted Power (dBm)	Gain (dBi)
2402	-10.11	-21.29	-11.28	-7.60	-12.83	-6.31	-0.41	2.89	-3.3
2440	-9.49	-18.73	-12.52	-8	-9.51	-3.79	0.16	3.28	-3.12
2480	-8.54	-19.58	-10.69	-5.56	-8.14	-3.68	1.27	3.3	-2.03

HMB Ant 1									
Frequency	X-Y Plane ϕ=0~360º, θ=90º		X-Z Plane ϕ=0º, θ=0~360º		Y-Z Plane ϕ=90º, θ=0~360º		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	-12.50	-17.03	-13.78	-10.42	-13.08	-3.63	-1.56	2.4	-3.96
2440	-12.64	-16.63	-14.79	-10.29	-12.32	-3.89	0.39	2.92	-2.53
2480	-8.19	-19.18	-10.18	-5.20	-7.94	-4.89	2.4	3.07	-0.67

Test Date: 03-05-2025

3. Conducted Power Measurement

3.1 Test Setup

Attenuator
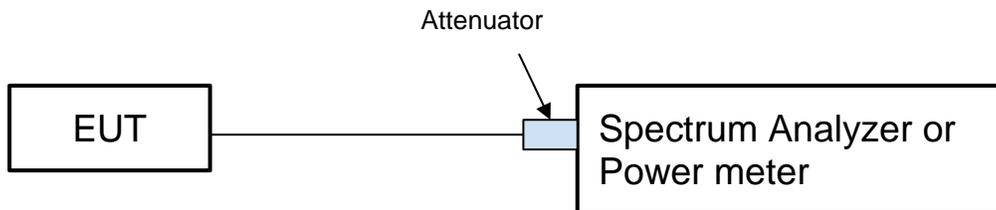
3.2 Test Instruments

Example(all instrument here should have calibration date):

Description	Model No.	Serial No.	Last Calibration
Spectrum Analyzer Keysight	E5071C	MY46102197	27th August 2024
RF signal cable	Molex	0897611670 (Model)	N/A

Note: The calibration interval of the above test instruments is 24 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

Bluetooth	
Frequency	**Conducted Power (dBm)**
2402	3.02
2440	3.08
2480	3.19

HMB Ant 0	
Frequency	**Conducted Power (dBm)**
2402	2.89
2440	3.28
2480	3.3

HMB Ant 1	
Frequency	**Conducted Power (dBm)**
2402	2.4
2440	2.92
2480	3.07

Test Date: 03-04-2025

4. 3D Radiation Pattern Measurement

4.1 Test Location

3D radiation pattern measurement in the anechoic chamber

4.2 Description of the anechoic chamber

Length: 100"
Width: 100"
Height: 107"
Turntable height: 30"
Measurement antenna height: 36"

4.3 Test Instruments

Description	Model No.	Serial No.	Last Calibration
Spectrum Analyzer Keysight	E4402B	Y45115804	Jun-24
Horn Antenna ETS	N/A	N/A	N/A
RF signal cable			

	Unknown (part of the MVG system)		
Software	Wave Studio	24.4.0	
Antenna Tower	N/A	N/A	N/A
Turntable	MVG Starlab		Nov 24
Controller	MVG Starlab		Nov 24
Chamber	MVG Starlab		Nov 24
Splitters/Combiners	MVG Starlab		Nov 24
			Nov 24

Note: The calibration interval of the above test instruments is 24 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;

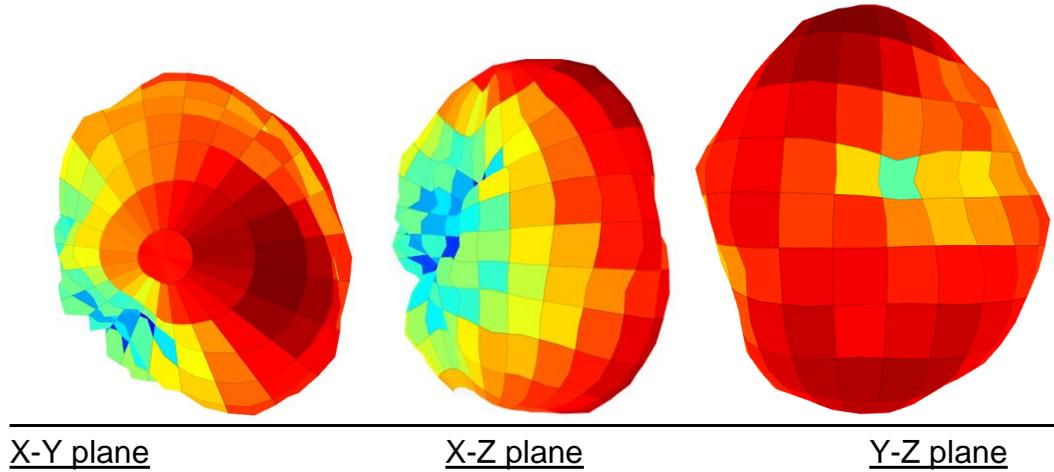G_T = gain of the substitute antenna, in dBd (ERP) or dBi (EIRP);

L_C = signal loss in the cable connecting the signal generator to the substitute antenna, in dB

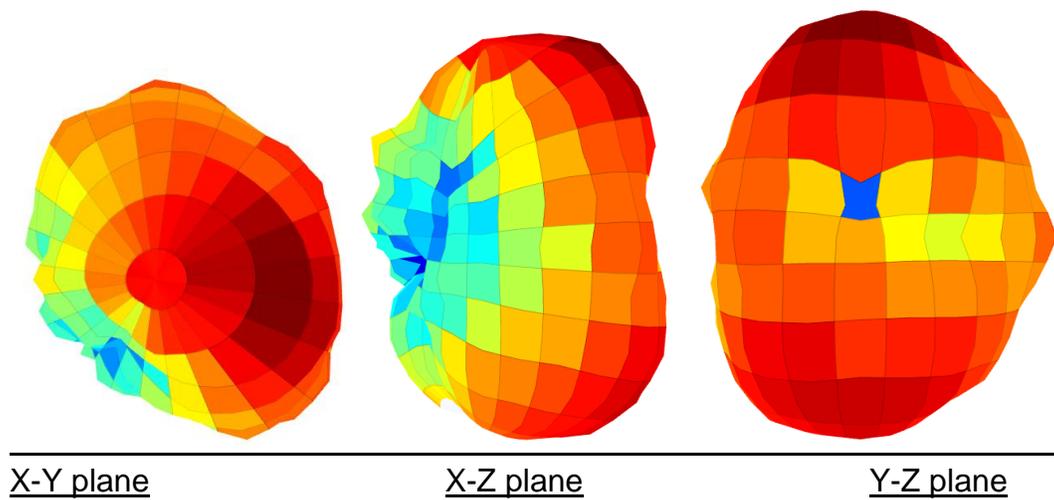ix. Antenna Peak Gain (dBi) = Max EIRP(dBm) - Conducted Power (dBm)
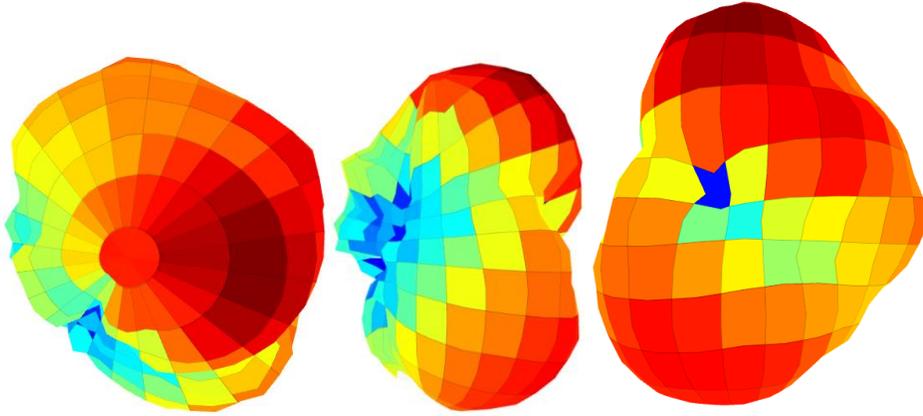
4.6 3D Pattern Test Plot

BT ANTENNA:

2402MHz:

X-Y plane   X-Z plane   Y-Z plane

2440MHz:

X-Y plane   X-Z plane   Y-Z plane

2480MHz:
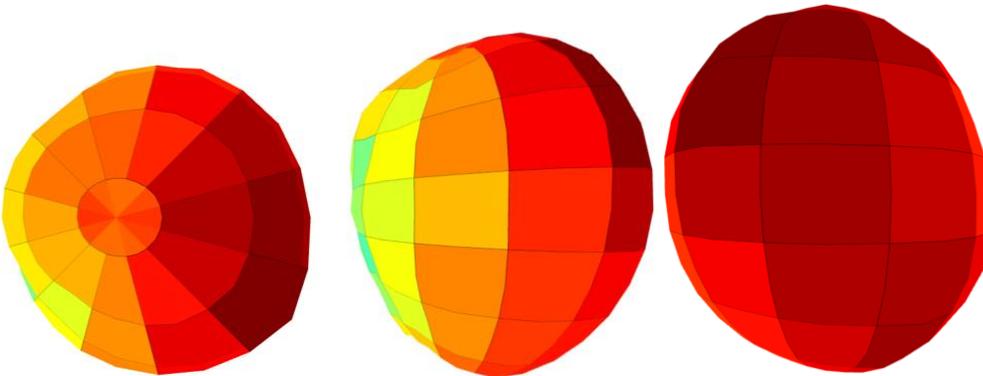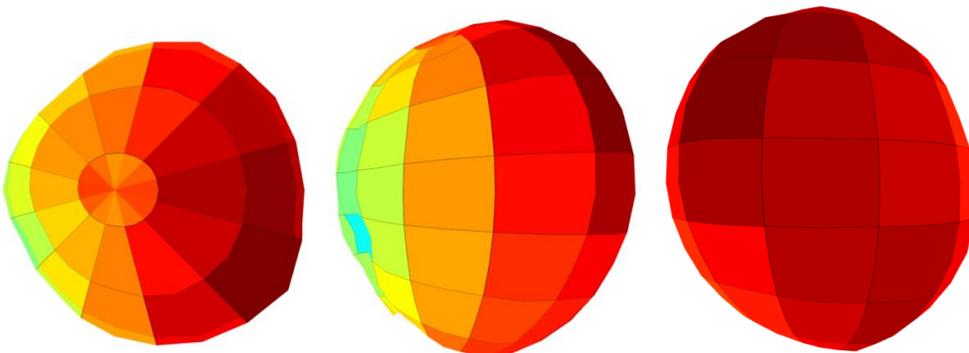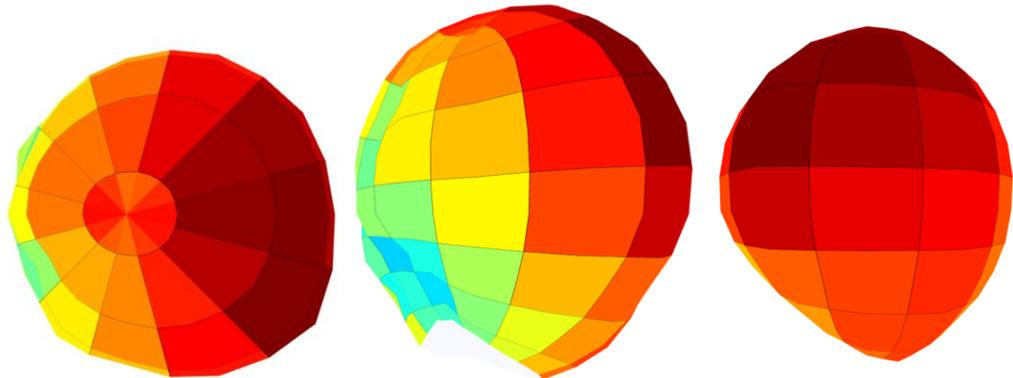

X-Y plane   X-Z plane   Y-Z plane

HMB ANTENNA 0:
2400MHz:

X-Y plane   X-Z plane   Y-Z plane

2440MHz:

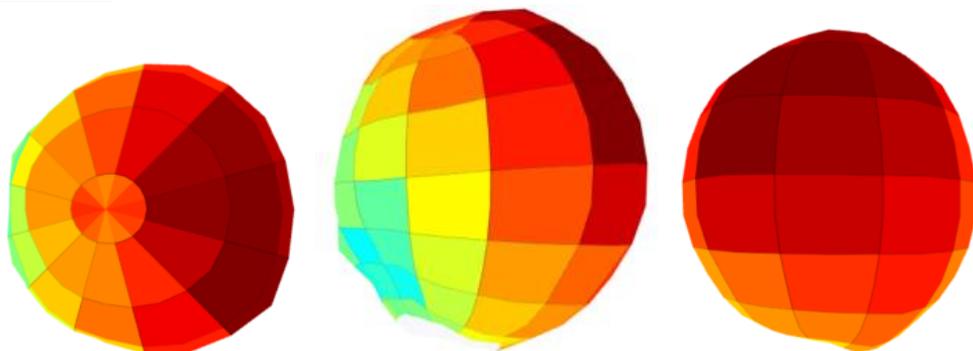

X-Y plane   X-Z plane   Y-Z plane

2480MHz:

X-Y plane   X-Z plane   Y-Z plane

HMB ANTENNA 1:

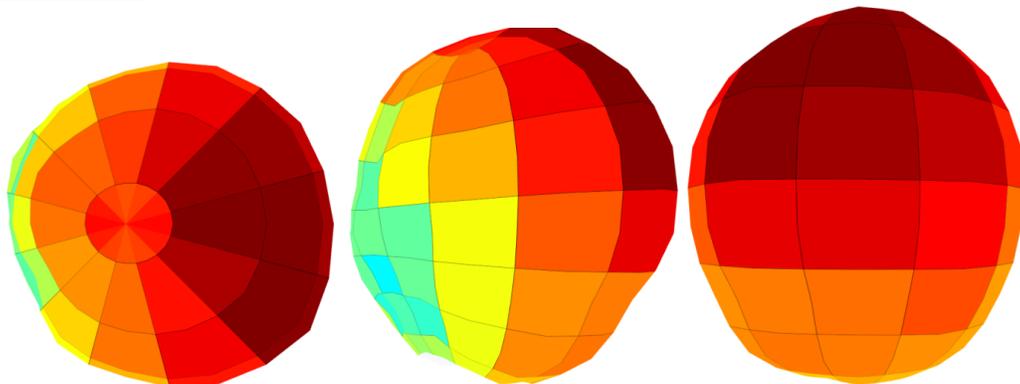2400MHz:

X-Y plane   X-Z plane   Y-Z plane

2440MHz:

X-Y plane   X-Z plane   Y-Z plane

2480MHz:

| X-Y plane | X-Z plane | Y-Z plane |