

Logitech

Antenna Under Test (AUT)

Report

Model Name: MR0109

Equipment Type: Non-rechargeable wireless gaming mouse

Manufacturer: Logitech Far East LTD.

Test Location: Daniel Borel Innovation Center, 1015 Lausanne, EPFL -
Innovation Park

Tested Personnel: Christian Castellaro

Report Date: November 9, 2023

Report Release History

Report version	Description	Date Issued
V1.0	Original release	2023/11/09

Table of Contents

1. EUT Antenna Information	3
2. Measured Values and Calculation of Antenna Gains	3
3. Conducted Power Measurement	4
3.1 Test Setup	4
3.2 Test Instruments	4
3.3 Test Procedure	4
3.4 Test Result of RF conducted Power	5
4. 2D Radiation Pattern Measurement	6
4.1 Test Location	6
4.2 Description of the anechoic chamber	6
4.3 Test Instruments	6
4.4 Test Procedure	7
4.5 Test Setup photos	8
4.6 2D Pattern Test Plot	9
5. Appendix for Logi internal reference	11

1. EUT Antenna Information

- 1) Antenna Material : Ceramic chip antenna
- 2) Antenna Type : Ceramic chip antenna
- 3) Antenna Dimension: 3.1mm x 1.6 mm
- 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.

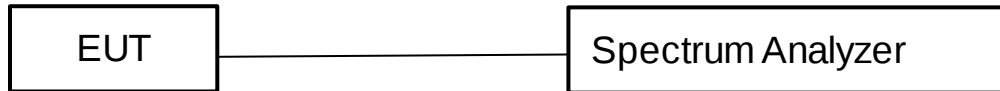
$$\text{Antenna Peak Gain (dBi)} = \text{Max EIRP(dBm)} - \text{Conducted Power (dBm)}$$

Frequency	X-Y Plane $\phi=0\sim360^\circ, \theta=90^\circ$	X-Z Plane $\phi=0^\circ, \theta=0\sim360^\circ$	Y-Z Plane $\phi=90^\circ, \theta=0\sim360^\circ$	Max Peak EIRP (dBm)	Conducted Power (dBm)	Antenna Peak Gain (dBi)
	Starlab composite / total	Starlab composite / total	Starlab composite / total			
2403	4.2	6.2	5.6	6.2	5.81	0.39
2442	4.6	6.2	5.1	6.2	5.71	0.49
2479	3.8	5.7	4.3	5.7	5.61	0.09

Test Date: November 03, 2023

3. Conducted Power Measurement

3.1 Test Setup



3.2 Test Instruments

Description	Model No.	Serial No.	Last Calibration
Spectrum Analyzer Keysight	N9000B	MY57102570	Jul 27, 2023
RF signal cable Woken	Huber+suhner 10844497	276	2023.01.28

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

Frequency	Conducted Power (dBm)
2403	5.81
2442	5.71
2479	5.61

Test Date: November 03, 2023

4. 2D Radiation Pattern Measurement

4.1 Test Location

3D radiation pattern measurement in the anechoic chamber with Starlab equipment, converted to 2D for XY - XZ - YZ planes.

4.2 Description of the anechoic chamber

Starlab : MODEL SL V2_065-18GHz

Serial Number 1102284-0035

Manufacturer MVG INDUSTRIES, SAS

Model SL V2_065-18GHz

4.3 Test Instruments

Description	Model No.	Serial No.	Last Calibration
Spectrum Analyzer Keysight	N9030A	MY54490520	2023/02/03
Antenna Tower/ Turntable	MF-7802	MF780208542	N/A
PSG analog signal generator (from 250 kHz to 50 GHz) Keysight	E8257D	MY53401987	2023/6/14
RF Coaxial Cable	SUCOFLEX104	RF104-215	2023/06/02

Note: The calibration interval of the above test instruments is 12 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. Place DUT on Starlab turntable and perform full 3d radiation pattern measurement
- vi. Export starlab 3D radiation pattern to XY - XZ - YZ planes
- vii. $\text{Antenna Peak Gain (dBi)} = \text{Max EIRP(dBm)} - \text{Conducted Power (dBm)}$

4.5 Test Setup photos

Please see another confidential document

4.6 2D Pattern Test Plot

