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RF Exposure Evaluation Report

Report No.: CQASZ20231001791E-04
Applicant: ZhuoYe ChuangYi Co., Ltd.
Address of Applicant: Room 602-1, Building 6, Shenzhen Bay Eco-Tech Park, Nanshan District, Shenzhen, China
Equipment Under Test (EUT):
EUT Name: GravaStar Mercury M1 Pro Wireless Gaming Mouse
Model No.: GravaStar M1
Test Model No.: GravaStar M1
Brand Name: GravaStar
FCC ID: 2ASXF-M1
Standards: 47 CFR Part 1.1307
47 CFR Part 2.1093
KDB447498D01 General RF Exposure Guidance v06
Date of Receipt: 2023-10-08
Date of Test: 2023-10-08 to 2023-10-26
Date of Issue: 2023-11-09
Test Result: **PASS***

*In the configuration tested, the EUT complied with the standards specified above

Tested By: Lewis Zhou
(Lewis Zhou)

Reviewed By: Timo Lei
(Timo Lei)

Approved By: Jack Ai
(Jack Ai)



1 Version

Revision History Of Report

Report No.	Version	Description	Issue Date
CQASZ20231001791E-04	Rev.01	Initial report	2023-11-09

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3 General Information

3.1 Client Information

Applicant:	ZhuoYe ChuangYi Co., Ltd.
Address of Applicant:	Room 602-1, Building 6, Shenzhen Bay Eco-Tech Park, Nanshan District, Shenzhen, China
Manufacturer:	ZhuoYe ChuangYi Co., Ltd.
Address of Manufacturer:	Room 602-1, Building 6, Shenzhen Bay Eco-Tech Park, Nanshan District, Shenzhen, China
Factory:	Dongguan Siliten Electronics Co., Ltd
Address of Factory:	Sijia Yewu Industrial Estate, Shijie Town, Dongguan City, Guangdong, China

3.2 General Description of EUT

Product Name:	GravaStar Mercury M1 Pro Wireless Gaming Mouse
Model No.:	GravaStar M1
Test Model No.:	GravaStar M1
Trade Mark:	GravaStar
Software Version:	V129
Hardware Version:	V0.1
Sample Type:	☐ Mobile ☒ Portable
Operation Frequency:	2403MHz-2480MHz
Channel Numbers:	16
Modulation Type:	GFSK
Antenna Type:	Ceramic antenna
Antenna Gain:	3.8dBi
Power Supply:	Li-ion battery: DC 3.7V 300mAh, Charge by DC 5V for adapter

4 SAR Evaluation

4.1 RF Exposure Compliance Requirement

4.1.1 Standard Requirement

According to KDB447498D01 General RF Exposure Guidance v06

4.3.1. Standalone SAR test exclusion considerations

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Exclusion Threshold condition, listed below, is satisfied.

4.1.2 Limits

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$$\left[\frac{\text{(max. power of channel, including tune-up tolerance, mW)}}{\text{(min. test separation distance, mm)}} \right] \cdot \sqrt{f(\text{GHz})} \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, where}$$

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation¹⁷

The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion

4.1.3 EUT RF Exposure

$$e_{irp} = p_t \times g_t = (E \times d)^2 / 30$$

where:

p_t = transmitter output power in watts,

g_t = numeric gain of the transmitting antenna (unitless),

E = electric field strength in V/m, $10^{((dB\mu V/m)/20)/10^6}$,

d = measurement distance in meters (m)---3m,

$$\text{So } p_t = (E \times d)^2 / 30 / g_t$$

Antenna polarization: Horizontal		
Frequency (MHz)	Level (dBuV/m)	Polarization
2480	90.93	Peak
2480	88.52	Average

Antenna polarization: Vertical		
Frequency (MHz)	Level (dBuV/m)	Polarization
2458	87.35	Peak
2458	83.30	Average

For 2480MHz wireless:

Field strength = 90.93dB μ V/m @3m

Ant. gain 3.8dBi; so Ant numeric gain=2.4

So $p_t = \{ [10^{(90.93/20)} / 10^6 \times 3]^2 / 30 / 2.4 \} \times 1000 \text{mW} = 0.155 \text{mW}$

So $(0.155 \text{mW} / 5 \text{mm}) \times \sqrt{0.3142 \text{GHz}} = 0.0174$,

0.0174 < 3.0 for 1-g SAR

So the SAR report is not required.