Safety Human Exposure

1.1 Radio Frequency Exposure Compliance

1.1.1 Electromagnetic Fields

RESULT: **Pass**

Test item	:	Remote control (Scroll Wheel)
Identification / Type No.	:	E2490
FCC ID	:	FHO-E2490
IC	:	10912A-E2490
Test standard	:	CFR47 FCC Part 2: Section 2.1093 CFR47 FCC Part 1: Section 1.1310 FCC KDB Publication 447498 D01 V06 RSS-102 Issue 6 December 2023

➢ **Product Classification**

This device defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that the RF source's radiating structure(s) is/are within 20 centimeters of the body of the user.

Max 2.45 dBi

➢ **Radio Frequency Exposure Limit**

For FCC:

a) For 100 MHz to 6 GHz and *test separation distances* ≤ 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following:

[(*max. power of channel, including tune-up tolerance, mW*) / (*min. test separation distance, mm*)] · [$\sqrt{f_{(GHz)}}$] ≤ 3.0 for 1-g SAR, and ≤ 7.5 for 10-g extremity SAR,[30] where

- $f_{(GHz)}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation[31]
- The result is rounded to one decimal place for comparison
- The values 3.0 and 7.5 are referred to as *numeric thresholds* in step b) below

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 according to 4.1 f) is applied to determine SAR test exclusion.

b) For 100 MHz to 6 GHz and *test separation distances* > 50 mm, the 1-g and 10-g *SAR test exclusion thresholds* are determined by the following (also illustrated in Appendix B):[32]

1) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·($f_{(MHz)}$/150)]} mW, for 100 MHz to 1500 MHz

2) {[Power allowed at *numeric threshold* for 50 mm in step a)] + [(test separation distance – 50 mm)·10]} mW, for > 1500 MHz and ≤ 6 GHz

c) For frequencies below 100 MHz, the following may be considered for SAR test exclusion (also illustrated in Appendix C):[33]

1) For *test separation distances* > 50 mm and < 200 mm, the power threshold at the corresponding test separation distance at 100 MHz in step b) is multiplied by [1 + log(100/$f_{(MHz)}$)]

2) For *test separation distances* ≤ 50 mm, the power threshold determined by the equation in c) 1) for 50 mm and 100 MHz is multiplied by ½

3) SAR measurement procedures are not established below 100 MHz.

For IC:

Frequency (MHz)	≤ 5 mm (mW)	10 mm (mW)	15 mm (mW)	20 mm (mW)	25 mm (mW)	30 mm (mW)	35 mm (mW)	40 mm (mW)	45 mm (mW)	> 50 mm (mW)
≤ 300	45	116	139	163	189	216	246	280	319	362
450	32	71	87	104	124	147	175	208	248	296
835	21	32	41	54	72	96	129	172	228	298
1900	6	10	18	33	57	92	138	194	257	323
2450	3	7	16	32	56	89	128	170	209	245
3500	2	6	15	29	50	72	94	114	134	158
5800	1	5	13	23	32	41	54	74	102	128

When the operating frequency of the device is between two frequencies located in above table, linear interpolation shall be applied for the applicable separation distance. If the separation distance of the device is between two distances located in above table, linear interpolation may be applied for the applicable frequency. Alternatively, the limit corresponding to the smaller distance may be employed.

For limb-worn devices where the 10 gram of tissue applies, the exemption limits for routine evaluation in above table are multiplied by a factor of 2.5.

For controlled-use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation in above table are multiplied by a factor of 5.

a) EUT RF Exposure Evaluation standalone operations

FCC

Mode	Frequency [MHz]	*Measured RF Output Power [dBm]	Distance [mm]	Calculate Result [W/kg]	FCC 1g-SAR Limit [W/kg]	FCC 10g-SAR Limit [W/kg]
BLE	2402	3.1	5	0.63	3	7.5
Zigbee	2405	4.6	5	0.89	3	7.5
Thread	2405	4.3	5	0.83	3	7.5

IC

Mode	Frequency [MHz]	*Measured RF Output Power [dBm]	Antenna Gain [dBi]	EIRP [mW]	Distance [cm]	Exemption Limit [mW]
BLE	2402	3.1	2.45	3.59	0.5	8.15
Zigbee	2405	4.6	2.45	5.07	0.5	8.13
Thread	2405	4.3	2.45	4.73	0.5	8.13

Note:

1. BLE RF Output Power: Refer CN24EKHE 001
2. Zigbee Output Power: Refer CN2413YJ 001
3. Thread Output Power: Refer CN24DP76 001
4. BLE, Zigbee and Thread share one RF chip and antenna, so no need to evaluation simultaneous transmission.
5. The product is a hand held device. So, exemption limit multiplied by a factor of 2.5 is applied.

➢ **Conclusion**

The distance between antenna and human is larger than 0.5 cm in the normal use.
Therefore, the maximum calculations result of above are meet the requirement of Radio Frequency Exposure limit.