# RF Exposure Evaluation

## *FCC ID: 2AIWP-EFOILRC*

## 1. Client Information

| | | |
|---|---|---|
| **Applicant** | : | SHENZHEN HOBBYWING TECHNOLOGY CO., LTD. |
| **Address** | : | 101-402.Bldg 4,Yasen Hi-tech Industrial Park, 8 Chengxin Rd.,Baolong Town, Longgang Dist., Shenzhen, China |
| **Manufacturer** | : | SHENZHEN HOBBYWING TECHNOLOGY CO., LTD. |
| **Address** | : | 101-402.Bldg 4,Yasen Hi-tech Industrial Park, 8 Chengxin Rd.,Baolong Town, Longgang Dist., Shenzhen, China |

## 2. General Description of EUT

| | | | |
|---|---|---|---|
| **EUT Name** | : | efoil s1 remote controller | |
| **Model(s) No.** | : | HWERCW-2301 | |
| **Model Different** | : | ---- | |
| **Product Description** | : | Operation Frequency: | 2.4GHz:2404MHz~2480MHz<br>Bluetooth LE5.1: 2402MHz~2480MHz |
| | | Number of Channel: | 2.4G: 71 channels<br>BLE: 40 channels |
| | | Antenna Gain: | 2.12dBi FPC Antenna for 2.4G<br>0dBi PCB Antenna for BLE |
| | | Modulation Type: | GFSK |
| | | Bit Rate of Transmitter: | Bluetooth LE:1/2Mbps |
| **Power Rating** | : | Input: DC 5V | |
| **Li-ion Polymer Battery** | : | 3.7V by 2500mAh Rechargeable Li-ion battery | |
| **Software Version** | : | V1.0 | |
| **Hardware Version** | : | HW7011-YT1-V1.4 | |

**Remark:**
(1) The antenna gain provided by the applicant, the verified for the RF conduction test provided by TOBY test lab.
(2) The above antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

**Note:** More test information about the EUT please refer the RF Test Report.



1 A/F., Building.6, Rundongsheng Industrial Zone, Longzhu, Xixiang, Bao'an, Shenzhen, Guangdong, China
Tel: +86 75526509301 Fax: +86 75526509195

# SAR Test Exclusion Calculations

**1. FCC: According to KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies v06.**

**(1) Clause 4.3: General SAR test reduction and exclusion guidance**

**Sub clause 4.31: Standalone SAR test exclusion considerations**

**1) The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6GHz at test separation distance≤5 mm are determined by:**

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

**[(max. power of channel, including tune-up tolerance, mW)/(min. test separation, mm)]*[ $\sqrt{f_{(GHz)}}$ ] ≤7.5.0 for 10-g SAR**

**2. Summary simultaneous transmission for SAR Exclusion**

**The SAR exemption limits outlined in clause 4.3.2(b) of KDB 447498 have been derived based on an approximate SAR value of 0.4 W/kg using half-wave dipole antennas Footnote 1. As such, when simultaneous transmitter SAR evaluations include transmitters that have been exempt from routine SAR evaluation, the SAR must be estimating based on the ratio between the maximum tune-up tolerance limit of the transmitter that has been exempt and the exemption limit at the specific distance and frequency for that transmitter. This ratio must be multiplied by 0.4 W/kg(2.0 W/kg for controlled use and 1.0 W/kg for limb worn devices) in order to calculate the estimated SAR level.**

**The estimate SAR value is calculated based the following equation:**

**(maximum power level including tune-up tolerance for transmitter A / maximum power level of exemption at the same frequency and distance) * 0.4W/kg**

1) $[(max.\ power\ of\ channel,\ including\ tune\text{-}up\ tolerance,\ mW) / (min.\ test\ separation\ distance,\ mm)] \cdot [\sqrt{f_{(GHz)}}/x]$ W/kg, for *test separation distances* ≤ 50 mm;

where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

2) 0.4 W/kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the *test separation distance* is > 50 mm.[37]

**The [Σ of (the highest measured or estimated SAR for each standalone antenna configuration, adjusted for maximum tune-up tolerance) / 1.6 W/kg] + [Σ of MPE ratios] is ≤ 1.0.**

**The SAR to peak location separation ratios of all simultaneously transmitting antenna pairs operating in portable device exposure conditions are all ≤ 0.04, and the [Σ of MPE ratios] is ≤ 1.0.**

## 3. Calculation:

| Bluetooth LE Mode(1Mbps) | | | | | | |
|---|---|---|---|---|---|---|
| Frequency (GHz) | Conducted Power (dBm) | Turn-up Power Tolerance (dB) | Max power of tune up tolerance (dBm) | Max power of tune up tolerance (mw) | Calculation Value | Threshold Value |
| 2.402 | -2.184 | -2±1 | -1 | 0.794 | 0.246 | **3.0** |
| 2.440 | -2.236 | -2±1 | -1 | 0.794 | 0.248 | **3.0** |
| 2.480 | -2.527 | -3±1 | -2 | 0.631 | 0.199 | **3.0** |
| **Bluetooth LE Mode(2Mbps)** | | | | | | |
| **Frequency (GHz)** | **Conducted Power (dBm)** | **Turn-up Power Tolerance (dB)** | **Max power of tune up tolerance (dBm)** | **Max power of tune up tolerance (mw)** | **Calculation Value** | **Threshold Value** |
| 2.402 | -2.093 | -2±1 | -1 | 0.794 | 0.246 | **3.0** |
| 2.440 | -1.918 | -2±1 | -1 | 0.794 | 0.248 | **3.0** |
| 2.480 | -2.469 | -2±1 | -1 | 0.794 | 0.250 | **3.0** |
| **2.4GHz** | | | | | | |
| **Frequency (GHz)** | **Conducted Power (dBm)** | **Turn-up Power Tolerance (dB)** | **Max power of tune up tolerance (dBm)** | **Max power of tune up tolerance (mw)** | **Calculation Value** | **Threshold Value** |
| 2.404 | 5.743 | 6±1 | 7 | 5.012 | 1.554 | **3.0** |
| 2.442 | 6.309 | 6±1 | 7 | 5.012 | 1.566 | **3.0** |
| 2.480 | 7.267 | 7±1 | 8 | 6.310 | 1.987 | **3.0** |

**Simultaneous Transmission for SAR Exclusion**

| Simultaneous Transmission for SAR Exclusion | | Total Calculation Value | Limit |
|---|---|---|---|
| **Bluetooth LE** | **2.4G** | | |
| **0.033** | **0.209** | **0.151** | **1.0** |

**Note: The sample support one Bluetooth LE modular and 2.4G modular, they supports difference antenna, need consider**

*$\Sigma$ of (the highest measured or estimated $SAR_{2.4G}$+$SAR_{2.4G}$)/1.6 = (0.033 +0.209)/1.6 = 0.151< 1.0;*

## Conclusion:

The measurement results comply with the FCC Limit per 47 CFR 2.1093 for the uncontrolled RF Exposure and SAR Exclusion Threshold per KDB 447498 v06.

**-----END OF REPORT-----**