



REPORT No. : SZ22080071S01

# RF EXPOSURE EXEMPT REPORT

**APPLICANT** : SHENZHEN MARKTRACE CO., LTD  
**PRODUCT NAME** : 2.4G RFID Tag  
**MODEL NAME** : HX607  
**BRAND NAME** : MarktraceRFID  
**FCC ID** : 2AJQV-HX607  
**STANDARD(S)** : 47 CFR Part 2(2.1093)  
**RECEIPT DATE** : 2022-08-08  
**TEST DATE** : 2022-08-10 to 2022-08-22  
**ISSUE DATE** : 2022-09-14

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MORLAB

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| Change History |            |                   |
|----------------|------------|-------------------|
| Version        | Date       | Reason for change |
| 1.0            | 2022-09-14 | First edition     |
|                |            |                   |



# 1. Technical Information

**Note:** Provide by applicant.

## 1.1 Applicant and Manufacturer Information

|                              |  |
|------------------------------|--|
| <b>Applicant:</b>            | SHENZHEN MARKTRACE CO., LTD  |
| <b>Applicant Address:</b>    | 1902-1903, Gongxiang Building A, No. 78, Songpingshan Community, Nanshan District, Shenzhen, China |
| <b>Manufacturer:</b>         | SHENZHEN MARKTRACE CO., LTD  |
| <b>Manufacturer Address:</b> | 1902-1903, Gongxiang Building A, No. 78, Songpingshan Community, Nanshan District, Shenzhen, China |

## 1.2 Equipment Under Test (EUT) Description

|                                   |                   |              |
|-----------------------------------|-------------------|--------------|
| <b>Product Name:</b>              | 2.4G RFID Tag     |              |
| <b>Sample No.:</b>                | 1#                |              |
| <b>Hardware Version:</b>          | V1.5              |              |
| <b>Software Version:</b>          | V1.0              |              |
| <b>Operating Frequency Range:</b> | 2440MHz; 13.56MHz |              |
| <b>Modulation Type:</b>           | 2440MHz:          | GFSK         |
|                                   | 13.56MHz:         | ASK          |
| <b>Antenna Type:</b>              | 2440MHz:          | PCB Antenna  |
|                                   | 13.56MHz:         | Loop Antenna |
| <b>Antenna Gain:</b>              | 1.50dBi           |              |



### 1.3 Applied Reference Documents

Leading reference documents for testing:

| Identity              | Document Title  | Method Determination /Remark |
|-----------------------|---|------------------------------|
| 47 CFR Part 2(2.1093) | Radio Frequency Radiation Exposure Assessment: Portable devices                             | No deviation                 |
| KDB 447498 D04v01     | RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices | No deviation                 |

**Note 1:** Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

**Note 2:** When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.



## 2. Device Category and RF Exposure Limit

Per user manual, this device is a 2.4G RFID Tag. Based on 47 CFR 2.1093, this device belongs to portable device category with General Population/Uncontrolled exposure.

### **Portable Devices:**

47 CFR 2.1093(b)

For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

### **General Population/Uncontrolled Exposure:**

47 CFR 2.1093(d) (2)

Limits for General Population/Uncontrolled exposure: 0.08 W/kg as averaged over the whole-body and spatial peak SAR not exceeding 1.6 W/kg as averaged over any 1 gram of tissue (defined as a tissue volume in the shape of a cube). Exceptions are the hands, wrists, feet and ankles where the spatial peak SAR shall not exceed 4 W/kg, as averaged over any 10 grams of tissue (defined as a tissue volume in the shape of a cube). General Population/Uncontrolled limits apply when the general public may be exposed, or when persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or do not exercise control over their exposure. Warning labels placed on consumer devices such as cellular telephones will not be sufficient reason to allow these devices to be evaluated subject to limits for occupational/controlled exposure in paragraph (d)(1) of this section.



### 3. RF Output Power

#### <2.4G Output Power>

| Mode          | Frequency<br>(MHz) | Average Power (dBm) |
|---------------|--------------------|---------------------|
|               |                    | GFSK                |
| 2.4GHz        | 2440               | 2.98                |
| Tune-up Limit |                    | 3.00                |

**Note 1:** According to KDB 447498, SAR test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

**Note 2:** The time-average power of 13.56MHz declared in the information document is less than the exemption condition, therefore SAR measurement is not required for this device.

**Note 3:** The output power of 2.4G refers to report (Report No.: SZ22080071W01).

## 4. RF Exposure Assessment

### ➤ Standalone Transmission SAR Assessment

1. According to KDB 447498 D04v01 Appendix B, the 1-g SAR test exclusion thresholds at test separation Distances  $\leq 20$  mm are determined by:

- a. The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator. For mobile devices that are not exempt per Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than  $ERP_{20\text{cm}}$  in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{\text{th}} (\text{mW}) = ERP_{20 \text{ cm}} (\text{mW}) = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B. 1})$$

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only if the physical dimensions of the radiating structure(s) do not exceed the electrical length of  $\lambda/4$  or if the antenna gain is less than that of a half-wave dipole.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

- b. The SAR-based exemption formula of § 1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold  $P_{\text{th}}$  (mW).

$$P_{\text{th}} (\text{mW}) = \begin{cases} ERP_{20 \text{ cm}} (d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B. 2})$$

where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and  $f$  is in GHz,  $d$  is the separation distance (cm), and  $ERP_{20\text{cm}}$  is per Formula (B.1). The example values shown in Table B.2 are for illustration only.



2. When the device is used, 5mm as the most conservative minimum test separation distance was used for evaluating.

| Frequency (GHz) | Separation Distance (cm) | ERP <sub>20cm</sub> | P <sub>th</sub> (mW) |
|-----------------|--------------------------|---------------------|----------------------|
| 2.44            | 0.5                      | 3060                | 3                    |

3. When standalone SAR is not required to be measured, per KDB 447498 D04v01 Appendix E, the following equation must be used to estimate the standalone 1g SAR.

$$SAR_{est} = 1.6 \cdot P_{ant} / P_{th} \quad [W/kg]$$

$P_{ant} < P_{th}$ , where  $P_{ant}$  is maximum time-averaged power or effective radiated power (ERP)

| Mode   | Max. Tune-up Power (dBm) | Exposure Position    | Body |
|--------|--------------------------|----------------------|------|
|        |                          | Test Distance (cm)   | 0.5  |
| 2.4GHz | 3.0                      | Estimated SAR (W/kg) | 1.07 |

➤ **Simultaneous Assessment**

| Simultaneous Transmission Consideration | Position | Applicable Combination |
|---|----------|------------------------|
|   | Body     | 2.4GHz & 13.56MHz      |

➤ **Total Exposure Radio Analysis**

The fields generated by the antennas can be correlated or uncorrelated. At different frequencies, fields are always uncorrelated, and the aggregate SAR contributions can be summed according to spatially averaged values of corresponding sources at any point in space, r, to determine the total exposure ratio (TER). Assuming l sources, the TER at each point in space is equal to

$$TER = \sum_{i=1}^{<300MHz} \frac{P_{th}}{P_{th,m}} + \sum_{i=1}^{6GHz} \frac{SAR}{SAR_{limit}} < 1$$

| Body           | 1                 | 2                             | 1+2                  | Verdict |
|----------------|-------------------|-------------------------------|----------------------|---------|
|                | 2.4GHz SAR (W/kg) | 13.56MHz <sub>Note</sub> (mW) | Total Exposure Ratio |         |
| RF Exposure    | 1.07              | 1.0                           | 0.67                 | PASS    |
| Limit to Ratio | 1.6               | 433                           |                      |         |

**Note:** For 13.56MHz, the maximum output power is 0.5mW and and 443mW exemption defined in TCB Workshop Apr. 2022 applies.





## Annex A Testing Laboratory Information

### 1. Identification of the Responsible Testing Laboratory

|                            |  |
|----------------------------|--|
| <b>Laboratory Name:</b>    | Shenzhen Morlab Communications Technology Co., Ltd.  |
| <b>Laboratory Address:</b> | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |
| <b>Telephone:</b>          | +86 755 36698555   |
| <b>Facsimile:</b>          | +86 755 36698525   |

### 2. Identification of the Responsible Testing Location

|                 |  |
|-----------------|--|
| <b>Name:</b>    | Shenzhen Morlab Communications Technology Co., Ltd.  |
| <b>Address:</b> | FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China |

### 3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

————— END OF REPORT —————