

# **Zhejiang Sunseeker Industrial Co., Ltd.**

# **MPE ASSESSMENT REPORT**

### **Report Type:**

FCC Part §2.1091 and §1.1307(b) assessment report

#### Model:

RMX3000K20VU, RMX4000K20VU, RMX6000K20VU, RMX8000K20VU, RMX10000K20VU, RMX12000K20VU, X7-3000, X7-4000, X7-6000, X7-8000, X7-10000, X7-12000

#### **Report Number:**

2404B0243SHA-003

#### Issue Date:

May 28, 2024

#### **DOCUMENT CONTROL NUMBER:**

TTRFFCCMPE-01 V1 © 2018 Intertek





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Report no.: 2404B0243SHA-003

**Applicant:** Zhejiang Sunseeker Industrial Co., Ltd.

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Manufacturer: Zhejiang Sunseeker Industrial Co., Ltd.

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Manufacturing site: Zhejiang Sunseeker Industrial Co., Ltd.

988 Jinde Road, Jiangdong Industrial Park, Jinhua, Zhejiang 321000,

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**FCC ID:** 2BFD7X35-1

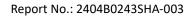
#### **SUMMARY:**

The equipment complies with the requirements according to the following standard(s) or Specification:

KDB447498 D01 General RF Exposure Guidance v06 FCC Part2.1091, FCC Part1.1307(b)

| PREPARED BY:     | REVIEWED BY: |  |
|------------------|--------------|--|
|                  | Zrie. li     |  |
| Project Engineer | Reviewer     |  |
| Scout Gong       | Eric Li      |  |

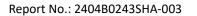
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## **Revision History**

| Report No.       | Version | Description             | Issued Date  |
|------------------|---------|-------------------------|--------------|
| 2404B0243SHA-003 | Rev. 01 | Initial issue of report | May 28, 2024 |

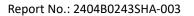




### 1 General Information

### 1.1 Description of Equipment Under Test (EUT)

| Product name:              | Robotic Lawn Mower  |  |
|----------------------------|---|--|
| Type/Model/PMN/HVIN:       | RMX3000K20VU, RMX4000K20VU,<br>RMX6000K20VU, RMX8000K20VU,<br>RMX10000K20VU, RMX12000K20VU,<br>X7-3000, X7-4000, X7-6000,<br>X7-8000, X7-10000, X7-12000  |  |
| Description of EUT:        | EUT is a Robotic lawn mower, there are nine models, all models are technically identical on mower unit except specific accessories used and declared working area by manufacturer. We tested RMX12000K20VU as representative and listed the worst results in this report. |  |
| Rating:                    | 20 V d.c., Class III, IPX5 for mower unit, IPX4 for charging station. n0: 3000 /min, Cutting width 35cm.  |  |
| Category of EUT:           | Class B   |  |
| EUT type:                  | ☐ Tabletop ☐ Floor standing   |  |
| Software Version:          | -   |  |
| Hardware Version:          | -   |  |
| Sample Identification No.: | 0240306-05-004  |  |
| Sample received date:      | March 6, 2024   |  |
| Date of test:              | March 7, 2024, to May 27, 2024  |  |





### 1.2 Technical Specification

#### Wi-Fi:

| Frequency Band:      | 2400MHz ~ 2483.5MHz                                   |  |  |
|----------------------|---|--|--|
| Support Standards:   | IEEE 802.11b, IEEE 802.11g, IEEE 802.11n(HT20)        |  |  |
| Type of Modulation:  | IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK)                |  |  |
|                      | IEEE 802.11g: OFDM (64-QAM, 16-QAM, QPSK, BPSK)       |  |  |
|                      | IEEE 802.11n(HT20): OFDM (64-QAM, 16-QAM, QPSK, BPSK) |  |  |
| Operating Frequency: | 2412MHz to 2462MHz for IEEE 802.11b/g/n(HT20)         |  |  |
| Channel Number:      | 11 Channels for 802.11b, 802.11g and 802.11n(HT20)    |  |  |
| Channel Separation:  | 5 MHz   |  |  |
| Antenna Information: | Copper tube antenna, External type, 2.37 dBi Gain     |  |  |

#### Bluetooth LE:

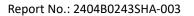
| Frequency Band:      | 2402MHz ~ 2480MHz                                 |
|----------------------|---|
| Support Standards:   | Bluetooth Low Energy                              |
| Type of Modulation:  | GFSK  |
| Channel Number:      | 40  |
| Data Rate:           | 1Mbps   |
| Channel Separation:  | 2MHz  |
| Antenna Information: | Copper tube antenna, External type, 2.37 dBi Gain |

#### LoRa module 1: 2BDFV-A39

| Operation Frequency: | 902MHz to 928MHz          |  |
|----------------------|---------------------------|--|
| Type of Modulation:  | LoRa                      |  |
| Channel Number:      | 26                        |  |
| Channel Separation:  | 1MHz                      |  |
| Antenna Information: | External antenna, 1.89dBi |  |

### LoRa module 2: 2BA39HX-DU1021D

| Frequency Band:      | 903MHz to 927MHz       |
|----------------------|------------------------|
| Type of Modulation:  | CSS                    |
| Channel Number:      | 49                     |
| Channel Separation:  | 500KHz                 |
| Antenna Information: | Dipole antenna, 2.0dBi |





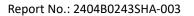
#### **TEST REPORT**

### LoRa module 3: 2A92VQD302

| Operation Frequency: | 902.55MHz to 926.45MHz |  |
|----------------------|------------------------|--|
| Type of Modulation:  | CSS                    |  |
| Channel Number:      | 240                    |  |
| Channel Separation:  | 100KHz                 |  |
| Antenna Information: | Dipole antenna, 3.0dBi |  |

### Cellular Module LE910C4-WWX: RI7LE910CXWWX

| Cellular<br>Protocol | Frequency<br>Range<br>(MHz) | Bandwidths<br>(MHz) | Modulation Types | Antenna<br>Information |
|----------------------|-----------------------------|---------------------|------------------|------------------------|
| GSM/GPRS             | 824.2 – 848.8               | -                   | GMSK             |                        |
| EDGE                 | 824.2 – 848.8               | -                   | 8-PSK            |                        |
| WCDMA                | 826.4 – 846.6               | -                   | Spread Spectrum  |                        |
| GSM/GPRS             | 1850.2 – 1909.8             | -                   | GMSK             |                        |
| EDGE                 | 1850.2 – 1909.8             | -                   | 8-PSK            | Dipole                 |
| WCDMA                | 1852.4 – 1907.6             | -                   | Spread Spectrum  | Antenna                |
| LTE BAND 25/2        | 1850.7 -1914.3              | 1.4/3/5/10/15/20    | QPSK / 16QAM     |                        |
| LTE BAND 4           | 1710.7 - 1754.3             | 1.4/3/5/10/15/20    | QPSK / 16QAM     | Maximum                |
| LTE BAND 26/5        | 824.7 - 848.3               | 1.4/3/5/10/15(B26)  | QPSK / 16QAM     | Antenna                |
| LTE BAND 7           | 2502.5 - 2567.5             | 5/10/15/20          | QPSK / 16QAM     | Gain:                  |
| LTE BAND 8           | 898.2 - 899.8               | 1.4/3               | QPSK / 16QAM     | 3.8 dBi                |
| LTE BAND 12          | 699.7 - 715.3               | 1.4/3/5/10          | QPSK / 16QAM     |                        |
| LTE BAND 13          | 779.5 - 784.5               | 5/10                | QPSK / 16QAM     |                        |
| LTE BAND 14          | 790.5 - 795.5               | 5/10                | QPSK / 16QAM     |                        |
| LTE BAND 26          | 814.7 - 823.3               | 1.4/3/5/10/15       | QPSK / 16QAM     |                        |

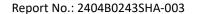




### 1.3 Description of Test Facility

| Name:      | Intertek Testing Services Shanghai                                      |
|------------|---|
| Address:   | Building 86, No. 1198 Qinzhou Road (North), Shanghai 200233, P.R. China |
| Telephone: | 86 21 61278200  |
| Telefax:   | 86 21 54262353  |

| The test facility is   | CNAS Accreditation Lab   |  |  |
|------------------------|--|--|--|
| recognized, certified, | Registration No. CNAS L0139                                      |  |  |
| or accredited by these |  |  |  |
| organizations:         | FCC Accredited Lab   |  |  |
|                        | Designation Number: CN0175                                       |  |  |
|                        | IC Registration Lab  |  |  |
|                        | CAB identifier.: CN0014  |  |  |
|                        | VCCI Registration Lab  |  |  |
|                        | Member No: 3598 (Registration No.: R-14243, G-10845, C-14723, T- |  |  |
|                        | 12252)   |  |  |
|                        | A2LA Accreditation Lab   |  |  |
|                        | Certificate Number: 3309.02                                      |  |  |
|                        |  |  |  |





#### 2 MPE Assessment

Test Result: Pass

#### 2.1 MPE Assessment Limit

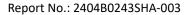
Mobile device exposure for standalone operations:

According to §1.1310, the limit for general population/uncontrolled exposures

| Frequency<br>range<br>(MHz) | Electric field<br>strength<br>(V/m) | Magnetic field<br>strength<br>(A/m) | Power density<br>(mW/cm2) | Averaging time (minutes) |
|-----------------------------|-------------------------------------|-------------------------------------|---------------------------|--------------------------|
|                             | Limits For Gene                     | ral Population/Uncontr              | olled Exposure            |                          |
| 0.3 – 1.34                  | 614                                 | 1.63                                | *(100)                    | 30                       |
| 1.34 – 30                   | 824/f                               | 2.19/f                              | *(180/f2)                 | 30                       |
| 30 – 300                    | 27.5                                | 0.073                               | 0.2                       | 30                       |
| 300 – 1500                  | /                                   | /                                   | f/1500                    | 30                       |
| 1500 – 100,000              | /                                   | /                                   | 1.0                       | 30                       |

F=Frequency in MHz; \*Plane-wave equivalent power density.

Mobile device exposure for simultaneous transmission operations: the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is  $\leq$  1.0.





#### 2.2 Assessment Results

Power density (S) is calculated according to the formula:

 $S = PG / (4\pi R^2)$ 

Where S = power density in mW/cm<sup>2</sup>

P = Radiated transmit power in mW

G = numeric gain of transmit antenna

R = distance (cm)

The power value of Wi-Fi / BLE are from the test report 2404B0243SHA-001 and 2404B0243SHA-002.

The power value of LoRa 1 modular refers to certificate of FCC ID: 2BDFV-A39.

The power value of LoRa 2 modular refers to certificate of FCC ID: 2BA39HX-DU1021D.

The power value of LoRa 3 modular refers to certificate of FCC ID: 2A92VQD302.

The power value of GSM/WCDMA/LTE modular refers to certificate of FCC ID: RI7LE910CXWWX.

The calculations in the table below use the highest gain of antenna for client EUT. These calculations represent the worst case in terms of the exposure levels.

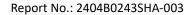
| Mode          | Frequency<br>band | ERP   | Antenna Gain | R    | S                     | Limits                |
|---------------|-------------------|-------|--------------|------|-----------------------|-----------------------|
|               | (MHz)             | (dBm) | (dBi)        | (cm) | (mW/cm <sup>2</sup> ) | (mW/cm <sup>2</sup> ) |
| Wi-Fi         | 2400.00 – 2483.50 | 16.53 | 2.37         | 20   | 0.0155                | 1.0000                |
| BLE           | 2400.00 – 2483.50 | 6.82  | 2.37         | 20   | 0.0017                | 1.0000                |
| LoRa 1        | 902.00 – 928.00   | 25.27 | 1.89         | 20   | 0.1036                | 1.0000                |
| LoRa 2        | 903.00 – 927.00   | 13.01 | 2.00         | 20   | 0.0063                | 1.0000                |
| LoRa 3        | 902.55 – 926.45   | 20.10 | 3.00         | 20   | 0.0406                | 1.0000                |
| GSM/GPRS Cell | 824.20 - 848.80   | 27.50 | -2.90        | 20   | 0.0574                | 0.5490                |

Note: 1 mW/cm<sup>2</sup> from 1.310 Table 1

This device exposure for simultaneous transmission operations. The sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is:

0.0155/1 + 0.0017/1 + 0.1036/1 + 0.0574/0.549 = 0.2251 < 1.0

For the device can support simultaneous transmission, according to 447498 D01 General RF Exposure Guidance v06.





### **Appendix I**

Definition below must be outlined in the User Manual:

| To satisfy FCC RF exposure requirements, a separation distance of 20 cm or more should be |
|---|
| maintained between the antenna of this device and persons during device operation.        |
| To ensure compliance, operations at closer than this distance is not recommended.         |
|   |
| **************************************  |