# 1 Cover Page

## *RF Exposure Evaluation Report*

| | |
|---|---|
| **Application No.:** | SHCR2201000101AT |
| **FCC ID:** | 2AZLQ-RK3288 |
| **IC:** | 27189-RK3288 |
| **Applicant:** | Keenon Robotics Co., Ltd. |
| **Address of Applicant:** | 11F, Building 56, No. 1000, Jinhai Road, Pudong District, Shanghai, China |
| **Manufacturer:** | Keenon Robotics Co., Ltd. |
| **Address of Manufacturer:** | 11F, Building 56, No. 1000, Jinhai Road, Pudong District, Shanghai, China |
| **Factory:** | WUJIANG LIANFENG ELECTRONICS CO., LTD |
| **Address of Factory:** | No.9 SIMING ROAD, WUJIANG ECONOMIC AND TECHNOLOGICAL DEVELOPMENT ZONE,SUZHOU CITY,JIANGSU PROVINCE,CHINA |
| **Equipment Under Test (EUT):** | |
| **EUT Name:** | RK3288 Board |
| **Model No.:** | RK3288 Board |
| **Standard(s) :** | FCC Rules 47 CFR §2.1091<br>KDB447498 D01 General RF Exposure Guidance v06<br>RSS-102 Issue 5 Amendment 1 (February 2, 2021) |
| **Date of Receipt:** | 2022-01-07 |
| **Date of Test:** | 2022-01-23 to 2022-02-15 |
| **Date of Issue:** | 2022-02-15 |
| **Test Result:** | **Pass*** |

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

Parlam Zhan

Parlam Zhan
Laboratory Manager

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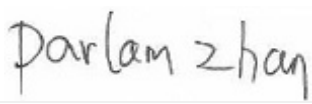
| Revision Record | | | |
|---|---|---|---|
| **Version** | **Description** | **Date** | **Remark** |
| 00 | Original | 2022-02-15 | / |
| | | | |
| | | | |

| | | | | |
|---|---|---|---|---|
| **Authorized for issue by:** | | | | |
| | |  | | |
| | | **Micheal Niu / Project Engineer** | | |
| | |  | | |
| | | **Parlam Zhan / Reviewer** | | |

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# 2 Contents



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# 3 General Information

## 3.1 General Description of E.U.T.

| | |
|---|---|
| Power supply: | DC 12V |
| Serial Number: | QLUI20220131001 |
| Firmware Version: | V1.0 |

## 3.2 Technical Specifications

2.4GHz

| | |
|---|---|
| Antenna Gain: | 3dBi (Provided by manufacturer) |
| Antenna Type: | PCB Antenna |
| Channel Spacing: | 5MHz |
| Modulation Type: | 802.11b: DSSS (CCK, DQPSK, DBPSK)<br>802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK) |
| Number of Channels: | 802.11b/g/n(HT20):11<br>802.11n(HT40):7 |
| Operation Frequency: | 802.11b/g/n(HT20): 2412MHz to 2462MHz<br>802.11n(HT40): 2422MHz to 2452MHz |

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## 3.3 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

## 3.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

**• CNAS (No. CNAS L4354)**

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

**• A2LA (Certificate No. 2541.01)**

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

**• FCC (Designation Number: CN1172)**

Compliance Certification Services Inc. has been recognized as an accredited testing laboratory. Designation Number: CN1172.

**• ISED (CAB identifier: CN0072)**

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E

**• VCCI (Member No.: 1938)**

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600,C-11707, T-11499, G-10216 respectively.

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# 4 Test Standards and Limits

## 4.1 FCC Radiofrequency radiation exposure limits:

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

| Frequency | Power density($mW/cm^2$) | Averaging time(minutes) |
|---|---|---|
| 300MHz~1.5GHz | f/1500 | 30 |
| 1.5GHz~100GHz | 1.0 | 30 |

## 4.2 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.2, RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

• at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $4.49/f^{0.5}$ W (adjusted for tune-up tolerance), where $f$ is in MHz;

• at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);

• at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than $1.31 \times 10^{-2}\ f^{0.6834}$ W (adjusted for tune-up tolerance), where $f$ is in MHz;

• at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

For 2.4G device, the limit of worse case is 2.68 W

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# 5 Measurement and Calculation

## 5.1 Maximum transmit power

The Power Data is based on the RF Test Report SHCR220100010101

| Test Mode | Test Channel | Ant | Power [dBm] | Power [mW] |
|---|---|---|---|---|
| 11B | 2412 | Ant1 | 15.68 | 36.98 |
| 11B | 2437 | Ant1 | 15.65 | 36.73 |
| 11B | 2462 | Ant1 | 15.73 | 37.41 |
| 11G | 2412 | Ant1 | 14.97 | 31.41 |
| 11G | 2437 | Ant1 | 15.53 | 35.73 |
| 11G | 2462 | Ant1 | 16.03 | **40.09** |
| 11N20SISO | 2412 | Ant1 | 15.37 | 34.43 |
| 11N20SISO | 2437 | Ant1 | 15.94 | 39.26 |
| 11N20SISO | 2462 | Ant1 | 16.03 | 40.09 |
| 11N40SISO | 2422 | Ant1 | 15.27 | 33.65 |
| 11N40SISO | 2437 | Ant1 | 15.12 | 32.51 |
| 11N40SISO | 2452 | Ant1 | 15.43 | 34.91 |

## 5.2 MPE Calculation

According to the formula $S=P/4\pi R^2$, we can calculate S which is MPE.

Note:

1) P (mW)
2) R = distance to the center of radiation of antenna (in meter) = 20cm
3) MPE limit = 1mW/cm²

For FCC:

For 2.4G WiFi

| The max. antenna gain is | | 3 | dBi | | |
|---|---|---|---|---|---|
| Max. Conducted Power P(mW) | Gain in Linear Scale G | Operation Distance R(cm) | Power Density ($mW/cm^2$) | Limit ($mW/cm^2$) | Result |
| 40.09 | 1.995 | 20 | 0.01591 | 1 | Pass |

*For IC:*

For 2.4GHz WiFi mode:

E.I.R.P.= P*G= 0.04009×1.995=0.08W<2.68W

So the device is exclusion from SAR test

**--End of the Report--**

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