

# TEST REPORT

Verified Code:

|                                                                                                                                                                                |                                                                                                                                                     |                                |               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|---------------|
| <b>Report No.:</b>                                                                                                                                                             | E202012112553-4                                                                                                                                     | <b>Application No.:</b>        | E202012112553 |
| <b>Client:</b>                                                                                                                                                                 | SHENZHEN EASYLINKIN TECHNOLOGY CO.,LTD                                                                                                              |                                |               |
| <b>Address:</b>                                                                                                                                                                | 705, Floor 7, Zhongdian Difu Building, Zhenhua Road, Fuqiang Community, Huaqiang North Street, Futian District, Shenzhen, Guangdong Province, China |                                |               |
| <b>Sample Description:</b>                                                                                                                                                     | LoRaWAN Gateway                                                                                                                                     |                                |               |
| <b>Model:</b>                                                                                                                                                                  | G200-HU915                                                                                                                                          |                                |               |
| <b>Test Specification:</b>                                                                                                                                                     | CFR 47, FCC Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices.<br>KDB 447498 D01 General RF Exposure Guidance v06           |                                |               |
| <b>Receipt Date:</b>                                                                                                                                                           | 2020-12-11                                                                                                                                          |                                |               |
| <b>Test Date:</b>                                                                                                                                                              | 2020-12-11 to 2021-03-19                                                                                                                            |                                |               |
| <b>Issue Date:</b>                                                                                                                                                             | 2021-04-08                                                                                                                                          |                                |               |
| <b>Test Result:</b>                                                                                                                                                            | Pass                                                                                                                                                |                                |               |
| <b>Prepared By:</b><br>Test Engineer                                                                                                                                           | <b>Reviewed By:</b><br>Technical Manager                                                                                                            | <b>Approved By:</b><br>Manager |               |
| <b>Other Aspects:</b>                                                                                                                                                          |                                                                                                                                                     |                                |               |
| Note: Note                                                                                                                                                                     |                                                                                                                                                     |                                |               |
| Abbreviations: ok / P = passed; fail / F = failed; n.a. / N = not applicable;                                                                                                  |                                                                                                                                                     |                                |               |
| The test result in this test report refers exclusively to the presented test sample. This report shall not be reproduced except in full, without the written approval of GRGT. |                                                                                                                                                     |                                |               |

## **DIRECTIONS OF TEST**

- 1. This station carries out test task according to the national regulation of verifications which can be traced to National Primary Standards and BIPM.**
- 2. The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.**
- 3. If there is any objection concerning the test, the client should inform the laboratory within 15 days from the date of receiving the test report.**

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## 1. GENERAL DESCRIPTION OF EUT

### 1.1. APPLICANT

Name: SHENZHEN EASYLINKIN TECHNOLOGY CO.,LTD  
Address: 705, Floor 7, Zhongdian Difu Building, Zhenhua Road, Fuqiang Community, Huaqiang North Street, Futian District, Shenzhen, Guangdong Province, China

### 1.2. MANUFACTURER

Name: SHENZHEN EASYLINKIN TECHNOLOGY CO.,LTD  
Address: 705, Floor 7, Zhongdian Difu Building, Zhenhua Road, Fuqiang Community, Huaqiang North Street, Futian District, Shenzhen, Guangdong Province, China

### 1.3. FACTORY

Name: SHENZHEN EASYLINKIN TECHNOLOGY CO.,LTD  
Address: 705, Floor 7, Zhongdian Difu Building, Zhenhua Road, Fuqiang Community, Huaqiang North Street, Futian District, Shenzhen, Guangdong Province, China

### 1.4. BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Equipment: LoRaWAN Gateway  
Model No.: G200-HU915  
Adding Model: /  
Trade Name: Easylinkin  
FCC ID: 2AYYO-G200US  
Power supply: DC12V power supplied by adapter  
Adapter Model: PS120W1000U  
Specification: Input: 100-240V~50/60Hz 0.5A Max  
Output: 12.0V --- 1.0A 12.0W  
Frequency Range: WIFI:2412MHz~2462MHz: 802.11b; 802.11g; 802.11n(HT20)  
2422MHz~2452MHz: 802.11n(HT40);  
Lora: 902.3~927.5MHz  
Transmit Power: WIFI:  
18.32dBm for 802.11b mode  
22.47dBm for 802.11g mode  
22.21dBm for 802.11n HT20 mode  
21.02dBm for 802.11n HT40 mode  
Lora:  
Peak: 109.35dBuV/m (Max.)  
Average: 77.83dBuV/m (Max.)  
Modulation type: WIFI:  
DSSS for 802.11b mode;  
OFDM for 802.11g mode;

|                           |                                           |
|---------------------------|-------------------------------------------|
|                           | OFDM for 802.11n mode.                    |
|                           | Lora: GFSK                                |
| Channel space:            | WIFI: 5MHz                                |
|                           | Lora:/                                    |
| Antenna<br>Specification: | External antenna with 2.15dBi gain (Max.) |
| Temperature<br>Range:     | 0°C ~ +60°C                               |
| Hardware<br>Version:      | PCB-GW200M-01D                            |
| Software<br>Version:      | g200_v2.0.0.2001201313                    |
| Sample No:                | E202012112553-0001, E202012112553-0005    |
| Note:                     | /                                         |

## 2. LABORATORY AND ACCREDITATIONS

### 2.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

Add.: No.1301 Guanguang Road Xinlan Community, Guanlan Street, Longhua District Shenzhen, 518110, People's Republic of China.  
P.C.: 518000  
Tel : 0755-61180008  
Fax: 0755-61180008

### 2.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to GB/T 27025(ISO/IEC 17025:2017)

**USA** A2LA(Certificate #:2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

**Canada** Industry Canada  
**USA** FCC

### 3. EVALUATION METHOD

Exposure category: General population/uncontrolled environment  
 EUT Type: Production Unit  
 Device Type: Mobile Device  
 Refer Standard: KDB 447498 D01 General RF Exposure Guidance v06  
 FCC Part 2 §2.1091

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modeled or measured field strengths or power density, is  $\leq 1.0$ . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

### 4. LIMITS FOR GENERAL POPULATION/UNCONTROLLEDEXPOSURE

(B)Limits for General Population/Uncontrolled Exposure

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength(H) (A/m) | Power Density (S) (Mw/cm <sup>2</sup> ) | Averaging Time[E] <sup>2</sup> , [H] <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|----------------------------------|-----------------------------------------|------------------------------------------------------------------|
| 0.3-1.34              | 614                               | 1.63                             | (100)*                                  | 30                                                               |
| 1.34-30               | 824/f                             | 2.19/f                           | (180/f)*                                | 30                                                               |
| 30-300                | 27.5                              | 0.073                            | 0.2                                     | 30                                                               |
| 300-1500              |                                   |                                  | F/1500                                  | 30                                                               |
| 1500-100,000          |                                   |                                  | 1.0                                     | 30                                                               |

Note: f=frequency in MHz; \*Plane-wave equivalent power density

## 5. CALCULATION METHOD

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

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

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to anisotropic radiator

R=distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the maximum gain of the used as following information, the RF power density can be obtained.

| Frequency Band | Antenna type     | Internal Identification | Maximum antenna gain |
|----------------|------------------|-------------------------|----------------------|
| 2.4GHz         | External antenna | Antenna 1               | 2.15dBi              |
| 904~926MHz     | External antenna | Antenna 1               | 2.15dBi              |

## 6. ESTIMATION RESULT

### 4.1 CONDUCTED POWER RESULTS

#### 2.4GHz WIFI

| Mode         | Channel | Frequency(MHz) | Peak Conducted Output Power (dBm) |
|--------------|---------|----------------|-----------------------------------|
| 802.11b      | 1       | 2412           | 17.72                             |
|              | 6       | 2437           | 18.32                             |
|              | 11      | 2462           | 16.16                             |
| 802.11g      | 1       | 2412           | 21.38                             |
|              | 6       | 2437           | 22.47                             |
|              | 11      | 2462           | 20.32                             |
| 802.11n HT20 | 1       | 2412           | 22.21                             |
|              | 6       | 2437           | 22.19                             |
|              | 11      | 2462           | 20.38                             |
| 802.11n HT40 | 3       | 2422           | 20.84                             |
|              | 6       | 2437           | 20.70                             |
|              | 9       | 2452           | 21.02                             |

#### Lora

| Frequency(MHz) | dBuV/m | Peak Conducted Output Power (dBm) |
|----------------|--------|-----------------------------------|
| 926            | 109.35 | 2.35                              |

## 4.2 MANUFACTURING TOLERANCE

### 2.4GHz

| Frequency (MHz)      | 802.11b | 802.11g | 802.11n HT20 | 802.11n HT40 |
|----------------------|---------|---------|--------------|--------------|
|                      | 2437    | 2437    | 2412         | 2422         |
| Target (dBm)         | 18.0    | 22.0    | 22.0         | 21.0         |
| Tolerance $\pm$ (dB) | 1.0     | 1.0     | 1.0          | 1.0          |

|                      |     |
|----------------------|-----|
| Frequency (MHz)      | 926 |
| Target (dBm)         | 2.0 |
| Tolerance $\pm$ (dB) | 1.0 |

## 4.3 MEASUREMENT RESULTS

### 4.3.1 STANDALONE MPE

| Mode         | Output power |          | Antenna Gain (dBi) | Antenna Gain (linear) | Duty Cycle | MPE (mW/cm <sup>2</sup> ) | MPE Limits (mW/cm <sup>2</sup> ) |
|--------------|--------------|----------|--------------------|-----------------------|------------|---------------------------|----------------------------------|
|              | (dBm)        | (mW)     |                    |                       |            |                           |                                  |
| 802.11b      | 19.0         | 79.4328  | 2.15               | 1.6406                | 100%       | 0.0259                    | 1.0000                           |
| 802.11g      | 23.0         | 199.5262 | 2.15               | 1.6406                | 100%       | 0.0652                    | 1.0000                           |
| 802.11n HT20 | 23.0         | 199.5262 | 2.15               | 1.6406                | 100%       | 0.0652                    | 1.0000                           |
| 802.11n HT40 | 22.0         | 158.4893 | 2.15               | 1.6406                | 100%       | 0.0518                    | 1.0000                           |

| Frequency(MHz) | Output power |        | Antenna Gain (dBi) | Antenna Gain (linear) | Duty Cycle | MPE (mW/cm <sup>2</sup> ) | MPE Limits (mW/cm <sup>2</sup> ) |
|----------------|--------------|--------|--------------------|-----------------------|------------|---------------------------|----------------------------------|
|                | (dBm)        | (mW)   |                    |                       |            |                           |                                  |
| 926            | 3.0          | 1.9953 | 2.15               | 1.6406                | 100%       | 0.0007                    | 1.0000                           |

Remark: 1. Maximum average power including tune-up tolerance;

2. MPE use distance is 20cm from manufacturer declaration of user manual.

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

$\sum$  of MPE ratios  $\leq 1.0$

## 7. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

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