



# RF Exposure Evaluation

## FOR

Guangzhou BDE Technology Inc.

BDE Ultra-Low Power & Long-Range Wi-Fi HaLow Module

Test Model: BDE-HWF7394N-US

Prepared for : Guangzhou BDE Technology Inc.  
Address : B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.  
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Date of receipt of test sample : December 09, 2024  
Number of tested samples : 2  
Sample No. : A241206010-1, A241206010-2  
Serial number : Prototype  
Date of Test : December 09, 2024 ~ March 21, 2025  
Date of Report : March 24, 2025





| RF Exposure Evaluation                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Report Reference No. ....                                                                                                                                                                                                                                                                                                                                                                                                                      | LCSA12064063EB                                                                                                                 |
| Date of Issue.....                                                                                                                                                                                                                                                                                                                                                                                                                             | March 24, 2025                                                                                                                 |
| Testing Laboratory Name.....                                                                                                                                                                                                                                                                                                                                                                                                                   | Shenzhen LCS Compliance Testing Laboratory Ltd.                                                                                |
| Address.....                                                                                                                                                                                                                                                                                                                                                                                                                                   | 101, 201 Bldg A & 301 Bldg C, Juji Industrial Park Yabianxueziwei, Shajing Street, Baoan District, Shenzhen, 518000, China     |
| Testing Location/ Procedure.....                                                                                                                                                                                                                                                                                                                                                                                                               | Full application of Harmonised standards ■<br>Partial application of Harmonised standards □<br>Other standard testing method □ |
| Applicant's Name.....                                                                                                                                                                                                                                                                                                                                                                                                                          | Guangzhou BDE Technology Inc.                                                                                                  |
| Address.....                                                                                                                                                                                                                                                                                                                                                                                                                                   | B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District, Guangzhou 510663, China                                       |
| <b>Test Specification</b>                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                |
| Standard.....                                                                                                                                                                                                                                                                                                                                                                                                                                  | FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06<br>FCC CFR 47 part1 1.1310<br>FCC CFR 47 part2 2.1091        |
| Test Report Form No.....                                                                                                                                                                                                                                                                                                                                                                                                                       | TRF-4-E-214 A/0                                                                                                                |
| TRF Originator.....                                                                                                                                                                                                                                                                                                                                                                                                                            | Shenzhen LCS Compliance Testing Laboratory Ltd.                                                                                |
| Master TRF.....                                                                                                                                                                                                                                                                                                                                                                                                                                | Dated 2011-03                                                                                                                  |
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| Test Item Description.....                                                                                                                                                                                                                                                                                                                                                                                                                     | BDE Ultra-Low Power & Long-Range Wi-Fi HaLow Module                                                                            |
| Trade Mark.....                                                                                                                                                                                                                                                                                                                                                                                                                                | BDE                                                                                                                            |
| Test Model.....                                                                                                                                                                                                                                                                                                                                                                                                                                | BDE-HWF7394N-US                                                                                                                |
| Ratings.....                                                                                                                                                                                                                                                                                                                                                                                                                                   | Input: DC 3.3V                                                                                                                 |
| Result .....                                                                                                                                                                                                                                                                                                                                                                                                                                   | Positive                                                                                                                       |

Compiled by:

Li Huan/ Administrator

Supervised by:

Jack Liu/ Technique principal

Approved by:

Gavin Liang/ Manager





## RF Exposure Evaluation

|                                         |                                        |
|-----------------------------------------|----------------------------------------|
| Test Report No. : <b>LCSA12064063EB</b> | <u>March 24, 2025</u><br>Date of issue |
|-----------------------------------------|----------------------------------------|

|                          |                                                                                               |
|--------------------------|-----------------------------------------------------------------------------------------------|
| Test Model.....          | : BDE-HWF7394N-US                                                                             |
| EUT.....                 | : BDE Ultra-Low Power & Long-Range Wi-Fi HaLow Module                                         |
| <b>Applicant.....</b>    | <b>: Guangzhou BDE Technology Inc.</b>                                                        |
| Address.....             | : B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District,<br>Guangzhou 510663, China |
| Telephone.....           | : /                                                                                           |
| Fax.....                 | : /                                                                                           |
| <b>Manufacturer.....</b> | <b>: Guangzhou BDE Technology Inc.</b>                                                        |
| Address.....             | : B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District,<br>Guangzhou 510663, China |
| Telephone.....           | : /                                                                                           |
| Fax.....                 | : /                                                                                           |
| <b>Factory.....</b>      | <b>: Guangzhou BDE Technology Inc.</b>                                                        |
| Address.....             | : B2-403, Chuangyi Building, 162 Science Avenue, Huangpu District,<br>Guangzhou 510663, China |
| Telephone.....           | : /                                                                                           |
| Fax.....                 | : /                                                                                           |

|                    |                 |
|--------------------|-----------------|
| <b>Test Result</b> | <b>Positive</b> |
|--------------------|-----------------|

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.





Revision History

| Report Version | Issue Date     | Revision Content | Revised By |
|----------------|----------------|------------------|------------|
| 000            | March 24, 2025 | Initial Issue    | ---        |
|                |                |                  |            |
|                |                |                  |            |





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## 1. Product Information

|                                                                                                                                           |                                                                         |
|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|
| EUT                                                                                                                                       | : BDE Ultra-Low Power & Long-Range Wi-Fi HaLow Module                   |
| Test Model                                                                                                                                | : BDE-HWF7394N-US                                                       |
| Ratings                                                                                                                                   | : Input: DC 3.3V                                                        |
| Hardware Version                                                                                                                          | : V1                                                                    |
| Software Version                                                                                                                          | : V3.3.0                                                                |
| Frequency Range                                                                                                                           | : 1MHz: 902.5MHz~927.5MHz<br>2MHz: 903MHz~927MHz<br>4MHz: 906MHz~926MHz |
| Channel Number                                                                                                                            | : 45 Channels                                                           |
| Modulation Type                                                                                                                           | : IEEE 802.11ah: OFDM (64QAM, 16QAM, QPSK, BPSK)                        |
| Antenna Description                                                                                                                       | : Whip Antenna, 3.8dBi(Max.)                                            |
| Exposure category                                                                                                                         | : General population/uncontrolled environment                           |
| EUT Type                                                                                                                                  | : Production Unit                                                       |
| Device Type                                                                                                                               | : Mobile Devices                                                        |
| Note: For a more detailed antenna description, please refer to the antenna specifications or the antenna report provided by the customer. |                                                                         |





## 2. Evaluation Method and Limit

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 modelled 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.

## 3. Refer Evaluation Method

### 3. 1 Refer Evaluation Method

[ANSI C95.1-2019](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices.

### 3. 2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

| Frequency Range(MHz)                        | Electric Field Strength(V/m) | Magnetic Field Strength(A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minute) |
|---------------------------------------------|------------------------------|------------------------------|-------------------------------------|-------------------------|
| Limits for Occupational/Controlled Exposure |                              |                              |                                     |                         |
| 0.3 – 3.0                                   | 614                          | 1.63                         | (100) *                             | 6                       |
| 3.0 – 30                                    | 1842/f                       | 4.89/f                       | (900/f <sup>2</sup> )*              | 6                       |
| 30 – 300                                    | 61.4                         | 0.163                        | 1.0                                 | 6                       |
| 300 – 1500                                  | /                            | /                            | f/300                               | 6                       |
| 1500 – 100,000                              | /                            | /                            | 5                                   | 6                       |

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

| Frequency Range(MHz)                          | Electric Field Strength(V/m) | Magnetic Field Strength(A/m) | Power Density (mW/cm <sup>2</sup> ) | Averaging Time (minute) |
|-----------------------------------------------|------------------------------|------------------------------|-------------------------------------|-------------------------|
| Limits for Occupational/Uncontrolled Exposure |                              |                              |                                     |                         |
| 0.3 – 3.0                                     | 614                          | 1.63                         | (100) *                             | 30                      |
| 3.0 – 30                                      | 824/f                        | 2.19/f                       | (180/f <sup>2</sup> )*              | 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





#### 4. MPE 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 an isotropic radiator

R=distance to the center of radiation of the antenna

#### 5. Antenna Information

EUT can only use antennas certificated as follows provided by manufacturer;

| Internal/External Identification | Antenna type and antenna number | Operate frequency band | Maximum antenna gain |
|----------------------------------|---------------------------------|------------------------|----------------------|
| External                         | Whip Antenna                    | 902.5MHz ~ 927MHz      | 3.8dBi               |

#### 6. Conducted Power

| Mode             | Frequency(MHz) | Max Conducted Power (dBm) |
|------------------|----------------|---------------------------|
| IEEE 802.11ah 1M | 902.5          | 22.63                     |
| IEEE 802.11ah 1M | 914.5          | 22.59                     |
| IEEE 802.11ah 1M | 927.5          | 22.64                     |
| IEEE 802.11ah 2M | 903            | 23.29                     |
| IEEE 802.11ah 2M | 913            | 23.07                     |
| IEEE 802.11ah 2M | 927            | 23.22                     |
| IEEE 802.11ah 4M | 906            | 21.07                     |
| IEEE 802.11ah 4M | 914            | 21.05                     |
| IEEE 802.11ah 4M | 926            | 21.06                     |

#### 7. Manufacturing Tolerance

| 802.11ah 1MHz Bandwidth (Peak) |             |                |              |
|--------------------------------|-------------|----------------|--------------|
| Channel                        | Low Channel | Middle Channel | High Channel |
| Target (dBm)                   | 22.0        | 22.0           | 22.0         |
| Tolerance ±(dB)                | 1.0         | 1.0            | 1.0          |
| 802.11ah 2MHz Bandwidth Peak)  |             |                |              |
| Channel                        | Low Channel | Middle Channel | High Channel |
| Target (dBm)                   | 23.0        | 23.0           | 23.0         |
| Tolerance ±(dB)                | 1.0         | 1.0            | 1.0          |
| 802.11ah 4MHz Bandwidth (Peak) |             |                |              |
| Channel                        | Low Channel | Middle Channel | High Channel |
| Target (dBm)                   | 21.0        | 21.0           | 21.0         |
| Tolerance ±(dB)                | 1.0         | 1.0            | 1.0          |





## 8. Measurement Results

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance,  $r = 20\text{cm}$ , as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

| Modulation Type         | Output power |          | Max. Antenna Gain (dBi) | Antenna Gain (linear) | MPE (mW/cm <sup>2</sup> ) | MPE Limits (mW/cm <sup>2</sup> ) |
|-------------------------|--------------|----------|-------------------------|-----------------------|---------------------------|----------------------------------|
|                         | dBm          | mW       |                         |                       |                           |                                  |
| 802.11ah 1MHz Bandwidth | 23.0         | 199.5262 | 3.8                     | 2.3988                | 0.0952                    | 1.0000                           |
| 802.11ah 2MHz Bandwidth | 24.0         | 251.1886 | 3.8                     | 2.3988                | 0.1199                    | 1.0000                           |
| 802.11ah 4MHz Bandwidth | 22.0         | 158.4893 | 3.8                     | 2.3988                | 0.0756                    | 1.0000                           |

### 8.2 Simultaneous Transmission MPE

The EUT equipped with one module and one antenna. So no need consider simultaneous transmission.

## 9. Conclusion

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

## 10. Description of Test Facility

NVLAP Accreditation Code is 600167-0.

FCC Designation Number is CN5024.

CAB identifier is CN0071.

CNAS Registration Number is L4595.

Test Firm Registration Number: 254912.

## 11. Measurement Uncertainty

| Test Item    | Frequency Range | Uncertainty         | Note |
|--------------|-----------------|---------------------|------|
| Output power | 1GHz-40GHz      | $\pm 0.57\text{dB}$ | (1)  |

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of  $k=2$ .

-----THE END OF REPORT-----

