

# RF Test Report

For

**Applicant name:** **Shanghai Huace Navigation Technology Ltd.**

**Address:** 577 Songying Road, Qingpu District, 201706 Shanghai, China

**EUT name:** Geodetic GNSS Receiver

**Brand name:** 

**Model number:** i100

**Series model number:** N/A

**FCC ID:** SY4-A02066

## Issued By

**Company name:** **BTF Testing Lab (Shenzhen) Co., Ltd.**

**Address:** 101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China

**Report number:** BTF250722R00106

**Test standards:** 47 CFR Part 2 Subpart J Section 2.1091

**Test conclusion:** Pass

**Date of sample receipt:** 2025-07-22

**Test date:** 2025-07-23 to 2025-09-04

**Date of issue:** 2025-09-04

**Prepared by:**



Chris Liu / Project engineer



Ryan.CJ / EMC Manager

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| Revision History |            |                   |
|------------------|------------|-------------------|
| Version          | Issue date | Revisions content |
| R_V0             | 2025-09-04 | Original          |
|                  |            |                   |
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## 1 Introduction

### 1.1 Laboratory Location

|                |   |
|----------------|---|
| Test location: | BTF Testing Lab (Shenzhen) Co., Ltd.  |
| Address:       | 101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China  |
| Description:   | All measurement facilities used to collect the measurement data are located at 101/201/301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Subdistrict, Bao'an District, Shenzhen, China |
| Phone number:  | +86-0755-23146130   |
| Fax number:    | +86-0755-23146130   |

### 1.2 Laboratory Facility

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

- **FCC - Designation No.: CN1409**

BTF Testing Lab (Shenzhen) Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The test firm Registration No. is 695374.

- **CNAS - Registration No.: CNAS L17568**

BTF Testing Lab (Shenzhen) Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L17568.

- **A2LA - Registration No.: 6660.01**

BTF Testing Lab (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.

### 1.3 Announcement

- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.
- (7) All entrusted information in this report is provided by the client and has been confirmed through consultation with the client; The testing items for this report have been discussed and confirmed with the client, and our company is only responsible for the content reflected in the report.

## 2 Product Information

### 2.1 Application Information

|               |  |
|---------------|--|
| Company name: | Shanghai Huace Navigation Technology Ltd.                  |
| Address:      | 577 Songying Road, Qingpu District, 201706 Shanghai, China |

### 2.2 Manufacturer Information

|               |  |
|---------------|--|
| Company name: | Shanghai Huace Navigation Technology Ltd.                  |
| Address:      | 577 Songying Road, Qingpu District, 201706 Shanghai, China |

### 2.3 Factory Information

|               |  |
|---------------|--|
| Company name: | Shanghai Huace Navigation Technology Ltd.                  |
| Address:      | 577 Songying Road, Qingpu District, 201706 Shanghai, China |

### 2.4 General Description of Equipment under Test (EUT)

|   |   |
|---|---|
| EUT name                                  | Geodetic GNSS Receiver  |
| Under test model name                     | i100  |
| Series model name                         | N/A   |
| Description of model name differentiation | N/A   |
| Hardware Version                          | N/A   |
| Software Version                          | N/A   |
| Rating:                                   | Input: 9V=2A, 12V=2A, 15V=2A<br>Adapter:<br>MODEL:EU204ASAR<br>AC INPUT:100-240Vac, 1.5A, 50-60Hz<br>DC OUTPUT:<br>C:5.0V=3.0A 15.0W or 9.0V=3.0A 27.0W or<br>12.0V=3.0A 36.0W or 15.0V=3.0A 45.0W or<br>12.0V=3.0A 36.0W or 15.0V=3.0A 45.0W or<br>20.0V=2.25A 45.0W<br>A:5.0V=3.0A 15.0W or 9.0V=2.0A 18.0W or<br>12.0V=1.5A 18.0W<br>C+A:<br>C: 5.0V=3.0A 15.0W or 9.0V=2.22A 20.0W or<br>12.0V=1.66A 20.0W or 15.0V=0.33A 20.0W or<br>20.0V=1.0A 20.0W<br>A:5.0V=2.0A 10.0W |

## 2.5 Technical Information

|                        |  |                 |
|------------------------|--|-----------------|
| Frequency Bands:       | Bluetooth                                  | 2402MHz-2480MHz |
|                        | WLAN 2.4GHz                                | 2412MHz-2462MHz |
|                        | 5GWIFI                                     | 5150MHz—5850MHz |
| Antenna type:          | Internal Antenna                           |                 |
| Antenna Gain:          | Bluetooth :0.56 dBi (declare by Applicant) |                 |
|                        | WLAN 2.4GHz:0.56dBi(declare by Applicant)  |                 |
|                        | 5GWIFI:4.37 dBi(declare by Applicant)      |                 |
| Antenna transmit mode: | SISO (1TX, 1RX)                            |                 |

### 3 RF Output Power

| Mode                  | Frequency (MHz) | Maximum Peak Conducted Output Power (dBm) |
|-----------------------|-----------------|---|
| BLE 1Mbps             | 2402            | 9.06                                      |
|                       | 2440            | 9.60                                      |
|                       | 2480            | 9.31                                      |
| BLE 2Mbps             | 2402            | 9.65                                      |
|                       | 2440            | 9.64                                      |
|                       | 2480            | 9.33                                      |
| Maximum Tune-up (dBm) |                 | 10.0                                      |

| Mode                  | Frequency (MHz) | Maximum Peak Conducted Output Power (dBm) |
|-----------------------|-----------------|---|
| GFSK                  | 2402            | 9.16                                      |
|                       | 2441            | 9.14                                      |
|                       | 2480            | 8.85                                      |
| Pi/4DQPSK             | 2402            | 8.50                                      |
|                       | 2441            | 8.52                                      |
|                       | 2480            | 8.20                                      |
| 8DPSK                 | 2402            | 8.64                                      |
|                       | 2441            | 8.61                                      |
|                       | 2480            | 8.27                                      |
| Maximum Tune-up (dBm) |                 | 10.0                                      |

| Mode             | Frequency (MHz) | Maximum Peak Conducted Output Power (dBm) |
|------------------|-----------------|---|
| 802.11b          | 2412            | 17.95                                     |
|                  | 2437            | 16.91                                     |
|                  | 2462            | 17.07                                     |
| 802.11g          | 2412            | 17.21                                     |
|                  | 2437            | 19.41                                     |
|                  | 2462            | 18.93                                     |
| 802.11n (HT20)   | 2412            | 15.83                                     |
|                  | 2437            | 18.62                                     |
|                  | 2462            | 18.05                                     |
| 802.11n (HT40)   | 2422            | 13.60                                     |
|                  | 2437            | 14.88                                     |
|                  | 2452            | 14.46                                     |
| 802.11ax (HEW20) | 2412            | 18.20                                     |
|                  | 2437            | 20.30                                     |

|                     |                       |       |
|---------------------|-----------------------|-------|
|                     | 2462                  | 19.99 |
| 802.11ax<br>(HEW40) | 2422                  | 15.95 |
|                     | 2437                  | 16.96 |
|                     | 2452                  | 16.58 |
|                     | Maximum Tune-up (dBm) | 21.0  |

| Mode                  | Frequency (MHz) | Maximum Peak Conducted Output Power (dBm) |
|-----------------------|-----------------|---|
| 802.11ac<br>(VHT80)   | 5210            | 6.45                                      |
|                       | 5290            | 7.23                                      |
|                       | 5530            | 8.85                                      |
|                       | 5610            | 8.25                                      |
|                       | 5775            | 6.36                                      |
| 802.11ax<br>(HEW80)   | 5210            | 6.99                                      |
|                       | 5290            | 7.27                                      |
|                       | 5530            | 9.37                                      |
|                       | 5610            | 8.93                                      |
|                       | 5775            | 6.72                                      |
| Maximum Tune-up (dBm) |                 | 10.0                                      |

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

## 4 Applied Reference Documents

| Identity              | Document Title  |
|-----------------------|---|
| 47 CFR Part 2(2.1091) | Radio Frequency Radiation Exposure Assessment: mobile devices |
| KDB 447498 D01v06     | General RF Exposure Guidance                                  |

## 5 Device Category and RF Exposure Limit

Per user manual, Based on 47 CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

|  |  |
|--|--|
| Mobile Devices:                            | <p>47 CFR 2.1091(b)</p> <p>For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location.</p> <p>Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.</p> |
| General Population/ Uncontrolled Exposure: | <p>The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.</p>                |
| Test Standards:                            | <p>The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.</p> <p>Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.</p>  |

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b) Limits for Maximum Permissible Exposure (MPE)

| Frequency range (MHz)                            | Electric field strength(V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|--|------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposures |                              |                               |                                     |                          |
| 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  |  |
| (B) Limits for General Population/Uncontrolled Exposure |       |        |                        |    |  |
| 0.3–1.34  | 614   | 1.63   | *(100)                 | 30 |  |
| 1.34–30   | 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

## 6 RF Exposure Assessment

### ➤ Standalone Transmission Assessment:

| Bands       | Frequency (MHz) | Tune-up Power(dBm) | Antenna Gain(dBi) | Power Density (mW/cm <sup>2</sup> ) | Limit for MPE (mW/cm <sup>2</sup> ) |
|-------------|-----------------|--------------------|-------------------|-------------------------------------|-------------------------------------|
| Bluetooth   | 2402            | 10                 | 0.56              | 0.0023                              | 1.0                                 |
| BLE         | 2412            | 10                 | 0.56              | 0.0023                              | 1.0                                 |
| WLAN 2.4GHz | 2437            | 21                 | 0.56              | 0.0285                              | 1.0                                 |
| 5GWIFI      | 5530            | 10                 | 4.37              | 0.0054                              | 1.0                                 |

**Note:**

1. According to KDB 447498, MPE assessment is based on source-based time-averaged maximum conducted output power of the RF channel requiring assessment, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.
2. MPE calculate method

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

Where:

S = Power density (in appropriate units, e.g. mW/cm<sup>2</sup>)

P = Time-average maximum tune-up power (in appropriate units, e.g. dBm)

G = numeric gain of the antenna (in appropriate units, e.g. dBi)

R = Separation distance to the centre of radiation of the antenna (20cm)

### ➤ Conclusion:

According to 47 CFR §2.1091, this device complies with human exposure basic restrictions.



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