# FCC RF EXPOSURE REPORT

## FCC ID: 2A3BD-OSRDR02C1

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|---|---|---|
| **Project No.** | : | 2404C146 |
| **Equipment** | : | AI Delivery Robot |
| **Brand Name** | : | ORIONSTAR |
| **Test Model** | : | OS-R-DR02-C |
| **Series Model** | : | OS-R-DR02-C1, OS-R-DR02-C2 |
| **Applicant** | : | Beijing Orion Star Technology Co., Ltd |
| **Address** | : | Room A-2570, 2nd Floor, No. 30, Shixing Street, Shijingshan District, Beijing, P.R. China |
| **Manufacturer** | : | Beijing Orion Star Technology Co., Ltd |
| **Address** | : | Room A-2570, 2nd Floor, No. 30, Shixing Street, Shijingshan District, Beijing, P.R. China |
| **Factory** | : | Guangdong Mingji Hi-Tech Electronics Co.,Ltd |
| **Address** | : | No.12 Changfu Road,Qinghutou,Tangxia Town,Dongguan,Guangdong, China |
| **Date of Receipt** | : | May 27, 2024 |
| **Date of Test** | : | Jun. 18, 2024 ~ Jul. 16, 2024 |
| **Issued Date** | : | Jul. 25, 2024 |
| **Report Version** | : | R00 |
| **Test Sample** | : | Engineering Sample No.: DG20240527177-3 |
| **Standard(s)** | : | FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091<br>FCC Title 47 Part 2.1091 & KDB 447498 D01 v06 |

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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## REPORT ISSUED HISTORY

| Report No. | Version | Description | Issued Date | Note |
|---|---|---|---|---|
| BTL-FCCP-7-2404C146 | R00 | Original Report. | Jul. 25, 2024 | Valid |

## 1. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi r^2} = \frac{EIRP}{4\pi r^2}$$

where:
S = power density
P = power input to the 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

## 2. ANTENNA SPECIFICATION

For 2.4GHz:

| Ant. | Manufacturer | P/N | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|
| 1 | HUIZHOU SPEED WIRELESS TECHNOLOGYCO., LTD | F-0A-5Q-0008-000-K0 | FPC | N/A | 0.37 |
| 2 | | F-0A-5Q-0009-000-K0 | FPC | N/A | 1.32 |

Note:
1) This EUT supports CDD, and all antenna gains are not equal, so Directional gain=10log[$(10^{G1/20}+10^{G2/20}+...10^{GN/20})^2$/N]dBi, that is Directional gain=10log[$(10^{0.37/20}+10^{1.32/20})^2$/2]dBi =3.87.
2) The antenna gain is provided by the manufacturer.

For 5GHz:

| Ant. | Manufacturer | P/N | Antenna Type | Connector | Gain (dBi) |
|---|---|---|---|---|---|
| 1 | HUIZHOU SPEED WIRELESS TECHNOLOGYCO., LTD | F-0A-5Q-0008-000-K0 | FPC | N/A | 1.55 |
| 2 | | F-0A-5Q-0009-000-K0 | FPC | N/A | 2.88 |

Note:
1) This EUT supports CDD, any transmit signals are correlated with each other, so Directional gain=10log[$(10^{G1/20}+10^{G2/20}+...10^{GN/20})^2$/N]dBi, that is Directional gain=10log[$(10^{1.55/20}+10^{2.88/20})^2$/2]dBi =5.25.
2) The antenna gain is provided by the manufacturer.

For LTE:

| Ant. P/N | Type | Ant. Manufacturer | Antenna Gain(dBi) | Note |
|---|---|---|---|---|
| F-0G-5Q-0014-000-K0 | FPC | HUIZHOU SPEED WIRELESS TECHNOLOGYCO., LTD | 3.79 | LTE Band 2 |
| | | | 4.13 | LTE Band 4 |
| | | | -1.51 | LTE Band 5 |
| | | | 2.72 | LTE Band 7 |
| | | | 1.11 | LTE Band 12 |
| | | | 1.11 | LTE Band 13 |
| | | | 3.76 | LTE Band 25 |
| | | | -1.51 | LTE Band 26 |
| | | | 3.82 | LTE Band 38 |
| | | | 3.82 | LTE Band 41 |

Note: The antenna gain is provided by the manufacturer.

## 3. CALCULATED RESULT

For 2.4GHz:

| Directional gain (dBi) | Directional gain (numeric) | Max. Output Power (dBm) | Max. Output Power (mW) | Power Density (S) ($mW/cm^2$) | Limit of Power Density (S) ($mW/cm^2$) | Test Result |
|---|---|---|---|---|---|---|
| 3.87 | 2.4378 | 25.64 | 366.4376 | 0.17781 | 1 | Complies |

For 5GHz:

| Directional gain (dBi) | Directional gain (numeric) | Max. Output Power (dBm) | Max. Output Power (mW) | Power Density (S) ($mW/cm^2$) | Limit of Power Density (S) ($mW/cm^2$) | Test Result |
|---|---|---|---|---|---|---|
| 5.25 | 3.3497 | 25.83 | 382.8247 | 0.25524 | 1 | Complies |

For LTE:

| Band | Frequency (MHz) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Antenna Gain (linear) | Output Power to Antenna | Power Density ($mW/cm^2$) | Power Density Limit ($mW/cm^2$) | Test Result |
|---|---|---|---|---|---|---|---|---|
| Band 2 | 1850.7 | 25 | 3.79 | 2.3933 | 756.83 | 0.1506 | 1.0000 | Complies |
| Band 4 | 1710.7 | 25 | 4.13 | 2.5882 | 818.46 | 0.1628 | 1.0000 | Complies |
| Band 5 | 824.7 | 25 | -1.51 | 0.7063 | 223.36 | 0.0444 | 0.5498 | Complies |
| Band 7 | 2502.5 | 25 | 2.72 | 1.8707 | 591.56 | 0.1177 | 1.0000 | Complies |
| Band 12 | 699.7 | 25 | 1.11 | 1.2912 | 408.32 | 0.0812 | 0.4665 | Complies |
| Band 13 | 779.5 | 25 | 1.11 | 1.2912 | 408.32 | 0.0812 | 0.5197 | Complies |
| Band 25 | 1850.7 | 25 | 3.76 | 2.3768 | 751.62 | 0.1495 | 1.0000 | Complies |
| Band 26 (814-824) | 814.7 | 25 | -1.51 | 0.7063 | 223.36 | 0.0444 | 0.5431 | Complies |
| Band 26 (824-849) | 827.7 | 25 | -1.51 | 0.7063 | 223.36 | 0.0444 | 0.5518 | Complies |
| Band 38 | 2572.5 | 25 | 3.82 | 2.4099 | 762.08 | 0.1516 | 1.0000 | Complies |
| Band 41 | 2498.5 | 25 | 3.82 | 2.4099 | 762.08 | 0.1516 | 1.0000 | Complies |

Note:
(1) The calculated distance is 20 cm.
(2) WLAN 2.4GHz, WLAN 5GHz and LTE can not simultaneous transmission.
(3) The LTE Max. Tune up Power test results reference to module report which is provided by the manufacturer. (Report No.: HR/2019/1001602)

**End of Test Report**