# FCC 47 CFR MPE REPORT

ION Audio, LLC

BATTERY-POWERED PORTABLE SPEAKER SYSTEM WITH
MULTI-CHANNEL MIXER AND FM RADIO

Model Number: TROUPER™ 100

Additional Model: iPA173, iPA173\*\*\*\*\*\*, TROUPER\*\*\*\*\*\*\*\*\*\*\*\*,
("\*" can be "a-z", "A-Z", "0-9", blank, "-", "+" or any character, symbol, alphanumeric)

FCC ID: 2AB3E-IPA173

| | |
|---|---|
| Applicant: | ION Audio, LLC |
| Address: | 200 Scenic View Drive, Cumberland, RI 02864, USA |
| | |
| Prepared By: | EST Technology Co., Ltd. |
| | Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China |
| Tel: 86-769-83081888-808 | |

| | |
|---|---|
| Report Number: | ESTE-R2402087 |
| Date of Test: | Jan. 26~Feb. 19, 2024 |
| Date of Report: | Feb. 24, 2024 |

# Maximum Permissible Exposure

## 1. Applicable Standards

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

## 1.1. Limits for Maximum Permissible Exposure (MPE)

**(a) Limits for Occupational/Controlled Exposure**

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm$^2$) | Averaging Times $\|E\|^2$, $\|H\|^2$ or S (minutes) |
|---|---|---|---|---|
| 0.3-3.0 | 614 | 1.63 | (100)* | 6 |
| 3.0-30 | 1842/f | 4.89/f | (900/f)* | 6 |
| 30-300 | 61.4 | 0.163 | 1.0 | 6 |
| 300-1500 | | | F/300 | 6 |
| 1500-10000 | | | 5 | 6 |

**(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$^2$) | Averaging Times $\|E\|^2$, $\|H\|^2$ 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 |
| 1500-10000 | | | 1.o | 30 |

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

## 1.2. MPE Calculation Method

$E \ (V/m) = \dfrac{\sqrt{30 \times P \times G}}{d}$         Power Density: $Pd \ (W/m^2) = \dfrac{E^2}{377}$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$Pd = \dfrac{30 \times P \times G}{377 \times d^2}$

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

## 2. **Conducted Power Result**

| Mode | Frequency (MHz) | Peak output power (dBm) | Peak output power (mW) |
|---|---|---|---|
| GFSK | 2402 | 10.26 | 10.617 |
| | 2441 | 7.49 | 5.610 |
| | 2480 | 4.68 | 2.938 |
| $\pi$/4-DQPSK | 2402 | 10.29 | 10.691 |
| | 2441 | 7.53 | 5.662 |
| | 2480 | 4.65 | 2.917 |
| 8-DPSK | 2402 | 10.27 | 10.641 |
| | 2441 | 7.52 | 5.649 |
| | 2480 | 4.65 | 2.917 |
| BLE | 2402 | 10.09 | 10.209 |
| | 2440 | 7.34 | 5.420 |
| | 2480 | 4.37 | 2.735 |

## 3. **Calculated Result and Limit**

| Mode | Peak output power (dBm) | Target power (dBm) | MAX Target power (dBm) | Antenna gain (dBi) | Antenna gain (Linear) | Power Density (S) (mW/cm$^2$) | Limited of Power Density (S) (mW/cm$^2$) | Test Result |
|---|---|---|---|---|---|---|---|---|
| GFSK | 10.26 | 10±1 | 11 | 2.81 | 1.910 | 0.00478 | 1 | Complies |
| $\pi$/4-DQPSK | 10.29 | 10±1 | 11 | 2.81 | 1.910 | 0.00478 | 1 | Complies |
| 8-DPSK | 10.27 | 10±1 | 11 | 2.81 | 1.910 | 0.00478 | 1 | Complies |
| BLE | 10.09 | 10±1 | 11 | 2.81 | 1.910 | 0.00478 | 1 | Complies |

**End of Test Report**