LIBERTY DEFENSE TECHNOLOGIES, INC.

MPE REPORT

SCOPE OF WORK
MPE CALCULATION – HEXWAVE SECURITY BODY SCANNER

REPORT NUMBER
105998912BOX-006MPE

ISSUE DATE
04/24/2025

DOCUMENT CONTROL NUMBER
Generic EMC Report Shell Rev. October 2022

MPE REPORT

(FULL COMPLIANCE)

Report Number: 105998912BOX-006MPE
Project Number: G105998912

Report Issue Date: April 24, 2025

Model(s) Tested: HW2000

Standards: **FCC Part 1 Subpart I, April 2024**
Procedures Implementing the National Environmental Policy Act of 1969
§1.1307 Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared.

ISED RSS-102 Issue 6 December 15, 2023
Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

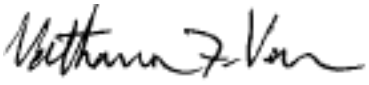
Tested by:
Intertek
Intertek Testing Services
70 Codman Hill Road
Boxborough, MA 01719
USA

Client:
Liberty Defense Technologies, Inc.
187 Ballardvale St, Suite 110
Wilmington, MA 01887
USA

Report prepared by:

Kouma Sinn / Senior Staff Engineer

Report reviewed by:



Vathana Ven / Senior Staff Engineer

Table of Contents

1 Introduction and Conclusion

This evaluation report covers for a mobile device subject to routine environmental evaluation for RF exposure. A mobile device is defined as a transmitting device designed 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 structurer(s) and the body of the user or nearby persons.

The evaluation indicated in section 2.0 were performed on the product constructed as described in section 4.0. The remaining sections are the verbatim text from the actual evaluation during the investigation. These sections include the evaluation name, the specified Method, and Results. No additions, deviations, or exclusions have been made from the standard(s) unless specifically noted.

Based on the results of our investigation, we have concluded the product evaluated **complies** with the requirements of the standard(s) indicated. The results obtained in this report pertain only to the item(s) evaluated. Intertek does not make any claims of compliance for samples or variants which were not evaluated.

2 Evaluation Summary

Section	Test full name	Result
3	Client Information	-
4	Description of Equipment Under Evaluation and Variant Models	-
5	System Setup and Method	-
6	Power Density Calculation (FCC §1.1310; ISED RSS-102 Issue 6)	Compliant
7	Revision History	-

3 Client Information

This EUT was evaluated at the request of:

Client: Liberty Defense Technologies, Inc.
187 Ballardvale St, Suite 110
Wilmington, MA 01887
USA

Contact: Val Safran
Telephone: 888-617-7226
Email: vsafran@libertydefense.com

4 Description of Equipment Under Test and Variant Models

Manufacturer: Liberty Defense Technologies, Inc.
187 Ballardvale St, Suite 110
Wilmington, MA 01887
USA

Description of Equipment Under Test (provided by client)
HEXWAVE screens for concealed metallic and non-metallic weapons and other threats using millimeter wave, advanced 3D imaging, and Artificial Intelligence for enhanced security. The system can process people seamlessly in all types of venues both indoor and outdoor. General justification: The HEXWAVE is a UWB device designed as a threat detection imaging system. UWB devices are low[1]power radio frequency devices that operate under RSS-220 6.4. UWB transmitters use narrow or short duration pulses that result in transmissions over very large bandwidths. Surveillance systems such as the HEXWAVE are designed to operate as “security fences” by establishing a stationary RF perimeter field and detecting the intrusion by persons or objects in that field. HEXWAVE System designed to operate in the 6-10.6 GHz band by sweeping through its frequency range in 200-megahertz blocks, in HEXWAVE term - “chirplets”. It sweeps a continuous waveform signal through a 200-megahertz block of spectrum with central frequency at 4.6GHz. That sweep is generated by SOM9009 module located on PCU sub-assembly. The output chirp waveform from SOM9009 is upconverted to the working frequency band, 6-10.6GHz. That up conversion happens on UP Converter Board that is part of FCB sub-assembly. LO board, that is part of FCB sub-assembly, produces 4 CW frequencies that are mixed on UC board with incoming sweep, starting from 6GHz, and spaced by 200MHz. Once SOM9009 finishes 200MHz sweep, then sweeps through the next 200-megahertz block of spectrum. These “chirplets” are grouped together in sets of four, spanning a total of 800 megahertz. Once the system finished sweeping over all group of four “chirplets” for pre-selected Tx antenna, it switches to another Tx antenna, and performs same sweep again. After completing switching between all TX antennas, Hexwave moves to the next block of “chirplets” (next 800MHz) by reprograming LO Synthesizers frequencies to next Up conversion band(new 4 CW), and repeats same control cycle until reach 10.6 GHz

Equipment Under Test Power Configuration			
Rated Voltage	**Rated Current**	**Rated Frequency**	**Number of Phases**
100-264VAC	15A	50/60 Hz	1

Variant Models:

The following variant models have been identified by the manufacturer as being electrically identical models, depopulated models, or with reasonable similarity to the model(s) tested. Intertek does not make any claims of compliance for samples or variants which were not tested.

None

5 Power Density Calculation

5.1 Requirement(s)

FCC §1.1310 Radiofrequency radiation exposure limits

Table 1 below sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic field.

Table 1 – Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power Density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	$*900/f^2$	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*100	30
1.34-30	842/f	2.19/f	$*180/f^2$	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

F = frequency in MHz * = Plane-wave equivalent power density

ISED RSS-102 Issue 5

Table 2 below sets forth limits for the RF field strength.

Table 2 – RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency range (MHz)	Electric field strength (V/m rms)	Magnetic field strength (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz. *Based on nerve stimulation (NS) **Based on specific absorption rate (SAR)

5.2 Method

An MPE evaluation was performed in order to show that the device was compliant with FCC §2.1091 and ISED RSS-102. The maximum power density was calculated for each transmitter at a separation distance of 20 cm. The calculation was performed using the maximum gain from the internal and external antennas declared by the manufacturer.

The maximum permissible exposure (MPE) is predicted by using the following equation:

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

where: S = power density (in appropriate units, e.g. mW/cm^2)
P = power input to the antenna (in appropriate units, e.g., mW)
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 (appropriate units, e.g., cm)

5.3 Calculation:

For EIRP of -39.54 dBm or 0.000111173 mW, Gain = 4.0 dBi or 2.5119, and R = 20 cm
Power Density = $((0.000111173*2.5119)/(4*\pi*20^2) = 0.000000055843$ $mW/cm^2 = 0.00000055843$ W/m^2

Notes: Data for power density calculation was taken from report # 105998912BOX-006.

5.4 Results:

The sample tested was found to Comply. The calculated maximum power density at 20 cm distance is less than the limits for general population / uncontrolled exposure.

6 ISED RSS-102 Issue 5 §2.5.2 Exemption

6.1 Requirement(s)

Exemption Limits: 10 W/m^2 (6 GHz ≤ f < 15 GHz).

MPE calculation: 0.00000055843 W/m^2

6.2 Results:

The sample tested was found to Comply. The calculated maximum power density at 20 cm distance is way less than the limits for general population / uncontrolled exposure.

7 Revision History

Revision Level	Date	Report Number	Prepared By	Reviewed By	Notes
0	04/24/2025	105998912BOX-006MPE	KPS KPS	VFV VFV	Original Issue