

## 4 FCC §2.1091, FCC §15.247(i) & ISEDC RSS-102 – RF Exposure

### 4.1 Applicable Standards

According to FCC §15.247(i) and §1.1307(b)(1), 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 of the Commission's guidelines.

#### Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
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

According to ISED RSS-102 Issue 6:

### 6.6 Field reference level exposure exemption limits

Field reference level (FRL) exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm (i.e. mobile devices), except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 1 W (adjusted for tune-up tolerance)
- at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than  $4.49/f^{0.5}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz
- at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance)
- at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz
- at or above 6 GHz and the source-based, time-averaged maximum EIRP of the device is equal to or less than 5 W (adjusted for tune-up tolerance)
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In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the EIRP was derived.

## 4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from 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

## 4.3 MPE Result

**Note:** The BTC conducted output power data were obtained from *Test Report Number: FR0D2423A* issued by *Sporton International Inc. On 05/05/2021*.

**Note:** The BLE conducted output power data were obtained from *Test Report Number: FR0D2423B* issued by *Sporton International Inc. On 05/05/2021*.

**Note:** The 2.4 GHz Wi-Fi conducted output power data were obtained from *Test Report Number: FR0D2423C* issued by *Sporton International Inc. On 05/05/2021*.

**Note:** The 5 GHz Wi-Fi conducted output power data were obtained from *Test Report Number: FR0D2423D* issued by *Sporton International Inc. On 05/05/2021*.

**Note:** The RFID conducted output power data were obtained from *Test Report Number: FR051819* issued by *Sporton International Inc. On 07/15/2020*.

### Bluetooth Classic (FCC ID: I28-WYSBHVDXP)

<u>Maximum output power at antenna input terminal (dBm):</u>	<u>11.72</u>
<u>Maximum output power at antenna input terminal (mW):</u>	<u>14.86</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2402</u>
<u>Maximum Directional Antenna Gain, typical (dBi):</u>	<u>3.0</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>2.0</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.00590</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 25 cm is 0.00590 mW/cm<sup>2</sup>. Limit is 1 mW/cm<sup>2</sup>.

### Bluetooth Low Energy (FCC ID: I28-WYSBHVDXP)

<u>Maximum output power at antenna input terminal (dBm):</u>	<u>8.60</u>
<u>Maximum output power at antenna input terminal (mW):</u>	<u>7.24</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2402</u>
<u>Maximum Directional Antenna Gain, typical (dBi):</u>	<u>3.0</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>2.0</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.00288</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 25 cm is 0.00288 mW/cm<sup>2</sup>. Limit is 1 mW/cm<sup>2</sup>.

**2.4 GHz WiFi (FCC ID: I28-WYSBHVDXP)**

<u>Maximum output power at antenna input terminal (dBm):</u>	<u>16.90</u>
<u>Maximum output power at antenna input terminal (mW):</u>	<u>48.98</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2437</u>
<u>Maximum Directional Antenna Gain, typical (dBi):</u>	<u>3.81</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>2.4</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.0234</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.0234 mW/cm<sup>2</sup>. Limit is 1 mW/cm<sup>2</sup>.

**5 GHz WiFi (FCC ID: I28-WYSBHVDXP)**

<u>Maximum output power at antenna input terminal (dBm):</u>	<u>14.70</u>
<u>Maximum output power at antenna input terminal (mW):</u>	<u>29.51</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>5180</u>
<u>Maximum Directional Antenna Gain, typical (dBi):</u>	<u>5.0</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>3.16</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.0186</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.0186 mW/cm<sup>2</sup>. Limit is 1 mW/cm<sup>2</sup>.

**RFID (FCC ID: UZ7RE40)**

<u>Maximum output power at antenna input terminal (dBm):</u>	<u>27.22</u>
<u>Maximum output power at antenna input terminal (mW):</u>	<u>527.23</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>902.75</u>
<u>Maximum Directional Antenna Gain, typical (dBi):</u>	<u>-30</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>0.001</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.0001</u>
<u>FCC MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>0.602</u>

The device is compliant with the requirement MPE limit for uncontrolled exposure. The maximum power density at the distance of 20 cm is 0.0001 mW/cm<sup>2</sup>. Limit is 0.602 mW/cm<sup>2</sup>.