# 5. RF EXPOSURE EVALUATION

### **5.1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)**

## **5.1.1 Applicable Standard**

FCC §15.247 (i) & §1.1310 & §2.1091

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 levels in excess of the Commission's guidelines. See §1.1307(b)(1) of this chapter.

Report No.: CR22030085-00A

Limits for Maximum Permissible Exposure (MPE) (§1.1310, §2.1091)

(B) Limits for General Population/Uncontrolled Exposure							
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm²)	Averaging Time (minutes)			
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 §1.1310 and §2.1091 RF exposure is calculated.

RSS-102 § (2.5.2):

RF 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, except when the device operates as follows:

- below 20 MHz and the source-based, time-averaged maximum e.i.r.p. 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 e.i.r.p. 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 e.i.r.p. 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 e.i.r.p. 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 e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

#### 5.1.2 Procedure

Prediction of power density at the distance of the applicable MPE limit

 $S = PG/4\pi R^2$  = power density (in appropriate units, e.g. mW/cm<sup>2</sup>); 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, the power gain factor, is normally numeric gain; R = distance to the center of radiation of the antenna (appropriate units, e.g., cm);

Report No.: CR22030085-00A

#### **Calculated Data:**

#### For FCC:

Operation Modes	Frequency (MHz)	Antenna Gain		Conducted output power including Tune-up Tolerance		Evaluation Distance	Power Density (mW/cm²)	MPE Limit (mW/cm <sup>2</sup> )
		(dBi)	(numeric)	(dBm)	(mW)	(cm)	( )	(=== )
Wi-Fi	2412-2462	3.00	2	26	398.11	20	0.1584	1

**Result:** The device meet MPE at 20 cm distance

### For ISED:

Mode Frequency (MHz)		Antenna Gain	Conducted output power including Tune-up Tolerance	EIRP		Exemption limits (mW)	Exemption
		(dBi)	(dBm)	(dBm)	(mW)	(111 ** )	
Wi-Fi	2412-2462	3	26	29	794.33	2684	Yes

Result: Compliant. The device is compliance exemption from Routine Evaluation Limits –RF exposure Evaluation.

==== END OF REPORT =====