5. RF EXPOSURE EVALUATION

5.1 For WIFI:

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.

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/cm^2)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	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.

5.1.2 MPE Calculation

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

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

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);

5.1.3 Calculated Result

Operation Modes	Frequency (MHz)	Conducted Output Power Including Tune-up Tolerance		Antenna Gain		Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBm)	(mW)	(dBi)	(numeric)			
Wi-Fi	2412-2462	18	63.1	1.5	1.41	20.00	0.018	≤1

Result: Device meet MPE requirement at 20 cm distance away from Antenna to human body.

5.2 For VHF:

5.2.1 Applicable Standard

According to 1.1310, 2.1091 systems operating under the provisions of this section shall be operated in a manner that ensures the public is not exposed to RF energy level in excess of the communication guidelines.

Limits for Maximum Permissible Exposure (MPE)

(B) Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f²)	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;

5.1.2 MPE Calculation

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

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

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);

5.1.3 Calculated Result

Frequency (MHz)	Maximum Average Output Power Including Tune-up Tolerance (dBm)	Maximum Allowable Antenna Gain (dBi)	Cable Loss (dB)	Operating Duty Cycle (%)	Evaluation Distance (cm)	Power Density (mW/cm^2)	Power Density Limit (mW/cm^2)
156.025-157.425	43.98	9	1	50	221	0.129	0.2

Note: Maximum target power is 25 W

Result: Device meet MPE requirement at 221 cm distance away from Antenna to human body.

5.3 For Simultaneously:

The 2.4G Wi-Fi can transmit simultaneously with VHF:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$= S_{WIFI}/S_{limit\text{-}WIFI} + S_{VHF}/S_{limit\text{-}VHF}$

$= 0.018/1 + 0.129/0.2$

$= 0.018 + 0.645$

$= 0.663$

< 1.0

Result: The device compliant the MPE for transmit simultaneously.

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