5. RF EXPOSURE EVALUATION

5.1 Applicable Standard

According to §1.1307(b)(3)(i)

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to § 1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 $R^2 f$.
1,500-100,000	19.2R^2.

5.2 Measurement Result

Operation Modes	Frequency (MHz)	λ/2π (mm)	Distance (mm)	Exemption ERP (mW)	Exemption ERP (dBm)	Maximum Conducted Power including Tune-up Tolerance (dBm)	Antenna Gain (dBi)	ERP (dBm)	ERP (mW)	MPE-Based Exemption
Wi-Fi	2412-2462	19.80	200	768	28.85	25	3.7	26.55	451.86	Compliant
Bluetooth	2402-2480	19.89	200	768	28.85	8	3.7	9.55	9.02	Compliant
Zigbee	2405-2480	19.86	200	768	28.85	9	2	8.85	7.67	Compliant

The Wi-Fi and Bluetooth can`t transmit simultaneously, Wi-Fi or Blueotooth can transmit simultaneously with Zigbee:

$$\sum_{i=1}^{a}\left(\frac{P_i}{P_{th\_i}}\right)+\sum_{j=1}^{b}\left(\frac{ERP_j}{ERP_{th\_j}}\right)+\sum_{k=1}^{c}\left(\frac{Evaluated_k}{Exposure\ Limit_k}\right)$$

= EPR_{-Wifi}/$ERP_{-\ Wi\text{-}Fi\ Limit}$ +$EPR_{-Zigbee}$/$ERP_{-\ Zigbee\ Limit}$
=451.86/768+7.67/768
=0.60
< 1.0
Result: The device compliant the MPE-Based Exemption at 20cm distances.

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