FCC §15.247 (i) & §1.1307 (b) (3) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 15.247 (i) and subpart 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.

According to KDB 447498 D04 Interim General RF Exposure Guidance

MPE-Based Exemption:

General frequency and separation-distance dependent MPE-based effective radiated power(ERP) thresholds are in Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] to support an exemptionfrom further evaluation from 300 kHz through 100 GHz.

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^2f.
1,500-100,000	19.2R^2.

Ris the minimum separation distance in meters
f = frequency in MHz

For multiple RF sources: Multiple RF sources are exempt if:

in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation:

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Result

Mode	Frequency (MHz)	Tune up conducted power	Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
		(dBm)	(dBi)	(dBd)	(dBm)	(W)		
UHF	917-922.2	10.0	-1.2	-3.35	6.65	0.005	0.2	0.470
BT	2402-2480	9.0	3.4	1.25	10.3	0.011	0.2	0.768
BLE	2402-2480	7.0	3.4	1.25	8.3	0.007	0.2	0.768
Wi-Fi	2412-2462	27.0	3.4	1.25	28.3	0.668	0.2	0.768

Note: 1. The tune up conducted power and antenna gain was declared by the applicant.
2. EUT contain a BT/Wi-Fi module ESP32-WROVER-E, FCC ID: 2AC7Z-ESP32WROVERE
3. 0dBd=2.15dBi
4. The UHF can transmit with BT/Wi-Fi at same time, the BT and Wi-Fi cannot transmit simultaneously

Simultaneous transmitting consideration (worst case):

The ratio=$MPE_{Wi\text{-}Fi}$/limit+MPE_{UHF}/limit=0.668/0.758+0.010/0.470=0.903＜1.0, so simultaneous exposure is compliant.

To maintain compliance with the FCC's RF exposure guidelines, place the equipment at least 20cm from nearby persons.

Result: Compliant.