1.1307 (b) (1) & §2.1091- MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Applicable Standard

According to subpart 1.1307 (b)(1), 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 General Population/Uncontrolled Exposure

Limits for General Population/Uncontrolled Exposure				
Frequency Range (MHz)	**Electric Field Strength (V/m)**	**Magnetic Field Strength (A/m)**	**Power Density (mW/cm^2)**	**Ave.eraging Time (Minutes)**
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*($180/f^2$)	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.e equivalent power density

Result

Calculated Formulary:

Predication of MPE limit at a given distance

$$S = \frac{PG}{4\pi R^2}$$

S = power density (in appropriate units, e.g. mW/cm2)
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)

For simultaneously transmit system, the calculated power density should comply with:

$$\sum_i \frac{S_i}{S_{Limit,i}} \le 1$$

MPE Results

Tune-Up Power Including Tolerance:

Mode	Frequency Range (MHz)	Antenna Gain#		Maximum Tune-up Power#	Cable Loss (dB)	Evaluation Distance (cm)	Power Density (mW/cm^2)	MPE Limit (mW/cm^2)
		(dBi)	(numeric)	(dBm)				
UL	698-716	8.0	6.31	20.0	4.97	20	0.040	0.465
	776-787	8.0	6.31	20.0	4.97	20	0.040	0.517
	824-849	8.0	6.31	20.0	5.17	20	0.038	0.549
	1710-1755	9.0	7.94	20.0	7.51	20	0.028	1.0
	1850-1915	9.0	7.94	20.0	7.51	20	0.028	1.0
DL	728-746	6.5	4.47	15.4	4.97	20	0.010	0.485
	746-757	6.5	4.47	15.4	4.97	20	0.010	0.497
	869-894	6.5	4.47	15.5	5.17	20	0.010	0.579
	2110-2155	8.5	7.08	16.0	7.51	20	0.010	1.0
	1930-1995	8.5	7.08	16.0	7.51	20	0.010	1.0
BT*	2402-2480	2.0	1.58	5.5	/	20	0.0011	1.0
BLE*	2402-2480	2.0	1.58	2	/	20	0.0005	1.0
Wi-Fi*	2412-2462	2.0	1.58	24	/	20	0.079	1.0

Note:

The tune-up power, cable loss and antenna gain was provided by applicant
*The EUT contains a certified module (FCC ID: 2AC7Z-ESP32WROVERB)
According to the MPE reports of FCC ID: 2AC7Z-ESP32WROVERB, Wi-Fi and Bluetooth can't transmit simultaneously

Simultaneously transmit consideration, the worst case:

The ratio= $MPE/Limit_{Booster}$+ $MPE/Limit_{Wi\text{-}Fi}$ =0.040/0.465+0.079/1=0.165<1.0

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

Result: Pass