

FCC §1.1307 (b) (3) & §2.1091- MPE-Based Exemption

Applicable Standard

According to subpart 1.1307 (b) (3) 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 exemption from 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	$0.0128 R^2 f$.
1,500-100,000	$19.2 R^2$.

R is 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

For worst case:

Mode	Frequency (MHz)	Tune up conducted power	Antenna Gain		ERP		Evaluation Distance (m)	ERP Limit (W)
		(dBm)	(dBi)	(dBd)	(dBm)	(W)		
BT	2402-2480	2.5	2.5	0.35	2.85	0.002	0.2	0.768
BLE	2402-2480	11.0	2.5	0.35	11.35	0.014	0.2	0.768
2.4G Wi-Fi	2412-2462	20.5	5.5	3.35	23.85	0.243	0.2	0.768
5G Wi-Fi	5150-5250	18.5	5.6	3.45	21.95	0.157	0.2	0.768
	5250-5350	19.0	5.6	3.45	22.45	0.176	0.2	0.768
	5470-5725	18.5	5.6	3.45	21.95	0.157	0.2	0.768
	5725-5850	16.0	5.6	3.45	19.45	0.088	0.2	0.768
	5850-5895	18.0	5.6	3.45	21.45	0.140	0.2	0.768
6G Wi-Fi	5925-6425	11.0	5.6	3.45	14.45	0.028	0.2	0.768
	6425-6525	9.5	5.6	3.45	12.95	0.020	0.2	0.768
	6525-6875	10.0	5.6	3.45	13.45	0.022	0.2	0.768
	6875-7125	9.5	5.6	3.45	12.95	0.020	0.2	0.768

- Note: 1. The tune up conducted power and antenna gain was declared by the applicant.
 2. The BT, 2.4G Wi-Fi, 5G Wi-Fi and 6G Wi-Fi can Simultaneous transmitting.
 3. For the 2.4G Wi-Fi, as it can support the beam-forming function, so the directional antenna gain should add the $10\lg 2$, $2.5\text{dBi}+10\lg 2=5.5\text{dBi}$.
 4. For the 5G Wi-Fi & 6G Wi-Fi, as it can support the beam-forming function, so the directional antenna gain should add the $10\lg 2$, $2.6\text{dBi}+10\lg 2=5.6\text{dBi}$.
 5. $0\text{dBd}=2.15\text{dBi}$

Simultaneous transmitting consideration (worst case):

The ratio= $\text{ERP}_{\text{BLE}}/\text{limit}+\text{ERP}_{2.4\text{G Wi-Fi}}/\text{limit}+\text{ERP}_{5\text{G Wi-Fi}}/\text{limit}+\text{ERP}_{6\text{G Wi-Fi}}/\text{limit}$
 $=0.014/0.768+0.243/0.768+0.176/0.768+0.028/0.768=0.600<1.0$, 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.