

RF EXPOSURE EVALUATION

MPE-Based Exemption

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)(3)(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**BT/Wi-Fi:**

Mode	Frequency (MHz)	Tune up conducted power [#] (dBm)	Antenna Gain [#]		ERP		Evaluation Distance (m)	ERP Limit (mW)
			(dBi)	(dBd)	(dBm)	(mW)		
BT	2402-2480	3.0	5.2	3.05	6.05	4.03	20	768
BLE	2402-2480	6.0	5.2	3.05	9.05	8.04	20	768
2.4G Wi-Fi	2412-2462	10.0	6.6	4.45	14.45	27.86	20	768
5G Wi-Fi	5180-5240	14.0	4.9	2.75	16.75	47.32	20	768
	5260-5320	12.5	4.6	2.45	14.95	31.26	20	768
	5500-5720	13.5	5.3	3.15	16.65	46.24	20	768
	5745-5825	15.5	5.2	3.05	18.55	71.61	20	768

Note: 1. The tune up conducted power and antenna gain was declared by the applicant.
 2. 0dBd=2.15dBi

NFC:

Mode	Frequency (MHz)	Maximum E-Field (dBuV/m@3m)	Maximum EIRP (dBm)	ERP		Evaluation Distance (cm)	ERP Limit (mW)
				(dBm)	(mW)		
NFC	13.56	70.43	-24.77	-26.92	0.002	20	751

Note: 1. EIRP = E-Field – 95.2 @3m, ERP = EIRP-2.15
 2. The NFC, BT and Wi-Fi can transmit at same time, the 2.4G and 5G Wi-Fi cannot transmit at same time

Simultaneous transmitting consideration (worst case):

The ratio= $ERP_{BLE}/limit + ERP_{5.8G\ Wi-Fi}/limit + ERP_{NFC}/limit = 8.04/768 + 71.61/768 + 0.002/751 = 0.104 < 1.0$

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