

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 v01 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

Mode	Frequency (MHz)	Tune up conducted power [#] (dBm)	Antenna Gain#		ERP		Evaluation Distance (m)	ERP Limit (W)
			(dBi)	(dBd)	(dBm)	(W)		
BT	2402-2480	7.5	1.74	-0.41	7.09	0.005	0.2	0.768
BLE	2402-2480	5.0	1.74	-0.41	4.59	0.003	0.2	0.768
Wi-Fi	2412-2462	22.5	1.74	-0.41	22.09	0.162	0.2	0.768
DECT Module 1	1921.536-1928.448	20.0	3.77	1.62	21.62	0.145	0.2	0.768
DECT Module 2	1921.536-1928.448	20.0	3.77	1.62	21.62	0.145	0.2	0.768

Note: 1. The tune up conducted power and antenna gain was declared by the applicant.

2. 0dBd=2.15dBi

3. The BT/BLE/Wi-Fi, DECT Module 1 and DECT Module 2 can transmit at same time, the BT/BLE and Wi-Fi cannot transmit at same time.

Simultaneous transmitting consideration (worst case):

$$\begin{aligned} \text{The ratio} &= \text{ERP}_{\text{Wi-Fi}} / \text{Limit} + \text{ERP}_{\text{DECT Module 1}} / \text{Limit} + \text{ERP}_{\text{DECT Module 2}} / \text{Limit} \\ &= 0.162/0.768 + 0.145/0.768 + 0.145/0.768 = 0.59 < 1.0 \end{aligned}$$

So simultaneous exposure is compliant.