

* RF Exposure

1. Regulation

According to §15.247(i), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines. See § 1.1307(b)(1) of this Chapter.

Limits for Maximum Permissible Exposure: RF exposure is calculated.

Frequency Range	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm ²]	Averaging Time [minute]
Limits for General Population / Uncontrolled Exposure				
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 ~ 1 500	/	/	f/1 500	30
1 500 ~ 15 000	/	/	1.0	30

f=frequency in MHz, *= plane-wave equivalent power density

MPE (Maximum Permissible Exposure) Prediction

Prediction of MPE limit at a given distance: Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2 \quad (\Rightarrow R = \sqrt{PG/4\pi S})$$

S = power density [mW /cm²]

P = Power input to antenna [mW]

G = Power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna [cm]

EUT: Maximum peak output power = 168.27 [mW] (22.26 dBm)

Antenna gain = 1.73 (2.39 dBi)

100 mW, at 20 cm from an antenna 6 [dBi]	$S = PG/4\pi R^2 = 100 \times 3.98 / (4 \times \pi \times 400)$ $= 0.07918 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
168.27 mW, at 20 cm from an antenna 2.39 [dBi]	$S = PG/4\pi R^2 = 0.05804 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$

2. RF Exposure Compliance Issue

The information should be included in the user's manual:

This appliance and its antenna must not be co-located or operation in conjunction with any other antenna or transmitter. A minimum separation distance of 20 cm must be maintained between the antenna and the person for this appliance to satisfy the RF exposure requirements.

3. Calculation Result of RF Exposure

* 802.11b

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 412	1.73	18.52	71.12	0.024 53
Middle	2 437	1.73	17.57	57.15	0.019 71
Highest	2 462	1.73	17.45	55.59	0.019 17

* 802.11g

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 412	1.73	22.26	168.27	0.058 04
Middle	2 437	1.73	21.26	133.66	0.046 10
Highest	2 462	1.73	21.22	132.43	0.045 68

* 802.11n HT20

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 412	1.73	21.38	137.40	0.047 39
Middle	2 437	1.73	20.44	110.66	0.038 17
Highest	2 462	1.73	20.34	108.14	0.037 30

* 802.11n HT40

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 422	1.73	20.58	114.29	0.039 42
Middle	2 437	1.73	20.05	101.16	0.034 89
Highest	2 452	1.73	20.17	103.99	0.035 87