

* 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 = 194.09 [mW] (22.88 dBm)

Antenna gain = 2.73 [dBi] (4.368 dBi)

100 mW, at 20 cm from an antenna 6 [dBi]	$S = PG/4\pi R^2 = 100 \times 3.98 / (4 \times \pi \times 400)$ $= 0.079 \text{ 18 [mW/cm}^2] < 1.0 \text{ [mW/cm}^2]$
194.09 mW, at 20 cm from an antenna 4.368dBi]	$S = PG/4\pi R^2 = 0.047 \text{ 18 [mW/cm}^2] < 1.0 \text{ [mW/cm}^2]$

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	2.73	17.21	52.60	0.028 61
Middle	2 437	2.73	14.84	30.48	0.016 58
Highest	2 462	2.73	16.26	42.27	0.022 99

* 802.11g

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 412	2.73	22.88	194.09	0.105 57
Middle	2 437	2.73	20.67	116.68	0.063 46
Highest	2 462	2.73	21.55	142.89	0.077 72

* 802.11n HT20

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 412	2.73	22.80	190.55	0.103 64
Middle	2 437	2.73	20.59	114.55	0.062 31
Highest	2 462	2.73	21.44	139.32	0.075 78

* 802.11n HT40

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 422	2.73	21.42	138.68	0.075 43
Middle	2 437	2.73	20.25	105.93	0.057 61
Highest	2 452	2.73	20.48	111.69	0.060 75