

* 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]

Mode	Target power [dBm]	Tune up tolerance [dB]	Max tune up power [dBm]	Max tune up power [mW]	Ant Gain [dBi]	Ant Gain [mW]	Power Density at 20 cm [mW/cm ²]
2.4 GHz (WiFi)	18.00	±2.5	20.50	112.20	1.44	1.39	0.031 10

Target power table

Mode	Target power [dBm]	Allowed tolerant [dB]	Max tune up power [dBm]	Measured Average power [dBm]
802.11b	18	±2.5	20.5	17.05
802.11g	16	±2.5	18.5	15.61
802.11n HT20	16	±2.5	18.5	16.01
802.11n HT40	12	±2.5	14.5	12.59

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]	Power Density at 2.5 cm [mW/cm ²]
Lowest	2 412	1.39	19.42	87.50	0.024 25	1.552 07
Middle	2 437	1.39	19.50	89.13	0.024 70	1.580 92
Highest	2 462	1.39	19.20	83.18	0.023 05	1.475 40

* 802.11g

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]	Power Density at 2.5 cm [mW/cm ²]
Lowest	2 412	1.39	21.93	155.96	0.043 22	2.766 37
Middle	2 437	1.39	21.79	151.01	0.041 85	2.678 61
Highest	2 462	1.39	21.79	151.01	0.041 85	2.678 61

* 802.11n HT20

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]	Power Density at 2.5 cm [mW/cm ²]
Lowest	2 412	1.39	22.57	180.72	0.050 09	3.205 61
Middle	2 437	1.39	22.67	184.93	0.051 25	3.280 27
Highest	2 462	1.39	22.53	179.06	0.049 63	3.176 22

* 802.11n HT40

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]	Power Density at 2.5 cm [mW/cm ²]
Lowest	2 412	1.39	17.85	60.95	0.016 89	1.081 21
Middle	2 437	1.39	17.62	57.81	0.016 02	1.025 44
Highest	2 462	1.39	17.84	60.81	0.016 86	1.078 72