

5.7 RF Exposure

5.7.1 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

Predication 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/cm^2]

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 = 180.30 [mW] (22.56 dBm)

Antenna gain = 2.00 (3 [dBi])

100 mW, at 20 cm from an antenna 6 [dBi]	$S = PG/4\pi R^2 = 100 \times 3.98 / (4 \times \pi \times 400)$ $= 0.07918 [\text{mW}/\text{cm}^2] < 1.0 [\text{mW}/\text{cm}^2]$
180.30 mW, at 20 cm from an antenna 3 [dBi]	$S = PG/4\pi R^2 = 0.07157 [\text{mW}/\text{cm}^2] < 1.0 [\text{mW}/\text{cm}^2]$

5.7.2 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.

5.7.2 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	2.00	20.74	118.58	0.047 07
Middle	2 437	2.00	20.46	111.17	0.044 13
Highest	2 462	2.00	19.88	97.27	0.038 61

* 802.11g

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 412	2.00	22.56	180.30	0.071 57
Middle	2 437	2.00	22.36	172.19	0.068 35
Highest	2 462	2.00	21.38	137.40	0.054 54

* 802.11n HT20

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 412	2.00	19.46	88.31	0.035 05
Middle	2 437	2.00	20.11	81.47	0.032 34
Highest	2 462	2.00	21.12	129.42	0.051 37

* 802.11n HT40

Channel	Frequency [MHz]	Ant Gain	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm ²]
Lowest	2 422	2.00	20.24	105.68	0.041 95
Middle	2 437	2.00	20.12	102.80	0.040 81
Highest	2 452	2.00	20.06	101.39	0.040 25