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

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

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 = 43.954 [mW] (16.43dBm) Antenna gain = 1.318 (1.2 [dBi])	
100 mW, at 20 cm from an antenna 6 [dBi]	S = PG/4πR² = 100 × 6 / (4 × π × 400) = 0.119 4 [mW/cm^2] < 1.0 [mW/cm^2]
43.954 mW, at 20 cm from an antenna 1.2 [dBi]	S = PG/4πR² = 0.011 53 [mW/cm^2] < 1.0 [mW/cm^2]
43.954 mW, at 2.5 cm from an antenna 1.2 [dBi]	S = PG/4πR² = 0.737 61 [mW/cm^2] < 1.0 [mW/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.

5.7.3 Calculation Result of RF Exposure

802.11b

Channel	Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm^2]	Power Density at 2.5 cm [mW/cm^2]
Lowest	2 412	1.318	16.43	43.954	0.011 53	0.737 61
Middle	2 437	1.318	16.41	43.752	0.011 47	0.734 22
Highest	2 462	1.318	16.40	43.652	0.011 45	0.732.54

802.11g

Channel	Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm^2]	Power Density at 2.5 cm [mW/cm^2]
Lowest	2 412	1.318	9.18	8.279	0.002 17	0.138 97
Middle	2 437	1.318	10.08	10.186	0.002 67	0.170.97
Highest	2 462	1.318	10.13	10.304	0.002 70	0.172 95

802.11n20

Channel	Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm^2]	Power Density at 2.5 cm [mW/cm^2]
Lowest	2 412	1.318	9.08	8.091	0.002 12	0.135 80
Middle	2 437	1.318	9.96	9.908	0.002 60	0.166 31
Highest	2 462	1.318	10.17	10.399	0.002 73	0.174 55