5.6 RF Exposure

5.6.1 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 = 93.97 [mW] (19.73 dBm) Antenna gain = 1.76 (2.46 [dBi])	
100 mW, at 20 cm from an antenna 6 [dBi]	S = PG/4πR² = 100 × 3.98 / (4 × π × 400) = 0.079 18 [mW/cm^2] < 1.0 [mW/cm^2]
43.954 mW, at 20 cm from an antenna 2.46 [dBi]	S = PG/4πR² = 0.032 94 [mW/cm^2] < 1.0 [mW/cm^2]

5.6.2 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.

5.6.3 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]
Lowest	2 412	1.76	19.73	93.97	0.032 90
Middle	2 437	1.76	19.51	89.33	0.031 28
Highest	2 462	1.76	19.57	90.57	0.031 71

*** 802.11g**

Channel	Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm^2]
Lowest	2 412	1.76	19.50	89.13	0.031 21
Middle	2 437	1.76	19.49	88.92	0.031 13
Highest	2 462	1.76	19.53	89.74	0.031 42

*** 802.11n HT20**

Channel	Frequency [MHz]	Ant Gain [mW]	power [dBm]	power [mW]	Power Density at 20 cm [mW/cm^2]
Lowest	2 412	1.76	19.44	87.90	0.030 78
Middle	2 437	1.76	19.36	86.30	0.030 22
Highest	2 462	1.76	19.33	85.70	0.030 01