



## 5.7 RF Exposure

### 5.7.1 Regulation

According to §15.407(f), U-NII devices are subject to the radio frequency radiation exposure requirements specified in §§ 1.1307(b), 2.1091 and 2.1093 of this chapter, as appropriate. All equipment shall be considered to operate in a "general population/uncontrolled" environment. Applications for equipment authorization of devices operating under this section must contain a statement confirming compliance with these requirements for both fundamental emissions and unwanted emissions. Technical information showing the basis for this statement must be submitted to the Commission upon request.

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 <sup>2</sup> ]	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 <sup>2</sup> )	30
30 ~ 300	27.5	0.073	0.2	30
300 ~ 1500	/	/	f/1500	30
1500 ~ 15000	/	/	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

$$S = PG/4\pi R^2$$

S = power density [mW/cm<sup>2</sup>]

P = power input to antenna [mW]

$$(\Rightarrow R = \sqrt{PG/4\pi S})$$

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 = 13.2[dBm] (= 20.9 [mW]) & Antenna gain = 2.79 [dBi]	
100mW, at 20cm from an antenna 6[dBi]	$S = PG/4\pi R^2 = 100 \times 3.98 / (4 \times \pi \times 400) = 0.0792 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
20.9mW, at 20cm from the antenna 2.79 [dBi]	$S = PG/4\pi R^2 = 0.0079 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
20.9mW, at 5cm from the antenna 2.79 [dBi]	$S = PG/4\pi R^2 = 0.1265 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$
20.9mW, at 2.5cm from the antenna 2.79 [dBi]	$S = PG/4\pi R^2 = 0.5059 \text{ [mW/cm}^2\text{]} < 1.0 \text{ [mW/cm}^2\text{]}$

NOTE: The antenna used for the EUT is an integral SMD chip antenna. The calculated values of MPE for the EUT show that MPE is safe beyond 2.5 cm from the antenna.

### 5.7.2 RF Exposure Compliance Issue

This information should be included in the user's manual:

*This appliance and its antenna must not be co-located or operating 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.*