

## 4 FCC §15.247 (i), §2.1091 – RF Exposure

### 4.1 Applicable Standard

According to FCC §15.247(i) and §1.1307(b)(1), 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 level in excess of the Commission's guidelines.

#### Limits for General Population/Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm <sup>2</sup> )	Averaging Time (minutes)
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
1500-100,000	/	/	1.0	30

f = frequency in MHz

\* = Plane-wave equivalent power density

### 4.2 MPE Prediction

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

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

Where: S = power density

P = power input to antenna

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

### 4.3 MPE Results

Worst case in 900 MHz: 900 MHz FSK modulation, 100 kbps data rate. 300 kHz channel spacing

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>29.96</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>990.83</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>902.3</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>3</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>2.0</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.393</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>0.602</u>

Worst case in 2.4 GHz: GFSK modulation, 500 kbps data rate. 800 kHz channel spacing

<u>Maximum peak output power at antenna input terminal (dBm):</u>	<u>22.85</u>
<u>Maximum peak output power at antenna input terminal (mW):</u>	<u>192.75</u>
<u>Prediction distance (cm):</u>	<u>20</u>
<u>Prediction frequency (MHz):</u>	<u>2472.8</u>
<u>Maximum Antenna Gain, typical (dBi):</u>	<u>4</u>
<u>Maximum Antenna Gain (numeric):</u>	<u>2.51</u>
<u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>	<u>0.096</u>
<u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u>	<u>1.0</u>

The device is compliant with the MPE limit for uncontrolled exposure.

## 5 FCC §15.203 – Antenna Requirements

### 5.1 Applicable Standard

According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

And according to FCC §15.247 (b) (4), if transmitting antennas of directional gain greater than 6 dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 5.2 Antenna List

Manufacturers	Models/Name	Antenna Gain (dBi)
WP Wireless	WPANT30017-CA	3 @ 900 MHz 4 @ 2400 MHz

The EUT antenna consists of an N-Type male connector with maximum of 4 dBi; therefore, it complies with the antenna requirement.