



## APPENDIX I RADIO FREQUENCY EXPOSURE

### LIMIT

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.

### EUT Specification

<b>EUT</b>	Wireless Camera
<b>Frequency band (Operating)</b>	<input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz <input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input type="checkbox"/> Others
<b>Device category</b>	<input type="checkbox"/> Portable (<20cm separation) <input checked="" type="checkbox"/> Mobile (>20cm separation) <input type="checkbox"/> Others
<b>Exposure classification</b>	<input checked="" type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> ) <input type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )
<b>Antenna diversity</b>	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas <input type="checkbox"/> Tx diversity <input type="checkbox"/> Rx diversity <input type="checkbox"/> Tx/Rx diversity
<b>Max. output power</b>	IEEE 802.11b mode: 20.17 dBm (103.99 mW) IEEE 802.11g mode: 18.59 dBm (72.28 mW) IEEE 802.11n HT 20 MHz mode: 22.76 dBm (188.80 mW) IEEE 802.11n HT 40 MHz mode: 21.71 dBm (148.25 mW)
<b>Antenna gain (Max)</b>	4.2 dBi (Numeric gain: 2.63)
<b>Evaluation applied</b>	<input checked="" type="checkbox"/> MPE Evaluation* <input type="checkbox"/> SAR Evaluation <input type="checkbox"/> N/A

### **Remark:**

*The maximum output power is 22.76 dBm (188.80 mW) at 2412MHz (with 2.63 numeric antenna gain.)*

### MPE EVALUATION

*No non-compliance noted.*



### Calculation

Given  $E = \frac{\sqrt{30 \times P \times G}}{d}$  &  $S = \frac{E^2}{3770}$

Where  $E =$  Field strength in Volts / meter

$P =$  Power in Watts

$G =$  Numeric antenna gain

$d =$  Distance in meters

$S =$  Power density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770d^2}$$

Changing to units of mW and cm, using:

$$P (mW) = P (W) / 1000 \text{ and}$$

$$d (cm) = d(m) / 100$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

Where  $d =$  Distance in cm

$P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>

### Maximum Permissible Exposure

Substituting the MPE safe distance using  $d = 20$  cm into Equation 1:

Yields

$$S = 0.000199 \times P \times G$$

Where  $P =$  Power in mW

$G =$  Numeric antenna gain

$S =$  Power density in mW / cm<sup>2</sup>



**IEEE 802.11b mode:**

EUT output power = 103.99mW

Numeric Antenna gain = 2.63

→ Power density = 0.05442 mW / cm<sup>2</sup>

**IEEE 802.11g mode:**

EUT output power = 72.28 mW

Numeric Antenna gain = 2.63

→ Power density = 0.03783 mW / cm<sup>2</sup>

**IEEE 802.11n HT 20 MHz mode:**

EUT output power = 188.80 mW

Numeric Antenna gain = 2.63

→ Power density = 0.09881 mW / cm<sup>2</sup>

**IEEE 802.11n HT 40 MHz mode:**

EUT output power = 148.25mW

Numeric Antenna gain = 2.63

→ Power density = 0.07759 mW / cm<sup>2</sup>

*(For mobile or fixed location transmitters, the maximum power density is 1.0 mW/cm<sup>2</sup> even if the calculation indicates that the power density would be larger.)*