

**\* RF Exposure**

**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 Permissible 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 ~ 1 500   | /                             | /                             | f/1 500                             | 30                      |
| 1 500 ~ 15 000  | /                             | /                             | 1.0                                 | 30                      |

f=frequency in MHz, \*= plane-wave equivalent power density

**MPE (Maximum Permissible Exposure) Prediction**

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

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

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

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 = 194.09 [mW] (22.88 dBm) |  |
| Antenna gain = 2.73 [mW] (4.368 dBi)                     |  |
| 100 mW, at 20 cm from an antenna 6 [dBi]                 | $S = PG/4\pi R^2 = 100 \times 3.98 / (4 \times \pi \times 400) = 0.079 \text{ 18 [mW/cm}^2] < 1.0 \text{ [mW/cm}^2]$ |
| 194.09 mW, at 20 cm from an antenna 4.368dBi]            | $S = PG/4\pi R^2 = 0.047 \text{ 18 [mW/cm}^2] < 1.0 \text{ [mW/cm}^2]$   |

**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.

### 3. Calculation Result of RF Exposure

**\* 802.11b**

| Channel | Frequency<br>[MHz] | Ant Gain | power<br>[dBm] | power<br>[mW] | Power Density<br>at 20 cm<br>[mW/cm <sup>2</sup> ] |
|---------|--------------------|----------|----------------|---------------|--|
| Lowest  | 2 412              | 2.73     | 17.21          | 52.60         | 0.028 61   |
| Middle  | 2 437              | 2.73     | 14.84          | 30.48         | 0.016 58   |
| Highest | 2 462              | 2.73     | 16.26          | 42.27         | 0.022 99   |

**\* 802.11g**

| Channel | Frequency<br>[MHz] | Ant Gain | power<br>[dBm] | power<br>[mW] | Power Density<br>at 20 cm<br>[mW/cm <sup>2</sup> ] |
|---------|--------------------|----------|----------------|---------------|--|
| Lowest  | 2 412              | 2.73     | 22.88          | 194.09        | 0.105 57   |
| Middle  | 2 437              | 2.73     | 20.67          | 116.68        | 0.063 46   |
| Highest | 2 462              | 2.73     | 21.55          | 142.89        | 0.077 72   |

**\* 802.11n HT20**

| Channel | Frequency<br>[MHz] | Ant Gain | power<br>[dBm] | power<br>[mW] | Power Density<br>at 20 cm<br>[mW/cm <sup>2</sup> ] |
|---------|--------------------|----------|----------------|---------------|--|
| Lowest  | 2 412              | 2.73     | 22.80          | 190.55        | 0.103 64   |
| Middle  | 2 437              | 2.73     | 20.59          | 114.55        | 0.062 31   |
| Highest | 2 462              | 2.73     | 21.44          | 139.32        | 0.075 78   |

**\* 802.11n HT40**

| Channel | Frequency<br>[MHz] | Ant Gain | power<br>[dBm] | power<br>[mW] | Power Density<br>at 20 cm<br>[mW/cm <sup>2</sup> ] |
|---------|--------------------|----------|----------------|---------------|--|
| Lowest  | 2 422              | 2.73     | 21.42          | 138.68        | 0.075 43   |
| Middle  | 2 437              | 2.73     | 20.25          | 105.93        | 0.057 61   |
| Highest | 2 452              | 2.73     | 20.48          | 111.69        | 0.060 75   |