

## 4 FCC §15.247(i), §2.1091 & IC RSS-102 - RF Exposure Information

### 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

Before equipment certification is granted, the procedure of IC RSS-102 must be followed concerning the exposure of humans to RF fields.

According to RSS-102 Issue 2 section 4.1, RF limits used for general public will be applied to the EUT.

| Frequency Range (MHz) | Electric Field (V/m rms) | Magnetic Field (A/m rms)                 | Power Density (W/m <sup>2</sup> ) | Time Averaging (min)      |
|-----------------------|--------------------------|--|-----------------------------------|---------------------------|
| 0.003 - 1             | 280                      | 2.19                                     | -                                 | 6                         |
| 1 - 10                | 280 / f                  | 2.19 / f                                 | -                                 | 6                         |
| 10 - 30               | 28                       | 2.19 / f                                 | -                                 | 6                         |
| 30 - 300              | 28                       | 0.073                                    | 2*                                | 6                         |
| 300 - 1 500           | 1.585 f <sup>0.5</sup>   | 0.0042 f <sup>0.5</sup>                  | f / 150                           | 6                         |
| 1 500 - 15 000        | 61.4                     | 0.163                                    | 10                                | 6                         |
| 15 000 - 150 000      | 61.4                     | 0.163                                    | 10                                | 616000 / f <sup>1.2</sup> |
| 150 000- 300 000      | 0.158 f <sup>0.5</sup>   | 4.21 x 10 <sup>-4</sup> f <sup>0.5</sup> | 6.67 x 10 <sup>-5</sup> f         | 616000 / f <sup>1.2</sup> |

**Note:** f is frequency in MHz

\* Power density limit is applicable at frequencies greater than 100 MHz

## 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

For 2.4 GHz Band, Internal Antenna with 5.0 dBi Gain:

| Radio Mode,<br>Channel & Frequency |    |      | Power Output (dBm) |         |         | Total<br>Power<br>(mW) | Total<br>Power<br>(dBm) | Power<br>Density<br>(mW/cm <sup>2</sup> ) | Limit<br>(mW/cm <sup>2</sup> )/<br>(W/m <sup>2</sup> ) |
|------------------------------------|----|------|--------------------|---------|---------|------------------------|-------------------------|---|--|
|                                    |    |      | Chain 0            | Chain 1 | Chain 2 |                        |                         |   |  |
| 802.11b                            | 1  | 2412 | 23.01              | 23.06   | 23.04   | 603.66                 | 27.81                   | 0.758                                     | 1/10   |
|                                    | 6  | 2437 | 23.03              | 23.07   | 23.03   | 604.59                 | 27.81                   | 0.759                                     | 1/10   |
|                                    | 11 | 2462 | 23.03              | 23.06   | 23.07   | 605.98                 | 27.82                   | 0.761                                     | 1/10   |
| 802.11g                            | 1  | 2412 | 22.06              | 22.12   | 22.09   | 485.43                 | 26.86                   | 0.609                                     | 1/10   |
|                                    | 6  | 2437 | 22.13              | 22.11   | 22.01   | 484.72                 | 26.85                   | 0.608                                     | 1/10   |
|                                    | 11 | 2462 | 22.04              | 22.13   | 22.02   | 482.48                 | 26.83                   | 0.606                                     | 1/10   |
| 802.11n 20                         | 1  | 2412 | 22.01              | 22.04   | 22.14   | 482.49                 | 26.83                   | 0.606                                     | 1/10   |
|                                    | 6  | 2437 | 22.08              | 22.13   | 22.14   | 488.42                 | 26.89                   | 0.613                                     | 1/10   |
|                                    | 11 | 2462 | 22.11              | 22.09   | 22.01   | 483.22                 | 26.84                   | 0.606                                     | 1/10   |
| 802.11n 40                         | 1  | 2422 | 22.11              | 22.11   | 22.12   | 488.03                 | 26.88                   | 0.613                                     | 1/10   |
|                                    | 4  | 2437 | 22.04              | 22.08   | 22.11   | 483.94                 | 26.85                   | 0.607                                     | 1/10   |
|                                    | 7  | 2452 | 22.09              | 22.03   | 22.13   | 484.70                 | 26.85                   | 0.608                                     | 1/10   |