

## 4 FCC §15.407(f), §2.1091 & IC RSS-102 - RF Exposure

### 4.1 Applicable Standard

According to FCC §15.407(f) 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 IC 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 (minutes)  |
|-----------------------|--------------------------|------------------------------------------|-----------------------------------|---------------------------|
| 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

### 5250-5350 MHz

|                                                                                         |               |
|-----------------------------------------------------------------------------------------|---------------|
| <u>Maximum peak output power at antenna input terminal (dBm):</u>                       | <u>18.25</u>  |
| <u>Maximum peak output power at antenna input terminal (mW):</u>                        | <u>66.83</u>  |
| <u>Prediction distance (cm):</u>                                                        | <u>20</u>     |
| <u>Prediction frequency (MHz):</u>                                                      | <u>5260</u>   |
| <u>Maximum Antenna Gain, typical (dBi):</u>                                             | <u>8</u>      |
| <u>Maximum Antenna Gain (numeric):</u>                                                  | <u>6.31</u>   |
| <u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>            | <u>0.0839</u> |
| <u>Power density of prediction frequency at 20.0 cm (W/m<sup>2</sup>):</u>              | <u>0.839</u>  |
| <u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u> | <u>1.0</u>    |
| <u>MPE limit for uncontrolled exposure at prediction frequency (W/m<sup>2</sup>):</u>   | <u>10</u>     |

### 5470-5725 MHz

|                                                                                         |               |
|-----------------------------------------------------------------------------------------|---------------|
| <u>Maximum peak output power at antenna input terminal (dBm):</u>                       | <u>21.89</u>  |
| <u>Maximum peak output power at antenna input terminal (mW):</u>                        | <u>154.53</u> |
| <u>Prediction distance (cm):</u>                                                        | <u>20</u>     |
| <u>Prediction frequency (MHz):</u>                                                      | <u>5550</u>   |
| <u>Maximum Antenna Gain, typical (dBi):</u>                                             | <u>8</u>      |
| <u>Maximum Antenna Gain (numeric):</u>                                                  | <u>6.31</u>   |
| <u>Power density of prediction frequency at 20.0 cm (mW/cm<sup>2</sup>):</u>            | <u>0.194</u>  |
| <u>Power density of prediction frequency at 20.0 cm (W/m<sup>2</sup>):</u>              | <u>1.94</u>   |
| <u>MPE limit for uncontrolled exposure at prediction frequency (mW/cm<sup>2</sup>):</u> | <u>1.0</u>    |
| <u>MPE limit for uncontrolled exposure at prediction frequency (W/m<sup>2</sup>):</u>   | <u>10</u>     |

The device meets FCC/IC MPE requirement for uncontrolled exposure environment at 20 cm distance.