

## Maximum Permissible Exposure (MPE)

### Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

RSS 102 issue 5.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1091 RF exposure is calculated.

### Limits for Maximum Permissible Exposure (MPE)

| Frequency Range<br>(MHz)                            | Electric Field<br>Strength (V/m) | Magnetic Field<br>Strength (A/m) | Power Density<br>(mW/cm <sup>2</sup> ) | Averaging Time<br>(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                         |
| 300-1500  | /                                | /                                | F/1500                                 | 30                         |
| 1500-15000  | /                                | /                                | 1.0                                    | 30                         |

F = frequency in MHz

\* = Plane-wave equipment power density

### Tune-Up Power and Tolerance:

|                             |                     |
|-----------------------------|---------------------|
| Frequency Range:            | 2402 – 2480MHz      |
| Bluetooth Version:          | V4.0                |
| Modulation type:            | GFSK                |
| Tune-up power               | 0dBm                |
| Power Tolerance:            | +/- 1dBm            |
| Measured Transmitter Power: | 0.33 dBm Peak       |
| Antenna Designation:        | Dipole Ant , 2.0dBi |

**FCC: 2.4GHz mode: Dipole Antenna**

Maximum Permissible Exposure (MPE) Evaluation

The worst case of average power: refer to FCC P15C test report for detail measurement date.

Power measurement:

| Frequency (MHz) | Peak Reading Power (dBm) | Cable Loss | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------------|------------|--------------------|------------------|-----------|
| Low             | 0.33                     | 0.00       | 0.33               | 0.00108          | 1         |
| Mid             | 0.15                     | 0.00       | 0.15               | 0.00104          | 1         |
| High            | -0.22                    | 0.00       | -0.22              | 0.00095          | 1         |

Prediction of MPE limit at a given distance

Equation from page 18 of 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

|  | CH 0-78 |                       |
|--|---------|-----------------------|
| Tune-Up power at antenna input terminal:                     | 0.00    | (dBm)                 |
| Tune-Up power at antenna input terminal:                     | 1.00    | (mW)                  |
| Tune-Up power Tolerance:                                     | 1.00    | dB                    |
| Duty cycle:  | 76.00   | (%)                   |
| Maximum Pav :  | 0.96    | (mW)                  |
| Antenna gain (typical):                                      | 2.00    | (dBi)                 |
| Maximum antenna gain:  | 1.58    | (numeric)             |
| Prediction distance:   | 20.00   | (cm)                  |
| MPE limit for uncontrolled exposure at prediction frequency: | 1.00    | (mW/cm <sup>2</sup> ) |
| Power density at predication frequency at 20 (cm) distance   | 0.0003  | (mW/cm <sup>2</sup> ) |

**Measurement Result:**

The worst power density is 0.0003 mW/cm<sup>2</sup> which is less than 1 mW/cm<sup>2</sup>.