

## 15. Maximum Permissible Exposure (MPE)

### 15.1. 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.

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 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

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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**15.2. Maximum Permissible Exposure (MPE) Evaluation:****BDR mode (GFSK):**

| Frequency (MHz) | Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------|--------------------|------------------|-----------|
| 2402.00         | 3.80                | 3.80               | 0.00240          | 1         |
| 2441.00         | 3.76                | 3.76               | 0.00238          | 1         |
| 2480.00         | 3.46                | 3.46               | 0.00222          | 1         |

**EDR mode ( $\pi/4$ DQPSK):**

| Frequency (MHz) | Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------|--------------------|------------------|-----------|
| 2402.00         | 2.38                | 2.38               | 0.00173          | 0.125     |
| 2441.00         | 1.92                | 1.92               | 0.00156          | 0.125     |
| 2480.00         | 1.21                | 1.21               | 0.00132          | 0.125     |

**EDR mode (8DPSK):**

| Frequency (MHz) | Reading Power (dBm) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|---------------------|--------------------|------------------|-----------|
| 2402.00         | 2.74                | 2.74               | 0.00188          | 0.125     |
| 2441.00         | 2.26                | 2.26               | 0.00168          | 0.125     |
| 2480.00         | 1.64                | 1.64               | 0.00146          | 0.125     |

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**15.3. MPE Prediction (BDR Mode)**

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

|                                                      |             |                       |
|------------------------------------------------------|-------------|-----------------------|
| Maximum peak output power at antenna input terminal: | 3.8         | (dBm)                 |
| Maximum peak output power at antenna input terminal: | 2.398832919 | (mW)                  |
| Duty cycle:                                          | 77          | (%)                   |
| Maximum Pav :                                        | 1.847101348 | (mW)                  |
| Antenna gain (typical):                              | -1.2        | (dBi)                 |
| Maximum antenna gain:                                | 0.758577575 | (numeric)             |
| Prediction distance:                                 | 20          | (cm)                  |
| Prediction frequency:                                | 2402        | (MHz)                 |
|                                                      |             |                       |
| MPE limit for uncontrolled exposure at prediction    | 1           | (mW/cm <sup>2</sup> ) |
| Power density at predication frequency at 20 (cm)    | 0.000279    | (mW/cm <sup>2</sup> ) |

**Measurement Result**

The predicted power density level at 20 cm is 0.000279mW/cm<sup>2</sup>. This is below the uncontrolled exposure limit of 1mW/cm<sup>2</sup> at 2402MHz.

*Note: In comparison with BDR, and EDR, BDR results highest emission of power, and further produces higher value of Maximum Permissible Exposure at 20cm. Hence, only the derivation of MPR on the basis of BDR mode is present in this given test report.*

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