

## Prediction of MPE at a given distance

### 1. Limits

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

| Frequency range (MHz)  | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|--|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposure</b>         |                               |                               |                                     |                          |
| 0.3-3.0  | 614                           | 1.63                          | *100                                | 6                        |
| 3.0-30   | 1842/f                        | 4.89/f                        | *900/f <sup>2</sup>                 | 6                        |
| 30-300   | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1,500  |                               |                               | f/300                               | 6                        |
| 1,500-100,000  |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 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/1500                              | 30                       |
| 1,500-100,000  |                               |                               | 1.0                                 | 30                       |

### 2. Test Procedure

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

Where:

S = power density

P = power input to the antenna

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna

**3. Result**

| Mode     | Frequency (MHz) | Prediction distance (cm) | RF power output |           | MPE (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | SAR Test Exclusion |
|----------|-----------------|--------------------------|-----------------|-----------|---------------------------|-----------------------------|--------------------|
|          |                 |                          | dBm             | mW        |                           |                             |                    |
| BT EDR   | 2402-2480       | 20                       | 5.384           | 3.4546    | 0.00094                   | 1                           | Yes                |
| BT LE    | 2402-2480       | 20                       | 4.714           | 2.9607    | 0.00080                   | 1                           | Yes                |
| WIFI     | 2412-2472       | 20                       | 17.528          | 56.5979   | 0.00096                   | 1                           | Yes                |
| GSM 850  | 824.20-848.80   | 20                       | 33.03           | 2009.0928 | 0.15983                   | 0.549                       | Yes                |
| PCS 1900 | 1850.20-1909.80 | 20                       | 32.83           | 1918.6687 | 0.15264                   | 1                           | Yes                |
| WCDMA B5 | 826.40-846.60   | 20                       | 24.70           | 295.1209  | 0.02348                   | 0.551                       | Yes                |
| WCDMA B2 | 1852.40-1907.60 | 20                       | 24.70           | 295.1209  | 0.02348                   | 1                           | Yes                |
| LTE B2   | 1850-1910       | 20                       | 25.94           | 392.6449  | 0.17447                   | 1                           | Yes                |
| LTE B4   | 1710-1755       | 20                       | 24.8            | 301.9952  | 0.13419                   | 1                           | Yes                |
| LTE B5   | 824-849         | 20                       | 24.78           | 300.6076  | 0.13358                   | 0.549                       | Yes                |
| LTE B7   | 2500-2570       | 20                       | 24.23           | 264.8500  | 0.11769                   | 1                           | Yes                |

*Maximum Simultaneous transmission MPE Ratios for BT+WIFI +GSM:*

| Max MPE Ratio<br>BT/Limit | Max MPE ratio<br>WIFI/Limit | Max MPE ratio<br>LTE B2/Limit | $\Sigma$ MPE ratios | Limit | Result |
|---------------------------|-----------------------------|-------------------------------|---------------------|-------|--------|
| 0.00094                   | 0.00096                     | 0.17447                       | 0.17637             | 1     | PASS   |

BT&WIFI Antenna Gain: 1.34dBi, 1.36(numeric)

LTE Antenna Gain: 2.04dBi, 1.6(numeric)

LTE Antenna Gain: 3.49dBi, 2.23(numeric)

Then SAR evaluation is not required.