



## RF Exposure Evaluation

### 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)

#### Limits for Maximum Permissible Exposure (MPE)

| Frequency range (MHz)                                   | Electric field strength (V/m) | Magnetic field strength (A/m) | Power density (mW/cm <sup>2</sup> ) | Averaging time (minutes) |
|---|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| (A) Limits for Occupational/Controlled Exposures        |                               |                               |                                     |                          |
| 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                        |
| 300–1500  |                               |                               | f/300                               | 6                        |
| 1500–100,000  |                               |                               | 5                                   | 6                        |
| (B) 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

Friis transmission formula:  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

**Pd** = power density in mW/cm<sup>2</sup>, **Pout** = output power to antenna in mW;

**G** = gain of antenna in linear scale, **Pi** = 3.1416;

**R** = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

### Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



## Test Result of RF Exposure Evaluation

### Tune-up Power

| Modulation Type | Frequency (MHz) | Output Power to antenna (dBm) | Output Power to antenna (mW) | Tune-up Power(dBm) ±1 | Maxmun Tune-up Power(dBm) |
|-----------------|-----------------|-------------------------------|------------------------------|-----------------------|---------------------------|
| GFSK            | 2404            | 11.60                         | 14.45                        | 11                    | 12                        |
|                 | 2445            | 11.18                         | 13.12                        | 11                    | 12                        |
|                 | 2478            | 10.47                         | 11.14                        | 10                    | 11                        |

| Frequency (MHz) | Output power to antenna (dBm) | Output power to antenna (mW) | Power Density at R=20cm (mW/cm²) | Limit (mW/cm²) | Result |
|-----------------|-------------------------------|------------------------------|----------------------------------|----------------|--------|
| 2404            | 12                            | 15.85                        | 0.02684                          | 1.0            | PASS   |
| 2445            | 12                            | 15.85                        | 0.02684                          | 1.0            | PASS   |
| 2478            | 11                            | 12.59                        | 0.02132                          | 1.0            | PASS   |

Remark: antenna gain=9.30 dBi