

Summation of RF exposure calculation

1. Power density at 20 cm of original **FCC ID:QV5MERCURY5E** equals to $S_1=0.531116 \text{ mW/cm}^2$ (Limit 0.61 mW/cm^2 for 915 MHz)

2. Power density at 20 cm of **FCC ID:PI403B** Bluetooth module calculation:

$$\text{The power density } P \text{ (mW/cm}^2\text{)} = P_T / 4\pi r^2$$

Limit for power density for general population/uncontrolled exposure is $P = 1 \text{ mW/cm}^2$ (for 2.4 GHz).

Conducted power given in FCC Grant is $0.0017 \text{ W}=2.3 \text{ dBm}$

Max antenna gain is 2 dBi

P_T is the transmitted power, which is equal to the peak transmitter output power 2.3 dBm plus maximum antenna gain 2 dBi, the maximum equivalent isotropically radiated power EIRP is

$$P_T = 2.3 \text{ dBm} + 2 \text{ dBi} = 4.3 \text{ dBm} = 2.7 \text{ mW}.$$

The power density at 20 cm calculated as follows:

$$S_2 = 2.7 \text{ mW} / 4\pi (20 \text{ cm})^2 = 0.0008 \text{ mW/cm}^2$$

3. Summation

When all the antennas are at least 20 cm away from the user but individual antennas cannot be separated by 20 cm from each other the following equation shall be fulfilled

$$S_1/\text{Limit} + S_2/\text{Limit} < 1, \text{ i.e.} \\ 0.531 \text{ mW/cm}^2 / 0.61 \text{ mW/cm}^2 + 0.0008 \text{ mW/cm}^2 / 1 \text{ mW/cm}^2 = 0.8715 < 1$$

Therefore, the LogiTag RFID reader including 2 approved modules complies with FCC RF exposure limit for mobile device for general population.