

MPE Analysis Report

The Equipment Under Test (EUT) is a Smart Garage Light (LED Lamp) which its function can be remote controlled by smartphone Apps via 2.4GHz wifi and Bluetooth BLE.

For Maximum Permissible Exposure (MPE) evaluation of the unit, the maximum power density at 20 cm from this transmitter shall be less than the General Population / Uncontrolled MPE limit in OET Bulletin 65 and meet the requirement listed in KDB447498.

1) For the 2.4GHz wifi portion of the unit, the measured powers among all the measured channels were within its production tolerance. The antenna gain is 2.4 dBi = 1.74 (num gain) and its maximum source-based time-averaging duty factor is 100%. From these data and its operating configuration, the exposed power density at a distance (R) of 20 cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

The EIRP radiated power
= conducted power (with maximum tolerance) + antenna gain
= 26 + 2.4 dBm
= 28.4 dBm (691.8 mW)

The radiated (EIRP) source-based time-averaging output power
= (691.8 * 1) mW
= 691.8 mW

The power density at 20 cm from the antenna
= $EIRP / 4\pi R^2$
= $691.8 / 4\pi R^2$
= 0.138 mW cm⁻²

2) For the Bluetooth portion of the unit, the measured powers among all the measured channels were within its production tolerance. The antenna gain is 2.4 dBi = 1.74 (num gain) and its maximum source-based time-averaging duty factor is 100%. From these data and its operating configuration, the exposed power density at a distance (R) of 20 cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

The EIRP radiated power
= conducted power (with maximum tolerance) + antenna gain
= 8 + 2.4 dBm
= 10.4 dBm (11 mW)

The radiated (EIRP) source-based time-averaging output power
= (11 * 1) mW
= 11 mW

The power density at 20 cm from the antenna
= $EIRP / 4\pi R^2$
= $11 / 4\pi R^2$
= 0.0022 mW cm⁻²

In the frequency range of 1,500 - 100,000MHz, the MPE limit is 1.0 mWcm⁻² for general population and uncontrolled exposure. As the measured power density at 20cm from the transmitter is lower than the MPE limit, the compliance to the MPE limit can be ensured by indicating the minimum 20cm separation between the transmitter's radiating structures and body of the user or nearby persons. The following RF exposure statement is proposed to be included in the user manual:

“ FCC RF Radiation Exposure Statement

Caution: To maintain compliance with the FCC’s RF exposure guidelines, place the unit at least 20cm from nearby persons.”

In addition, for this product with multiple transmitter and antenna (Bluetooth and WiFi), the requirement of Simultaneous Transmission evaluation has also been considered and has complied with the following conditions of the worse case;

$$\text{MPE1/Limit1} + \text{MPE2/Limit2} \leq 1$$

Thus,

$$\begin{array}{l} 0.0022/1 + 0.138/1 = 0.1402 \\ \text{Bluetooth} \quad \text{WiFi} \end{array}$$

It is concluded that no Simultaneous Transmission evaluation is required.