

INTERTEK TESTING SERVICES

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

The Equipment Under Test (EUT) is a Bluetooth 4.0 transceiver for a helicopter which operates in the frequency range 2402MHz to 2480MHz (40 channels with 2 MHz spacing). The EUT is powered by 1 x 11.1V Rechargeable battery.

There are two RF Modules into the Helicopter, one is embedded Bluetooth and other one is a plug in transceiver of RF2.4GHz respectively. The function of Bluetooth is for calibration. The EUT can be connected to the Smartphone via Bluetooth to finish the calibration procedure. Then the helicopter can enter into the other RF2.4GHz function part for normal controlling. When powering on the helicopter, the LED (red color) on the plane will be lighted. It can be controlled in flying forward, turning left and right by corresponding Controller. The helicopter can also be connected to the PC for data transfer function such as upgrading firmware.

Regarding the plug in RF2.4GHz module portion, which had been certified and granted.
(FCC ID: N4ZFLYSKYIA6B).

As per the measured data shown on the RF exposure of certified plug in Transceiver 2.4GHz RF (FCC ID: N4ZFLYSKYIA6B), the measured power is 15.346mW. The antenna gain is 2 dBi = 1.58 (num gain) From these data and its operating configuration – Mobile device, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

The Conducted Power = 15.346 mW

$$\begin{aligned}\text{The power density at 20cm} &= 15.346 * 1.58 / 4\pi R^2 \\ &= 0.00484 \text{ mW cm}^{-2}\end{aligned}$$

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For the 2.4GHz Bluetooth Transmission;

From these data and its operating configuration – Mobile device, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated according to OET Bulletin 65 as follow:

Antenna Type: Internal antenna

Antenna Gain: +0dBi

Nominal rated field strength: 94.5 dB μ V/m at 3m

Maximum allowed field strength of production tolerance: +/- 3dB

According to the KDB 447498:

Based on the Maximum allowed field strength of production tolerance was 97.5dB μ V/m at 3m in frequency 2.4GHz, thus;

The EIRP = $[(FS \cdot D)^2 \cdot 1000 / 30] = 1.687\text{mW}$

Conducted power = Radiated Power (EIRP) – Antenna Gain

So;

Maximum Conducted Power = 1.687mW.

The Conducted Power = 1.687 mW

The power density at 20cm = $1.687 \cdot 1 / 4\pi R^2$
= 0.00336 mW cm⁻²

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Per KDB 447498 D01 v05, simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on calculated or measured field strengths or power density, is ≤ 1.0 .

The MPE ratio for Certified RF2.4GHz Transmission can be calculated as follow:

$$\begin{aligned} &= \text{The power density at 20cm} / \text{MPE limit} \\ &= 0.00484 \text{ mW cm}^{-2} / 1.0 \text{ mW cm}^{-2} \\ &= 0.00484 \end{aligned}$$

The MPE ratio for Bluetooth Transmission can be calculated as follow:

$$\begin{aligned} &= \text{The power density at 20cm} / \text{MPE limit} \\ &= 0.00336 \text{ mW cm}^{-2} / 1.0 \text{ mW cm}^{-2} \\ &= 0.00336 \end{aligned}$$

$$\begin{aligned} &\text{The sum of the MPE ratios for all simultaneous transmitting antennas} \\ &= 0.00484 + 0.00336 \\ &= 0.0082 \end{aligned}$$

As the sum of MPE ratios for all simultaneous transmitting antennas is ≤ 1.0 , simultaneous transmission MPE test exclusion will be applied.

Conclusion

In frequency range of 1,500 - 100,000MHz, the MPE limit is 1.0 mWcm^{-2} for general population and uncontrolled exposure. As simultaneous transmission MPE test exclusion is applied and the measured power density at 20cm from all the standalone transmissions 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 base unit at least 20cm from nearby persons."