

INTERTEK TESTING SERVICES

RF Exposure report

The Equipment Under Test (EUT) is a R/C Helicopter, Model: VOYAGER-3 with 2.4GHz wireless transmission function operating in 2405-2479MHz and 5.8GHz wireless transmission function operating in 5733-5847MHz. The EUT is powered by rechargeable battery DC 29.6V. For more detailed features description, please refer to the user's manual.

The EUT have two 2.4GHz wireless modules which are FCS-RX701 and BT-2403A, and they can't operate simultaneously.

Each module of 2.4GHz Band has two antennas but operates on SISO mode only, if the receiver sensitivity has meet the internal limit valve, the antenna of EUT will auto transfer to the other antenna. 5.8GHz band only with one antenna.

Modulation Type: DSSS

Antenna Type: Integral antenna

Antenna Gain: 3dBi for both 2.4GHz wireless module FCS-RX701, BT-2403A and 5.8GHz wireless module

The nominal conducted output specified: 19.0dBm (Tolerance: +/- 3dB) for 2.4GHz wireless module FCS-RX701 and BT-2403A

The nominal conducted output specified: 1.0dBm (Tolerance: +/- 3dB) for 5.8GHz wireless module

The maximum tested conducted output power for 2.4GHz band is 20.47dBm and the minimum tested conducted output power for 2.4GHz band is 18.27dBm which are within the specified power.

The maximum tested radiated output power (e.i.r.p.) for 5.8GHz band is 4.4dBm and the minimum tested radiated output power (e.i.r.p.) for 5.8GHz band is 3.5dBm which are within the specified power.

According to FCC Part 2.1091, this unlicensed transmitting devices is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use,

According to the KDB 447498 and OET 65, the simple calculation as below:

For Maximum Permissible Exposure (MPE) evaluation of the product, the maximum power density at 20 cm from this transmitter shall be less than the General Population / Uncontrolled MPE limit in FCC Part 1.1310.

For 2.4GHz wireless modules which are FCS-RX701 and BT-2403A, the maximum E.I.R.P.=
 $19.0+3+3=25\text{dBm}=316.2\text{mW}$

The source-based time averaged maximum radiated power = $316.2 \times \text{Duty Cycle} =$

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316.2mW

From above data, 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:

$$= 316.2 / 4\pi R^2 \\ = 0.063 \text{mW/cm}^2$$

For 5.8GHz wireless modules, the maximum E.I.R.P= 1.0+3+3=7.0dBm=5.0mW

The source-based time averaged maximum radiated power = 10 x Duty Cycle = 5.0mW

From above data, 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:

$$= 5.0 / 4\pi R^2 \\ = 0.001 \text{mW/cm}^2$$

The MPE limit is 1.0 mW/cm² for general population and uncontrolled exposure in the Bluetooth frequency range according to FCC Part 1.1310. 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 structure and body of the user or nearby persons.

Transmitter Duty Cycle Calculation

The EUT transmit continuously during the test, the duty cycle is 100%.

For Simultaneous transmitting of 2.4GHz and 5.8GHz Band:

According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits = 0.063/1 + 0.001/1 = 0.064 < 1

The following RF exposure statement or similar sentence is proposed to be included in the user manual:

“FCC RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”