

INTERTEK TESTING SERVICES

Analysis Report

The equipment under test (EUT) is a Bluetooth module with BT 3.0+HS, 2.1+EDR function operating in 2402-2480MHz, and BT 4.1+LE function operating in 2402-2480MHz. The EUT is powered by DC 3.3V. For more detail information pls. refer to the user manual.

Modulation Type: GFSK, $\pi/4$ DQPSK, 8DPSK

Bluetooth Version: 4.1+LE and 3.0+HS, 2.1+EDR

Antenna Type: Integral antenna (Gain: 0 dBi)

The nominal conducted output power (e.i.r.p) specified: 10dBm (Tolerance: +/-3dB)

The maximum radiated emission for the EUT is 108.1dB μ V/m for BT4.1+LE at 3m in the frequency

$$2.402\text{GHz} = [(FS \cdot D)^2 / 30] \text{ mW}$$

= 12.9dBm which is within the production variation

The minimum radiated emission for the EUT is 105.0dB μ V/m for BT 3.0+HS, 2.1+EDR at 3m in the

$$\text{frequency } 2.441\text{GHz} = [(FS \cdot D)^2 / 30] \text{ mW}$$

= 9.8dBm which is within the production variation.

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.

The maximum radiated output power specified is 13dBm = 20mW

The source- based time-averaging radiated output power

$$= 20 \cdot \text{Duty cycle mW} \leq 20 \text{ mW (Duty Cycle} \leq 100\%)$$

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated as follow:

$$= 20 \text{ mW} / 4\pi R^2$$

$$= 0.004 \text{ mW/cm}^2$$

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.

The following RF exposure statement 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.”