

INTERTEK TESTING SERVICES

RF Exposure

The equipment under test (EUT) is a 2.1CH Soundbar with Wireless Subwoofer, Wireless Subwoofer with BT 5.0 EDR function operating in 2402-2480MHz and 2.4GHz Transmitter function operating in 2404-2476MHz. The EUT is powered by 120V/60Hz. For more detail information pls. refer to the user manual.

Standalone SAR evaluation for BT function

Bluetooth Version: 5.0

Antenna Type: Integral antenna

Antenna Gain: 6.0 dBi max

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

The nominal conducted output power specified: -4dBm (+/-4dB).

The nominal radiated output power (e.i.r.p) specified: 2dBm (+/- 4dB).

The maximum conducted output power for the EUT is -1.25dBm in the frequency 2402MHz which is within the production variation.

The minimum conducted output power for the EUT is -2.45dBm in the frequency 2441MHz 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:

The source-based time averaged maximum radiated power = 2dBm+4dB
= 6dBm = 3.981mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna for 2.4GHz BT band can be calculated according to OET 65 as follow:

= $3.981\text{mW} / 4\pi R^2$

= $0.0008\text{mW}/\text{cm}^2$

< $1\text{mW}/\text{cm}^2$

The MPE limit is $1.0 \text{ mW}/\text{cm}^2$ for general population and uncontrolled exposure in the 2.4GHz 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.

INTERTEK TESTING SERVICES

Standalone SAR evaluation for 2.4GHz transmitter

2.4GHz transmitter:

Antenna Type: Integral Antenna.

Antenna Gain: 1.5 dBi.

Modulation Type: GFSK.

The nominal conducted output power specified: -5.5dBm (+/-4dB)

The nominal radiated output power (e.i.r.p) specified: -4dBm (+/-4dB)

The minimum peak radiated emission for the EUT is 91.5dB μ V/m at 3m in the frequency 2404MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -3.73dBm

which is within the production variation.

The maximum peak radiated emission for the EUT is 91.0dB μ V/m at 3m in the frequency 2441MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = -4.23dBm

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:

The source-based time averaged maximum radiated power = 0dBm = 1.0mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna for 2.4GHz band can be calculated according to OET 65 as follow:

$$= 1.0\text{mW} / 4\pi R^2$$

$$= 0.0002 \text{ mW/cm}^2$$

$$< 1\text{mW/cm}^2$$

The MPE limit is 1.0 mW/cm² for general population and uncontrolled exposure in the 2.4GHz 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.

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Simultaneous Transmission SAR Evaluation

For Simultaneous transmitting of Bluetooth and 2.4GHz transmitter, According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits = $0.0008/1 + 0.0002/1 = 0.001 < 1$

Since the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in the device is ≤ 1.0 , the EUT is considered to satisfy MPE compliance for simultaneous transmission operations.

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.”