

RF Exposure

The equipment under test (EUT) is a 5.1 Ultra-Slim Surround Soundbar/5.1 Ultra-Slim Surround Soundbar System with Bluetooth FHSS technology operating in 2402-2480MHz and 5.8G Band function operating in 5729-5847MHz. There are two modules of Bluetooth. The EUT is powered by DC 24V/2.0A. For more detail information pls. refer to the user manual.

MPE for BT function: BT module: JL7102C6

Bluetooth Version: 5.3 EDR

Antenna Type: Integral antenna

Antenna Gain: 1.19 dBi max

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

The nominal conducted output power specified: 2.81dBm (+/-2dB).

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

According to the KDB 447498 V06:

The maximum peak radiated emission for the EUT is 100.5dB μ V/m at 3m in the frequency 2441MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = 5.27dBm
which is within the production variation.

The minimum peak radiated emission for the EUT is 99.6dB μ V/m at 3m in the frequency 2480MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = 4.37dBm
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 V06 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 6 dBm = 3.98 mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna for 5.3 EDR mode can be calculated according to OET 65 as follow:

$$= 3.98 \text{ mW} / 4\pi R^2$$

$$= 0.00079 \text{ mW/cm}^2$$

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

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

MPE for BT function: BT module: JL7106C6

Bluetooth Version: 5.3 EDR

Antenna Type: Integral antenna

Antenna Gain: 3.32 dBi max

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

The nominal conducted output power specified: 4.68dBm (+/-2dB).

The nominal radiated output power (e.i.r.p) specified: 8dBm (+/- 2dB).

According to the KDB 447498 V06:

The maximum peak radiated emission for the EUT is 104.3dB μ V/m at 3m in the frequency 2480MHz

The EIRP = $[(FS*D)^2 / 30]$ mW = 9.07dBm
which is within the production variation.

The minimum peak radiated emission for the EUT is 102.8dB μ V/m at 3m in the frequency 2402MHz

The EIRP = $[(FS*D)^2 / 30]$ mW = 7.57dBm
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 = 10 dBm = 10.00 mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna for 5.3 BLE mode can be calculated according to OET 65 as follow:

$$= 10.00 \text{ mW} / 4\pi R^2$$

$$= 0.00199 \text{ mW/cm}^2$$

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

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

MPE for 5.8G function:

Antenna Type: Integral antenna

Antenna Gain: 4.9 dBi max

Modulation Type: GFSK

The nominal conducted output power specified: -15.9dBm (+/-3dB).

The nominal radiated output power (e.i.r.p) specified: -11dBm (+/- 3dB).

According to the KDB 447498 V06:

The maximum peak radiated emission for the EUT is 85.3dB μ V/m at 3m in the frequency 5788MHz

The EIRP = $[(FS * D)^2 / 30]$ mW = -9.93dBm

which is within the production variation.

The minimum peak radiated emission for the EUT is 81.8dB μ V/m at 3m in the frequency 5847MHz

The EIRP = $[(FS * D)^2 / 30]$ mW = -13.43dBm

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 = -8 dBm = 0.16 mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna for 5.8G mode can be calculated according to OET 65 as follow:

$$= 0.16 \text{ mW} / 4\pi R^2$$

$$= 0.00003 \text{ mW/cm}^2$$

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

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

Simultaneous Transmission MPE

For Simultaneous transmitting of Bluetooth EDR and 5.8G function, According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits = $0.00079/1 + 0.00199/1 + 0.00003/1 = 0.00281 < 1$

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.”