

INTERTEK TESTING SERVICES

RF Exposure

The Equipment Under Test (EUT) is a STRENGTH PRO with 2.4GWi-Fi function operating at 2412-2462MHz and 5GWi-Fi function operating at 5150-5250MHz, 5250-5350MHz, 5470-5725MHz, 5725-5850MHz and Bluetooth 5.0 (Dual Mode: BR/EDR+BLE) function operating at 2402-2480MHz. The EUT is powered by AC120V/60Hz. For more detailed features description, please refer to the user's manual.

Bluetooth Version: 5.0 BR/EDR mode.

Antenna Type: Built-in rod antenna.

Antenna Gain: 1.42dBi.

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

The nominal conducted output power specified: 6.0dBm (+/-2dB)

The nominal radiated output power (e.i.r.p) specified: 7.42dBm (Tolerance: +/-2dB).

According to the KDB 447498 D04 v01:

The maximum peak radiated emission for the EUT is 102.5dB μ V/m at 3m in the frequency 2402MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = 7.27dBm
which is within the production variation.

The minimum peak radiated emission for the EUT is 100.0dB μ V/m at 3m in the frequency 2441MHz

The EIRP = $[(FS \cdot D)^2 / 30]$ mW = 4.77dBm
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 D04 v01 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 7.42dBm + 2dB = 9.42dBm = 8.75mW

At the distance (R) of 20cm to 40cm and in 0.3 GHz to 6 GHz, MPE Exclusion Threshold Level:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

The exemption threshold ERP limit is 3060mW for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1307. 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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Bluetooth Version: 5.0 BLE mode.

Antenna Type: Built-in rod antenna.

Antenna Gain: 1.42dBi.

Modulation Type: GFSK.

The nominal conducted output power specified: 3.0dBm (+/-2dB)

The nominal radiated output power (e.i.r.p) specified: 4.42dBm (Tolerance: +/-2dB).

According to the KDB 447498 D04 v01:

The maximum peak radiated emission for the EUT is 99.5dB μ V/m at 3m in the frequency 2402MHz

The EIRP = [(FS*D) ^2 / 30] mW = 4.27dBm

which is within the production variation.

The minimum peak radiated emission for the EUT is 96.4dB μ V/m at 3m in the frequency 2440MHz

The EIRP = [(FS*D) ^2 / 30] mW = 1.17dBm

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 D04 V01 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 4.42dBm + 2dB = 6.42dBm = 4.39mW

At the distance (R) of 20cm to 40cm and in 0.3 GHz to 6 GHz, MPE Exclusion Threshold Level:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

The exemption threshold ERP limit is 3060mW for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1307. 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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2.4GHz Wi-Fi:

Antenna Type: Built-in rod antenna.

Antenna Gain: 1.42dBi.

Modulation Type: BPSK, QPSK, 16QAM, 64QAM, CCK, DQPSK, DBPSK.

The nominal conducted output power specified: 20.5dBm (Tolerance: +/-4dB).

The nominal radiated output power (e.i.r.p) specified: 21.92dBm (Tolerance: +/-4dB).

The maximum conducted output power for the EUT is 24.3dBm in the frequency 2412MHz(IEEE 802.11G) which is within the production variation.

The minimum conducted output power for the EUT is 16.9dBm in the frequency 2462MHz 802.11b mode 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 D04 V01 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 21.92dBm + 4dB= 25.92dBm = 390.84mW

At the distance (R) of 20cm to 40cm and in 0.3 GHz to 6 GHz, MPE Exclusion Threshold Level:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

The exemption threshold ERP limit is 3060mW for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1307. 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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5GHz Wi-Fi:

Antenna Type: Built-in rod antenna.

Antenna Gain: 2.17dBi

Modulation Type: BPSK, QPSK, 16QAM, 64QAM, 256QAM.

The nominal conducted output power specified: 12.0dBm (Tolerance: +/-4dB).

The nominal radiated output power (e.i.r.p) specified: 14.17dBm (Tolerance: +/-4dB).

The maximum conducted output power for the EUT is 15.44dBm in the frequency 5825MHz(IEEE 802.11 N20) which is within the production variation.

The minimum conducted output power for the EUT is 9.69dBm in the frequency 5580MHz(IEEE 802.11 AC20) which is within the production variation.

According to FCC Part 2.1091, this unlicensed transmitting device is categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, According to the KDB 447498 D04 V01 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 14.17dBm + 4dBi = 18.17dBm = 65.61mW

At the distance (R) of 20cm to 40cm and in 0.3 GHz to 6 GHz, MPE Exclusion Threshold Level:

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases}$$

The exemption threshold ERP limit is 3060mW for general population and uncontrolled exposure in the 2.4GHz frequency range according to FCC Part 1.1307. 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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For Simultaneous transmitting of 2.4GHz WiFi and Bluetooth, According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE ratio = $390.84/3060 + 8.75/3060 = 0.1306 < 1$

For Simultaneous transmitting of 5GHz WiFi and Bluetooth, According to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE ratio = $65.61/3060 + 8.75/3060 = 0.0243 < 1$

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.”