

INTERTEK TESTING SERVICES

RF Exposure

The equipment under test (EUT) is an CS116K4 with Bluetooth 5.2 (dual-mode) function operating in 2402-2480MHz, 2.4G WIFI function operating in 2412-2462MHz and 5G WIFI function operating in 5150MHz~5250 MHz, 5250MHz~5350MHz, 5470MHz-5725MHZ, 5725MHz~5850MHz. The EUT is powered by DC 5V from an adapter. For more detail information please refer to the user manual.

EDR

Bluetooth Version: 5.2

Antenna Type: Metal antenna.

Antenna Gain: 2.68dBi.

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

The nominal conducted output power specified: 7dBm (Tolerance: +/-2dB).

The maximum conducted output power for the EUT is 8.34dBm in the frequency 2402MHz which is within the production variation.

The minimum conducted output power for the EUT is 6.40dBm in the frequency 2480MHz 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 = 9dBm +2.68dBi = 11.68dBm = 14.72mW

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:

$$= 14.72\text{mW} / 4\pi R^2$$

$$= 0.0029 \text{ mW/cm}^2$$

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

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

FCC ID: 2AYYS-CS116K4O

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BLE

Bluetooth Version: 5.2

Antenna Type: Metal antenna.

Antenna Gain: 2.68dBi.

The nominal conducted output power specified: 5dBm (Tolerance: +/-2dB).

The maximum conducted output power for the EUT is 5.95dBm in the frequency 2402MHz which is within the production variation.

The minimum conducted output power for the EUT is 4.72dBm in the frequency 2480MHz 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 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 7dBm +2.68dBi = 9.68dBm = 9.29mW

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:

$$= 9.29\text{mW} / 4\pi R^2$$

$$= 0.0018 \text{ mW/cm}^2$$

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

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

Antenna Type: Metal Antenna.

Antenna0 Gain: 2.91dBi. Antenna1 Gain: 1.64dBi. MIMO:5.31dBi

Modulation Type: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, CCK, DQPSK, DBPSK and DSSS.

The nominal conducted output power specified: 24dBm (Tolerance: +/-4dB).

The maximum conducted output power for the EUT is 27.8dBm in the frequency 2462MHz(IEEE 802.11ac-VHT20 SISO Ant0) which is within the production variation.

The minimum conducted output power for the EUT is 21.4dBm in the frequency 2437MHz(IEEE 802.11ac-VHT40 MIMO Ant1) 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 = 28dBm +5.31dBi = 33.31 dBm = 2142.89mW

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:

$$= 2142.89\text{mW} / 4\pi R^2$$

$$= 0.4265 \text{ mW/cm}^2$$

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

The MPE limit is 1.0 mW/cm² for general population and uncontrolled exposure in the WIFI 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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5GHz WiFi:

Antenna Type: Metal Antenna.

Antenna0 Gain: -0.42dBi. Antenna1 Gain: 0.54dBi. MIMO: 3.08dBi.

Modulation Type: BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, OFDM and OFDMA

The nominal conducted output power specified: 14dBm (Tolerance: +/-5dB).

The maximum conducted output power for the EUT is 18.70dBm in the frequency 5775MHz(IEEE 802.11ax-HE80) which is within the production variation.

The minimum conducted output power for the EUT is 9.70dBm in the frequency 5700MHz(IEEE 802.11ax-HE20) 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 = 19dBm +3.08dBi = 22.08dBm =161.44mW

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:

$$= 161.46\text{mW} / 4\pi R^2$$

$$= 0.0321 \text{ mW/cm}^2$$

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

The MPE limit is 1.0 mW/cm² for general population and uncontrolled exposure in the WIFI 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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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 limits = $0.4265/1 + 0.0029/1 = 0.4280 < 1$

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 limits = $0.0321/1 + 0.0029/1 = 0.0336 < 1$

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.”