

### RF Exposure

The equipment under test (EUT) is an OTT STICK with Bluetooth(dual-mode) function operating in 2402-2480MHz, 2.4G Wi-Fi function operating in 2412MHz~2462MHz, 5G Wi-Fi function operating in 5150MHz~5250MHz, 5250MHz~5350MHz, 5470MHz~5725MHz, 5725MHz~5850MHz. The EUT is powered by DC 5.0V, 1.0A from adapter. For more detail information pls. refer to the user manual.

#### EDR

Antenna Type: Internal antenna.

Antenna Gain 1: 2.66dBi.

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

The nominal conducted output power specified: 6.5dBm (Tolerance: +/-2dB).

The maximum conducted output power for the EUT is 8.22dBm in the frequency 2441MHz which is within the production variation.

The minimum conducted output power for the EUT is 5.07dBm 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 V06 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 8.5dBm + 2.66dBi = 11.16dBm = 13.06mW

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:  
=  $13.06\text{mW} / 4\pi R^2$   
=  $0.0026\text{mW}/\text{cm}^2$   
<  $1\text{mW}/\text{cm}^2$

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

BLE

Antenna Type: Internal antenna.

Antenna Gain 1: 2.66dBi.

The nominal conducted output power specified: 4dBm (Tolerance: +/-2dB).

The maximum conducted output power for the EUT is 5.30dBm in the frequency 2402MHz which is within the production variation.

The minimum conducted output power for the EUT is 4.42dBm 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 V06 and OET 65, the simple calculation is as below:

The source-based time averaged maximum radiated power = 6dBm+2.66dBi = 8.66dBm = 7.35mW

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 follows:  
=  $7.35\text{mW} / 4\pi R^2$   
= 0.0015 mW/cm<sup>2</sup>  
<1mW/cm<sup>2</sup>

The MPE limit is 1.0 mW/cm<sup>2</sup> 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.

2.4GHz Wi-Fi:

Antenna Type: Internal Antenna.

Antenna0 Gain: 2.54dBi, Antenna1 Gain: 2.66dBi, MIMO: 5.6dBi

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

The nominal conducted output power specified: 22dBm (Tolerance: +/-6dB).

The maximum conducted output power for the EUT is 28.0dBm in the frequency 2437MHz (IEEE 802.11N20MIMO) which is within the production variation.

The minimum conducted output power for the EUT is 16.3dBm in the frequency 2462MHz (IEEE 802.11B ANT1) 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 V06 and OET 65, the simple calculation is as below:

The source-based time averaged maximum radiated power = 28dBm + 5.6dBi = 33.6dBm = 2290.87mW

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 follows:  
=  $2290.87\text{mW} / 4\pi R^2$   
= 0.4560 mW/cm<sup>2</sup>  
<1mW/cm<sup>2</sup>

The MPE limit is 1.0 mW/cm<sup>2</sup> 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.

5GHz Wi-Fi:

Antenna Type: Internal Antenna.

Antenna Ant 0: 4.52dBi, Antenna Ant 1: 3.91dBi, MIMO: 7.2dBi

Modulation Type: OFDM and OFDMA.

The nominal conducted output power specified: 14dBm (Tolerance: +/-7dB).

The maximum conducted output power for the EUT is 20.1dBm in the frequency 5825MHz (IEEE 802.11 AC20 MIMO) which is within the production variation.

The minimum conducted output power for the EUT is 7.59dBm in the frequency 5510MHz\_UNII-3 (IEEE 802.11 N40 SISO ANT0) 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 V06 and OET 65, the simple calculation is as below:

The source-based time averaged maximum radiated power = 21dBm + 7.2dBi = 28.2dBm  
= 660.69mW

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 follows:  
=  $660.69\text{mW} / 4\pi R^2$   
=  $0.1315\text{mW}/\text{cm}^2$   
<  $1\text{mW}/\text{cm}^2$

The MPE limit is  $1.0\text{mW}/\text{cm}^2$  for general population and uncontrolled exposure in the 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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## INTERTEK TESTING SERVICES

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For Simultaneous transmitting of 2.4GHz Wi-Fi 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 =  $0.4560/1 + 0.0026/1 = 0.4586 < 1$

For Simultaneous transmitting of 5GHz Wi-Fi 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 =  $0.1315/1 + 0.0026/1 = 0.1341 < 1$

Since the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in the device is  $\leq 1.0$ , 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.”