

## Safety Human Exposure

### Radio Frequency Exposure Compliance

#### Electromagnetic Fields

RESULT:

Pass

##### Test Specification

Test standard : CFR47 FCC Part 2.1091  
RSS-102 Issue 5

Limit : CFR47 FCC Part 1.1310

**FCC requirement:** Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 20cm normally can be maintained between the user and the device.

##### MPE Calculation Method according to OET Bulletin 65

Power Density:  $S_{(mW/cm^2)} = PG/4\pi R^2$  or  $EIRP/4\pi R^2$

Where:

S = power density (mW/cm<sup>2</sup>)

P = power input to the antenna (mW)

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna (cm)

##### The maximum conducted output power specified:

Bluetooth: 7.0dBm

Wi-Fi 2.4GHz band: 16.0dBm

Wi-Fi 5GHz band: 15.0dBm

Antenna Gain = 2.0dBi for each antenna,

Antenna gain for MIMO (2Tx) =  $G_{ANT} + 10 \log(N)$  dBi =  $2 + 10 \log(2) = 5.0$ dBi.

From the RF output power, antenna gain, the max. exposed power density at a distance (R) of 20cm from the center of radiation of the antenna can be calculated as below:

For 2.4GHz Band:  $S_{(mW/cm^2)} = PG/4\pi R^2 = 0.025$ mW/cm<sup>2</sup>

For 5GHz Band:  $S_{(mW/cm^2)} = PG/4\pi R^2 = 0.020$ mW/cm<sup>2</sup>

**Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310:** 1.0 mW/cm<sup>2</sup>

For Simultaneous transmitting of Wi-Fi 2.4GHz and 5GHz Bands, according to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially results to the applicable frequency dependent MPE limits  
=  $0.025/1 + 0.020/1 = 0.045 < 1$

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.

**IC requirements:** The EUT shall comply with the requirement of RSS-102 section 2.5.2.

**Exemption from Routine Evaluation Limits – RF Exposure Evaluation**

RF exposure evaluation is required if the separation distance between the user and/or bystander and the device's radiating element is greater than 20 cm, except when the device operates as follows:  
at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than  $1.31 \times 10^{-2} f^{0.6834}$  W (adjusted for tune-up tolerance), where  $f$  is in MHz;

- RF exposure evaluation exempted power for 2.4GHz ISM band: 2.68 W
- RF exposure evaluation exempted power for 5GHz U-NII-1 band: 4.53 W
- RF exposure evaluation exempted power for 5GHz U-NII-3 band: 4.86 W

The maximum conducted output power and e.i.r.p. (0.126W for 2.4GHz band and 0.1W for 5GHz band) are far below the exempted power level, so the RF exposure evaluation is not required.

For Simultaneous transmitting of Wi-Fi 2.4GHz and 5GHz Bands, according to 865664D02 2.2 d) 1):

The sum of the ratios of the spatially results to the applicable frequency dependent MPE limits  
 $= 0.126/2.68 + 0.100/4.53 = 0.069 < 1$

The following RF exposure statement or similar sentence is proposed to be included in the user manual:

**“RF Radiation Exposure Statement Caution: This Transmitter must be installed to provide a separation distance of at least 20 cm from all persons.”**