6 Safety Human Exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT: **Pass**

Test Specification

Test standard : CFR47 FCC Part 2: Section 2.1091
CFR47 FCC Part 1: Section 1.1310
FCC KDB Publication 447498 v06
RSS-102 Issue 5 March 2019

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^2)

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 nominal maximum conducted output power specified:
802.11b/g/n: 18.70 dBm
BLuetooth Low Energy: 8.87 dBm

EUT with Antenna 1:
From the peak RF output power, the minimum mobile separation distance, d=20 cm, as well as the antenna gain (4.0 dBi 802.11b/g/n and Bluetooth Low Energy), the RF power density can be calculated as below:

For 802.11b/g/n: $\mathbf{S_{(mW/cm^2)}= PG/4\pi R^2 =}$ 0.037 mW/cm^2

For BLuetooth Low Energy: $\mathbf{S_{(mW/cm^2)}= PG/4\pi R^2 =}$ 0.004 mW/cm^2

Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310: 1.0 mW/cm2

EUT with Antenna 2:

From the peak RF output power, the minimum mobile separation distance, d=20 cm, as well as the antenna gain (3.7 dBi 802.11b/g/n and Bluetooth Low Energy), the RF power density can be calculated as below:

For 802.11b/g/n: $\mathbf{S_{(mW/cm^2)}= PG/4\pi R^2 =}$ 0.035 mW/cm^2

For BLuetooth Low Energy: $\mathbf{S_{(mW/cm^2)}= PG/4\pi R^2 =}$ 0.004 mW/cm^2

Limits for Maximum Permissible Exposure (MPE) according to FCC Part 1.1310: 1.0 mW/cm2

- **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 x 10^{-2} $f^{0.6834}$ W (adjusted for tune-up tolerance), where f is in MHz;

- RF exposure evaluation exempted power for2.4G DTS: 2.676 W

The nominal maximum conducted output power specified:

802.11b/g/n: 18.70 dBm

BLuetooth Low Energy: 8.87 dBm

Antenna Gain: 4.0 dBi 802.11b/g/n and Bluetooth Low Energy

The Max. e.i.r.p. for 802.11b/g/n: 22.7dBm = 0.186 W

The Max. e.i.r.p. for BLuetooth Low Energy: 12.8dBm = 0.019 W

Both e.i.r.p. for the 802.11b/g/n and BLuetooth Low Energy are less than the RF exposure evaluation exempted power. So RF exposure evaluation is not required.

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