RF Exposure

The Equipment Under Test (EUT) is a 120V Smart Switch with Wi-Fi function operating in 2412-2462MHz and Bluetooth 4.2 function operating in 2402-2480MHz. Wi-Fi and Bluetooth share an antenna while the Wi-Fi and Bluetooth can`t transmit at the same time. The EUT is powered by AC120V/60Hz. For more detailed features description, please refer to the user's manual.

Bluetooth Version: 4.2 BLE
Antenna Type: Integral antenna.
Antenna Gain: 3.74dBi.
Modulation Type: GFSK
The nominal conducted output power specified: 7.0dBm (+/-3dB).

The maximun conducted output power for the EUT is 7.67dBm in the frequency 2480MHz which is within the production variation.

The minimum conducted output power for the EUT is 6.66dBm in the frequency 2402MHz 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 =
7.0dBm+3dB+3.74dBi =13.74dBm= 23.66mW

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:
= 23.66mW/ 4πR^2
= 0.0047mW/cm^2
<1mW/cm^2

The MPE limit is 1.0 mW/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.

2.4GHz Wi-Fi:
Antenna Type: Integral Antenna.
Antenna Gain: 3.74dBi.
Modulation Type: BPSK, QPSK, 16QAM, 64QAM, CCK, DQPSK, DBPSK.
The nominal conducted output power specified: 16dBm (Tolerance: +/-5dB).

The maximun conducted output power for the EUT is 19.84dBm in the frequency 2462MHz(IEEE 802.11g) which is within the production variation.

The minimum conducted output power for the EUT is 11.77dBm in the frequency 2412MHz(IEEE 802.11b) 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 = 16dBm+5dB+3.74dBi =24.74dBm = 297.85mW

From above data, the exposed power density at a distance (R) of 20cm from the center of radiation of the antenna for 2.4GHz WIFI band can be calculated according to OET 65 as follow:
= 297.85mW/ 4πR^2
= 0.0593mW/cm^2
<1mW/cm^2

The MPE limit is 1.0 mW/cm^2 for general population and uncontrolled exposure in the 2.4GHz Wi-Fi 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.

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."