RF Exposure

The equipment under test (EUT) is a XAG FBV Smart Electric Valve Controller (Internal Antenna), XAG FBV Smart Electric Valve Controller (External Antenna) with Bluetooth function operating in 2402-2480MHz, 2.4G WIFI function operating in 2412-2462MHz. The EUT is powered by 3.65V with a rechargeable battery. For more detail information pls. refer to the user manual.

BLE
Bluetooth Version: 5.0
Antenna Type: PCB antenna.
Antenna Gain:

Antenna	Max Gain(dBi)
AN2400-PCB176BX (Internal Antenna)	5.6
AN2400-PCB176BX (External Antenna)	-1.05

The nominal conducted output power specified: 1dBm (Tolerance: +/-2dB).

The maximun conducted output power for the EUT is 1.71dBm in the frequency 2480MHz which is within the production variation.

The minimum conducted output power for the EUT is 0.95dBm 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 V06 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 3dBm+5.6dBi = 8.6dBm = 7.24mW

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:
= 7.24mW/ 4πR^2
= 0.0014 mW/cm^2
<1mW/cm^2

The MPE limit is 1.0 mW/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.

2.4GHz WiFi:
Antenna Type: PCB Antenna.
Antenna Gain:

Antenna	Max Gain(dBi)
AN2400-PCB176BX (Internal Antenna)	5.6
AN2400-PCB176BX (External Antenna)	-1.05

Modulation Type: BPSK, QPSK, 16QAM, 64QAM, 256QAM, CCK, DQPSK, DBPSK and DSSS.
The nominal conducted output power specified: 18dBm (Tolerance: +/-3dB).

The maximun conducted output power for the EUT is 20.7dBm in the frequency 2412MHz(IEEE 802.11g) which is within the production variation.

The minimum conducted output power for the EUT is 15.0dBm in the frequency 2462MHz(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 V06 and OET 65, the simple calculation as below:

The source-based time averaged maximum radiated power = 21dBm +5.6dBi = 26.6dBm = 457.1mW

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:
= 457.1mW/ 4πR^2
= 0.0910 mW/cm^2
<1mW/cm^2

The MPE limit is 1.0 mW/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.

Not support Simultaneous transmitting in 2.4GHz WiFi and Bluetooth.

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.”