

## RF EXPOSURE EVALUATION

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency(RF) Radiation as specified in §1.1307(b)

FCC ID: 2AQA6-H7050

### EUT Specification

|                                   |                                                                                                                                                                                                                                          |
|-----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EUT</b>                        | Smart LED Bulb                                                                                                                                                                                                                           |
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input type="checkbox"/> WLAN: 5.18GHz ~ 5.24GHz<br><input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz<br><input checked="" type="checkbox"/> Others: 2.402GHz~2.480GHz |
| <b>Device category</b>            | <input type="checkbox"/> Portable (<20cm separation)<br><input checked="" type="checkbox"/> Mobile (>20cm separation)<br><input type="checkbox"/> Others ____                                                                            |
| <b>Exposure classification</b>    | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )                                            |
| <b>Antenna diversity</b>          | <input type="checkbox"/> Single antenna<br><input checked="" type="checkbox"/> Multiple antennas<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input type="checkbox"/> Tx/Rx diversity           |
| <b>Max. output power</b>          | -1.495 dBm (0.0007W); 2.4G WIFI: 15.24dBm (0.0334W)                                                                                                                                                                                      |
| <b>Antenna gain (Max)</b>         | 1.5 dBi                                                                                                                                                                                                                                  |
| <b>Evaluation applied</b>         | <input checked="" type="checkbox"/> MPE Evaluation<br><input type="checkbox"/> SAR Evaluation                                                                                                                                            |

Limits for Maximum Permissible Exposure(MPE)

| Frequency Range(MHz)                                         | Electric Field Strength(V/m) | Magnetic Field Strength(A/m) | Power Density(mW/cm <sup>2</sup> ) | Average Time |
|--------------------------------------------------------------|------------------------------|------------------------------|------------------------------------|--------------|
| <b>(A) Limits for Occupational/Control Exposures</b>         |                              |                              |                                    |              |
| <b>300-1500</b>                                              | --                           | --                           | <b>F/300</b>                       | <b>6</b>     |
| <b>1500-100000</b>                                           | --                           | --                           | <b>5</b>                           | <b>6</b>     |
| <b>(B) Limits for General Population/Uncontrol Exposures</b> |                              |                              |                                    |              |
| <b>300-1500</b>                                              | --                           | --                           | <b>F/1500</b>                      | <b>6</b>     |
| <b>1500-100000</b>                                           | --                           | --                           | <b>1</b>                           | <b>30</b>    |

## Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

$P_d$  = Power density in  $mW/cm^2$

$P_{out}$  = output power to antenna in Mw

$G$  = gain of antenna in linear scale

$\pi = 3.1416$

$R$  = distance between observation point and center of the radiator in cm

$P_d$  the limit of MPE,  $1mW/cm^2$ . If we know the maximum gain of the antenna and total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

## Measurement Result

| Operating Mode | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm | Power density Limits ( $mW/cm^2$ ) |
|----------------|-------------------|----------------|-------------------|--------------------|--------------|-----------------------|------------------------------------|
|                | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | ( $mW/cm^2$ )         |                                    |
| 802.11b        | 2412              | 13.99          | 13.99 $\pm 1$     | 14.99              | 1.5          | 0.0089                | 1                                  |
|                | 2437              | 13.88          | 13.88 $\pm 1$     | 14.88              | 1.5          | 0.0086                | 1                                  |
|                | 2462              | 13.30          | 13.30 $\pm 1$     | 14.3               | 1.5          | 0.0076                | 1                                  |
| 802.11g        | 2412              | 13.38          | 13.38 $\pm 1$     | 14.38              | 1.5          | 0.0077                | 1                                  |
|                | 2437              | 14.84          | 14.84 $\pm 1$     | 15.84              | 1.5          | 0.0108                | 1                                  |
|                | 2462              | 14.58          | 14.58 $\pm 1$     | 15.58              | 1.5          | 0.0102                | 1                                  |
| 802.11n (HT20) | 2412              | 13.13          | 13.13 $\pm 1$     | 14.13              | 1.5          | 0.0073                | 1                                  |
|                | 2437              | 15.24          | 15.24 $\pm 1$     | 16.24              | 1.5          | 0.0118                | 1                                  |
|                | 2462              | 14.40          | 14.40 $\pm 1$     | 15.4               | 1.5          | 0.0097                | 1                                  |
| BLE            | 2402              | -1.534         | -1.534 $\pm 1$    | -0.534             | 1.5          | 0.0002                | 1                                  |
|                | 2440              | -1.495         | -1.495 $\pm 1$    | -0.495             | 1.5          | 0.0003                | 1                                  |
|                | 2480              | -1.890         | -1.890 $\pm 1$    | -0.89              | 1.5          | 0.0002                | 1                                  |

**For Transmit Simultaneously Max Result:**

**BLE+2.4G WIFI**

**Ratio:** BLE  $_{RF\ ratio}$  + 2.4G WIFI  $_{RF\ ratio}$  = **0.0118+0.0003=0.0121<1.0**