

## RF EXPOSURE EVALUATION

KDB 447498 D01 Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies v06.

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)

### EUT Specification

|                                   |                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>FCC ID</b>                     | 2A7VD-H703B                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>EUT</b>                        | Govee Outdoor Dots String Lights                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> BT: 2.402GHz ~ 2.480GHz<br><input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input type="checkbox"/> RLAN: 5.180GHz ~ 5.240GHz<br><input type="checkbox"/> RLAN: 5.260GHz ~ 5.320GHz<br><input type="checkbox"/> RLAN: 5.500GHz ~ 5.700GHz<br><input checked="" type="checkbox"/> RLAN: 5.745GHz ~ 5.825GHz<br><input type="checkbox"/> Others: |
| <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/cm2)<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm2)                                                                                                                                                                                                                                 |
| <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>Antenna gain (Max)</b>         | BLE: 3.77dBi<br>WiFi 2.4G: 3.98dBi                                                                                                                                                                                                                                                                                                                                                                  |
| <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 |
|-------------------------------------------------------|------------------------------|------------------------------|------------------------------------|--------------|
| (A) Limits for Occupational/Control Exposures         |                              |                              |                                    |              |
| 300-1500                                              | --                           | --                           | F/300                              | 6            |
| 1500-1000000                                          | --                           | --                           | 5                                  | 6            |
| (B) Limits for General Population/Uncontrol Exposures |                              |                              |                                    |              |
| 300-1500                                              | --                           | --                           | F/1500                             | 6            |
| 1500-1000000                                          | --                           | --                           | 1                                  | 30           |

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

Where

$P_d$  = Power density in mW/cm<sup>2</sup>

$P_{out}$  = 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<sup>2</sup>. 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.

## Max Measurement Result

| Operating Mode | Measured Power (dBm) | Tune up tolerance (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm (mW/ cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
|----------------|----------------------|-------------------------|--------------------------|--------------------|----------------------------------------------|--------------------------------------------|
| BLE            | 6.51                 | 6.51 ±1                 | 7.51                     | 3.77               | 0.0027                                       | 1                                          |
| WiFi 2.4G      | 17.89                | 17.89 ±1                | 18.89                    | 3.98               | 0.0385                                       | 1                                          |

## The simultaneous transmission for BLE + WiFi 2.4G:

$$\sum_i \frac{S_i}{S_{Limit,i}}$$

$$= S_{BLE} / S_{limit-BLE} + S_{WiFi 2.4G} / S_{limit-2.4G}$$

$$= 0.0027 / 1 + 0.0385 / 1$$

$$= 0.0412$$

$$< 1.0$$

**Result: PASS.**

