

## 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-H6841                                                                                                                                                                                                                                                                                                                                                                              |
| <b>EUT</b>                        | Govee Cone Tree 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 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            |
| 1500-100000                                           | --                           | --                           | 5                                  | 6            |
| (B) Limits for General Population/Uncontrol Exposures |                              |                              |                                    |              |
| 300-1500                                              | --                           | --                           | F/1500                             | 6            |
| 1500-100000                                           | --                           | --                           | 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 | Tune up tolerance | Max. Tune up Power | Linear Gian | Power density at 20cm  | Power density Limits (mW/cm <sup>2</sup> ) |
|----------------|----------------|-------------------|--------------------|-------------|------------------------|--------------------------------------------|
|                | (dBm)          | (dBm)             | (dBm)              | (dBi)       | (mW/ cm <sup>2</sup> ) |                                            |
| BLE            | 3.21           | 3.21 ±1           | 4.21               | 2.382       | 0.0011                 | 1                                          |
| WiFi 2.4G      | 16.42          | 16.42 ±1          | 17.42              | 2.500       | 0.0149                 | 1                                          |

## The Maximum simultaneous transmission for BLE+WiFi 2.4G ANT2:

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

$$= S_{BLE} / S_{limit-2.4} + S_{WLAN ANT2} / S_{limit-2.4}$$

$$= 0.0011 / 1 + 0.0149 / 1$$

$$= 0.016$$

$$< 1.0$$

**Result:** No Standalone SAR test is required.

