

## 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>                     | 2AQY4-027                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>EUT</b>                        | Smart WiFi Lock With Fob                                                                                                                                                                                                                                                                                                                                                                                     |
| <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 checked="" type="checkbox"/> Others: 13.56MHz |
| <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 checked="" type="checkbox"/> Single antenna<br><input 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: 1.21 dBi<br>Wi-Fi 2.4G: 3.28 dBi<br>NFC: 0dBi                                                                                                                                                                                                                                                                                                                                                           |
| <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                                              | E-Field strength (dBμV/m) | Max Output power (dBm) |
|-------------------------------------------------------------|---------------------------|------------------------|
| NFC                                                         | 47.27                     | -47.99                 |
| Max Output power=E-Field strength-95.2=47.27-95.2=-47.99dBm |                           |                        |
| Note: EIRP(dBm)=E(dBμV/m)-95.2                              |                           |                        |

| Operating Mode | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm  | Power density Limits  |
|----------------|----------------|-------------------|--------------------|--------------|------------------------|-----------------------|
|                | (dBm)          | (dBm)             | (dBm)              | (dBi)        | (mW/ cm <sup>2</sup> ) | (mW/cm <sup>2</sup> ) |
| BLE            | -1.77          | -1.77 ±1          | -0.77              | 1.21         | 0.0002                 | 1                     |
| WiFi 2.4G      | 12.62          | 12.62 ±1          | 13.62              | 3.28         | 0.0097                 | 1                     |
| NFC            | -47.99         | -47.99 ±1         | -46.99             | 0            | 0.0000000040           | 1                     |

Note: BT&WiFi&NFC cannot support simultaneous transmission.

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