

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

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC ID                     | 2AH9Q-K004002                                                                                                                                                                                                                                                                                                                                                                                                                        |
| EUT                        | xTool F2 Ultra                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Frequency band (Operating) | <input checked="" type="checkbox"/> BT: 2.402GHz ~ 2.480GHz<br><input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input checked="" type="checkbox"/> RLAN: 5.180GHz ~ 5.240GHz<br><input checked="" type="checkbox"/> RLAN: 5.260GHz ~ 5.320GHz<br><input checked="" type="checkbox"/> RLAN: 5.500GHz ~ 5.700GHz<br><input checked="" type="checkbox"/> RLAN: 5.745GHz ~ 5.825GHz<br><input type="checkbox"/> Others: |
| Device category            | <input type="checkbox"/> Portable (<20cm separation)<br><input checked="" type="checkbox"/> Mobile (>20cm separation)<br><input type="checkbox"/> Others ____                                                                                                                                                                                                                                                                        |
| Exposure classification    | <input type="checkbox"/> Occupational/Controlled exposure (S = 5mW/cm2)<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm2)                                                                                                                                                                                                                                                                  |
| Antenna diversity          | <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                                                                                                                                                                                                       |
| Antenna gain (Max)         | BLE: 1.72 dBi<br>Wi-Fi 2.4G: 3.22 dBi<br>WiFi 5.2G: 1.32dBi<br>WiFi 5.3G: 2.08dBi<br>WiFi 5.6G: 3.52dBi<br>WiFi 5.8G: 3.59dBi                                                                                                                                                                                                                                                                                                        |
| Evaluation applied         | <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 | Antenna Gain | Power density at 20cm  | Power density Limits (mW/cm <sup>2</sup> ) |
|----------------|----------------|-------------------|----|--------------------|--------------|------------------------|--------------------------------------------|
|                | (dBm)          | (dBm)             |    | (dBm)              | (dBi)        | (mW/ cm <sup>2</sup> ) |                                            |
| BLE            | 0.41           | 0.41              | ±1 | 0.41               | 1.72         | 0.0008                 | 1                                          |
| WiFi 2.4G      | 18.32          | 18.32             | ±1 | 18.32              | 3.22         | 0.0480                 | 1                                          |
| WiFi 5.2G      | 13.88          | 13.88             | ±1 | 13.88              | 1.32         | 0.0173                 | 1                                          |
| WiFi 5.3G      | 12.44          | 12.44             | ±1 | 12.44              | 2.08         | 0.0124                 | 1                                          |
| WiFi 5.6G      | 17.93          | 17.93             | ±1 | 17.93              | 3.52         | 0.0438                 | 1                                          |
| WiFi 5.8G      | 18.59          | 18.59             | ±1 | 18.59              | 3.59         | 0.0510                 | 1                                          |

## The Maximum simultaneous transmission for BLE+WiFi 5.8G

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

$$= S_{BLE} / S_{limit-2.4} + S_{wifi 5.8G} / S_{limit-2.4}$$

$$= 0.0008 / 1 + 0.0510 / 1$$

$$= 0.0518 < 1.0$$

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

## Shenzhen Anbotek Compliance Laboratory Limited

