



## CTC Laboratories, Inc.

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# Maximum Permissible Exposure Evaluation

FCC ID: 2AAOY-WTSD-MIX31K

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

|                            |                                                                                                                                                                                                                                                                                               |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Product Name               | WTSD-MIX31                                                                                                                                                                                                                                                                                    |
| Trade Mark                 | /                                                                                                                                                                                                                                                                                             |
| Model/Type reference       | WTSD-MIX31K                                                                                                                                                                                                                                                                                   |
| Listed Model(s)            | /                                                                                                                                                                                                                                                                                             |
| Frequency band (Operating) | <input checked="" type="checkbox"/> BT: 2.402GHz ~ 2.480GHz<br><input checked="" type="checkbox"/> BLE: 2.402GHz ~ 2.480GHz<br><input type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input type="checkbox"/> RLAN: 5.180GHz ~ 5.240GHz<br><input type="checkbox"/> RLAN: 5.745GHz ~ 5.825GHz |
| Device category            | <input type="checkbox"/> Portable (<5mm separation)<br><input type="checkbox"/> Mobile (>20cm separation)<br><input checked="" type="checkbox"/> fixed (>20cm separation)<br><input type="checkbox"/> Others                                                                                  |
| Exposure classification    | <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> )                                                                                                   |
| Antenna diversity          | <input checked="" type="checkbox"/> Single antenna<br><input type="checkbox"/> Multiple antenna<br><input type="checkbox"/> Tx diversity<br><input type="checkbox"/> Rx diversity<br><input type="checkbox"/> Tx/Rx diversity                                                                 |
| Antenna gain (Max)         | -0.58dBi                                                                                                                                                                                                                                                                                      |
| 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           |

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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:

| BLE  |                         |                           |                         |                          |                    |                                     |                                    |
|------|-------------------------|---------------------------|-------------------------|--------------------------|--------------------|-------------------------------------|------------------------------------|
| Type | Channel frequency (MHz) | Max. Measured Power (dBm) | Tune up tolerance (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm ( $mW/cm^2$ ) | Power density Limits ( $mW/cm^2$ ) |
| GFSK | 2402                    | -2.36                     | $-2 \pm 1$              | -1                       | -0.58              | 0.00014                             | 1                                  |
|      | 2440                    | -1.90                     | $-2 \pm 1$              | -1                       | -0.58              | 0.00014                             | 1                                  |
|      | 2480                    | -1.74                     | $-2 \pm 1$              | -1                       | -0.58              | 0.00014                             | 1                                  |

| BT             |                         |                           |                         |                          |                    |                                     |                                    |
|----------------|-------------------------|---------------------------|-------------------------|--------------------------|--------------------|-------------------------------------|------------------------------------|
| Type           | Channel frequency (MHz) | Max. Measured Power (dBm) | Tune up tolerance (dBm) | Max. Tune up Power (dBm) | Antenna Gain (dBi) | Power density at 20cm ( $mW/cm^2$ ) | Power density Limits ( $mW/cm^2$ ) |
| GFSK           | 2480                    | -1.61                     | $-1 \pm 1$              | 0                        | -0.58              | 0.00017                             | 1                                  |
| $\pi/4$ -DQPSK | 2480                    | -0.83                     | $0 \pm 1$               | 1                        | -0.58              | 0.00022                             | 1                                  |
| 8-DPSK         | 2480                    | -0.47                     | $0 \pm 1$               | 1                        | -0.58              | 0.00022                             | 1                                  |

Note: For a more detailed features description, please refer to the RF Test Report.

\*\*\*\*\*THE END\*\*\*\*\*