

## RF EXPOSURE EVALUATION

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)

FCC ID: **Z7OTD2100**

### EUT Specification

| EUT                               | Thermal Receipt Printer                                                                                                                                                                                                        |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input type="checkbox"/> WLAN: 5.18GHz ~ 5.32GHz / 5.50GHz ~ 5.70GHz<br><input type="checkbox"/> WLAN: 5.745GHz ~ 5825GHz<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/cm <sup>2</sup> )<br><input checked="" type="checkbox"/> General Population/Uncontrolled exposure (S=1mW/cm <sup>2</sup> )                                  |
| <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>Max. output power</b>          | 17.46dBm( 0.055718W)                                                                                                                                                                                                           |
| <b>Antenna gain (Max)</b>         | 2.18 dBi                                                                                                                                                                                                                       |
| <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 |
|--------------------------------------------------------------|------------------------------|------------------------------|------------------------------------|--------------|
| <b>(A) Limits for Occupational/Control Exposures</b>         |                              |                              |                                    |              |
| <b>300-1500</b>                                              | --                           | --                           | <b>F/300</b>                       | <b>6</b>     |
| <b>1500-100000</b>                                           | --                           | --                           | <b>5</b>                           | <b>6</b>     |
| <b>(B) Limits for General Population/Uncontrol Exposures</b> |                              |                              |                                    |              |
| <b>300-1500</b>                                              | --                           | --                           | <b>F/1500</b>                      | <b>6</b>     |
| <b>1500-100000</b>                                           | --                           | --                           | <b>1</b>                           | <b>30</b>    |

## Friis transmission formula: $P_d = \frac{P_{out} \cdot G}{4 \cdot \pi \cdot R^2}$

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.

## Measurement Result

| Test Channel | Measurement Peak Output Power(dBm) |         |              |              |
|--------------|------------------------------------|---------|--------------|--------------|
|              | 802.11b                            | 802.11g | 802.11n(H20) | 802.11n(H40) |
| Lowest       | 16.59                              | 13.11   | 13.21        | 13.01        |
| Middle       | 17.45                              | 13.86   | 13.86        | 13.31        |
| Highest      | 17.46                              | 14.03   | 13.87        | 13.62        |

| Operating Mode | Test Channel | Tune up tolerance (dBm) | Max tune up conducted power(dBm) | Output Peak power (mW) | Ant. Gain (dBi) | Ant. Gain (numeric) | Power density at 20cm (mW/cm <sup>2</sup> ) | Power density Limits (mW/cm <sup>2</sup> ) |
|----------------|--------------|-------------------------|----------------------------------|------------------------|-----------------|---------------------|---------------------------------------------|--------------------------------------------|
| 802.11b        | 1            | 16 ± 1                  | 17                               | 50.12                  | 2.18            | 1.652               | 0.016472                                    | 1                                          |
|                | 6            | 17 ± 1                  | 18                               | 63.10                  | 2.18            | 1.652               | 0.020737                                    | 1                                          |
|                | 11           | 17 ± 1                  | 18                               | 63.10                  | 2.18            | 1.652               | 0.020737                                    | 1                                          |
| 802.11g        | 1            | 13 ± 1                  | 14                               | 25.12                  | 2.18            | 1.652               | 0.008255                                    | 1                                          |
|                | 6            | 14 ± 1                  | 15                               | 31.62                  | 2.18            | 1.652               | 0.010393                                    | 1                                          |
|                | 11           | 14 ± 1                  | 15                               | 31.62                  | 2.18            | 1.652               | 0.010393                                    | 1                                          |
| 802.11n (H20)  | 1            | 13 ± 1                  | 14                               | 25.12                  | 2.18            | 1.652               | 0.008255                                    | 1                                          |
|                | 6            | 14 ± 1                  | 15                               | 31.62                  | 2.18            | 1.652               | 0.010393                                    | 1                                          |
|                | 11           | 14 ± 1                  | 15                               | 31.62                  | 2.18            | 1.652               | 0.010393                                    | 1                                          |
| 802.11n (H40)  | 3            | 13 ± 1                  | 14                               | 25.12                  | 2.18            | 1.652               | 0.008255                                    | 1                                          |
|                | 6            | 13 ± 1                  | 14                               | 25.12                  | 2.18            | 1.652               | 0.008255                                    | 1                                          |
|                | 9            | 13 ± 1                  | 14                               | 25.12                  | 2.18            | 1.652               | 0.008255                                    | 1                                          |

Signature



2015-01-19