

## 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: 2ABC5-E0004

### EUT Specification

|                                   |                                                                                                                                                                                                                                                                      |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>EUT</b>                        | <b>Android Tablet</b>                                                                                                                                                                                                                                                |
| <b>Frequency band (Operating)</b> | <input checked="" type="checkbox"/> WLAN: 2.412GHz ~ 2.462GHz<br><input checked="" type="checkbox"/> WLAN: 5.18GHz ~ 5.24GHz<br><input checked="" type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz<br><input checked="" type="checkbox"/> Others: 2.402GHz~2.480GHz (BLE) |
| <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>          | WiFi 2.4GHz : 14.02dBm (0.0252W)<br>WiFi 5.1G: 10.70dBm (0.0117W)<br>WiFi 5.8G: 12.06dBm (0.0161W)<br>BLE: 4.137dBm (0.0026W)                                                                                                                                        |
| <b>Antenna gain (Max)</b>         | WiFi 2.4G&BLE: 1.5 dBi<br>WiFi 5.1G&WiFi 5.8G: 1.23dBi                                                                                                                                                                                                               |
| <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: $P_d = \frac{P_{out} * G}{4 * \pi * R^2}$

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

### 2.4GHz WiFi & BT:

| Operating Mode | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm | Power density Limits ( $mW/cm^2$ ) |
|----------------|-------------------|----------------|-------------------|--------------------|--------------|-----------------------|------------------------------------|
|                | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | ( $mW/cm^2$ )         |                                    |
| 802.11b        | 2412              | 13.48          | 13.48±1           | 14.48              | 1.5          | 0.0079                | 1                                  |
|                | 2437              | 13.43          | 13.43±1           | 14.43              | 1.5          | 0.0078                | 1                                  |
|                | 2462              | 12.97          | 12.97±1           | 13.97              | 1.5          | 0.0070                | 1                                  |
| 802.11g        | 2412              | 14.02          | 14.02±1           | 15.02              | 1.5          | 0.0089                | 1                                  |
|                | 2437              | 13.65          | 13.65±1           | 14.65              | 1.5          | 0.0082                | 1                                  |
|                | 2462              | 13.55          | 13.55±1           | 14.55              | 1.5          | 0.0080                | 1                                  |
| 802.11n (HT20) | 2412              | 13.61          | 13.61±1           | 14.61              | 1.5          | 0.0081                | 1                                  |
|                | 2437              | 13.34          | 13.34±1           | 14.34              | 1.5          | 0.0076                | 1                                  |
|                | 2462              | 13.24          | 13.24±1           | 14.24              | 1.5          | 0.0075                | 1                                  |
| 802.11n (HT40) | 2422              | 13.61          | 13.61±1           | 14.61              | 1.5          | 0.0081                | 1                                  |
|                | 2437              | 13.19          | 13.19±1           | 14.19              | 1.5          | 0.0074                | 1                                  |
|                | 2452              | 13.22          | 13.22±1           | 14.22              | 1.5          | 0.0074                | 1                                  |
| BLE            | 2402              | 4.137          | 4.137±1           | 5.137              | 1.5          | 0.0009                | 1                                  |
|                | 2440              | 3.932          | 3.932±1           | 4.932              | 1.5          | 0.0009                | 1                                  |
|                | 2480              | 3.473          | 3.473±1           | 4.473              | 1.5          | 0.0008                | 1                                  |

### 5.1GHz &5.8GHz WiFi:

| Operating Mode | Channel Frequency | Measured Power | Tune up tolerance | Max. Tune up Power | Antenna Gain | Power density at 20cm  | Power density Limits  |
|----------------|-------------------|----------------|-------------------|--------------------|--------------|------------------------|-----------------------|
|                | (MHz)             | (dBm)          | (dBm)             | (dBm)              | (dBi)        | (mW/ cm <sup>2</sup> ) | (mW/cm <sup>2</sup> ) |
| 802.11a        | 5180              | 10.70          | 10.70±1           | 11.70              | 1.23         | 0.0039                 | 1                     |
|                | 5200              | 10.12          | 10.12±1           | 11.12              | 1.23         | 0.0034                 | 1                     |
|                | 5240              | 9.60           | 9.60±1            | 10.60              | 1.23         | 0.0030                 | 1                     |
| 802.11n20      | 5180              | 10.48          | 10.48±1           | 11.48              | 1.23         | 0.0037                 | 1                     |
|                | 5200              | 10.02          | 10.02±1           | 11.02              | 1.23         | 0.0033                 | 1                     |
|                | 5240              | 9.11           | 9.11±1            | 10.11              | 1.23         | 0.0027                 | 1                     |
| 802.11ac20     | 5180              | 10.32          | 10.32±1           | 11.32              | 1.23         | 0.0036                 | 1                     |
|                | 5200              | 9.84           | 9.84±1            | 10.84              | 1.23         | 0.0032                 | 1                     |
|                | 5240              | 9.17           | 9.17±1            | 10.17              | 1.23         | 0.0027                 | 1                     |
| 802.11n40      | 5190              | 9.21           | 9.21±1            | 10.21              | 1.23         | 0.0028                 | 1                     |
|                | 5230              | 8.64           | 8.64±1            | 9.64               | 1.23         | 0.0024                 | 1                     |
| 802.11ac40     | 5190              | 9.53           | 9.53±1            | 10.53              | 1.23         | 0.0030                 | 1                     |
|                | 5230              | 8.49           | 8.49±1            | 9.49               | 1.23         | 0.0023                 | 1                     |
| 802.11ac80     | 5210              | 9.44           | 9.44±1            | 10.44              | 1.23         | 0.0029                 | 1                     |
| 802.11a        | 5745              | 12.06          | 12.06±1           | 13.06              | 1.23         | 0.0053                 | 1                     |
|                | 5785              | 11.46          | 11.46±1           | 12.46              | 1.23         | 0.0047                 | 1                     |
|                | 5825              | 10.93          | 10.93±1           | 11.93              | 1.23         | 0.0041                 | 1                     |
| 802.11n20      | 5745              | 11.09          | 11.09±1           | 12.09              | 1.23         | 0.0043                 | 1                     |
|                | 5785              | 10.40          | 10.40±1           | 11.40              | 1.23         | 0.0036                 | 1                     |
|                | 5825              | 9.83           | 9.83±1            | 10.83              | 1.23         | 0.0032                 | 1                     |
| 802.11ac20     | 5745              | 11.54          | 11.54±1           | 12.54              | 1.23         | 0.0047                 | 1                     |
|                | 5785              | 10.61          | 10.61±1           | 11.61              | 1.23         | 0.0038                 | 1                     |
|                | 5825              | 9.83           | 9.83±1            | 10.83              | 1.23         | 0.0032                 | 1                     |
| 802.11n40      | 5755              | 10.52          | 10.52±1           | 11.52              | 1.23         | 0.0037                 | 1                     |
|                | 5795              | 9.43           | 9.43±1            | 10.43              | 1.23         | 0.0029                 | 1                     |
| 802.11ac40     | 5755              | 10.24          | 10.24±1           | 11.24              | 1.23         | 0.0035                 | 1                     |
|                | 5795              | 9.13           | 9.13±1            | 10.13              | 1.23         | 0.0027                 | 1                     |
| 802.11ac80     | 5775              | 10.42          | 10.42±1           | 11.42              | 1.23         | 0.0037                 | 1                     |

### Note:

**2.4G WiFi+BLE+5.1G WiFi +5.8G WiFi simultaneous ( worst case ):**

**0.0089+0.0009+0.0039+0.0053=0.0271 < 1**