

**FCC §15.247 (i), §2.1091 – RF Exposure****FCC ID: 2BFIZ-X5AD2****Applied procedures / limit**

According to FCC §15.247(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

**Limits for Occupational / Controlled Exposure**

| Frequency Range (MHz) | Electric Field Strength $E$ (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time $ E ^2,  H ^2$ or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------------|----------------------------------------------|
| 0.3-3.0               | 614                               | 1.63                              | (100)*                                   | 6                                            |
| 3.0-30                | 1842 / f                          | 4.89 / f                          | (900 / f)*                               | 6                                            |
| 30-300                | 61.4                              | 0.163                             | 1.0                                      | 6                                            |
| 300-1500              |                                   |                                   | F/300                                    | 6                                            |
| 1500-100,000          |                                   |                                   | 5                                        | 6                                            |

Note: f is frequency in MHz

\* = Power density limit is applicable at frequencies greater than 100 MHz

**Limits for General Population / Uncontrolled Exposure**

| Frequency Range (MHz) | Electric Field Strength $E$ (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/ cm <sup>2</sup> ) | Averaging Time $ E ^2,  H ^2$ or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|------------------------------------------|----------------------------------------------|
| 0.3-1.34              | 614                               | 1.63                              | (100)*                                   | 30                                           |
| 1.34-30               | 824/f                             | 2.19/f                            | (180/f)*                                 | 30                                           |
| 30-300                | 27.5                              | 0.073                             | 0.2                                      | 30                                           |
| 300-1500              |                                   |                                   | F/1500                                   | 30                                           |
| 1500-100,000          |                                   |                                   | 1.0                                      | 30                                           |

Note: f = frequency in MHz

\* = Plane-wave equivalent power density

## MPE PREDICTION

Predication of MPE limit at a given distance, Equation from OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S = power density

P = power input to antenna

G = power gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the center of radiation of the antenna, R=20cm

## Test Result of RF Exposure Evaluation

## Module1:

| Mode           | Modes& Channel Freq. (MHz) | Tune up Produce power | Maximum peak output power (dBm) | Output power to antenna (mW) | Antenna Gain (numeric) | Power Density (S) (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
|----------------|----------------------------|-----------------------|---------------------------------|------------------------------|------------------------|-----------------------------------------|-----------------------------|--------|
| EDR            | GFSK &2402                 | 3±1                   | 4                               | 2.5119                       | 1.5959 (2.03dBi)       | 0.00080                                 | 1                           | Pass   |
| BLE            | GFSK 2M&2402               | 3±1                   | 4                               | 2.5119                       | 1.5959 (2.03dBi)       | 0.00053                                 | 1                           | Pass   |
| 2.4G WIFI ANT1 | 802.11b& 2437              | 16±1                  | 17                              | 50.1187                      | 1.5631 (1.94dBi)       | 0.01559                                 | 1                           | Pass   |
| 2.4G WIFI ANT2 | 802.11b& 2462              | 17±1                  | 18                              | 63.0957                      | 3.0409 (4.83dBi)       | 0.03819                                 | 1                           | Pass   |
| 5.2G WIFI ANT1 | 802.11a20& 5200            | 17±1                  | 18                              | 63.095                       | 2.5003 (3.98dBi)       | 0.03140                                 | 1                           | Pass   |
| 5.2G WIFI ANT2 | 802.11a20& 5240            | 18±1                  | 19                              | 79.4328                      | 2.3823 (3.77dBi)       | 0.03977                                 | 1                           | Pass   |
| 5.8 WIFI ANT1  | 802.11a20& 5785            | 18±1                  | 19                              | 79.4328                      | 3.8107 (5.81dBi)       | 0.06025                                 | 1                           | Pass   |
| 5.8 WIFI ANT2  | 802.11a20& 5785            | 18±1                  | 19                              | 79.4328                      | 1.8323 (2.63dBi)       | 0.02897                                 | 1                           | Pass   |

## Module2

| Mode | Modes& Channel Freq. (MHz) | Tune up Produce power | Maximum peak output power (dBm) | Output power to antenna (mW) | Antenna Gain (numeric) | Power Density (S) (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
|------|----------------------------|-----------------------|---------------------------------|------------------------------|------------------------|-----------------------------------------|-----------------------------|--------|
| EDR  | GFSK &2402                 | 3±1                   | 4                               | 3.1623                       | 1.8030 (2.56dBi)       | 0.00090                                 | 1                           | Pass   |
| BLE  | GFSK 1M&2480               | 3±1                   | 4                               | 3.1623                       | 1.8030 (2.56dBi)       | 0.00090                                 | 1                           | Pass   |

BT+WIFI supported simultaneous transmission:

Module1 BT + Module1 2.4GWIFI + Module2 BT:

$\Sigma$  MPE Ratio =0.00080+0.03819+0.00090=0.03989 $\leq$ 1, So passed.

Module1 BT + Module1 5GWIFI + Module2 BT:

$\Sigma$  MPE Ratio =0.00080+0.06025+0.00090=0.06195 $\leq$ 1, So passed.

Note: 2.4GWIFI and 5GWIFI do not support simultaneous transmission.