

## FCC §15.247 (i), §2.1091 – RF Exposure

FCC ID: 2BAAR-AE211

### 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  <sup>2</sup> , H  <sup>2</sup> 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  <sup>2</sup> , H  <sup>2</sup> 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

|              | Modes&<br>Channel<br>Freq.<br>(MHz) | Tune up<br>Produce<br>power | Maximu<br>m peak<br>output<br>power<br>(dBm) | Output<br>power<br>to<br>antenna<br>(mW) | Antenna<br>Gain<br>(numeric) | Power<br>Density<br>(S)<br>(mW/<br>cm2) | Limit<br>(mW<br>/<br>cm2<br>) | Result |
|--------------|-------------------------------------|-----------------------------|----------------------------------------------|------------------------------------------|------------------------------|-----------------------------------------|-------------------------------|--------|
| BLE          | GFSK&<br>HCH                        | 8±1                         | 9                                            | 7.9433                                   | 1.4421<br>(1.59dBi)          | 0.0023                                  | 1                             | Pass   |
| EDR          | 8DPSK&<br>HCH                       | 3±1                         | 4                                            | 2.5119                                   | 1.4421<br>(1.59dBi)          | 0.0007                                  | 1                             | Pass   |
| 2.4G<br>WIFI | 802.11ax(<br>HE20)&<br>MCH          | 18±1                        | 19                                           | 79.4328                                  | 1.4421<br>(1.59dBi)          | 0.0228                                  | 1                             | Pass   |
| 5.2GWIFI     | 802.11ac4<br>0&5190                 | 14±1                        | 15                                           | 31.6228                                  | 2.6977<br>(4.31dBi)          | 0.017                                   | 1                             | Pass   |
| 5.8GWIFI     | 802.11ax4<br>0&5795                 | 14±1                        | 15                                           | 31.6228                                  | 2.7861<br>(4.45dBi)          | 0.0175                                  | 1                             | Pass   |

BT+WIFI supported simultaneous transmission:

BLE+2.4GWIFI:  $\sum \text{MPE Ratio} = 0.0023/1 + 0.0228/1 = 0.0251 \leq 1$ ,

BLE+5GWIFI:  $\sum \text{MPE Ratio} = 0.0023/1 + 0.0175/1 = 0.0198 \leq 1$ ,

So passed.