



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

## FCC ID: 2A4AS-2407A

### 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=0.2m

## TEST RESULTS

|            | Tune up<br>Produce<br>power | Maximum<br>output power<br>(dBm) | Output<br>power to<br>antenna<br>(mW) | Antenna Gain<br>(numeric) | Power<br>Density (S)<br>(mW/<br>cm <sup>2</sup> ) | Limit (mW<br>/ cm <sup>2</sup><br>) | Result |
|------------|-----------------------------|----------------------------------|---------------------------------------|---------------------------|---------------------------------------------------|-------------------------------------|--------|
| BT         | 8±1                         | 9                                | 7.943                                 | 1.73(2.39dBi)             | 0.002735                                          | 1                                   | Pass   |
| BLE        | 6±1                         | 7                                | 5.01                                  | 1.73(2.39dBi)             | 0.001725                                          | 1                                   | Pass   |
| 2.4G WIFI  | 12±1                        | 13                               | 19.95                                 | 1.73(2.39dBi)             | 0.006868                                          | 1                                   | Pass   |
| WCDMA-B2   | 23±1                        | 24                               | 251.19                                | 1.44(1.59dBi)             | 0.071981                                          | 1                                   | Pass   |
| WCDMA-B4   | 23±1                        | 24                               | 251.19                                | 1.42(1.51dBi)             | 0.070981                                          | 1                                   | Pass   |
| WCDMA-B5   | 22±1                        | 23                               | 199.53                                | 0.68(-1.69dBi)            | 0.027000                                          | 0.55                                | Pass   |
| LTE Band2  | 24±1                        | 25                               | 316.23                                | 1.44(1.59dBi)             | 0.090619                                          | 1                                   | Pass   |
| LTE Band4  | 24±1                        | 25                               | 316.23                                | 1.42(1.51dBi)             | 0.089360                                          | 1                                   | Pass   |
| LTE Band5  | 23±1                        | 24                               | 251.19                                | 0.68(-1.69dBi)            | 0.033991                                          | 0.55                                | Pass   |
| LTE Band12 | 23±1                        | 24                               | 251.19                                | 0.86(-0.65dBi)            | 0.042989                                          | 0.47                                | Pass   |
| LTE Band13 | 23±1                        | 24                               | 251.19                                | 0.64(-1.92dBi)            | 0.031992                                          | 0.52                                | Pass   |
| LTE Band14 | 23±1                        | 24                               | 251.19                                | 0.59(-2.3dBi)             | 0.029492                                          | 0.51                                | Pass   |
| LTE Band66 | 23±1                        | 24                               | 251.19                                | 1.42(1.51dBi)             | 0.070981                                          | 1                                   | Pass   |



|            |            |    |        |                |          |      |      |
|------------|------------|----|--------|----------------|----------|------|------|
| LTE Band71 | $23 \pm 1$ | 24 | 251.19 | 0.63(-2.01dBi) | 0.031492 | 0.41 | Pass |
|------------|------------|----|--------|----------------|----------|------|------|

**For the Max simultaneous transmission:**

WIFI+LTE

Simultaneous transmitting =  $0.006868 / 1 + 0.090619 / 1 = 0.097487 \leq 1.0$

For the max result :  $0.097487 \leq 1.0$ , compliance with FCC's RF Exposure