

## Maximum Permissible Exposure

FCC ID: 2AACS-ULT215

### Applicable Standard

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

#### (a) 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 Times   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                                                                      |
| 1500-100000           |                                   |                                   | 5                                       | 6                                                                      |

#### (b) 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 Times   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                                                                     |
| 1500-100000           |                                   |                                   | 1.0                                     | 30                                                                     |

Note: f=frequency in MHz; \*Plane-wave equivalent power density

### MPE Calculation Method

$$E \text{ (V/m)} = (30 * P * G)^{0.5} / d \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = E^2 / 377$$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = (30 * P * G) / (377 * d^2)$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

## Calculated Result and Limit

### Antenna Gain: 2.0dBi

WIFI:

| Antenna Gain<br>(Numeric) | Output Power (dBm) | Peak Output Power (mW) | Power Density (S)<br>(mW/cm <sup>2</sup> ) | Limit of Power Density (S)<br>(mW/cm <sup>2</sup> ) | Test Result |
|---------------------------|--------------------|------------------------|--------------------------------------------|-----------------------------------------------------|-------------|
| 1.585                     | 9.72               | 9.38                   | 0.003                                      | 1                                                   | Compiles    |

BT:

| Antenna Gain<br>(Numeric) | Output Power (dBm) | Peak Output Power (mW) | Power Density (S)<br>(mW/cm <sup>2</sup> ) | Limit of Power Density (S)<br>(mW/cm <sup>2</sup> ) | Test Result |
|---------------------------|--------------------|------------------------|--------------------------------------------|-----------------------------------------------------|-------------|
| 1.585                     | 1.44               | 1.4                    | 0.00044                                    | 1                                                   | Compiles    |

$$0.00044+0.003=0.00344<1$$

**Note: the worse case was recorded.**