

Appendix C. Maximum Permissible Exposure

FCC ID: XZB-MAXR954 Page No. : C1 of C3



1. Maximum Permissible Exposure

1.1. 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 levels 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 0.25 m 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/ cm²) | 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 | |

(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/ cm²) | 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

1.2. MPE Calculation Method

E (V/m) =
$$\frac{\sqrt{30 \times P \times G}}{d}$$
 Power Density: Pd (W/m²) = $\frac{E^2}{377}$

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

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

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.

FCC ID: XZB-MAXR954 Page No. : C2 of C3



Report No.: FR121723

1.3. Calculated Result and Limit

For 5GHz UNII Band:

Antenna Type: Dipole Antenna

Max Conducted Power for IEEE 802.11n 20MHz MCS8: 16.74dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Average Output Power (dBm) | Average Output Power (mW) | Power Density (S) (mW/cm²) | Limit of Power Density (\$) (mW/cm²) | Test Result |
|-----------------------|---------------------------|----------------------------------|---------------------------------|----------------------------------|--------------------------------------------|-------------|
| 3.80 | 2.3988 | 16.7445 | 47.2548 | 0.022563 | 1 | Complies |

For 5GHz ISM Band:

Antenna Type: Dipole Antenna

Max Conducted Power for IEEE 802.11n 20MHz MCS8: 22.06dBm

| Antenna Gain (dBi) | Antenna Gain (numeric) | Average Output Power (dBm) | Average Output Power (mW) | Power Density (S) (mW/cm²) | Limit of Power Density (S) (mW/cm²) | Test Result |
|-----------------------|---------------------------|----------------------------------|---------------------------------|----------------------------------|-------------------------------------------|-------------|
| 3.80 | 2.3988 | 22.0597 | 160.6821 | 0.076722 | 1 | Complies |

For 2.4GHz Band:

Antenna Type: Dipole Antenna

Max Conducted Power for IEEE 802.11b: 24.30 dBm

| Directional Antenna Gain (dBi) | Antenna Gain (numeric) | Average Output Power (dBm) | Average Output Power (mW) | Power Density (S) (mW/cm²) | Limit of Power Density (\$) (mW/cm²) | Test Result |
|--------------------------------------|---------------------------|----------------------------------|---------------------------------|----------------------------------|--------------------------------------------|-------------|
| 4.81 | 3.0271 | 24.3010 | 269.2177 | 0.162212 | 1 | Complies |

Note: Directional Antenna Gain = Test Antenna Gain + 10 log (Antenna quantity)

CONCULSION:

Both of the WLAN 2.4GHz Band and WLAN 5GHZ Band can transmit simultaneously, the formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 +etc. < 1

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is 0.076722 / 1 + 0.162212 / 1 = 0.238934, which isless than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

FCC ID: XZB-MAXR954 Page No. : C3 of C3