

14 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

14.1 Standard Applicable

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

This is a Mobile device, the MPE is required.

According to §1.1310 and §2.1093 RF exposure is calculated.

Limits for Maximum Permissive Exposure (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density (mW/cm ²) | Averaging Time (minute) |
|---|----------------------------------|----------------------------------|--|----------------------------|
| Limits for General Population/Uncontrolled Exposure | | | | |
| 0.3-1.34 | 614 | 1.63 | *(100) | 30 |
| 1.34-30 | 824/f | 2.19/f | *(180/f ²) | 30 |
| 30-300 | 27.5 | 0.073 | 0.2 | 30 |
| 300-1500 | / | / | F/1500 | 30 |
| 1500-15000 | / | / | 1.0 | 30 |

F = frequency in MHz

* = Plane-wave equipment power density

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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No.134,WuKungRoad,NewTaipeiIndustrialPark,WukuDistrict,NewTaipeiCity,Taiwan24803/新北市五股區新北產業園區五工路 134 號

t (886-2) 2299-3279

f (886-2) 2298-0488

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14.2 Maximum Permissible Exposure (MPE) Evaluation

| Frequency (MHz) | Output Power (dBm) | Output Power (mW) | Limit (mW) |
|-----------------|--------------------|-------------------|------------|
| 2412 | 14.00 | 25.12 | 1000 |
| 2437 | 14.10 | 25.70 | 1000 |
| 2462 | 14.06 | 25.47 | 1000 |

MPE Prediction (802.11b 2412~2462)

Prediction of MPE limit at a given distance

Equation from page 18 of 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

| | | |
|---|-----------|-----------------------|
| Maximum average output power at antenna input | 14.10 | (dBm) |
| Maximum average output power at antenna input | 25.703958 | (mW) |
| Duty cycle: | 100 | (%) |
| Maximum Pav : | 25.703958 | (mW) |
| Antenna gain (Maximum): | 2.8 | (dBi) |
| Antenna gain (linear): | 1.9054607 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 2437 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0097488 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.097488mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.

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| Frequency (MHz) | Output Power (dBm) | Output Power (mW) | Limit (mW) |
|-----------------|--------------------|-------------------|------------|
| 2412 | 11.99 | 15.81 | 1000 |
| 2437 | 11.99 | 15.81 | 1000 |
| 2462 | 11.75 | 14.96 | 1000 |

MPE Prediction (802.11g 2412~2462)

Prediction of MPE limit at a given distance

Equation from page 18 of 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

| | | |
|---|-----------|-----------------------|
| Maximum average output power at antenna input | 11.99 | (dBm) |
| Maximum average output power at antenna input | 15.81248 | (mW) |
| Duty cycle: | 100 | (%) |
| Maximum Pav : | 15.81248 | (mW) |
| Antenna gain (Maximum): | 2.8 | (dBi) |
| Antenna gain (linear): | 1.9054607 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 2412 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0059972 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0059972mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2412MHz.

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| Frequency (MHz) | Output Power (dBm) | Output Power (mW) | Limit (mW) |
|-----------------|--------------------|-------------------|------------|
| 2412 | 12.88 | 19.412 | 1000 |
| 2437 | 12.90 | 19.500 | 1000 |
| 2462 | 12.89 | 19.455 | 1000 |

MPE Prediction (802.11n_HT20 2412~2462) (MIMO)

Prediction of MPE limit at a given distance

Equation from page 18 of 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

| | | |
|---|-----------|-----------------------|
| Maximum average output power at antenna input | 12.90 | (dBm) |
| Maximum average output power at antenna input | 19.498446 | (mW) |
| Duty cycle: | 100 | (%) |
| Maximum Pav : | 19.498446 | (mW) |
| Antenna gain (Maximum): | 5.81 | (dBi) |
| Antenna gain (linear): | 3.8106582 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 2437 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0147894 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0147894mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.

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