

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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14.2 Maximum Permissible Exposure (MPE) Evaluation

802.11a Power Table

| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5180 | 9.68 | 0.00929 | 1 |
| 5220 | 9.18 | 0.00828 | 1 |
| 5240 | 8.85 | 0.00767 | 1 |
| 5745 | 9.08 | 0.00809 | 1 |
| 5785 | 8.58 | 0.00721 | 1 |
| 5825 | 7.83 | 0.00607 | 1 |

MPE Prediction (802.11a)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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 peak output power at antenna input terminal: | 9.68 | (dBm) |
| Maximum peak output power at antenna input terminal: | 9.289663868 | (mW) |
| Duty cycle: | 99 | (%) |
| Maximum Pav : | 9.196767229 | (mW) |
| Antenna gain (typical): | 2 | (dBi) |
| Maximum antenna gain: | 1.584893192 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5180 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0029013 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0029013mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 5180MHz.

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802.11n HT20 Power Table

| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5180 | 10.43 | 0.01104 | 1 |
| 5220 | 9.10 | 0.00813 | 1 |
| 5240 | 9.55 | 0.00902 | 1 |
| 5745 | 8.58 | 0.00721 | 1 |
| 5785 | 9.03 | 0.00800 | 1 |
| 5825 | 7.89 | 0.00615 | 1 |

MPE Prediction (802.11n_HT20)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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 peak output power at antenna input terminal: | 10.43 | (dBm) |
| Maximum peak output power at antenna input terminal: | 11.0407862 | (mW) |
| Duty cycle: | 99 | (%) |
| Maximum Pav : | 10.93037834 | (mW) |
| Antenna gain (typical): | 2 | (dBi) |
| Maximum antenna gain: | 1.584893192 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5180 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0034481 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0034481mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 5180MHz.

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802.11n HT40 Power Table

| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5190 | 8.55 | 0.00716 | 1 |
| 5230 | 8.07 | 0.00641 | 1 |
| 5755 | 8.41 | 0.00693 | 1 |
| 5795 | 9.06 | 0.00805 | 1 |

MPE Prediction (802.11n_HT40)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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 peak output power at antenna input terminal: | 9.06 | (dBm) |
| Maximum peak output power at antenna input terminal: | 8.053784412 | (mW) |
| Duty cycle: | 99 | (%) |
| Maximum Pav : | 7.973246568 | (mW) |
| Antenna gain (typical): | 2 | (dBi) |
| Maximum antenna gain: | 1.584893192 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5795 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0025153 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0025153mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 5795MHz.

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