

MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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

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Maximum Permissible Exposure (MPE) Evaluation

| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5180 | 13.84 | 0.0242 | 0.2500 |
| 5220 | 13.86 | 0.0243 | 0.2500 |
| 5240 | 13.72 | 0.0236 | 0.2500 |
| 5260 | 13.97 | 0.0249 | 0.2099 |
| 5300 | 13.64 | 0.0231 | 0.2094 |
| 5320 | 13.74 | 0.0237 | 0.2094 |

MPE Prediction (802.11a 5150~5350)

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 terminal: | 13.97 | (dBm) |
| Maximum average output power at antenna input terminal: | 24.94594727 | (mW) |
| Duty cycle: | 98.6 | (%) |
| Maximum Pav : | 24.59670401 | (mW) |
| Antenna gain (Maximum): | 2.96 | (dBi) |
| Antenna gain (linear): | 1.97696964 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5260 | (MHz) |
| MPE limit for uncontrolled exposure at prediction frequency: | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) distance | 0.0096789 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0096789 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5260MHz.

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| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5180 | 12.91 | 0.0195 | 0.2500 |
| 5220 | 12.97 | 0.0198 | 0.2500 |
| 5240 | 12.71 | 0.0187 | 0.2500 |
| 5260 | 12.83 | 0.0192 | 0.2239 |
| 5300 | 12.76 | 0.0189 | 0.2239 |
| 5320 | 12.83 | 0.0192 | 0.2239 |

MPE Prediction (802.11n_HT20 5150~5350)

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 terminal: | 12.97 | (dBm) |
| Maximum average output power at antenna input terminal: | 19.81527026 | (mW) |
| Duty cycle: | 98.3 | (%) |
| Maximum Pav : | 19.47841066 | (mW) |
| Antenna gain (Maximum): | 2.96 | (dBi) |
| Antenna gain (linear): | 1.97696964 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5220 | (MHz) |
| MPE limit for uncontrolled exposure at prediction frequency: | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) distance | 0.0076649 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0076649 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5220MHz.

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| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5500 | 13.97 | 0.0249 | 0.2089 |
| 5580 | 13.84 | 0.0242 | 0.2099 |
| 5700 | 13.7 | 0.0234 | 0.2094 |

MPE Prediction (802.11a 5470~5725)

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 peak output power at antenna input terminal: | 13.97 | (dBm) |
| Maximum peak output power at antenna input terminal: | 24.94594727 | (mW) |
| Duty cycle: | 98.6 | (%) |
| Maximum Pav : | 24.59670401 | (mW) |
| Antenna gain (Maximum): | 2.91 | (dBi) |
| Antenna gain (linear): | 1.954339456 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5500 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0095681 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0095681 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5500MHz.

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| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5500 | 12.97 | 0.0198 | 0.2239 |
| 5580 | 12.95 | 0.0197 | 0.2234 |
| 5700 | 12.76 | 0.0189 | 0.2239 |

MPE Prediction (802.11n_HT20 5470~5725)

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 peak output power at antenna input terminal: | 12.97 | (dBm) |
| Maximum peak output power at antenna input terminal: | 19.81527026 | (mW) |
| Duty cycle: | 98.3 | (%) |
| Maximum Pav : | 19.47841066 | (mW) |
| Antenna gain (Maximum): | 2.91 | (dBi) |
| Antenna gain (linear): | 1.954339456 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5500 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0075771 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0075771 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5500MHz.

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| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5745 | 13.78 | 0.0239 | 1 |
| 5785 | 13.9 | 0.0245 | 1 |
| 5825 | 13.97 | 0.0249 | 1 |

MPE Prediction (802.11a 5725~5850)

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 peak output power at antenna input terminal: | 13.97 | (dBm) |
| Maximum peak output power at antenna input terminal: | 24.94594727 | (mW) |
| Duty cycle: | 98.6 | (%) |
| Maximum Pav : | 24.59670401 | (mW) |
| Antenna gain (Maximum): | 2.11 | (dBi) |
| Antenna gain (linear): | 1.625548756 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5825 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0079584 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0079584 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5825MHz.

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| Frequency (MHz) | Output Power (dBm) | Output Power (W) | Limit (W) |
|-----------------|--------------------|------------------|-----------|
| 5745 | 12.79 | 0.0190 | 1 |
| 5785 | 12.96 | 0.0198 | 1 |
| 5825 | 12.96 | 0.0198 | 1 |

MPE Prediction (802.11n_HT20 5725~5850)

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 peak output power at antenna input terminal: | 12.96 | (dBm) |
| Maximum peak output power at antenna input terminal: | 19.7696964 | (mW) |
| Duty cycle: | 98.3 | (%) |
| Maximum Pav : | 19.43361156 | (mW) |
| Antenna gain (Maximum): | 2.11 | (dBi) |
| Antenna gain (linear): | 1.625548756 | (numeric) |
| Prediction distance: | 20 | (cm) |
| Prediction frequency: | 5785 | (MHz) |
| MPE limit for uncontrolled exposure at prediction | 1 | (mW/cm ²) |
| Power density at predication frequency at 20 (cm) | 0.0062879 | (mW/cm ²) |

Measurement Result

The predicted power density level at 20 cm is 0.0062879 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5785MHz.

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