

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 Permissible 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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14.2 Maximum Permissible Exposure (MPE) Evaluation

802.11b Power Table

Frequency (MHz)	Reading Power (dBm)
2412.00	12.64
2437.00	12.46
2462.00	12.43

MPE Prediction (802.11b)

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	12.64	(dBm)
Maximum average output power at antenna input	18.36538343	(mW)
Duty cycle:	96.7	(%)
Maximum Pav :	17.75932578	(mW)
Antenna gain (typical):	3.22	(dBi)
Maximum antenna gain:	2.098939884	(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)	0.007420	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.007420mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2412MHz.

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802.11g Power Table

Frequency (MHz)	Reading Power (dBm)
2412.00	12.28
2437.00	12.37
2462.00	12.43

MPE Prediction (802.11g)

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	12.43	(dBm)
Maximum average output power at antenna input	17.49846689	(mW)
Duty cycle:	95.3	(%)
Maximum Pav :	16.67603894	(mW)
Antenna gain (typical):	3.22	(dBi)
Maximum antenna gain:	2.098939884	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.006967	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.006967mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2462.

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802.11n_20M (2.4G) Power Table

Frequency (MHz)	Reading Power (dBm)
2412.00	12.38
2437.00	12.32
2462.00	12.11

MPE Prediction (802.11n_20M (2.4G))

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	12.32	(dBm)
Maximum average output power at antenna input	17.06082389	(mW)
Duty cycle:	94.9	(%)
Maximum Pav :	16.19072187	(mW)
Antenna gain (typical):	3.22	(dBi)
Maximum antenna gain:	2.098939884	(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)	0.006764	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.006764mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437.

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802.11n_40M (2.4G) Power Table

Frequency (MHz)	Reading Power (dBm)
2422.00	11.24
2437.00	11.15
2452.00	10.89

MPE Prediction (802.11n_40M (2.4G))

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	11.24	(dBm)
Maximum average output power at antenna input	13.30454418	(mW)
Duty cycle:	92	(%)
Maximum Pav :	12.24018065	(mW)
Antenna gain (typical):	3.22	(dBi)
Maximum antenna gain:	2.098939884	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2422	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.005114	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.005114mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2422.

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