

13 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

13.1 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

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13.2 Maximum Permissible Exposure (MPE) Evaluation

802.11b Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2412.00	16.65	16.65	0.04624	1
2437.00	16.55	16.55	0.04519	1
2462.00	16.66	16.66	0.04635	1

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 peak output power at antenna input terminal:	16.66	(dBm)
Maximum peak output power at antenna input terminal:	46.34469197	(mW)
Duty cycle:	100	(%)
Maximum Pav :	46.34469197	(mW)
Antenna gain (typical):	2.88	(dBi)
Maximum antenna gain:	1.940885878	(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)	0.0179040	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.01790 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2462MHz.

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802.11g Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2412.00	16.43	16.43	0.04395	1
2437.00	16.61	16.61	0.04581	1
2462.00	16.72	16.72	0.04699	1

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 peak output power at antenna input terminal:	16.72	(dBm)
Maximum peak output power at antenna input terminal:	46.98941086	(mW)
Duty cycle:	100	(%)
Maximum Pav :	46.98941086	(mW)
Antenna gain (typical):	2.88	(dBi)
Maximum antenna gain:	1.940885878	(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)	0.0181531	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.01815mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2462MHz.

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802.11n_HT20MHz Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2412.00	16.35	16.35	0.04315	1
2437.00	16.79	16.79	0.04775	1
2462.00	16.74	16.74	0.04721	1

MPE Prediction (802.11n_20M)

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:	16.79	(dBm)
Maximum peak output power at antenna input terminal:	47.75292737	(mW)
Duty cycle:	100	(%)
Maximum Pav :	47.75292737	(mW)
Antenna gain (typical):	2.88	(dBi)
Maximum antenna gain:	1.940885878	(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)	0.0184480	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.01884 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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