

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	17.85	17.85	0.006095	1
2437.00	17.98	17.98	0.006281	1
2462.00	18.02	18.02	0.006339	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:	18.02	(dBm)
Maximum peak output power at antenna input terminal:	63.38697113	(mW)
Duty cycle:	100	(%)
Maximum Pav :	63.38697113	(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)	0.0244878	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0244878 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	24.42	24.42	0.027667	1
2437.00	24.88	24.88	0.030761	1
2462.00	24.60	24.60	0.028840	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:	24.88	(dBm)
Maximum peak output power at antenna input terminal:	307.6096815	(mW)
Duty cycle:	100	(%)
Maximum Pav :	307.6096815	(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)	0.1188366	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.1188366mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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802.11n_HT20MHz Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2412.00	24.47	24.47	0.027990	1
2437.00	24.68	24.68	0.029376	1
2462.00	24.52	24.52	0.028376	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:	24.68	(dBm)
Maximum peak output power at antenna input terminal:	293.7649652	(mW)
Duty cycle:	100	(%)
Maximum Pav :	293.7649652	(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)	0.1134881	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.1134881 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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