

1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

1.1 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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1.2 Maximum Permissible Exposure (MPE) Evaluation

2412MHz, Target: 7 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 8 dBm

2437MHz, Target: 6 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 7 dBm

2462MHz, Target: 5 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 6 dBm

Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)
2412	7.03	5.047	1000
2437	6.24	4.207	1000
2462	5.87	3.864	1000

MPE Prediction (802.11b 2412~2462)

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	8.00	(dBm)
Maximum average output power at antenna input	6.3095734	(mW)
Duty cycle:	100	(%)
Maximum Pav :	6.3095734	(mW)
Antenna gain (Maximum):	5	(dBi)
Antenna gain (linear):	3.1622777	(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)	0.0039715	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0040 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2412MHz.

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Maximum Permissible Exposure (MPE) Evaluation

2412MHz, Target: 12 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 13 dBm

2437MHz, Target: 12 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 13 dBm

2462MHz, Target: 10 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 11 dBm

Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)
2412	12.83	19.187	1000
2437	12.71	18.663	1000
2462	10.07	10.162	1000

MPE Prediction (802.11g 2412~2462)

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	13.00	(dBm)
Maximum average output power at antenna input	19.952623	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.952623	(mW)
Antenna gain (Maximum):	5	(dBi)
Antenna gain (linear):	3.1622777	(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)	0.0125589	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0126 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2412MHz.

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Maximum Permissible Exposure (MPE) Evaluation

2412MHz, Target: 11 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 12 dBm

2437MHz, Target: 12 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 13 dBm

2462MHz, Target: 9 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 10 dBm

Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)
2412	11.62	14.521	1000
2437	12.93	19.633	1000
2462	9.01	7.962	1000

MPE Prediction (802.11n-HT20 2412~2462)

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	13.00	(dBm)
Maximum average output power at antenna input	19.952623	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.952623	(mW)
Antenna gain (Maximum):	5	(dBi)
Antenna gain (linear):	3.1622777	(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)	0.0125589	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0126 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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Maximum Permissible Exposure (MPE) Evaluation

2422MHz, Target: 11 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 12 dBm

2437MHz, Target: 12 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 13 dBm

2452MHz, Target: 9 dBm, Max. Rated Avg. Power + Max. Tolerance (± 1 dBm): 10 dBm

Frequency (MHz)	Output Power (dBm)	Output Power (mW)	Limit (mW)
2422	11.97	15.740	1000
2437	12.98	19.861	1000
2452	9.12	8.166	1000

MPE Prediction (802.11n-HT40 2422~2452)

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	13.00	(dBm)
Maximum average output power at antenna input	19.952623	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.952623	(mW)
Antenna gain (Maximum):	5	(dBi)
Antenna gain (linear):	3.1622777	(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)	0.0125589	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0126 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2437MHz.

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