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

Maximum Permissible Exposure (MPE) Evaluation

802.11b (Main)

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		1	
1	2412	18.11	0.79 Watt = 28.98 dBm
6	2437	**19.89**	0.79 Watt = 28.98 dBm
11	2462	19.27	0.79 Watt = 28.98 dBm

MPE Prediction (802.11b (Main))

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	19.89	(dBm)
Maximum average output power at antenna input	97.49896377	(mW)
Duty cycle:	99.3	(%)
Maximum Pav :	96.81647103	(mW)
Antenna gain (Maximum):	7.02	(dBi)
Antenna gain (linear):	5.035006088	(numeric)
Prediction distance:	100	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.003881	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.00388mW/cm^2. This is below the uncontrolled exposure limit of 1mW/cm^2 at 2437MHz.

802.11g (Main)

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		6	
1	2412	15.40	0.79 Watt = 28.98 dBm
6	2437	**20.94**	0.79 Watt = 28.98 dBm
11	2462	13.94	0.79 Watt = 28.98 dBm

MPE Prediction (802.11g (Main))

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	20.94	(dBm)
Maximum average output power at antenna input	124.1652308	(mW)
Duty cycle:	96.1	(%)
Maximum Pav :	119.3227868	(mW)
Antenna gain (Maximum):	7.02	(dBi)
Antenna gain (linear):	5.035006088	(numeric)
Prediction distance:	100	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.004783	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.00478mW/cm2. This is below the uncontrolled exposure limit of 1mW/cm2 at 2437MHz.

802.11n_20M (MIMO Chain 0+1)

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS8	
1	2412	15.07	0.40 Watt = 25.97dBm
6	2437	20.22	0.40 Watt = 25.97dBm
11	2462	16.05	0.40 Watt = 25.97dBm

MPE Prediction (802.11 n_20M (MIMO Chain 0+1))

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	20.22	(dBm)
Maximum average output power at antenna input	105.1961874	(mW)
Duty cycle:	92.7	(%)
Maximum Pav :	97.5168657	(mW)
Antenna gain (Maximum):	10.03	(dBi)
Antenna gain (linear):	10.06931669	(numeric)
Prediction distance:	100	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.007818	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.00782mW/cm2. This is below the uncontrolled exposure limit of 1mW/cm2 at 2437MHz.

802.11n_40M (MIMO Chain 0+1)

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS8	
1	2422	13.93	0.41 Watt = 26.11dBm
6	2437	20.30	0.41 Watt = 26.11dBm
11	2452	13.68	0.41 Watt = 26.11dBm

MPE Prediction (802.11 n_40M (MIMO Chain 0+1))

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	20.3	(dBm)
Maximum average output power at antenna input	107.1519305	(mW)
Duty cycle:	89.9	(%)
Maximum Pav :	96.32958554	(mW)
Antenna gain (Maximum):	10.03	(dBi)
Antenna gain (linear):	10.06931669	(numeric)
Prediction distance:	100	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.007723	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.00772mW/cm2. This is below the uncontrolled exposure limit of 1mW/cm2 at 2437MHz.