

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

1.2 MAXIMUM PERMISSIBLE EXPOSURE (MPE) EVALUATION

802.11b (Aux)

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		1	
1	2412	20.72	0.82 Watt = 29.12 dBm
6	2437	25.64	0.82 Watt = 29.12 dBm
11	2462	21.73	0.82 Watt = 29.12 dBm

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		1	
1	2412	18.07	0.82 Watt = 29.12 dBm
6	2437	23.55	0.82 Watt = 29.12 dBm
11	2462	19.30	0.82 Watt = 29.12 dBm

MPE Prediction (802.11b (Aux))

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

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 terminal:	25.64	(dBm)
Maximum average output power at antenna input terminal:	366.4375746	(mW)
Duty cycle:	100	(%)
Maximum Pav :	366.4375746	(mW)
Antenna gain (typical):	6.88	(dBi)
Maximum antenna gain:	4.875284901	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.355591	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.355591mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.

802.11g (Aux)

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		6	
1	2412	18.46	0.82 Watt = 29.12 dBm
6	2437	24.73	0.82 Watt = 29.12 dBm
11	2462	18.50	0.82 Watt = 29.12 dBm

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		6	
1	2412	15.57	0.82 Watt = 29.12 dBm
6	2437	21.81	0.82 Watt = 29.12 dBm
11	2462	15.65	0.82 Watt = 29.12 dBm

MPE Prediction (802.11g (Aux))

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 terminal:	24.73	(dBm)
Maximum average output power at antenna input terminal:	297.1666032	(mW)
Duty cycle:	100	(%)
Maximum Pav :	297.1666032	(mW)
Antenna gain (typical):	6.88	(dBi)
Maximum antenna gain:	4.875284901	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.288370	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.288370mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.

802.11n_20M (MIMO Chain 0+1)

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS8	
1	2412	21.16	0.41 Watt = 26.11dBm
6	2437	25.46	0.41 Watt = 26.11dBm
11	2462	20.92	0.41 Watt = 26.11dBm

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS8	
1	2412	17.92	0.41 Watt = 26.11dBm
6	2437	22.49	0.41 Watt = 26.11dBm
11	2462	18.19	0.41 Watt = 26.11dBm

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	25.46	(dBm)
Maximum average output power at antenna input	351.5604405	(mW)
Duty cycle:	100	(%)
Maximum Pav :	351.5604405	(mW)
Antenna gain (typical):	6.88	(dBi)
Maximum antenna gain:	4.875284901	(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)	0.341154	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.341154mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.

802.11n_40M (MIMO Chain 0+1)

		Peak Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS8	
1	2422	13.85	1 Watt = 30 dBm
6	2437	25.02	1 Watt = 30 dBm
11	2452	14.37	1 Watt = 30 dBm

		Average Power Output (dBm)	
CH	Frequency (MHz)	Data Rate	Required Limit
		MCS8	
1	2422	11.03	1 Watt = 30 dBm
6	2437	22.36	1 Watt = 30 dBm
11	2452	11.59	1 Watt = 30 dBm

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

$$S = \frac{PG}{4\pi R^2}$$

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 terminal:	25.02	(dBm)
Maximum average output power at antenna input terminal:	317.6874071	(mW)
Duty cycle:	100	(%)
Maximum Pav :	317.6874071	(mW)
Antenna gain (typical):	6.88	(dBi)
Maximum antenna gain:	4.875284901	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.308284	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.308284mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.