

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

		Peak Power Output (dBm)				
CH	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412	13.46	13.34	12.78	13.39	1 Watt = 30 dBm
6	2437	14.17	14.11	14.07	14.02	1 Watt = 30 dBm
11	2462	14.12	14.10	14.11	14.09	1 Watt = 30 dBm
		Average Power Output (dBm)				
CH	Frequency (MHz)	Data Rate				Required Limit
		1	2	5.5	11	
1	2412	10.97	10.99	10.96	10.82	1 Watt = 30 dBm
6	2437	11.25	11.21	11.18	11.13	1 Watt = 30 dBm
11	2462	11.21	11.13	11.02	10.95	1 Watt = 30 dBm

**Note: Measured by power meter, cable loss as 11dB that offsets on the power meter.*

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 avg output power at antenna input	11.25	(dBm)
Maximum peak avg output power at antenna input	13.33521432	(mW)
Duty cycle:	100	(%)
Maximum Pav :	13.33521432	(mW)
Antenna gain (typical):	3	(dBi)
Maximum antenna gain:	1.995262315	(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)	0.005296	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.005296mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.

802.11g

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412	19.84	19.56	20.20	19.36	20.38	19.83	18.79	19.06	1 Watt = 30 dBm
6	2437	20.45	20.43	20.36	20.16	20.26	20.22	20.15	20.07	1 Watt = 30 dBm
11	2462	20.32	20.30	20.28	20.21	20.23	20.11	19.83	19.70	1 Watt = 30 dBm
		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		6	9	12	18	24	36	48	54	
1	2412	11.32	11.27	11.33	11.30	11.09	10.93	10.02	10.05	1 Watt = 30 dBm
6	2437	11.17	11.13	11.10	10.98	10.75	10.64	10.41	10.22	1 Watt = 30 dBm
11	2462	10.91	10.83	10.69	10.64	10.37	10.24	10.12	9.99	1 Watt = 30 dBm

**Note: Measured by power meter, cable loss as 11dB that offsets on the power meter.*

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 avg output power at antenna input	11.33	(dBm)
Maximum peak avg output power at antenna input	13.58313447	(mW)
Duty cycle:	100	(%)
Maximum Pav :	13.58313447	(mW)
Antenna gain (typical):	3	(dBi)
Maximum antenna gain:	1.995262315	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2412	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.005394	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.005394mW/cm2. This is below the uncontrolled exposure limit of 1mW/cm2 at 2412MHz.

802.11n_20M

		Peak Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	18.52	18.66	18.81	19.04	17.86	19.03	16.85	16.40	1 Watt = 30 dBm
6	2437	20.46	20.13	19.83	19.56	18.26	18.21	17.65	16.86	1 Watt = 30 dBm
11	2462	20.30	20.02	19.76	19.41	18.11	17.96	17.24	16.83	1 Watt = 30 dBm
		Average Power Output(dBm)								
CH	Frequency (MHz)	Data Rate								Required Limit
		MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	
1	2412	10.46	10.33	10.35	10.73	9.55	9.52	7.65	7.56	1 Watt = 30 dBm
6	2437	11.45	11.23	11.05	10.86	8.93	8.72	7.83	7.43	1 Watt = 30 dBm
11	2462	11.34	11.06	10.86	10.31	9.15	8.56	7.72	7.23	1 Watt = 30 dBm

**Note: Measured by power meter, cable loss as 11dB that offsets on the power meter.*

MPE Prediction (802.11 n_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:	11.45	(dBm)
Maximum peak output power at antenna input terminal:	13.96368361	(mW)
Duty cycle:	100	(%)
Maximum Pav :	13.96368361	(mW)
Antenna gain (typical):	3	(dBi)
Maximum antenna gain:	1.995262315	(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)	0.005546	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.005546mW/cm². This is below the uncontrolled exposure limit of 1mW/cm² at 2437MHz.