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

Cable loss = 0		Peak Power Output				
CH	**Frequency (MHz)**	**Data Rate**				**Required Limit**
		1	**2**	**5.5**	**11**	
1	**2412**	**11.48**	11.42	11.39	11.35	**1 Watt = 30 dBm**
6	**2437**	9.98	9.92	9.87	9.84	**1 Watt = 30 dBm**
11	**2462**	10.48	10.46	10.44	10.40	**1 Watt = 30 dBm**
Cable loss = 0		Average Power Output				
CH	**Frequency (MHz)**	**Data Rate**				**Required Limit**
		1	**2**	**5.5**	**11**	
1	**2412**	9.11	9.05	8.98	8.91	**1 Watt = 30 dBm**
6	**2437**	7.74	7.55	7.34	7.24	**1 Watt = 30 dBm**
11	**2462**	8.58	8.42	8.35	8.28	**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 output power at antenna input terminal:	11.84	(dBm)
Maximum peak output power at antenna input terminal:	15.27566058	(mW)
Duty cycle:	99.7	(%)
Maximum Pav :	15.2298336	(mW)
Antenna gain (typical):	0.3	(dBi)
Maximum antenna gain:	1.071519305	(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)	0.003248	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.003248mW/cm^2. This is below the uncontrolled exposure limit of 1mW/cm^2 at 2412MHz.

802.11g

Cable loss = 0		Peak Power Output								Required Limit
CH	**Frequency (MHz)**	**Data Rate**								
		6	**9**	**12**	**18**	**24**	**36**	**48**	**54**	
1	**2412**	**18.15**	17.91	17.71	17.51	17.31	17.10	16.87	16.58	**1 Watt = 30 dBm**
6	**2437**	15.66	15.50	15.31	15.12	14.91	14.76	14.57	14.42	**1 Watt = 30 dBm**
11	**2462**	13.79	13.73	13.62	13.54	13.43	13.34	13.26	13.17	**1 Watt = 30 dBm**
Cable loss = 0		Average Power Output								Required Limit
CH	**Frequency (MHz)**	**Data Rate**								
		6	**9**	**12**	**18**	**24**	**36**	**48**	**54**	
1	**2412**	8.98	8.64	8.29	7.94	7.58	7.22	6.78	6.51	**1 Watt = 30 dBm**
6	**2437**	7.48	7.08	6.69	6.30	5.90	5.51	5.10	4.52	**1 Watt = 30 dBm**
11	**2462**	7.93	7.62	7.28	6.91	6.55	6.20	5.82	5.56	**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 output power at antenna input terminal:	18.15	(dBm)
Maximum peak output power at antenna input terminal:	65.31305526	(mW)
Duty cycle:	98.4	(%)
Maximum Pav :	64.26804638	(mW)
Antenna gain (typical):	0.3	(dBi)
Maximum antenna gain:	1.071519305	(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)	0.013707	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.013707mW/cm2. This is below the uncontrolled exposure limit of 1mW/cm2 at 2412MHz.

802.11n_20M

Cable loss = 0		Peak Power Output								
CH	Frequency (MHz)	Data Rate								Required Limit
		6.5	13	19.5	26	39	52	58.5	65	
1	2412	**17.61**	16.96	16.30	15.61	14.95	14.32	13.69	12.55	1 Watt = 30 dBm
6	2437	15.68	15.13	14.57	14.04	13.52	12.99	12.47	11.65	1 Watt = 30 dBm
11	2462	13.82	13.48	13.04	12.62	12.19	11.77	11.32	11.06	1 Watt = 30 dBm
Cable loss = 0		Average Power Output								
CH	Frequency (MHz)	Data Rate								Required Limit
		6.5	13	19.5	26	39	52	58.5	65	
1	2412	8.63	7.79	7.00	6.19	5.35	4.55	3.72	2.25	1 Watt = 30 dBm
6	2437	7.71	6.89	6.08	5.22	4.38	3.55	2.74	1.23	1 Watt = 30 dBm
11	2462	7.82	7.11	6.29	5.43	4.57	3.70	2.86	2.14	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

$S = PG/4 \ R^2$

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:	17.61	(dBm)
Maximum peak output power at antenna input terminal:	57.67664634	(mW)
Duty cycle:	98.3	(%)
Maximum Pav :	56.69614335	(mW)
Antenna gain (typical):	0.3	(dBi)
Maximum antenna gain:	1.071519305	(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)	0.012092	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.012092mW/cm2. This is below the uncontrolled exposure limit of 1mW/cm2 at 2412MHz.