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

Internal Antenna

802.11b Power Table

Frequency (MHz)	Reading Power (dBm)
2412.00	19.10
2437.00	19.63
2462.00	**19.92**

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 average output power at antenna input	19.92	(dBm)
Maximum average output power at antenna input	98.1747943	(mW)
Duty cycle:	99	(%)
Maximum Pav :	97.1930464	(mW)
Antenna gain (typical):	4.25	(dBi)
Maximum antenna gain:	2.66072506	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.051474	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.051474 mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2 at 2462MHz.

802.11g Power Table

Frequency (MHz)	Reading Power (dBm)
2412.00	14.35
2437.00	**14.38**
2462.00	14.22

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 average output power at antenna input	14.38	(dBm)
Maximum average output power at antenna input	27.4157417	(mW)
Duty cycle:	98	(%)
Maximum Pav :	26.8674269	(mW)
Antenna gain (typical):	4.25	(dBi)
Maximum antenna gain:	2.66072506	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.014229	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.014229 mW/cm2. This is below the uncontrolled exposure limit of 1 mW/cm2 at 2437.

802.11n_20M (2.4G) MIMO Chain 0+Chain 1Power Table

Frequency (MHz)	Reading Power (dBm)
2412.00	15.01
2437.00	16.22
2462.00	**16.42**

MPE Prediction (802.11n_20M (2.4G))

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	16.42	(dBm)
Maximum average output power at antenna input	43.8530698	(mW)
Duty cycle:	97	(%)
Maximum Pav :	42.5374777	(mW)
Antenna gain (typical):	7.26	(dBi)
Maximum antenna gain:	5.32108259	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.045053	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.045053 mW/cm2. This is below the uncontrolled exposure limit of 1 mW/cm2 at 2462.

802.11n_40M (2.4G) MIMO Chain 0+Chain 1Power Table

Frequency (MHz)	Reading Power (dBm)
2422.00	14.15
2437.00	**15.21**
2452.00	14.54

MPE Prediction (802.11n_40M (2.4G))

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	15.21	(dBm)
Maximum average output power at antenna input	33.1894458	(mW)
Duty cycle:	93	(%)
Maximum Pav :	30.8661846	(mW)
Antenna gain (typical):	7.26	(dBi)
Maximum antenna gain:	5.32108259	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.032691	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.032691 mW/cm2. This is below the uncontrolled exposure limit of 1 mW/cm2 at 2437.

Remark: For RF exposure potentially generating from Co-located transmitter, please reference to the section of collocated MPE analysis, Report No.: ER/2015/20030.