

# 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 §2.1091 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 <sup>2</sup> )	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 <sup>2</sup> )	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

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## 1.2 Maximum Permissible Exposure (MPE) Evaluation

802.11b Aux1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	1	12.76	1 Watt = 30.00 dBm	PASS
6	2437	1	13.03	1 Watt = 30.00 dBm	PASS
11	2462	1	13.40	1 Watt = 30.00 dBm	PASS

### MPE Prediction (802.11b 2412~2462)

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

Max. output power including tune-up tolerance:	13.40	(dBm)
Max. output power including tune-up tolerance:	21.877616	(mW)
Duty cycle:	98.86	(%)
Maximum Pav :	21.628211	(mW)
Peak Antenna gain (Maximum):	4.06	(dBi)
Peak Antenna gain (linear):	2.5468303	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm) distance:	0.011	(mW/cm <sup>2</sup> )

### Measurement Result

The predicted power density level at 20 cm is 0.011 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 2462MHz.

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### 1.3 Maximum Permissible Exposure (MPE) Evaluation

802.11g Aux1						
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit		RESULT
1	2412	6	11.81	1 Watt =	30.00 dBm	PASS
6	2437	6	11.89	1 Watt =	30.00 dBm	PASS
11	2462	6	11.97	1 Watt =	30.00 dBm	PASS

#### MPE Prediction (802.11g 2412~2462)

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

Max. output power including tune-up tolerancel:	11.97	(dBm)
Max. output power including tune-up tolerancel:	15.739829	(mW)
Duty cycle:	93.39	(%)
Maximum Pav :	14.699426	(mW)
Peak Antenna gain (Maximum):	4.06	(dBi)
Peak Antenna gain (linear):	2.5468303	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm) distance	0.007	(mW/cm <sup>2</sup> )

#### Measurement Result

The predicted power density level at 20 cm is 0.007 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 2462MHz.

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### 1.4 Maximum Permissible Exposure (MPE) Evaluation

802.11n_HT20M Aux1					
CH	Freq. (MHz)	Data Rate	Max. Avg. Output include tune up tolerance Power (dBm)	Limit	RESULT
1	2412	MCS0	10.89	1 Watt = 30.00 dBm	PASS
6	2437	MCS0	10.94	1 Watt = 30.00 dBm	PASS
11	2462	MCS0	10.98	1 Watt = 30.00 dBm	PASS

#### MPE Prediction (802.11n20 2412~2462)

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

Max. output power including tune-up tolerance:	10.98	(dBm)
Max. output power including tune-up tolerance:	12.531412	(mW)
Duty cycle:	92.62	(%)
Maximum Pav :	11.606594	(mW)
Peak Antenna gain (Maximum):	4.06	(dBi)
Peak Antenna gain (linear):	2.5468303	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2462	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm <sup>2</sup> )
Power density at prediction frequency at 20 (cm) distance:	0.006	(mW/cm <sup>2</sup> )

#### Measurement Result

The predicted power density level at 20 cm is 0.006 mW/cm<sup>2</sup>.

This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 2462MHz.

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