

# 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 <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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**Maximum Permissible Exposure (MPE) Evaluation (worst case)**

CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	11.45	13.96	1 Watt = 30
6	2437	1	<b>13.64</b>	23.12	1 Watt = 30
11	2462	1	11.67	14.69	1 Watt = 30

**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:	<b>13.64</b>	(dBm)
Max. output power including tune-up tolerance:	23.120648	(mW)
Duty cycle:	<b>99</b>	(%)
Maximum Pav :	22.889441	(mW)
Peak Antenna gain (Maximum):	<b>2.2</b>	(dBi)
Peak Antenna gain (linear):	1.6595869	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>2437</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.008	(mW/cm <sup>2</sup> )

**Measurement Result**

 The predicted power density level at 20 cm is 0.008 mW/cm<sup>2</sup>.

 This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 2437MHz.

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**Maximum Permissible Exposure (MPE) Evaluation (worst case)**

CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	10.26	10.62	1 Watt = 30
6	2437	1	<b>13.65</b>	23.17	1 Watt = 30
11	2462	1	10.13	10.30	1 Watt = 30

**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 tolerance:	<b>13.65</b>	(dBm)
Max. output power including tune-up tolerance:	23.173946	(mW)
Duty cycle:	<b>99</b>	(%)
Maximum Pav :	22.942207	(mW)
Peak Antenna gain (Maximum):	<b>2.2</b>	(dBi)
Peak Antenna gain (linear):	1.6595869	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>2437</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.008	(mW/cm <sup>2</sup> )

**Measurement Result**

 The predicted power density level at 20 cm is 0.008 mW/cm<sup>2</sup>.

 This is below the uncontrolled exposure limit of 1 mW/cm<sup>2</sup> at 2437MHz.

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**Maximum Permissible Exposure (MPE) Evaluation (worst case)**

CH	Frequency (MHz)	Data Rate	Avg. Output Power (dBm)	Avg. Output Power (mW)	Limit
1	2412	1	9.48	8.87	1 Watt = 30
6	2437	1	<b>12.34</b>	17.14	1 Watt = 30
11	2462	1	9.38	8.67	1 Watt = 30

**MPE Prediction (802.11n\_HT20 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:	12.34	(dBm)
Max. output power including tune-up tolerance:	17.139573	(mW)
Duty cycle:	99	(%)
Maximum Pav :	16.968177	(mW)
Peak Antenna gain (Maximum):	2.2	(dBi)
Peak Antenna gain (linear):	1.6595869	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2437	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	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 2437MHz.

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