

# 1 MAXIMUM PERMISSIBLE EXPOSURE (MPE)

## 14.1 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

### 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

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## 802.11a Max. Output Power

## 802.11a\_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	13.86	24.342	23.98	PASS
44	5220	6	<b>13.95</b>	24.851	23.98	PASS
48	5240	6	13.81	24.063	23.98	PASS

## MPE Prediction (802.11a 5150~5250MHz)

Average output power at antenna input terminal:	<b>13.95</b>	(dBm)
Average output power at antenna input terminal:	24.831331	(mW)
Duty cycle:	<b>93.25</b>	(%)
Maximum Pav :	23.155216	(mW)
Peak Antenna gain (Maximum):	<b>4.5</b>	(dBi)
Peak Antenna gain (linear):	2.8183829	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5220</b>	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm2)
Power density at predication frequency at 20 (cm) distance	0.013	(mW/cm2)

## Measurement Result

The predicted power density level at 20 cm is 0.013 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 5220MHz.

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## 802.11n\_HT20 Max. Output Power

### 802.11n\_HT20\_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	MCS0	12.88	19.406	23.98	PASS
44	5220	MCS0	<b>12.96</b>	19.767	23.98	PASS
48	5240	MCS0	12.83	19.184	23.98	PASS

## MPE Prediction (802.11n\_HT20 5150~5250MHz)

Average output power at antenna input terminal:	<b>12.96</b>	(dBm)
Average output power at antenna input terminal:	19.769696	(mW)
Duty cycle:	<b>92.91</b>	(%)
Maximum Pav :	18.368025	(mW)
Peak Antenna gain (Maximum):	<b>4.5</b>	(dBi)
Peak Antenna gain (linear):	2.8183829	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5220</b>	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm2)
Power density at predication frequency at 20 (cm) distance	0.010	(mW/cm2)

### Measurement Result

The predicted power density level at 20 cm is 0.01 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 5220MHz.

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## 802.11n\_HT40 Max. Output Power

### 802.11n\_HT40\_Main

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	MCS0	11.94	15.645	23.98	PASS
46	5230	MCS0	11.90	15.502	23.98	PASS

## MPE Prediction (802.11n\_HT40 5150~5250MHz)

Average output power at antenna input terminal:	11.94	(dBm)
Average output power at antenna input terminal:	15.631476	(mW)
Duty cycle:	86.82	(%)
Maximum Pav :	13.571248	(mW)
Peak Antenna gain (Maximum):	4.5	(dBi)
Peak Antenna gain (linear):	2.8183829	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5190	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm2)
Power density at predication frequency at 20 (cm) distance	0.008	(mW/cm2)

### Measurement Result

The predicted power density level at 20 cm is 0.008 mW/cm2.

This is below the uncontrolled exposure limit of 1 mW/cm2 at 5190MHz.

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