

## FCC 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 Permissible 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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## Maximum Permissible Exposure (MPE) Evaluation

### 802.11a Max. output power

#### 802.11a\_MIMO

CH	Frequency (MHz)	Data Rate	AVERAGE POWER (dBm)		TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1				
36	5180	MCS8	9.61	10.31	<b>12.98</b>	<b>19.881</b>	29.5	PASS
44	5220	MCS8	9.65	10.23	12.96	19.770	29.5	PASS
48	5240	MCS8	9.45	10.11	12.80	19.067	29.5	PASS
52	5260	MCS8	9.76	10.05	<b>12.92</b>	<b>19.578</b>	23.48 or $11+10\log(B) = 23.92$	PASS
60	5300	MCS8	9.21	9.98	12.62	18.291	23.48 or $11+10\log(B) = 23.95$	PASS
64	5320	MCS8	10.31	9.15	12.78	18.962	23.48 or $11+10\log(B) = 23.91$	PASS
100	5500	MCS8	8.45	11.03	<b>12.94</b>	<b>19.675</b>	22.77 or $11+10\log(B) = 23.97$	PASS
116	5580	MCS8	9.54	9.85	12.71	18.655	22.77 or $11+10\log(B) = 23.93$	PASS
140	5700	MCS8	9.11	10.53	12.89	19.445	22.77 or $11+10\log(B) = 23.95$	PASS
149	5745	MCS8	8.95	10.74	12.95	19.710	28.62	PASS
157	5785	MCS8	9.12	9.93	12.55	18.006	28.62	PASS
165	5825	MCS8	8.61	11.02	<b>12.99</b>	<b>19.908</b>	28.62	PASS

## MPE Prediction (802.11a 5150~5250)

MIMO gain=  $G+(10 \log N)= 3.49+3.01= 6.5\text{dB}$

Average output power at antenna input terminal:	<b>12.98</b>	(dBm)
Average output power at antenna input terminal:	19.860949	(mW)
Duty cycle:	<b>100</b>	(%)
Maximum Pav :	19.860949	(mW)
Peak Antenna gain (Maximum):	<b>6.5</b>	(dBi)
Peak Antenna gain (linear):	4.4668359	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	<b>5180</b>	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.018	(mW/cm <sup>2</sup> )
<b>Measurement Result</b>		
The predicted power density level at 20 cm is 0.018 mW/cm <sup>2</sup> .		
This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup> at 5180MHz.		

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## MPE Prediction (802.11a 5250~5350)

MIMO gain=  $G+(10 \log N)= 3.49+3.01= 6.5\text{dB}$

Average output power at antenna input terminal:	12.92	(dBm)
Average output power at antenna input terminal:	19.588447	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.588447	(mW)
Peak Antenna gain (Maximum):	6.5	(dBi)
Peak Antenna gain (linear):	4.4668359	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5260	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.017	(mW/cm <sup>2</sup> )
<b>Measurement Result</b>		
The predicted power density level at 20 cm is 0.017 mW/cm <sup>2</sup> .		
This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup> at 5260MHz.		

## MPE Prediction (802.11a 5470~5725)

MIMO gain=  $G+(10 \log N)= 4.2+3.01= 7.21\text{dB}$

Average output power at antenna input terminal:	12.94	(dBm)
Average output power at antenna input terminal:	19.678863	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.678863	(mW)
Peak Antenna gain (Maximum):	7.21	(dBi)
Peak Antenna gain (linear):	5.2601727	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5500	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm <sup>2</sup> )
Power density at predication frequency at 20 (cm)	0.021	(mW/cm <sup>2</sup> )
<b>Measurement Result</b>		
The predicted power density level at 20 cm is 0.021 mW/cm <sup>2</sup> .		
This is below the uncontrolled exposure limit of 1 mW/cm <sup>2</sup> at 5500MHz.		

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## MPE Prediction (802.11a 5725~5850)

MIMO gain=  $G+(10 \log N)= 4.37+3.01= 7.38\text{dB}$

Average output power at antenna input terminal:	12.99	(dBm)
Average output power at antenna input terminal:	19.906733	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.906733	(mW)
Peak Antenna gain (Maximum):	7.38	(dBi)
Peak Antenna gain (linear):	5.4701596	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5825	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.022	(mW/cm^2)
<b>Measurement Result</b>		
The predicted power density level at 20 cm is 0.022 mW/cm2.		
This is below the uncontrolled exposure limit of 1 mW/cm2 at 5825MHz.		

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