

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 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

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	12.98	19.881	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	12.92	19.578	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	12.94	19.675	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	12.99	19.908	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:	12.98	(dBm)
Average output power at antenna input terminal:	19.860949	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.860949	(mW)
Peak Antenna gain (Maximum):	6.5	(dBi)
Peak Antenna gain (linear):	4.4668359	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5180	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.018	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.018 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² 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 ²)
Power density at predication frequency at 20 (cm)	0.017	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.017 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² 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 ²)
Power density at predication frequency at 20 (cm)	0.021	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.021 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² 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/cm ²)
Power density at predication frequency at 20 (cm)	0.022	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.022 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5825MHz.		

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