

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 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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802.11a Max. Output Power

802.11a_Aux1

CH	Frequency (MHz)	Data Rate	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	6	13.97	24.931	23.98	PASS
44	5220	6	13.99	25.046	23.98	PASS
48	5240	6	14.00	25.104	23.98	PASS

MPE Prediction (802.11a 5180~5240MHz)

Average output power at antenna input terminal:	14.00	(dBm)
Average output power at antenna input terminal:	25.118864	(mW)
Duty cycle:	93.38	(%)
Maximum Pav :	23.455995	(mW)
Peak Antenna gain (Maximum):	4.9	(dBi)
Peak Antenna gain (linear):	3.0902954	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5240	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at prediction frequency at 20 cm distance:	0.014	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.014 mW/cm².

This is below the uncontrolled exposure limit of 1 mW/cm² at 5240MHz.

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802.11n_HT20 Max. Output Power

802.11n_HT20_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1			
36	5180	MCS8	11.88	10.46	14.56	28.32779307	PASS
44	5220	MCS8	12.04	10.68	14.74	28.32779307	PASS
48	5240	MCS8	11.92	10.58	14.63	28.32779307	PASS

MPE Prediction (802.11n_HT20 5180~5240MHz)

Average output power at antenna input terminal:	14.74	(dBm)
Average output power at antenna input terminal:	29.785164	(mW)
Duty cycle:	92.96	(%)
Maximum Pav :	27.688289	(mW)
Peak Antenna gain (Maximum):	4.9	(dBi)
Peak Antenna gain (linear):	3.0902954	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5220	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at prediction frequency at 20 cm distance:	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 5220MHz.

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802.11n_HT40 Max. Output Power

802.11n_HT40_MIMO

CH	Frequency (MHz)	Data Rate	Avg. POWER (dBm)		TOTAL POWER (dBm)	REQUIRED LIMIT (dBm)	RESULT
			CH 0	CH 1			
38	5190	MCS8	11.58	10.21	14.58	22.30779307	PASS
46	5230	MCS8	11.49	10.2	14.52	22.30779307	PASS

MPE Prediction (802.11n_HT40 5190~5230MHz)

Average output power at antenna input terminal:	14.58	(dBm)
Average output power at antenna input terminal:	28.707806	(mW)
Duty cycle:	86.76	(%)
Maximum Pav :	24.906892	(mW)
Peak Antenna gain (Maximum):	4.9	(dBi)
Peak Antenna gain (linear):	3.0902954	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5190	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance:	0.015	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.015 mW/cm².

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

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