

15. MAXIMUM PERMISSIBLE EXPOSURE (MPE)

15.1 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 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

Please be noted that 2.4G antenna will not transmit together with 5G antenna.

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802.11a Max. Output Power

802.11a_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	16.45	44.157	23.98	PASS
44	5220	16.50	44.668	23.98	PASS
48	5240	16.70	46.774	23.98	PASS

MPE Prediction (802.11a 5150~5250)

Average output power at antenna input terminal:	16.70	(dBm)
Average output power at antenna input terminal:	46.773514	(mW)
Duty cycle:	100	(%)
Maximum Pav :	46.773514	(mW)
Peak Antenna gain (Maximum):	2.76	(dBi)
Peak Antenna gain (linear):	1.8879913	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5240	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
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/cm2.		
This is below the uncontrolled exposure limit of 1 mW/cm2 at 5240MHz.		

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802.11n_HT20M Max. Output Power

802.11n_HT20_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
36	5180	16.15	41.210	23.98	PASS
44	5220	16.40	43.652	23.98	PASS
48	5240	16.60	45.709	23.98	PASS

MPE Prediction (802.11n_HT20 5150~5250)

Average output power at antenna input terminal:	16.60	(dBm)
Average output power at antenna input terminal:	45.708819	(mW)
Duty cycle:	100	(%)
Maximum Pav :	45.708819	(mW)
Peak Antenna gain (Maximum):	2.76	(dBi)
Peak Antenna gain (linear):	1.8879913	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5240	(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/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5240MHz.		

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802.11n_HT40M Max. Output Power

802.11n_HT40_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
38	5190	10.75	11.885	23.98	PASS
46	5230	12.90	19.498	23.98	PASS

MPE Prediction (802.11n_HT40 5150~5250)

Average output power at antenna input terminal:	12.90	(dBm)
Average output power at antenna input terminal:	19.498446	(mW)
Duty cycle:	100	(%)
Maximum Pav :	19.498446	(mW)
Peak Antenna gain (Maximum):	2.76	(dBi)
Peak Antenna gain (linear):	1.8879913	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5230	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.007	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.007 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5230MHz.		

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802.11ac VHT80M Max. Output Power

802.11ac_VHT80_Main

CH	Frequency (MHz)	TOTAL POWER (dBm)	TOTAL POWER (mW)	REQUIRED LIMIT (dBm)	RESULT
42	5210	8.10	6.457	23.98	PASS

MPE Prediction (802.11ac_VHT80 5150~5250)

Average output power at antenna input terminal:	8.10	(dBm)
Average output power at antenna input terminal:	6.4565423	(mW)
Duty cycle:	100	(%)
Maximum Pav :	6.4565423	(mW)
Peak Antenna gain (Maximum):	2.76	(dBi)
Peak Antenna gain (linear):	1.8879913	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5210	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.002	(mW/cm ²)
Measurement Result		
The predicted power density level at 20 cm is 0.002 mW/cm ² .		
This is below the uncontrolled exposure limit of 1 mW/cm ² at 5210MHz.		

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