

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

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Maximum Permissible Exposure (MPE) Evaluation

802.11a operation Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5180	17.12	17.12	0.05152	0.85
5220	16.91	16.91	0.04909	0.85
5240	17.02	17.02	0.05035	0.85

MPE Prediction (802.11a 5150~5250)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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

Maximum peak output power at antenna input terminal:	17.12	(dBm)
Maximum peak output power at antenna input terminal:	51.52286446	(mW)
Duty cycle:	96.94	(%)
Maximum Pav :	49.94626481	(mW)
Antenna gain (typical):	6.69	(dBi)
Maximum antenna gain:	4.666593803	(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)	0.0463931	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.04639mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5180MHz.

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802.11n HT20 MIMO operation (CH 0 + CH 1) Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5180	18.02	18.02	0.06339	0.43
5220	18.06	18.06	0.06397	0.43
5240	18.04	18.04	0.06368	0.43

MPE Prediction (802.11n_HT20 5150~5250)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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

Maximum peak output power at antenna input terminal:	18.06	(dBm)
Maximum peak output power at antenna input terminal:	63.97348355	(mW)
Duty cycle:	93.62	(%)
Maximum Pav :	59.8919753	(mW)
Antenna gain (typical):	6.69	(dBi)
Maximum antenna gain:	4.666593803	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5220	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0556313	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.05563mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5220MHz.

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802.11n HT40 MIMO operation (CH 0 + CH 1) Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5190	17.92	17.92	0.06194	0.43
5230	17.79	17.79	0.06012	0.43

MPE Prediction (802.11n_HT40 5150~5250)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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

Maximum peak output power at antenna input terminal:	17.92	(dBm)
Maximum peak output power at antenna input terminal:	61.94410751	(mW)
Duty cycle:	91.01	(%)
Maximum Pav :	56.37533224	(mW)
Antenna gain (typical):	6.69	(dBi)
Maximum antenna gain:	4.666593803	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5190	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0523648	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.05236mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5190MHz.

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802.11a operation Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5745	11.89	11.89	0.01545	0.66
5785	12.33	12.33	0.01710	0.66
5825	12.68	12.68	0.01854	0.66

MPE Prediction (802.11a 5725~5850)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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

Maximum peak output power at antenna input terminal:	12.68	(dBm)
Maximum peak output power at antenna input terminal:	18.53531623	(mW)
Duty cycle:	96.94	(%)
Maximum Pav :	17.96813556	(mW)
Antenna gain (typical):	7.8	(dBi)
Maximum antenna gain:	6.025595861	(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)	0.0215503	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.02155mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5825MHz.

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802.11n HT20 MIMO operation (CH 0 + CH 1) Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5745	18.29	18.29	0.06745	0.33
5785	17.87	17.87	0.06124	0.33
5825	17.90	17.90	0.06166	0.33

MPE Prediction (802.11n_HT20 5725~5850)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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

Maximum peak output power at antenna input terminal:	18.29	(dBm)
Maximum peak output power at antenna input terminal:	67.45280277	(mW)
Duty cycle:	93.62	(%)
Maximum Pav :	63.14931395	(mW)
Antenna gain (typical):	7.8	(dBi)
Maximum antenna gain:	6.025595861	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5745	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0757389	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.07574mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5745MHz.

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802.11n HT40 MIMO operation (CH 0 + CH 1) Power Table

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
5755	17.05	17.05	0.05070	0.33
5795	17.79	17.79	0.06012	0.33

MPE Prediction (802.11n_HT40 5755~5795)

Prediction of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4 R^2$$

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

Maximum peak output power at antenna input terminal:	17.79	(dBm)
Maximum peak output power at antenna input terminal:	60.11737375	(mW)
Duty cycle:	91.01	(%)
Maximum Pav :	54.71282185	(mW)
Antenna gain (typical):	7.8	(dBi)
Maximum antenna gain:	6.025595861	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5795	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0656205	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.06562mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5795MHz.

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