

1. 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 §2.1091 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

Maximum Permissible Exposure (MPE) Evaluation

2.4GHz mode:

The worst case: refer to FCC test report for detail measurement date.

Power measurement:

Channel		Output Chain (dBm)		Combined Output Power (dBm)	Limit(dBm)
		Chain 1	chain 2		
802.11n HT20	Low	24.31	25.39	27.89	30.00
	Mid	24.15	24.55	27.36	30.00
	High	24.54	24.78	27.67	30.00

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

Maximum output power at antenna input terminal:	27.89	(dBm)
Maximum output power at antenna input terminal:	615.1768727	(mW)
Tune-Up power Tolerance:	1	dB
Duty cycle:	100	(%)
Maximum Pav :	774.4617978	(mW)
Antenna gain (typical):	2.9	(dBi)
Maximum antenna gain:	1.9498446	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.3005733	(mW/cm ²)

Measurement Result:

The predicted power density level at 20 cm is 0.3005733 mW/cm².. This is below the uncontrolled exposure limit of 1 mW/cm².

5150MHz – 5250MHz Mode:

The worst case of Average power a mode: refer to FCC test report for detail measurement date.

Power measurement:

2*2

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)
		chain 0	chain 1		
802.11n HT20	5180	17.95	18.01	20.99	30
	5200	17.65	18.12	20.90	30
	5240	17.99	17.99	21.00	30

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

Maximum output power at antenna input terminal:	21	(dBm)
Maximum output power at antenna input terminal:	125.8925412	(mW)
Tune-Up power Tolerance:	1	(dB)
Duty cycle:	100	(%)
Maximum Pav :	158.4893192	(mW)
Antenna gain (typical):	3.04	(dBi)
Maximum antenna gain:	2.01372425	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0635258	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0635258mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm².

5725MHz – 5850MHz Mode:

The worst case of Average power a mode: refer to FCC test report for detail measurement date.

Power measurement:

2*2

Mode	Freq(MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)
		chain 0	chain 1		
	5745	17.59	18.12	20.87	30
	5785	17.98	18.03	21.02	30
	5825	17.75	18.13	20.95	30

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

Maximum output power at antenna input terminal:	21.02	(dBm)
Maximum output power at antenna input terminal:	126.4736347	(mW)
Tune-Up power Tolerance:	1	(dB)
Duty cycle:	100	(%)
Maximum Pav :	159.2208727	(mW)
Antenna gain (typical):	3.04	(dBi)
Maximum antenna gain:	2.01372425	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm^2)
Power density at predication frequency at 20 (cm)	0.0638191	(mW/cm^2)

Measurement Result

The predicted power density level at 20 cm is 0.0638191mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm².

Simultaneous transmission mode

2.4GHz mode + (5150MHz – 5250MHz) Mode:

Prediction frequency:	2.4	(GHz)
Power density at predication frequency at 20 (cm)	0.3005733	(mW/cm ²)

Prediction frequency:	5	(GHz)
Power density at predication frequency at 20 (cm)	0.0635258	(mW/cm ²)
2.4GHz + 5GHz Power density at predication frequency at 20 (cm) distance	0.3640991	(mW/cm ²)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)

The predicted power density level at 20 cm is 0.3640991mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm².

Simultaneous transmission mode

2.4GHz mode + (5725MHz – 5850MHz) Mode:

Prediction frequency:	2.4	(GHz)
Power density at predication frequency at 20 (cm)	0.3005733	(mW/cm ²)

Prediction frequency:	5	(GHz)
Power density at predication frequency at 20 (cm)	0.0638191	(mW/cm ²)
2.4GHz + 5GHz Power density at predication frequency at 20 (cm) distance	0.3643924	(mW/cm ²)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)

The predicted power density level at 20 cm is 0.3643924mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm².

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