

ID: AHLALP

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

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Maximum Permissible Exposure (MPE) Evaluation

2.4GHz mode:

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

Power measurement:

802.11b

Cable loss = 0		Output Power		Limit (dBm)
CH	Frequency (MHz)	Detector		
		PK (dBm)	AV (dBm)	
1	2412	14.98	12.47	30
6	2437	14.83	12.32	
11	2462	14.79	12.34	

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 peak output power at antenna input terminal:	12.47	(dBm)
Maximum peak output power at antenna input terminal:	17.66037821	(mW)
Duty cycle:	100	(%)
Maximum Pav :	17.66037821	(mW)
Antenna gain (typical):	5.65	(dBi)
Maximum antenna gain:	3.672823005	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	2412	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0129107	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0129 mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 2412MHz.

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5150MHz – 5250MHz Mode:

The worst case of Average power N HT20 mode: refer to FCC test report for detail measurement date.

Power measurement:

3*3 MIMO

Mode	Freq(MHz)	channel	Output Chain (dBm)			Combine Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B	Chain C			
N HT20	5180	36	6.53	6.77	6.41	11.34	16.98	Pass
	5200	40	6.46	6.57	6.3	11.22	16.98	Pass
	5240	48	6.73	6.56	6.41	11.34	16.98	Pass

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 peak output power at antenna input terminal:	11.34	(dBm)
Maximum peak output power at antenna input terminal:	13.61444682	(mW)
Duty cycle:	100	(%)
Maximum Pav :	13.61444682	(mW)
Antenna gain (typical):	5.83	(dBi)
Maximum antenna gain:	3.828247433	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5180	(MHz)
MPE limit for uncontrolled exposure at prediction frequency:	1	(mW/cm ²)
Power density at predication frequency at 20 (cm) distance	0.0103741	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0104mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5180MHz.

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5725MHz – 5850MHz Mode:

The worst case of Average power N HT40 mode: refer to FCC test report for detail measurement date.

Power measurement:

3*3 MIMO

Mode	Freq(MHz)	channel	Output Chain (dBm)			Combine Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B	Chain C			
N HT40	5755	151	6.72	6.74	6.55	11.44	30	
	5775	155	6.6	6.35	6.59	11.29	30	Pass
	5815	163	6.62	6.44	6.56	11.31	30	Pass

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 peak output power at antenna input terminal:	11.44	(dBm)
Maximum peak output power at antenna input terminal:	13.93156803	(mW)
Duty cycle:	100	(%)
Maximum Pav :	13.93156803	(mW)
Antenna gain (typical):	5.83	(dBi)
Maximum antenna gain:	3.828247433	(numeric)
Prediction distance:	20	(cm)
Prediction frequency:	5755	(MHz)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm ²)
Power density at predication frequency at 20 (cm)	0.0106157	(mW/cm ²)

Measurement Result

The predicted power density level at 20 cm is 0.0106mW/cm². This is below the uncontrolled exposure limit of 1 mW/cm² at 5755MHz.

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Zigbee and Z-Wave mode: both of Zigbee and Z-wave meet FCC 15.249 requirement, the MPE and SAR is not required.