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.

FCC: 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: The worst case of Average power

2.4GHz mode:

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

Power measurement:

Channel		Frequency (MHz)	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B			
AN HT20	1	2412	16.21	16.72	19.48	30	Pass
	6	2437	16.13	16.64	19.40	30	Pass
	11	2462	15.99	16.15	19.08	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 output power at antenna input terminal:	19.48	(dBm)
Maximum output power at antenna input terminal:	88.7156012	(mW)
Tune-Up power Tolerance:	2	dB
Duty cycle:	100	(%)
Maximum Pav :	140.6047524	(mW)
Antenna gain (typical):	3.5	(dBi)
Maximum antenna gain:	2.238721139	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.06265	(mW/cm^2)

Measurement Result:

The worst power density is 0.06265 mW/cm^2 which is less than 1 mW/cm^2.

5150MHz – 5250MHz Mode:

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

Power measurement:

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
			chain A	chain B			
N HT20	5180	36	16.11	16.29	19.21	30	Pass
	5200	40	15.82	16.88	19.39	30	Pass
	5240	48	17.45	17.01	20.25	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 output power at antenna input terminal:	20.25	(dBm)
Maximum output power at antenna input terminal:	105.9253725	(mW)
Tune-Up power Tolerance:	2	dB
Duty cycle:	100	(%)
Maximum Pav :	167.8804018	(mW)
Antenna gain (typical):	4.5	(dBi)
Maximum antenna gain:	2.818382931	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.09418	(mW/cm^2)

Measurement Result:

The worst power density is 0.09418 mW/cm^2 which is less than 1 mW/cm^2.

5725MHz – 5850MHz Mode:

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

Power measurement:

Mode	Freq(MHz)	channel	Output Chain (dBm)		Combine Output Power (dBm)	Limit(dBm)	Result
			Chain A	chain B			
N HT20	5745	149	16.35	17.25	19.83	30	Pass
	5785	157	16.19	17.22	19.75	30	Pass
	5825	165	16.17	16.58	19.39	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 output power at antenna input terminal:	19.83	(dBm)
Maximum output power at antenna input terminal:	96.16122784	(mW)
Tune-Up power Tolerance:	2	dB
Duty cycle:	100	(%)
Maximum Pav :	152.4052754	(mW)
Antenna gain (typical):	4.5	(dBi)
Maximum antenna gain:	2.818382931	(numeric)
Prediction distance:	20	(cm)
MPE limit for uncontrolled exposure at prediction	1	(mW/cm2)
Power density at predication frequency at 20 (cm)	0.08550	(mW/cm^2)

Measurement Result:

The worst power density is 0.0855 mW/cm^2 which is less than 1 mW/cm^2.

Simultaneous transmissions:

2.4GHz + 5150MHz-5250MHz mode:

0.06265 + 0.09418 = 0.15683 mW/cm^2.

2.4GHz + 5725MHz-5850MHz mode:

0.06265+0.0855 = 0.14815 mW/cm^2.

The predicted power density level at 20 cm is 0.15683mW/cm^2. This is below the uncontrolled exposure limit of 1 mW/cm^2.

~ end ~